UNITED STATES DEPARTMENT OF AGRICULTURE.

Office of Experiment Stations.

Irrigation and Drainage Investigations.

Report on

# EVERGLADES DRAINAGE PROJECT

in

Lee and Dade Counties,

Florida.

January to May

1907.

John T. Stewart

Drainage Engineer

UNITED STATES DEPARTMENT OF AGRICULTURE.

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Washington, D.C., May 18, 1907

Dr. Elwood Mead,
Chief Irrigation and Drainage Investigations,
Office of Experiment Stations,
U.S. Department of Agriculture,
Washington, D.C.

Sir:

I hereby transmit a report of the field work done under my direction from January 20th to April 7th, on the Everglades drainage project. Unsigned instructions delivered to me on January 17th, by Mr. J.O. Wright, expert in drainage, of this Office, state that the object and purpose of the survey was-

"1.) To determine the topography of the country lying south of township 41 so as to locate proper channels to carry the overflow of Lake Okeechobee to the sea along the natural and most practical routes.

2.) To determine approximately the extent, area, and character of the water that drains into Lake Okeechobee so as to calculate the discharge capacity of the channel or channels necessary to prevent the overflow of the lake.

3.) To determine the depth of muck and to locate the rim of the stone which encircles the lake or skirts or crosses the Everglades.

4.) To analyze the different kinds of soil found and determine their value for agriculture.

5.) Make plans and estimates of costs of a complete system of drainage."

A letter of January 31, signed by yourself, instructed as follows:

> "I would like to suggest that you keep a very full diary in which you will enter everything relative to the appearance and production of the country that you are going through. State what kind of fish you see and their abundance, what kind of grass, what kind of fowls and trees, and your experiences in carrying out the work."

While the above instructions have not been fully complied with, they have been carried out to the best of my ability so far as the time and facilities at my command would permit.

Respectfully,

John T. Stewart

Drainage Engineer.

The area to be investigated as stated in paragraph 1 of instructions, lies in the southern part of Florida, the greater part being included within the boundaries of Lee and Dade Counties. My official connection with the work began on January 16. Previous to that time Ft. Myers, the county seat of Lee County, had been selected as the local headquarters and the route for two lines of levels from Ft. Myers to the vicinity of Brown's Store, and thence one line across the Everglades, had been determined. Mr. Lawrence Brett, levelman, and Mr. E.F. Chadwick, rodman, had left Washington on January 5th for Ft. Myers, where they were to begin the line of levels which was to run eastwardly along the Caloosahatchee River. Mr. Paul Funderhide had been employed as levelman and ordered to report at Ft. Myers about January 20. It had also been practically decided to emply [sic] as a general assistant , Mr. I. S. Singletary, a resident of Ft. Myers. In accordance with the instructions contained in the letter of January 31st, this report has been made out in journal form.

January 18. Left Washington via the Atlantic Coast Line, arriving at Ft. Myers, Florida, at 5 P.M., January 20. Found Mr. Funderhide at the depot, he having arrived the night before. Stopped at the Bradford Hotel.

January 20. Spent some time during the forenoon in looking for a boarding place, but, on account of the number of tourists in town, found that a rate of $2.50 a day at the Bradford Hotel was the best I could do. Called on Dr. Brecht and obtained some general information. Also saw I.S. Singletary and told him he could begin work on the 23rd. Had a talk with Mead and Thompson in regard to employing them with their ox teams to move the camps, but they asked $6 per day for each team and could not begin work till 10 days later. In looking over the stores decided that (H.A.?) Hendry, hardware, and

M.K. Heitman, grocer, would be the best places to buy outfits and supplies. Tried to telephone Brett at Ft. Thompson, but the phone would not work. Learned later from the river men that Brett had gone up to Lake Okeechobee and would not be back till Wednesday.

January 22 to 27, inclusive. Bought camp equipment and supplies, employed teams and men necessary to outfit two camps. Frank Carson, liveryman, offered to furnish saddle horses at $1.25 per day, and teams at $5 per day, including a teamster who could cook for the camp party. He would also furnish forage for the stock at Ft. Myers, but would not transport it to the camps. As there was no other stock available, these terms were accepted. Late Wednesday afternoon, talked to Brett by phone and asked him to come to Myers, but as the boat was late, he did not get in till 6.30 P.M. Thursday. On Thursday Funderhide and Singletary established a tide gauge at Ft. Myers. Thursday evening had a conference with Brett, Funderhide and Singletary in regard to the work. Brett left Myers at 8 A.M. Friday morning for Labelle, with his outfit which was made up as follows: Lawrence Brett, levelman; E.F. Chadwick, rodman; J.R. McLeod, axman; and Marvin Carson, teamster. They had a mule team wagon, 9 by 9 tent, necessary camp outfit and 25 days' rations. On Friday afternoon, with Funderhide's assistance, ran the levels from the initial bench mark to the tide gauge. Funderhide began work at Ft. Myers Saturday morning, his camp outfit leaving town at noon, making their first camp 6 miles out on the old military trail which runs to Immokalee. This outfit consisted of Paul Funderhide, levelman; (H.B.?) Troutman, rodman; Charles Hadley, teamster. They had a mule team wagon, 9 by 9 tent, necessary camp outfit and 15 days' rations. During the week I had decided to make a reconnaissance from Myers via Immokalee, Brown's Store,

Travers house, Labelle and back to Myers. All arrangements for this trip were made by Singletary who was to accompany me. About 10 A.M. Sunday morning, Heitman, grocer, told me that the flour had been missed in making up Funderhide's supplies, but he had sent it out that morning.

The weather throughout the week was warm and pleasant. There was a heavy fall of rain about 6 P.M. Friday which caused no inconvenience and, on account of the sandy soil, it improved the roads. I found the people at Ft. Myers very friendly and pleasant to meet but on account of the great number of tourists, prices of supplies, teams and labor were very high. Nearly everything has to be shipped in, freight rates are high and there are more or less delays in freight, express and mail. I tried for five days to have two turning pins make at the blacksmith's shop, but as the smith was on a spree I could get nothing done. A number of articles needed could not be obtained in Myers and we had to do the best we could as it took too long to get anything in from another town. The Donovan range ordered by express from Columbus, Ohio, did not arrive, although the bill came on the 21st. The compasses, stadia wires and protractors had not arrived. Considerable interest was shown in out work and the people are anxious to have something done to prevent the overflow of the Caloosahatchee River.

At various times during the progress of the work, Singletary wrote up notes on various subjects relating to the country. He was raised in southern Florida and has been a resident of Lee county for 32 years. In this time he has been engaged as a cattleman, hunter, guide, county assessor, county collector, timber estimator and surveyor. As his notes are more or less explanatory of the conditions in Lee County, they have been abstracted and are inserted at this point.-

"Mr. I.S. Singletary, agent, U.S. Department of Agriculture:

Pine Timber Land.

This is a virgin forest of 'flat-wood', or 'slash' pine. The pines are tall and straight, branching near the top, and are from 50 to 100 feet tall, 80 feet being an average. They range in thickness from saplings to large trees 3 feet in diameter, the majority of the stand being about 15 inches through, 4 feet above the ground. The pine forests are interspersed with flag ponds, popash heads, and long open sloughs 600 to 1200 feet wide, often a mile or more in length; but there are no springs or brooks.

The soil of the timber land is sandy, supporting a growth of wire grass which makes fair grazing for cattle. As a rule, pine timber land is dry when the rest of the country is under water so that the occurrence of pine may be looked upon as an indication of high land.

Cypress timber land is a true swamp as it is under water the greater part of the time. The timber is usually small although there are some very large trees. The trees are draped heavily in Spanish moss and are covered with air plants. The soil is largely of muck formation with some outcroppings of sand and rock. Many places are always boggy even in the dry season. Scattered throughout the cypress may be found many pine islands, saw grass, and willow ponds.

Prairie.

The Florida 'prairie' is open, flat land covered with wire grass and saw palmetto, and is dotted with thickets or 'heads' of oak and cabbage palm, and pine islands. The grass makes excellent grazing for cattle, which range in large numbers in 'pastures' enclosed by their owners usually without the knowledge or consent of the persons owning the land. This grass is burned off in January or February, and by March 1st cattle find a new growth of green nutritious grass, so that by May 1st they are fat and ready for market. Water is found over the prairies in numerous ponds, which in the wet season- June to October- are full of water. From October until the rains begin again, the ponds shrink, so that the Spring finds them no more than small water holes, many of them wholly dry. These ponds supply green food long after the grass has dried out, and the cattle resort to them in large numbers.

Saw Palmetto Beds

The saw palmetto is a universal and characteristic growth. It forms the undergrowth of the pine timber land, and dots the prairie everywhere that a slight elevation not otherwise occupied occurs. It consists of sprouts of leaves, or 'fans' which may attain a height of 6 feet if undisturbed, but which usually are not higher than (?) feet. These fans spring out of the tips of thick rough roots, about 5 inches in diameter, which creep along the surface of the soil to a length sometimes of 5 to 9 feet. These beds are kept burned off by hunters, the roots suffering no apparent damage by the process. As might be expected, walking, riding, and especially driving over these roots, is a rough and unpleasant experience. They are hard to clear off, the cost of grubbing accounting to about $15 per acre. The palmetto bed is in no sense an indication of the presence of water.

Pine Islands.

Pine islands are isolated clumps of pine timber, ranging in size from a grove of perhaps 30 trees to a stand covering many hundred acres, scattered throughout the open prairie and cypress country. The soil in these islands is high, dry, sandy and unproductive. The name 'island' is applied to them because they stand out from the flat prairie as an island from the sea.

Hammock.

A hammock is distinguished by its vegetation, the presence of oak and cabbage palm, and the absence of pine. It, too, is higher than the surrounding country, and its soil, a dark loamy sand, is the most fertile to be found. Under cultivation it will produce to advantage all the ordinary field crops, notably sugar cane, vegetables, and citrus fruits. The hammocks are no [sic] so numerous as the pine islands or ponds. In extent they cover from 1 to 300 acres.

Cypress Heads.

Like pine islands, cypress also appears in isolated clumps, but these 'heads' are always a sure sign of low wet ground, having more or less water in them all the year. The cypress growth in such a head is usually small.

Ponds.

The copious rainfall of the wet season drenches the whole land and every depression, little or big, becomes a natural reservoir, storing up the water in quantities which may last all the year. Around and in these pools is found a luxurious growth of grasses, whose decay through centuries has left in them a characteristic deposit of rich muck. The different species of grass do not flourish together, and so each has occupied certain ponds exclusively, so that the ponds may be differentiated by the kind of vegetation growing in them, as follows:

A. Saw grass pond. The saw grass is found in either muck or marl, and grows from 2 to 12 feet high, though the latter height is unusual, a little over 6 feet being a mean. It is often so rank as to be impenetrable. The saw grass often grows around the edges of other ponds or heads.

B. Popash pond or head. These ponds found everywhere throughout the region, are usually ver [sic] low, containing as much as 2 feet of water during the summer. In them grows the popash, a low scrubby tree, seldom growing higher than 25 feet. It occurs in clusters, often 12 or even more branches from a single root. The trees are spread well apart, but so thick a covering do they form that no vegetation can grow underneath. Air plants grow upon the branches, but moss is not found. The popash is a soft white brittle ash.

C. Flag ponds. These are found in two varieties, fire flags and common pond lily flags.

    a. Fire flags are a species of lily, growing sometimes 10 feet tall, and having a leaf almost exactly similar to that of the banana tree. They indicate a very rich as well as low, soil.

b. Lily flags resemble the ordinary stiff stemmed pond lily of the North, and the ponds where they occur are as a result more open than any of the others. They occur either in sand or muck.

D. Maiden cane ponds. These ponds may be either sand or muck, but usually are white sand. This cane indicates soft sweet water, and it is to these ponds that hunters and others turn to seek good water, which may always be obtained at a depth of a few feet. The maiden cane is a tall very slim, and graceful grass, and cattle are very fond of it. It grows from 2 to 6 feet high, and has been baled with good results from fodder, but only to a limited extent.

Grapefruit.

Grapefruit has a thick peel, and will carry better in shipping long distances than oranges. One acre will hold about 64 trees, which in good soil with good treatment at 10 years of age, may produce 800 to 1000 boxes of fruit. Size of box 12 inches x 12 inches x 27 inches and owing to size of fruit, will contain from 36 to 64 fruit per box, and sells on the trees to buyers for eastern and northern markets at $1.50 to $2.25 per box. Seedling trees- trees grown from seeds- will begin bearing in from 4 to 6 years, and being a rapid vigorous grower, will develop into large trees at 10 years from planting. There are many varieties but none better than the common variety.

Oranges.

There are more varieties of oranges than grapefruit. The planting, and cultivation are the same, but the production per acre is less than grapefruit. Seedling orange trees require from 5 to 7 years to begin bearing. Budded trees will begin fruiting in from 2 to 3 years from budding, and it is possible to get good crops of fruit from budded trees in 5 years from budding with good treatment. One acre in good bearing oranges, should produce from 600 to 800 boxes. The seedling orange commands from $1 to $1.25 on the trees, which are generally sold in the month of September or October and shipped, same as grapefruit. Oranges run from 150 to 226 per box when packed ready from shipping.

Late oranges such as Tardiff, Valencia, late Brazil, Naval, King and (Lambs?) summer orange, may remain on trees till late spring or summer, retaining all their juices, and often sell at from $3 to $6 and even $8 per box. The seedling orange begins to dry up about the first of February or March and becomes dry and pithy.

A sour orange grows wild in many of the hammocks in the big cypress. These are used for preserves, and their stock [sic] is preferred by many citrus fruit growers to bud other varieties of orange into.

The Tangerine and Mandarin orange, styled the kidglove orange, by reason of their very thin soft peel, are also raised and generally sell at $3 to $5 per box. While they do not make very large trees, they are very prolific and will produce from 300 to 600 boxes per acre.

There is also a small orange called Kumquat. They are small, oblong in shape and are generally sold at 20 to 25 cents per quart, there being about two dozen in a quart. The

trees are smaller than other oranges. One hundred trees could be planted on an acre. They are used for table desert, making preserves and table decorations.

Lemons.

The climatic conditions have a tendency to cause lemons, although fine flavored, to grow large with a coarse looking peel which detracts from the commercial value and consequently they are not raised to any great extent. The native lemon usually called the Florida rough lemon, is quite sour and makes excellent preserves and lemonade and the stalk is valuable for budding grapefruit into, it being preferred by many growers to any other.

Limes.

Limes of a fine quality can be reaised [sic], their yield being from 200 to 400 boxes per acre, which sell from $3 to $5 each.

The citrus family is grown in different soils. High pine lands are preferred for oranges, on a claim that the trees grow more readily and raise a brighter, smoother fruit, and not subject to what is called ‘creasing’, which is nothing more than the inner lining of the orange, cracking or splitting next to the outer peel, causing a slight crease in the outer peel. This class of orange is a very poor shipper, and will not carry any distance. This condition prevails in nearly all the hammock oranges. Almost without an exception the hammock lands are underlaid with either marl or clay, and it is claimed that this subsoil of marl or clay, causes the ‘creasing’.

Grapefruit is quicker grown and makes a larger tree and better fruit in the clay and marl hammocks than on the high pine lands. Grapefruit however, has a thick peel and does not crease in any soil. The hammock lands are, as a rule, much more fertile than the pine lands and require less fertilizer, for citrus trees and the common fruits and field crops. For quick and good results both pine and hammock lands require more or less fertilizer. For orange and grapefruit, the fertilizer is used in proportion to age and size of trees.

Young trees one year from planting require about 5 pounds to the tree, which is used in two applications, one in January or February, and one in May or June. Fertilizer is thus applied twice each year, in proportion to age and size of trees, until they are in full bearing, when as much as 50 pounds may be applied to each tree, as all the natural food or fertility of soil is exhausted.

The Avocada [sic] pear.

This is an oblong fruit with a large seed, is very tender, and will not stand rough handling or long shipments, is packed in crates holding from 2 to 3 dozen. They grow on a tree which will reach the height of 40 to 60 feet with a moderate spread of branches and bearing from 25 to 30 creates [sic] each. The fruit sell from 5 to 15 cents each and are eaten by peeling off the skin, then slicing and sprinkling with salt and pepper.

The Mango.

This is a kidney shaped oblong fruit, a little larger than a goose egg, about one-half of it being a rather flat seed. The fruit part is fibrous, slightly stringy and very sweet.

They are tender and will not stand long shipments, are packed in crates holding from 6 to 8 dozen each. The tree often reaches from 20 to 24 inches in diameter with wide spreading branches and not very high and bears from 15 to 20 crates of fruit, which sell from $2.50 to $3 each.

The Sapadillo.

This is a fruit a little larger than a hen's egg, is flat, being wider than long, is brown when ripe, and has flat seeds, is very soft, thick-skinned and sweet when ripe. They are packed in crates, holding from 10 to 12 dozen each. The tree attains a height of 15 to 20 feet with well branching limbs and produce from 15 to 20 crates which sell from $3 to $4, each.

The sugar apple.

This is a very sweet slightly granulated fruit with a rough looking or ridged peel, is about the size of the Sapadillo, is packed in crates holding 8 to 10 dozen each, grows on a tree about the same as the Sapadillo which will produce from 6 to 10 crates, selling from $3 to $5 each. The Avocada [sic] pear, Mango, Sapadillo and sugar apple require fertile soil if not naturally so, must be fertilized. The high keys and islands along the Gulf Coast which are of a shell and sand formation seem to be the best suited for them.

The Banana.

The banana is grown to a limited extent. As they are very sensitive to cold, they are easily killed, but as the plant grows and fruits in one season, the fruit often has an opportunity to develop before the cold sets in, in the latter of December. There are several varieties of this plant. They grow from 10 to 20 feet in height, each stalk producing one bunch. Each bunch has from 50 to 150 bananas according to the variety and the season. The stalk comes up in the spring, grows and fruits the same season and then is cut down. A sucker will come out from the root which will make the stalk for the next season. The plant is propagated by breaking these suckers off and burying them in the ground, all but the top. After the plant is once started, numerous suckers will come up from the roots so that it is not necessary to replant every year or to plant very thickly, as the ground will soon be covered by the suckers from the original plant. They require no cultivation but need rich muck land or leaf mold. From 700 to 1,000 bunches may be obtained from the acre which ordinarily sell from $.75 to $1.

The Guava.

The Guava is an oblong pear shaped fruit, which compares favorably in size to the peach, but has small flat seeds and has been described as having a taste peculiarly and decidedly its own. Their principle use is for the making of jam, jelly and marmalade. They are packed in crates holding from 15 to 20 dozen each, but will not stand rough handling. The trees are usually planted 15 to 20 feet apart and are somewhat on the shrub order, as a tree (?) years of age will be from 20 to 25 feet high. They are rapid growers and will bear two years after planting, are very sensitive to cold, but when killed to the ground by frost will sprout up and at the end of the year will begin bearing again. To a limited extent they are ever bearing, as there can usually be bloom and ripe fruit found at any time of the year, but the principle crop is produced in June, July, And August. An

average tree will produce about 10 crates which sell from $1 to $1.50 each. They seem to thrive well in any of the soils but the poorer lands need fertilization to cause trees to produce well. Other than this fertilization the trees need no cultivation after they are well started.

Cocoanuts.

These can be grown but are not produced to any great extent, trees being usually planted for ornament. They grow very rapidly and will begin to bear in 6 or 7 years. The tree will reach a height of 40 to 60 feet and have no limbs except the long stems which hold the fan shaped leaves at the top of the trunk.

Pineapples.

Pineapples can be successfully grown, but as their production did not prove profitable their growth has been nearly discontinued.

Strawberries.

Strawberries are well adapted to the country and will fruit about Christmas, but are not raised to any great extent.

Pineapples and strawberries both require from 1,000 to 1,500 pounds per acre of fertilizer which costs from $35 to $45 per ton.

Farms vary in size from 1 to 640 acres, the amount of cultivated land on each being in the same proportion, there being no uniform size or amount of land owned or cultivated by one man. Farm lands range in price from $1 to $75 per acre, according to location, quality and suitability for raising various products.

Wages for farm hands average about $1.50 per day and board themselves. Wages for single horse, $1.50 a day and fed by the owner.

Rough pine lumber is worth $17 per thousand feet. Pressed pine lumber, $20 to $25 per thousand feet.

The following field crops are raised by nearly all farmers except oats and rye which are raised to a very limited extent:

Sugar Cane.

Four varieties are raised, locally known as the ribbon, green, Bowman, and Japanese. The cane is planted in December and January and cut from the following October to January. The cane in the section does not make good sugar as it does not seem to granulate properly, but makes a fine quality syrup. Hammock lands are considered best for syrup and pine lands for sugar. The cane is used quite extensively for feed, being cut when green for fodder. It is planted by laying the stalks lengthwise in a furrow and then plowing it under. One thousand stalks will plant an acre, such stalks being considered worth about 1 cent each, two men and one horse planting an acre a day. After the cane begins to grow it requires three plowings and two hoeings. A man and horse will plow an acre a day and a man can hoe about one-half an acre per day. In harvesting the cane one man can strip and top one-fourth acre a day and cut one-half acre. One man and team will haul one-half an acre per day when mill is close. Three men and horse will make two

barrels of syrup per day, using one-half cord of wood worth about $2 per cord. Barrels for syrup cost $1.50 each and hold (?) gallons, weight of syrup being about 1 pound per gallon. A one-horse wagon can haul 2 to 3 barrels at a load. A cane mill ready for running would cost $60, kettles costing $15 each, two being required for each outfit. An average yield is about 8 barrels per acre and sells from .60 to $1 per gallon.

Rice.

Rice is planted in the latter part of May or the first of June and usually not flooded, is raised on either pine or hammock land, low hammock being the best. Land is plowed and pulverized and the rice planted with either a drill or sown broad-cast. Where drilled it is plowed or hoed, is raised in tracts of 1 to 5 acres, cut with a sickle or scythe bound in small sheaves and the grain beat out. It is worth about $2 per bushel in the husk, the cost of raising one acre. One-half bushel of grain will drill one acre. One man and horse will plow an acre per day, also pulverize an acre per day and will plant or cultivate two acres per day. Two men will cut and bind one-half an acre per day. One man will beat out and clean one-quarter acre per day. Sacks cost 5 cents each. An ordinary yield is about 50 bushels per acre.

Oats and Rye.

Oats and rye are raised the same as rice and are used in the sheaf for food.

Sweet Potatoes.

There are a number of varieties of sweet potatoes, but there is no marked difference between them. They grow well in all the soils except the muck and black soils. They yield from 50 to 300 bushels per acre, about 100 bushels being a fair average, the price running about .75 per bushel. The cost of raising one acre at the time of digging is about the same as the cost of an acre of rice at the time of cutting. One man and horse will dig and sack about half an acre per day. They can be kept till the time of planting the next year by storing in houses or burying in conical pits the same as potatoes in the north. The usual time of planting is June and July, although they have been planted as late as August. They are raised in tracts of one-half to five acres.

Irish Potatoes.

Irish potatoes are raised in tracts of one-half to five acres and cost about the same to raise as sweet potatoes, but the seed costs more and the crop is not as sure. They grow best on the black land producing the same as sweet potatoes, with a selling price of $1.75 per bushel.

Corn.

Corn is raised in 5 to 20 acre fields, yielding about 20 bushels per acre and has a selling price of .75, is usually planted by March 1, and snapped early in August. It is only raised for feed.

The only forage raised is cow peas used as pasturage and hay, each farmer having from 1 to (?) acres. They are either drilled or sown broad-cast, the land being prepared the same as for rice and produces 1½ tons per acre, are sown from March to July and

mature in three months, are cut when they begin to ripen. Two crops can be raised in a season.

Crab grass comes up and grows voluntarily and is used for pasturage and hay. It will yield 1 ton per acre and is worth about one-third less than timothy hay. Two cuttings can be made in one season, one in July and the other in October.

Pine.

There are two species of pine, locally known as 'slash' and 'spruce'.

Slash pine grows in sandy land, is very pitchy and is used for lumber and turpentine purposes.

Spruce pine grows in sand hills and has no value except for poles.

Cypress.

There are two varieties, the white and black, both growing in the same locality and of the same value. They grow in the deep swamps in a black or muck soil and are used for lumber and shingles.

Oak.

There are seven varieties, but none of them grow very extensively.

The live oak is the common variety and is usually found around the hammocks. When large enough is quite valuable for timber.

The water oak grows in the low land but is not of much value.

