

SOIL SURVEY OF TANGIPAHOA PARISH, LOUISIANA.

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LOCATION AND BOUNDARIES OF THE AREA.

Tangipahoa Parish has an area of 504,064 acres or approximately 788 square miles, and is situated in that eastern projection of the State of Louisiana which lies to the south of Mississippi. It is included within parallels $30^{\circ} 16'$ and 31° north latitude and $90^{\circ} 15'$ and $90^{\circ} 34'$ west longitude.

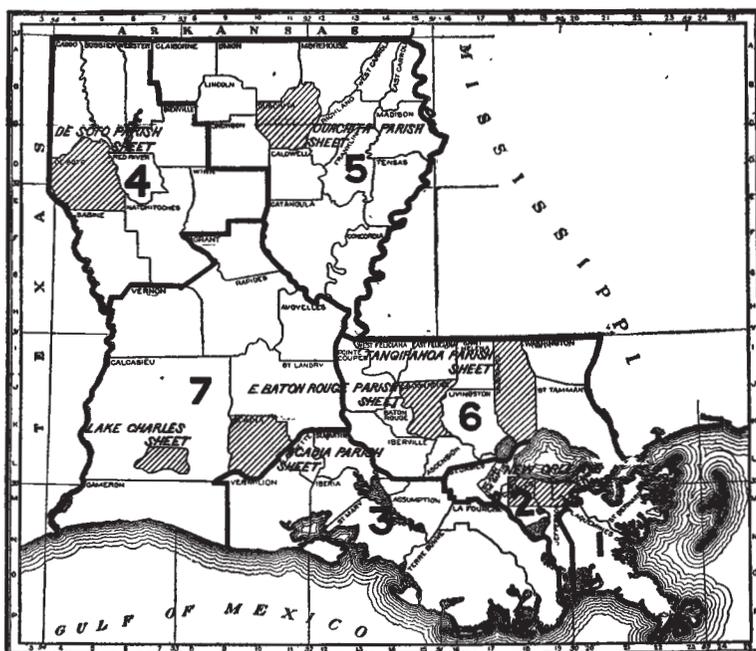


FIG. 20.—Sketch map showing location of the Tangipahoa Parish area, Louisiana.

The parish has a general long rectangular outline, and extends from the Mississippi-Louisiana line on the north to Pass Manchac and Lakes Pontchartrain and Maurepas on the south, a distance of 49 miles. On the east it is bounded by the parishes of Washington and St. Tammany and on the west by Livingston and St. Helena. Its

width is 19 miles, except on both the north and south ends, where it is narrowed to 13 miles by reason of the boundaries following waterways. Hammond, with a population of about 2,500, is the largest town in the parish, and Amite is the parish seat.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Tangipahoa Parish, formerly included in the parishes adjoining it on the west and east, was not organized as a separate parish until 1871. The settlement of the larger part of the territory included in the parish has been slow and much of the parish still remains in practically a virgin state. A few settlements had been made prior to 1800 and a considerable number were established about 1812. During the Spanish regime many grants of land were made to favored citizens along the principal streams of the parish. These are recognized to-day in the form of "head rights" or irregularly shaped sections.

Ten miles of impassable swamp separated the parish from the navigable waters along its southern boundary, and water communication was had with New Orleans via Springfield or Madisonville, which are situated on tide-water streams just outside the parish to the west and east, respectively. The earlier exports consisted almost entirely of lumber, staves, tar, and other forest products. The upper part of the parish produced very small quantities of cotton, rice, cane sirup, and tobacco for home consumption only. In 1854 the New Orleans, Jackson, and Great Northern Railroad, now the Illinois Central, was run through the present parish, and this had the effect of developing the contiguous country to some extent. Before and after the civil war large herds of cattle roamed the woods and fattened upon the native grasses. For winter pasture they were driven westward toward the Mississippi and grazed in the canebrakes until spring. During this period the lands, and indeed the timber as well, were considered almost worthless, so that large areas were sold for taxes. Later, and until about 1885, lumbering in various forms was almost the sole industry of the parish, and this is yet extremely important. Large sawmills are located at Kentwood, Genesee, Natalbany, and Hammond, and since 1895 the timber has been rapidly cut. The trucking industry was started about fifteen years ago and the dairying about 1899.

As a whole, the population of the parish is native-born, but at Hammond, Roseland, and other points along the railroad are found many people from Iowa, Michigan, and Illinois. These began to arrive about 1888 and have been active in promoting the trucking and dairying interests. Immigrants from Italy form a larger part of the population in the vicinity of Independence. They are chiefly engaged in strawberry growing, are hard-working and thrifty, and

are making good citizens. Many tracts of land, considered worthless for agricultural purposes, have been ditched and drained by them and are giving good results.

CLIMATE.

Reaching northward as it does for a distance of nearly 50 miles from Lake Pontchartrain, an extension of the Gulf of Mexico, and rising from sea level to an elevation of some 300 feet, the parish at its extremes necessarily presents considerable climatic differences. There are Weather Bureau stations located at Hammond and Amite. These towns are 15 miles apart and have a difference in elevation of 71 feet, the latter being the highest. The following table gives the normal monthly and annual precipitation and temperature at these two points:

Normal monthly and annual temperature and precipitation.

Month.	Amite.		Hammond.		Month.	Amite.		Hammond.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	° F.	Inches.	° F.	Inches.		° F.	Inches.	° F.	Inches.
January.....	51.7	6.01	53.4	4.66	August.....	80.8	7.26	81.2	6.88
February....	53.6	6.06	53.1	5.16	September...	77.2	3.09	77.2	3.74
March.....	61.6	5.36	61.8	5.12	October.....	66.9	2.00	67.0	2.74
April.....	67.8	5.01	68.5	5.09	November....	58.7	4.15	57.4	3.93
May.....	74.2	3.42	74.3	3.19	December....	52.1	4.16	53.1	4.22
June.....	79.6	6.37	79.8	6.42	Year.....		60.41	67.4	58.13
July.....		6.92	81.6	6.38					

The Hammond records are representative of the pine flats. Those from Amite more nearly represent the conditions in the northern portion of the parish; but since the elevation of the station is considerably less than the greater part of the rolling country, it is likely that the latter figures do not show the extreme of difference between the two sections of the parish.

