PART ONE.

PART ONE.

A BRIEF DESCRIPTION OF THE NATURAL FEATURES OF THE EVERGLADES AND THEIR PRESENT CONDITION.

THERE are but few persons in the United States who have not heard of the Everglades of Florida, yet a large per cent of those who have not SEEN the Everglades have an erroneous and imperfect conception of this territory. The general impression is that the Everglades is an impenetrable swamp or jungle covered with a dense growth of trees and vines, infected with all kinds of reptiles, and reeking with fever and malaria.

During the past three years the writer has had an opportunity of meeting a great many persons from different parts of the country, on their first visit to this famous territory. With hardly a single exception they were filled with surprise and admiration. Instead of an impenetrable swamp, covered with timber, they found a vast PRAIRIE sixty miles wide, stretching from Lake Okeechobee on the north to Biscayne Bay on the south.

Between the Everglades and the Atlantic Ocean is a belt of small timber, whose general surface is one to three feet higher than the Everglades directly west, and having a slight slope toward the south. This strip of land is composed of sand, loam and clay, with some muck in the low places, the entire area being

underlain with an oolitic limestone. The depth of earth on this limestone ranges from twelve feet or more at the north end, to a mere covering at the south end. Near the coast a series of flat ridges of sand have been thrown up by the action of the wind and waves, two to ten feet higher than the general level. The growth in this belt is scattering pine and scrub palmetto, on the sandy portions, and small cypress in the sloughs. There is a similar strip of high land, though much wider, on the west side of the Everglades, having a slope toward the south and west.

The soil between these two ridges is a well decomposed "muck" (not peat) two to fourteen feet deep. This muck is underlain with a porous rotten limestone mixed in many places with sand, clay, shell and marl.

As a general proposition, the muck is deepest near Lake Okeechobee, and shallowest in the southern portion of the Everglades. For a distance of about twenty miles south from Lake Okeechobee, the underlying material is practically level on top. Beyond this it becomes uneven, being marked with irregular depressions and ridges. As the surface is level, this unevenness of the sub-stratum causes a varying depth of muck within a limited area.

The surface of the Everglades, taken as a whole, appears to be a level plain, having a slope of three inches per mile toward the south and east, yet this general statement is subject to slight modification. Throughout the entire area there are numerous winding shallow depressions or channels 100 to 500 feet wide, and

one to three feet lower than the land through which they pass. These depressions, locally called "Strands," wind through the 'Glades in all directions, though their general trend is from north to south. In other places there are slight depressions, like ponds or lagoons, covering one to forty acres. These are most numerous along the eastern margin and throughout the southern portion. The muck in these depressions is usually less firm than the land on either side. These irregularities of the surface also affect the depth of muck at these points, as the underlying hard material is no lower in these surface depressions than under the adjacent land. These low places are usually filled with water, while the general surface of the Everglades is comparatively dry.

Early Description of the Everglades.

The following description of the Everglades was written in 1848, by Col. S. H. Long, Topographical Engineer of the U. S. Army, and transmitted to Hon. J. D. Wescott, Jr., U. S. Senator from Florida. It presents very clearly the condition at that time, and the opinion that was held as to the future possibilities of the Everglades.

"The main body of this district appears to be situated between 25 degrees 31 minutes and 27 degrees of north latitude, and between 80 degrees 30 minutes and 81 degrees 15 minutes of west longitude from Greenwich. Its extent from north to south is about 100 miles, and its average width from east to west about 50 miles.

It is bounded on the north by Lake Okeechobee, which may be regarded as an extensive water sheet covering a portion of the Everglades and holding it in a state of constant submersion, and on the east, south and west by a sort of rim or margin, elevated a few feet above the common level of the included district and of the circumjacent country. A profusion of insular tracts of greater or less extent, and of elevations about equal to that of the rim, or a few feet above the common level of the district, are scattered in every direction over the surface of the district.

"With the exception of these insulated tracts and the rim with which it is bounded, the entire district is subject to periodical overflows of water to the depth of two or four feet during the rainy season, which usually prevails from August or September to February or March of every year. These overflows are supposed to have their principal origin in the country northward of Lake Okeechobee and to be brought down to the lake through the channel and valley of the Kissimmee River.

"The entire district embraces an area of about 5,000 square miles, nearly one-half of which, agreeably to the best information I can obtain, is susceptible of drainage, and, when thus reclaimed, would present fields of vast magnitude adapted to the cultivation of sugar, rice, and numerous tropical products of great value. The method of drainage that has been proposed and recommended is as follows, viz:

"First—A spacious canal or drain leading

from Lake Okeechobee westward, through the valley or pass of Caloosahatchee River to the Gulf of Mexico;

"Second—A similar canal leading from the same lake eastward, through the valley of Lochahatchee River to the Atlantic Ocean; and

"Third—Numerous drains of much smaller size leading across the rim and communicating, respectively, with one or more of the numerous rivulets that rise in the vicinity of the rim and empty into the Gulf of Mexico and Atlantic at various points along the coast of Florida.

"It is believed by many that the two large canals first mentioned will amply subserve the purpose of drainage; but, should they prove inadequate, that the desired end may be effectually attained by means of the smaller drains mentioned in the third proposition.

