UNITED STATES
COAST AND GEODETIC SURVEY

T. C. MENDENHALL, Superintendent.

BULLETIN, No. 19.

Approved for Publication, March 15, 1890.

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WITH REFERENCE TO OYSTER CULTURE.

A report by J. C. DRAKE, Ensign U. S. Navy, Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner "Ready."
1889-1890.

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ON THE SOUNDS AND ESTUARIES OF GEORGIA WITH REFERENCE TO OYSTER CULTURE.

A report by J. C. DRAKE, Ensign U. S. Navy, Assistant, U. S. Coast and Geodetic Survey, Commanding Schooner "Ready."
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PREFACE.

In 1889, while the legislature of Georgia was making an effort to frame a law for the development of the Oyster Industry in her waters, it was found that the information as to the capabilities in that direction was very incomplete.

Consequently, in September, 1889, a resolution was passed by the legislature of that State requiring the Governor to make application to the Federal Government for assistance in collecting information destined to assist the State authorities in framing judicious laws.

The request was made early in September, 1889, and referred to the Superintendent of the Coast and Geodetic Survey, Dr. T. C. Mendenhall.

On September 13, 1889, the Superintendent of the Coast Survey issued instructions directing me to assume command of the schooner "Ready," than at Charleston, S. C., and to proceed to the coast of Georgia and make such hydrographic surveys and examinations as might be required in connection with the investigation of the oyster beds by the authorities of the State of Georgia.

On September 23, 1889, the "Ready" was placed in commission, and, with a small hydrographic party on board, arrived at the mouth of the Savannah River, October 2, 1889, where active field work commenced.

The general plan of work adopted by the chief of the party was to carry the investigations from the Savannah River southward to the Florida line.

The appropriation available for the prosecution of this work was small, and the time limited to five months, so that at the outset it was discovered that the examinations could not be made as minute and comprehensive as was desirable.

The experience of the chief of the party in this special work, and his information on the subject consisted: (1) in the knowledge he had gained while assisting Lieutenant Francis

Winslow, U. S. N., in a similar work for the State of North Carolina, covering a period of three years; (2) in a personal inspection of the larger oyster farms in Connecticut, and from conversations with the oyster planters; and (3) in the information gathered from reading the reports of the Shell Fish Commissioners of New York and Connecticut, the articles by Prof. John A. Ryder, of the U. S. Fish Commission, and by Prof. W. K. Brooks, of Johns Hopkins University.

As assistants in this work, I was enabled to secure the services of two of my associates in the North Carolina survey—namely, Mr. John D. Battle and Mr. W. F. Hill, and also those of Mr. W. N. King, jr., a graduate of the United States Naval Academy. Mr. Battle and Mr. King assisted with the field work, while Mr. Hill was principally occupied with the office work, plotting, and drafting. It gives me pleasure to testify here to the abilities, zeal, and good judgment displayed by these gentlemen.

The labors of the party have been lessened and rendered more agreeable by the cordial assistance of the people living along and near the section in which the investigation has been prosecuted. The native oysterman, the tonger, and the packer, as well as the most prominent men, have afforded assistance and extended courtesies which are gratefully appreciated. An enthusiastic interest was manifested by Dr. A. Oemler, of Savannah, Ga., an authority on the biology and propagation of the oyster, through whose efforts I was enabled in many ways to expedite the survey. Upon the approval of the Mayor, the health officer of Savannah, Dr. W. F. Brunner, placed a naphtha launch at our disposal, by which we were enabled to double the field working force. Not less than 1,500 miles of sounding lines were made in this launch alone.

While the following report should be regarded as incomplete, and by no means exhaustive, still it is believed that the statistics gathered will be sufficient to point out to the State authorities what further legislation is desired in order to encourage the oyster industry.

METHODS.

The locations of the oyster beds in the mouth of the Savannah River were accomplished by the application of the methods of ordinary hydrographic surveying. That is to say, a sufficient number of the old triangulation stations having been recovered in the vicinity and signals erected thereon, the position of the sounding boat at any time was obtained by measuring with a sextant the angles subtended by three or more of these known signals.

Moving southward from the Savannah River, it was soon discovered that it would be impracticable to continue this method of locating positions and make sufficient progress to enable the party to examine the entire area within the allotted time. Very few of the old triangulation stations could be recovered, and to establish new ones would require carrying the triangulation southward from the stations near the Savannah River as a base.

At the village of Thunderbolt, the oyster depot for Savannah, I was enabled to consult the most intelligent local oystermen, whose information, coupled with a personal reconnoissance of the surrounding waters, indicated to me that nearly all the natural beds lay along the borders of the marshes and on the slopes of the banks, and that almost invariably a portion of the natural growth was visible above low water. Thus having learned in general terms the localities to be carefully examined, an inspection of the Coast Survey Charts showed that, with observers trained in marine surveying, any position desired could be indicated on the charts to within a few yards, and with sufficient exactness to answer all the requirements of this survey. The narrow streams with their numerous and well-defined lines and curves, the minute topography, showing the innumerable small drains, the character of the marshes, clumps of shrubs, hummocks, Indian mounds, all served as marks by which to plot approximately the results of the survey.

Thus, on a boat running between known topographical points, an experienced seaman was continuously at work feeling the bottom with a pole, and the observer indicated graphically on a Coast Survey Chart (scales of $\frac{1}{30000}$ and $\frac{1}{40000}$) spread out on a board before him, the characteristic soundings obtained. The observer would also make notes as to the

appearance of the water, the condition of the natural growth, sediment or deposit, or washing away of any parts of the shore lines, etc.

Whenever the depth of water exceeded twenty-five feet, recourse was had to the hand-lead, and occasionally, as a means of checking, the lead and pole were kept going simultaneously.

Having previously learned from the local oystermen and fishermen the general locality of those natural oyster beds which have been resorted to by the public, and with the methods of the survey modified, as above described, the examinations were continued southward to the Florida line.

The weather was remarkably favorable for field observations until February, when it became foggy and rainy. I shall have occasion to refer again to the effects of the unusually dry season on the conclusions to be deduced from the observed specimens of the specific gravity of the water. It was anticipated that the rainy season would set in sufficiently early to admit of a rapid series of density observations to be taken, for comparison, over the entire ground, as the vessel returned to Savannah, but such, unfortunately, was not the case.

The field work closed February 28, 1890.

The total expenditure to accomplish this work on account of the Coast and Geodetic Survey was $368.21.

LIMITS OF THE AREA EXAMINED.

The area which it was desired to examine includes all the waters under the jurisdiction of the State of Georgia in which oysters are found growing naturally, and in which it might be considered practicable to make them grow by planting or other artificial means. This area is composed of estuaries, sounds, and mouths of rivers along the coast of the State. Included between the latitude of 32° 03′ north and 30° 43′ north, and having a general direction of S. S. W., it is bounded on the north by the Savannah River, and on the south by the middle line of the St. Mary's, and includes all the islands lying within the former. For the most part it consists of a network of tortuous rivers, creeks, and lagoons, connecting with each other and surrounding low and uninhabitable marsh lands. These marsh lands have a nearly horizontal surface whose height is about the plane of mean low water. On the illustrations (7 in number) which accompany this report, are graphically shown the location, limits, and area of the natural oyster beds, and the specific gravity of the water reduced to a temperature of 60° Fahrenheit, that of distilled water being represented by 1.0000. The specific gravities are indicated in red figures, and when more than one specimen of water was taken at the same point, the mean of all the observations has been plotted, and the number of the specimens is indicated in blue figures in parentheses, following the red figures. In addition to the specimens taken by the sounding-boats while in the field, specimens were also taken every four hours, day and night, from the ship's anchorage. There are also indicated in black, lines 1,000 feet from shore, inside of which, under the present State law, one person can lease five acres only, while beyond he may lease five hundred acres. These projections are nothing more than Coast Survey Charts Nos. 440, 441, 443, 444, 446, 447, and 448, but they were made from dry proof plates on heavy drawing-paper. Nos. 441 and 444 are on a scale of $\frac{1}{30000}$, the remaining ones being $\frac{1}{40000}$. It is believed the information collected can be better understood by a study of these projection-charts, so-called, showing, as they do, the characteristic depths of water bottom and the topography of the adjacent lands, than by having it plotted on original projections.

In the following detailed descriptions the area examined divides itself naturally into the numerous sounds, estuaries, rivers, and creeks, nearly all of which have names, as can be seen from an inspection of the Coast Survey Charts Nos. 156 and 157.

DESCRIPTION OF AREAS EXAMINED.

Some general statements may be made here in order to avoid a monotonous repetition of certain facts for each locality.

Over the entire area examined it was found that the currents were nearly uniform, and were produced by the tides. In the fresh-water rivers, the Savannah, Ogeechee, Altamaha, and Satilla, the velocity of the current on the ebb was of course augmented, while that on the flood was retarded. Wherever the vessel was anchored, current observations were taken, and for any particular place it was noticeable that the strongest current (greatest velocity) occurred when the flood had run about four hours, or two-thirds high water; and similarly the strongest ebb took place after the water had been falling about two hours. All the current observations were made on the surface of the water.

It is believed that the currents, ranging, as they do, from 1 to 2 knots per hour, present the most favorable features for the successful and rapid growth of oysters that can be claimed for the waters examined.

For the purposes of this report the rise and fall of the tides may be regarded as uniform for the entire area. For the most part, the mean rise and fall is seven feet, and the deviation from this is unimportant.

In regard to the deposits, it may be said that a certain amount of mud is brought out of the adjacent marshes on every tide, but during the spring tides the greatest amount of deposit takes place, and during this time the entire river in some places was very muddy.

This almost universal deposit of mud in the waters examined is considered the greatest obstacle to the successful propagation of oysters. It is particularly a disadvantage in the spawning season, when the planter deposits the shells or cultch to get a set. Hence, it would be well to note the time of spring tides in the spawning season, and shell the ground directly after this time.

The temperature of the water does not change rapidly on the coast of Georgia, and there is no marked difference in the temperature of the northern and southern parts of the State, although there is a difference of about 100 miles in latitude.

As a rule the oysters are not fat until late in December or early in January, which is probably due to the length of the warm seasons, and, in some localities, to the absence of rains.

The past winter was known as a very dry season—far more so than the average, and was also a very warm winter. Hence we heard the native oystermen complain that the oysters were unusually poor and unfit for market until January and February.

Savannah River.—The Savannah River being a well-known and an important commercial stream, scarcely requires for the purposes of this report a hydrographic description. By reason of the large volume of fresh water, oysters are only found in this river near its mouth, where they are kept alive by the influence of the flood tide. The two principal beds examined were those on the Tybee Knoll Spit, and those on the shoal known as the Oyster Bed. The oysters are generally poor in quality, and small and well covered with barnacles. Part of them ebb out at low water, while the other part extend into the water for a depth of 20 feet and less. The bottom is more or less shifting, and also shows that deposits are constantly taking place. In a few instances the sounding pole, after probing through a foot or more of surface stratum on the Tybee Knoll Spit, came into a substratum of dead shells.

On St. Michael's Shoal, and to the northward and westward of it, are found scattering beds of oysters more or less killed by the deposits and the effects of freshets in the rivers. These beds were not surveyed, and are therefore not indicated on the illustration. Samples of the oysters, however, showed them to be superior in size and shape to those on the surveyed beds. But sufficient information was collected to show that it was not advisable to undertake the cultivation of oysters in any part of the Savannah river, unless possibly at or near the mouth of Lazaretto Creek. The improvements to deepen the channel for navigation purposes also render an attempt to cultivate oysters in this river unadvisable.