As will be observed from the table, the temperature in the southern portion is slightly higher than that in the northern. Moreover, the range of temperature in the latter part is greater than that in the former. The low elevation and proximity of the pine flats to the lake waters also have a tempering effect upon the winter climate. The summers are long and hot, and the higher temperatures range from 96 to 103°, but the periods of excessive heat are not of long duration. A southeastern breeze usually springs up after nightfall and gives relief from the heat of the day.

During the last eight years the average dates of last and first killing frosts at the two stations are as follows: Last in spring, March 16 at Amite, March 2 at Hammond; first in fall, November 9 at Amite, November 11 at Hammond.

Thus it will be seen that while the average growing season for the parish is about eight and one-half months, there is a difference of two weeks in its length between the pine hills and the flats. The winter temperature seldom goes below 12° F., and farm work can be carried on during all months of the year. Plowing for general farming usually begins the latter part of February and for special crops much earlier. Snow does not fall more than once in every three or four years.

The rainfall for the area is very copious and well distributed throughout the year, and except in the case of some fall truck crops, agriculture is likely to suffer more from an excess of moisture than from drought. The rainfall in the hills is somewhat greater than that in the flat lands. The greatest precipitation occurs during the three summer months, and is followed by a dry fall, with heavy, almost tropical, rains again in January, February, and March.

The prevailing winds during the spring and summer months are from some quarter of the South. High winds are likely to occur during March and April, and an occasional hurricane from the southwest destroys considerable timber and does other damage along its path.

Though the air is moisture-laden at all times and abrupt changes in temperature are frequent during the winter, the climate of the pine flats has proved to be beneficial to persons suffering from asthmatic and other pulmonary troubles, and Hammond has reputed as a health and winter resort.

The general healthfulness of the area is excellent. Some malaria is experienced along the margin of the lake swamp, but the parish as a whole is free from it. This is no doubt due largely to the excellent water supply in both the hills and the pine flats. In the lower parts of the parish mosquitoes are common during certain seasons.

PHYSIOGRAPHY AND GEOLOGY.

The area consists of three physiographic divisions—a zone of flat swampy country fronting on Lakes Pontchartrain and Maurepas, the pine flats lying just to the north, and the pine hills extending north to the parish boundary. The Tangipahoa River, which enters the area on the north, flows southward through all of these divisions and empties into Lake Pontchartrain near the southeastern corner of the parish. All of the waters of the area eventually reach this lake either through the Tangipahoa or through other smaller rivers and streams. The division first mentioned has an altitude of 10 feet and occupies about 15 per cent of the entire area of the parish. It is composed entirely of cypress and gum swamps, with the exception of a small area of treeless marsh. The soils are always peaty and mucky, except in places along the shores of Lake Pontchartrain

and the larger water courses, where natural levees of more earthy material have been built up.

The pine flats division of the area, which, as stated, lies just north of the division just described, is usually marked at their contact by an abrupt rise of from 5 to 15 feet, though east of the Tangipahoa River the change is more gradual. These flats occupy about 25 per cent of the whole area of the parish and have an altitude ranging from 15 to 100 feet, being characterized by their extensive broad, flat, poorly drained areas and the ashy appearance of the soil when dry. In a northerly direction there is an imperceptible but gradual rise of about 5 feet per mile, while in an east and west direction the surface is practically level, except where it is dissected by shallow water courses. The larger water courses have almost vertical banks and flow through meandering channels, with the surface of the country rising but little above them. The smaller streams have almost no banks at all, and many of them are mere swamplike depressions which serve as avenues of drainage after the heavy rains common to the region. There is, however, usually sufficient fall in some direction to insure fair drainage, provided artificial means are used.

The pine hills division of the area occupies the whole northern part of the parish and is separated from the pine flats by an irregular line running in a southeast-northwest direction. It comprises about 60 per cent of the whole area and has an altitude ranging from about 100 feet where it borders the pine flats to nearly 300 feet at the State line. Its low hills rise rather abruptly out of the pine flats and northward develop gradually into a more rolling and dissected country. In a northerly direction the gradual rise per mile is but little greater than in the pine flats region, but in an east and west direction the surface of the country is cut by stream courses running southward. The stream valleys are from 10 to 60 feet deep, but the hills may usually be referred to the same general level.

The zone of flat country referred to the first physiographic division consists of the geologic formation known as the Alluvium, which is the most recent in Louisiana, being still, though slowly, in process of building. The surface of both the pine flats and pine hills divisions consists of the Port Hudson of Quaternary age, beneath which occurs the Lafayette. The deeper stream courses, wider valleys, and more hilly, rolling character of the pine hills were developed before the Port Hudson deposits were laid down as a veneer upon the Lafayette. In the northern part of the parish, where this veneer is thin, it has been eroded from most of the hillsides, thus exposing the red Lafayette, which weathers into a more productive soil than that derived from the Port Hudson formation. The differences in the soils of these divisions are thus due to differences

in the drainage conditions. The soils in each case are characterized by their fine sandy and silty nature.

From Pass Manchac northward as far as Natalbany flowing artesian wells from 200 to 350 feet deep furnish an unlimited supply of pure water, while in the rolling country bored wells from 25 to 70 feet deep are used. The clays of the Port Hudson formation are utilized at many points along the railroad for making bricks. There are several small mills and gins run by the water power of the larger creeks and it is thought there are a few locations along the Tangipahoa River where power might be developed for manufacturing purposes. The rock outcrops in the area are very limited and consist of a few patches of a coarse ferruginous sandstone.

SOILS.

The soils of Tangipahoa Parish, notwithstanding the simplicity of the superficial geology, are varied in character, and ten distinct types were established by the survey. The distribution of these soils is shown by color in the accompanying map. Their several areas are stated in the following table:

Areas of different soils.