"The practicability of draining the Everglades must, of course, depend on the elevation of Lake Okeechobee, and of the Everglades themselves, above the level of the high tides in the ocean. This elevation is supposed to be from twelve to twenty feet. The difference of the levels alluded to, so far as I can learn, has never been determined by instrumental surveys. Its accurate determination should unquestionably precede any attempts to accomplish the object in view.

"By means of the two canals connecting Lake Okeechobee with tidewater, together with a lock in each (if necessary) of suitable dimensions to admit small coasters and steamers, it is supposed that a line of continuous navigation may

be opened entirely across the Isthmus of Florida from the Atlantic to the Gulf of Mexico. In case the locks should be found expedient and proper, they should be accompanied by spacious waste weirs or sluices and perhaps flood-gates, in order to afford a full and free discharge of water from the lake," etc.

Formation of the Everglades.

The southern part of the Peninsula of Florida was at one time covered with water, which receded and left the rock ridges on either side of what is now the Everglades exposed. The basin between these ridges has been gradually filled by accretions and the growth of vegetable matter. There are no indications of an upheaval or of volcanic action in South Florida. Neither is there any indication that the rock underlying the muck is of coral formation, except in very limited areas. It is not stratified, but is homogeneous in charcter. In most places it is soft and porous, but there are, however, certain limited areas in which it is very hard and difficult to remove. When in place, this stone is quite retentive of moisture, but dries out and hardens when it is exposed to the air, and makes good concrete and surface dressing for roads.

The most important factor connected with the formation and reclamation of the Everglades is Lake Okeechobee, the largest body of fresh water, except Lake Michigan, wholly within the United States. This lake is almost circular in shape, covers a half million acres, and has an average depth of thirteen feet. It lies at the

northern end of the Everglades, and has a mean surface elevation of 20.6 feet above sea level. It is not fed by springs or subterranean channels, but derives its supply of water from the run-off from the flat pine lands lying to the north and west. The area draining into Lake Okeechobee is seven and one-half times as large as the lake itself. This, with the surface of the lake, gives a catchment area of 4,000,000 acres to furnish the supply of water for the lake. Until recently Okeechobee had no well-defined outlet, but canals have now been dug, connecting it with the sea. It has low, marshy banks on the south and west, and during the rainy season (June to October), after filling to an elevation of 21.6 feet, about one foot above normal, it overflows its banks in the lowest places for a distance of seventy miles, and the surplus water passes off over the land, finally reaching natural channels through which it is discharged into the Gulf of Mexico or the Atlantic Ocean. It is this annual overflow from the lake, flooding the deposit of muck lying between the ridges of highland, that has formed the "Everglades."

If a water-tight dam were built across the Peninsula of Florida at the south end of Lake Okeechobee, so as to cut off all the water from the lake, there would be no Everglades. The surface water would soon evaporate and the pools dry up. The muck would become parched, and the water-loving plants that now cover the surface would die from lack of moisture, and the area would become a barren plain. Like the arid lands of the West, it "would cry for water."

Natural Drainage.

During this formative period, water that was discharged by the Kissimmee River into Lake Okeechobee, while endeavoring to find an outlet to the sea, broke through the rock rim in many places, both on the east and west coast, and by its constant action eroded the rock, so that there are numerous channels through which the surface water flows quite freely from the Everglades, both into the Atlantic Ocean and the Gulf of Mexico. In many places these channels are worn down several feet, but do not extend far beyond the rim into the interior. The water is brought from the margin of the 'Glades in small rivulets to the heads of these streams, which increase in size as they approach their outlets. The difference in elevation between sea level and the source of these streams gives many of them sufficient fall to cut out large and deep channels. The streams on the east coast, beginning at Rockledge and going south, are as follows:

Sebastian River, St. Lucie River, Loxahatchee River, Hillsboro River, Cypress Creek, Middle River, New River, Snake Creek, Arch Creek, Little River, Miami River and Snapper Creek. These streams are shorter, and have more fall per mile than those on the west coast. None of these were originally connected directly with Lake Okeechobee, although they receive more or less water from it during the period of heavy rains. On the west coast the conditions are somewhat different.

The Caloosahatchee River, a stream of consid-

erable importance, now takes its water directly from Lake Okeechobee and the adjacent country on the west, and flows southwest to Fort Myers.

Natural Growth and Vegetation.

Along the south shore of Lake Okeechobee there is a strip of land, one-half to two miles wide, covered with a dense growth of "Custard Apple," a dwarfed, gnarled tree, twenty to thirty feet high and eight to twelve inches in diameter. The wood of this tree is hard, but decays quickly when cut down, while the roots are very soft, almost as light as cork when dry, and are easily removed from the soil. Along the edges of this custard apple there are clumps of willow, elder and other soft shrubs. This entire fringe of timber and bushes is covered with a wild morning glory, giving the whole a picturesque appearance.

Along the eastern margin of the Everglades there is a growth of small cypress, scattering pine, myrtle and willow. The line between the sandy land and the muck is not well defined. It is difficult to tell just where the upland ceases and the muck begins. In some places the clumps of small trees and underbrush extend three to five miles from the rock rim into the open prairie, while in others the open prairie terminates in a well-defined line next to the rock rim. The combined area of these strips of timber and clumps of bushes is less than one per cent of the entire area of the Everglades.