Specific gravity.—While making the soundings in this river the vessel was anchored one and a half miles east of Fort Pulaski, in the Tybee Roads, where the average specific gravity, from twenty-nine observations taken every four hours, was 1.0146. The greatest density was 1.0211, and the lowest 1.0084. At low water on the Oyster Bed Shoal it was 1.0090.

The currents are strong, and are produced by the tides combined with the outflow of the river, and influenced to some extent by the force and direction of the wind. The mean rise and fall of the tide at the mouth of the Savannah River is about 7 feet. The area of natural oyster beds at the mouth of the Savannah River is about 80 acres, but of this area at least one-half will be found to be dead shells.

Wassaw Sound.—This sound lies between Tybee Island on the north, and Wassaw Island on the south. It is 2 miles in width at its mouth, and only extends that distance inland to Cabbage Island. With the exception of the deep channel leading into Tybee River on the north, and the Wilmington River on the south, it is for the most part very shoal, and the bottom is generally shifting sand. The adjacent shores are nearly all marshy, and along Cabbage Island shore there is a narrow streak of the so-called raccoon oysters and many dead shells. No part of this sound is suitable for oyster cultivation. Besides being exposed to the heavy seas, the shoal water, and the shifting bottom, the water itself is entirely too salt. The currents are those produced by the rise and fall of the tides, which are augmented by the northeast winds.

Tybee River.—Tybee River is about 7 miles in length, and is formed by the junction of St. Augustine Creek and Turner's Creek. It enters Wassaw Sound on its northern side, has a general direction of north for the first three miles from its mouth, and an average width of one-fourth of a mile. It separates Tybee Island on the east from Wilmington Island on the west, bending to the northwestward, and narrowing to about one-eighth of a mile; it then separates Wilmington Island from McQueen's Island. The depth of the water over the major part ranges from 20 to 40 feet. The bottom is for the most part soft mud, but in the deepest part of the stream, and where the current is strongest, it is sticky and sometimes hard. Scattered along the borders of the marshes, and partly above low water, the total area of oysters in this river is 39 acres. At one point only do they extend across the stream, and are there found in water as deep as 30 feet. All the beds are, however, nearly depleted from excessive fishing. The specific gravity of the water at the mouth is 1.0196; at the head it is 1.0132.

A heavy overflow from the Savannah River would make the upper half of this river too fresh for safety in oyster cultivation. Otherwise, by improving the bottom, it is practicable to bring nearly all of this river into oyster grounds. There is more or less mud deposit all over it, but it is believed that only at marked places, as eddies and shoals, is the sediment so great as to prevent at least the growth of planted oysters. The total area is 900 acres; that beyond 1,000 feet from the shore, 28 acres.

Lazaretto Creek.—This is a narrow, winding stream, averaging not more than 100 yards in width. It is a tributary to the Tybee River, and is about 5 miles in length. It flows through the marsh between Tybee and McQueen's islands, and enters Savannah River just south of Cockspur Island. The depth of water ranges from 7 to 20 feet. The bottom is generally of very soft mud except in places of very small area, where it is sticky, and where may be found a few scattering oysters of a very superior quality both in shape and flavor. These beds, however, have been nearly destroyed by excessive fishing. Lazaretto Creek receives the bulk of its waters from Tybee River, and during the first part of the ebb the water flows out both in the Savannah River and in Tybee River, while in the last of the ebb the water from the Savannah River enters the creek, thus possibly accounting for the superior flavor of the oysters found in this creek and its tributary called Oyster Creek.

Specific gravity.—The specific gravity of the water in Lazaretto Creek is 1.0204 at its Tybee River mouth at low water, and 1.0118 at its Savannah River mouth at one-half flood tide. The total area of the creek is 250 acres. Area of natural oyster beds, 19 acres.

Oyster Creek is a small winding stream, about 100 yards in width, which enters Lazaretto Creek about one mile from Tybee River. It is 3 miles in length and trends westward, then northward and westward in the marshes of McQueen's Island. The depth of water ranges from 7 to 25 feet for the first mile, after which it widens somewhat and becomes a shoal. The bottom is variable, but more favorable for oyster cultivation than Lazaretto Creek. Soft mud

prevails, but there is more or less of sand near the mouth, and hard mud and sticky bottom near the head. Very few oysters are now found in this creek, but they are of a fine quality. There are a few scattered oysters and dead shells over the upper half of the creek, but they have not been considered thick enough to be indicated on the chart. There is every indication here that excessive fishing has almost depleted a once valuable bed of oysters. An overflow from the Savannah River for any length of time would endanger the lives of oysters in this creek. Otherwise it presents many very favorable features for oyster culture. The total area is 180 acres. Area of natural oyster beds, 2 acres.

Shad River.—This narrow and winding stream connects with Tybee River about four miles from its mouth, trends southward and eastward through the marshes of Wilmington Island, divides into two branches, and joins again about one-half mile before re-connecting with Tybee River, about 2 miles from its mouth. It is about 4 miles in length, and averages about 150 yards in width. The bottom is generally soft mud, but contains spots of sand and sticky bottom, particularly toward the northern end. The depth of water ranges from 6 to 25 feet. Very few oysters were found except those which were planted near the northern end by Dr. A. Oemler, specimens of which proved the ground to be very desirable for oyster propagation.

Specific gravity.—Through the kindness of Dr. Oemler, who resides one-half mile from the northern end of Shad River, I was enabled to get a series of density observations at that point. Three specimens of water were taken daily, with few exceptions, at 8 A. M., noon, and 4 P. M. These observations, 192 in number, were commenced on the 12th of October, 1889, and ended on the 6th of December, 1889. The mean of all the observations is 1.0163; the lowest observed is 1.0102, and the highest, 1.0208. From a study of these observations it will be seen that the change of density is not large, and is dependent upon the tide, the flood increasing and the ebb decreasing the density. It will also be observed that the force and direction of the wind modify somewhat the density, the easterly wind increasing and the westerly wind decreasing it. So far as concerns the specific gravity of the water with reference to oyster culture, the conditions of Shad River leave nothing more to be desired. Again, it would not be very expensive to regulate the amount of fresh water entering Shad River from Tybee River. The flavor of the oysters grown in this vicinity is highly spoken of in Savannah, where a ready market is found for them. The total area of Shad River is 350 acres.

Wilmington River.—This River enters Wassaw Sound at its southern and western side. For the first 8 miles it has a general northwest direction to the village of Thunderbolt, which is the oyster depot of Savannah. For the first 5 miles it lies between Wilmington Island on the north and east, and Skiddaway Island on the south and west, and has an average width of half a mile. It then narrows to one-fourth of a mile, running about 3 miles with this width to Thunderbolt. Beyond this, connecting with the Savannah River, it is too fresh for the propagation of oysters. The depth of water for the greater part of this river lies between 20 and 40 feet. The bottom is variable, there being several long strips of soft mud where deposits are constantly taking place. These are particularly noticeable in the shoal waters and near the marsh. Above the three small islands called The Sisters, the bottom is generally soft mud, but the deepest part of the channel is a little sticky. Below The Sisters, and in the water deeper than 12 feet, as a rule, it will be found to be hard bottom, some sticky mud and some sand with mud; also toward the mouth some hard sand. More or less mud is brought out of the marshes by the first of the ebb, and is deposited in the river, particularly at eddies and at shoal turns in the river. Along the wooded portions of Wilmington Island the left bank is washing away, and hence oysters should not be planted very near this shore. A few natural beds were found in this river, principally between Thunderbolt and Turner's Rock, but they are of no consequence, having been about exterminated by excessive fishing, being so near the oyster market. It is believed that oysters can be grown successfully in the major portion of this river, especially in the deep and harder bottom from Turner's Rock to the mouth.

The specific gravity varies considerably according to the state of the tide, and is modified somewhat by the freshets in the Savannah River. In October, at Thunderbolt, the mean of forty-two specimens, taken every 4 hours, was 1.0140, the maximum 1.0149, and the minimum 1.0074. At low water, near the mouth of Herb River, it was 1.0096; at high water 1.0134; at Turner's Rock the mean of two specimens was 1.0167. At The Sisters the mean of nine specimens was 1.0189. At high water, 1 mile below The Sisters, it was 1.0173, and 2 miles below it was 1.0208. Near the mouth of the river the mean of six specimens was 1.0212. The maximum was 1.0271, the minimum being 1.0188. The mean rise and fall of the tide in this river was about 8 feet, being a few inches higher above Turner's Rock, and a few inches lower below it.

At Thunderbolt the strongest current observed was 1.3 knots per hour. The total area from Thunderbolt to the mouth is 2,116 acres; that beyond 1,000 feet from the shore, 460 acres. Area of natural oyster beds, 8 acres.

Herb River.—This is a tributary of the Wilmington River, which it enters about 1 mile below Thunderbolt. From its mouth it leads through marshes in a general southwesterly direction, and separates Dutch Island on the east from the main land on the west. It is about 4 miles long, and averages about two hundred yards in width. The depth of water for the greater part ranges from 8 to 20 feet. The bottom is variable, but the greater part is mud. Near the left shore there is hard mud, and in some places there is sticky mud with occasional sand. There is very little shifting bottom near the right bank. In places of small area considerable deposits of mud are going on, and dead shells are found beneath the mud.

Specific gravity.—The specific gravity at low water at the mouth was 1.0119. Two miles above the mouth, at one-half flood, 1.0123. The area of the first three miles is 160 acres. Area of natural oyster beds 11 acres, the greater part being about depleted by fishing. This stream has some very favorable natural advantages for the cultivation of oysters. It is only indirectly affected by the freshets in the Savannah River, receiving sufficient fresh water to make the oysters fat in the winter, and sufficient salt water, with the flood tides, to give them a good flavor.

Skiddaway River is a tributary of the Wilmington River, into which it flows nearly opposite Turner's Rock. It leads through marshes in a southwesterly direction, separating Skiddaway Island on the east from Dutch Island, and the Isle of Hope on the west. For the first 3 miles it averages about one-fourth of a mile in width. It then narrows and divides into two branches, after which it is called Isle of Hope River. For the most part the depth of water ranges from 12 to 25 feet. The character of the bottom is soft mud, with an occasional small area of hard and sticky mud and sand.

Specific gravity.—The specific gravity at the mouth at one-third tide was 1.0167. Two miles above the mouth at low water, 1.0144. The total area from Isle of Hope to the mouth was 450 acres; area of natural oyster beds 12 acres. The oysters found in this river were small and scattering, and there were many dead shells among them. It is believed that oysters can be profitably grown in the deeper water of this river, especially in the channel, where the current is strong and the deposit least.

Grimball's Creek.—This is a small tributary of Skiddaway River, which it enters on its western side about 2 miles above its mouth, separating Dutch Island from the Isle of Hope. It is only about 1 mile in length, and averages about 100 yards in width. The depth of water ranges from 2 to 6 feet. The bottom is soft mud, but not too soft to prevent planted oysters from growing. The total area of the creek is 54 acres. Area of natural oyster beds, 3 acres. This creek is only adapted, by reason of its shoal water, to the cultivation of oysters by the use of tongs.

Half Moon River flows into the Wassaw Sound through the marshes of Wilmington Island, just south of the mouth of Tybee River. It averages about 400 yards in width for the first mile, when it narrows and extends through the marshes north and west to the wooded portions of Wilmington Island. It is shoal, ranging from 3 to 10 feet, and the bottom is soft mud and

generally unfit for the cultivation of oysters. The specific gravity at the mouth, at one-half flood, was 1.0196. The total area of the river is 360 acres. Area of natural oyster beds 7.5 acres.