In the prairies there is a species of oak which grows from 1 to 2 feet in height and bears a large acorn which makes it valuable for hog feed.

There are also a few black jack, burr, willow and post oaks, which grow in the high land, but are of no value except for mast.

Cabbage Palm or Palmetto.

The cabbage palm or palmetto grows on the hammocks and along the high rich banks of streams. The wood is soft and spongy and is used some for piling as it is durable in the water. This is the most common of the palm family. It has a bud in the center of the top which is frequently cut out and used for food, being prepared the same as cabbage and is locally known as 'swamp cabbage'. The trunk which may be 12 to 15 inches in diameter, is bare of branches, all the foliage being at the top. The trees are often 30 or 40 feet in height.

Mangroves.

The mangroves are found along the borders of streams and the coast where the water is salty or brackish. It has many branches, the roots often starting several feet above the ground, making it very difficult to travel through.

Button wood.

Button wood is another salt water growth somewhat the nature of sycamore. A growth of button wood and mangrove indicates that the water is more or less salty as they will not grow where the water is always fresh.

Maderia.

Maderia grows along the southern coast. It is very hard and durable, takes a good polish and is used for furniture.

Wild Fig or Rubber Tree.

The wild fig or rubber trees are occasionally found. Their popularity is that roots often start from the branches or trunk a number of feet above the ground. If the seed should be dropped in the bark of another tree, it will begin to grow, sending roots out toward the ground and branches up in the air, the roots winding around the trunk of the tree which they will eventually kill and in time the original tree will decay, leaving a hollow rubber tree in its place.

There are several other varieties if palms and other trees, the majority of which have been planted for ornamental purposes, although it is claimed there are a few native royal palms in the southern part of the country.

Wild Animals.

The bear and panther are still found in and around the big cypress country while back from the settlements white tail deer are quite plentiful and throughout the country bobcats, coons and possums abound. Around the vicinity of hard wood timber and other places where there is suitable food, gray and fox squirrels can be found, while cotton tail and swamp rabbits are scattered throughout the county. Timber wolves at one time were plentiful, but their destructive habits toward stock has caused them to be hunted so relentlessly by stockmen that they are now very scarce. The animals which have attracted the most attention in the country are the otter and alligator. On account of the immense area of swamp land, it has been the natural home of these two and they have been the source of such revenue as for several years a large number of persons followed hunting almost exclusively as an occupation. Otter hides bring from $4 to $6 each and the alligator on account of their numbers and the fact that the hide was good the entire year although the price varied according to the size, and was not very high, made hunting quite profitable. At the present time both these animals are becoming so scarce that there are very few other than the Indians who make an exclusive business of hunting.

Snakes.

While snakes are quite numerous and there are several varieties, snake stories in regard to this section have been greatly exaggerated. The diamond back rattler is the most dreaded of Florida snakes. It is very seldom a person is bitten by one of these snakes, but there have been some deaths caused by their bite, but it is thought it was due to the lack of proper attention. These snakes are not plentiful and one may travel for several weeks or even months in the wilds of Florida without seeing one. There is a little rattle snake locally known as a ground rattler. This snake is quite vicious and will bite, but so far as known, no fatalities have resulted from its bite. There are two varieties of moccasin, the more common one being locally known as the cotton mouth from the fact that the mouth when opened is white on the inside. These snakes are about (3?) feet in length, quite thick and of a dark color and lie around the edge of the water. When disturbed they open the mouth very wide, the upper jaw turning nearly back and they bite only when the object

comes very close. They are quite poisonous but not fatal. The other moccasin is a bright copper colored snake and known as the copper moccasin. They are rather scarce and not much feared. There are three varieties of black snakes, the largest of which is known as the gopher snake which sometimes attains the length of 7 feet. These snakes are considered harmless. There is a snake known as the whip or tree snake which has a length of 4 to 6 feet and is often found around the settled sections. While it has rather a vicious appearance and will bite, it is not poisonous. There are a number of smaller snakes usually known as grass snakes, none of which are dangerous.

Birds.

There are many varieties of birds, some of which are migratory, going north during the summer season. They can be considered under three classes as song birds, plume birds and game birds. The song birds are numerous and are the same as found in other sections of the state, the plume birds are of three species and are found around the swamps and sloughs. They are the long white crane, a pure white bird about 2 feet in height, having on its back fastened between the wings, from 12 to 24 long white plumes. The plumes from one bird usually bring the hunter from $1 to $2. The egrett [sic] which is also a white bird but not as large as the long white, has a bunch of plumes curving upward at the tip and from 6 to 8 inches long, each bird bringing the hunter from $1.50 to $3. The pink curlew or roseate spoon bill is a bird with pink feathers and a broad flat bill. As the plumes of these birds are at their best at the nesting time, it is then that they are hunted. As large flocks nest in one vicinity, they are easily killed and have been hunted almost to extermination. They are now protected, it being unlawful to either kill or deal in their plumes. The principle game bird is the wild turkey. They have been very plentiful but, owing to the persistency with which they have been hunted, they have been driven back from the settlements and are becoming somewhat scarce. Sandhill cranes are frequently seen around the sloughs in the pine woods and there are several varieties of ducks. Jack snipe may be found in the winter and quail are numerous around the settlements, some being scattered throughout the pine woods countrys [sic].

Insects.

The common house fly where cleanliness is practiced is not a source of much annoyance. In March or April a large black and also a large gray horse-fly make their appearance. They last from 4 to 6 weeks and are very numerous around the marshes and swamps and will kill both horses and cattle when they are left unprotected. These flies are followed by another horse fly, being a yellowish color about the size of a honey bee but they are neither so plentiful nor worry stock so much as the two preceding varieties. Deer flies are very numerous around oak wood and mangrove swamps. In the past few years there is a stock fly a little smaller than the ordinary house fly which seems to rest entirely on stock, never leaving them. Often times these flies are the cause of sores around which they gather and if the cattle are left uncared for, may cause their death. During the fly season horses are protected by coverings while the range cattle gather in large bunches and protect themselves during the day passing back and forth among each other. Mosquitoes in places can usually be found at any season of the year but they are not the source of any great annoyance, except during the months of June, July and August. They seldom bother in the open pine woods and are the worst along the coast, though often bad

around any tract of swamp. When the mosquitoes are bad it is necessary to use a protection made of fine netting and in some sections it is necessary to protect animals and even poultry at night. Along the coast and for a few miles back there is a very small fly or gnat, known as the sand fly. They are the most numerous in the vicinity of sandy ridges. Their bite is even worse that that of the mosquito and they are very hard to screen off as it requires muslin and calico to turn them, their season being about the same as that of the mosquito.

Frost and Freeze.

The freeze of 1894 caused much widespread damage in Florida. At Ft. Myers the thermostat went down to 24 degrees above zero, while in 1906 it fell to 20 above. These freezes killed many of the young citrus trees to the ground, damaged much of the fruit on the trees and killed nearly all the tropical plants to the ground. Sudden chilling of the shallow waters caused the death of many fish.

Overflows of the Caloosahatchee River.

These overflows have been frequent during the past 30 years. The highest water known occurred in 1878, but as there was not much settlement in the valley at that time no great amount of damage was done. In September 1903 a general overflow occurred which did serious damage to the fruit growers and the farmers along the river valley. The field and garden crops were drowned out and many of the citrus trees were killed. The water was over the average surface along the valley from 8 to 14 days. In August 1906 there occurred another overflow which from the extent of damage done, was the worst that had ever occurred. The water was not quite so high as the 1878 flood, but it remained on the valley longer and had the greater amount of property to destroy. This flood again drowned out the field and garden crops, killing many fruit trees, the water coming up into many of the dwellings, causing the occupants to abandon their homes from 1 to 3 weeks, the water standing from 3 to 5 feet in depth over the valley. The residents of the valley earnestly desire a partial drainage and lowering of Lake Okeechobee or a dam to be constructed west of the lake which will hold the waters back.

Lumber and Turpentine.

No turpentine is produced in Lee County and very little is being done in the lumber industry. As the pine forests are gradually decreasing, the pine products are increasing in price. It is thought that the pine in Lee County would make good turpentine orchards. Farther north in the State a turpentine farm consists of 10,500 trees which would cover an area of about 300 acres of scattering pine. Such farms are operated for three consecutive years and should produce-

125- 50 gallon barrels of turpentine at 70 cents per gallon…$4,375.00

375- 200 pound barrels of resin at 5 cents per pound……..5,260.75

The land would then produce 1,000 feet of lumber worth $2 per thousand standing. The actual cost of operating such a farm would be about (?) per annum.

Pasturage.

Pasturage is very important to the stock raiser. Free pasturage and the native grasses are becoming scarce. The continual grazing and the natural fires apparently are

killing them out. The best grazing is in pine lands, prairies and marshes, such lands being considered worth from 50 to 75 cents per acre for grazing purposes. If these lands were drained, Bermuda, St. Lucy or Cuba grass could be produced. This would greatly increase pasturage with a more nutritious grass. The cattlemen are beginning to improve their stock, and more pasture lands are desirable.

Improving Land.

The cost of clearing and improving an acre depends on the growth of timber. An acre of heavy oak or pine land cleared of all its timber, ready for the plow, will cost from $40 to $50 per acre. Open pine land, with but few trees will cost from $5 to $10 per acre. Heavy saw palmetto and scrub oak land will cost from $25 to $35 per acre. This class of land is full of palmetto roots, which must be grubbed out root by root, the entire acre being literally dug up. Fencing with wire ranges in price from $5 to $7 per acre. The average lands when so cleared are well suited to all kinds of vegetables, oranges and grapefruit. From $200 to $500 per acre is a reasonable income to expect from one acre planted in vegetables, such as tomatoes, cucumbers, cauliflower, celery, cabbage, eggplants, lettuce, peppers, stringbeans, squash and even strawberries. Vegetable growing has been a very quick and profitable industry, especially early vegetables. Egg plants and tomatoes can be planted so that they can be put on the market in November and December, while such vegetables as peppers, cucumbers, squash, celery, lettuce and beans may be planted in October and placed on the markets in the winter months. All of these vegetables may be planted in January so that the shipments can begin in March and April, the ordinary pine woods being the best suited to the spring crops as they do not dry out so readily which is very desirable with spring crops where there is no means of irrigating."

January 28.

Left Ft. Myers at 7:30 A.M. in a light covered rig, driving Hadley's pony and one of Carson's. Had forage supplies and camp equipment sufficient for one week. (?) Funderhide at work about 9 A.M.; had dinner at the 16-mile post. We were following the old military trail and stopped that night with Mr. (Barron?) at Immokalee. The road over (?) we passed was very sandy, made about 32 miles. Singletary tried two shots with the rifle at a sandhill crane 300 yards away but missed. In the afternoon I shot three times at a sandhill crane with the rifle but missed. Timber very open, could see at any time from one-quarter to one mile. I estimated that one-quarter of the country seen during the day was prairie. There were many sloughs, some dry others with water in them. There were

also a number of cypress heads. Near Kenneday Carson's house there is quite a distinct channel washed out. The drainage apparently is southward, the surface being a series of low ridges and sloughs, the sloughs forming rather an indefinite channel. When the sloughs become deep enough, the cypress timber grows and they are called cypress heads or strands. All cypress seen was very small. The other timber is slash pine from 3 to 12 inches in diameter. The only undergrowth is saw palmetto 12 to 30 inches in height. In the vicinity of Immokalee there is a rise of land covered with hard wood undergrowth.

January 29.

Left Immokalee at 6:30 A.M. and soon entered an extensive prairie, interspersed with sloughs full of water, small clumps of pine, a few hammocks, and many patches of saw palmetto and apparently a continuous body of cypress to the south. Crossed the Okaloacooche[1] [sic] slough at the Widow McLane's, where she lived having a cabin and a few fruit trees. The slough was bordered by thick cypress, approximately 600 feet in width, some very large trees. There is a fairly well defined channel but obstructed with timber. Continued on through the prairie as described above, and passed through numerous hammocks and cypress heads in the vicinity of Leaning Oak. Stopped at Rock Lake for noon, although it was quite late in the day. Rock Lake is a clear open body of water 1000 feet in diameter. The banks are covered with cypress so that the lake is not noticeable till one is at its banks. Many white birds were flying around and lighting in the trees. The next 5 miles the road was crooked, winding around hammocks, cypress heads and patches of saw palmetto. On account of a scarcity of water, camped at 4:30. Just at dark, Singletary located the roost of a wild turkey.

January 30.

Arose at daybreak and shot the turkey Singletary had located the night before. Were on the road at 6:30 which ran through small prairies bordered by cypress heads and hammocks. Crossed a number cypress strands. While walking ahead of the team I saw a turkey about 200 yards away. I sat down in the road and Singletary began calling. The turkey came to within 30 yards, and I shot it. The country became more open. We sighted the Mission at about 10 A.M. and reached Brown's about 11 A.M. where we had dinner. When two miles from Brown's, a Seminole Indian, John Pierce, got on to ride with us. He is said to be a descendant of Oceola [sic]. After arriving at Brown's, he took me out into the Glades in his canoe. The Glades in front of Brown's are very open, small patches of saw grass, a few hammocks with the water about one foot deep. Their appearance was much different than I had expected to see. Left Brown's at 2 P.M., traveled northwest about 10 miles through open country, some cypress heads on the left, pine islands and hammocks on the right. Crossed several outcrops of limestone, one being at the Mission. Drove till dark on account of not being able to find water. Camped at Bill Crawford's cabin. He had his family there and was looking after fences for cattlemen; had planted out a few fruit trees. Crawford had hunted in the Glades, said there were times when he thought the water from opposite Little Cypress, flowed both north and south. Thought there might be a light divide near there in the Glades. Said there was a wide ridge in the middle of the Glades. The channels were along the east and west shore. The east side was more brushy than the west, the heaviest saw grass being in the vicinity of Lake Okeechobee. A canoe could be taken from Brown's along the west shore to Lake Hicpochee, thence through the canal into Okeechobee.

January 31.

Left Crawford's at 7 A.M., drove north without a road through open prairie, interspersed with a few pine islands, hammocks, saw palmetto beds and an occasional cypress head. Saw many sloughs but all dry. Could not get water for noon till 2 P.M. While stopping at noon, shot a coon in a cypress tree. Then traveled through timber till about 4:30 at which time we struck the trail of Brett's camp wagon and followed it till sunset and camped where he had been in the evening before. Just after dark I signaled Brett's camp by firing shots. The weather during the day had been cloudy with a number of light showers.

February 1.

Left camp at 6 A.M. and found Brett's camp in about 2 miles. He was starting to run a line out into the Glades. Left Brett's camp at 8 A.M. for Labelle. Carson, Brett's teamster, went with us for food. Till we reached the Clay place, where we had lunch, the country was open with timber to the south, similar to that passed through the day before. Had a fairly good road after striking the Travers house. Thought a line of level shout be run from the Travers house to Lake Hicpochee and another from bench mark 19 to the west end of the canal. From the Clay place the road was through pine timber interspersed with small prairie, cabbage palm and hammocks. Arrived at Labelle where we camped at 4:30.

February 2.

Left Labelle at 6:30. Drove through cabbage palm and pine timber and saw much saw palmetto, taller than any seen father [sic] south. Passed a number of orange groves but the road ran too far from the river to see much of the groves. Crossed the Orange

River at Buckingham, had shell road from there to Ft. Myers, where we arrived at 4:30. Apparently the frost during the last week in December had injured to a more or less extent all of the groves along the route. Small trees were killed to the ground and much of the fruit had been injured by the frost. All tropical plants such as bananas and guavas were killed or badly injured. Nearly all of the country traveled over during the week was fenced into large pastures by cattlemen. Those fences apparently are run without regard to ownership, or land lines and are often miles in length, a man sometimes being hired to patrol these fences and keep them in proper condition. Quite a number of cattle were seen. They are a small variety and apparently no attention is given to breeding. Hogs are allowed to run at large and often become so wild that it is necessary to catch them with dogs and load them into (?). When they are not too wild, they are driven out of the timber by men on horseback. While it would be impractical to travel any distances in a straight line through any of the country seen, it is not difficult by signaging [sic] some to go in any direction. Very few settlers or farms were seen in the county traveled over.

February 4, 5 and 6.

Spent at Ft. Myers in making up reports and accounts, and preparing a load of supplies ready to go out to the Mission for the two camps. While at the hotel met Mr. Tenny and White of the Bureau of Plant Industry and Mr. (Nell?) of the Bureau of Forestry, U.S. Department of Agriculture.

February 7.

Left Ft. Myers at 7 A.M. for Brown's store in company with E.D. Walsh, teamster, and a 4-mule team with a load consisting of 1,100 pounds of subsistence, 1,400 pounds of forage and 300 pounds camp equipment and other material. Roads very sandy.

About 2 P.M. sighted two whopping cranes. While trying to get a shot at them saw three others in easy range, two of which I killed at one shot. An hour later a flock of 7 quail ran across the road. Killed the entire bunch at 5 shots. Florida quail have more white on them than Illinois quail. Went into camp at sunset in Carson's pasture, 22 miles from Ft. Myers. Dressed the quail and cut the breast out of the cranes. Walsh cooked supper. I rode Hadley's pony the entire day. The route was the same as traveled on the 20th.

February 8.

Left camp at 6:30 A.M. Passed Carson's house at 7:30. After passing through the gate east of Carson's took left hand road so did not go through Immokalee. Passed a great many sloughs full of water during the forenoon. Had dinner at the Okaloacoochee slough. At this point the slough is approximately 1,000 feet wide and 6 inches deep with a slight current to the south, is full of grass, having no timber on the banks. There was an old causeway at this point which had been built by the army. Walsh said he had crossed here when the water ran into the wagon box and it was hard to find a place dry enough to sleep on. About 2 miles further east passed junction of road from Widow McLane's which we had traveled on January 29. The road lay through an extensive prairie interspersed with hammocks, patches of saw palmetto and clumps of pine trees with a few individual pines and cabbage palms. The cypress timber showed a continuous line to the south. Where the road came near the cypress, it passed through a well constructed gate, after which a fence ran parallel to the road on the north for several miles. Went into camp at 4:30 at the Leaning Oak. Weather foggy in the morning with light clouds later.

February 9.

Left camp at 6:30. About a mile east of the Leaning Oak kept the left hand road, the right hand fork being the one traveled on January 29. Passed point of cypress at 8:30 keeping the right hand road. Passed Crawford's place at 10 A.M. The road lay among cypress heads and hammocks to Crawford's place; high water marks showed 12 to 13 inches above the surface on the cypress in the various heads. From Crawford's to the Mission traveled same road as on January 30. The dog started a deer out of a cypress head. I chased it for a time on the horse but on account of my hat blowing down my face did not get it. Reached the Mission about 1 P.M. where we camped; but none of my men were there. Funderhide had set a bench mark there the day before and I was told he had camped near Brown's. I rode over to Funderhide's camp and found Hadley had started back to Myers with the team and Troutman being sick had also gone back. Funderhide came back with me to the Mission where we found Brett's camp had moved in. Chadwick had not been able to work all week on account of the rheumatism and Carson was sick and wanted to go into town. Out of the two camps there were only enough able-bodied men to make one crew.

February 10, Sunday.

Walsh, the teamster, started back to Myers before sun up. All the men spent the day in camp. In the afternoon, visited an Indian grave. The body was laid in a small box or pen made of cypress logs and could be seen through the cracks. Talked to a trapper by the name of Graham about crossing the Glades but he wanted $3 per day and did not seem very anxious to go, so did not hire him.

February 11.

Singletary went out to locate the Mission and Brown's store with reference to the section corners. I put a stadia ring in the level. The rings which had been sent us were the adjustable kind and would not fit out instruments but by the use of some copper wire, succeeded in getting one of them in so that it could be used. Brett and Funderhide worked during the day in the Glades coming back to camp in the evening. I also put in a water gauge at Brown's store and moved Funderhide's camp back to the Mission. Bought two Indian canoes from Brown for $20.

February 12.

Brett, Funderhide and McLeod with two boats and supplies for five days went into the Glades. Had a talk with Mr. Graham. He said:

> "The water in the Glades runs south, going out at Shark and Miami Rivers. Has seen a good current 25 miles north of the head of Shark River. At high water period saw same current throughout Glades. Thinks there is more fall south of Brown's than north. The water for 5 or 6 miles west of Brown's drains southeasterly into Glades. During rainy season all the prairie is covered with water, hammocks, pine land and saw palmetto patches are usually above water but all the rest covered. Has seen the Glades dry. Can go from Brown's to head of Shark River in a boat during high water period, September to October being the best months."

In the afternoon, rode north along the edge of the Glades. Visited the ruins of old Sam Jones, and another Indian village. Weather clear but very windy.

February 13.

The nights are said to be very cool for this country. In company with Singletary and Mr. Johnson of the Mission, made a horseback reconnaissance in the Big Cypress. Traveled about 12 miles east of south. Visited the ruins of old Ft. Shackelford[2] [sic]; nothing of the old fort remains. The Indians have had a shack near the site and their poles are still standing. The fort was one hour's ride from the Mission and was located in a

small pine island in the center of a small prairie bordered by cypress. Southwest of the fort we entered the Big Cypress by crossing a narrow strand of it. Then followed a series of pine islands and prairies. Another hour's ride taking us to Dixie's camp. Dixie's mother was a negro captured in the Indian wars and his father a Seminole. There were two huts but no one was at home. On our return we found his mother and his wife, a Seminole squaw at the camp. They gave Singletary quite a large piece of dried venison. Another two hours ride took us to the west end of what Singletary thought was Cow Bone prairie where we lunched. As it had become so boggy, we could not take the horses farther; traveled on foot about 2 miles, following an Indian trail; after wading a number of sloughs and bogs, came to quite a large Indian camp on a hammock surrounded by water. An old squaw and two young squaws were the only occupants. They refused to talk and we could get no information from them. From the appearance of the country, thought we were on a bay leading into the Glades, as there were two very large canoes at the camp. The houses consisted of upright poles with a ridge and thatched with cabbage palm leaves but having no siding or floors. Beds were made of flattened cedar poles, resting on upright posts about two feet above the ground. It was quite neat all about the camp and there were many tin and granite iron cooking utensils. They seemed to own a number of hogs, the leader of which wore a bell and they were being fed palm cabbage. Did not reach our camp till sometime after dark. As we approached camp, heard Chadwick firing signal shots which we answered. In the distance rode over the day, a wagon could be taken with very little cutting. There are several places south of Dixie's camp for a short distance where it is very boggy. On account of the bog, we had to walk and lead the horses. The cypress timber as a rule was small and quite thick. The prairies

and pine islands were small and separated by cypress strands having a southeasterly direction. There were also many saw grass sloughs all of which were boggy. From appearances we were in a swamp which was drying and in the wet season there would be very little dry land. We were evidently following the general trend of a light ridge with a swamp on both sides. Rock could be seen in a number of places and in some of the cypress strands by pushing the vegetable matter aside with the foot, the rock would be uncovered. Apparently it was a sheet limestone.

February 14.

Collected soil samples in the vicinity of the Mission, which Singletary said were typical of the country west of the Glades. Mr. Graham passed camp hunting. In talking to him of our trip the day before, he thought we had not been on Cow Bone island but had passed to the west of it. The farthest Indian village reached was about 10 miles south and near the edge of the Glades. The Mission consists of a section of land, a 6-room frame building used as a hospital, two stories high, and a small dwelling house located on a hammock. W.J. Godden in charge is the only person officially located there. The entire plant is in charge of the Episcopal church, the official name being Seminole Mission and Hospital, Glade Cross, Lee County, Florida, post office, Immokalee, Florida. Dr. Godden had two books which related to the history of this country and were quite interesting. Green's School History of Florida, by Edwin L. Green, and The Red Patriots or the Story of the Seminoles by Charles H. Coe. Singletary and Chadwick wrote up notes on the general description of the country west of the Glades. In the afternoon, Carson and I rode to the northwest. In passing a slough Carson noticed alligator signs. He grunted up the gator which I shot, after which it was (rogered?) and skinned by Carson. This was my

first experience with alligators and it was quite interesting. When I returned to camp I found that Mr. Johnson of the Mission had been at Brown's. The Indians had reported seeing the boys in the Glades Wednesday. He also told me that the local hunters had agreed not to work for less than $3 per day.

February 15.