The depressions and ponds above described,

probably aggregating five per cent of the entire area, are covered with a growth of lily-pads and other aquatic plants. The remainder is covered with a dense growth of coarse grass, four to eight feet high, which, from the structure of its blades, is called "Saw Grass." The stem of this grass is quite coarse, the blade is tough, with a serrated edge, and the plant is unfit for forage or any other use. When the land is once broken and this saw grass destroyed, it does not reproduce itself, but the ground is soon covered with a growth of coarse weeds, principally with what is called "Careless Weed." The writer has seen careless weeds along the canal banks, twenty inches in circumference at the ground and sixteen feet high—the growth of one season.

Ownership and Control.

As but few persons outside of the State of Florida are familiar with the method of handling the swamp and overflowed lands, a brief description of the ownership and control of these lands may be useful.

By the treaty of 1819, Spain ceded to the United States the territory then known as East and West Florida. This territory was by Act of Congress, approved March 3, 1845, admitted into the union under the name of the State of Florida.

The Federal Government, in 1850, by what is commonly known as the "Swamp Land Grant," ceded to the several States for the purpose of drainage and reclamation, all the swamp and

overflowed land within their respective borders, remaining unsold at the time. By this act Florida acquired title to all the swamp and overflowed lands within her borders, amounting to upwards of twenty million acres.

Patents or deeds for these lands have been issued by the Federal Government to the several States, from time to time. Patent No. 137, known as the Everglades, embracing 2,862,080 acres, was issued April 29, 1903. The Legislature of the State, in 1851, passed an Act accepting the swamp and overflowed lands ceded to it by the Federal Government, and made provision for a Board of Internal Improvement, composed of members from the several judicial circuits of the State, to take charge of these swamp lands. This Board was unable to discharge its duty and recommended a new bill, which became a law June 6, 1855. (See Chapter 610, Laws of Florida). This Act creates a Board of Trustees of the Internal Improvement Fund by designating the Governor, Comptroller, Treasurer, Attorney-General and Commissioner of Agriculture, and their successors in office, as Trustees, and grants to said Trustees irrevocably the lands granted to the State of Florida by the Act of 1841, for internal improvement purposes, remaining unsold, and also the lands granted to the State of Florida under the Act approved September 28, 1850, for the purpose and trust therein set forth, the main trust being the drainage and reclamation of the overflowed lands.

The personnel of the Board of Trustees of the Internal Improvement Fund, which has control of the public lands, has been frequently changed

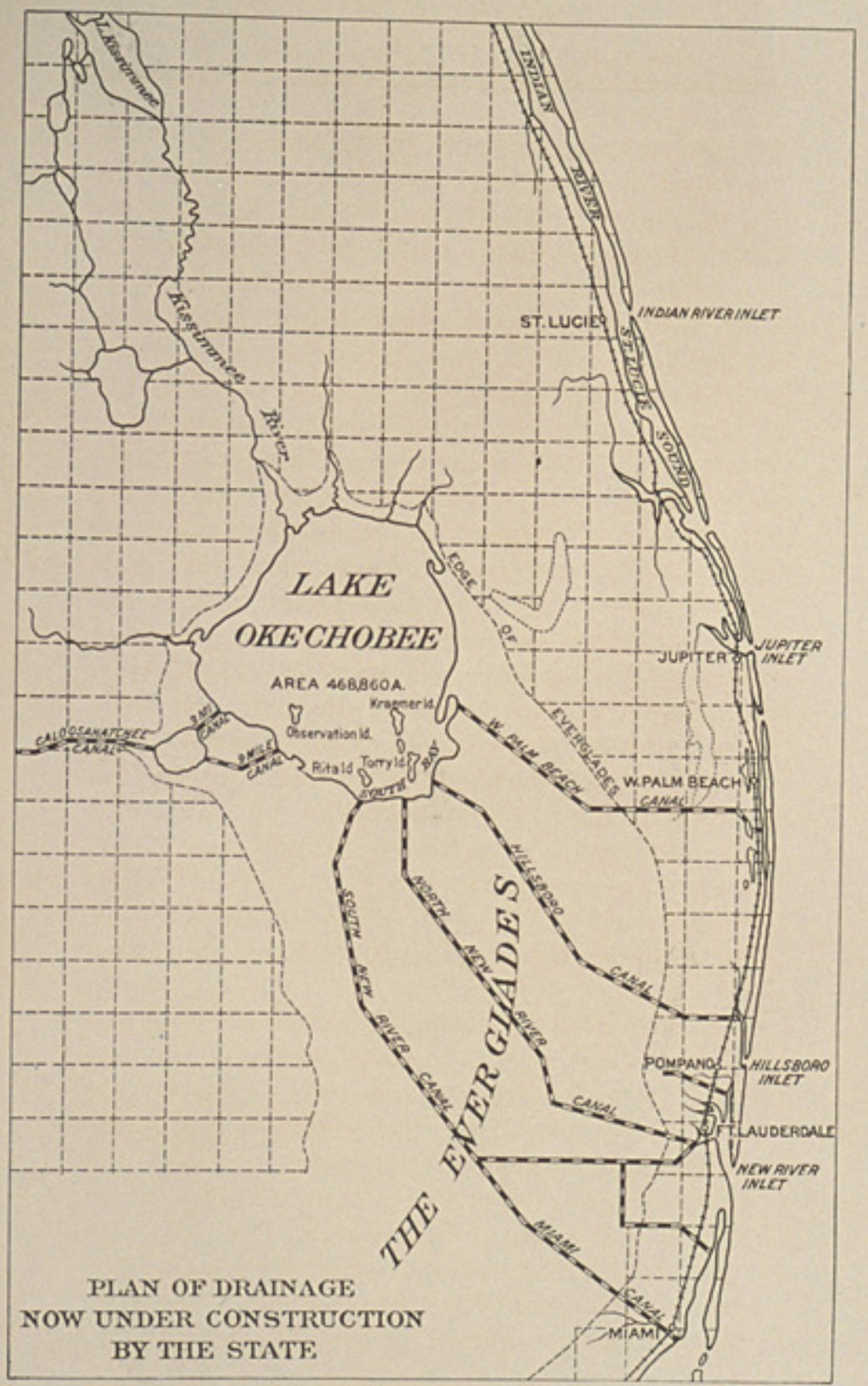
by the election of new State officers. These frequent changes have been detrimental to the formation and carrying out of any fixed policy concerning the drainage of the swamp lands. It has generally been the belief of the Trustees that they should be drained, but how or by whom has been an open question.