Tybee Cut is a small shoal stream separating Cabbage Island on the south from Wilmington Island on the north. The bottom is too soft for the cultivation of oysters. At the mouth entering Wilmington River the specific gravity at low water was 1.0195; at high water, 1 mile above the mouth, 1.0124. Total area is 145 acres. Area of natural oyster beds, 10 acres.

Turner's Creek is a narrow, winding stream, separating Wilmington Island on the south from White Marsh Island on the north. It is about 4 miles in length, and about two hundred yards in width, and is the connecting link between Tybee River and Wilmington River. A few oysters of a poor quality were found in this river, but the water is too fresh, or liable to become so, to admit of oyster cultivation. The bottom is soft mud with an occasional spit of hard sand. The total area of the creek is 192 acres. Area of natural oyster beds, 10 acres.

Tybee Creek and Little Tybee Creek are two small streams which flow through the wooded hummocks of Tybee Island into the sea. They were not examined, being of little commercial importance, as their mouths are obstructed by shoals with but 2 or 3 feet at low water. I was informed that a few oysters of a fair quality could be found in places along their shores.

Romerly Marsh Creek comes into Wassaw Sound near the mouth of Wilmington River. For the first two miles it extends west, and is about four hundred yards wide, and the depth of water ranges from 12 to 30 feet. Beyond this it narrows and divides into several small, tortuous, and shoal streams, containing here and there a small natural bed of oysters of inferior quality. The bottom is soft and generally unfit for oyster cultivation, the water being also very salt. The total area of this creek, with its small tributaries, is 250 acres. Area of natural oyster beds, 10 acres.

The specific gravity at its mouth, at three-fourths flood, was 1.0228; 2 miles above the mouth, at two-thirds flood, 1.0222.

Odingsell River begins in the Romerly marshes and flows nearly south for about 3 miles, where it empties into Ossabaw Sound. It separates Wassaw Island from Little Wassaw Island, and averages about one-eighth of a mile in width. The depth of water ranges from 13 to 40 feet. The bottom is generally soft mud, with an occasional sticky spot and streaks of sand and mud. The water in this river is very salt, the specific gravity at the head being 1.0224 at low water. A greater portion of this river may be made available for oyster cultivation. It has a total area of 350 acres, including Rhodes and Curtis creeks. The area of natural oyster beds is 34.5 acres. On the natural beds there are more dead shells than oysters, and the latter are very small owing to excessive fishing. In Rhodes and Curtis creeks the bottom will generally be found to be soft mud.

Wassaw Creek enters Odingsell River on the east side near its mouth. It is about 4 miles in length and from 10 to 20 feet deep, but only averages 100 yards in width. For the first mile it has along each shore a narrow strip of natural oyster beds, the quality being inferior and the beds containing many dead shells. The bottom is soft, except at a few points near the shore, and generally unfit for the cultivation of oysters.

The specific gravity 1 mile above the mouth at low water was 1.0232. Total area of creek, 130 acres. Area of natural oyster beds, 17 acres.

Adams' Creek comes into Ossabaw Sound to the westward of Little Wassaw Island, which it separates from Skiddaway Island. It is about 4 miles long, connects with Odingsell River, has a general southwest direction, and averages about 10 yards wide. The depth of water ranges from 6 to 25 feet, and the bottom is soft mud, except near the shore in places where sand and mud and sticky bottom is found, and which is the only area here fit for the cultivation of oysters. Total area of the creek is 256 acres. Area of natural oyster beds, 8 acres.

The specific gravity 2 miles above the mouth, at one-third flood, was 1.0234. At the junction with the Odingsell River, at half flood, it was 1.0239.

Delegal Creek joins Vernon River near its mouth on the east side, and separates Green Island from Skiddaway Island. It is about 3 miles long, averages about 200 yards in width, and ranges from 4 to 20 feet in depth. The character of the bottom near and along the shore is sand and mud, and is suitable for oyster cultivation, while in the middle of the stream it is generally soft mud.

The specific gravity of the water 3 miles above the mouth was 1.0208. One mile above the mouth 1.0212. The oysters, which are scattered along the shore and partly ebb out at low water, are small, from excessive fishing, and poor, possibly from not receiving enough fresh water. The total area of the creek is 246 acres. Area of natural oyster beds is 22.5 acres.

Vernon River enters Ossabaw Sound to the northward of Raccoon Key. It has a general northwest direction, and is about 9 miles in length. For the first 3 miles it is about five-eighths of a mile in width, then it narrows to three-eighths and to one-fourth of a mile. For the most part the depth ranges from 20 to 40 feet. The character of the bottom varies, according to the location, from very soft mud to hard sand. Above the mouth of Burnside River the bottom is generally very soft and unsuitable for oyster cultivation. Below this, however, and in the channel and deeper portions, the bottom becomes sticky and sometimes hard. There is also a marl formation opposite the mouth of Little Ogeechee River, which extends more or less to the mouth of the Vernon River. With the exception of a heavily-wooded hummock, known as Green Island, the Vernon River flows entirely through marsh as far as Beaulieu, and must, therefore, contain a large amount of mud brought out of the marshes on the spring tides. Through the kindness of Mr. H. J. Lewis, of Stratford, Conn., I was enabled to make several hauls with a steam oyster dredge in the Vernon River and in the mouth of the Ogeechee River. In the Vernon River, opposite Hell-Gate, the dredge brought up a quantity of dead oyster shells, most of them being very old and large. In the mud and marl also brought up in the dredge, were found three or four drills, but none of the oyster shells indicated that the drills had been the cause of the destruction of the oysters. A considerable amount of brown sponge was found attached to the shells. Several hauls were also made along the shore over the strip of natural oyster beds, and no star-fish were found, although the water in this vicinity is very salt. The oysters were of inferior quality, and there were many dead shells.

The average specific gravity at Montgomery, from 151 specimens, was 1.0204; the maximum 1.0224; the minimum 1.0184. The change of density of this river being due to local rains, the above record of densities may be regarded as the highest, or containing the largest amount of salt that may be anticipated in this river. A prolonged local rain would make it extremely doubtful as to oysters living above White Bluff, and for cultivation it is recommended to go no higher than Montgomery and no lower than Hell-Gate. The current due to the tide is strong. A series of observations at Beaulieu showed the maximum to be two knots per hour on the service.

The total area from Montgomery to the mouth is 1,728 acres; area beyond 1,000 feet from the shore, 1,080 acres. Area of natural oyster beds, 20 acres.

Burnside River is a tributary of Vernon River, coming into it on the northeastern side of Skiddaway Island. It is about one-fourth mile wide, and extends eastward about 2½ miles, when it divides, the principal branch taking the name of Back River. The depth of water ranges for the most part between 8 and 30 feet.

The bottom is variable, soft mud prevailing, but it is believed that at least one-half of the area is suitable for oyster culture. There is some deposit going on adjacent to the marshes on the northern side, and also for a short distance on the shoal water on the south side, particularly near the mouth of the river.

In February, 1889, about 4,000 bushels of oysters were planted near the shore in Burnside River, adjacent to the wooded portion of Skiddaway Island. These oysters came from Bradley's Creek, near Ossabaw Sound, and Walburg's Creek, near St. Catherine's Sound. They were planted in water from 2 to 10 feet at low tide, and the character of the bottom was part hard sand with dead shells, hard and tenacious mud, and soft mud. It was also found

that a marked deposit was taking place at one point where the oysters were planted. The maximum current over the entire strip is about one knot per hour.

In February, 1890, one year after planting, I made a haul with a steam dredge over the different parts of the bed. It was found that the oysters had grown rapidly, and in one more year would be marketable. In only one spot had they been killed, and that was where they had been covered with the soft mud deposit. No young from last summer's spawning were observed, hence the oysters must have been covered with mud before the spawning season.

While all the samples examined showed a healthy and superior oyster, yet the ones from the hard mud bottom were the fattest.

In the mud brought up from these hauls were found about half a dozen drills, and there was quite an abundance of the brown sponge which had grown on these oysters since they had been planted. There were no positive indications that the oysters had been killed from any other cause than the heavy mud deposit.

The specific gravity here at one-half flood was 1.0176; at the mouth of the river, 1.0194. The total area is 302 acres. Area of natural oyster beds, 10.5 acres.

Back River, an extension of Burnside River, trends northward and westward for about 4 miles, dividing into small streams and terminating in the marsh. The first 2 miles, the only part suitable for oyster culture, is about 400 yards wide, and ranges from 3 to 12 feet in depth.

The bottom is sticky for the most part, the deepest portion being little soft mud, while the shoal is sand, with here and there sand with mud.

Altogether Back River may be regarded as favorable for oyster culture, both in the character of the bottom and the density of the water, the principal objection being the depth of water, limiting the greater portion to cultivation by tongs instead of steamers; and also a liability in case of heavy storms, by reason of the shoal water, to shifting bottom. Oysters have been planted in this river near the shore and gave a rapid growth.

The specific gravity was, at one-half flood, 1.0179. The total area is 224 acres. Area of oyster beds, 7 acres.

Little Ogeechee River joins the Vernon River about 3 miles above its mouth and opposite Green Island. Extending westward it is about three-eighths of a mile in width for the first 2 miles, when it is obstructed by three marshy islands and shoals, beyond which the bottom is unfit for the cultivation of oysters.

Of the above area the greater part has a depth ranging between 12 and 30 feet. The bottom is sand in the shoal parts, and is partly shifting. In the deeper water the bottom is hard mud and marl, and well adapted to oyster culture.

At low water, at the mouth, the specific gravity was 1.0199; two miles above the mouth, at one-half flood, 1.0193.

The area to the marsh islands is 420 acres; area beyond 1,000 feet, 120 acres; area of natural oyster beds, 7 acres.

Little Ogeechee River extends inland for about 25 miles, and during the heavy rains a large volume of fresh water is brought down, thus endangering the lives of oysters, at least above the area above described.

Ossabaw Sound lies between Wassaw Island on the north and Ossabaw Island on the south, the distance across the mouth being about 3½ miles. It extends inland only 2 miles to Raccoon Key.

No part of this sound was considered fit for oyster culture by reason of its shoal water, shifting bottom, and exposure to the heavy seas from the ocean.

Ogeechee River enters Ossabaw Sound on the south side of Raccoon Key, and really appears as a prolongation of the sound as far as the Middle Marshes. It is the second largest river on the coast of the State, extending into the interior of the country in a northwesterly direction for some 250 miles. By reason of the large volume of fresh water flowing out of this river, only a short portion of it is available for oyster culture, namely, from its mouth to about 1 mile above the Florida Passage, making a distance of about 5 miles. For the first 2 miles it is

about 1 mile wide; for the next three it is about one-half mile wide. Besides the Middle Marsh Islands and Egg Islands, situated in this river, and the flats which make off from them, at least one-third of the above area is too shoal and bottom shifting to admit of oyster cultivation.

In the channels, and where the depth is 8 feet or more, the bottom is hard, generally marl, and suitable for oyster cultivation.

A series of density observations were made near Egg Island, the maximum being 1.0219, the mean 1.0198, and the minimum 1.0169. Similarly at the mouth of the Florida Passage we have maximum 1.0180, mean 1.0161, and minimum 1.0138.

The total area in that part of the river described is 1,809 acres; area beyond 1,000 feet from shore, 612 acres; area of natural oyster beds, 38.5 acres.

The oysters are for the most part inferior, and partly ebb out at low water, being scattered along the edges of the marshes.