Soil.	Acres.	Percent.	Soil.	Acres.	Per cent
Monroe silt loam.....	196,864	39.0	Yazoo clay.....	8,896	1.8
Orangeburg fine sandy loam.	84,672	16.9	Amite sandy loam.....	7,232	1.3
Hammond silt loam.....	70,976	14.1	Marsh.....	3,072	.6
Peat.....	59,200	11.7	Norfolk sand.....	896	.2
Meadow.....	55,936	11.1			
Amite loam.....	16,320	3.3	Total.....	504,064

AMITE SANDY LOAM.

The soil of the Amite sandy loam varies from a brown or reddish-brown sandy loam to a loamy sand of the same color, and has an average depth of about 8 inches. The subsoil varies from a heavy red sandy loam to a sandy clay. At a distance of 4 or 5 feet below the surface the color occasionally becomes yellowish, and at distances ranging from 12 to 20 feet below the surface there is usually a thick stratum of well-rounded gravel.

The Amite sandy loam occurs principally in the valley of the Tangipahoa River and is especially well developed in the vicinity of Amite, along the divide between the river and the back swamp. It is also found in patches associated with smaller streams in other parts of the parish.

This type is sometimes spoken of as "second bottom" or "hammock lands," and usually its surface features are very gently rolling.

There is generally not more than 6 or 8 feet difference in the elevation of different parts of the fields. It is rarely subject to overflow, and owing to its gently rolling surface and the character of both soil and subsoil, the rains either run off freely or are quickly absorbed. In dry weather the subsoil moisture rises easily to supply the growing crops. For the above reason it is one of the most desirable types in the area for both general farming and trucking, and its importance as a soil type is limited only by the comparatively small area which it occupies. Most of it is under cultivation.

The type is sedimentary in origin, having been formed when the present channels were occupied by larger and swifter streams. The presence of the coarse gravel substratum is evidence of this. It was a deposit along the edge of these ancient valleys. In the vicinity of Amite, along the divide between the river and the back swamp, it was formed when the high waters of the river ran over into the swamp.

The Amite sandy loam is especially well adapted to sweet and Irish potatoes and sugar cane. The average yield of corn when well cared for is about 35 bushels per acre. Cotton will average three-fourths bale per acre and sometimes more. Oats will yield from 40 to 60 bushels per acre. The soil is also a very desirable type for strawberries, cabbage, radishes, cucumbers, lettuce, beans, and other small trucking crops. Its price ranges from \$20 to \$60 an acre.

The following table gives the average results of mechanical analyses of typical samples of the soil and subsoil of the Amite sandy loam:

Mechanical analyses of Amite sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12414, 13083.....	Soil.....	0.1	3.7	12.1	33.3	10.8	30.7	9.0
12415, 13084.....	Subsoil.....	.1	2.6	8.3	25.0	7.6	34.8	21.3

MONROE SILT LOAM.

The most extensive and important soil type found in Tangipahoa Parish is the Monroe silt loam. It consists of a silty or fine sandy loam, with an average depth of 12 inches. The first 3 or 4 inches is gray or brown in color, changing at that depth to a yellowish or a lemon-yellow color. Between 12 and 18 inches from the surface the material grades into a heavy yellow silt loam or silty clay subsoil, which continues to a depth of 36 inches. This occasionally has an orange color, and is frequently mottled with red, brown, or drab. Sometimes at from 30 to 36 inches a somewhat lighter, friable silt with less clay is found. Small quantities of iron concretions occur in a few localities.

The Monroe silt loam covers the greater part of the northern half of the parish and is also found in a great many small areas in the southern part, where it occurs as slight elevations in the pine flats and as strips along nearly all the stream courses. These latter areas are from one-eighth to one-half mile in width, which varies according to the size of the stream.

The topography of the main body of the Monroe silt loam is influenced by the extent to which the country had been eroded before its submergence and the deposition of the Port Hudson formation. In general, the surface is gently rolling, though nearly flat areas occur along the tops of a few of the watersheds. The extreme northern portion of the parish is somewhat more rugged than farther south, since in the former the ancient stream valleys had been cut deeper. This, however, has little effect upon the topography of the Monroe silt loam, since the steeper slopes are usually covered with another type of soil—the Orangeburg fine sandy loam.

Owing to the rolling character of the type, the Monroe silt loam possesses good natural drainage. On the other hand, the character of the soil and subsoil is such that in dry weather the type retains moisture well. In derivation it may be traced to the Port Hudson of the Quaternary period, which was an offshore deposit of material from northern regions when the country was at a much lower level and the sea extended inland many miles beyond its present limits. Since the region was elevated water has removed many of the finer particles from the top soil, thus leaving it with its fine sandy or silty character. Weathering and plant growth have contributed toward making the soil as we find it to-day.

As a rule, the pine flat areas have a slightly heavier and more mottled subsoil than the main body of the type. They are usually distinguished from the Hammond silt loam by a growth of black-jack oak and dogwood in addition to the pine. A somewhat sandier soil occurs in some of the areas and is deserving of mention not only because of its character, but also because it is in demand both as a trucking soil and for general farming. The material composing these lowland areas and their method of formation are similar to those of the surrounding Hammond silt loam. The difference in texture is due entirely to the better drainage conditions existing on the elevations and near the streams.

The older settlements of the country were not made upon the Monroe silt loam, because it was not considered well adapted to any crop. It has been highly esteemed for its valuable longleaf pine timber, but its real value for agricultural purposes has not been duly appreciated. It is only within the last few years, since the timber has been so largely removed and the agricultural population of the region has increased, that any considerable areas of this soil have been under

cultivation. Eventually the main agricultural development of the parish must take place upon this soil, because of its areal importance. It is true that the type is not naturally a productive soil. The brown top soil seldom exceeds 4 inches in depth, and the organic-matter content is low. Its special value lies in the fact of its possibilities when brought to a state of productivity by fertilization and rotation of crops, combined with careful management. Its location is excellent, thus insuring good drainage; it responds readily to fertilization and holds moisture well during the summer, while its fine sand content makes it an easy soil to work. With these advantages it is well adapted either to truck growing or to general farming, and in this respect is far superior to the Hammond silt loam. At the present time it is used for all of the general crops of the region, besides such special crops as strawberries, cabbage, radishes, lettuce, tomatoes, and other trucking crops. With ordinary care and attention cotton will average about one-half bale per acre. Corn will average about 20 bushels per acre, although as much as 50 bushels per acre is sometimes grown after some highly fertilized truck crop. There is a moderate acreage in oats and satisfactory yields are secured, but the grain is not thrashed, being fed in the sheaf. Trucking is becoming a very profitable industry, and the profits from a single acre are sometimes \$200 to \$300 or more, depending upon the season, the market, and the care and attention given to the crops. The price of the unimproved land varies from \$5 to \$10 an acre, according to its distance from the railroad.