In February, 1881, the Trustees entered into a contract with Hamilton Disston, of Philadelphia, Pa., to drain and reclaim several million acres of land in South Florida in which were included the Everglades. He entered upon the undertaking, and considerable work was done in Osceola County, near Kissimmee, and in the Caloosahatchee River valley, between Fort Thompson and Lake Okeechobee. The work contemplated was never completed, and very little permanent good was accomplished. The Disston contract was terminated in 1893. No other drainage was undertaken by the Trustees until 1907, when the work now being carried on was inaugurated.

The Plan of Drainage Adopted by the State.

The foregoing statements explain why Lake Okeechobee is the dominant feature in any rational plan for the reclamation of the Everglades. Without Lake Okeechobee the Everglades would never have been formed, and without it the Everglades can never be reclaimed and made productive.

Any intelligent person, familiar with the natural conditions, will recognize at once that the first step in any plan of reclamation is the con-



PLAN OF DRAINAGE
NOW UNDER CONSTRUCTION
BY THE STATE

trol of the flood waters from Lake Okeechobee. To accomplish this the Trustees have undertaken to cut enough canals from the lake to tide-water to permanently lower the level of the lake to an elevation of sixteen feet above sea level. No one knows certainly just how many canals of given capacity will be required to do this.

The Trustees have already completed a canal sixty feet wide and eight feet deep from the west side of the lake to the channel of the Caloosahatchee River at Fort Thompson, and have let a contract, which is now seventy per cent completed, for three canals fifty feet wide and ten feet deep from the south end of the lake to the Atlantic Ocean. These three canals will be finished some time during the year 1913. Another canal eighty feet wide and ten feet deep is projected from the east side of the lake to tide-water at West Palm Beach. This canal will no doubt be completed within the next two years. These five canals leading from the lake, having a combined width of 290 feet and a depth of flow of eight feet, when the lake is bank-full, will, in the judgment of the writer, be sufficient to control the overflow from the lake.

In addition to the discharge capacity of these five canals during the rainy season, the plan adopted by the Trustees contemplates lowering the level of the lake to sixteen feet above sea level at the beginning of the rainy period, and allowing it to fill to nineteen or twenty feet at the close of the season. The object of this storage is two-fold:

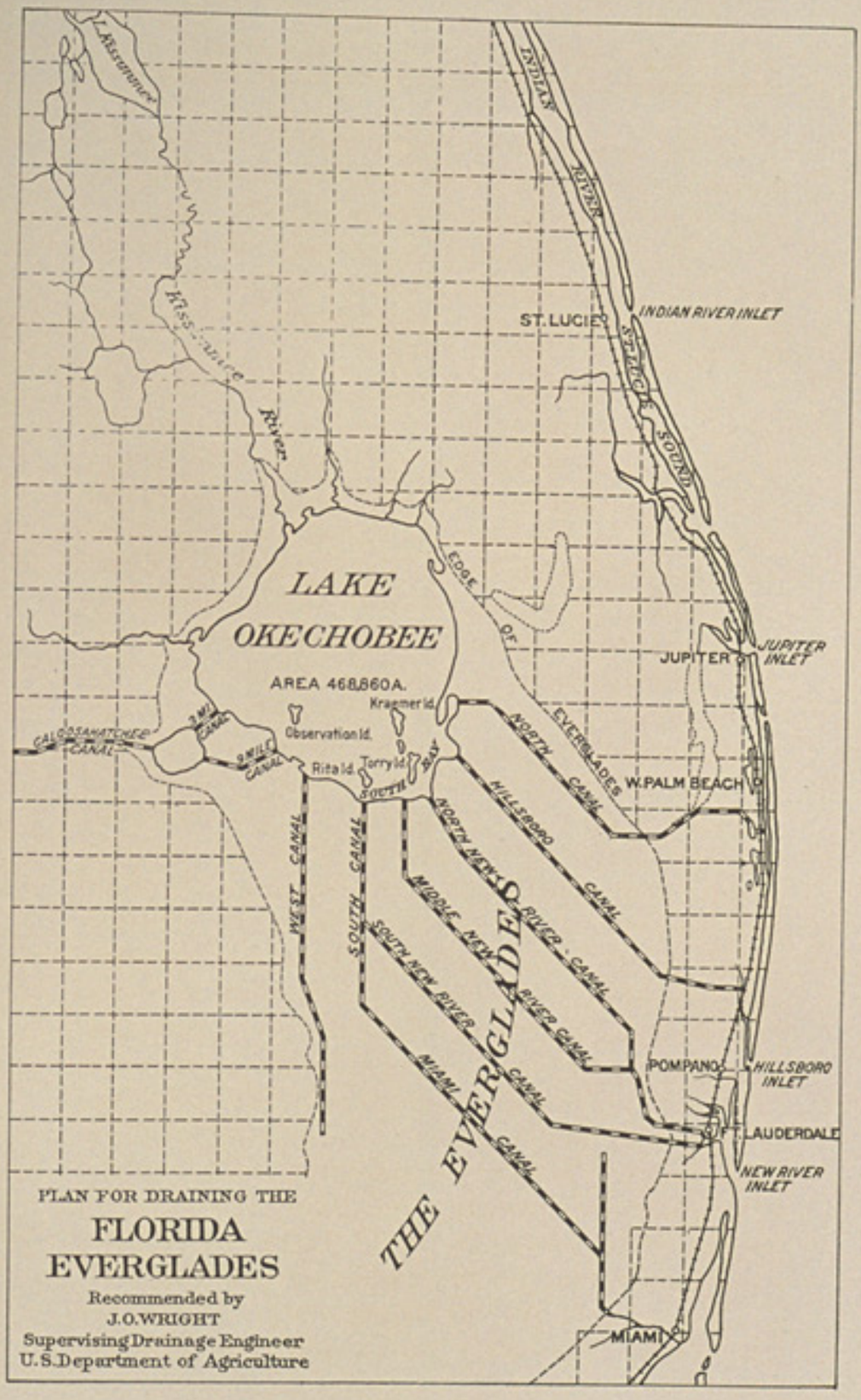
1. To lessen the number of canals that would be necessary to discharge this run-off during the short period in which it is accumulating.

2. To hold an adequate supply of water in the lake for irrigation, if needed, and to maintain a uniform flow in the canals throughout the year.

For this purpose concrete locks and dams are to be built in each canal near the shore of the lake. These dams are provided with sluice gates, by means of which the quantity of water flowing from the lake into the canals is at all times under the control of the lock-tender. There is probably no other place in the world where the conditions are so favorable for both irrigation and drainage as in this project.

By lowering the level of the lake a storage capacity, having an area as large as the State of Rhode Island, and three or four feet deep, is formed. This will provide an inexhaustible supply for irrigation and assist in maintaining a sufficient depth of flow in the canals throughout the year to afford navigation for shallow-draft boats and barges. There are skeptics, and so-called "engineers," who claim this cannot be done, but those who have given this matter the most careful consideration maintain that, by the construction of suitable locks and dams, with sluice gates at proper intervals in the canals, it is a simple and inexpensive matter. By opening or closing the gates the stage of water, within certain limits, in any portion of the canals, may be successfully regulated.

When these five canals are completed, should it be found that their discharge is not sufficient



PLAN FOR DRAINING THE

FLORIDA EVERGLADES

Recommended by
J.O. WRIGHT
Supervising Drainage Engineer
U.S. Department of Agriculture

to control the level of the water in the lake, others can be constructed, and the money so far expended will not have been wasted. This is a much wiser method of procedure than to have constructed six or seven canals and find that only five were required to do the work.

Lateral Canals.

The next step in any plan of reclamation is to provide means for promptly removing the excess of water that falls directly on the Everglades. This can be done on practically all the area by gravity drainage. In the southern part some of the ponds and depressions may be so low as to require pumping, but these are very small and the land of doubtful value when drained. Just how much local precipitation will have to be removed from this area by drainage is another matter about which engineers do not agree, since no other body of land like the Everglades has been reclaimed. Results obtained by actual experience are lacking. Conclusions based solely on theory are often disappointing, so experience must be the final arbiter in determining the quantity that must be removed.

The main arteries now being built for controlling the overflow from the lake increase in width at stated intervals, so that their combined discharge capacity at their outlets is much greater than at the lake end. In a plan of drainage prepared by the writer (see Senate Document No. 89, pages 168 to 171), eight canals, having a discharge capacity at their out

lets two and one-third times their capacity near the lake, were recommended as main arteries. The arrangement shown on this plan is not being strictly carried out by the Trustees, but the exact location of these canals is not a matter of vital importance so long as the requisite discharge capacity is provided.

There is no difficulty whatever in completely draining the Everglades when the overflow from Lake Okeechobee is cut off; it is simply a matter of digging enough canals and laterals to remove the rainfall as rapidly as it accumulates. The material is soft, free from trees and roots, and is easily handled with a steam dredge or ditching machine.

Low Cost of Work.