Bradley's River comes into Ossabaw Sound from the north end of Ossabaw Island. It is about 5 miles long, and averages about 200 yards in width for the first 3 miles, and having a general direction of southwest.

Only the first 2 miles of this river were examined. There is only about 4 feet at the mouth, but once in the river the depth for the first 2 miles ranges from 6 to 15 feet.

The bottom is generally soft, increasing in hardness as you ascend the river; but very little area is considered suitable for oyster culture.

Around the mouth, and scattered along and near the shore, are a series of natural oyster beds, generally of the raccoon grade. About the mouth of this river were observed several beds, 10 or 20 yards in diameter, of raccoon oysters, which ebb out at low water, and show that the formation of the bed has taken place on soft mud, and each year the spat have caught on the previous year's growth, thus forming a mass of coon oysters and dead shells at least 2 feet in thickness.

At low water the specific gravity at the mouth was 1.0224; 2 miles above the mouth, 1.0208.

It is very natural to infer that the upper and narrow portion of this river is well adapted to the cultivation of oysters so far as concerns the density of the water.

Total area of first 2 miles of the river, 128 acres. Area of natural oyster beds, 8.5 acres.

The Florida Passage is a tributary of the Ogeechee, and, with Bear River, separates Ossabaw Island from the main land. It is about 2 miles long, and averages about 400 yards in width. The depth of water ranges between 10 and 20 feet for the greater portion. The bottom is soft mud, with occasional small areas of sticky bottom, particularly near the shore, where a few oysters of an inferior grade may be found.

The specific gravity at the lower mouth, where it is joined by Buck Head Creek and Bear River, was 1.0146, being the mean of 25 observations, the maximum being 1.0176, the mininum 1.0119. The total area is 320 acres.

Freshets in the Ogeechee will endanger the lives of oysters in this river, otherwise the area of sticky and hard mud bottom is suitable for oyster planting.

Red Bud Creek, a small narrow stream about 3 miles wide, comes into the Florida Passage on the west side, about 1 mile from its mouth. The water in this creek is too fresh for oysters, except near the mouth, and even there oysters are liable to be killed by the overflows from the Ogeechee. The total area of this creek is 112 acres. The area of natural oyster beds is 25 acres.

Queen Bess Creek is a small stream coming into the Florida Passage on the east side, and nearly opposite Red Bud Creek. It is not considered suitable for oyster culture by reason of the very soft bottom, and is also liable to become too fresh from its proximity to the Ogeechee River.

Buck Head Creek comes out of the marshes on the west side of Ossabaw Island, and joins Bear River at its junction with the Florida Passage. It is about 2 miles in length. The first mile averages 400 feet in width; the second about 100. The depth of the water ranges from 4 to 16 feet. The bottom for the most part is hard sticky mud, with an occasional deposit, especially along the shores. This creek has a total area of 96 acres, and contains no natural oyster beds of any consequence.

While there is a considerable deposit brought out of the marshes at high tide, yet it is believed that oysters can be cultivated in the greater portion of the creek.

The specific gravity near the head is 1.0152; at the mouth the mean of 25 observations is 1.0146.

Bear River begins at the junction of the Florida Passage and Buck Head Creek, and flows through extensive marshes in a southerly direction, separating Ossabaw Island from the main land. It enters St. Catherine's Sound on its north side, being 8 miles in length, and at its mouth 1¼ miles wide, but narrows rapidly to one-fourth of a mile, which is its average width. The depth of water ranges from 8 to 30 feet for the greater portion. The general character of the bottom is soft mud, with here and there a small area of hard and sticky bottom, the soft bottom prevailing generally toward the mouth of the channel.

The natural oyster beds lie along the shores and partly ebb out at low water, and are about depleted by excessive fishing, there being now more dead shells than oysters. At one point, about 1 mile from the head, the natural bed extends nearly across the stream. The oysters found in this river are small, but of a superior quality.

The specific gravity at the head or junction is 1.0146; at the mouth of Kilkenny Creek, 1.0093; at the mouth, 1.0025. Total area, 1,424 acres. Area beyond 1,000 feet from the shore, 740 acres. Total area of natural oyster beds, 815 acres.

The currents are strong, from one to two knots per hour, and are increased by freshets from the Ogeechee, which also change the density of the waters.

Kilkenny Creek enters Bear River at the west side about 2 miles above its mouth. It is 5 miles in length, and flows westwardly for the first 2 miles with a width of 400 yards. It then narrows to about 100 yards and flows northerly, connecting again with Skippers Narrows into the Florida Passage For the first 3 miles the depth of water ranges from 6 to 30 feet. The bottom is soft mud, except along the shores, where it is a little sticky and sometimes hard with mud. The remaining portion of this creek has a depth ranging from 2 to 12 feet, and the bottom changes from hard mud, sand and tenacious mud to clay, and is well adapted to the cultivation of oysters. Scattered along the borders of the shore there is a series of small natural beds about depleted, and containing many dead shells.

The specific gravity 2 miles above the mouth is 1.0185; at the mouth of Cabbage Creek, 1.0191, and at its mouth, 1.0193. Total area of the bottom, 352 acres. Area of natural oyster beds, 10.5 acres.

Skippers Narrows is well adapted to the cultivation of oysters, the bottom being hard mud and sticky, with the exception of small areas where mud deposits are taking place. The area is small though, and can only be cultivated by the use of hand implements. Both Skippers Narrows and the upper part of Kilkenny Creek are liable to be affected by the freshets from the Ogeechee River. But for this these areas are admirably adapted to the cultivation of oysters. Experiments with planted oysters have been carried on in Skippers Narrows and the head of Kilkenny Creek by Mr. George Appleton, of Bryan county. Samples were shown of the planted oysters of 1, 2, and 3 years' planting, and indicated that the oysters had greatly improved and had rapidly grown, being for the most part marketable after 2 years' planting. A few barrels of Blue Point oysters were brought by Mr. Appleton from the north and planted in this locality. The oysters so planted showed a rapid growth and appeared to retain their peculiar flavor.

Newell's Creek is a small stream about 50 yards in width and 2 miles in length, entering Bear River from Ossabaw Island. The depth of water ranges from 4 to 20 feet, and for the first mile of this creek the bottom may be considered as a solid rock of natural oysters. Although excessive fishing is carried on here the natural bed is not yet exterminated, but the oysters taken up are very small, being generally of not more than 2 to 3 years' growth. The total area of the creek is 70 acres; that of natural oyster beds, 33 acres.

St. Catherine's Sound separates Ossabaw Island on the north from St. Catherine's Island on the south. It is about 1⅜ miles in width, and extends inland into the marshes about 2 miles. This sound is totally unfit for the cultivation of oysters by reason of the water being

too salt, by reason of its exposure to the heavy seas, especially the northeast gales, and also by the large amount of its area being very shoal.

Medway River is the principal tributary to St. Catherine's Sound, of which it appears as the prolongation. That part of it examined extends about 7 miles inland. Beginning with a width of 1 mile, it extends in a westerly direction 2 miles, then narrows to a half mile in width running northerly and westerly. The depth of water in this river ranges from 1 foot to 30 feet, there being many shoals making out into the middle of the river. The character of the bottom is sand and soft mud, the sand being, as a rule, shifting and making shoals. It is therefore unsuitable for oyster cultivation, unless possibly in the vicinity of Sunbury. Along the shores are a series of natural oyster beds of the raccoon type, the total area of which is 49 acres. There are a few beds which do not ebb out and they show the oysters to be of a very superior quality, although the size of the oysters indicated that the beds are very much depleted by excessive fishing. At one place on this river the shore had changed so that the depth of 8 feet shown on the chart by the survey of 1857 is now dry at low water.

The specific gravity 2 miles above Sunbury is 1.0174; at Sunbury, 1.0182; at the mouth of Goulds, 1.0180; at the upper mouth of Cedar Creek, 1.0196; at the mouth of Medway River, 1.1020. The total area of the river 1 mile above Sunbury is 2,560 acres; that beyond 1,000 feet from shore is 1,660 acres. The area of natural oyster beds is 49 acres.

Cedar Creek is a small stream coming into St. Catherine's Sound on the southwest side. It extends in a westerly direction about 2½ miles, and has a depth of water ranging from 5 to 20 feet, and an average width of 200 yards. Along the shores are a series of scattered oyster beds, found on both sides, being almost a continuous streak. They are small and crowded together, and generally of the raccoon type. The bottom is hard and sticky along the shores and for a considerable distance along the channel, beyond which it is very soft.

The specific gravity of the mouth is 1.0196 at low water; at the lower mouth, 1.1021 at low water. The total area is 256 acres; beds of natural oysters, 23 acres.

North Newport River enters St. Catherine's Sound to the southward and westward. At its mouth it is 1½ miles wide, narrowing rapidly to a half, and then to a quarter of a mile, which is its average width. It flows almost entirely through the marsh for about 9 miles. It has an uneven bottom like Medway River, and the greater portion consists of sand and is subject to shifting during heavy seas. There are a few natural oysters along the shores, which is the most favorable bottom for the cultivation of oysters.

At half ebb the specific gravity at the mouth was 1.0197. The total area is 1,372 acres; area beyond 1,000 feet from shore, 528 acres. The current at the mouth of this river is from 1 to 1½ knots per hour.

The specific gravity of the water at the head, or 8 miles from the mouth, is 1.0193; at the mouth it is 1.0211.

Timmon's River is a tributary of North Newport River, into which it flows on its north side 2 miles from its mouth. It extends westward for 4 miles, and rejoins the North Newport River. It averages about one-fourth of a mile in width, and is entirely surrounded by marshes. The depth of the water ranges from 9 to 30 feet, there being frequent shoals extending out from the shores. The bottom is not liable to shift, however, and in the sticky portions will be found suitable ground for oyster cultivation. This, however, is a small area. Scattered along the shores are a series of small oyster beds and numerous dead shells. The total area of the river is 512 acres; that of natural oyster beds, 20 acres.

The specific gravity of the water at the mouth at one-half ebb was 1.0197.

Walburg Creek enters St. Catherine's Sound close to the north point of St. Catherine's Island. It has an average width of one-eighth of a mile. Its direction is southerly for 2 miles, then westerly for 2 miles, where it joins the North Newport River. The depth of water for a greater portion of this creek ranges from 10 to 20 feet. The bottom is soft mud, becoming a little sticky near the shores, along which is a streak of natural oyster beds of an inferior quality and small size. In the marshes there are some raccoon oysters.

The specific gravity at the mouth is 1.0240. The mean of 137 observations at the middle of Walburg Creek is 1.0222; the greatest density observed was 1.0250, the least was 1.0201. The strongest current observed was two knots per hour. The total area of the creek is 352 acres; that of natural oyster beds, 48 acres.

Johnson's Creek is a narrow stream about 5 miles in length, and connects North Newport and South Newport Rivers. It is the inside passage to Sapelo Sound, and separates St. Catherine's Island on the east from the marshes of the main land on the west. It has an average width of about 100 yards, and the depth ranges between 10 and 20 feet. There are several small beds of oysters scattered along the edges, and these partly ebb out. They are small and of an inferior quality. The character of the bottom varies from hard sand to soft mud, the latter prevailing.

The specific gravity at the upper mouth is 1.0211, and at the lower mouth, 1.0222. The total area of the creek is 310 acres. The area of natural oyster beds, 27 acres. The maximum current observed at the lower mouth was two knots per hour.