The following table gives the average results of mechanical analyses of samples of the Monroe silt loam:

Mechanical analyses of Monroe silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
11897, 11899.....	Soil.....	1.2	2.1	1.8	12.8	7.9	57.3	16.5
11898, 11900.....	Subsoil.....	.4	1.3	1.2	9.3	7.1	52.8	27.4

ORANGEBURG FINE SANDY LOAM.

The Orangeburg fine sandy loam is a dark-brown fine sandy loam, with an average depth of 10 inches, underlain by a red sandy clay. It is locally called "black sandy land," from the dark appearance of the sand in some localities. As is usual with all soils of this character that occupy hillsides, the depth of soil overlying the red clay varies considerably, ranging from 6 to 18 inches. The shallower soil is usually more or less mixed with the subsoil, which imparts to it a reddish-brown color. The areas of the deeper soil have a yellowish color, and also are likely to contain a greater proportion of medium sand than

the average. Iron concretions are numerous in some localities. The sand content of the subsoil varies considerably, and in a few localities a large percentage is present. Some areas near the Chefuncte River present this phase. It is not so desirable a soil as the main portion of the type, since if drought occurs the crops are likely to suffer considerably.

The Orangeburg fine sandy loam is found only in the northern half of the area, and usually above an elevation of 130 feet. The timber growth is pine, hickory, dogwood, and several species of oak. As explained under "Geology," the soil areas represent outcroppings of the red Lafayette clays and occupy hill slopes along shallow valleys. It is therefore without exception a well-drained soil. In most cases the material forming the top soil has been contributed from two sources: The larger portion is derived directly from the underlying red clay through the removal of the clay particles by water action; the other portion consists of fine sand which has been left as a residue after the erosion of the yellow deposits of Port Hudson which formerly covered it.

Of all the upland types of the area the Orangeburg fine sandy loam is by nature the most productive. For this reason, and from the fact that the soil always occurs near a stream course of some sort, it was selected for the older settlements made in the northeast part of the parish prior to the civil war. Many of these places are still in good condition.

When the Orangeburg fine sandy loam is not situated upon too steep a hillside, it is a very desirable general farming soil. At the present time a large proportion of it is not under cultivation. Here the covering of grasses and other natural growth has protected it from washing, but many examples of serious erosion were observed in the cleared fields, and, in general, too little attention has been paid to this waste.

When well fertilized the Orangeburg fine sandy loam produces an average yield of 20 bushels of corn and one-half bale of cotton per acre. It is a good peach soil, and the leveler portions are suitable for truck, but it has not been used for these purposes to any extent.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the Orangeburg fine sandy loam:

Mechanical analyses of Orangeburg fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12437, 13095.....	Soil.....	0.5	5.0	13.9	25.8	12.3	30.2	12.0
12438, 13096.....	Subsoil.....	.1	2.6	9.5	25.0	8.8	21.3	32.1

NORFOLK SAND.

The Norfolk sand, to a depth of 8 inches, consists of a brown or reddish-brown medium sand. The subsoil to a depth of 36 inches is similar in general character, but lighter in color and usually a little less loamy. The soil is quite uniform in texture, but the color varies and some areas have a yellowish color. At about 30 inches the subsoil frequently grades into a coherent red sand containing considerable clay.

This type has less extent than any other found in the survey, and the individual areas occupied by it are very small. A few of them are found as deposits along the larger streams, but the majority occur in a series of peculiar sand mounds in the pine flats. Their size varies from 2 to 30 acres and their elevation above the surrounding country is from 6 to 20 feet. They jut up at short intervals along a single line, 11 miles in length, which extends along the west side of the Tangipahoa River at a distance of from 1½ to 2 miles. Surrounded as they are by a soil composed of totally different materials, the exact origin of the mounds is hard to explain. It is likely, however, that they were formed by stream currents before the deposition of the top member of the pine flats, when the country was below sea level.

The limited extent of the Norfolk sand makes it agriculturally unimportant. It is a well-drained soil, and the larger areas are under cultivation. Some truck is successfully grown upon them, especially on the lower slopes of the mounds, where the soil is somewhat mixed with finer materials. Cotton produces about one-half bale per acre when well fertilized. Fruit trees do especially well. The natural growth is scrub oak and pine.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Norfolk sand:

Mechanical analyses of Norfolk sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12159.....	Soil.....	0.0	5.7	31.3	44.8	4.6	9.3	4.0
12160.....	Subsoil.....	.0	5.7	28.1	40.5	4.1	13.7	7.5

MARSH.

In the southern part of the area, between the highland and the lake swamp, there is a strip of treeless swamp country varying from one-fourth mile to a mile in width, and known as the "prairie" or "marsh." This has been mapped as Marsh. The surface covering for several inches consists simply of a mass of grass roots. Under this is found a black silty clay containing a high percentage of organic matter, the

depth of which varies considerably in different parts of the several areas, ranging from 5 or 6 inches to 3 feet or more. Beneath the black clay a drab or bluish clay appears, fairly uniform in texture, and reaching to a depth of 8 or 9 feet, where a considerable quantity of white sand is mingled with the clay. Observations made near alligator holes indicate that at a lower depth pure sand would be found.