There is probably not another large body of land in the United States that can be drained and put in cultivation as cheaply as the Everglades. The main arteries or outlets to serve the entire area will not cost to exceed $2.00 per acre. The cost of laterals and farm drains will depend largely upon the purpose for which the land is to be used. For general farming this will be from $3.00 to $5.00 per acre. If the land is to be used for intensive farming, and a complete system of canals and ditches for both drainage and irrigation are provided, the cost will not exceed $10.00 per acre. The difference between the cost of reclaiming this land and the reclamation work in the arid west is simply astounding. In a report published by the De-

partment of Commerce and Labor December 1, 1910, it is stated the Federal Government has approved thirty reclamation projects having an area of 3,029,951 acres at an estimated cost of $119,555,555.00, or approximately $40.00 per acre.

When land in the Everglades is drained there is no grubbing or clearing to be done before it can be put in cultivation. The low cost of complete drainage and irrigation, the absence of clearing and grubbing, and the favorable climatic conditions, are facts that must be taken into consideration by prospective purchasers in comparing the value of this land with other lands on the market.

Persons who claim the Everglades cannot be drained are ignorant of the natural conditions or wilfully misrepresent them. The fact that the State has been working on this project for five years and the land is not yet drained does not indicate failure or impossibility. The Panama Canal was commenced before the drainage of the Everglades, but no ships have yet passed through this canal. If a farmer should buy land on a projected railroad and grow crops, he could not reasonably expect to ship his products on this line of road before the grade was completed and the ties and rails laid. The fact that trains were not running would be no indication that the road could not be built. Because the land in the Everglades cannot be occupied and farmed at the present time does not signify it cannot be reclaimed. The beneficial results of the work now under contract and pro-

jected cannot be realized until the canals are completed.

A piece of unfinished work often makes the natural conditions worse than they were before the work was commenced. An unimproved street, when ploughed up and partially graded, is frequently worse than it was before the improvement was begun. This is particularly true of this project at the present time. The unfinished canals concentrated the overflow from the lake during the past rainy season and flooded the lower part of the Everglades west of Fort Lauderdale. This has caused the opponents of this work to reiterate the old falsehood—"The Everglades cannot be drained." They cite the overflow as an illustration that the work is a failure. Such statements are the result of an ignorance too dense to be overcome, or else are made with a sinister motive.

Present Condition.

At this point I wish to emphasize the fact that no part of the Everglades is yet sufficiently drained for occupancy and cultivation. This is because the main arteries for controlling the overflow from Lake Okeechobee are not complete. Attempts have been made, although the land is imperfectly drained and subject to overflow each year, to cultivate limited areas adjacent the canals and on the south shore of the lake. Some of these attempts have been successful, while others have been failures.

From the present rate of progress it now

seems that the drainage work will be sufficiently advanced by December 1, 1913, to cultivate with safety and profit much of the higher land immediately south of Okeechobee. It will, however, be necessary to dig additional outlets, and put in a complete system of laterals, before the Everglades as a whole can be put in cultivation. No arrangement has yet been made for doing this work.

More than one-half of the muck land in the Everglades has been sold by the Trustees of the Internal Improvement Fund to private parties, without any stipulation or agreement as to lateral drains. Much of this land has since been resold, and is now held in small tracts (ten to forty acres), by persons scattered throughout the United States. This is an unfortunate condition confronting the owners of Everglade land that must be met and overcome.

So far as the records show, the Trustese have not officially adopted any policy concerning lateral ditches. In certain instances, in which they have sold large areas of Everglade land, they have agreed with the purchasers to expend seventy-five per cent of the purchase money, in the construction of certain canals, which are now under contract and will soon be completed. In no instance do the records show that the Trustees have promised or agreed to drain any particular part of the Everglades. The canals now being constructed are an essential part of any drainage plan, and must be completed before a system of laterals can be provided.

Obligation of the State.

When the swamp and overflowed land was ceded to the several States by the Federal Government the following condition was imposed by the Act: "The proceeds of said land, whether from sale or direct appropriation in kind, shall be applied exclusively, as far as necessary, to reclaiming said land by means of levees and drains." (Rev. Stat., Sect. 2480.)

It is quite evident from this statute that Congress intended to place, and did place, the burden of draining this land on the land itself, and not on some other person or property. It was never contemplated by Congress, or by the States accepting the land, that it would ever be drained by the Federal Government, or at the expense of the State, other than in the manner set forth in the act itself. The burden of drainage is still on this land, and it cannot be shifted by change in ownership.

In the case of Kimball vs. the Reclamation Fund Commissioner (43 Cal. 344), the Supreme Court of that State said: "In accepting this grant the State was bound to carry out in good faith the objects for which it was made. It would practically defeat the whole cause of reclamation contemplated by Congress if the mere sale of land to private proprietors should have the effect to exempt it from the power of the Legislature to reclaim it. Such a result would be a flagrant violation of its duty toward the Federal Government."

In order to discharge this obligation, the State of Florida has provided two ways for raising

funds for carrying on the work: First—the Legislature, in 1907, created a Special Drainage District embracing the Everglades and some contiguous territory, containing approximately 4,300,000 acres, and levied a drainage tax of five cents per acre, per annum on all the lands in the district for the purpose of draining the land; second—it has seventy-five per cent of the money received from the sale of swamp and overflowed lands for the purpose of drainage. These are the only sources of revenue the State has for carrying on the drainage work in the Everglades.