South Newport River enters Sapelo Sound on its northern side. It runs through marsh on both banks in a northwesterly direction for about 7 miles, where it joins with North Newport River. It has a width of 1¾ miles at its mouth, but narrows rapidly, and 2 miles above averages one-half mile. The depth of water ranges from 6 to 20 feet for about two-thirds of the area; the remaining portion being a series of shoals and shifting bottom, partly ebbing out at low water. The deeper portion of the river has a muddy bottom ranging from soft to hard and sticky. The shoals consist for the most part of sand.

The specific gravity of the water 5 miles above the mouth is 1.0192 at one-third flood; 2 miles above the mouth, 1.0222 at two-thirds flood. The total area is 2,300 acres; that beyond 1,000 feet from the shore, 622 acres. Area of natural oyster beds, 32 acres.

Wahoo River enters South Newport River at its mouth on the south side. It extends in a northwesterly direction for about 3 miles, averaging about 300 yards in width, and having a depth ranging from 6 to 20 feet. The bottom is hard and sticky along both shores, with an occasional sounding of soft mud. In the channel it is, for the most part, soft and unsuitable.

The specific gravity of the mouth at one-sixth flood is 1.0214; 2 miles above the mouth at one-third flood it is 1.0214. The total area of the river is 256 acres. Area of natural oyster beds is 20 acres.

Sapelo Sound separates St. Catherine's Island on the north from Black Beard and Sapelo Islands on the south. It is only 1 mile in width at its entrance, but extends inland to the westward about 4½ miles, with an average width of about 1½ miles. The main body of this sound is deep and the bottom hard, but the water is too salt for oyster culture.

Sapelo River is a prolongation of Sapelo Sound in a westerly direction. It is about 1 mile in width at its mouth, but soon narrows to one-half mile, which width it holds for 1½ miles to the entrance to Broro River. Beyond this it extends into the wooded country for about 15 miles. About two-thirds of the area has a depth less than 6 feet; the remaining portion ranging from 6 to 40 feet. The bottom for the most part is hard, both in the shoal and deep water. In the deep water from Broro River to Front River is the only part which is considered favorable for the cultivation of oysters.

The specific gravity of the water 1 mile from its mouth was 1.0214 at low water; at Broro River it was 1.0204 at one-third flood. The total area from its mouth to Broro River is 2,112 acres; the area beyond 1,000 feet from the shore is 677 acres. Area of natural oyster beds is 17 acres.

Barbour's Island River enters Sapelo Sound about 1 mile west of the mouth of South Newport River. This river was not examined, having been inadvertently overlooked, but from native oystermen it was learned that a few scattered oyster beds extended along near the shore, and that the bottom was generally soft mud.

Little Mud River enters Sapelo River on its north side, and is about 2 miles long, extending in the marshes in a northwesterly direction. It is about 400 yards wide for the first mile,

and 150 for the remaining. As the name indicates, the prevailing character of the bottom is soft mud, being a little sticky along the shores, where an extensive streak of natural oyster beds is found. The oysters are of an inferior type, and partly ebb out at low water.

The specific gravity at the head of the river was 1.0212 at two-thirds flood; 1 mile from the mouth it was 1.0216 at one-half flood. The total area of the river is 224 acres. Area of natural oyster beds is 22 acres.

Julienton River enters Sapelo River on the northern side 1½ miles to the westward of Barbour's Island River. It runs a crooked westerly course, has an average width of one-fourth of a mile for about 3 miles, this being the area examined. About two-thirds of the area has a depth of water ranging between 6 and 25 feet; the remaining area consists of many shoals of hard and shifting sand. The deeper water has a bottom of mud and sand, and is suitable for oyster culture. The natural oyster beds lie along the shores, and are about exterminated by excessive fishing.

The specific gravity of the water 2 miles above the mouth was 1.0204 at one-half flood. The total area of the river examined is 630 acres. Area of natural oyster beds, 14 acres.

Back and Front rivers are two small tributaries of the Sapelo River, coming into it from the southward on either side of Creighton Island. They are only about 2 miles long and 100 yards wide, having a depth ranging from 6 to 20 feet. In Back River there is a total area of natural oyster beds of 3.5 acres.

The specific gravity at the mouth, at one-third flood, was 1.0204; at 1 mile above the mouth, 1.0198 at one-third flood. The total area is 144 acres, of which the greater portion is unsuitable by reason of the soft bottom.

Front River has an area of natural oyster beds of 11.5 acres.

The specific gravity of the water 1 mile above the mouth was 1.0207, at two-thirds flood. Total area of the river is 230 acres, the greater portion of which is unsuitable by reason of the bottom being soft mud.

Mud River is a broad and shallow stream which enters Sapelo Sound from the southward, and separates Sapelo Island from the main land. For the first 2 miles it is about 1 mile in width. The bottom is almost entirely soft mud, and the only part suitable for oyster culture is a narrow strip along its bank adjacent to the wooded land of Sapelo Island. The marshy banks on both sides are lined with raccoon oysters.

The total area of the river is 2,430 acres; area beyond 1,000 feet from the shore, 1,250 acres. Area of natural oyster beds is 40 acres.

The specific gravity at the mouth, at low water, was 1.0209; 2 miles above mouth, at one-half flood, it was 1.0216.

New Tea Kettle Creek is a narrow winding stream of about 100 yards in width, having a general north and south direction, and connecting Mud River with Doboy Sound. It is about 4 miles in length, and runs through marshes its entire distance. The depth of water ranges from 9 to 24 feet. Hard and sticky mud prevails along the edges, while soft mud predominates in the middle of the creek. The sticky portion is suitable for oyster cultivation, and at intervals near the marshes can be found small areas of natural oyster beds.

The specific gravity 2 miles above the lower mouth was 1.0209 at high water. The specific gravity at the upper mouth was 1.0195. The total area is 190 acres. Area of natural oyster beds, 14 acres.

Old Tea Kettle Creek lies to the westward of New Tea Kettle Creek, and also connects the upper part of Mud River with Doboy Sound. It is about 4 miles in length, has a general northwesterly direction, and an average width of about 300 yards. About one-third of its area has a depth of water ranging between 6 and 20 feet; the remaining area being composed, for the most part, of sand shoals, and entirely unfit for the cultivation of oysters. The deep water has a bottom of mud more or less sticky. Several small beds of oysters are found along the edges, of an inferior grade, but suitable for planting purposes.

The specific gravity at the upper mouth is 1.0194; 1½ miles above the lower mouth, 1.0197. Total area of the creek is 608 acres. Total area of natural oyster beds, 25.5 acres.

Duplin River is the first tributary to Doboy Sound on the northward side, into which it empties 1½ mile to the westward of Sapelo Light-house. It is a small stream averaging about 150 yards in width, and extends some 5 miles to the northward in the marshes of Sapelo Island. The depth of water for nearly all of the river ranges between 6 and 20 feet. The prevailing character of the bottom is soft mud, with here and there patches of a small area of sticky bottom on which are a few scattered oysters extending to the edge of the mouth.

At low water the specific gravity at the head is 1.0187; at the mouth, 1.0191. The total area of the river is 355 acres. Area of natural oyster beds is 22 acres.

Doboy Sound separates Sapelo Island on the north from Wolf Island on the south. Extending in a northwesterly direction it is about 5 miles long, and averages about three-fourths of a mile in width. About two-thirds of the area of this sound has a depth of water ranging from 20 to 40 feet. A large volume of salt water enters and renders almost the entire area unsuitable for oyster culture. Along the shores are strips of oysters and dead shells.

Several hauls with a steam dredge were made in this sound between the mouth of Connegan River and Sapelo Light-house, and quite a number of star-fish were brought up in the dredge, which fact would of itself render the attempt to cultivate oysters here a useless undertaking.

Connegan River is a tributary of Doboy Sound. It extends through marshes to the southward about 3 miles, and joins North River by a small branch, thus receiving indirectly a portion of the fresh water from the Darien River. It is about one-fourth of a mile in width, and the depth ranges from 6 to 16 feet. The bottom is variable, but generally hard, and suitable for oyster culture.

The specific gravity 1½ miles above the mouth is 1.0164. The total area of the river is 616 acres. The area of natural oyster beds is 14 acres.

North River enters Doboy Sound on the north side of Doboy Island. It extends through marshes in a westerly direction for about 5 miles, where it joins a small creek connecting with the Darien River, by means of which it receives a small quantity of fresh water. It averages about one-fourth of a mile in width, and has a depth ranging between 8 and 20 feet. The character of the bottom is mud, about one-third of it being sufficiently hard or sticky to be utilized.

The specific gravity at the mouth, 1.0180; 1 mile above the mouth, 1.0171. The total area is 528 acres. Area of natural oyster beds is 7 acres.

Back River enters Doboy Sound on the south side of Commodore Island. It is about one-fourth of a mile in width, and bends northward and westward and thence southward, where it is joined by the mouth of Darien River. It is about 3 miles long, and runs entirely through marshes. The depth of water ranges from 8 to 20 feet. The character of the bottom is hard, being both hard mud and mud and sand, and is well adapted for the cultivation of oysters.

The specific gravity at the mouth is 1.0189; at the head it is 1.0171. At the village of Doboy the mean specific gravity, from thirty-five observations, was 1.0174; the maximum being 1.0212, the minimum, 1.0109. The total area of the river is 540 acres. The area of natural oyster beds is 28.5 acres. The maximum current observed at Doboy was 1.7 knots per hour.

Rockdedundy River is really one of the deltas of the Darien River. It is about one-fourth of a mile in width, runs entirely through marshes, and has a length of about 2 miles. There are several shoal spots in this river of less than 6 feet, and only about one-half of the area has a depth of more than 6 feet, and in that area the bottom is very uneven, ranging from 6 to 30 feet in depth.

At the mouth of this river there is an important natural oyster bed, covering about 5 acres. Samples of oysters taken here show the conditions favorable for a rapid growth. The oysters were not large, however, which is due to excessive fishing, and indicates that the bed is being fast depleted. The character of the bottom is favorable for the cultivation of oysters, except in the shoal places.

The specific gravity of the water at the mouth was 1.0170. Total area of the river, 350 acres. Area of natural oyster beds, 7.5 acres.

Darien River is considered unfit for the cultivation of oysters by reason of its waters being too fresh.

South River begins at the mouth of Rockdedundy River, and extends in an easterly direction along the north side of Wolf Island Marshes for a distance of 3 miles, where it empties into Doboy Sound. It has a depth of water ranging from 8 to 20 feet for the principal part of its area, and an average width of 200 yards. The bottom is generally favorable for the growth of oysters.

The specific gravity at its mouth is 1.0180; at its head, 1.0170. The total area of the river is 320 acres. Area of natural oyster beds is 20.5 acres.

(NOTE.)—*Wolf Creek and Beacon Creek*, both coming out of the marshes of Wolf Island, were not examined.

Little Mud River is the first tributary to Altamaha Sound on the north side. Extending to the northward about 2 miles and separating Wolf Island from Rockdedundy Island, it joins the mouth of Rockdedundy River. It has an average width of about 300 yards, disregarding the shoal at the mouth of the river. The depth of water ranges from 6 to 20 feet. The bottom is suitable for the growth of oysters, being for the most part hard and sticky mud with a little sand. The water in this river is liable to become very fresh when there is a rise in the Altamaha River.

The specific gravity 1 mile above the mouth, 1.0076; at the junction with Rockdedundy River, 1.0171. The total area is 321 acres. The area of natural oyster beds, 14.5 acres.

Samples of oysters from this river, taken from a small bed only recently discovered, were of a superior quality both in shape and size.