The Marsh supports a growth of coarse grass, which affords some pasture. It is only a few feet above sea level, and except for short periods during the summer it is covered with fresh water the entire year. A growth of cypress and gum surrounds the area on all sides, and is gradually encroaching upon the treeless portion. Old residents assert that within the past forty years the area has been built up nearly 3 feet. The filling material is derived principally from several small streams which empty their sediment-laden waters directly upon its surface.

At the edge of the highland bordering this type on its northern side there is found a well-defined beach line, probably an earlier though comparatively recent boundary of Lake Pontchartrain, so that the soil probably formed the bottom of the northern part of that body of water when it was more extensive than at present.

The Marsh is an important type, not because of any present use, but because of the undoubted agricultural value of the soil when reclaimed, a project which is feasible in all but a small part of the area. At the present time a large area of similar soil in an adjoining parish is being diked, ditched, and fitted with pumping apparatus, and will be in cultivation by the end of the year. Rice and sugarcane will probably be grown. A small area in Tangipahoa Parish was reclaimed a few years ago and sowed to rice with excellent results, 175 sacks being obtained from an area of less than 20 acres.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type.

Mechanical analyses of Marsh.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand	Silt.	Clay.
		<i>Per ct.</i>						
12167.....	Soil.....	0.0	0.2	0.4	2.9	9.1	66.4	21.0
12168.....	Subsoil.....	.0	.0	.2	4.2	15.3	62.4	17.5

MEADOW.

The Meadow consists of low-lying and swampy areas of the upland which, because of their variable character, could not be satisfactorily classified or mapped as separate types of soil. It is all subject to overflow during the winter and spring months.

The largest continuous area of Meadow, known as the River Swamp, is found along the Tangipahoa River. It averages nearly a mile in width through almost the entire length of the parish. The character of the soil material of this river bottom is exceedingly variable, and its surface is cut by many old stream channels and bayous. Large deposits of sand and gravel occur at various points along the stream, especially in the lower part of the parish. Farther up the stream some areas have nearly a clay soil, and there are also many detached areas which are identical in character with the Amite loam. At the present time these are covered with a heavy growth of beech, magnolia, poplar, and some pine. Eventually they will be cultivated and will make exceedingly valuable soils. The expense of clearing the land has been one cause for their neglect. After April 1 the danger of floods is usually past and these tracts are high enough above the stream to provide for excellent drainage during the remainder of the year. Aside from the large area described, little Meadow occurs in the hill regions.

The areas of Meadow in the pine flats, which are very numerous, occur either as strips along the shallow streams or in the form of swamps varying from a few to several hundred acres. They are covered with gum, willow, water oak, bay, holly, and some pine, and their limits are always sharply defined by the change from this growth to the open forest of the piney woods. In very few cases is their drainage and cultivation practicable. The soil is usually of a gray silty nature, and while it would be suitable for rice, its value for other crops is doubted. The largest area of Meadow in the pine flats is situated to the west of Amite, and is known as the Black Swamp. Its general character is similar to the other areas, although the soil is heavier than the average, and the elevation in places slightly higher than usual in these depressions. The more elevated areas would be productive and could be easily reclaimed and put into cultivation. The Black Swamp is covered with beech, chestnut, oak, magnolia, bay, poplar, and some shortleaf pine.

AMITE LOAM.

The Amite loam is the only real bottom soil under cultivation in the parish. The soil consists of a dark-brown or nearly chocolate colored loam from 6 to 10 inches deep, and often contains thin seams of fine sand. The subsoil is a yellowish or reddish clay loam, which has a uniform texture to a depth of 36 inches.

The soil occurs only as flood plains of the larger streams in the upper part of the parish. It is likely that the larger portion of the subsoil consists of a deposit, in the previously eroded valleys, of material similar to that covering the surrounding hills. The soil has been formed of the silt and fine sand carried in from the surround-

ing hills and spread out over the terraces in times of overflow. The soil itself is quite uniform in different parts, but the areas in which it occurs are not so. They are often badly cut up and contain swampy places, as well as small deposits of sand and clay. Where such places were numerous or the area was much cut by old stream channels it was mapped as Meadow.

The Amite loam is a valuable soil, but is of little importance in the area because of its limited extent. Much of it is not yet under cultivation. The areas are overflowed during the winter, but there is no danger from this source during the growing season. The soil is the best corn soil in the parish and produces from 30 to 40 bushels per acre. When fertilized cotton yields from two-thirds to 1 bale per acre. Cabbage, sugar cane, radishes, and other crops do proportionately well.

The following table gives the average results of mechanical analyses of typical samples of the soil and subsoil of the Amite loam:

Mechanical analyses of Amite loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12439, 13081.....	Soil.....	Tr.	0.8	2.4	15.9	7.5	50.6	22.6
12440, 13082.....	Subsoil.....	Tr.	.7	1.9	10.3	4.3	50.0	32.5

PEAT.

The area classed as Peat comprises the larger proportion of the lowland swamp bordering Lakes Pontchartrain and Maurepas in the extreme southern end of the parish. For a depth of 3 feet or more the material composing the swamp is simply a brown peaty mass of decayed vegetation, containing many root fibers and having a putrid odor. In certain parts of the swamp a light-drab clay was found underlying the peat at a depth of from 7 to 9 feet, but it lies usually much deeper than this. Most parts of the Peat are covered with some standing water at all seasons of the year, and it is so nearly at sea level that during periods when a southeast wind blows the water from Lake Pontchartrain backs up along the bayous and overflows these lowlands to a depth of 2 to 3 feet. They are at all times boggy and in places nearly impassable.

It is evident from this description of the Peat that the Mississippi sediments have had little influence upon its surface character. The greater part of the soil has been formed by the decay of the luxuriant vegetation. In this respect it differs from those large swamp areas which comprise the greater part of the Mississippi delta. The latter

consist principally of heavy clays, and the peat or muck areas are of merely local extent.

The Peat is covered with a dense growth of cypress, black gum, tupelo gum, some soft maple, willow, and an almost tropical growth of underbrush and vines. In the higher portions along its edges the palmetto grows to great size. Most of the cypress for some distance back from the waterways has been cut and removed by means of "pull-boats"; that farther from the shore will eventually be reached by means of "skidders" run in on light tramways.

