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EDITOR AND PROPRIETOR.

TERMS.

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Report of Charles B. Shaw, Esq.,
Engineer of Literary Board, on the Drainage of the SWAMP LANDS of North Carolina.

To the President and Directors of the Board of Literature of N. C.

GENTLEMEN: A period has arrived in the operations preparatory to the Drainage of the Swamp Lands, which makes it necessary to submit a memoir of the Surveys and Examinations, and suggest for your consideration the plans and estimates which have been deduced from them.

On the reception of your instructions to that effect, such instruments were purchased as were necessary for the commencement of the work, and as soon thereafter as practicable, a corps of assistants procured for the surveys.

Pennington, the organization of field parties, examination was made in the county archives, at Hyde Court-house, for evidence of title, on the part of the State, to retroceded lands. The only deed of that description was one from Sheriff James Watson to his Excellency Gov. Williams, for a large tract of 5,000 acres, lying in the rear of the front patents on the east side of Pungo river, forming a part of a large tract of 300,000 acres granted to John Hall, in 1793, known as the Hall Patent, and subsequently the property of John G. Blount, dec'd., to whose heirs and to Messrs. Smallwood and Donnell, the remainder of it now belongs.

A connected chain of title exists in the Hyde county records, from the State through John G. Blount and Edward Harris, to William Orr, for whose taxes the aforesaid tract of 55,000 acres was sold and duly conveyed to the Governor, for the benefit of the State, on 1st Sept. 1801; and the same is now on record in the office of the Secretary of State.

Among the deeds transmitted to me by the Board, from Raleigh, are also many re-conveyances of large tracts in Tyrrel county—one in particular for 40,000 acres, on the west side of Alligator River, and east of Alligator Lake, and a second for 22,000 acres of reverted land, lying near Pungo Lake, known as Jones and Davie's patent. This latter lies north of the 55,000 acre tract in Hyde. There is also good reason to believe that 40,000 acres of land, never granted to any individual or company, will, upon examination, be found south of Alligator Lake, forming in part the north boundary of the Hall patent.

It thus appears that no less than 138,000 acres of land, belonging to the State, the contiguous to, and are more or less injured by the redundant waters of Pungo and Alligator Lakes. The drainage of these Lakes, or a reduction of their waters, appeared therefore to be an important preliminary to any attempt at reclaiming the State lands, and examinations for that purpose became necessary.

The special appropriation by the Legislature of \$8,000 to the purpose of draining Lake Mattamuskeet, had been expended, just previous to my arrival in that district, in the enlarging of a canal before existing from Lake Landing to Yoking creek. The canal had already been opened, and the water of the Lake was slowly subsiding; but an extensive shoal at the head of the canal, upon which the depth of water did not exceed a foot, made it evident that, below that depth, the canal could have no effect, except by its extension thro' the shoal to the deep water of the lake. The undoubted property of the Literary Board in the lake flats when reclaimed, the probability of their reimbursing any expense incurred for their improvement, and the certainty that the Yoking Canal could not effect that purpose, occasioned the institution of surveys, to determine how it could best be accomplished.

These examinations were the first undertaken, and in obedience to your subsequent instructions, were made with much care.

Among several modes which suggested themselves for drawing off the lake waters, was that by a canal from the north side to a remarkable bend of Alligator river, where an enlargement and an increased depth of the stream would permit the retention of the diluvial matter deposited by the canal without interruption, at least for many years, of its discharge, and without impediment to the navigation of the river. A small canal, constructed at private expense, extended nearly the whole distance, and afforded great facilities in the execution of a survey, which otherwise must have progressed very slowly, from the necessity of penetrating the all pervasive and very impenetrable soil of gall-berry, fetter-

bushes, and brambles, mixed occasionally with reeds. This route is known as that of Spencer's Ditch. A second line which solicited examination and presented similar exemption from the difficulties which usually attend swamp surveys, was that of Blount's Ditch, extending also from the north margin of the lake to Alligator River, and distant from Spencer's Ditch about three miles at each end. The third line surveyed was that of the large ditch at the side of the Rosebay Turnpike, extending from the west end of the lake to Rosebay Creek.