From the first of these sources (the drainage tax) a fund of about $150,000 per annum is collected—the Trustees owning about 1,300,000 acres in the drainage district on which no assessment is made. This tax has been levied and collected each year since 1907.

The amount raised by the second method (from the sale of swamp and overflowed lands) is uncertain and indefinite. The constitution of the State provides that twenty-five per cent of all the moneys received from the sale of public lands shall be turned into the school fund for the purpose of education. This leaves but three-fourths of the amount received for the purpose of drainage.

When the drainage work was commenced, the public had but little confidence in the success of the undertaking, and it was difficult to sell the land at any price. The Trustees, however, finally succeeded in selling about 700,000 acres at $1.25 to $2.00 per acre. When pending suits which had been brought against the Trustees to

restrain the collection of the drainage tax were dismissed, and a contract for the excavation of 184 miles of drainage canal was let to a responsible firm, the price of Everglade land advanced to $12.00 to $20.00 per acre, according to location. It then seemed that the Trustees would have no difficulty whatever in raising the money that would be needed to reclaim all the land in the drainage district. This, however, was not the case. Just when all the difficulties seemed to have been met and overcome, a powerful interest, both within and without the State, that was opposed to the drainage, set out to injure or destroy the project by circulating false and malicious reports concerning the character of the land and the efficiency of the work being done. The old adage—"a lie travels faster than the truth"— was more than verified in this instance. Within a very few months it was proclaimed throughout the country that the Everglades was nothing but worthless peat and the drainage was a failure. The effect of these false and pernicious reports created distrust in the minds of the public and impaired the demand for Everglade land. These unwarranted attacks have peojardized the resources of the Trustees, and will no doubt retard the completion of the drainage work.

Although a lie travels faster than the truth, it is not so enduring. In the course of a few years, these false statements concerning the Everglades will have been disproved and public confidence fully restored. It is a remarkable fact that practically all the derogatory statements relating to the character of the Ever-

glades and the plan of reclaiming them have been made by persons who have no personal knowledge of existing conditions. These criticisms are based on vague rumors and "hearsay evidence," that would not be accepted in any court of inquiry. These false and misleading statements, that have been so assiduously circulated, are the creatures of an inexcusable ignorance, or else they have been circulated with malicious intent or for personal gain.

Co-operation Necessary.

Experience in other States has convinced me that some form of co-operation among the several land owners must be secured before perfect drainage can be accomplished. No individual land owner, unless his land lies adjacent to one of the outlets, can drain his own land without affecting that of others. If the holdings in the Everglades were all in the State, or all in a single individual, it would be a simple matter to provide this lateral drainage, but with a diversified and widely distributed ownership it is a more difficult proposition.

Voluntary co-operation of all the land owners interested in a project of this kind is ideal, but not possible. Differences of opinion as to plans, distribution of cost, method of procedure and many other details will naturally arise to hinder and delay the work. Some legal instrument must be provided through which public sentiment, as expressed by a majority of the people interested, can be carried out.

To meet existing conditions, and make possi-

ble the complete reclamation of the Everglades, the ownership must practically all be controlled by some one person, or else the State Legislature must enact a General Drainage Law similar to those now in operation in many of the other States, under which the work can be carried out. Without some such provision, it will be difficult to complete the reclamation of the Everglades.

The intrinsic value of this land, in its present state, is not very great, but when drained it will become one of the most productive areas in the United States. The demand for good farm land is steadily increasing, while the supply becomes less and less each year. The writer remembers quite distinctly when the swamp lands in Indiana and Illinois were worth less than $5.00 per acre; the same lands are selling today at $100.00 to $200.00 per acre. This increase in value has been brought about by drainage, which made possible a natural growth and development of the country.

The holders of Everglade land should not be discouraged, but should unite in a common and persistent effort to complete the drainage as soon as possible and thereby reap the benefits of a substantial increase in price.

Transportation.

To any one owning land in the Everglades the facilities for easy access and transportation are of vital importance. It is generally conceded that water transportation is the cheapest method of handling freight, unless long distances

are to be covered and time becomes an essential element. When the necessary canals are completed, any part of the Everglades can be reached with shallow-draft boats and barges. Locks are to be constructed in the main canals at proper intervals to maintain a boating stage at all seasons of the year. This method of transportation has been found quite satisfactory in Holland and some parts of Germany. Through these canals the Florida East Coast Railway can be reached at Miami, Fort Lauderdale, Deerfield and West Palm Beach. This road is now building a branch from Maytown to Okeechobee City, on Taylor's Creek, four miles north of Lake Okeechobee. This will afford an additional outlet for products grown in the Everglades. The Atlantic Coast Line can be reached at Fort Myers via the Caloosahatchee River. There is a road projected across the Everglades from Tampa to Fort Lauderdale. This will no doubt be built as soon as there is a demand for it.

After the drainage is completed, and the land has had time to settle, highways can be built at a reasonable cost. The canal banks can be used for the road bed and the stone excavated from the canals for covering the surface.

The Survey of the Everglades.