Agriculturally the Peat has little value. The unstable character of the soil and subsoil makes it unsuited for successful diking. In addition to this the soil is so nearly pure organic matter that only special crops could be grown upon it. Before the value of the timber was realized, much of the swamp was purchased from the Government at 25 cents an acre. The present market value of the areas supporting cypress timber is from \$10 to \$12 an acre.

YAZOO CLAY.

At the edges of the lake swamp, along the water fronts, and upon the highland side, there is found a heavier soil than that composing the main swamp area. Its character is exceedingly variable. The strip along Pass Manchac consists of a heavy brown clay loam with a depth of 8 or 9 inches, underlain by a sticky bluish or drab silty clay. The materials are somewhat similar along Lake Pontchartrain, but there considerable fine gray sand enters into the composition of the soil along the immediate shore. The soil of the type along the banks of the Tangipahoa River is slightly heavier, and the subsoil is a yellowish mottled clay. A larger area occurs in the neighborhood of the point at which the Tangipahoa River enters the swamp from the highland, and here the soil is a heavy brown silty clay, with considerable organic matter, with the subsoil similar in texture, but lighter in color.

The areas of Yazoo clay along the water fronts consist of natural levees built up by sediments in times of flood. They are slightly elevated and grade into the swamp from one-sixteenth to one-eighth of a mile back from the shore. In addition to the usual swamp growth, ash, live oak, and willow are found growing upon them. Several very large shell banks are found associated with the shore at the mouth of Tangipahoa River. A few gardens represent the entire use of the soil for agricultural purposes.

The areas on the highland side of the swamp are formed by sediments brought down by the Tangipahoa River and smaller streams and spread out over the swamp. They are covered with a dense growth of gum and are under water for the greater part of the year. At present they have no agricultural value.

The following table gives the results of mechanical analyses of the Yazoo clay:

Mechanical analyses of Yazoo clay.

Number.	Description.	Fine gravel.	Coarse sand.	Med-ium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
12165.....	Soil.....	0.0	0.5	0.7	7.9	14.4	50.5	26.0
12166.....	Subsoil.....	.0	1.0	1.2	3.2	3.0	67.8	23.6

HAMMOND SILT LOAM.

The Hammond silt loam is a silty or fine sandy loam with an average depth of 15 inches. The surface has an ashy-gray appearance, which becomes dark-gray or brown when wet. This gray color may continue for the entire depth of the soil, but it frequently changes to a yellowish color at 4 or 5 inches from the surface. The subsoil is a heavy silty clay of a yellowish color, with drab, brown, or red mottling. A few iron concretions are found, but they are not a distinctive feature of the soil. The transition from soil to subsoil is usually gradual. During dry weather the soil does not hold moisture well, but bakes hard, and when powdered becomes almost white with a chalky appearance. Occasional small low swales or savannas are found, the soil of which has a brown or nearly black color.

The Hammond silt loam forms the main part of the pine flats region, and in smaller areas extends along some of the larger streams. It occupies broad, level interstream areas, broken only by an occasional swell or swampy depression, and its main body occurs between elevations of 15 and 100 feet. The drainage conditions over the greater part of the type are poor. Stream courses are numerous, but their channels are so immature that their influence as direct drainage factors extends but a short distance back from the stream. In addition to this the impervious character of the clay composing the subsoil does not allow the free passage of water by means of seepage, and during the winter water stands upon many parts of the area for long periods. Crawfish are more or less plentiful throughout the area of this type of soil. In winter the unimproved roads are soft, though not boggy.

In its broader area the type is quite uniformly a silt loam, but the smaller areas frequently show considerable variation, so that both a lighter and heavier phase are found. The latter occurs principally near the lake swamp, especially where the transition from the pine flats to the alluvium divisions is gradual. The soil is shallower and the subsoil considerably heavier than in the main body of the type. It has little agricultural value. The lighter phase is not very extensive, but somewhat more important. The soil is very similar in appearance to the main portion of the type, but is distinctly a fine

sandy loam and in addition has a variable heavy sandy loam subsoil. It is found to some extent in the vicinity of Independence and elsewhere in small areas, and is especially well adapted to strawberries and truck.

A minor phase of the soil also occurs as slight depressions or very flat stretches in the rolling areas of Monroe silt loam. Except for the subsoil, which is more a silty loam than a clay in character, these smaller areas are similar to the main portion of the type. None of them is under cultivation.

The drainage of field upon Hammond silt loam is one of the principal factors in successful cultivation. At present comparatively little has been done in this respect, but illustrations of its value are not lacking. The success of many farmers in the Italian colony about Independence has been due largely to care in drainage, and the more productive areas along stream banks serve as natural illustrations. As yet the country is not settled sufficiently to warrant the construction of large trunk ditches, but eventually this method of drainage should be used. Some areas, especially about the heads of streams, are difficult to drain in any manner, but between stream courses there is usually sufficient fall to provide for the removal of surplus water. In the meantime the fields should be plowed in narrow lands for general crops, and in addition to this, in a large number of cases, open ditches should be constructed. With proper drainage and fertilization the type may be brought to a state of productivity.

The Hammond silt loam is derived from the Port Hudson clays, composed of marine sediments. The soil proper has been modified by weathering and by plant growth.

The natural forest growth upon the Hammond silt loam is almost exclusively longleaf pine, the greater part of which has been cut away. The second growth and the timber of the low-lying areas are mostly loblolly or shortleaf pine. Palmetto and some oak are found near the swamp.

The Hammond silt loam is very deficient in organic matter and is naturally a very poor soil. This fact, added to its poor drainage conditions, formerly caused it to be held in very low esteem for all farming purposes, and it has been only a relatively short time that any considerable areas have been under cultivation. Cotton has not been grown upon it with success and corn is usually a failure. Oats will yield from 40 to 60 bushels per acre, and crab-grass hay, sugar cane, and small truck do fairly well, but the crop to which the largest acreage is devoted at present is strawberries. In a good year from 300 to 400 cases per acre can be produced and a profit of from \$75 to \$200 or more realized. All these crops have to be heavily fertilized to obtain satisfactory results. During the last few years dairying has been

developed upon this type in the vicinity of Hammond. Excellent pasturage is afforded during the spring and summer months.