The line of the Yoking canal was also surveyed and levelled, and soundings were taken of its depth, with the purpose of affording to the commissioners, should they require it, the information necessary to the completion of that work.

A random survey was also made from a deep part of Lake Mattamuskeet, opposite James McClum's house, to East Bluff Bay, and triangles were thrown across East and West Bluff Bays, whereby the direction and length of canals between them and the Lake might be determined with all sufficient exactness—avoiding thus the difficulties of penetrating the dismals, which would have rendered it impossible to complete the survey before the re-opening of spring, and might postpone the work, should it be found expedient to undertake it, to the next year.

Surveys and Levels were subsequently taken between Pungo River and Pungo Lake, and a line of exploration run into the State tract of 55,000 Acres, to ascertain its character and capability of being drained, and the proper plans for that purpose; the results of which will be communicated in another place.

Before describing in their proper order the details of these several operations, a few remarks will be offered, explanatory of the position of these Lakes and their effect upon the immense wastes which surround them.—They invariably occupy the highest ground, their sites having in all probability, once been firm ground, and their basins excavated by the action of fire; successive growths of aquatic and other plants have by degrees still further elevated their margins, and made them the receptacles of pluvial water from the adjoining swamps in rainy seasons. To these swamps, in the dry weather which may succeed, their waters are turned, the loose spongy character and great capacity for moisture of a purely vegetable soil, attracting the Lake waters to a distance that would be incredible to those unacquainted with such localities.

Free evaporation from the general surface of these vast solitudes, is almost impossible from their umbrageous character; it is probably no more than half that which occurs in cultivated districts. The excess of moisture must consequently either be taken up to supply vegetable growth, or escape by slow filtration to the nearest stream whose dall meanderings are at variance with all the purposes of artificial drainage: After long continued rains, or under the influence of high winds, the Lakes overflow, and their contents are suddenly poured upon the already half submerged swamps; a continued motion, or press as it is termed, of the water, then takes place in the direction of the greatest declivity, until it reaches the vicinity of cultivation, where, the soil being of a less permeable nature, and sometimes more depressed, water accumulates to the depth of several feet, notwithstanding the greater facilities there afforded for its discharge and evaporation. The duration of this evil is increased, though its intensity is no doubt abated, by the slow arrival of these redundant waters, which, having few vents in the shape of natural streams, are compelled to seek low and soft places whereby they may find exit. From these two causes, slow evaporation, and almost imperceptible drainage, result an autumnal and winter climate of uncommon humidity with the concomitants of rheumatism and pleurisy. In summer, the conjoint effects of heat and moisture are felt in malaria and the attendant diseases.

The evident remedy of the evils is, the removal entirely, or in part, of the contents of these great elevated basins, by Canals or artificial rivers which shall at the same time receive the surface water of the country. Their greater inclination, resulting from their directness, regular form and the secondary Canals, to be constructed as the sales of public land progress, will reduce the lands contiguous to a sufficient dryness for all the purposes of agriculture.—The clearing and cultivation of the lands will remove in part, if not entirely, the sources of disease; and their unexampled fertility, when reclaimed, will afford ample means of subsistence at home, to those who are now compelled to seek it in new and remote territories. I have no purpose to occupy your time with descriptions of the swamp region, already well known from the Memoir of Judge Murphy, and the reports of Messrs. Fulton and Nash; taking for granted that what has been so often described is now well understood. I will proceed at once to

a brief detail of the results of the several surveys before alluded to.