The tract known as the Everglades has not been divided into townships and ranges and subdivided into sections. The high land on either side was surveyed many years ago by the Federal Government, but the work was not

extended into the open marsh because of its swampy condition.

Many maps have been published showing the township and range lines, and in many instances the sections and subdivision of sections, in the Everglades. These are all "Office Maps," made from data at hand and assumed, and not from an actual survey of the land. They give general information, but are not to be accepted as accurate.

The Trustees of the Internal Improvement Fund adopted a map June 10, 1907, dividing the Everglades into townships and ranges. This map was made by projecting on a plot the township and range lines on the north, east and west sides of the Everglades, and not from any survey of the land. This was designated an "official map," and land has been bought and sold by it. Each township was supposed to contain 36 sections of 640 acres each.

On October 29, 1910, the Trustees requested their Chief Drainage Engineer to prepare and submit a plan for surveying the Everglades. Instructions for making a survey in accordance with the official map above mentioned were prepared by the engineer and approved by the Board of Trustees December 29, 1910, and the work was commenced the following March. One party of surveyors was placed in the field on the east side of the Everglades and another on the west side. Although the field notes of the U. S. survey adjacent to the Everglades showed the townships to be exactly six miles wide, an actual measurement showed them to be greatly in excess of this width. Many of the corner posts

previously set by the Government were missing, and in many places no trace could be found on the ground to show that the lines had ever been run. This made it necessary to re-run many of the lines and re-locate the lost corners, at great expense to the State, as it required several months to do this work.

When the existence of this surplus was brought to the attention of the Trustees, and it was discovered that the sections in the Everglades, under the plan of subdivision adopted, would contain more than 640 acres each, they directed their Engineer to prepare another plan that would divide the territory into townships exactly six miles square, containing thirty-six sections of 640 acres each. In compliance with this order, a second plan was prepared and approved by the Trustees, in which it is proposed to make the several townships each six miles square, as nearly as may be, and containing thirty-six sections of 640 acres each. The surplus, instead of being distributed among the several townships, is disposed in large blocks, throughout the area. This is held by the State, and will be sub-divided into lots of a convenient size.

After adopting the second plan, it became necessary to re-locate several of the corners that had already been established. The survey is now being carried on in conformity with this modified plan. Permanent markers, consisting of a 1¼ -inch galvanized iron pipe, are driven through the muck into the underlying hard material and surmounted by a bronze cap, with a proper inscription to designate the loca-

tion. These markers are placed at the section corners.

Owing to the swampy condition of the land, this work was found to be both slow and expensive. There is not sufficient water for the use of boats for transporting supplies, and the ground is too soft for the use of horses or oxen. Along the margin of the Everglades, near the highland, supplies and subsistence were carried in on the shoulders of the laborers, but as the interior of the 'Glades was reached, the cost of this work became prohibitive. The time lost in moving camp and going to and from the work, was much more than that employed in running lines and setting corners.

The writer, who at that time was Chief Drainage Engineer, decided it would be necessary to abandon the survey until the drainage was completed, or else find some less expensive method of doing the work. After considering various expedients suggested, it was decided to build a tractor that would run in the Everglades, and transport the necessary supplies and furnish comfortable quarters for the men employed. Such a machine was designed and built and has proven eminently satisfactory.

This machine travels in the Everglades at the rate of two miles an hour, and carries 3,000 pounds, in addition to its own weight. A cook house and sleeping quarters are erected on the machine, so that no time is lost in going to and from the work. The corner markers and supplies are carried on it, thereby greatly reducing the number of men required in a party making the survey.

The use of this machine makes possible the survey of the Everglades in its present condition at a reasonable cost. Six men with this tractor can accomplish twice as much work in a week as twelve men under the old method. It mashes down the vegetation, and makes a smooth surface on which to measure the distance, and furnishes an elevated platform from which to take observations with an instrument, thus making it possible to do much more accurate work than by the old method. With two of these tractors in use, the survey of the entire Everglades can be completed within a year, if the work is steadily prosecuted.

Healthfulness.

The writer has received hundreds of letters asking about the healthfulness of the Everglades. Swamp lands are usually unhealthful and malarious, but the Everglades seem to be an exception to the rule. There have been from 200 to 300 men from different sections of the country employed as engineers and surveyors, and workmen on the dredges for the past four years. These men have lived in the 'Glades, waded in the water, slept in wet clothing, eaten simple food, and in many instances drunk the water from the sloughs and ponds; and yet there has been practically no illness among them. I doubt if a more healthy lot of workmen can be found in any place than those employed in the Everglades. I attribute the healthfulness of this area to the fact that the water is not stagnant, and that the surface is swept at all times

with a salt breeze from the Gulf of Mexico or the Atlantic Ocean. No one need hesitate in purchasing land in the Everglades because of the unhealthfulness of the locality. With screened houses, pure water and wholesome food, as good health can be enjoyed here as in any place in the country.

Conclusion.

Like all new countries, the settlement of the Everglades will be attended with many failures and disappointments. Persons will settle here whose lives are not in harmony with rural conditions; they will become dissatisfied and move away, and their places will be filled by others better fitted for farm life.

I have studied the reclamation and settlement of the Everglades from all view points, and am fully convinced that within a score of years it will be one of the most productive areas in the United States.