Singletary and I wrote up notes in the forenoon and in the afternoon made another trip out in the country with Carson. We followed a string of hammocks for 3 or 4 miles to the northwest. The rock outcropped almost continuously. The string of hammocks were parallel to the edge of the Glades and 3 to 4 miles from it. We dismounted and walked through a number of cypress and popash heads. After we passed the outside fringe of undergrowth it was very easy to go around in these places. Some of them were quite boggy around a small pool of water which was only an alligator hole. There was quite a little muck in these ponds. In some places the rock outcropped in them. The most of the sheet limestone seen in this vicinity is quite rough, being sort of basin shaped with a rim about 2 inches high. On our return to camp we found the boys had come in out of the Glades. They were out of kerosene and needed a longer tripod. They thought the oil stove would require 3 pints of oil per day.

My observations so far would indicate that the following general facts are true of the country north of the Big Cypress and East (West?) of the Everglades:

Prairie lands and pine woodlands are annually burnt off by cattlemen and hunters. This fire destroys all dry vegetable matter and leaves the sand bare. In the ponds which are too wet to burn the vegetable matter accumulates and forms a muck. The fire also kills young pines. If the surface water could be drained off and the fires prevented, it is

believed that the prairie lands would soon be covered with pine, as a number of young pines were seen at various places in the prairie which had been missed by the fire.

Hammocks are above the water line. Saw palmetto beds are usually above the highwater [sic] line. The more vigorous the growth of palmetto the drier and richer the land. Pine woodland seldom overflows. Prairie lands overflow nearly ever season. Cypress woodland is swamp under water the greater part of the year. The continuation of a long prairie is often a cypress swamp. It is not uncommon to find a circle of cypress, then a circle of saw grass, and then an open pond or fire flag pond. Saw grass grows in shallow water and in a dry time a saw grass pond is a poor place to look for water. Ponds, sloughs and land which are sandy or have a sand bottom, are not boggy when wet. The amount of muck lands in the pine and prairie regions is very small. From observation of water marks on the trees in the various ponds the high water line is about 2 feet above the bottom.

The alligators often dig quite a deep hole in the center of ponds during the dry season so that water is held in a pond that would otherwise go dry. These holes may be 3 feet below the average depth of the pond. It is probable that 4 feet would cover the range from top of hammock to bottom of slough, the average surface being about midway between the two.

February 16.

Rode over to Brown's in the morning to see about hiring two men. Brett and Funderhide extended the legs of the split tripod 25 inches, by using cypress poles. Frank Carson came in with the supply team at 11 A.M. and went out at 1:30 P.M. Marvin Carson went back with him, R.L. Allen being left in his place. The stock was also all

changed, team horses being left in place of the mules. Dr. Godden was digging a water hole near the Mission. The water table lay very close to the surface, the water coming in rapidly out of the sand, which caved easily when a hole was dug into it but otherwise was quite solid.

February 17, Sunday.

S.H. Anderson who claimed to have spent much time in the Glades, was at the camp over night. He said:

> "The water in the Glades runs south and east. Streams on east side give a current to the east. There are a number of small hammocks along the east side north of Deerfield, also around the head of New and Miami Rivers. The heaviest saw grass is along the south shore of Lake Okeechobee and extends south through the Glades along the supposed ridge. The further south, the thinner the saw grass which always indicates shallow water. The Glades consist of patches of saw grass interspersed with open lakes and channels. These channels never exceed 10 yards in width and usually much narrower, there being no particular direction to the open water area."

February 18.

Hired Anderson to go into the Glades and about 8 o'clock. Brett, Funderhide, Chadwick, McLeod and Anderson left Brown's with three boats and two weeks supplies. I took a number of photos as they left, also photoed [sic] several Indians and Brown's and Wilkinson's stores. I also took two photos of saw grass. The saw grass at the surface of the water or ground has a stalk or stem about 1 ½ inches in diameter. It immediately branches out into 12 or more blades. These blades if flattened out would be about ¾ inch wide but in place of being flat have a bend on the center rib which gives them a V-shape, the blades becoming very small at the top and bend very slightly. The new blades come up from the center while some of the outside and lower ones die. Rather a heavy stalk is

sent up out of the center which apparently flowers, seeds and the entire plant dies. The saw is a row of very fine teeth which grow on the blade. These teeth are set forward and when rubbed toward the top are not felt, but when rubbed backward will tear and cut. The average height of this grass is about 6 feet, although it is said to grow to 15 feet (?). It is no harder to get through than the wide bladed slough grass in the north. It grows in muck or marl land and where the water is shallow or dry part of the year. When there are dead blades among it, it burns readily with considerable noise and a very black smoke, the blades burning off to the stem near the ground. Its growth is an indication of boggy or mucky land. It is often burnt in the Glades by alligator hunters to indicate their location to others. Persons traveling in the Glades cut and pile it above the water line to sleep on, such a bed being called a gator's nest. The best tool to cut this grass with is a brush scythe although a machete is quite good.

February 19.

Left camp at 7:30 with Singletary and Allen to explore a road to the south in the big cypress. We were accompanied by Dr. Godden of the Mission. When near the site of Toney's abandoned camp, struck an old road which we followed for 5 ½ hours. Estimated we were 14 miles south and two miles east of Mission. We then rode south one mile farther. Saw the site of a large deserted Indian camp and two lines of fence posts. As the country had become too boggy for horses we walked a mile further south to the timber. There was apparently a solid line of cypress along the south, a large open prairie running to the east and looked as if it ran to the Glades. The entire distance traveled during the day was through small prairies and pine islands separated by narrow cypress

strands, cypress timber all being small. Crossed a great deal of low wet land, some of which was boggy.

February 20.

Allen heard a turkey gobbling near the camp about sunrise which he shot in a few minutes. Singletary and I rode out from camp about 2 miles which was as far as we could take the horses. We then dismounted and followed an Indian trail afoot. As we neared the cypress, the trail became larger and several branch trails came in. After 40 minutes walking through cypress swamp, wading water knee-deep, we came to an Indian camp where we found 4 squaws, 5 children, two boys and one buck, by the name of Phillip Billy, who told us we were at the camp where old Dr. Torry died. The deserted camp seen the day before was Dr. Torry's old camp. From all appearances we were in a cypress swamp directly connected with the main Glades. The Indians said it was 4 miles to open Glades but the water was continuous. Estimated we were about south of of [sic] Brown's near the south line of town 50. We returned to camp at 1 P.M. A few minutes later one of the team horses became bogged in a cypress strand. We got him out by rolling him over, padding his feet with air plant and gunny sacks and then made a roadway of palmetto leaves. This required the work of 4 men about 2 hours but the horse was none the worse for his experience. We then moved camp about one mile north. I followed a trail one hour east and Singletary followed one the same time west but found nothing but cypress swamp.

February 21.

Returned to the Mission where I saw Fred Crawford, who told me that-

"The Indian camp where we had been was in a cypress bay of the main Glades; that there was a wagon trail from this camp to Squirrel (Pens?); that Tom Roberts

> of Miami was one of the best posted men on the Glades in the country. He further said that the flood water from north of his place drained northeast into the Glades while that south ran southeast to the Glades. He thought the west divide of the Glades was near the pasture fence east of Okaloacoochee slough."

Rode to Brown's in the evening and settled bills. Brown said the Ashley boys of Pompano had hunted a great deal in the Glades and were reliable men; that where saw grass is kept burnt off it does not grow nearly so rank as when not disturbed; and that during the past six years he handled 50,000 alligator skins.

February 22.

In company with Singletary started for Ft. Myers on horseback. Rode northwest from Mission along line of hammocks which ended about 5 miles out. No rock was seen after leaving these hammocks. The sheet rock outcrop which apparently ends here, I think is a continuation of the outcrop which I noticed near the Mission and as far south as I have been. The water from near Crawford's is said to flow just north of these hammocks into the Glades which from general appearances, I believe to be true. About 6 miles out passed a prominent mound; also passed Hendry's flowing well. It was a three inch pipe running full, water being very strong of sulphur [sic]. Reached Hampton's place about 2:30 P.M. Hampton is located on a hammock having a small grove of citrus trees and banana plants, but there was no one at home. All the country passed through this place, was prairie, many sloughs, and a few hammocks. Hammocks were numerous and fairly good size in the vicinity of Hampton's, and lay in an east and west direction. This locality is locally known as the Devil's Garden. On leaving Hampton's, entered pine timber. Passed the double gaps and reached Hendry's cow camp at sunset, but Mr. Daniels, the occupant, was away. The entire course for the day was similar to that of January 31. As we had expected to spend the night with either Hampton or Daniels and were horseback

the only supplies we carried were a small piece of bacon, dried venison, a few biscuit and some coffee in Singletary's saddle bags, and had no bedding except a small saddle blanket for each. As there was no one at home at either of these places, we turned the horses in Daniel's pasture and made supper off the bacon and venison, making coffee in an empty tomato can. Similar fare had been had for lunch. We then collected a pile of pine wood and built a large fire, along side of which we lay down to sleep. I arose every hour during the night and rebuilt the fire. Late in the night on awakening I smelt [sic] cloth burning and on examination found that my saddle blanket, the only bedding, was on fire and over half burnt.

February 23.

Arose as soon as it began to get light and made breakfast off the venison and coffee, as the bacon and biscuit had given out. We saddled up and rode west through the open pine woods. The water along this course was said to flow to the north as we were traveling just north of the divide. Crossed several prairies and sloughs full of water which was said to be the northern outlet of the Okaloacoochee slough. Reached Christian's place about 1:30. He had a grove of citrus trees on a hammock which was located on the 12-mile slough, but was not at home. We made lunch of venison and coffee. As we had had no feed for the stock since leaving the Mission and as there was no prospect of getting any nearer than Myers, we changed our course and rode southward to Kenneday Carson's which place we reached at 5 P.M. During the day the smoke from many fires in the woods were seen. These fires had been set by either hunters or cattlemen. Spent the night with Carson.

February 24, Sunday.

We traveled over the main road, reaching Ft. Myers about the middle of the afternoon.

February 25 to March 18.

Made up the February accounts and reports and collected such information by correspondence and interviews as was practicable. Singletary started back to the Mission on February 26 with a load of supplies. On his arrival there on March 2, he found the Glades party had come in on the 20th. I had sent out instructions for them to work in the Big Cypress till I came out to camp again, but as the water in the Glades was falling, Brett and Funderhide thought best to continue the Glades work. As more help was needed in pulling the boats R.L Allen, one of the teamsters, was employed, and on March 4, the party consisting of Brett, Funderhide, Chadwick, McLeod, Anderson and Allen left Brown's to continue the Glade line with the intention of not returning to the west side but going on through to the east coast. Singletary with the other teamster brought the teams back to Myers, one camp outfit being left at the Mission and one at Immokalee. On March 8th and 9th I made a river trip from Ft. Myers to Ft. Thompson and on March 12th started to the east coast, stopping at West Palm Beach, Ft. Lauderdale and Miami. The information acquired during this time is shown in the following:

Mr. William Wilson, Buckingham, Fla., Supt. of Travers Orange Grove- February 27.

Mr. Wilson was chainman on the J.M. Ingram expedition which crossed the Everglades from the site of Old Sam Jones to Miami in 1892.

The expedition consisted of 18 men and they took supplies thinking they could cross in 10 days, but the time actually required was 21 days. They chained about two-thirds of the distance across, but had to abandon survey work on account of supplies

giving out. Five of the men gave out and had to be hauled. Five of the men with the outfit were not necessary for the survey work. Mr. Ingram walked when there was not enough water to float the boats. Both he and Mr. (?) are well spoken of by Mr. Wilson.

Toward the center of the glades there were open places a half mile wide and two to three miles long of clear water from the waist to shoulder deep. Then there would be saw grass strands of similar size where the water was shallow, these strands of saw grass and water apparently had a southwesterly trend, the deepest water being about the middle of the Glades. The eastern side is very rocky and there are a number of hammocks varying in size from 1 to 40 acres in the vicinity of the Miami River. Nowhere was there any current perceptible. A number of small custard apple islands were seen in the center and on the west side. Their surface was about the same as that of the water. The small men on the trip stood the work better than the larger ones. The walking was very difficult and tiresome, but if there had been sufficient supplies the work could have been completed.

The Travers orange grove covers 35 acres and they have a steam irrigation plant. There is only one 3 inch main and four 2 inch laterals laid 200 feet apart. Fifty feet of hose is used and there is pressure sufficient to throw the water 60 feet from the nozzle. A 2 inch hose with a 1 inch nozzle was used, a 22-horse-power vertical boiler which burns ¾ cord of pitch pine wood in ten hours and a duplex 10 x 10 piston plunger pump. Water is taken from Orange River, the surface of which is approximately 6 feet below surface of grove. Plant will irrigate 4 acres in ten hours at a cost of approximately $10.00. To run two nozzles, requires three men at $1.25 per day and one man to tend the pump and boiler. Wood costs $3.00 per cord. Plant was bought second-handed and cost $1400.00. A similar plant, if installed new, would cost about $4,000.00. Plant has been used for 7 years. Pipes are laid ten inches deep with plugs every 200 feet. They irrigate from one to three times a year. The owners consider the plant paid for itself, including the cost of operating the first year it was installed. Have had good crops in dry years when neighboring groves were a partial failure. Irrigation often saves the trees after a frost as the trees when frosted often start up, but if the ground is dry they will die, whereas if properly irrigated they will live. They were irrigating for the third time this year on

account the freeze and dry season. In irrigating, the water is thrown up through the trees. The orchard had a good healthy appearance and produced $8,000.00 worth of fruit the past season, $5,500 of which was profit. Drainage ditches are dug 2 feet in depth where there are no ridges requiring a deeper cut to get fall. These ditches need cleaning every year, but the deposit is only sand and is quickly thrown out. Have in one string of 10 inch tile which works satisfactorily. Ditches are dug by hand; they dig easily in sand but hard in marl. The sand is from 1 to 18 inches in depth underlaid with marl. Rock comes to the surface in some of the neighboring groves. Orange River overflows some at times of excessive rains, but does no great damage.

J.F (Shands?), ex-County Surveyor and Superintendent of Lee County Schools, Fort Myers, Florida,- March 2.

Naples is the only point in Lee County and is one of three points on the west coast where there is a bluff at the edge of the Gulf. This ridge which is covered with oak and is good land, begins twelve miles south of Myers on the Naples road and continues south with a few depressions and flats to near Henderson Creek. A great deal of good land on the east side of the ridge is damaged by water during the rainy season. The stream channels through this ridge are not wide enough to permit the water to escape as rapidly as it collects and as a result the water rises and flows southerly along the east side of the ridge. Estero and Survey Creeks[3] are nearly alike. They rise in the cypress and flow through the ridge. The bed of Survey Creek[3] is about 16 feet below the surface though the ridge, which is somewhat greater than it is on Estero Creek. During the low water period, and at high tide, there is no fall in these creeks which is true of all the streams that flow to the west as far south as Cape Sable. To improve these streams the channels would need to be widened but not deepened. Survey Creek[3] is the natural outlet for Lake Trafford and a channel should be constructed up to that point. In the low water period there is a back current in these streams when the tide is rising. There is a slight divide beginning near Lake Hicpochee and extending south near Rock Lake to the Shark River, this divide separating the Big Cypress from the Everglades, but at times of high water, the water in the Big Cypress and Everglades is thought to be continuous. On account of the flat surface no deep or disastrous floods can occur, but nearly the entire surface may be covered over with a thin sheet of water during the rainy season. The floods kill the wild grass and young timber and the object to be attained in drainage is to relieve the country of the rainfall in a few days so that it will not lie on the ground for weeks as it does at present. Drainage would increase the pasturage and be of benefit to the timber. Do not consider that it would be of any special benefit to drain the Everglades except around the shores of Lake Okeechobee and so far as it is necessary to prevent the present high land

from flooding would estimate that only one-tenth of the county could be cultivated if it was properly drained.

In the deeper parts of the Cypress the decaying vegetation and the dying fish have left a very rich deposit. Under present conditions nothing is claimed for this country that would bring it up to the average of other sections except the climate. South of the Caloosahatchee River cold has never done serious harm. Very few old trees have been injured, and an entire crop has never been destroyed. Young trees have been killed and the more tropical vegetation has been frosted, but no serious or widespread damage has ever been caused by the frost.

The greater part of the country is underlaid with hardpan from one to 4 feet below the surface; this hardpan consists of iron mixed with sand of a red or brown color and is usually, but not always very hard. It prevents the moisture from rising in dry seasons and seems to be poisonous to plant life. Fruit trees will not grow where it exists. It underlies nearly all of the land between Myers and Immokalee, but not under the Immokalee Ridge and some of the sloughs and swamps. There is only one band of sheep being kept in the county, which are being sheared twice a year and are doing well. On average it would require 10 acres of the wild pasture land to keep one cow a year.

A brother (?) is a turpentine expert, does not think the turpentine industry would be profitable in Lee County. The pine contains so many pine products that it would require an improved class of machinery to extract them all. When this can be done the pine would be very valuable, but it will be necessary to cut and roast it. Some sections of pine might pay for turpentine at the present time, but the greatest profit would come from the above method. Much of the pine will sink when thrown into the water. Button wood timber if of any size indicates salt water. Maderia timber is very sensitive to cold and does not grow in Lee County, but is to be found farther south; it is a very fine wood, will take an excellent polish, but not plentiful and its growth indicates salt water.

Sheriff Tippins has sounded Rock Lake and found the depth varying. At one point rock bottom would be struck within 4 or 5 feet of the surface, while only a few feet away it might be 70 feet. Apparently it is a rock bottom with very deep basins in the rock.

(W.A.?) Roberts, timber estimator and land locator, Ft. Myers, Florida,- March 3.

Water in the Big Cypress will drain to the south or southwest; channels could be constructed into this section from the heads of any of the creeks. Lake Trafford has an outlet to the south nearly as good as the one at Survey Creek.[3] Most of the cypress strands dry up in a very dry season. The deepest part of the cypress swamp is in the vicinity of Deep Lake. A prong of the main swamp which is the outlet to the Okaloacoochee slough runs on each side of Deep Lake hammock and very seldom goes dry. The natural location for a large drainage channel would be up this swamp and on up the slough. There must be a rim of rock or hard material about the head of all the streams that empty through the west coast as there is practicably tide water to the head of the streams, where the channels

disappear and there seems to be no erosion above that point although there are swift currents at the high water period. The channels of these streams are rocky. Shark River has a rocky channel and a swift current at its head in the high water period. At low water the tide runs nearly to the head where the channel suddenly disappears into the Glades. At the high water period have traveled by boat 30 miles northeast of the head. In the Glades, this section is very rocky, having only a small amount of muck and not considered worth reclaiming. There is a big pine island near the head of Shark River, also several smaller islands, but they are so rocky as not to be of much value. Have known the Glades to be dry around the head of the river. There are also several islands and hammocks lying in the Glades east of the main land up to township 30.

The saw grass growth in the southern Glades is very light. There is much open water with a light growth of marsh grass.

Along the south shore of Lake Okeechobee no banks. A border of custard apple 1/8 to 1/2 mile in width and continuous reaches of saw grass, some of which appear to be 15 feet high. The custard apple was from 4 to 6 inches in diameter and 15 to 20 feet high. There was a good channel 18 feet deep with a hard bottom for a distance of ½ mile, from the main lake into Pelican Lake. As far as could be seen from Pelican Lake there was apparently a clear channel with a good current which might make a good drainage channel. The drainage needed by the country is channels sufficient to keep the rainfall off as rapidly as it falls. Hyacinth and wild lettuce which grow in deep clear water would not live where the water is rising and falling and would not interfere with a drainage channel.

In the Big Cypress section rock is near the surface often being on top in the prairie and pine lands. In the cypress it is from 12 inches to 18 inches below the surface. In some places it is boulders and others sheet rock, but there is soil enough for cultivation. The cypress is good along the deepest part of all the strands, but other places it is only scrub and not of much value. There are more and larger hammocks than farther north. Deep Lake hammock had two hundred acres cleared and a little drainage would give 250 acres more. There is also another hammock which covers 200 acres. In the country north of the Big Cypress, hardpan lies from 18 to 36 inches below the surface and the strata is usually from 3 to 4 inches thick. This strata is poisonous to fruit trees, but probably would not effect [sic] vegetables. Only hammocks and pine lands free from hardpan are good for grove. Hardpan does not underlie ridges, hammocks and cypress swamps, but probably underlies the pine and prairie north of the Big Cypress, but there is not so much of it in the Big Cypress. Mangrove marshes are not worth reclaiming. Estimate that about ½ the area of Lee County could be cultivated if drained.

Capt. Fred Menge, Fort Myers, Florida- March 3.

Had charge of the dredge excavation for the Disston Company. The machine used was a Menge bucket dredge. All the excavation done was in muck. Cut a channel 7 feet deep, 20 feet wide with vertical banks. Average 220 feet a day of this work or a mile per month. One day cut 600 feet. Ten hours was considered a day's work. Burned ¾ cord of wood per day. Tests were made on the growing qualities of the muck. It would raise good corn but rice was all straw. If the Everglades soils are drained it will require a system of gates and dams or some method of irrigation to prevent the soil from becoming too dry.

The average depth of Lake Okeechobee is about 12 feet. On the south side the lake gradually increases in depth. It could be lowered four feet below low water without injury which would bring the edge of the lake about to the edge of the present vegetation line. The lake should be used as a reservoir during the rainy season. Muck could be used for a levee water would not percolate through if not too high.

Went south from the end of the 13-mile canal to the boat landing making soundings. The rock raises to the south at the south side of the lake. It was 12 to 15 feet to rock. Opposite the boat landing it was about six. There was usually about 4 inches of sand on top of the rock. There were no hammocks near Lake Okeechobee or this line of soundings. The 13-mile canal was in a continuous reach of saw grass with little open water. The saw grass was often 12 feet in height. The material excavated was all of one kind, being a stringy rooty nature and would burn if dry and did not cave after excavating.

Dr. J.E. Brecht, Fort Myers, Florida.

Formerly Indian agent at Immokalee, Florida. Has traveled over a large area of the country in locating Indian lands. Only the hammocks lying between Immokalee and Brown's is of any value. The other land is too sandy or rocky. The Everglades south of Brown's would have little value if drained, only lands around Lake Okeechobee being worth reclaiming. The drainage of the Everglades would remove the barrier to the east winds which often cause freezes on the east coast and are prevented doing damage on the west coast by the warm moist air of the Everglades. Hardpan is poisonous to the vegetable growth where the roots reach down to it; if the country was drained below this hardpan strata it would disappear as it is evidently formed by poor drainage as it does not exist around the banks of streams or in the hammocks.

Climate is really the only thing of which this country can boast, as it would be very easy to overstock the market with fruit and vegetables, so as to make their production unprofitable.

Captain Hendry, Labelle, Florida.- March 8.

Captain Hendry has been an extensive cattle raiser and lived in this country for many years and has always been much interested in the drainage question. Lake Okeechobee now stands higher than formerly; this is proven by the fact that there are points around the Lake where old pine stumps are standing showing that pine has once grown where it would be too wet for it now. The lake could be lowered five feet below its present level without injuring it as a lake. The head of the Caloosahatchee River was formerly about five miles west of Lake Hicpochee. This lake was probably the same level as Lake Okeechobee, as they were connected by a saw grass marsh and are really in the same swamp. Was with Colonel Meigs when the source of the river was traced out. The Everglades muck will raise good sugar cane as it was tested by the Disston people near Lake Hicpochee. The greater part of the Glades would be valuable if drained. Started with the Times Democrat Expedition to go south through the Glades but left them and came out south of Little Cypress. This expedition left Lake Okeechobee at South Bay, which is the highest part of the Glades and traveled south coming out at Shark River. At

point where lake was left the first mile was through custard apple bushes with some willows and an occasional cypress. The custard apple bushes in the appearance resemble apple trees. Saw grass is not as heavy as formerly as the continued burning prevents its becoming so rank. If it is cut under the water or burnt off and the water raises before it starts to grow it will be killed as it cannot start to grow under the water. Stafford (?) of Fort Denaud has found a sand mound in the Glades a mile from the south shore of the Lake; has also located a large open channel leading to the southeast. He knows the country south of the Glades well and his statements are reliable.

The Caloosahatchee River from Fort Denaud to Fort Thompson is very crooked. There are numerous places where the steam boat is turned around the bends by the aid of a push pole and two places where it is necessary to use ropes. The stream is so very crooked that from my observations, I am led to believe that for drainage purposes an entirely new channel would be as economical as to attempt to straighten the present one and would give a greater carrying capacity than could be had by improving the old channel.