Spencer's Canal was constructed for the improvement of private property, and commences half a mile from the north margin of the Lakes; its width is 10 feet, its length 5 miles, and its depth varies from 1 1/2 to 2 feet. The survey was made upon the Canal bank. At the point of commencement, soundings were extended in a straight line into the Lake. Five feet water was found at the distance of 500 yards, and that depth is not increased more than one foot at the distance of a mile from the shore. Within a few yards of the Lake the land rises about a foot and a half. An alteration of very gentle ridges and depressions succeeds for nearly 2 1/2 miles, the variation either above or below the Lake level seldom exceeding a few inches—the greatest depression being fifteen inches. The declivity towards Alligator River, is afterwards more rapid. The first half mile is chiefly cultivated, and is thoroughly reclaimed from water, producing at present with the most careful tillage, in good seasons, 8 or 10 barrels of Corn to the Acre. The two miles succeeding are heavily timbered, and is generally the unimproved belt of land around the Lake for the same width—the growth being cypress, black and sweet gum, and maple, with a most luxuriant undergrowth of vines and flowering shrubs—laurel and bay trees, with an undergrowth of gall-berry and fetter-bushes, succeeded, followed by an extensive savanna overgrown with reeds and fetter-bushes, and interspersed with dwarf pines. These savannas are frequently devastated by fire; at other times they afford a valuable range to cattle and droves of hogs.—The total fall from the surface water of the Lake to the ordinary water of Alligator River, is 4,818 feet. The reeds on the margin of the River indicate an occasional rise of 2 feet above this point, though during the flood of August last, the rise was probably 4 feet. The soil is easy of excavation, but difficulties exist in regard to the timber, and the interruption of water during the process of removing the earth.

Upon Blount's Ditch, appearances were similar to those already described—the distance from the Lake to the river but 3 miles, and the fall 4,329 feet. Alligator River was surveyed between the mouths of these two ditches, and found to be extremely crooked, and of a very variable depth and width, altogether unsuited to the rapid conveyance of water. Spencer's Canal is the most suitable location on the North side; the River at its termination being 15 feet deep, and 60 feet wide, its width augmenting very fast as it is descended.

The tides as they are called, are mere accumulations of water under the effects of Northerly winds; in calm weather the River has probably very little fall before Spencer's Canal; the termination of which may be considered the level of Albemarle Sound. It will be seen hereafter, that Pamlico Sound is about 51 feet below Lake Mattamuskeet, whence the difference of level of the two Sounds is ascertained to be 7-tenths of a foot, and not 2 feet as heretofore supposed. This result was to have been expected, as a fall of two feet from Albemarle to Pamlico Sound would create a constant and unstable current through Croatan Sound; instead whereof, it is at all times navigable, and its current at times scarcely perceptible.

The Rosebay Turnpike Canal was next surveyed. This is at the West end of the Lake, the distance nearly 4 miles, and the fall 4,728 to a stake which is about 3 or 4 tenths above the ordinary water of Rosebay Creek; 5.20 may be assumed as the fall, the greater part of which occurs in the last mile, for which reason the depth of cut would be greater on the average than on other lines of greater declivity. Between the Lake and Rosebay there has been an extensive juniper swamp, indicating a sandy bottom, and I have heard that quicksand was encountered in digging the Canal. The Canal is about 20 feet wide and very shallow, its banks having in many places collapsed. The water is very shoal at its head, and for a variety of other reasons, not necessary to enumerate, I consider this the least eligible of the several proposed locations.

Yoking Canal is that recently constructed for the purpose of draining the Lake. The fund appropriated was evidently insufficient to accomplish a work of that magnitude; a part of it was necessary to purchase the right of way and the previously existing smaller Canal. As regards the actual labor performed there, I should suppose, from a very rough estimate, that it could not have been less than 70,000 cube yards of excavation, of which the cost was something less than \$5,000. No complaint can be made on the score of economy, but it is much to be regretted that the appropriation had not been larger, thus affording more latitude to the Commissioners in the selection of a suitable line. It does not become me to anticipate their report, but I believe it is now conceded by them, that with an extensive shoal ex-

isting, at either end of this Canal, and their exhausted means, they cannot accomplish their object.

I would recommend the expenditure of about \$2,500 in removing the Mud Shoal, as it is called, in Yoking Creek, and extending that Canal to the deep waters of the Lake; but I consider it too devious, even after those improvements, and of too irregular an inclination and section, to drain the Lake.