Altamaha Sound lies between Wolf Island on the north and Little St. Simon's Island on the south. It is about 2 miles wide at its entrance, but the sound is obstructed by a series of shoals and marsh islands, among which the narrow channels run most circuitously. Oysters will not grow in this sound higher up than 2 miles from the mouth, or from the western side of Egg Island to the mouth of the sound. The above area includes about 1,200 acres, of which one-half is beyond 1,000 feet from the shore. Natural oyster beds make out around the northern and eastern edges of Egg Island, and also along the shores north and south of Egg Island, extending to the ocean.

Making out from the northeast point of Little St. Simon's Island there is a narrow reef of oysters. This reef is formed along the side of the channel, and about one-half of its area is visible above low water. It averages about 60 yards in width, and extends into the ocean for about one statute mile. The oysters are all of an inferior quality, and those visible above low water are of the "raccoon" type, and at least three-fourths of the mass is composed of dead shells.

This reef is formed on hard sand bottom, and the continuous catch and growth of young oysters on it presents a remarkable phenomenon in the life of the oyster. The reef is directly exposed to the heavy northeast seas, and during a portion of the stage of flood tide it would seem natural to suppose the reef to be covered with entirely salt water. On the other hand, during a part of the ebb, the water over this reef must be very fresh, so fresh that fishermen tell me that they are able to drink it.

With the aid of a steam oyster dredge I was enabled to make a more extensive inspection of that portion of the bed which does not ebb out. It was about half-flood when we arrived on the bed, at which stage all the oysters were about covered with water. Put over the steam dredge and hauled along the edge of the oyster reef, bringing up principally dead oyster shells which were well covered with barnacles. The few live oysters found in the bulk were very poor in quality, but fair in shape and size. Four or five hauls were made successively along a distance of half a mile, and in bottom ranging from 7 to 20 feet. With these hauls three star-fish, of the kind so destructive to the oyster, were caught. The star-fish were full

grown, and among the shells brought up could be seen a number that had been killed apparently by the star-fish. From the appearance of other shells, there was evidence that the drum-fish had killed some of the oysters also. When these observations were made there was a fresh wind blowing from the northeast, and it was about one-half flood tide.

The density of the surface water was 1.0124, while at the bottom at the same point it was 1.0214. Had the density of the water been uniform at this place and contained more salt than that contained at the surface, it is believed that the star-fish would not have been found here. One of the live star-fish was afterwards placed in a bucket of the surface water, and after a period of 24 hours it was found to have died.

At low water the specific gravity of the water at the mouth was 1.0067; off the mouth of Little Mud River, 1.0012.

Hampton River connects with Buttermilk Sound on the east side and flows in an easterly and then in a southerly direction, separating St. Simon's and Little St. Simon's islands, and coming out on the coast 5 miles below the mouth of Altamaha Sound. It is about 12 miles in length, and the depth of water ranges from 8 to 40 feet. From the mouth it has an average width of 500 yards for the first three miles; it then gradually narrows to a width of about 150 yards.

The prevailing character of the bottom is sticky. There are a few sand shoals at intervals, but very little evidence of shifting bottom, and so far as concerns the character of the bottom this river is admirably adapted to the growth of oysters. At the head of this river there is considerable clay, which is more or less a deposit brought in from the Altamaha River. The natural oyster beds found in this river lie along the shores, and are generally of the "raccoon" type, being partly visible at low water.

The specific gravity at the mouth of Village Creek was 1.0215; 2 miles above Village Creek, 1.0167; 4 miles above, 1.0115; 5 miles above, 1.0109, and 7 miles above, 1.0037. These observations were taken at low water, and it will be observed that the water in the upper half is too fresh, or too liable to become so, to admit of the growing of oysters. This river has an area of 992 acres. Area of natural oyster beds, 3.25 acres.

Village Creek comes into Hampton River from the southward about 1½ miles above its mouth, winding through the marshes and separating Long Island from St. Simon's Island, and at its head connecting with a narrow and tortuous stream that flows southward between the two islands named, and enters the sea at the south end of Long Island.

This creek is about 4 miles long and 300 yards wide for the greater portion. There are a few shoal spots in it, but the depth of water for the most part ranges from 10 to 30 feet. The character of bottom ranges from soft mud to sticky mud, with occasionally a small area of hard sand. Scattered along here and there may be found a small area of natural oyster beds making out from the edges of the marsh. The oysters are poor and small—poor by reason of the high salt water, and small from being crowded together. The total area of the creek is 352 acres. Area of natural oyster beds, 7 acres.

At low water at the head of Village Creek the specific gravity was 1.0205; at its mouth, 1.0215.

Frederica River flows almost entirely through marshes in a southerly direction, separating St. Simon's Island from the main land, and, connecting with the fresh water of Buttermilk Sound, flows into St. Simon's Sound. It is quite crooked, and will not average more than 150 yards in width, except for 2 miles from the mouth; it has a depth ranging from 7 to 30 feet.

The water in this river is found to be entirely too fresh for the growing of oysters above a point 2 miles from its junction with Mackay's River. The bottom in this portion varies from soft and sticky mud to hard mud and sand.

The specific gravity at the lower mouth was 1.0145, the mean of five observations being 1.0157; the highest observed, 1.0184, and the lowest, 1.0130. The total area of the river is 752 acres, and that adapted to the growth of oysters about 250 acres. Area beyond 1,000 feet from the shore, 60 acres. Area of natural oyster beds, 14 acres. The maximum current observed at the mouth of this river was 1.4 knots per hour.

Mackay's River comes into St. Simon's Sound about 1 mile to the westward of Frederica River. Like Frederica River it flows through marshes, and connects Buttermilk Sound with St. Simon's. It is wider than Frederica River, but shoaler in places.

That part adapted to the growing of oysters extends from the lower mouth to about the junction with Back River. The character of the bottom in this river is favorable for the growing of oysters, being, for the most part, hard and sticky mud and clay.

The specific gravity at the mouth was 1.0211; 2 miles above the mouth, 1.0120, and 3 miles above the mouth, 1.0060. The total area of this river is 960 acres. Area adapted to the cultivation of oysters, about 300 acres. Area of natural oyster beds, 37.5 acres.

Back River enters St. Simon's Sound just to the southward of the mouth of Mackay's River. Taking a northerly course it is about 5 miles long and joins Mackay's River, being about one-fourth of a mile wide. It has a depth ranging from 6 to 30 feet. The character of the bottom for the greater portion is soft mud. There is some clay, probably a deposit, along the left bank near the mouth. In places there is a little sand and small area of sticky bottom.

The specific gravity at the mouth was 1.0211; 1 mile above the mouth, 1.0186; at the head, 1.014. The total area of the river is 800 acres. Area of natural oyster beds, 36 acres.

St. Simon's Sound lies between St. Simon's Island on the north, the marshes making off from the main land on the west, and Jekyl Island on the south. It is about 1 mile wide at the entrance, has a depth ranging from 5 to 10 fathoms, and therefore contains a large quantity of sea-water. The only part adapted to the growth of oysters is the area embraced within one-half mile from the mouths of Frederica and Mackay's rivers, the remaining area being too salt. This sound has a total area of 1,728 acres.

Brunswick River is the principal tributary to St. Simon's Sound, of which it appears as a prolongation to the southward and westward. It has an average width of about 1 mile for the first 2 miles, or to Brunswick Point, where it turns to the northward and narrows to three-fourths of a mile, holding that direction for 2½ miles to Buzzard's Island, where it divides into two branches, the main branch being called Turtle River; here it is joined by the other branch, about 1½ miles above Buzzard's Point.

The depth of water in Brunswick River ranges from 15 to 40 feet for about three-fourths of the area. The character of the bottom is hard sand, except near the shores, where it is generally soft or sticky. That portion of the river east of the upper mouth of Plantation Creek is considered too salt for the growth of oysters.

The mean specific gravity off the mouth of Jekyl Creek for eighteen observations was 1.0199; the maximum, 1.0212, and the minimum, 1.0184. The highest current observation was 1.8 knots per hour. The total area of the river is 5,088 acres. Area beyond 1,000 feet from shore, 2,450 acres. Area of natural oyster beds, 14 acres.

Turtle River begins at the southeast point of Buzzard's Island and extends in a northwesterly direction for about 7 miles, separating Blythe Island on the west from the main land on the east. For this distance it has an average width of one-half mile; it then narrows to one-fourth of a mile, bending to the westward. The depth of the greater portion of this river ranges between 12 and 40 feet, there being one or two extensive shoals. The character of the bottom is hard, being in some places of a silica formation. Along the shores there is a perceptible deposit. The area covered by the deeper water is considered favorable for the growing of oysters.

Specific gravity.—A series of observations were made off the City of Brunswick, with the following results: the mean of 177 specimens was 1.0196, the maximum being 1.0219, and the minimum 1.0185. The total area is 2,548 acres; area beyond 1,000 feet from shore, 882 acres. Area of natural oyster beds, 82 acres (including the areas of the natural beds in the small tributaries of Turtle River).

Colonel's Creek is a tributary of Brunswick River, into which it flows at the junction of Turtle River. It separates Colonel's Island on the south from Blythe Island on the north, being about 8 miles long, and averaging for the first half about 400 yards wide, and for the

remaining about 100 yards. The character of the bottom is variable, ranging from very soft mud to hard and sticky mud and hard sand. For the lower half the depth of water ranges from 8 to 30 feet for about two-thirds of the area, the remaining area being composed of sand shoals. It is only the hard and sticky portion in the deep water that is considered suitable for oyster cultivation. The total area of the bottom is 720 acres. Area of natural oyster beds is 30.5 acres.

At low water the specific gravity at the mouth was 1.0193; 2 miles above the mouth, 1.0192; 3 miles above the mouth, 1.0189.

Jointer's Creek connects with Brunswick River on the east side of Colonel's Island by several small branches, all narrow and crooked. The creek itself is nearly 4 miles long, flows in a southeasterly direction into Jekyl Sound, and has an average width of about one-third of a mile. About two-thirds of the area has a depth of water varying from 8 to 20 feet, in which the bottom is variable, soft mud prevailing. At some points, however, the bottom is hard, consisting of sand and mud, and is good oyster ground. The remaining area of this creek consists of shoals, partly bare at low water and unsuitable for the growth of oysters.

At low water the specific gravity near the head was 1.0201; at the mouth, 1.0207. Total area of the creek 1,040 acres. Area of natural oyster beds, 19 acres.

Jekyl Creek separates Jekyl Island on the east from the marshes on the west, and has a length of 3½ miles, running nearly north and south, and connects Brunswick River with Jekyl Sound. It has a width of about one-fourth of a mile, and the depth of water ranges from 6 to 20 feet for at least three-quarters of the area. The bottom consists principally of soft mud and is considered unfit for the growth of oysters except a narrow strip along the shores.

The specific gravity at the southern mouth was 1.0213; off the Club-House, 1.210; at the upper mouth, 1.0215. Total area of creek, 1,100 acres. There are a few scattered oysters along the edges of the marshes on either side.

Jekyl Sound is a branch of St. Andrew's Sound, lying to the northward and westward of it, and is about 2 miles long and 1 mile wide. The water in this sound is considered too salt for oyster propagation.

Little Satilla River comes into Jekyl Sound just south of Jointer's Creek, and has a width at its mouth of about one-half mile. The river soon becomes narrow and is filled with marshy islands and shoals. It has a general northwesterly direction, extending into the interior for a distance of about 30 miles, consequently during freshets there is a considerable amount of fresh water brought down. Only about one-quarter of the first 2 miles of this river has a depth of more than 6 feet. This area, however, ranging in depth from 6 to 20 feet, has a hard and sticky bottom and is suitable for the growth of oysters. Along the shores the bottom varies from soft mud to sticky mud. The total area of the first 3 miles is 1,650 acres. Area of natural oyster beds, 25 acres.