The overflows in the valley stand from 1 to 4 feet deep and last from 10 to 20 days and extend down to between Rialto and Alto. Captain Hendry and the steamboat officers say the river banks are widening but that the channel is filling up and bars are forming. They think this is caused by the wash from the steamboats rather than erosion during the high water period and I am of the same opinion after seeing the effect of the steamboat waves. The overflow has caused quite a perceptible ridge to form on either bank.

From statements made by a number of fruit growers along the river probably 25 per cent of the fruit crop for 1906 was damaged by the December freeze. About half the crop had been picked when the freeze came and one-half the remainder was damaged by this freeze. Many of the young trees were killed to the ground or seriously injured. No trees over 7 years of age were killed. The flood which lasted from 15 to 20 days in

September, the cold in December and the dry weather following December has been very hard on the groves.

The Superintendent of the Garvey orange grove thinks hardpan is not injurious if a large hole 4 or 5 feet in diameter is dug through the strata and filled up with top soil in which to plant the tree. Also, thinks a levee should be built in a north and south direction in the vicinity of Lake Hicpochee. This would prevent the wind from driving the water to the westward out of Lake Okeechobee, which in his mind is the cause of the overflows in the Caloosahatchee valley. The canal could be left open as there would not be enough water coming through to do any harm.

Steamboat agent at Sanford, Florida, said that during very high waters, the flood from the Kissimmee River came over into the St. John's. The fall in St. John's River from Sanford to the mouth is only four feet, there being about 10 inches of tide in the St. John River at Palatka.

(?) Moses, West Palm Beach, Florida, was secretary of the Ingram Expedition. No levels were run. Muck which is more of a peat than muck was from three to ten feet deep. Would all burn if dry and would require some system of irrigation if drained. There is good land along the east side but doubtful if the main part of the Glades are of much value. Reclaimed muck lands are being farmed at Boynton and Delray. These lands are underlaid with sand, leaving the water level 2 or 3 feet below the surface. These lands contain more lime than the Glades, but require fertilizing as some plant foods are wanting.

Makes about the same statement as Wilson in regard to the Ingram expedition. Says Ingram walked when necessary and was not an extra number. They crossed at a very dry time. Thinks the water in the Glades divides running to the southeast and southwest. Saw grass ridges seem to have a little silt in them as they were a little sticky. The dividing ridge where they crossed was about two miles wide. Some of their men gave out from the tiresome walking and short rations. Water from west of railroad and 17 miles south of Palm Beach runs north to Jupiter.

<u>George W. Potter, West Palm Beach, President of Dade county bank.</u>
A fire in the woods every few years is worse than one every year as it is hotter and kills more timber. Cold winds come from north and northwest. Freezes do not come from east.

West of Palm Beach, there is a ridge near edge of Glades, but at high water Glades water comes over into Clear Lake and the Indians bring their canoes into Clear Lake.

Frank Stranahan, Ft. Lauderdale, Florida. New River overflows. The overflow lasted for a month in 1906. The banks are higher than the land a short distance back. Glades were dry one season. A rock ridge was shot out at head of New River. Since then much land has overflowed which did not before. Tide runs back nearly to Glades and salt water has been up in the cypress. There are many places in the Glades which will hold water and many places not worth draining.

A resident of Miami says pineapples are planted every 5 to 7 years. The plants are suckers taken from old plants. They can set out 14,000 plants to the acre and get (?) good fruit and will pay well at 5 cents each. They are planted in the sandy ridge land. The pine land is the best. Avocado pears grow best on high rocky land which is worthless for other purposes and is very profitable.

A resident of Delray does not want Glades drained. They prevent frosts and cold winters from northwest. Much of the Glades are sandy and worthless and there is plenty of land without them. Marl prairies grow good Irish potatoes.

J.(?) Frederick, Miami, Florida, surveyor. Thinks there is a ridge in Glades which divides the water. Better to open all little streams in the Glades than one large one. Should drain southeast and southwest. There is a gradual fall to the south. When Glades rise, springs open up in low strands which run southeast from Glades showing seepage or underground connections. Where small streams have been cleared out, there is a big improvement in the drainage conditions. Railroad land maps reasonably correct in topography. People not opposed to drainage but want a good plan and sure that it is right. The pool at the head of the Miami River is 6.75 above high tide or 8.00 above low tide. Snapper Creek is partially subterranean. Ran a line of soundings on township line 6 miles north of Miami, 15 miles west into Glades, muck averages 1-½ feet deep. There were often wide strips of white sand and rock. Land along this line considered of no value, but in the Miami basin six miles south there is a good bed of muck. Made a railroad survey across southern Glades as shown on map. There was nothing of any value on this line. Rock sometimes stuck above the water and long stretches of sand. Muck in places but not enough of it. Saw grass flats were a foot or more above the water. Not over 10 per cent of the area taken from a point 10 miles north of Miami east and west and then south is of any value. Hammocks are too small and saw grass does not necessarily indicate productive land.

Mr. S.H. Richmond, of Miami, Florida.- March 16.- Agent for the Perrin [sic] Land Grant. The Glades below Miami are rocky and are not of much value. The water should be held down to about the present low level to prevent overflow of the east coast. A tract of land near Cutler will probably be protected by dikes in the near future. Land is productive which has enough dirt to plow. Pine lands are stalls south of Miami and are surrounded by a rim of rock. The low places are grass rivers which run to the Glades. The prairies to the south are marl and produce well. Timber fires every year are a good thing. They kill snakes, flies and mosquitoes. Do not injure the growing timber. If the surface went for several years without burning, so much vegetable matter would accumulate that the timber would be destroyed.

The Miami River is smaller than the New. The tide runs up to the rapids. The rapids are very short and rocky and only a small amount of water over them, on March 15th. The river is 50 feet wide at foot of rapids and disappears inside of ¼ mile going up. The river gets wider as it goes down. The banks are low. Would estimate that they are 2 feet above high tide and overflow at the high water period. There are several branches of river between rapids and numerous small hammocks in sight from the head.

From what I can learn the country in the vicinity of and south and Miami is rocky. Rock is full of pot holes in places and other places in sheets. The pot hole formation also occurs in the southern part of the Glades where the rock sticks out of the water, the holes being filled with muck. The muck is stringy and more of a peat and if thoroughly dry will burn. Several companies have been considering the advisability of pressing it into bricks for fuel. Marl prairies if drained are productive. Spruce pine land is said to be the best ground for pineapples as it is very poor land and woods do not grow on it. The Experiment Station at Miami have abandoned many of the tropical fruits as the climate is too cold for successful growing.

Mr. Newman, engineer for the State on the dredge boats says that he ran levels from Miami west. The pool at the head of the Miami River was 6 feet above high tide and for the next 10 miles there was a uniform rise of 3 inches per mile. The next 3 miles were level. The grade of the state ditch is 3 inches per mile and the ditches are intended to be 10 feet deep and 65 feet wide. Some of the rock in the ditch is quite hard and is being blasted. Thinks southern Glades worthless.

Before leaving Fort Myers I decided to make a trip into the Glades from the east side, my object being to meet the Glades party and to get a personal knowledge of the eastern Glades. With this in view I stopped at Fort Lauderdale on the 14th for the purpose of employing one of the Ashley boys who had been recommended to me as experienced

Gladesman. I found that John Ashley was employed in the State dredge. As he belonged to a night shift that had been temporarily laid off for a few days, I secured his services and arranged with him to have a canoe and outfit ready to start on the 19th.

March 19.

We left Fort Lauderdale at 7:30. Were towed up the north fork of New River by a gasoline launch till the water-moss became so thick it clogged the propeller. Banks of river are low and timbered, pine coming down near the stream in several places. The upper part of the channel has been straightened by handwork. Had to drag the canoe through these improved parts. Channel disappeared in open marsh and water very low, the bottom being sandy. For about a mile there was no trail and very hard traveling as we had to pull the canoe and sank into the muck at every step from the knee to the hip. In the afternoon the water became better, and had to do very little leading. About 2:30 saw smoke to the northwest. From its appearance and location I thought the fire must have been set by the Glade party. Camped at 4:45 northwest of dredge smoke and north of Pine Island in the edge of the Glades. Grassy marshes ran east in long strands and the cypress timber ran west in long points. A few small clumps of cypress, myrtle and bay bushes west of camp, but generally open. To the east there was much more timber than open swamp. The route of travel in the afternoon was apparently in a channel or saw grass flat with open strands of water. On climbing a tree near the camp, again saw the smoke to the northwest. Was satisfied it was made by the burning of heavy saw grass. To the east and north was a large tract of heavy saw grass. To the northwest more or less open water could be seen while to the west were tracts of bushes and saw grass. The channels have a growth of small maiden cane, flags and numerous lilies, both white and yellow. The yellow lilies are locally known as ‘bonnets’. The water is from 1 to 4 feet

deep and the leads from 3 to 75 feet wide. Grass shows water has had a current east of south. These leads are very crooked, but the general direction is east of south.

March 20.

Left camp at 7:15, traveled west and north. General appearance same as afternoon of the 19th. Shot a mallard duck, limpkin and cotton mouth moccasin. Three small fish jumped into the canoe. Good water and only had to pull the boat a short distance 2 or 3 times. Low ridges of saw grass, myrtle and bay bushes lay between open grassy lakes through which would run a crooked narrow lead. The appearance from the top of the tree was that of brush land interspersed with meadows and pools. Probably one-half of the land was just above the water level. The thickest bushes are in islands, 15 to 24 inches above the water but these are small and composed of vegetable matter. Sand can be seen in the bottom of the deeper holes in the channels, these holes being full of fish. Stopped for dinner in a little clump of bay bushes, 25º northwest of the north end of Pine Island. Saw no smoke from the Galdes [sic] party to-day. At 4:30 crossed their track. Saw where five men had walked, but could see no sign of where the level had been set up. Camped for the night on a little bay and myrtle island, 50 feet in diameter, the highest part of which is evidently above high water. In the center of the island is a bay tree 20 feet in height. This island has been much used by hunters for camping. These islands are of a vegetable formation and have the appearance of a bush getting started and causing the muck to accumulate. Late in the evening caught a 1½ pound bass which ran out of the channel into the muck.

March 21.

Started east in the morning to follow the trail of the Glades party, but there were so many dry saw grass strands that we could not make any speed. Finally found the trail

of six men and still saw no signs of the level. We were satisfied that the canoes and the work had been abandoned and the party were on their way out afoot and were so far ahead of us that we would not have any chance of overtaking them as we found where the fire had been on the 19th. We then decided to return to Lauderdale. We stopped for noon near where we had nooned on the 20th. It was a myrtle ridge which was the nesting place of plume birds known as the "long whites", quite a number of which were flying around. In the afternoon traveled further west and south than on the trip out. In the evening saw a large area of land above the water covered with low saw grass. Camped on a low wet myrtle ridge in plain sight of pine island and a little northwest of it.

March 22.

Started in the morning with the intention of going to Lauderdale by Pine Island and the south branch of New River, but the water became so shallow that we had to back out and go by the north fork. Had some very hard pulling to get the boat into a lead which would take us to the north fork. While stopped at noon, saw two little alligators. Ashley located a large one in a cave a few feet from where we had landed, but it would not rise to his grunting. He located it by running his boat pole through the muck. After digging some of the muck away he ran the pole down which the gator caught in his mouth. He worked his hand down the pole, catching the gator with his fingers under the lower jaw and by hooking a forked stick under the jaw we soon pulled it out. It was a little over 6 feet in length. About 2 P.M. we met an Indian in a canoe who was going gator hunting. Later in the afternoon saw what I thought was a bald eagle and shot it, but it proved to be a fish eagle and smelt [sic] very badly. Had much hard pulling in the evening; camped in a cypress head, both being very tired. These cypress heads are higher than the surrounding Glades.

March 23.

Led the boat for about 3 hours with such hard pulling, but there was usually a sand bottom. All the deep holes were full of fish, brim, sun fish, black bass, alligator gars and dog fish. Nearly all the flags above the water had attached to them from 1 to 2 dozen small eggs about the size of a BB shot. Do not know what they were. Poled the canoe all the way to Lauderdale as there was no launch or oars available. Poling is very slow work in deep water. On reaching Lauderdale found the Glades party in camp there. They had already arrived at Pompano at 2 P.M. on the 20th. They were somewhat the worse for the trip, having run short of supplies and several of the party had sore feet. Anderson asked to be relieved and I paid him off that night. Allen also wanted to return to Ft. Myers, but I prevailed on him to stay.

March 24, Sunday.

Received two telegrams from the post office asking me to look up the Glades party. Did not understand the meaning of these despatches [sic] as the party had not been lost. Made plans for completing the Glades work.

March 25.

Went up to the State dredge and got permission from the superintendent, Mr. Byron, to use Ashley till the Glades line was completed. I also tried to get a Glades boat belonging to the State, but it could not be spared. I then hired a launch and went by water to Pompano, as Ashley knew of a canoe there which he could get. We went down to New River to near the inlet; then went north on the east coast drainage canal. That canal does not seem to be of much value, for drainage along the section we passed. There were many mangrove bushes on both banks. We secured the boat, getting back to Lauderdale after dark. This boat with the one owned by Ashley was sufficient to complete the Glades line.

March 26.

Brett, Funderhide, McLeod and Ashley with the two canoes loaded with 10 days supplies, left Lauderdale at 8:30. They were towed up New River by a launch. Just after starting the front canoe suddenly filled with water and nearly sank, but nothing was lost. On my return to Lauderdale I went with the launch up the main channel of New River to get a fly belonging to Ashley which we would need for a camp west of Pompano. In the afternoon Chadwick and Allen began a line of levels at Lauderdale which they were to extend to Pompano; thence west into the Glades to meet the line coming from the west. I placed a small water gauge on the railroad bridge at Ft. Lauderdale.

March 27.

Went down to Miami in the morning as I wanted to interview Mr. Roberts and Mr. Butler, for was not able to see them on my previous trip. These interviews are given as follows:

"Mr. George (?) Butler, Miami, Florida, a surveyor and tax collector, thinks there is land enough without the Glades and they would not be a desirable place to live on account of the distance from markets and poor roads. It will require many large channels to drain them which would not pay if it required rock cutting. The water should be lowered to prevent the flooding of the coast. Levees will not hold the water as it would follow the rock. On account of winds, tides are often very high on east coast. It has been found by experiment that muck land will settle (?) to 30 per cent. Three lines of soundings have been run into the Glades between Miami and Lauderdale, by Frederick, McDonald and (?). Think the profiles are on file at Tallahassee in office of Secretary of State. Mr. Ross, State Chemist, knows about these soundings. The Glades peat would make good fuel.

Thomas Roberts, Miami, Florida. Mangrove timber 12 to 13 miles wide along gulf coast. Water works out of Glades all along south coast and up gulf coast to near Chokoliskee [sic] Bay.[4] Shark River has a good channel with long leads. Southern Glades very rocky. Many small islands and some hammocks in Glades south of line west of Miami. Camping places can be found in this section. Many low ridges along east coast. All very low and hammocks small. Ridge all the way down the center which divides the water flowing east and southwest. At high water period water covers this ridge and from a point 10 miles south of Brown's there are strands of water crossing this ridge in many places. Water leads in Glades are in direction of outlets. Much floating bog along the ridge 10 miles south of Brown's. No islands east and north of Brown's. There are

settlements at Flamingo and Cape Sable. Indian canoes best for Glades work. November a good month. Necessary to drain Big Cypress to drain Glades. Low divide between the two. Indians run west from Miami with a gasoline launch at high water.

John Ashley, Pompano, Florida, said there is a lake about 7 miles long but narrow lying neat the center of the Glades 15 mile south of Lake Okeechobee. There is also an area of about 5 miles square which has an elevation about the same as high water. This area is covered with myrtle bushes and lie east and a little north of Brown's. There is a series of myrtle and bay ridges parallel to and lying along east shore. Some small heads extend out farther. At high water can go up east side to Jupiter and can go nearly straight from Lauderdale to Brown's. Much floating tussock land on east side."

March 29.

Drove out to Walter Waldin's farm, 6 miles west of Miami. There was thick, tall pine timber all the way, the best I have seen. Ridges and depressions were more prominent than on the west coast; land very rocky; many places looked as if there were no soil; timber grew right on rock. The depressions are sandy, having more soil. Holes were blasted out for fruit trees and filled with dirt taken from flats. Saw many groves which looked well except for dry weather. The roads were made by piling rock on the roadway and then rolling with a steam roller. The rock in the bed seems to be one mass having no seams. Was told that it could be cut with an ax. Mr. Waldin's place is a hammock at the edge of the Glades. A number of islands could be seen a short way out. The Glades soil here appeared to be more of a muck than farther out. His irrigation plant consists of an 8 inch suction centrifugal pump with a 9 foot lift. Water is supplied by a ditch from Glades. The power is furnished by a 6 horsepower gasoline engine made at Marion, Indiana, 1200 feet of flume 16 inches wide, 12 inches deep. At each end there is a (?) foot section (11?) inches wide and 6 inches deep. Water is let out of flume by 1 inch holes 6 feet apart. Holes closed by wooden plugs. Pump will fill a straight flume 18 inches wide and 12 inches deep with a 1 inch fall per 10 feet. Four men irrigate 4 acres in 2½ hours. Water applied once a week. Pump will run (?) 1-inch holes on a 6 inch head.

On a cold night in December the surface temperature of the garden was raised from 32 to 40 degrees in 15 minutes. Thermometer was placed on surface between streams. Irrigates 100 feet each side of flume. As soon as water reaches end of furrow the hole is partially stopped by a small rock and just water enough [sic] let out to keep the furrow full. The land is a ridge hammock of 8 acres in area. Irrigation pays as it has saved the crop this year. Mr. Waldin thinks pineapples and citrus fruits will grow in muck; that muck levee will hold; expects to levee and drain about 1000 acres. Has fall enough for open ditch. Would like to have water lowered in Glades.

The last hurricane came from the northwest and flooded all the low land, injuring many trees. Land in this section sells from $15 to $1,000 per acre. All lands are fertilized, using from one-half to two tons per acre which costs from $27 to $40 per ton. In the afternoon, drove to Cocoanut grove. Pine timber next the ocean bounded by rock roof 8 to 10 feet high. Country in this section very rocky. There were many nice residences and groves. Visited the Punch Bowl and accidentally met Kirk Munroe and was invited to his packing house to eat oranges (Hassan?) style. Saw many cocoanut and royal palm trees when not in the pine woods. The growth in the low land was very thick with various trees and bushes. Many wild fig trees with their peculiar growth; also mastic and gumbolimbo [sic] trees were seen. All pine woods seen are very rocky and bounded by roof of rock. Saw a hydraulic dredge at work which used a cutter on the feed pipe and apparently was doing good work where there was a good deal of vegetable matter.

In talking with various persons the following general information has been obtained:

Many in the vicinity of Miami do not want Glades drained. Think there is land enough for the present. If too much land is improved there will be danger of over production. They are also afraid it will cause the climate to be a few degrees cooler and will cause the coast strip to become drier in the dry season, as they have the impression that the Glades temper the northwest winds and sub-irrigate the land east. What they want is enough drainage to prevent flooding in the rainy season. The general opinion is that the lower Glades are not of much value, but there is a strip of good land next too [sic] timber along the east side. Nearly all the low land and the prairies overflow at the high water period. The ridges are more prominent on the east coast than on the west. From what I can learn there is a wide strip of salt marsh along the south and west coast but a low ridge next the coast which overflows during storms. One of these ridges is said to run from Cape Sable to Flamingo. There are post offices at each of these points. Tide water runs up high on all the streams which flows southeast and southwest between Cutler and Chokoliskee [sic] Bay.[4] It is also the general impression that there is a wide saw grass flat which extends from Okeechobee to the southern end of the peninsula, nearly all of this flat being under water during the rainy season, but in the southern part there are leads where boats can get through at the low water period, the deeper water being on either side of this flat. The islands or hammocks as they are called are along the east side and across the south end. Streams running to the east are very crooked, deep and have low banks which overflow their channels, disappearing near the glades. Strands from the Glades run out to the heads of these streams. Rock appears near the surface where the channels disappear. At the present time the Glades are lower than they have been for several years as nearly all saw grass land is above water. I am told that the Glades have been

practically dry. Open strands of water in the Glades seem to angle in the direction of outlets. Out some distance from the timber the material is more of a peat than a muck and nearly all of it if dry would burn and if pressed would make good fuel. The Glades land would need irrigation if drained. The groves in truck farms are now suffering from drought and the crop is short and next year's fruit crop will be injured if it does not rain at once. Many are watering their crops and trees in a crude way, there being a few fairly well constructed irrigation plants. It is said that plenty of water can be had near the surface on the east coast. There seems to be no trouble with hardpan in the vicinity of Miami, as they blasted out holes in the rock to plant trees. All muck requires fertilization and its settlement will vary with conditions. Along east coast cultivated lands run in patches on both sides of the railroad.

March 31.

Went to Pompano; left note-books in Mr. Peacock's safe. Mr. Marshall took me out near the Glades where Chadwick and Allen were camped. Drove the entire way through flat pine woods. Low places in the timber had been cleared and planted in tomatoes, the tomato farms on this road being about 4 miles west of Pompano.

Mr. Marshall said vegetables did not do well where saw palmetto grows as it seemed to leave a tanic [sic] acid in the soil and caused the water to have a reddish color. Thinks the Glades should be lowered so they can farm with certainty the lands east. Says the people want drainage. All the low land in the pine timber free from saw palmetto; either sand or muck is fine vegetable land but requires from 1 to 3,000 pounds of fertilizer on all crops, the amount and kind entirely depending on the land.

The greater part of the palmetto on the east coast is of a bluish color. A great deal of the pine woods has been under water in times of flood for a short period. They are very sandy but comparatively free from rock, although an occasional outcrop can be seen. Found the boys occupying an old Indian camp which had belonged to Robert Oceola [sic], which was located on a noticeable ridge near a swamp that led to the Glades. Spent Sunday afternoon in looking up a route to get a line of levels into the Glades.

April 1.

Chadwick and Allen started to run levels while I continued to examine the country to find an opening by which we could get into the Glades, but it soon began to rain which continued till noon. In the afternoon Allen and I located a practicable route for searching the open Glades. There was a heavy wind during the day and quite cool at night.

April 2.

A high northwest wind which lasted all day and night and continued through the next day. Cut line for Chadwick to run levels. At noon fired the heavy saw grass along the cypress. The grass was very heavy, higher than one's head with a coating of dead grass in the bottom. It was very hard to walk through, as one could not see where he was going and the dead grass tripped the feet. The green blades would strike the face and feel as if they were sticking to it. When fired, it burned very rapidly with a black smoke and a crackling sound which could be heard for some distance. This heavy saw grass was about a mile in width. It has evidently been covered with cypress at one time, as there were many dead trees both standing and lying on the ground. We put up a flag on a cypress island out on the edge of the Glades and saw smoke of the Glades party.

April 3.

Continued the line of level out to the cypress island where late in the afternoon we set a bench mark and again saw the smoke of the Glades party. Judging from the distance, thought they could reach the island on the following day. The saw grass which we had fired the day before had burned all night and continued to burn all the day, sending up a large column of black smoke which I knew would attract the attention of the Glades party and give them our location. On our way to camp, Allen showed us the edible bud in the saw grass. He pulled the stalk apart and at the lower end of where it breaks is an inch or two which can be eaten. It is quite tender and does not taste badly. Where this line was run out from pine timber, the pine is bordered by open scrub cypress, and small cypress heads; then there are strands of cypress and saw grass which run out to the Glades, these strands being very thick and hard to get through. The cypress at one time has been continuous, but for some reason, probably fire, a great deal of it has died. The cypress island where we set the bench mark is in the edge of open Glades. The open Glades are flags, lilies, water grass and water. This island is west of all the cypress strands and there are only two or three small cypress heads farther out. There are many bunches of myrtle bushes to the west. These are in sort of rows from 100 to 1,500 feet long and 50 to 200 feet wide, running nearly north and south. In looking at them from a distance they appear to cover the entire ground, but from a tree top they seem to be isolated patches in open Glades and can be passed around without any trouble. At this point I would estimate that they do not cover over one-quarter the area. There is practically no water east of the island but a short distance west of it a canoe could be floated. The surface of nearly all of the islands and ridges are apparently near the high water mark. At a long distance cypress

heads and strands have the appearance of ridges and hills on account of the different height of the trees, the shorter ones being on the outside and the higher ones in the center. In looking over the Glades at a distance, most of the bushes have the appearance of being on ridges which is due to the earth curvature and probably accounts for the fact that they are always spoken of as ridges.

April 4.