At Cypress Point, four miles West of Lake Landing, is the boldest part of the Lake shore. The depth of 5 feet may be had 500 yards from the margin: At the distance of 7 miles, as ascertained by our survey, there are two Bays of Pamlico Sound, one of which, East Bluff Bay, was sounded and exhibited a depth of 5 feet within a few yards of the marsh—the harbor spacious and secure, and having a general depth of 6, 7 and 8 feet. West Bluff Bay is divided from East Bluff Bay by Pungo Bluff, and is more remote from Cypress Point. It is also reported to be shoal and less secure as a harbor.

The examinations which have been made of Lake Mattamuskeet, have satisfied me that it ought to be drained; and from the information as yet obtained, a Canal from Cypress Point to East Bluff Bay, would best attain that end. Previously however, to deciding on the location, I would recommend an examination of the Harbours of West Bluff and Mount Pleasant Bay. The total fall from the Lake to Pamlico Sound, as ascertained by the leveling of Yoking Canal, is 51 feet to mid-tide; this fall, in a distance of 7 miles; will give an inclination to the bottom of the Canal of 78 100ths of a foot, or decimally expressed 0.000156. A Canal 35 feet at bottom, and 50 feet at the water surface, with 5 feet depth, would comprise an area of 212 1/2 square feet, the perimeter of the bottom and sides would be 53 feet, and the division of the former quantity by the latter, would give its mean depth, or what hydrodynamicists term the radius of its section. The velocity generated by that inclination and mean depth, would be about two and a fifth feet per second, which multiplied into the area 212 1/2, and afterwards divided by 27, to reduce it to cubic yards, gives 17 1/2 as the quantity per second drawn from the Lake. This Canal would pass through the lands of Blount, Donnell, and Smallwood and others, now quite unoccupied, and its capacity would require increase, with a view to pass off the accumulated quantity of water between the Lake and the Bay. A proportion of the expense would have to be defrayed by the owners of the land under the existing law, although the land reclaimed by the operation from the Lake would alone authorize it. About one cubic yard per second must be the increased capacity of discharge for each additional square mile of improved land; and to provide for improvement on each side of the Canal to a distance of 2 miles, that the marginal lands might be drained without diminishing the flow of water from the Lake, the discharge at the mouth of the Canal must be 31 1/2 cubic yards per second. This would be nearly accomplished, by making the Canal 60 feet wide at bottom and 75 at the water surface, at its embouchure. Such dimensions would give a discharge of 29 3/8 cubic yards.

An enquiry will now arise, whether some economy might not result from making the process of draining the Lake more gradual, thus giving the Canal only such dimensions as will drain off the Swamp waters, and preserve the reduced level of the Lake, after it shall have been attained.—Supposing the Lake waters to be lowered nearly to the Canal bottom, upon the occurrence of rain, as soon as the Canal was filled; there would be a heavy press of water back into the Lake, which would continue until the Canal water sub-sided below the Lake level. The quantity of water so discharged into the Lake, would but slightly affect the level, and upon the discontinuance of rain, the flow from the Lake would recommence. The Lake has been found, by my recent survey, to contain 86 square miles. One inch depth upon a square mile, requires a drain capable of venting one cubic yard per second for 24 hours. A Canal which would drain 17 1/2 cubic yards per second, would reduce its waters one-fifth of an inch in 24 hours, and could the same head be maintained, would discharge 60 inches in 300 days; the time would be nearly doubled, however, in consequence of the continued reduction of the head, unless a more rapid discharge be afforded by an increased width at the lower end of the Canal, whereby an uninterrupted efflux may be afforded to the Lake waters.