At low water the specific gravity at the mouth was 1.0213; 2 miles above the mouth, 1.0210; 3 miles above the mouth, 1.0200.

Umbrella Creek comes into Jekyl Sound just south of Little Satilla River. It is about 3 miles long and 200 yards wide, and winds through the marshes in a westerly direction. It has a depth from 10 to 20 feet, the bottom varying from soft to sticky mud, with occasional patches of hard bottom.

At low water the specific gravity at the mouth was 1.0219; 2 miles above the mouth, 1.0208. The total area of the creek is 272 acres. Area of natural oyster beds, 13 acres.

St. Andrew's Sound lies between Jekyl Island on the north and Little Cumberland Island on the south. Its entrance is 2 miles wide, and the sound extends inland southerly and westerly about 4 miles. The water is considered too salt and the bottom too much exposed to heavy seas to admit of oyster cultivation.

Satilla River comes into St. Andrew's Sound on its west side. Like the Altamaha, this is a fresh-water stream, taking its rise in the interior of the State. The first 3 miles of this river is the only part that need be considered, the water above this becoming too fresh. The river

has a width of about 1 mile for the above distance, and has a westerly direction, with marshes on both sides. It is broken up by extensive sand shoals, partly bare at low water, so there is about one-quarter of the above area available, and this part lies in water varying in depth from 6 to 30 feet, and has a bottom which is generally hard. Total area of first 3 miles, 2,560 acres; area beyond 1,000 feet from the shore, 1,296 acres; total area of natural oyster beds, 26 acres.

At low water the specific gravity at the mouth was 1.0226; 2 miles above the mouth, 1.0207; 4 miles above the mouth, 1,0187.

Cumberland River enters St. Andrew's Sound from the southward, separating Cumberland Island on the east from the marshes of the main land on the west. It has a general southerly direction, is about 5 miles long, and connects with Cumberland Sound. Beginning at a width of 1 mile at the mouth, it gradually diminishes to one-quarter of a mile at its junction with Cumberland Sound. The depth of water over three-quarters of this area ranges between 12 and 25 feet, and the character of the bottom varies from soft mud to hard mud and sand. The shoal portion consists of hard sand; in a few places soft mud deposits.

The deep water is generally considered suitable for oyster culture, and the oysters found along the shores, partly ebbing out, are of a superior flavor, and present a more healthy appearance than those from any other locality examined.

The specific gravity of the water in this sound was about uniform throughout. Off the mouth of Floyd's Creek the mean of thirty-four observations was 1.0229, the maximum being 1.0241, and the minimum, 1.0225. The total area of the entire river is 3,500 acres; area beyond 1,000 feet from the shore, 1,380 acres. Area of natural oyster beds, 92 acres. The maximum current observed was 1.5 knots.

Floyd's Creek is a tributary of the Cumberland Riyer, coming into it 2 miles above the mouth and extending in a westerly direction for about 4 miles, having a width of 200 yards, and a depth varying from 10 to 30 feet. It flows entirely through marshes, and the general character of the bottom is hard except along near the shores, where it varies from soft to sticky mud. This creek is considered well adapted to the growth of oysters.

The specific gravity at the head was 1.0217; 2 miles from the mouth, 1.0227; at the mouth, 1.232. The creek has a total area of 480 acres, and a total area of natural oyster beds of 13 acres.

Brick Hill River is a tributary of Cumberland River, into which it empties on the east side opposite the mouth of Floyd's Creek. It winds in a southerly direction entirely through marsh for about 6 miles, where it again connects with Cumberland River. For the first 3 miles it averages about 400 yards in width; beyond this it narrows to about 200 yards. The first 3 miles is considered suitable for the cultivation of oysters, the character of the bottom varying from soft mud to sticky mud, and the depth of water from 7 to 25 feet.

The specific gravity at the lower mouth was 1.0225; 3 miles above, 1.0217. The total area of the river is 512 acres. Area of natural oyster beds, 20 acres.

Mud Creek connects with Brick Hill River at its mouth, and is a small stream of about 100 yards in width and 2 miles long. It is deep, but the bottom is muddy and is not considered suitable. Along the edges is a narrow strip of natural oyster beds.

The specific gravity at the head was 1.0217. Total area, 160 acres. Area of natural oyster beds, 16 acres.

Cumberland Sound lies between Cumberland Island on the north and Amelia Island on the south, and extends to the northward and westward, separating Cumberland Island from the marshes of the main land. It is about 9 miles long, joins with Cumberland River, and is almost entirely surrounded by marshes. It is about 1 mile in width at the entrance and averages this distance for the first 4 miles. Beyond 2 miles from the entrance the sound becomes very shoal, with the exception of a narrow deep channel, which is the only area on which oysters may be cultivated The character of the bottom ranges from soft mud to hard sand with an occasional small area of clay. About one-fifth of the area of this sound has a depth ranging

from 10 to 36 feet, and about one-half of this area is suitable for the growth of oysters. Around the edges of the marshes are a series of natural oyster beds, the greater portion of which can be seen above low water.

The specific gravity at the head was 1.0225; off the mouth of King's Bay, 1.0231; off the mouth of St. Mary's River, 1.0233. The maximum current observed was 1.8 knots per hour. The sound has a total area of 3,904 acres, and the area beyond 1,000 feet from the shore, 1,248 acres. Total area of natural oyster beds, 80 acres.

Crooked River is a tributary of Cumberland Sound, into which it enters from the westward. It has several mouths flowing between marshy islands and joins Cumberland Sound at its junction with Cumberland River. Making to the westward for a distance of 30 or 40 miles it was found to be practically a fresh-water stream, and no part of it may be considered suitable for the cultivation of oysters. Scattered along the edges, at its mouth, are a series of small oyster beds, having a total area of 17 acres.

King's Bay is a branch of Cumberland Sound making off to the northward and westward, and about 1½ miles to the southward of Crooked River, with which it connects by several small branches. The bottom is soft and generally unsuitable for the cultivation of oysters. Total area of the bay is 512 acres. Area of natural oyster beds, 20 acres.

Specific gravity at the head is 1.0225; at the mouth, 1.0230.

St. Mary's River, forming the boundary between Georgia and Florida, takes its rise far back in the interior, and is a fresh-water stream. The area extending about 1 mile from the mouth is the only part adapted to the growth of oysters, by reason of freshets from this river. This portion, however, has a generally soft bottom. The width averages about one-fourth of a mile, and the depth of water ranges from 6 to 25 feet.

Specific gravity at the mouth was 1.0221.

GENERAL CONCLUSIONS.

DENSITIES.

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In making a study of the densities recorded, it will be found that the data is insufficient to draw definite conclusions or make comparisons with the densities observed in other States. Although the observations covered a period of five months, yet the phenomenally dry season—there being scarcely any rain-fall during the above period—has left us with a record of an extreme instead of a mean. That is to say, it may be safely inferred that no portion of the water examined will be likely to contain a larger percentage of salt than has been indicated by these density observations.

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As a rule, the specimens of water were taken from the surface. In the Vernon River a series of observations were taken every hour for twelve hours; first, to note the range of the density as the tide rose and fall; and second, to note the difference in density at the surface and bottom of the water at the same instant. This experiment was repeated in Walburg's Creek, at the mouth of the Altamaha Sound, and in Turtle River, near Brunswick.

As was natural to infer, after an inspection of the different bodies of water and a knowledge of the source from which the water was received, the rate of change for any twelve hours was very small for all but the Altamaha Sound, and likewise the difference in density at the top and bottom was inconsiderable and unimportant, except in the case of the Altamaha Sound.

While water having a density ranging from 1.0120 to 1.0200 is considered most desirable, the question arises, "How long will an oyster live in water absolutely salt or fresh?" As an instance coming under my personal observation, I mention the following: During the spawning season of 1889, this vessel was anchored in the harbor of Charleston, S. C., and several young oysters attached themselves to the rudder. I first observed them in September, 1889, when the vessel was hauled out for repairs. The shells of the oysters were then about the size of a silver half-dollar. In October the vessel went to sea for three days, bound for Savannah, Ga., being hove-to twelve hours in a gale of wind during the passage. After a fortnight she again

went to sea for two days, coming into Wassaw Sound. A month latter we were anchored for a week in Altamaha and Buttermilk Sounds, where the density of the water was 1.0001, and sometimes less, and the fishermen used the water for drinking purposes. In January, 1890, having occasion to haul the vessel out again, the oysters attached to the ship's rudder were removed. All of them were found to be alive, and all had grown since leaving Charleston. They were not fat, being a little dark and watery, but presented about the appearance of the average raccoon oyster.

In regard to the enemies of the oyster, the Georgia coast is not wanting in the star-fish, which has played such havoc with the cultivated beds in Connecticut, for they were found in the deep waters of Sapelo, Doboy, and St. Andrew's Sounds; also at the mouth of the Altamaha Sound. But none ~~were~~ found far from the ocean, nor over any part of the area which I have considered adapted to oyster culture.

In the sounds south of the Altamaha the drum-fish are very numerous.

On the southern shore of St. Catherine's Island, and on the shores at the mouth of the Satilla River, there are washed up a large quantity of dead oyster shells, and almost half of the shells have a small hole near the "eye" of the shell, which would rather indicate that the oyster had been killed by the drills.

In regard to the condition of the natural oyster beds of the State of Georgia, it was observed that there was a general depletion caused by excessive fishing, and that the nearer the market the more were the beds depleted. In fact, the area which I have indicated on the charts as natural oyster beds really include all that area where oysters have grown, and practically nothing but shells now remain; it also allows for a reasonable expansion of the beds. As a rule it includes all the raccoon oysters attached to the edge of the marshes, and in a few instances may include small areas which have been planted.

The recent oyster law of this State, which is appended to this report, does not require a knowledge of the location and area of the natural beds. It very properly permits any one to enter ground for private cultivation on any oyster bed which is not resorted to by the public for the procuring of oysters by the use of tongs for consumption or for sale. So few and so small are the oysters which now remain scattered along the shores that it would be to the interest of the State if its citizens were permitted to lease any area, the State selling to the highest bidder the now almost depleted oyster beds.

As a means of rapidly depleting the natural beds no more effective method could be instituted than the establishment of factories for the canning of oysters. These in the end will be of great benefit to the State, because the sooner the natural beds are depleted the sooner will the citizens engage in private cultivation, and enact laws that will give inducement to capital.

It is hardly within the province of my duties to comment upon the wisdom of the oyster law which went into effect on the first of last January. While it is a conservative measure, yet it must be admitted that the law is a good beginning, and already the people along the sea-coast are disposed to avail themselves of its inducement. Two companies have taken out leases for about 3,000 acres of ground, one near Savannah, and the other near Brunswick. Some of the most prominent business men in both localities, as well as the native tonger, have taken stock in the companies. There is only one feature in the oyster law which I take the liberty of bringing to the notice of the State authorities. That is the 1,000 feet limit. An inspection of the charts which accompany this report will show that for the most part the area between the shore and the 1,000 feet limit is too deep for oysters to be taken by the use of tongs, hence this area, if cultivated, must be done by steamers. No oyster grower can afford to use a steamer unless he has at least 500 acres of oyster ground. Therefore, if this ground is not cultivated in large farms by the use of steamers, it will not be cultivated at all.

In a table following may be found the total area examined in each locality, the area beyond 1,000 feet from the shore, and also the area of oyster beds.

It will be observed that these areas do not include those bodies of water which were partially examined and found unsuitable for oyster culture.