Chadwick and I ran a compass line from the Oceola [sic] camp to the bench mark at the edge of the Glades. On arriving at this bench mark we found McLeod and Ashley, they having camped there the evening before. Brett and Funderhide had gone back to complete the line which they closed on Chadwick's bench mark about noon. As there was no water by which we could the boat any further east, we packed out all the camp equipment that was of any value, abandoning the boat. On the way out fire was noticed in Brett's pack. It was at once taken off and an effort made to extinguish it, but one comfort was destroyed.

The line across the Glades was begun February 5th by Funderhide and Troutman, they having carried the line out on that date as far as Wilkinson's Store. Brown's Store is a small Indian trading post located on a sand island which, at the high water period, is about a half mile out in the Glades. The Wilkinson's Store is another Indian trading post, located on a similar island and one-half mile east of Brown's, being about a mile out in the Glades. However, Mr. Brown's Store which is said to be near the place locally known as the boat landing or Bow Legs Promontory, is usually spoken of as the edge of the Glades and in our work we have considered it as the western edge of the Glades and all Glade distances are given as so far east of this point.

From February 11th to 15th the Glades line was continued from Wilkinson's Store by Brett, Funderhide and McLeod with two canoes. They worked out a distance of 6 miles from Brown's, returning on the 15th. As is required all three men part of the time to pull the canoes, when the party returned to the Glades on February 15th, it was increased by Chadwick and Anderson, another boat being also added. It required one day for this outfit to reach the point where they had left on the 15th. The party remained in the Glades till February 27th, having advanced the line to 14.5 miles. On this date they began the return trip, reaching Brown's on March 1st. During this trip it, at times, required the entire crew to pull the boats over the dry strands. The outfit started back in the Glades on March 4th, consisting of the same men as on the previous trip with the addition of R.L. Allen, three days being required to reach the point where they left off on February 27th. When the line was advanced to 18.5 miles the water had nearly disappeared and a reconnaissance showed there was practically no water for 5 or 6 miles ahead. As it was impracticable to take the boats further, they were abandoned, four of the men packing such supplies and camp outfit as they could carry in addition to their bedding, while the other two carried their own bedding and ran the line of levels. In the manner the line was advanced to 30.5 miles. As supplies were becoming very low, all of the outfit was left at this point, except the necessary bedding and the last of the subsistence, and the entire crew started on March 10th for the east coast, arriving at Pompano on the 20th. Arrangements for continuing the work were made as stated on March 23rd to 26th. The party which returned to the Glades from Ft. Lauderdale did not reach the point, where they left on the 18th, till noon of the 30th. The line was then carried forward, two men being able to handle the canoes till April 3rd, when, on account of shallow water, one boat

was abandoned. The other canoe was taken to the point of closing the line at the eastern edge of the Glades. As it was impracticable to get further, it was abandoned there.

One tent fly was the only storm protection carried, this usually being placed under the beds. On the western side of the Glades, beds were made for the night by cutting and piling up saw grass on the drier strands. The ordinary Florida mosquito bars put over the beds, were sufficient protection against dew, mosquitoes and snakes. Cooking was done on a two-burner blue flame oil stove. This stove did not prove satisfactory as the currents of air in the opening prevented it from burning properly and the oil was bulky to carry; but it answered the purpose when there was no wood.

In the eastern part of the Glades sufficient wood for cooking purposes and places dry enough to sleep on could be found. Where saw grass was thick and interfered with the running of the line, it was burnt off, no cutting being required to clear the way.

The boats used were the Indian canoes made from a cypress log, being sharp at the front end and square at the rear, the two ends being somewhat higher than the center. One of the boats which is about the average size was 20 feet in length, 12 inches deep, 30 inches wide, 2 feet back from the front end and 24 inches wide, 4 feet in front of the back end, the widest portion of the boat being 2 feet back of the front end and gradual tapering back. The object of this shape is to prevent wedging in the saw grass, as it is claimed that the boat which is widest near the center will become wedged and is much harder to control. The boats are pushed by means of a light cypress pole from 14 to 20 feet in length, having a small three-cornered piece of wood, nailed to the lower end. This is to give greater bearing surface on the end which is set on the ground. This bearing surface is about 5 inches in length by 1 inch in width. Where there are fairly good leads, a man can

pole 15 miles a day. One of the boats secured at Lauderdale was made out of sawed cypress. These boats are very light, but as they are flat-bottomed they upset easily and when heavily loaded and settled in the muck, are hard to start. The Indian canoe is preferred by nearly all Glade hunters.

From February 8th to April 4th was occupied in running the line from Brown's to Pompano, the level line being advanced from 1 to 2 miles a day. The great difficulty was in keeping up supplies as the entire force was often required to pull the canoes over dry strands of saw grass several time, the entire day being spent in this work.

From Brown's to the 10 mile the walking was very tiresome as one would sink into the muck from the ankle to the knee. From the 18th to the 30th mile, the walking was comparatively easy, but from the 30th mile to the eastern edge it was very difficult as there were many deep strands of water, there being floating bogs or tussocks throughout many places in this section, the worst being the vicinity of the 30th and 36th mile. These bogs are masses of vegetable matter which are partially afloat. When one walks on them, they break through. As one foot is pulled out, the other one continually sinks, making progress almost impossible and being extremely tiresome. Being continually in the water and wet all the time is very disagreeable. The warm water often scalds the feet and the muck working in around the shoe tops is the cause of sore ankles and a water plant known as waumpee, is the cause of an intense burning wherver [sic] the water in which this plant grows strikes the flesh for any length of time. This, however, can be prevented by keeping the limbs well coated with some form of grease, such as axle grease or mutton tallow. Where one's foot will stand it, it is much easier to travel bare-footed, as the feet

can be pulled out of the muck with less exertion and there is not so much danger of scalding or causing muck sores.

There is little real danger in the Everglades, as the weather never becomes cold enough to cause any serious results from that source, and if there is a gun or small amount of fishing tackle at hand and the edible bud of saw grass is known there is no actual danger of starvation. While continuing traveling to the eastward for a few days will bring one to the settlements along the Florida East Coast Railway. So far as I was able to learn there has only been one death caused in the Everglades. This was an alligator hunter who was bitten by a cotton mouth moccasin. Having no remedies at hand and thinking something must be done he drank a bottle of creosote, which, undoubtedly, was the cause of his death.

There are sections even at the high water period, where it would be very difficult to force a boat through the saw grass, but at that period there can usually be found open places where a boat will run comparatively easy, and this is the season when examinations in the Glades should be made, as during the low period the work of walking and dragging the boats or carrying packs, is so fatiging [sic] that little headway can be made.

On April 5th, Pompano elevations were collected to low tide at the mouth of Cypress Creek by Paul Funderhide. As a team could not be secured on the 5th, the camp outfit was not moved to Pompano till the 6th. As I had received instructions to disband at that point, the outfit was packed up, Ashley was released on the 5th and the rest of the crew returned to Ft. Myers. Brett, Funderhide and Chadwick starting for Washington on

the 9th. I remained at Ft. Myers till the camp outfits were brought in from Brown's Store and Immokalee and the business details of the work were settled.

During the period I visited Mr. Washburn's farm which lies 3 miles east of Fort Myers. He has a grove and truck farm in what was originally a cypress swamp and saw grass pond. Apparently he is a very successful farmer. He was fertilizing hit citrus trees by hauling muck from a nearby swamp. He has lately put down an artesian well. This well is a 3½ inch pipe 600 feet deep flowing 400 gallons to the minute and cost complete $1,000.00. So far he has been using it for furrow irrigation, and is having several hundred feet of canvas hose made to conduct the water to distant areas where the water will be applied between the rows. His citrus trees are planted on very high ridges with deep furrows between. Says the water has stood in the grove a number of days without any serious effects. Further investigation might be given to this farm with profit.

## Survey.

At the beginning of the work the location of a bench mark in the vicinity of Ft. Myers was not known, consequently a bench mark was established and an initial elevation of 50.00 assumed. With this initial elevation at Ft. Myers, Paul Funderhide ran a line of levels eastward along the old military trail via Immokalee to the Mission and Brown's Store. Lawrence Brett, from the same point, ran a line of levels along the main road via Buckingham and Labelle to the Travers House, thence along the western edge of the Everglades, tying on to Funderhide's line at the Mission 1.64 feet high. The two parties were then united and the line with Funderhide's elevation was continued across the Glades from Brown's Store to the eastern edge of the Glades.

Later in the season, a bench mark was found at Ft. Myers which had been established by the U.S. corps of engineers during the survey of the Caloosahatchee River. For the sake of uniformity, it was thought best to use the same elevation of mean low water as has been used by the U.S. engineers, consequently this bench mark was connected to the initial bench mark established by this Department and all field elevations run from Ft. Myers to the eastern edge of the Everglades are reduced to the army datum by subtracting 42.32 from each. The distance along these lines of levels from Ft. Myers to Brown's Store were obtained by pacing as there were no stadia rings in the instrument. From Brown's Store, eastward 22.3 miles the distance was obtained by stadia. On account of the time required to make the readings, stadia measurements were discontinued at this point, and no distances were taken to the eastern edge of the Glades. To facilitate the completion of the Glades line, E.F. Chadwick established a bench mark at Ft. Lauderdale and assumed an initial elevation of 10. From this bench mark he ran a line of levels along the Florida and East Coast Railroad to Pompano; thence westward via the abandoned camp of Robert Oceola [sic], to the eastern edge of the Glades where he connected with the Glades line coming from the west. To reduce these elevations to the Ft. Myers datum, 7.35 feet should be subtracted from each. The distance along this line were obtained by pacing. The turning pin used was a ½ inch jointed gas pipe with a steel point which was run down to the sand or rock. This pin also answered as a sounding rock.

From information furnished by the U.S. Coast and Geodetic Survey, the maximum range of tide at Punta Rassa which is at the mouth of the Caloosahatchee River, is 3.6 feet, the mean range being 1.7 feet and at Hillsboro Inlet which is near Pompano the maximum range is 3.7 feet with a mean range of 2.3 feet.

The following bench marks were set and elevations determined. The elevations as given in this list are based upon the mean low water elevatinn [sic] as used by the U.S. Army in the survey for the Caloosahatchee River.

## Bench Marks at Ft. Myers.

20 ft. from South bank of River on Joseph Viva's place at Fort Myers. A chiseled surface cut into the N.E. corner of a rock 2.6 ft. by 3.6 ft projecting about 0.75 ft. above ground.

Wild fig 25 ft. high N. 28° 00' W. 12.5 ft. Dist.
Orange 0.8 ft. diam. 18 ft. high S. 85° 46' E. 11.0 ft. Dist.
Orange 0.8 ft. diam. 9 ft. high S. 56° 25' E. 2.5 ft. Dist.
Vivas' house N.W. cor. main bldg. S. 51° 30' E. 104.5 ft Dist.
Vivas' house N.W. cor. of L. S. 68° 30' E. 104.5 ft Dist.

Elevation 3.873

Initial bench mark set by U.S. Department of Agriculture. Heitman's grocery store corner 1st and Jackson Sts., S.E. end iron plate under window facing Jackson St. 4 feet from corner entrance to store. Raised part of iron plate at corner of brick.

Elevation 7.68

Tide gauge set on east side of Hendry St. dock. Gauge is a 2 inch by 4 inch pine timber nailed to a piling. Opposite first house on dock, approximately 200 feet from above. Gauge is graduated in feet and tenths from top down.

Elevation of zero which is top of gauge 5.03

## Bench Marks along Wagon Road via Buckingham, Labelle and Travers house, thence along the West Edge of the Everglades to Glade Cross Mission.

No. 1 Nail in root of pine tree on left of road about 370 yards E. of railroad track.
Elevation 11.66

No. 2 Nail in root of blazed pine at turn in road. Box nailed to S. side of tree
Elevation 17.76

No. 3 Nail in root of pine tree left of road. Tree blazed and bears sign "E.T. Cox house furnishings." Elevation 16.78

No. 4 X on E. door sill Buckingham's store marked "Ware House".
Elevation 14.97

No. 5 Nail in root of blazed right side or [sic] road.
Elevation 17.22

No. 6 Nail in root of blazed pine. Right of road just E. of Nooning Pond
Elevation 19.59

No. 7 Nail in telephone pole near Alva
Elevation 12.63

No. 8 Nail in root of blazed pine W. of road E. of timber gate
Elevation 15.46

No. 9 Nail in blazed telephone pole

Elevation 15.67

No. 10 Nail in root of blazed pine W. of road

Elevation 14.65

No. 11 Nail in E. side of pine near Thompson's lane

Elevation 16.36

No. 12 Nail in root of blazed W. side of lane to Goodno dock

Elevation 12.09

No. 13 Nail in palmetto

Elevation 15.34

No. 14 Nail in root of blazed pine S. of road to Lake Hicpochee along Goodno's pasture fence.

Elevation 23.09

No. 16 Nail in root of blazed pine 1,000 ft. E. of gap in S. pasture fence

Elevation 19.90

Bench Mark A is established at Ft. Thompson and is 10 ft. above an imaginary plane.
All other bench marks and levels etc. refer to this datum plane.

| Bench Marks | Above Datum | Distance from B.M. to Saw Grass | Elevation of Ground at Margin of Saw Grass | Elevation of water at Margin of Saw Grass | Rock Below Surface | Location |
|---|---|---|---|---|---|---|
| A | 10.00 ft. | | | | 3.4 ft. | |
| Gen. Meigs B.M. | 11.45 | | | | 2.0 | |
| Capt. Black B.M. | 3.72 | | | | 3.0 | |
| River at Thompson | 6.95 | | | | Rock outcrop | |
| Surface Hickpochee [sic] | 21.35 | | 21.50 | | No rock | |
| B. | 25.40 | | 21.70 | | No rock | North side of hammock Near L. Hichpochee [sic] |
| C. | 23.30 | | 21.65 | 21.95 | No rock | 24 21 T. 44 W.33<br>1 6 |
| D. | 20.94 | 1 mile W. | 19.40 | 19.90 | No rock | 8 9 T.44 N.35 1000 W. of Sec. Cor.<br>17 16 |
| E. | 20.85 | 1 mile W. | 17.35 | 19.60 | No rock | 21 22 T.44 N.35-1000 E. of intersection<br>28 27 |
| F. | 20.16 | 500 ft. E. | 18.05 | 18.46 | 1 to 3 ft. | 25 36 T.45 N.33-100 ft. S. of Twp. Line.<br>2 1 |
| G. | 19.32 | 1 mile E. | 17.25 | 18.22 | 6 ft. | S.W. cor 13-45-33. |
| H. | 19.21 | 100 steps E. | 15.70 | 16.84 | 2 to 4 ft. | 300 steps N. of S.W cor. 34-14-33 |
| I. | 17.22 | 1/4 mile W. | 14.34 | 15.40 | 3 to 5 " | 1/4 mile N.E. of S.E. cor. 14-46-33 |
| J. | 15.17 | | 13.06 | 13.66 | No rock | 1/4 mile S.E. of S.E cor. 36-46-33 |
| K. | 14.80 | | 11.73 | 13.47 | No rock | Near S.W. cor. 18-47-34 |
| L. | 12.72 | 1/4 mile E. | 9.24 | 11.24 | No rock | Near S.W. cor. 6-46-34. |

No. 17 Nail in root of blazed pine on N. side of road W. of frame house.
Elevation 21.19

No. 18 Nail in root of blazed pine standing in clump of scrub palmetto
Elevation 23.12

No. 19 Nail in root of blazed pine S. of road near Pine Island
Elevation 23.19

No. 20 Nail in root of blazed pine S. of road
Elevation 24.00

Lake Hicpochee to Glade Cross Mission.

No. 21 Nail in root of blazed pine 300 ft. W. of Travers House pens.
Elevation 25.43

No. 22 Blazed dead pine in marsh marked by red flag.
Elevation 22.75

No. 24 Nail in root of blazed pine 2 miles S. of Travers House
Elevation 25.76

No. 25 Nail in root blazed pine
Elevation 26.92

No. 26 Nail in root blazed pine
Elevation 27.41

No. 27 Nail in root blazed pine
Elevation 27.68

No. 29 Nail in root of pine near edge of marsh marked by red flag
Elevation 25.83

No. 30 Nail in root of blazed pine
Elevation 24.15

No. 31 Nail in root of blazed Lone pine on prairie
Elevation 22.86

No. 34 Nail in root of blazed palmetto
Elevation 19.75

Bench Marks along Military Trail via Immokalee to Brown's Store, thence Across the Everglades to Pompano and Ft. Lauderdale.

Spike in root of pine 400 ft. S. of road fork
Elevation 20.62

Spike in root of pine on S. side of road near mile post 6
Elevation 21.02

Spike in root of pine E. side of road 500 ft. E. of 10th mile post
Elevation 27.18

Spike in root of pine S. of road, 1600 ft. E. of 13th mile post
Elevation 30.43

Spike in root of pine 200 ft. W. of (Race?) Pond
Elevation 31.24

Spike in root of pine tree E. of Kenneday Carson's house.

Elevation 24.90

Spike in root of pine 300 ft. E. of 27th mile post

Elevation 35.37

Spike in root of pine tree 100 ft. N.E. of schoolhouse at Immokalee

Elevation 38.07

Spike in cypress, W. edge of dock at Rock Lake

Elevation 22.43

Spike in pine E. of road between 36th and 37th mile.

Elevation 20.79

Spike in pine E. of road at 39th mile.

Elevation 28.54

Spike in root of palmetto ½ mile W. of Leaning Oak at the 46th mile

Elevation 26.54

Spike in oak S. of road at the 50.5 mile

Elevation 24.79

Spike in cypress on W. side of Rock Lake

Elevation 24.65

Spike in palmetto near the 55th mile

Elevation 23.38

Spike in oak N. of road near the 58th mile

Elevation 22.46

Spike in pine N. of road at the 62nd mile

Elevation 19.61

Spike in palmetto S. side of hammock near cottage at Glade Cross Mission

Elevation 17.86

Spike in cypress on S. side of small cypress head S. of road ½ mile W. of Brown's

Elevation 15.70

Water gauge near boat landing at Brown's Store. Cypress pole driven into sand. Nail driven at water surface on Feb. 11th. Elevation of nail 15.01. Top of iron wagon axle driven into sand at edge of boat trail at Brown's Store.

Elevation 17.25

Spike in cypress 600 ft. S. of Wilkinson's Store

Elevation 15.70

Spike in root of myrtle about 8 ft. high 8 miles E. of Brown's

Elevation 14.(?)

Spike in willow on Halleluiah hammock 27 miles E. of Brown's

Elevation 13.08

Nail in fork of myrtle on S. end of Breakfast hammock 31 miles E. of Brown's

Elevation 16.24

Nail in tree on N. edge of Kaple hammock 36 miles (?) of Brown's

Elevation 16.03

Top of cypress stump 24 in. high (?) of Cypress Island at E. edge of Glades 40 miles E. of Brown's

Elevation 14.49

Spike in blazed pine Northermost [sic] of 4 pines 250 ft. N.W. of Robert Oceola's [sic] abandoned camp

Elevation 20.03

Spike in blazed S. side of road where road enters Ives' tomato patch

Elevation 13.47

Top of rail in front of Pompano depot

Elevation 15.02

Spike in telephone pole S.E. corner of road crossing S. of Pompano Depot

Elevation 15.06

Top of rail on railroad bridge 334 B

Elevation 9.51

Top of rail middle of bridge 338 A

Elevation 9.25

Spike in root of pine 300 ft. W. of road crossing and 1,000 ft. N. of mile post 399

Elevation 6.48

(?) on S.E. corner Foundation Pier of galvanized iron house E. of Ft. Lauderdale

Elevation 6.3

Top of rail in front of depot at Ft. Lauderdale

Elevation 10.23

Top of rail center of F.E.O. draw bridge at Ft. Lauderdale

Elevation 10.82

Tide gauge on W. end of (Pile?) Cap of 7th bent from E. end of New River Railroad bridge. Gauge 2 inch by 2 inch pine, graduated from top or zero top down.

Elevation 5.12

Head of drift bolt in W. end of mud sill at 6th bent of railroad bridge, bolt marked by 3 small nails driven around it.

Elevation 2.63

## Elevations from Ft. Myers via Buckingham, Labelle and the Travers House to Glade Cross Mission.

Mean low tide at Ft. Myers as used by U.S. Army engineers

Elevation 0.0

Average of 30 low tides at Ft. Myers during March, 1917

Elevation 0.6

Ordinary high water at Ft. Myers

Elevation 2.3

Extreme high water at Ft. Myers

Elevation 4.5

Elevation of surface between Ft. Myers and Buckingham varies from 5.1 to 19 ft., the average being about 12 ft.

Elevation of surface between Buckingham and Alva varies from 13 ft. to 19 ft., the average being about 15 ft.

Water surface of Caloosahatchee River at Alva — Elevation 1.3

Elevation of surface between Alva and Labelle varies from 10 ft. top 15.5 ft., the average being about 14 ft.

Water surface of Caloosahatchee River at Labelle — Elevation 5.9

High water mark at Ft. Thompson — Elevation 17.2

Elevation of surface between Labelle and Travers House varies from 11 ft. to 24 ft. At 5 miles E. of Labelle the elevation raises to 18 ft. and gradually increases to the Travers house.

Elevation of surface between Travers house and the Mission varies from 26 ft. to 18 ft., gradually decreasing from the Travers House to the Mission.

Water surface of Everglades E. of Travers House — Elevation 21.3

Water surface of Everglades ½ mile (?) of line common to Twps. 44 and 45 — Elevation 20.8

Water surface of Everglades on line common to Twps. 45 and 46 — Elevation 19.5

Water surface of Everglades on line common to Twps. 46 and 47 — Elevation 18.8

Water surface of Everglades at Brown's Store — Funderhide's Elevation 15.0

<u>Elevation from Ft. Myers along the Military Trail via Immokalee to Brown's Store, thence easterly across Everglades to Cypress Creek East of Pompano.</u>

| | |
|---|---|
| General surface 3 miles southeasterly from Ft. Myers | Elevation 19.9 |
| General surface 12 miles southeasterly from Ft. Myers | " 27.7 |
| General elevation 20 miles southeasterly from Ft. Myers | " 30.7 |
| General surface 25 miles southeasterly from Ft. Myers | " 25.0 |
| General surface at Immokalee | " 37.7 |
| Water surface at Lake Trafford | " 20.0 |
| High water mark of Lake Trafford | " 22.0 |
| General surface 6 miles east of Immokalee | " 23.0 |
| Water surface of Okaloacoochee slough | " " 25.3 |
| General surface near the Okaloacoochee slough | " 27.0 |
| General surface near Leaning Oak | " 26.0 |

| | | |
|---|---|---|
| General surface in vicinity of Rock Lake | " | 24.0 |
| Water surface of Rock Lake | " | 21.0 |
| General surface 8 miles southeasterly from Rock Lake | " | 21.0 |
| General surface 4 miles W. of Brown's Store | " | 17.7 |
| General surface 1 mile W. of Brown's Store | " | 17.0 |
| Water surface of Everglades at Brown's Store | " | 15.0 |
| Ordinary high water mark at Brown's Store | " | 16.4 |
| Extreme high water mark of Everglades at Brown's Store | " | 14.9 |
| General surface of muck at Brown's Store | " | 14.3 |
| Surface of sand at Brown's Store | " | 13.8 |
| Water surface 5 miles W. of Brown's Store | " | 14.7 |
| General surface of muck 5 miles N. of Brown's Store | " | 14.0 |
| Surface of sand 5 miles E. of Brown's Store | " | 11.0 |
| Water surface of Everglades 20 miles E. of Brown's Store | " | 13.0 |
| General surface of muck 20 miles W. of Brown's Store | " | 13.0 |
| General surface of rock 20 miles W. of Brown's Store | " | 8.0 |
| Water surface 30 miles E. of Brown's Store | " | 12.6 |
| General surface of muck 30 miles W. of Brown's Store | " | 12.6 |
| Surface of rock 30 miles E. of Brown's Store | " | 6.2 |
| Water surface 40 miles E. of Brown' Store | " | 12.2 |
| General surface of muck 40 miles E. of Brown's Store | " | 11.6 |
| Surface of rock 40 E. of Brown's Store | " | 10.0 |
| High water mark 40 miles E. of Brown's Store | " | 14.7 |
| Elevation of ridge at Oceola's [sic] camp | Elevation | 18.7 |
| General surface 4 miles W. of Pompano | " | 12.3 |
| Surface elevation in the vicinity of Pompano | " | 11.0 |
| Low tide at mouth of Cypress Creek E. of Pompano (only 1 observation) | " | 0.9 |
| Low tide at Ft. Lauderdale (only 1 observation) | " | 0.6 |

Water was very high on East coast on account of wind and Spring tide.