If we suppose that by the expenditure of a small sum upon the Yoking Canal, it can be made to discharge half the quantity of that to East Bluff Bay, their joint effect would accomplish the reduction of the Lake 1/2 ft. in about 300 days; and supposing that a warm summer should evaporate one foot more of water than fell in the same time upon the Lake; its waters might be reduced

4 1/2 ft. in eight months, and 3 1/2 ft. below their present level in less than two-thirds of that time, or about 150 days; the precise period would vary according to that of the rapid evaporation, and whether it take place at the commencement or latter part of the period of discharge. If the dimensions of the Canal be restricted to a width of 60 feet, a slight diminution of the discharge from the Lake would occur during heavy rains, which would, however, be more than compensated at other times, by the increased capacity which would result from the more ample dimensions below, and consequently greater fall from the Lake when the lower sections of the Canal were not filled. If these Canals be executed, they will probably be undertaken by slave owners in the neighborhood, where they yearly value of a slave's labor varies from 80 to 90 dollars. If clothing and subsistence be rated at \$50 per annum, and one-fifth be added for contractors' profit, the daily labor a slave will cost about one-half dollar. From 300 to 600 cube feet per day, is the ordinary work of ditchers in this country, according to the character of the ground. Taking the mean of the two, the more evasions of each cubic yard would be nearly three cents.—Supposing the two banks to be 20 feet wide at top, with a slope of one and a half to one, the mean distance of transportation at the upper end will be about 40 feet, and 51 at the lower end, averaging 46 feet, in which distance 3 men will easily transport what 2 can excavate. The removal of 2 cubic yards would thus cost 15 cents, or 7 1/2 per yard; but one-fourth must be added to this estimate for idle days and loss of time from bad weather, whence the price per cubic yard becomes 9 1/2 cents.

The area of a section taken midway between the head and mouth of the Canal, supposing the average cut to be 5 1/2 feet, would be about 34 yards which would give as the cost of one mile, at 9 1/2 cents per yard, \$5, 682 80 100ths, and for 7 miles the sum of \$39,770 60 100ths. The quantity of good land which will be reclaimed from the Lakes will be 10,500 Acres, and the value cannot but exceed the expenditures, even after deduction of interest upon the capital expended between the construction of the Canal and the sale of the land.

To ascertain how much good land would be laid dry by the operation of draining down 3 1/2 feet below the present level, a survey was first made of the Lake margins; after which soundings were taken at the depth of 3 1/2 ft. which were surveyed by triangulation; and the quantity included between the present and lower margin, determined by the difference of the two areas.

The Lake bottom was also bored with a land auger to the depth of several feet at every sounding station.—In some instances a few inches of sand were found overlying a deep vegetable soil, but in most instances sand was absent. Sand would be more generally found at the surface of the soil, that being more exposed to the attrition of the water, whereby the vegetable matter would be removed, and the sand, from its greater weight, be left behind. The quantity of that matter must rather add to, than detract from the value of the soil. Some clay and red ashes are also found at the Lake bottom, intermixed with vegetable matter. All the soundings are properly registered, and with the other field books preserved for your inspection. A general Chart is in preparation, exhibiting all the operations of the season; it will be transmitted by the first opportunity after its completion.

CONGRESSIONAL.

CALHOUN AND WEBSTER.
Correspondence of the Balt. Con. Transcript, Washington, March 23, 1838.

The Senate to-day exhibited a gladiatorial combat, such as occurred last Saturday week between Clay and Calhoun, with this difference, that instead of the Kentuckian Senator, the State Rights-leader had to cope with Daniel Webster; and be the Judgment of the spectators what it may, there can be but one opinion upon the indefatigable spirit and ingenuity, with which Mr. Calhoun has sustained this second struggle.

On the coming up of the Special Order, Mr. Calhoun commenced his reply to Webster's arguments on the constitutionality of Congress providing a uniform currency, previously answering at great length what he termed the attacks made on him—personally by Mr. Webster.