The price of land in the Hammond silt loam areas varies from \$5 to \$15 an acre, according to its location. Near the railroad at Independence some tracts have been sold at from \$50 to \$75 an acre, but these prices are exceptionally high.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the Hammond silt loam:

Mechanical analyses of Hammond silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>				
11667, 13085.....	Soil.....	1.4	1.8	1.6	9.2	23.1	50.8	11.8
11668, 13086.....	Subsoil.....	.1	.6	1.0	8.8	16.4	43.1	27.7

AGRICULTURAL METHODS.

The methods employed in trucking, which is now the leading agricultural industry in the parish, have been worked out through experience, and are well understood, at least by the older growers. There are two prime requisites necessary for the success in this business: First, thorough preparation for and cultivation of the crop, and, second, intelligent application of fertilizers. Strawberries form the chief truck crop. The plants are transplanted during the months of August to November, inclusive. They are set in rows upon beds raised 6 inches above the intervening dead furrows, and at the rate of 12,000 to 14,000 plants to the acre. The Klondike berry, grown at present, has excellent shipping qualities, though not a sweet berry. The beds are allowed to bear from one to three years. Before bedding the soils should receive at least two plowings, and an application of fertilizer has been found to be necessary to produce the best results. The plants set in August grow larger, but those set in November are said to produce the better berry. The vines are mulched with pine straw in January and February, and the berries begin to ripen the last week in March.

In growing strawberries commercial fertilizer is used, it being thought that stable manure impairs the shipping quality of the fruit. This continued use of commercial fertilizer assists little in the permanent building up of the soil, and in case it is desired to grow other truck crops on the sandy land but little benefit from previous applications may be expected. For vegetables some stable manure is a necessity and little hope for success without its use can be entertained. It is delivered at the stations along the Illinois Central Railroad at the rate of \$9 a car, and its use should be general, both for truck and general farming crops.

Where cattle are kept a combination of the truck and dairy business has proved profitable. It is usually necessary to buy considerable feed during the winter, but the dairyman is continually building up his land by the use of stable manure, and the increased crops he receives are said to more than pay his additional feed bill.

Irrigation in the lower section of the area has been employed to some extent, especially for use with fall truck crops, but as yet it has not received the attention it deserves. The importance of keeping such crops growing rapidly is considerable, and the ease with which artesian water can be piped to any part of the field makes its use practicable and cheap. Even higher up in the parish, where water has to be pumped, it is probable that its use will be found profitable.

There are shippers' associations at Ponchatoula and Roseland, and these have aided materially in securing cheaper transportation rates and a uniformity in methods of packing and making shipments. All goods sent through the association are consigned to one man in Chicago, who acts as distributing agent. Most of the goods are shipped on commission. Some berries are sold for cash at the station, and upon the whole this seems the best method with very perishable products, for while the price is somewhat lower than the market, all risk of poor returns because of damaged or delayed shipments is avoided.

Throughout the general farming portion of the area the cattle are bred neither for milk nor beef. There is here also a general lack of appreciation of the value of barnyard manure, the stock being usually allowed to run at large, and no attempt being made to save the manure during any part of the year. The importance of stock raising as an adjunct to nearly every kind of farming, where the manure is judiciously saved and applied to the tilled fields, can not be overestimated.

The Orangeburg fine sandy loam is practically the only soil in the area which is subject to serious washing. In recent years the practice of contour cultivation has been followed to some extent on this soil. This is a step in the right direction and in some cases all that is needed to correct the washing, but many of the fields are so situated that nothing less than permanent terracing will be efficient. The presence of many stumps in the cleared fields also tends to cause much washing. Where many of them are present the contours can not be properly followed, and breaks in the rows are bound to occur. As a rule, this soil is not cultivated below a depth of 3 or 4 inches, and it is seldom that the red clay subsoil is disturbed. In most areas the type will stand much deeper plowing.

With certain notable exceptions there is in the part of the area where general farming is practiced a lack of appreciation of the value of deep plowing and thorough preparation of the land. Even

farmers who know that trucking requires this do not seem to realize that the same principles hold true for all crops. A light single-horse plow is still in general use even in breaking new ground. Since the depth of the seed-bed in succeeding years usually depends largely upon the first plowing this should be 6 inches or deeper in most of the soils. It is true that too much of the subsoil brought to the surface the first year may reduce the crop somewhat, but the better results in subsequent years will more than offset this temporary disadvantage.

While the value of systematic rotation of crops generally is recognized, the practice of rotation is by no means common. In some cases cotton is followed by corn, with cowpeas sown in the corn at the last plowing. Oats, sown in the fall and harvested in May, will prove a good crop and should be more generally grown. The fact that the few livery stables in the parish have to import both hay and grain indicates the lack of interest in the production of feeding crops. The proportion of farmers growing corn sufficient to carry them through the year is probably between one-half and two-thirds. Very little attention is paid to the selection of either corn or cotton seed.

AGRICULTURAL CONDITIONS.

That portion of the parish west of Tangipahoa River is the more highly developed, not because of any difference in the soil conditions, but by reason of the better transportation facilities. The larger part of the parish is still in a state of transition from a community whose main interest was centered in some form of lumbering to one in which agriculture is the chief occupation. For many the change is hard to make, since the work is new and the soils do not always respond readily to the first years of cultivation. It is also difficult for the older agricultural settler to accustom himself to the new and changing conditions. Formerly his stock ranged over thousands of acres not necessarily his own. He lived on a small clearing, growing a few necessities of life, and was content with his few acres. At present many of these older men complain bitterly of the curtailed range for their stock, and some even decry the settlement of the parish and the building of railroads.

Roughly speaking, the agricultural population of the parish may be divided into two classes—those pursuing general agriculture and the truck growers. The latter are naturally confined to a strip some 5 or 6 miles wide on each side of the railroad. The farm buildings in this section are above the average for the rest of the parish, and the houses are usually painted. In the remoter parts of the parish many of the buildings are characteristic of a newly settled country and are usually poor. Often shelter for stock is wanting entirely.