In the vicinity of Brown's Store at the time of beginning the Glades line on February 8, the water had an average depth of 0.7. by March 15, it had entirely disappeared at this place and by April 11, the surface of the water in a well dug out in the Glades was 2 feet below the ground surface and the Glades were said to be dry for a distance of 3 or 4 miles out. For 3 miles out from Brown's the muck is very shallow underlaid with sand. From the 3rd to the 10th mile, the muck averaged in depth from 1 to 6 feet, usually running about 3 feet. It was underlaid with sand and rock which alternated in

about equal sections, there being no rock west of the 5th mile. From the 10th to the 27th mile water was found only in low places, the muck in many places being at or above the water surface. Muck averaged from 2½ to 7 feet in depth, the greater part of it being 4½ feet. This section throughout is underlaid with rock. At 12 miles a willow island with one cabbage palm was seen about 3 miles to the south. At 14¼ miles the water fell 0.15 from February 26th to March 7th. At 18½ miles a small island and rock outcrop was seen ½ mile to the south. At 27 miles a willow island was passed which was named Halleluiah hammock. From 27 to 31½ miles the water was increasing, there being several deep strands just west of 31½ miles. In one of these strands a person wading through would go down to the rock, the muck being about 4 feet deep in this section underlaid with rock. At 31½ miles there was a willow island called Breakfast hammock. From 31½ to 33½ miles about ½ the area was taken up by water leads from 1 to 4 feet deep. The muck had a depth of about 4½ feet underlaid with rock and a few places with sand. At 35½ miles is an island covered with Maple trees. From 35½ to 40 miles there were water leads 1 to 3 feet in depth and very boggy, the muck in this section being about 4½ feet in depth, but decreasing to 1½ near 40 and is underlaid with rock and sand. At 41½ miles the underlying sand comes to the surface, there being no water through this section. Apparently there is a strata of sand of varying thickness overlying the rock. When this strata was thin the sounding rod went to rock. At other points the sand had a depth sufficient to prevent the rod reaching the rock. The actual depth of the sand could not be determined as a soil auger was not available. The surface of the rock and sand rises and falls without any regularity and apparently has no relation to the surface of the muck. The Oceola [sic] ridge is 44 miles and Pompano 49½ miles from Brown's.

Samples of Soil Collected.

No. 1 to No. 6 were collected in the vicinity of the Glade Cross Mission and are said by Singletary to be typical of the country west of the Everglades. These six samples represent an average of six inches in depth at the surface. The Everglade samples represent the upper 16 inches and thought to be typical of the entire depth.

No. 1 Prairie soil or white sand, flooded every year.

No. 2 Crust which forms top of No. 1 formed when water dries up, usually very thin.

No. 3 Sample taken from saw palmetto bed.

No. 4 Sample taken from Mission hammock.

No. 5 Sample taken from saw grass slough.

No. 6 Sample taken from popash and fire flag slough.

No. 7 Sample of Everglade soil taken 3 miles east of Brown's Store.

No. 8 Sample of Everglades soil taken 6 miles east of Brown's Store.

No. 9 Sample taken from cypress strand where horse bogged on February 21.

No. 10 Sample of rock outcrop from near Mission.

No. 11 Sample of Everglade soil taken 36 miles east of Brown's Store.

## Cost of Field Work.

The total amount expended from January to May under my direction is as follows:

| | |
|---|---|
| Salaries ……..... | $2188.00 |
| Railroad fares …….. | 418.97 |
| Livery, including saddle horses, team stock forage and teamster who the cooking ……. | 614.75 |
| Hotel subsistence ……. | 287.95 |
| Field subsistence …….. | 341.30 |
| Field supplies ……... | 26.55 |
| Camp equipment ……..... | 144.10 |
| Express ……. | 3.40 |
| Sundries …… | 18.75 |
| Amount spent in traveling expenses and salaries not directly connected with the field work …….. | 406.00 |
| Amount expended on field work up to May 1st ……... | $3637.66 |

## Work from May 1st to May 18th in Washington Office.

| | |
|---|---|
| Draftsman, 7 days …… | $26.00 |
| Stenographer …… | -- |
| Engineer ……... | 90.00 |

The following table compiled from the records of the U.S. Weather Bureau shows the mean annual temperature, the maximum and minimum temperature, with the month in which they occurred, and the date of the first and last killing frost from 1898 to 1907, inclusive, so far as records have been kept at four stations.

| Year | Annual Mean | Highest | Date | Lowest | Date | Date latest Killing frost | Date first Killing frost |
|---|---|---|---|---|---|---|---|
| **Kissimmee** | | | | | | | |
| 1898 | 72.8 | 98 | - | 22 | Jan. | -- | -- |
| 1899 | -- - | 100 | Aug. | 20 | Feb. | Feb. 13 | -- |
| 1900 | 72.3 | 101 | Aug. | 27 | Jan. | Feb. 19 | None |
| 1901 | 70.0 | 95 | Aug. | 24 | Dec. | Feb. 24 | Dec. 17 |
| 1902 | 72.7 | 100 | June | 22 | Jan. | Jan. 22 | Dec. 26 |
| 1903 | 70.6 | 99 | Aug | 26 | Jan. | Feb. 10 | Nov. 28 |
| 1904 | 71.0 | 97 | June | 32 | Jan. | Jan. 15 | Dec. 21 |
| 1905 | 71.0 | 94 | June | 20 | Jan. | Jan. 29 | None |
| 1906 | 71.2 | 95 | Aug. | 20 | Dec. | None | Dec. 23 |
| 1907 | | | | | | | |
| **Jupiter** | | | | | | | |
| 1898 | 73.7 | 91 | Sept. | 31 | Jan. | -- | -- |
| 1899 | 74.4 | 95 | Aug. | 28 | Feb. | -- | -- |
| 1900 | 74.3 | 93 | Aug | 31 | Feb. | Feb. 19 | None |
| 1901 | 72.6 | 92 | May | 38 | Dec. | None | None |
| 1902 | 74.4 | 96 | Aug. | 38 | Jan. | None | None |
| 1903 | 74.1 | 96 | Aug. | 36 | Nov. | None | None |
| 1904 | 73.8 | 94 | Oct. | 39 | Jan. | None | None |
| 1905 | 74.6 | 94 | June | 24 | Jan. | Jan. 26 | None |
| 1906 | 73.7 | 91 | July | 30 | Dec. | None | Dec. 24 |
| **Ft. Myers** | | | | | | | |
| 1898 | 72.6 | 94 | July | 28 | Jan. | -- | -- |
| 1899 | 73.1 | 93 | -- | 29 | Feb. | Feb. 14 | -- |
| 1900 | 72.3 | 92 | July | 34 | Feb. | None | None |
| 1901 | 70.3 | 94 | June | 32 | Dec. | None | Dec. 21 |
| 1902 | 72.2 | 94 | June | 31 | Jan. | Jan. 14 | None |
| 1903 | 71.8 | 94 | May | 35 | Nov. | None | None |
| 1904 | -- | 94 | June | 34 | Jan. | None | None |
| 1905 | 73.5 | 94 | June | 27 | Jan. | Jan. 27 | None |
| 1906 | 72.4 | 92 | Aug. | 31 | Dec. | None | Dec. 24 |
| **Miami** | | | | | | | |
| 1898 | -- | -- | ---- | ------- | ---- | ---------- | ---------- |
| 1899 | -- | -- | ---- | ------- | ---- | ---------- | ---------- |
| 1900 | -- | -- | ---- | ------- | ---- | ---------- | ---------- |
| 1901 | 74.5 | 91 | May | 36 | Jan. | None | None |
| 1902 | 75.6 | 94 | June | 37 | Feb. | None | None |
| 1903 | -- | -- | ---- | 36 | Jan. | None | None |
| 1904 | -- | 93 | May | 36 | Jan. | Jan. 15 | None |
| 1905 | -- | 94 | June | 29 | Jan. | Jan. 26 | None |
| 1906 | 75 | 92 | July | 32 | Dec. | None | Dec. 26 |

Table showing the total rainfall, number of days of rainfall, and the maximum rainfall in 24 hours, for each month of the years 1898 to 1907, inclusive, at Kissimmee, Osceola County, Florida.

1898

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| Jan. | 0.23 | 1 | 0.23 |
| Feb. | 1.12 | 3 | 0.42 |
| March | 0.00 | 0 | 0.00 |
| April | 0.12 | 1 | 0.12 |
| May | 0.35 | 1 | 0.35 |
| June | 5.75 | 6 | 1.50 |
| July | 7.90 | 10 | 2.25 |
| Aug. | 11.41 | 15 | 2.20 |
| Sept. | 4.52 | 10 | 1.47 |
| Oct. | 5.17 | 13 | 1.43 |
| Nov. | 0.88 | 4 | 0.25 |
| Dec. | 3.02 | 9 | 1.45 |
| | 40.47 | | |

1899

| | | | |
|---|---|---|---|
| Jan. | 5.72 | 9 | 1.11 |
| Feb. | 11.53 | 7 | 4.75 |
| March | 1.68 | 4 | 0.91 |
| April | 3.06 | 4 | 1.64 |
| May | 1.60 | 1 | 1.60 |
| June | 3.06 | 7 | 0.87 |
| July | 8.37 | 15 | 2.59 |
| Aug. | 11.06 | 15 | 2.95 |
| Sept. | 7.03 | 10 | 2.65 |
| Oct. | 15.98 | 7 | 9.50 |
| Nov. | 0.25 | 1 | 0.23 |
| Dec. | 1.60 | 4 | 0.94 |
| | 70.92 | | |

1900

| | | | |
|---|---|---|---|
| Jan. | 4.22 | 8 | 1.14 |
| Feb. | 2.68 | 5 | 0.91 |
| March | 6.07 | 6 | 1.91 |
| April | 3.02 | 6 | 1.05 |
| May | 5.84 | 7 | 3.00 |
| June | 8.18 | 15 | 1.40 |
| July | 5.66 | 14 | 1.23 |
| Aug. | 3.23 | 4 | 1.48 |
| Sept. | 4.50 | 7 | 1.96 |
| Oct. | 4.83 | 8 | 2.67 |
| Nov. | 1.62 | 3 | 1.00 |
| Dec. | 5.09 | 6 | 3.25 |
| | 54.91 | | |

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| | 1901 | | |
| Jan. | 0.92 | 3 | 0.35 |
| Feb. | 2.46 | 5 | 0.94 |
| March | 3.51 | 6 | 0.80 |
| April | 3.23 | 3 | 2.91 |
| May | 2.96 | 3 | 2.30 |
| June | 8.78 | 12 | 1.66 |
| July | 2.84 | 10 | 0.38 |
| Aug. | 9.91 | 19 | 1.35 |
| Sept. | 12.95 | 11 | 4.60 |
| Oct. | 1.18 | 3 | 0.37 |
| Nov. | 0.67 | 2 | 0.52 |
| Dec. | 1.35 | 3 | 0.50 |
| | 50.76 | | |
| | 1902 | | |
| Jan. | 0.19 | 1 | 0.19 |
| Feb. | 6.07 | 6 | 2.65 |
| March | 1.88 | 4 | 1.17 |
| April | 1.73 | 4 | 1.00 |
| May | 0.34 | 2 | 0.23 |
| June | 5.85 | 7 | 5.30 |
| July | 5.36 | 12 | 2.10 |
| Aug. | 7.27 | 9 | 2.39 |
| Sept. | 6.36 | 15 | 1.35 |
| Oct. | 3.07 | 3 | 0.76 |
| Nov. | 1.15 | 3 | 0.87 |
| Dec. | 0.96 | 2 | 0.66 |
| | 40.22 | | |
| | 1903 | | |
| Jan. | 4.76 | 8 | 1.66 |
| Feb. | 5.04 | 6 | 2.71 |
| March | 5.84 | 10 | 2.00 |
| April | 0.25 | 1 | 0.25 |
| May | 6.68 | 9 | 2.35 |
| June | 10.12 | 14 | 1.45 |
| July | 6.07 | 13 | 1.58 |
| Aug. | 4.31 | 8 | 1.10 |
| Sept. | 12.06 | 14 | 2.95 |
| Oct. | 1.02 | 5 | 0.31 |
| Nov. | 3.56 | 5 | 2.30 |
| Dec. | 1.51 | 3 | 1.09 |
| | 61.22 | | |

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| | 1904 | | |
| Jan. | 4.16 | 8 | 1.40 |
| Feb. | 5.16 | 5 | 2.12 |
| March | 0.80 | 3 | 0.60 |
| April | 2.25 | 4 | 0.85 |
| May | 0.51 | 4 | 0.25 |
| June | 8.19 | 14 | 1.20 |
| July | 8.56 | 9 | 2.55 |
| Aug. | 4.53 | 9 | 1.20 |
| Sept. | 4.66 | 10 | 1.30 |
| Oct. | 6.72 | 12 | 1.55 |
| Nov. | 3.15 | 5 | 1.73 |
| Dec. | 0.30 | 2 | 0.70 |
| | 49.40 | | |
| | 1905 | | |
| Jan. | 0.70 | 2 | 0.62 |
| Feb. | 0.91 | 4 | 0.87 |
| March | 3.88 | 8 | 1.25 |
| April | 1.82 | 6 | 0.60 |
| May | 7.17 | 12 | 2.05 |
| June | 4.46 | 11 | 2.25 |
| July | 14.05 | 22 | 2.10 |
| Aug. | 13.90 | 23 | 2.70 |
| Sept. | 4.94 | 9 | 1.50 |
| Oct. | 3.19 | 5 | 1.40 |
| Nov. | T | 0 | T |
| Dec. | 9.43 | 15 | 3.26 |
| | 64.45 | | |
| | 1906 | | |
| Jan. | 6.43 | 6 | 3.34 |
| Feb. | 1.49 | 4 | 0.56 |
| March | 2.74 | 7 | 0.93 |
| April | 1.48 | 4 | 0.68 |
| May | 6.77 | 11 | 2.24 |
| June | 10.21 | 13 | 1.70 |
| July | 6.66 | 14 | 2.10 |
| Aug. | 2.59 | 6 | 0.82 |
| Sept. | 3.26 | 8 | 0.84 |
| Oct. | 2.00 | 6 | 0.66 |
| Nov. | 0.16 | 1 | 0.16 |
| Dec. | 0.04 | 2 | 0.02 |
| | 43.82 | | |
| | 1907 | | |
| Jan. | 0.10 | 1 | 0.10 |
| Feb. | 0.05 | 1 | 0.05 |
| March | T | 0 | T |

Table showing total rainfall, number of days of rainfall, and the maximum rainfall in 24 hours, for each month of the years 1898 to 1907, inclusive, at Jupiter, Dade County, Florida.

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| **1898** | | | |
| Jan. | 0.36 | 6 | 0.13 |
| Feb. | 0.95 | 5 | 0.56 |
| March | 3.26 | 7 | 2.28 |
| April | 1.90 | 6 | 1.47 |
| May | 1.15 | 5 | 0.60 |
| June | 0.12 | 8 | 0.06 |
| July | 6.80 | 11 | 1.70 |
| Aug. | 6.62 | 15 | 1.52 |
| Sept. | 3.38 | 24 | 1.14 |
| Oct. | 10.89 | 19 | 2.52 |
| Nov. | 1.11 | 8 | 0.71 |
| Dec. | 2.56 | 6 | 0.07 |
| | 39.1 | | |
| **1899** | | | |
| Jan. | 4.30 | 17 | 0.94 |
| Feb. | 4.64 | 12 | 1.78 |
| March | 3.62 | 5 | 2.03 |
| April | 3.11 | 7 | 1.51 |
| May | 1.65 | 7 | 0.64 |
| June | 5.45 | 12 | 1.32 |
| July | 3.35 | 14 | 0.07 |
| Aug. | 3.96 | 11 | 1.70 |
| Sept. | 11.27 | 25 | 2.76 |
| Oct. | 16.66 | 15 | 4.96 |
| Nov. | 0.97 | 9 | 0.53 |
| Dec. | 2.97 | 25 | 1.57 |
| | 61.95 | | |
| **1900** | | | |
| Jan. | 3.40 | 15 | 1.01 |
| Feb. | 2.28 | 12 | 0.45 |
| March | 6.20 | 6 | 3.00 |
| April | 2.16 | 7 | 1.10 |
| May | 7.45 | 15 | 2.18 |
| June | 2.90 | 16 | 0.73 |
| July | 3.49 | 15 | 1.38 |
| Aug. | 1.12 | 6 | 0.48 |
| Sept. | 7.62 | 13 | 3.64 |
| Oct. | 10.11 | 20 | 2.61 |
| Nov. | 0.78 | 5 | 0.50 |
| Dec. | 5.10 | 11 | 0.82 |
| | 52.63 | | |

1901

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| Jan. | 8.29 | 12 | 4.94 |
| Feb. | 1.07 | 5 | 0.40 |
| March | 2.30 | 6 | 0.75 |
| April | 2.13 | 5 | 1.34 |
| May | 3.63 | 7 | 2.02 |
| June | 17.41 | 13 | 7.45 |
| July | 7.23 | 18 | 2.09 |
| Aug. | 12.13 | 21 | 1.77 |
| Sept. | 9.71 | 16 | 3.03 |
| Oct. | 7.08 | 24 | 1.02 |
| Nov. | 0.94 | 7 | 0.82 |
| Dec. | 4.17 | 10 | 2.69 |
| | 76.09 | | |

1902

| | | | |
|---|---|---|---|
| Jan. | 0.96 | 5 | 0.75 |
| Feb. | 4.64 | 7 | 1.70 |
| March | 0.97 | 7 | 0.34 |
| April | 0.97 | 5 | 0.44 |
| May | 4.83 | 7 | 2.27 |
| June | 3.92 | 10 | 1.69 |
| July | 4.73 | 11 | 1.21 |
| Aug. | 1.91 | 13 | 0.46 |
| Sept. | 6.01 | 20 | 1.81 |
| Oct. | 13.74 | 17 | 4.58 |
| Nov. | 2.36 | 13 | 0.68 |
| Dec. | 0.71 | 3 | 0.55 |
| | 45.79 | | |

1903

| | | | |
|---|---|---|---|
| Jan. | 6.98 | 15 | 3.33 |
| Feb. | 4.50 | 9 | 2.41 |
| March | 9.27 | 17 | 2.49 |
| April | 0.44 | 5 | 0.31 |
| May | 2.71 | 9 | 1.26 |
| June | 7.01 | 18 | 1.52 |
| July | 3.23 | 15 | 0.88 |
| Aug. | 2.47 | 14 | 0.69 |
| Sept. | 15.82 | 21 | 6.59 |
| Oct. | 1.81 | 10 | 1.05 |
| Nov. | 2.50 | 14 | 1.12 |
| Dec. | 0.56 | 5 | 0.21 |
| | 57.30 | | |

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| | 1904 | | |
| Jan. | 2.56 | 13 | 0.93 |
| Feb. | 2.10 | 6 | 0.91 |
| March | 3.06 | 9 | 2.30 |
| April | 2.85 | 6 | 2.52 |
| May | 2.42 | 14 | 0.77 |
| June | 10.54 | 18 | 2.44 |
| July | 4.39 | 14 | 1.08 |
| Aug. | 5.79 | 15 | 2.00 |
| Sept. | 8.92 | 16 | 2.44 |
| Oct. | 21.39 | 14 | 10.43 |
| Nov. | 3.68 | 13 | 1.20 |
| Dec. | 0.49 | 8 | 0.19 |
| | 68.19 | | |
| | 1905 | | |
| Jan. | 1.40 | 8 | 0.76 |
| Feb. | 1.50 | 10 | 0.95 |
| March | 5.39 | 11 | 1.08 |
| April | 3.14 | 7 | 2.47 |
| May | 3.35 | 8 | 1.01 |
| June | 2.08 | 11 | 0.95 |
| July | 9.12 | 13 | 1.03 |
| Aug. | 10.72 | 21 | 1.78 |
| Sept. | 10.77 | 16 | 2.32 |
| Oct. | 4.26 | 16 | 1.46 |
| Nov. | 2.88 | 9 | 2.01 |
| Dec. | 15.18 | 26 | 5.75 |
| | 69.79 | | |
| | 1906 | | |
| Jan. | 2.62 | 13 | 1.19 |
| Feb. | 6.41 | 9 | 3.62 |
| March | 2.50 | 12 | 0.96 |
| April | 2.57 | 7 | 0.76 |
| May | 7.04 | 16 | 2.64 |
| June | 11.90 | 12 | 3.75 |
| July | 7.97 | 20 | 2.71 |
| Aug. | 8.38 | 22 | 2.02 |
| Sept. | 8.37 | 10 | 5.62 |
| Oct. | 8.31 | 17 | 6.08 |
| Nov. | 4.53 | 4 | 3.16 |
| Dec. | 0.05 | 1 | 0.05 |
| | 70.65 | | |
| | 1907 | | |
| Jan. | 0.01 | 5 | 0.37 |
| Feb. | 0.08 | 2 | 0.07 |
| March | 0.19 | 7 | 0.12 |

Table showing the total rainfall, number of days of rainfall, and the maximum rainfall in 24 hours, for each month of the years 1898 to 1907, inclusive, at Fort Myers, Lee County, Florida.