This portion of Calhoun's remarks were very severe and pointed, and roused the Northern Senator to a state of irritation which I never saw him display so openly before. He writhed a host in his chair, as if impatient of his inability to interrupt Calhoun and repel his charges; now and then giving vent to his feelings in sharp exclamations, as he practice quite foreign to his composed demeanor. Afterwards he proceeded to bring charges of inconsis-

tency against Mr. Webster on the Tariff question, in proof of which he quoted largely from several of that Senator's speeches. The purely argumentative portion of his remarks were given with his accustomed ability, and force. Webster of course replied and with such warmth and excitement, as I thought his Northern temperament was incapable of. As the whole discussion was mostly upon matters affecting them personally, and in fact consisted of mutual attacks and defence of each other's consistency I refrain from dwelling upon any of its pungent passages, but there are one or two points the nature of which makes them legitimate subjects of notice.

Calhoun had in the course of his charges against Webster's consistency, intimated that he could draw a parallel between his and Webster's position as to the late war, not reditable to the latter. When replying to this intimation, Webster warmly challenged Calhoun to produce what he had to say on that head, and then proceeded to explain his view in reference to the war, and how he had always been one of the most strenuous advocates of increasing the naval power of the country, he burst forth with one of the most elegant passages to be found in his various speeches.

He alluded to the importance of our navy and then sketched in the most vivid manner the position of England with regard to the European continent at that time under the power of Bonaparte, who being subject to the maritime superiority of England, yet like the fabled giant of old, was invincible whenever he touched the earth. This great power—England, had been made great by her navy; her march was over the mountain wave, her home was on the deep; and we, said Webster, were to attempt to wrestle with her on her own element, to intercept that march; and to pay our respects to her on the home—the deep! The whole of this passage was very fine, and fitting as it did in the heart of Americans who heard him, that honest pride in the achievements of our navy, its effect upon the Senate was electrical indeed, every one forgetting for the moment, all party feelings in the theme which led to this magnificent episode.

But the best thing in the whole debate, was an amusing extract read by Webster from a volume containing the proceedings of the provincial government of East Tennessee. He advised Calhoun to take a hint from what he would read and embody in a substitute for his 23d section of the bill, which there was a motion to strike out. The passage read by Webster, gave forth that as specie payments were difficult in East Tennessee, it was ordered that hereafter their Governor should be paid 6000 deer skins, and so on with the other civil officers; their pay being given in skins of raccoons, muskrat minks, decreasing in number and value, according to their rank. The gusto with which Webster read this passage, convulsed the whole audience, the administration party giving into the general mirth, and among them no man laughed more heartily than Calhoun himself, who said he had an objection to such a payment if the skins could be provided—to which Webster replied, "Oh! I'll attend to that. This story, made the remainder of the debate very temperate, and when the Senate adjourned, both of the combatants seemed to regard each other with very peaceable looks.

Correspondence of the Baltimore Chronicle, Washington, March 31, 1838.
The Fulton Claim.—Ogden Hoffman—Extract from his Speech.—Moses—private Bills—Senator—No Senator—The Mandamus Case—Assa Kendall's Destiny.

As my postscript informed you last night the House refused the reconsideration of the Fulton Relief Bill. The debate upon Gen. Thompson's motion was very brilliant. Among others the remarks of Mr. Thompson himself were very able and eloquent. Mr. Biddle's refutation of Duncan's imputation that Fulton does not deserve the laurel he has so long worn, was also a most vigorous and effective piece of eloquence. As to Hoffman, whatever he touches he adorns, and so he did this subject.—I give you a brief extract or two from this beautiful speech.

Replying to Mr. Craig of Virginia, who, opposing the bill, had said that the success of Fulton was attributed to good-luck, Mr. H. said that others had contented themselves with tearing away the branches, and scattering the foliage, but that he (Mr. Craig) had struck at the root of that flourishing tree, which had been reared as the monument of that great patriot's fame. He denied, boldly, any other credit than good-luck to the genius of Fulton, as the inventor of steam navigation. In the same way you would strip from the brow of the scholar his laurel, and from that of the soldier his laurel, you would strike from your pension rolls the names of the veteran patriots, whose blood has been shed, in achieving their country's independence. Even the tomb of Washington would be unadorned, and his statue would be stripped of its chaplet