The majority of the farmers in the truck business are out of debt, and the status in this respect for the entire parish is good. The percentage of mortgages on farm property is small.

The farms throughout the parish are operated almost exclusively by the owners, this being so largely because land is plentiful and cheap. The public land for homeseekers has all been taken up, but farms can be purchased very cheaply. The size of farms varies in different parts of the area, depending upon whether general farming or trucking is pursued. Far removed from the railroad the farms range from 60 to 100 acres in size. Near the railroad, where trucking is becoming quite universal, they vary from a few to about 50 acres in extent. The large lumber companies have holdings ranging from 1,000 to 40,000 acres. A large part of this was bought for prices ranging from \$1.25 to \$3 an acre, and is now worth \$12 to \$15. It is thought by some that these large holdings retard the agricultural development of the area, while others believe that when once the timber is removed these lands will be put upon the market at a reasonable figure, and that the region will develop more rapidly than if it had not been first exploited by the lumbermen. In the central part of the parish there are large areas of pine still standing. At the present time it is estimated that between 8 and 10 per cent of the parish is under cultivation.

During the last decade there has been a general scarcity of farm labor in the parish, due largely to the fact that more profitable employment can be obtained in the sawmills and upon public works than upon farms, since at the usual price for general farming products the farmer can not afford to pay more than from \$10 to \$15 a month and board. When general farming is pursued, the labor is generally performed by the owner and his sons. Where trucking is followed, it is necessary to employ a great deal of labor during a portion of the year, but the prices obtained for trucking products are usually high enough so that liberal wages can be paid. The native negro labor is the best that can be obtained. Many of the Italians work by the month for the first year or so they are in the country, and they are said to be very satisfactory as laborers. It is not long, however, before they are operating small truck farms of their own. The present movement for a diversion of a portion of the foreign immigration toward the Southern States should eventually make farm labor more abundant. The negro population of the parish is about one-third of the total, and is mostly centered in the towns.

The principal products in the general farming portion of the area are cotton, corn, oats, sirup, cattle, and hogs, while along the railroads the products are strawberries, cabbage, beans, radishes, lettuce, cucumbers, tomatoes, potatoes, and dairy products. The total cotton crop of the parish in 1904 was about 10,000 bales, and the average yield

slightly under one-half bale per acre. Where grown it is the chief money crop, while corn and oats are consumed on the farm. At present the value of the truck shipments exceeds that of all the other farm crops combined. In 1903 the express company forwarded 350 cars of strawberries from Independence, Hammond, and Ponchartroula, in addition to which over a hundred cars of berries and truck were handled by the railroad company as freight.

The dairy business in the vicinity of Hammond is important and promises to increase with the location of a suitable receiving station at that place. At present the daily shipments of milk to New Orleans are about 1,500 gallons, for which 15 cents a gallon is received in winter and 13 cents in summer. The daily milk consumption of New Orleans is about 12,000 gallons and a much larger proportion of this amount should be furnished from this area.

At the present time tree fruits are not grown to any extent. There is opportunity for peach growing in the northern part of the parish, and with a certain amount of protection by cornstalks and pine boughs during the winter certain varieties of oranges and tangerines can be grown in the southern part. One orchard of 20 trees was observed from which the owner sold \$120 worth of fruit the fourth year. Some Japanese fruits, including plums, also do well. Pecans might be profitably grown.

The unsettled portions of the parish still afford a wide range for cattle and hogs for about nine months of the year. Numbers of sheep are also pastured, but are not especially profitable. Other products consist of large quantities of pine and cypress lumber and turpentine.

The earlier settlements of the parish were usually made along stream courses upon the Orangeburg fine sandy loam or Amite loam, and as a rule the first crops grown were well adapted to these soils. The Monroe silt loam was not considered a good soil, but is now being recognized as a safe and profitable type for cotton, corn, oats, and truck crops. Strawberries do best upon newly cleared land, either Monroe silt loam or Hammond silt loam, though the quality of the berry is slightly better upon the latter and most of the berries are grown upon it. Other truck crops do not do so well upon it, except upon the drier and more sandy portions, and it is not a good soil for cabbage, cucumbers, tomatoes, corn, or cotton.

The Amite sandy loam is well adapted to all crops of the area. Alfalfa has been tried upon the Hammond silt loam, but the soil is usually too low and wet for it to succeed. It should, however, do well upon the Monroe silt loam.

The excellent transportation facilities furnished by the Illinois Central Railroad have been the controlling factor in the development of the truck business of the parish. Chicago, the market to which most of the products go, is reached in thirty-six hours by express and in

sixty hours by freight, while New Orleans is only two hours distant. During the strawberry season, which lasts for about six weeks, a special refrigerator express train is run northward every evening, and there is usually excellent cooperation between the railroad and the growers in the matter of shipments. St. Louis, Cincinnati, and Milwaukee also receive a small part of the products.

The eastern portion of the area is somewhat isolated at present. There are several log tramways which cross the parish from east to west and connect with the railroad. After the timber is removed it is believed some of these will become passenger and freight carrying roads and will assist in the development of this section of the country. A few of the wagon roads of the parish have been improved by the simple and cheap method of crowning the center with material from the sides, and an excellent road, both in summer and winter, is the result. Oxen are used for all heavy transportation.

One reason for the present and undoubted future success of the parish in the truck and berry business is its geographical and climatic position. Its products are not the earliest upon the market, being preceded by those of Florida and Texas, but they begin at a time when there is a greater demand for early vegetables than the first shipments receive.

There can be no question that within the next few years a rapid and yet normal development will take place in the unsettled portions of the parish. The larger part of the parish is composed of soils capable of being brought into profitable cultivation, while the climate is healthful and the water pure. The center of the parish is but 60 miles from New Orleans, at present the metropolis of the South and rapidly growing. It is also upon the main line of travel between the Central States and New Orleans, and the only highland parish north of the city possessing this advantage.

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