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| **1898** | | | |
| Jan. | 0.05 | 1 | 0.08 |
| Feb. | 0.02 | 1 | 0.02 |
| March | 0.46 | 3 | 0.42 |
| April | 0.37 | 3 | 0.25 |
| May | 3.53 | 7 | 0.78 |
| June | 2.83 | 7 | 0.52 |
| July | 8.16 | 15 | 2.71 |
| Aug. | 11.62 | 18 | 3.00 |
| Sept. | 10.73 | 16 | 2.00 |
| Oct. | 4.99 | 12 | 1.11 |
| Nov. | 1.29 | 5 | 0.86 |
| Dec. | 3.12 | 5 | 1.35 |
| | 47.17 | | |
| **1899** | | | |
| Jan. | 5.21 | 9 | 1.06 |
| Feb. | 8.77 | 7 | 4.08 |
| March | 1.23 | 5 | 0.55 |
| April | 1.74 | 4 | 1.40 |
| May | 1.15 | 3 | 0.72 |
| June | 5.93 | 19 | 1.58 |
| July | 12.08 | 17 | 3.67 |
| Aug. | 6.72 | 14 | 1.40 |
| Sept. | 2.51 | 13 | 0.72 |
| Oct. | 2.56 | 8 | 1.35 |
| Nov. | 0.94 | 4 | 0.82 |
| Dec. | 0.50 | 6 | 0.21 |
| | 49.34 | | |
| **1900** | | | |
| Jan. | 3.17 | 8 | 1.97 |
| Feb. | 3.99 | 7 | 1.11 |
| March | 4.12 | 6 | 1.74 |
| April | 2.87 | 6 | 1.70 |
| May | 4.65 | 9 | 1.68 |
| June | 7.12 | 17 | 1.58 |
| July | 9.63 | 15 | 2.15 |
| Aug. | 9.77 | 17 | 1.75 |
| Sept. | 8.29 | 15 | 3.05 |
| Oct. | 10.35 | 10 | 3.11 |
| Nov. | 1.91 | 5 | 0.90 |
| Dec. | 2.78 | 8 | 1.61 |
| | 68.65 | | |

1901

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| Jan. | 0.50 | 3 | 0.31 |
| Feb. | 0.72 | 3 | 0.30 |
| March | 2.67 | 4 | 0.98 |
| April | 1.89 | 2 | 1.34 |
| May | 2.30 | 4 | 0.76 |
| June | 20.28 | 19 | 11.70 |
| July | 5.23 | 17 | 1.03 |
| Aug. | 12.41 | 14 | 1.48 |
| Sept. | 6.86 | 14 | 2.10 |
| Oct. | 0.78 | 3 | 0.43 |
| Nov. | 0.52 | 3 | 0.26 |
| Dec. | 1.62 | 3 | 1.19 |
| | 55.78 | | |

1902

| | | | |
|---|---|---|---|
| Jan. | 0.52 | 3 | 0.26 |
| Feb. | 6.79 | 6 | 5.06 |
| March | 0.18 | 3 | 0.09 |
| April | 1.03 | 4 | 0.60 |
| May | 1.23 | 6 | 0.58 |
| June | 6.63 | 11 | 3.05 |
| July | 4.60 | 12 | 0.96 |
| Aug. | 5.97 | 9 | 1.42 |
| Sept. | 6.60 | 18 | 1.30 |
| Oct. | 7.46 | 12 | 2.07 |
| Nov. | 0.96 | 3 | 0.44 |
| Dec. | 2.93 | 3 | 2.00 |
| | 44.90 | | |

1903

| | | | |
|---|---|---|---|
| Jan. | 4.76 | 10 | 1.65 |
| Feb. | 3.37 | 9 | 1.91 |
| March | 7.78 | 12 | 2.10 |
| April | T | 0 | T |
| May | 0.71 | 3 | 0.52 |
| June | 10.45 | 14 | 2.92 |
| July | 11.40 | 19 | 2.30 |
| Aug. | -- | -- | -- |
| Sept. | 4.15 | 6 | 2.03 |
| Oct. | 1.62 | 3 | 0.32 |
| Nov. | 2.02 | 4 | 1.65 |
| Dec. | 1.61 | 5 | 0.48 |
| | 47.87 | | |

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Table showing the total rainfall, number of days of rainfall, and the maximum rainfall in 24 hours, for each month of the years 1901 to 1907, inclusive, at Miami, Dade County, Florida

1901

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| Jan. | ---- | ---- | ---- |
| Feb. | T | 0 | T |
| March | 1.67 | 3 | 1.08 |
| April | 1.97 | 3 | 0.90 |
| May | 10.42 | 6 | 5.44 |
| June | 21.72 | 10 | 8.25 |
| July | 8.18 | 7 | 3.20 |
| Aug. | 10.85 | 9 | 1.00 |
| Sept. | 15.30 | 6 | 4.00 |
| Oct. | 4.92 | 6 | 1.00 |
| Nov. | ---- | ---- | ---- |
| Dec. | 1.55 | 2 | 0.80 |
| | 76.58 | | |

1902

| | | | |
|---|---|---|---|
| Jan. | 0.00 | 0 | 0.00 |
| Feb. | 5.30 | 2 | 3.58 |
| March | 0.00 | 0 | 0.00 |
| April | 1.85 | 4 | 0.75 |
| May | 0.94 | 8 | 0.30 |
| June | 6.01 | 9 | 2.69 |
| July | 3.28 | 7 | 0.88 |
| Aug. | 5.53 | 7 | 2.90 |
| Sept. | 7.61 | 13 | 1.65 |
| Oct. | 4.17 | 9 | 1.20 |
| Nov. | 7.12 | 5 | 5.00 |
| Dec. | 1.86 | 1 | 1.86 |
| | 43.67 | | |

1903

| | | | |
|---|---|---|---|
| Jan. | 4.99 | 7 | 2.00 |
| Feb. | 4.70 | 4 | 5.00 |
| March | 3.82 | 7 | 1.25 |
| April | 0.00 | 0 | 0.00 |
| May | 1.35 | 4 | 0.40 |
| June | 10.48 | 10 | 1.90 |
| July | ---- | ---- | ---- |
| Aug. | 2.35 | ---- | ---- |
| Sept. | 12.54 | 12 | 3.00 |
| Oct. | 4.48 | 5 | 1.65 |
| Nov. | 3.70 | 3 | 2.00 |
| Dec. | T | 0 | T |
| | 48.41 | | |

| Month | Total Rainfall | No. of days of rainfall | Maximum Rainfall in 24 hours |
|---|---|---|---|
| | 1904 | | |
| Jan. | 1.70 | 2 | 0.90 |
| Feb. | 1.65 | 2 | 1.60 |
| March | 3.10 | 4 | 2.05 |
| April | 2.04 | 3 | 1.80 |
| May | 12.28 | 10 | 4.40 |
| June | 6.06 | 10 | 1.30 |
| July | 2.94 | 4 | 0.85 |
| Aug. | 9.15 | 11 | 3.00 |
| Sept. | 8.43 | 13 | 2.75 |
| Oct. | 10.08 | 14 | 2.25 |
| Nov. | 5.21 | 6 | 2.00 |
| Dec. | 0.40 | 2 | 0.30 |
| | 63.04 | | |
| | 1905 | | |
| Jan. | 2.65 | 2 | 2.00 |
| Feb. | 0.64 | 2 | 0.51 |
| March | 1.69 | 3 | 1.32 |
| April | 1.32 | 4 | 0.80 |
| May | 3.93 | 3 | 3.50 |
| June | 7.61 | 10 | 2.00 |
| July | 3.65 | 7 | 1.07 |
| Aug. | 13.71 | 16 | 2.75 |
| Sept. | 11.99 | 15 | 2.15 |
| Oct. | ---- | ---- | ---- |
| Nov. | 3.68 | 9 | 1.05 |
| Dec. | 12.33 | 15 | 4.00 |
| | 63.2 | | |
| | 1906 | | |
| Jan. | 3.10 | 7 | 1.89 |
| Feb. | 3.78 | 6 | 1.21 |
| March | 4.38 | 8 | 2.60 |
| April | 2.25 | 5 | 1.42 |
| May | 7.89 | 9 | 2.70 |
| June | 8.60 | 8 | 4.73 |
| July | 9.26 | 6 | 4.34 |
| Aug. | 8.94 | 8 | 2.00 |
| Sept. | 2.59 | 4 | 1.06 |
| Oct. | 13.68 | 12 | 4.30 |
| Nov. | 7.54 | 5 | 5.70 |
| Dec. | 0.00 | 0 | 0.00 |
| | 72.01 | | |
| | 1907 | | |
| Jan. | 1.48 | 2 | 1.13 |
| Feb. | 0.16 | 1 | 0.16 |
| March | 0.72 | 2 | 0.47 |

Recommendations for Continuing Drainage
Investigations on the Everglades Project.

The drainage problems of the Everglades cover an area lying south of the Caloosahatchee River and the northern boundary of Dade County including the watershed which drains south into Lake Okeechobee. There can be no drainage of any large section in this area without affecting that of another as the divides are only noticeable during the low water period. There is some doubt in my mind about the value of the Everglades proper for agriculture purposes if drained, but the country lying east and west of the Glades are the lands which need the immediate attention and will be greatly benefited by the lowering of Lake Okeechobee.

The work accomplished so far only confirms the work of previous surveys in that there is fall sufficient to lower Lake Okeechobee and to drain the upper part of the Everglades. Sufficient data to determine the best route for outlets, to estimate their cost and the agricultural value of the lands when drained, had not been secured, hence, in my judgment, the following field investigations are necessary:

An examination of the upper Caloosahatchee River and the canals in the vicinity of Lake Hicpochee; the depth and nature of soil south of Lake Okeechobee and the marsh areas north of Lake Okeechobee and also the shore and depth of the lake. The information to be gained by these investigations would be the action of the canals which have been constructed for a number of years, the value of the soil south of the lake, the area of marsh north of the lake to be benefited by drainage and the amount the lake will stand lowering without affecting it as a lake.

In my letter of March 1st I recommended the running of a line of levels from the vicinity of Immokalee to Labelle, Survey Creek[3] and Allen River.[5] The object of this

work would be to determine the nature of the divide between Immokalee and Labelle in the vicinity of 10-mile creek, the feasibility of draining the Lake Trafford marsh by the way of Survey[3] and Estero Creeks and of getting an outlet to the Big Cypress Swamp by Allen River.[5] A personal knowledge in a general way of the country is also desirable. An examination of the west coast from Allen River[5] to the southern end of the peninsula for the purpose of determining the feasibility of outlets into the Everglades through the streams which empty into the Gulf. An examination of the east coast throughout Dade County to determine the feasibility of outlets to the Everglades through the streams which run to the east and the condition of the cultivated lands in that section. Interviews should be had with the older and prominent residents that their views and ideas in regard to drainage might be obtained. The object of these interviews would be to give the residents confidence in our work by acquainting them with the fact that we are investigating the entire section. We would know and be prepared to satisfactorily answer any objections to a proposed drainage system which might be submitted. As the shortest line to tide water from Lake Okeechobee is east of the lake it is desirable that careful examination should be made of that section for an outlet. For the purpose of determining the area and value of the Everglades for agricultural purposes, a general examination should be made by passing in a zigzag line down the western side and north near the eastern side. In this way a personal knowledge of the entire area could be acquired. I would not recommend further survey work until these examinations are made. I think after they are completed a route for an outlet could be suggested after which it might be necessary to do some survey work in order to estimate the cost and to be satisfied that the route was practicable. The examination of the Everglades should be made at the period of highest

water while that of the Big Cypress region at the period of lowest water. It is unfortunate that part of this work had not been done during April and the early part of May of this season, as the conditions were more favorable than they have been for several years and are likely to be for some time in the future. I am of the opinion that there is some information in regard to this region in the way of survey records which could still be collected and would suggest that a plat be made beginning at the north line of Dade County and extending near the eastern watershed of the Kissimmee River around the head of the river and down along the western side of this watershed, to the mouth of the Caloosahatchee River as indicated by the blue line on the plat at the end of this report. From the mouth of the Caloosahatchee the coast line should be followed around the southern part of the peninsula and back to the north border of Dade County. This map should be a polyconic projection having for its base the coast survey plates of the coast line. Into this outline should be fitted the land office surveys, only the township lines being inked. On to this skeleton there should be sketched all the topography shown by the land office township plates and all data which can be secured from plats of other surveys. With such a plat it would be possible to make locations at any time in the field by the use of solar instruments.

In carrying on further investigations in the Everglades it is quite desirable that some method should be used by which positions can be at least approximately located. The best method of doing this, I have not fully decided, as I have several plans in mind and wish to investigate the matter further, but will be prepared to make a report on this in time to get the necessary outfit by October which will be as early as it will be desirable to take up this work.

In connection with the above investigation, the various local irrigation plants of the State should also be fully investigated, as in much of this country there can be no successful drainage without irrigation.

Area, Population, Farm Products and their Value as Given by the 3rd Census of Florida for Lee County.

| | | |
|---|---|---|
| Area …… | | 4,641 |
| Population- | | |
| White …….. | | 8,562 |
| Negro …….. | | 398 |
| Other races …….. | | 1 |
| | | 8,961 |
| Farm Products and their Values- | | |
| Corn , acre, 102; bushels, 1,096 …… | $ | 1,056.00 |
| Oats, acres, 2; bushels, 50 …… | | 25.00 |
| Sweet potatoes, acres, 93; bushels, 15,650 ……... | | 6,647.00 |
| Sugar cane, acres, 40; barrels syrup, 460 …….. | | 7,030.00 |
| Rice, acres, 4; bushels, 172 …… | | 269.00 |
| Field peas, acres, 11; bushels, 232 …… | | 765.00 |
| Peanuts, acres, 8; bushels, 285 …….. | | 280.00 |
| Velvet beans, acres, 12; bushels, 575 …… | | 608.00 |
| Irish potatoes, acres, 1; bushels, 100 ……. | | 175.00 |
| Hay (native grasses), acres, 57; tons, 84 …… | | 1,583.00 |
| Millet, acres, 1; tons, 2 …….. | | 20.00 |
| Cassava, acres, 4; tons, 20 ……. | | 100.00 |
| Celery, acres, 2; crates, 500 …….. | | 1,000.00 |
| Pepper, acres, 27; crates, 5,123 ……. | | 4,626.00 |
| Cabbage, acres, 2; crates, 295 …….. | | 329.00 |
| Tomatoes, acres 1,792; crates, 15,756 …….. | | 16,215.00 |
| Squashes, acres 16; crates, 2,560 …….. | | 1,585.00 |
| Egg plants, acres, 31; crates, 3,407 …… | | 5,461.00 |
| Cucumbers, acres, 1; crates 120 …… | | 130.00 |
| Beans, acres, 1; crates, 30 ……. | | 80.00 |
| Watermelon, acres 15; carloads, 11 …….. | | 1,083.00 |
| Orange trees, bearing, 46,714; non-bearing, 76,432; boxes, 86,726 …… | | 68,602.00 |
| Lemon trees, bearing 427; non-bearing, 427; boxes, 105 ……. | | 100.00 |
| Lime trees, number, 130; crates, 165 …… | | 128.00 |
| Grapefruit trees, number 112,526; crates, 30,142 ……. | | 83,590.00 |
| Pineapples, crates, 7,601 ……... | | 11,432.00 |
| Bananas, bunches, 222 …….. | | 131.00 |
| Sugar apples, crates, 5 …….. | | 5.00 |
| Avocado pears, crates, 247 …… | | 315.00 |
| Guavas, crates, 400 …… | | 575.00 |
| Cocoanut trees, number, 1,760; number nuts, 5,500 ……. | | 110.00 |
| Strawberries, quarts, 100 …….. | | 23.00 |
| Peachtrees, number, 15; bushels, 15 …… | | 30.00 |

| | | |
|---|---|---|
| Grapes, pounds, 9,000 …….. | | 150.00 |
| Livestock- | | |
| Mules, number, 68 …… | $ | 9,366.00 |
| Horses, number, 330 ……. | | 26,405.00 |
| Work oxen, number yoke 30 …… | | 1,480.00 |
| Stock cattle (native), 10,580 ……. | | 105,680.00 |
| Jersey, ¾ grades and up; number, 51 …… | | 2,180.00 |
| Cows, kept for milk only; number, 144 …… | | 6,700.00 |
| Hogs, all ages; number, 2,526 ..……. | | 5,705.00 |
| Poultry, all ages, common; number, 12,365 ……. | | 5,283.00 |
| All other poultry, number, 413 ……. | | 220.00 |
| Eggs sold and used, dozen, 47,061 ……... | | 9,054.00 |
| Milk sold and used, gallons, 46,920 ……. | | 13,719.00 |
| Butter sold and used, pounds, 4,644 ……. | | 1,264.00 |
| Honey, stands of bees, 93; pounds, 1,180 ……. | | 128.00 |
| Beeswax, pounds, 75 …… | | 75.00 |
| Total farm value …… | $ | 421,320.00 |

Area, Population, Farm Products and their Value as given by the 3rd census Florida for Dade County

| | |
|---|---|
| Area ……... | 4,434 |
| Population- | |
| White ……. | 7,880 |
| Negro ……. | 4,181 |
| Other races …… | 29 |
| | 12,090 |
| Farm Products and their Values- | |
| Corn, acres, 3; bushels 63 ……... | 65.00 |
| Sweet potatoes, acres, 28; bushels, 4,445 ……. | 4,102.00 |
| Sugar cane, acres, 1 …… | 40.00 |
| Field peas, acres 6; bushels, 136 …… | 545.00 |
| Hay (native grasses), acres, 51; tons, 80 …… | 480.00 |
| Velvet beans, acres, 27 ……... | 10.00 |
| Celery, acres, 1; crates 220 …… | 400.00 |
| Pepper, acres, 58; crates, 220 ……. | 19,114.00 |
| Irish potatoes, acres, 71; bushels, 4,175 ……. | 6,391.00 |
| Cabbage, acres, 10; crates, 727 ……... | 1,347.00 |
| Tomatoes, acres, 2,143; crates 424,297 ……. | 648,718.00 |
| Squashes, acres, 10; crates 2,615 …… | 2,190.00 |
| Egg plants, acres, 75; crates, 19,970 ……... | 32,617.00 |
| Cucumbers, acres, 41; crates, 4,078 ……... | 7,706.00 |
| Watermelons, acres, 13 ……... | 1,025.00 |
| English peas, acres, 2; crates 33 ……. | 171.00 |
| Beets, acres, 1; crates, 200 ……... | 500.00 |
| Beans, acres, 79; crates,11,763 ……... | 22,807.00 |
| Orange trees, bearing, 15,430; non-bearing, 59,801; boxes, 14,226 ……... | 28,794.00 |
| Lemon trees, bearing 315; non-bearing 42,767; boxes, 130 …… | 506.00 |
| Lime trees, number, 8,040; crates, 931 …… | 1,302.00 |
| Grape fruit trees, 148,770; crates, 12,418 …… | 29,848.00 |
| Pineapples, crates, 189,130 ……. | 272,368.00 |
| Bananas, bunches, 5,958 ……. | 2,860.00 |
| Sugar apples, crates, 115 ……... | 2,923.00 |
| Avocado pear trees, number, 5,139; crates, 1,146 ……... | 5,316.00 |
| Guavas, crates, 5,560 ……... | 2,923.00 |
| Cocoanut trees, number, 3,419; number of nuts, 14,700 …… | 1,725.00 |
| Strawberries, acres, 13; quarts, 1,380 ……. | 465.00 |
| Peach trees, number, 471; bushels, 2 ……... | 5.00 |
| Grapes, pounds, 440 …… | 32.00 |

Livestock-

| | |
|---|---|
| Mules, number, 172 …… | $ 32,670.00 |
| Horses, number 415 …… | 51,573.00 |
| Stock cattle, number, 1,203 …… | 13,050.00 |
| Cows, kept for milk only; number, 295 …….. | 15,640.00 |
| Hogs, all ages,; number, 125 …….. | 786.00 |
| Poultry, all ages, common; number 23,393 …… | 12,073.00 |
| Eggs sold and used, dozen, 51,951 …… | 14,996.00 |
| Milk sold and used, gallons, 34,860 ……... | 15,197.00 |
| Butter sold and used, pounds, 955 …….. | 314.00 |
| Honey, stands of bees, 141; pounds, 1076 …….. | 634.00 |
| Total farm value …… | $1,248,365.00 |

Copy Jax. Sept. 10, 1887

Richard Salinger, Esq.,

Dear Sir:-

Mr. Crenshaws notes and observations in reference to a survey from Ft. Thompson to Lake Hichpochee[6] [sic]- thence- via margin of Everglades to a point 600 steps S.E. of Indian boat landing and near S.E. cor. of Sec. 6, T. 46 E. 34 are received.

The point at which survey stopped is close to where the Big Cypress joins the Everglades.- This boat landing is where the Indians land in coming over from Miami.

Mr. Crenshaw also connected his levels with the B.M. of Genl. Meigs at Ft. Thompson. I secured the original notes and the elevation of this B.M. through the courtesy of Capt. Wm. M. Black- now in charge of U.S. surveys and engineering work here.

In making the survey the distance gone over by levels and meanders was also 70 miles.

The work was done at a season when there was considerable annoyance from repeated rains, insects etc. and natural delays consequent to lack of transportation, etc.

The first work consisted in establishing the level of Hichpochee[6] [sic] lake with the B.M. at Ft. Thompson.

From Lake Hichpochee[6] [sic] a live of levels was carried along the margin of the Everglades to the southwest.

About every three miles a bench mark was established and properly marked and described which will be valuable for future reference.

Parties were sent out into the saw grass at intervals to determine the nature and depth of soil on about what would be the line of canal providing this route be selected. Due to the force being short handed and the laborious nature of this work and constant annoyance from insects, and more particularly from the fact that several of the men were unable to proceed with this work, the examination of the saw grass region was deferred until a more convenient season.

12 bench marks in all were established the original notes locate them with reference to section, Twp. & Range.

Rock is found at from 2 to 4 feet below surface at several points, but where the examinations were projected into the saw grass the depth below the surface increased. In

cutting south from Hichpochee[6] [sic] and Okeechobee, after determining upon a general line it would be necessary to have examinations made well in advance of the cutting in order to avoid encountering rock ridges which at points approach the surface.

The accompanying map shows the general line of examination marked in red, also the position and designation of Bench Marks.

The elevations of the Lake Hichpochee[6] [sic] - the Bench Marks and the surface of the ground and water at the edge of saw grass are given below.

The B.M.s are frequently from ¼ to 1 mile from the margin of the saw grass, and this distance had to be leveled over in order to secure elevation of saw grass opposite each B.M.

I also append some memorandum from surveys of Col. Meigs and Capt. Black of the U.S. Engineering Corps.

Memoranda from notes of Gen. Meigs, of survey of Caloosahatchee River March and April 1879,- (Elevation above mean low tide at Ft. Myers, - 1.7 ft. is mean rise and fall of tide at Myers.

| | |
|---|---|
| Surface of water in Lake Hichpochee[6] [sic] & Okeechobee …… | 21.94 |
| High surface water of Lake Okeechobee (T) ……..... | 25.08 |
| South shore of Lake Hichpochee[6][sic] …… | 22.44 |
| Surface of river at Lightseys Ferry …… | 13.17 |
| Surface of river where it emerges from Lake Flirt[7] …….. | 6.34 |
| Surface of river at Ft. Thompson Ferry April 3, 1879 ……... | 5.93 |
| Bed of river at Ft. Thompson Ferry, April 3, 1879 …… | 1.28 |
| Ground adjacent to Ft. Thompson Ferry …… | 11.08 |
| Surface of river at ft. of Ft. Thompson rapids …… | 5.94 |
| B.M. #7 …….. | 11.86 |

Memorandum of survey of Caloosa [sic] River[8]- from notes of Capt. Wm. Black U.S. Eng. Corps.

Elevation above mean low water at Myers.
Mean rise and fall of Tide at Myers 1.7 ft.

(Bch.?) 30 March and April 1887.-

| | |
|---|---|
| Surface of water L. Okeechobee …….. | 21.815 |
| “ ” “ ” ” Hichpochee[6] [sic] ……. | 19.595 |
| Apl. 1st “ ” Sugar Berry Hammock …… | 17.303 |
| “ 4 “ ” Coffee Mill Hammock …… | 13.515 |
| “ 11 “ ” Ft. Thompson Ferry ……. | 7.300 |
| “ 11 B.M.F. ” Meigs’ Survey #7 …….. | 12.099 |
| “ 11 B.M. #4- iron pipe (Ft. Thompson) …….. | 10.477 |

An examination of the foregoing shows following conditions.-

| | | |
|---|---|---|
| Lake Hichpochee[6] [sic] above Meigs B.M. …….. | | 10.04 feet |
| " " " | Black B.M …….. | 9.144 |
| " " " | Meigs B.M. as compared by Crenshaw …….. | 9.93 |
| " " " | Black " " " " | 11.64 |
| Captn Black found Hichpochee[6] [sic] below Okeechobee ……. | | 2.22 |

Genl. Meigs found Hichpochee[6] [sic] & Okeechobee on same level.

Crenshaw found ¼ mile east of B.M. L. (at saw grass) a fall of 21.36 - 9.24 - 12.12 ft. - distance from parallel from south shore of Okeechobee to B.M. L.- 24 miles.

This gives a gradual fall of six inches to the mile.

The levels indicate that sufficient fall exists in this distance to accomplish our object.

The fall is not nearly so rapid however as on the line of canal leading west from Hichpochee[6] [sic] to the Caloosa [sic] River.[8]

If time was afforded it would be advantageous to conduct a series of levels to the B.M. from Okeechobee toward the Miami and New River.

There is no definite information as to the conditions on the East side.

This work should be attended with a great deal more expense than on the West side- from the fact that teams would have to be procured at Ft. Capron. It might be possible to send the Rosalie down on a reconnaissance and endeavor to reach the fast land somewhere on the S.E. shore of Lake Okeechobee and from this a base, with a couple of pack horses, a party could make a comparative examination as to advantages of the outlet to S.E. or S.W.

This work in East side can only be done by fitting up regularly for it.

After Rosalie established a camp if such is possible, she could go back and send horses and guide down from Bassinger[9] [sic].

If work is done on East side we of course will not have advantages of supplies, etc., and convenience of transportation as on West side.

On the other hand an examination there may of great advantage providing we can secure time to make it.

While this was going on No.1 could make wood landing etc. on Hichpochee[6][sic].

Yours truly,

J.M. Kreamer

I wish to add that the fall of 12 ft. is ample for our purpose. It will necessitate a canal of greater cross section to accomplish our result.

This fall is found immediately upon the margin of the Glades and the conditions may be more favorable on line of cutting on West side,- which line would be farther removed from the margin.

The examination suggested B.M. from Okeechobee is all that is left for us to do to be fully informed.

If you desire, I will have made it.

Yours truly,

J.M. Kreamer

Jacksonville, Florida,
February 4,1894.

Col. Jas. M. Kreamer,
Chief Engineer Okeechobee Drainage Co.

Sir:

I herewith enclose field notes of a reconnaissance of South shore of Lake Okeechobee and extending from extreme south end of Lake, through center of Everglades to the head waters of Harney River, and thence down said river & the Gulf of Mexico. This expedition was fitted out by the New Orleans "Times Democrat" and placed under command of Major A.F Williams. Our party left Cedar Keys on the 18th of October and proceeded to Lake Okeechobee via Punta Rassa, the Caloosahatchie [sic] River[8] and your canal connecting Hickpochee[6] [sic] with Lake Okeechobee. We coasted along the south shore of last named lake in a S. Easterly direction, to its extreme south east end, at which point I determined the latitude by a Meridian Altitude of the sun (using the Artificial Horizon furnished by yourself, and a sextant of my own) and found it to be 26°, 40' 30". Infind [sic] in this locality 8 streams, or bayous making in a southerly direction and extending from 1 to 2 miles through low wet swamp to saw grass, where they cease. These bayous or lagoons are from one to 300 feet wide, 8 to 10 feet deep with soft mud bottom. The margin of lake generally is fringed with low wet swamp and saw grass; swamp averaging from one to 2 miles in width before reaching the saw grass ocean extending south for nearly 100 miles. In many places I find the banks of these bayous or streams, elevated above the water from 1 to 2 feet, the soil of a rich dark color, and exceedingly rich in quality. Taking advantage of one of these lagoons, we pass through the swamp (growth sugar apple) and enter the saw grass ocean in which we find but a few inches of water not sufficient to float our light boats, but flowing perceptibly in a southerly direction. I sounded regularly with a 10-foot rod and for 30 miles (our course being south) I found no evidence of rock or sand; how much deeper this rich soil or muck extended I had no means of determining. At that distance 30 miles south of lake I found rock at 6-½ feet below surface, at 35 miles rock 7-½ below surface, at about 40 miles from 2 to 4 feet; the lake at this point reached the northern limit of the lower Everglades; and Genl. Child's route as represented on the maps from Miami to (Emma Madjes?) Landing. This route may be considered as the <u>dividing</u> line between the <u>upper</u> and <u>lower</u> Everglades. The upper or northern glades being a solid body of dense saw grass extending 30 miles East and West and 40 miles North and South, and which has hitherto been considered impenetrable. The dividing line above all (?) defined except by an entire change in the character of the country which consists simply in numerous islands and sloughs; by taking advantage of which you may wind your way through the saw grass. The lower Everglades is also saw grass but cut up by sloughs (course sloughs generally southerly) and dotted with innumerable small island, varying in area from 1 to 20 acres. Most of these islands are subject to overflow. Soil rich loam.

At point about East from Bowlegs landing, Capt. Hendry left us with a small boat and one man and proceeded to Fort Myers, for the purpose of sending us assistance

should it become necessary. He informed me that the day after leaving us (almost on dry land) he found a current of water 3 feet deep flowing southerly along the cypress; that the current was sufficiently strong to bend the saw grass in the direction it was flowing and that the canal connecting Lake Hickpochee[6] [sic] with Okeechobee did not, in his opinion, carry off one-tenth the quantity of water that was taken off by this natural channel. It has been shown by the surveys of the U.S. Engineers that there is a fall from Lake Okeechobee to tide water of the Gulf of Mexico of 25 6/10 feet. It has also been ascertained that there is a fall of about 22 feet from Okeechobee to the Atlantic Ocean. On one expedition we had no level and consequently ran no lines, hence, it was impossible for us to determine the difference of levels between the Lake and Gulf. As we approached the headwaters of Harney River the rock crops out at the surface on which we found only about 2 inches water, except where we found sloughs heading towards the Gulf in a southerly direction. We entered the head of Harney River by one of these sloughs (10 inches water in grass slough). This stream is navigable for about 16 miles for small boats and about 12 miles for vessels drawing 4-½ feet. The river is about 250 feet wide; with rock bottom; water perfectly clear; banks low mangrove swamp. The district of rich land south of Lake Okeechobee extends about 30 miles from East to West and from 70 to 75 from North to South, embracing over 1,000,000 acres of land unsurpassed for fertility, and richness in quality, which when reclaimed, will be the most valuable sugar district in the United States.

Respectably,
Your Obtsvt.,
Chas. F. Hopkins
Assistant Engineer.

The foregoing, together with accompanying field notes will give you an idea of T.D. expedition &c., from which you can write report to suit yourself.

C.F.K.

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Field notes of a reconnaissance made in Oct and Nov 1883 of South Shore of Lake Okeechobee and from extreme South east end of said Lake to head of Harneys [sic] River[10] and thence down said stream to Gulf of Mexico.

Chas. F. Hopkins
Engineer 60.

Oct. 17 1883, Left Jacksonville. Arrive Cedar Keys at 8 P.M.
" 18 Left Cedar Keys at 8 P.M. on board of Steamer Lizzie Henderson.
" 19 Arrived at Punta Rassa at 8 P.M.
" 20 Left Punta Rassa in small boats for Fort Myers. strong [sic] breeze from South East. Two of our boats [("Bassine")?] "filled", no one drowned. Arrived at Fort Myers at 6 P.M., distance 18 miles.

Oct. 21 &
" 22 Remained at Fort Myers.
" 23 Left Fort Myers; arrived at Dr. Kellum's on the Caloosahatchie River[8] at 6.30 P.M. Distance 23 miles
" 24 Encamped at Kellums.
" 25 Left Kellums at 6 P.M. encamped near old Fort Denaud. Distance 16 miles.
" 26 Encamped at Fort Thompson. Distance 20 miles.
" 27 Left Fort Thompson at 3 P.M. "Coffee Mill Hammock"; distance 14 miles.
" 28,
" 29 &
" 30 Encamped at Coffee Mill Hammock.

Nov. 1 Left "Coffee Mill" at 9 P.M. Encamped (in our boats) at entrance of canal with Lake Okeechobee. Wind S.W. and blowing fresh; distance from Coffee Mill Hammock to Sugar Berry Hammock 10 miles (by river); distance from Sugar Berry Hammock to West side of Lake Hickpochee[6] [sic] 4 miles, distance (W 22°, 00' E) across Lake Hickpochee[6] [sic] to entrance of canal five miles; thence by canal NE by East 2½ miles to West shore of Okeechobee.

Nov. 2 Sounded at entrance of canal at Okeechobee and found depth of five feet to soft mud and four feet through the mud to a hard formation of sand. No rock. Total depth to land formation 9 feet, to which depth the canal can be cut.
Where there is sand bottom, the canal will "scour" or deepen; but little or no scouring is observed where there is mud. The canal between Okeechobee and Hickpochee[6] [sic], the bottom being mud, has scoured, but little, if any. I find the water, about one foot above the <u>natural</u> bank of canal. The current in canal where it leaves Okeechobee is not over 2 knots per hour, and scarcely perceptible where it enters Hickpochee[6] [sic]. This I attribute to its spreading in the saw grass and the rise in Lake Hickpochee[6] [sic] caused by heavy local rainfall. I find the water from Hickpochee[6] [sic] to Sugar Berry Hammock and a short distance below, a depth of 2 feet over the natural bank of canal. The current from Lake Hickpochee[6] [sic] to Fort Thompson and down stream is usually rapid, evidently caused by the rise of water in Hickpochee[6] [sic]. On the 27th of October the water at Fort Thompson (?) banks of the river and just beginning to rise. The high water found as above stated at the head of the river and Lake Hickpochee[6] [sic] will evidently produce the usual overflow of the Caloosahatchie[8] [sic] and Valley unless it is obviated by the work done by the Drainage Company at the falls, near Fort Thompson, where the great trouble exists. Hitherto it has been observed, taking the water at its present stage at Sugar Berry Hammock four miles below Hickpochee[6] [sic] that the water at Fort Thompson was 8 feet above its present height, with a current scarcely perceptible for the entire distance of 10 or 12 miles in an air line. This may be understood when we remember that the escape of the water through the Caloosahatchie [sic] river[8], at and near Fort Thompson not being of sufficient capacity to prevent the escape of the water; it is so obstructed, or "banked up" at or near Fort Thompson, that there is a back water, or cessation of current above the falls. I am credibly informed that by observation in 1876, during the highest overflow ever known in this country it was proven that the

waters of Lake Okeechobee and Fort Thompson were on the same level, and even at the falls at Fort Thompson, at that time, there was no perceptible current.

The first appearance of any current was several miles below Fort Thompson. To illustrate more practically, imagine this section of country, from Lake Okeechobee to Fort Thompson to be an immense funnel, its small and being at or near Fort Thompson. This funnel is capable of permitting escape of an ordinary supply of water, caused from local rainfall, but during a wet season, common in this region, it becomes gorge and insufficient to take off the water, and overflow of the Caloosahatchie[8] [sic] valley ensues.

For navigable purposes the present river is sufficient. In order to prevent the usual overflow, I would like to make the following suggestions, to wit, commence at present bank and remove earth 150 feet on each side of channel on level with present bank of river. This cutting would commence where the river forms a well defined channel, just above the "late falls". There is a gradual rise on each side of the canal; perhaps an elevation of 2 feet in 150, or, in other words, a fall of 2 feet in 150 towards canal. By making these cuts level with canal for 150 feet on each side, the usual overflow would probably be prevented and a sufficient depth of water be insured at all seasons for navigation on the channel, or present canal. It is not believed, that in making these cuts on each side of the canal that there would be any rock to be removed; but that it would leave exposed at this depth (2 feet) the surface of rock. The work could be accomplished with ordinary appliances and comparatively small outlay.

Eight miles south of Fort Thompson, on a Okaloacoochee slough there is a "divide" the water flushing N. & S.

Where water is 3 feet over banks at the falls, it follows the course of canal to be cut.

The Okaloacoochee River flows southerly through the "Big Cypress" and thence to Gulf of Mexico.

Nov. 3.

Left camps at entrance of canal with Lake Okeechobee and encamped in our boats, on the edge of saw grass six miles southeasterly from canal. Mr. Marshall, photographer, joined us from Manatee.

Nov. 4.

Camped at a point on south shore of lake, said point being S by E from the S point of observation island and about 4 miles distance. Found a good harbor for our boats and a sand beach to rest on. Growth, cabbage palm, cypress, ash and Indian rubber trees. High wind from the north and rough sea, capsized two boats, and lost material part of camp equipage. A strip of land extends southeasterly a mile or more varying from 80 to 100 yards in width. The greater part of this strip is very rich land. Some of the India rubber and Cypress trees are of large size; one

of the cypresses about 5 feet in diameter. This narrow strip of dry sand beach is the only “camp ground”, on south side of lake, in rear of which a safe and splendid harbor for boats &c., deep water, say from 6 to 10 feet.

Nov. 5

Left camp at 6 A.M. Wind fresh from N East. At 8, two of the provision boats filled, beached them and returned to old camp, where remained for the night. There is a small bench extending southeasterly for about one mile.

Nov. 6.

On the way at 6 A.M. coasting along south shore of lake, at 12 A.M. found a creek or lagoon, extending south and about 200 feet wide at entrance. Depth of water 6 feet mud bottom. There is an island 2-½ miles north of us. Continued south up creek, or lagoon for one-half mile where it forks, one prong leading so theast [sic] and the other southwest. Growth on the bank of creek, sugar apple and morning glory. The land at fork of creek 16 inches above water. The current flows south at the rate of one-half knot per hour. Soil dark, loam exceedingly rich. The average depth of creek is 8 to 9 feet. Bottom soft mud to form of creek. In the fork of creek moving southeast, we found some scattering rock boulders.

Nov. 7,
“ 8 and
“ 9

Examining streams, or lagoons, flowing southerly from lake, we found 8 streams from 1 to 2 miles apart, along south shore. These water courses extend only about one or two miles southerly from lake shore and are from 1 to 200 yards in width; depth of water 8 to 10 feet. Bottom soft mud, no rock. No perceptible current until we got 2 miles from lake, through “custard apple swamp”. The third stream west of most easterly one we have selected from which to enter saw grass.

Nov. 10.

The stream above named is about 250 yards wide at its mouth an continues from 1-¼ miles; varying in width from 250 to 20 yards in width; it then narrows to a small creek from five to ten feet deep, through swamp and finally loses itself at a distance of 2-½ miles. After leaving the lake 1-½ miles, we found a perceptible current flowing southerly. There are three good “camp grounds” on this river; the land in many places two feet above water and exceedingly rich in quality; in fact I have never seen better soil in or out of Florida. The latitude, by Meridian Altitude of the Sun, taken at the extreme south end of Lake Okeechobee I find to 26°, 40’, 30”.

Nov. 11

Leave Custard apple Swamp and enter a flat country covered with dense growth of Yuma grass, Bonnets, (wamper?) and scattering willows; water 18

inches deep. Found great difficulty in clearing and forcing our boats through this growth. Soil rich muck. No rock or sand to be found at a depth of 10 feet.

Nov. 12.

Still forcing our way as above. Soil same as above. No rock or sand at a depth of 10 feet.

Nov. 13.

Engaged as above. Wind northeast and raining. Soil rich muck. Sounded to a depth of 10 feet, through solid muck. Very rich. No rock or sand. The Custard Apple Swamp bordering the lake is about 1-½ miles wide. The main or heavy body of saw grass 4-½ miles from south shore of lake.

Nov. 14.

We reach the main body of saw grass. Wind from northeast and light. Average depth of water before reaching heavy saw grass about 6 inches; in saw grass it is from 10 to 12 inches in depth.

Soil very rich muck; no rock or sand to be found 10 feet below surface.

Nov. 15.

Wind light and variable. Saw grass will only burn in patches. Sounded to a depth of 10 feet through rich muck. No rock or sand to be found.

Nov. 16.

Strong breeze from northeast. Discontinued firing saw grass. Made sail and put the men overboard to assist in forcing our boats ahead. Water 15 inches. Soil rich muck. Sounded to a depth of 10 feet. No rock, camped in boats as usual. No wood, used bacon to boil our coffee. Course south. Distance made 1-½ miles.

Nov. 17.

Strong breeze from northeast. Our boats encircled by burning saw grass. The supply boat (Queen?) Anne carried away her mast. The Daisy (W.?) and Susie (S.?) lost main boom &c. camp in our boats as usual. No wood to be had, use bacon for fuel. Light rain during the evening. Soil rich muck. No rock or sand at 10 feet. Course S. S. E. Distance made ¾ mile.

Nov. 18.

Sunday. Wind N.W. moderate and cloudy, with passing showers of rain. Rested in our boats to-day.

Nov. 19

Still in saw grass. Sounded to a depth of 10 feet in rich muck. No rock or sand. A heavy squall of wind and rain during the night. Course S. S. W. Distance made 3 miles. Sounded to a depth of 10 feet, solid rich muck. No rock or sand. The surface of ground is becoming harder and heavier bodies of saw grass. The deepest water is found in the heaviest saw grass.

Nov. 20

Heavy patches of saw grass for first mile, after which the grass becomes small and the water shallow, not exceeding ten inches. Course S. S. W. Distance made 2 miles. At 12 A.M. discovered a smoke bearing S.E. Fast and distant about twenty miles. This smoke has probably been made by Indians crossing Everglades from the big cypress swamp to Miami. Birds are noticed several miles ahead of us. The first sign of animal life seen with the exception of a few alligators since leaving lake shore. Sounded and found no rock or sand at 10 feet. Soil rich muck. After breaking through a hard crust on surface found muck or mud, as usual.

Nov. 21.

Still continue to see birds ahead. At 2 P.M., left main body of solid and dense saw grass extending S.E. and N.W., and enter a level plane covered with scattering saw grass; dog tongue, water lilies, etc. In many places surface covered with white flowers (water lilies); the surface of ground becomes harder and is covered with grass, such as is found on the east and west edges of saw grass in other areas in the Cattle Range. At 4 P.M. crossed a small deep creek W. S.E. and E. N.W. very crooked, width 10 feet, depth 8 to 10 feet; current sluggish and setting to the westward. At 5, encamped as usual in our boats.

Nov. 22.

Water getting very shallow. In many places not over 2 inches in depth. At 4 P.M. cross a small creek 6 feet wide. 10 feet deep, followed this gulley [sic] S west for a short distance and resumed our course over land. As these gulleys [sic] increase in number the water becomes shallow, in fact, scarcely covering surface of ground in many places. The gulleys [sic] are narrow and deep, having no beginning or ending but seem to rise or sink at will. Possibly they may be fed by springs. Sounded during the day through muck bed to a depth of 10 feet. No rock or sand. Soil very rich. At sunset crossed a gulley [sic] 8 feet wide and 10 feet deep, and encamped, as usual in our boats. Course made south. Distance made 2-½ miles.

Nov. 23.

Water continues very shallow, only about 2 inches deep. Finding it impossible to carry over large provision boat, (Queen?) Anne we abandoned her and continued our course south, water still very shallow. At sunset camped in our boats. No wood to be had, used bacon for fuel. Soil rich muck, no rock or sand at 10 feet.

Nov. 24.

Continue our course south, water still continues very shallow, not over three inches deep. At 1 P.M. cross a gulley [sic] S.E. and N.E. followed it a few hundred yards to where it ended. These gulleys [sic] are narrow and very deep, being from 10 to 12, water in them, saw some shells in bottom of gulley [sic]; the

shells are soft and crumble by touching them with our poles. Sounded 10 feet, rich muck, no rock or sand. At 5 P.M. encamped in our boats.
Sounded 10 feet, rich muck, no rock or sand. At 6 P.M. encamped in our boats.

Nov. 25.

Water still very shallow, not over 2 or 3 inches deep. We are almost hauling our boats over dry land. Capt. Hendry left in small boat with one man for Fort Myers. I am satisfied we would find deeper water a few miles to the west, but Major insists on continuing south. A point of land in sight bearing W. S. W. (supposed?) to be the cypress trees at Bowlegs Landing. Distance about 14 miles.

Nov. 26.

Water still very shallow, not exceeding 2 or three inches in depth; soil rich muck, no rock at 10 feet. Course south. Distance made ¾ mile.

Nov. 27.

Cloudy with fresh breeze from the north. Water deepens to 8 or 10 inches. (?) and found rock bottom at a depth of 6-½ feet, overlaid with rich muck. We suppose we are in T. 46 S.W. 34 E. About East from Bowlegs landing and distance about 14 or 15 miles. Sounded several times during the day and found solid rock at 8-½ feet. Late in the evening after making a haul or a days run of about 5 miles, sounded and found rock at 7 feet. Camped on a small island containing only dry land enough to spread our blankets on; growth maiden cane, elder and custard apple. The maiden cane covered the only dry spot of land. This small island is the first land we found south of Okeechobee. We found some rock on this island, which is a bird rookery &c., Hundred of buzzards, curlews, &c., roost here.

Nov. 29

Remained on island and repaired boats.

Nov. 30

Continued course south, found open sloughs extending southerly, saw grass still continues. Northeast end of the big cypress, bears S.W. and distant about 15 miles. Distance made 5 miles.

Dec. 1

First course S. S. E. following a slough, water two feet deep, found rock at that depth in bottom in sloughs. At 12 A.M. intersected route S.E. and N.W. leading from (Emma Madjes?) landing to Miami. This route is simply a series of sloughs winding through the saw grass. Our approximate distance is about 40 miles south of Lake Okeechobee. This route from (Emma Madjes?) landing to Miami (noted on map on Genl. Childs route) divides what is known as the upper and lower Everglades. The country North of this to Okeechobee, is a solid ocean of saw grass, in which there is but one or two small islands, and some deep small

gulleys [sic] occasionally. The country south of this route, is known as the lower Everglades and is also saw grass, but cut up by sloughs and dotted by numbers of small islands, which increase in number as you go south. The great majority of these islands are subject to overflow. Course southerly. Distance made 15 miles, soil rich muck. Rock from 2 to 4 feet deep below surface. Camped on a small island for the night, on which there are three cabbage trees, and dry land enough for a part of us to spread our blankets. We find an old (oar?), about 8 feet long on this island and a stake (driven years ago) driven in the mud &c.

Dec 2.

Following a slough in a southerly direction, water two feet deep, the entire bottom of sloughs almost covered with rock. The rock in saw grass from 4 to 5 feet below surface of muck. The "Big Cypress Swamp" in plain view to the westward. Distance made 5 miles.

Dec. 3.

Continued following sloughs southerly. Rock bottom. Water 16 inches deep. In Tp 87 S.E. (?); water shoals to three inches, bottom solid rock. All hands engaged in lifting boats across for several miles. The saw grass has disappeared and instead we find a kind of wire grass. The rocks are jagged and well calculated to destroy boats. We are now in the midst of innumerable islands. These islands are generally low and subject to overflow. Growth, cocoa plant, white bay, sweet bay and occasionally scattered cabbage palms. I presume we are now near the headwaters of Shark or Harney River. Distance made about 15 miles.

Dec. 4.

Water 2 inches deep. Bottom solid rock. Great danger of losing our boats. Provisions getting scant, not over four days bread. At 12, discovered a smoke, bearing W. S. W. and another S. East. Several guns fired in S.E. direction, evidently by Indians to divert us from our course. Saw large quantities of deer. At sunset camped in out boats as usual.

Dec. 5.

Continue our course W. S. W. in direction of smoke seen the day before. We discover another smoke in same direction, and feel satisfied that these smoke are made by (Jms.?) Christian, who was sent from Okeechobee by way of the Gulf to make signals at head of Shark or Harney River. At 5 P.M. discovered a man approaching us from the West and soon discovered it was our man Christian. Camped as usual in our boats. Our situation until we met Christian was a desperate one; with scant 4 days rations of bread and our frail boats almost high and dry on the rocks. Christian had been at head of river 10 days, making signals for us, and had reconnoitered the country for 15 miles around, and consequently was able to pilot us to a grassy slough leading into Harny[10] [sic] or Shark River.

Dec. 6

Entered headwaters of river (Harney or Big Shark) a small slough in saw grass and mangrove swamp. This slough widens in a mile or so to a well defined stream or creek, which widens going down stream (4 or 5 miles) to 250 feet. The depth of water (average) 4-½ feet. Bottom solid rock, water very clear. The banks are low mangrove swamps, not even offering dry ground enough to spread a blanket. This river is navigable for about 18 miles, for boats drawing 4-½ feet of water. At entrance the water is 9 feet deep; bottom soft mud, but after entering, and a short distance up, solid rock appears in bed of river and continues to its source. At 10 P.M. we reached Mr. Atwells place on Rogers Creek, a small stream leading from Harney River to the Gulf of Mexico and discharging itself at North side of Lost Man Key[11].

Dec. 7.

Left Lost Man's Key[11] in schooner Sweet Y & G. Capt. Atwell, arrived following day at Colliers place on Big Marco Island, 18 acres of first quality land 20 feet above sea and under cultivation in tropical fruits and vegetables growing in great perfection. Pulling from Marco Key we reached Punta Rassa, on 9th instant and from thence to Cedar Keys by steamer, and arrive in Jacksonville on 14th December.

Long Key about two miles east from the headwaters of Harney River and on the Lower Everglades is about 12 miles in length; extending N W & S W and about from 4 to 600 yards in width. The N.E. end of Key, is a cabbage hammock of about 25 acres, subject to overflow at high stages of water. The soil is rich dark loam 4 inches deep- substrate rock. Growth cabbage, mastic cocoa plant and Indian rubber or wild fig, cabbage growth predominating. Remainder of Key low mangrove swamp, of little or no value.

[1] Transcriber believes this is a reference to Okaloacoochee slough.

[2] Transcriber could not verify place name in Geographic Names Information System (GNIS), but believes this is a reference to Fort Shackleford according to Whyte, Herbert. "Hunting by Automobile: From New York to Florida." The Outing Magazine. October 1910: p.522.

[3] Transcriber believes this is a reference to Surveyor's Creek according to Bowman, Isaiah. Forest Physiography: Physiography of the United States and Principles of Soils in Relation to Forestry. Manchester: Ayer Publishing, 1911.

[4] Transcriber believes this is a reference to Chokoloskee Bay.

[5] Transcriber could not verify place name in Geographic Names Information System (GNIS), but believes this is a reference to Allen River, now known as Barron River, according to Hrdlicka, Ales. The Anthropology of Florida. Harvard University: The Society, 1922.

[6] Transcriber believes this is a reference to Lake Hicpochee.

[7] Transcriber could not verify place name in Geographic Names Information System (GNIS), but believes this is a reference to Lake Flirt, the original headwaters for the Caloosahatchee Rivers, west of Lake Okeechobee, according to Rhoads, Samuel N. "The Breeding Habits of the Florida Burrowing Owl (*Speotyto Cunicularia Floridana*)." The Auk: A Quarterly Journal of Ornithology 9:1 (1892) 1

[8] Transcriber believes this is a reference to Caloosahatchee River.

[9] Transcriber believes this is a reference to Basinger, Florida.

[10] Transcriber believes this is a reference to Harney River.

[11] Transcriber could not verify place name in Geographic Names Information System (GNIS) or any other source.