This table shows in round numbers that there are 70,000 acres which have been examined, and that an area of 18,000 acres is beyond the 1,000 feet limit; also, that the depleted oyster beds cover an area of 1,700 acres.

Of the 70,000 acres not more than 30,000 are considered suitable; and of the 18,000 beyond the 1,000 feet limit not more than 6,000 are considered suitable.

While the above area may appear small, it nevertheless represents ground for the investment of a large amount of capital and the employment of many people.

Under the present law the 30,000 acres, if leased, would turn into the State school fund $30,000, and after having been reduced to cultivation, at no expense to the State, its taxable property would have increased by $3,000,000.

Respectfully submitted,

JAMES C. DRAKE,

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STATE OF GEORGIA.

TABLE OF AREAS EXAMINED WITH REFERENCE TO OYSTER CULTURE.

LOCALITY.	Acres. Total.	Outside 1,000 feet Limit.	Natural Oyster beds.
Wilmington River, from Thunderbolt to mouth	2,116	460	8.0
Herb River	160		11.0
Skiddaway River, from Isle of Hope to mouth	450		12.0
Grimball's Creek	54		3.0
Turner's Creek, from Wilmington River to Tybee River	192		10.0
Tybee Cut, from Wilmington River to Half Moon River	145		10.0
Tybee River, from St. Augustine Creek to mouth	900	28	39.0
Shad River	350		
Lazaretto Creek, from Tybee River to Savannah River	256		19.0
Oyster Creek	180		1.75
Half Moon River	360		7.50
Wassaw Sound	3,550		
Tybee Creek	368		
Little Tybee Creek	170		
Romerly Marsh Creek and Tributaries	256		10.0
Old Romerly Marsh Channel	120		
Back River, from Cedar Hammock to junction with Burnside River	224		7.0
Burnside River, from Skiddaway Narrows to Vernon River	352		10.5
Vernon River, from Montgomery to Ossabaw Sound	1,728	1,080	20.0
Little Ogeechee River, from Rosedue Island to Vernon River	1,100	120	7.0
Harvey's Creek	250		
Crooked Creek	160		
Delegal Creek	246		22.5
Ogeechee River, from Harvey's Cut to mouth	2,420	1,800	38.5
Charles Creek	160		
Wassaw Creek	130		17.0
Adams' Creek	256		8.0
Odingsell River	350		34.5
Bradley's Creek	128		8.5
Florida Passage, from Ogeechee River to Bear River	320		
Red Bird Creek	112		2.5
Queen Bess Creek	48		
Cane Patch Creek	144		
Buck Head Creek	96		
Bear River, from Buck Head Creek to mouth	1,424	740	81.5
Big Tom Creek	100		
Kilkenny and Cabbage Creeks	352		10.5
Medway River	2,560	1,660	49.0
Cedar Creek	256		23.0
Walburg Creek	352		48.0
Vandyke Creek	256		
Timmons River, from its upper to lower mouth	512		20.0
North Newport River, from South Newport to its mouth	1,372	528	43.0
Johnson's Creek	310		37.0
Newell's Creek			33.0
South Newport River, from North Newport to its mouth	2,300	622	32.0
Little Mud River	320		14.5
Altamaha Sound, from Egg Island	1,280	767	131.0
Hampton River	992		33.5
Village Creek	352		7.0
Black Bank River and Postell's Creek	194		5.0
Frederica River	752	60	14.0
Mackay's River	960		37.5
Back River	800		36.0
Little River	156		8.0
Brunswick River	5,088	2,456	14.0
Turtle River	2,548	882	82.0
Cowper's Creek	136		11.5
Colonel's Creek	712		30.5
Buffalo River	375		9.0
Gilson's Creek	104		4.0
Plantation Creek	180		
Little Satilla River and Jekyl Sound	2,930	1,376	25.0
Jekyl Creek	1,100		
Umbrella Creek	272		13.0
Satilla River	2,560	1,296	26.0
Terrapin Creek	128		1.0

TABLE OF AREAS EXAMINED WITH REFERENCE TO OYSTER CULTURE—CONTINUED.

LOCALITY.	ACRES.		
	Total.	Outside 1,000 feet Limit.	Natural Oyster beds.
Cumberland River	3,520	1,380	92.0
Floyd's Creek	480	.....	13.0
Wahoo River	256	.....	20.0
Little Mud River	224	.....	22.0
Barbour's Island River	592	.....	15.5
Julienton River, from Broro River to mouth	630	.....	14.0
Broro River, from upper to lower mouth	205	.....	.....
Mollclark River	230	.....	6.0
Back River	144	.....	3.5
Sapelo River, from Back River to mouth	2,112	677	17.0
Front River	230	.....	11.5
Mud River, from Creighton Island to mouth	2,432	1,256	40.5
New Teakettle Creek, from Mud River to Old Teakettle Creek	190	.....	14.0
Duplin River	355	.....	22.0
Old Teakettle Creek	608	.....	25.5
Dark Creek	96	.....	.....
Atwood River	208	.....	2.5
Hudson River	160	.....	2.5
Connegan River	660	.....	14.0
North River, from Buzzard's Roost Creek	540	.....	28.5
Rockdedundy River, from Darien River to Back River	350	.....	7.5
South River	320	.....	20.5
Wolf Creek	144	.....	.....
Beacon Creek	176	.....	.....
Brick Hill River	512	.....	20.0
Mud Creek	164	.....	16.0
Shellbine Creek	160	.....	1.0
Delaroche Creek	64	.....	1.0
Cumberland Sound	3,904	1,248	80.0
Crooked River	512	.....	17.0
King's Bay	544	.....	20.0
St. Mary's River	384	.....	12.0
Summations	70,690	18,436	1,756.8

STATE OF GEORGIA.

RESOLUTION AUTHORIZING THE APPOINTMENT OF AN OYSTER COMMISSION.

On September 29th, 1889, the Legislature of Georgia passed a resolution authorizing the Governor to appoint an Oyster Commission.

[Copy of resolution.]

A resolution authorizing the Governor to appoint an Oyster Commission.

"*Resolved by the Senate, the House concurring*, That the Governor be, and he is hereby, authorized and empowered to appoint a Commission consisting of (3) three citizens of this State, who are familiar with the oyster growth and interests of this State, and who have no immediate interest therein, to investigate and report to the next General Assembly of this State, what changes, if any, are desirable or necessary in the laws of this State governing the same."

STATE OF GEORGIA.

AN ACT FOR THE REGULATION AND PROTECTION OF OYSTER CULTURE.

An Act to repeal Section 1618 of the Code of 1882, providing in what manner oysters may be taken, and providing forfeitures for unlawful taking thereof; also, to repeal Section 1619 of said Code, providing proceedings for violation of said Section 1618 of the Code; also, to repeal Section 1621 of the Code, giving exclusive rights to oyster privileges to certain land owners; also, to repeal Section 1623 of the Code so far as it applies to penalties for violation of Section 1621 of the Code; also, to repeal Section 1621 (c) of said Code, providing a penalty for disturb-

ing oyster beds; also, to repeal the Act of 1873, approved February 20th, 1873, entitled An Act to encourage the oyster business in this State, and providing that the Mayor and City Council of Savannah, Brunswick, St. Mary's, and Darien, may make rules and regulations to encourage and protect the people of this State in making oyster beds and propagating oysters, and giving said cities jurisdiction over the waters within their limits, and in the counties within which said cities are located; and in lieu and place thereof, substituting An Act providing in what manner, at what seasons, and for what purposes, oysters may be caught in the State of Georgia, the method and lease of public domain within the State of Georgia for oyster planting, propagation, and cultivation, the revenue to be paid therefor, the penalties for violation of this act, and for other purposes therein mentioned.

SECTION 1. *Be it enacted by the General Assembly of the State of Georgia, and it is hereby enacted by the authority of the same*, That Section 1618 of the Code of 1882, providing in what manner oysters may be taken, and providing forfeitures for the unlawful taking thereof; Section 1619, providing proceedings for violations of said Section 1618 of the Code; Section 1621 of said Code, giving exclusive rights to oyster privileges to certain land owners; Section 1623 of said Code, so far as it applies to penalties for violations of said Section 1621 of the Code; Section 1621 (c) providing a penalty for disturbing oyster beds; and the Act of 1873, approved February 20th, 1873, entitled "An Act to encourage the oyster business in this State," and providing that the Mayor and City Council of Savannah, Brunswick, St. Mary's, and Darien, may make rules and regulations to encourage the people in this State in making oyster beds and propagating oysters, and giving said cities jurisdiction over the waters within their limits and in the counties within which said cities are located, be, as to each of said sections of the Code, and as to the Act of 1873, in this section described, and the same are hereby repealed.

SECTION 2. *Be it further enacted by the authority aforesaid*, That it shall not be lawful to pick, tong, dredge, or in any other manner take or catch oysters from any of the waters of this State, except from private beds, from the first of May to the thirty-first of August, inclusive, of each and every year, except for the purpose of replanting the same in the waters of this State; nor shall it be lawful for oysters to be taken for any purpose during any season, from one hour after sunset on Saturdays until one hour before sunrise on the succeeding Mondays.

SECTION 3. *Be it further enacted by the authority of the same*, That it shall not be lawful to "rough" take or catch oysters from any of the public beds within the waters of this State, unless the same shall be culled over the beds from which they may be taken, except when the weather is such as to render it dangerous to remain at the beds; provided that the terms of this section shall not apply to the taking of oysters for the purpose of replanting the same in any of the waters of this State.

SECTION 4. *Be it further enacted by the authority aforesaid*, That it shall not be lawful to take or catch any oysters in any of the waters of this State with or by a scoop, rake, drag, or dredge, or by the use of any other instrument than the oyster tongs heretofore in general use for taking oysters, except within the waters more than 1,000 feet distant from the shore at ordinary mean low tide, provided that oysters may be taken by any means or device from any private bed, by the owner or lessee thereof, and for the purpose of transplating to other beds in this State, from territory unleased within said limits of 1,000 feet, but in the last case only upon the consent and approval of the County Commissioners within which said territory may be located, or upon the consent and approval of the Ordinary for those counties which have no Board of County Commissioners, which consent shall be given in all cases in which application is made for the purpose of transplanting oysters to other beds within the waters of this State, from such beds as are not resorted to by the citizens of this State, for the purpose of procuring oysters for consumption or for sale.

SECTION 5. *Be it further enacted by the authority aforesaid*, That any person violating any or either of the three foregoing sections of this Act, shall, upon conviction, be deemed guilty of a misdemeanor, and shall be punished in accordance with Section 4310 of the Code of 1882.

SECTION 6. *Be it further enacted by the authority aforesaid*, That when oyster banks, or beds of oysters of natural formation, be within rivers or creeks of this State, not exceeding 130 feet in width at ordinary mean low tide, and not used for purposes of navigation, the person or owners having the ownership of the land on both sides of such creeks or rivers shall have the exclusive right to the usufruct of such banks or beds of oysters as aforesaid; *provided, however*, that the rights of opposite riparian owners or proprietors shall only extend to the middle of the stream.

SECTION 7. *Be it further enacted by the authority aforesaid*, That the County Commissioners in each of said counties, or where there is no Board of County Commissioners, then the Ordinary for said county, upon the application of any person for certain territory in any of the navigable waters of this State, and within a distance of 1,000 feet from the shore at ordinary mean low tide, upon satisfactory proof, on hearing had before the County Commissioners or Ordinary, that such territory has been duly staked off at the time of ordinary mean low tide, for a period of thirty days before the hearing of such application, shall execute a lease for twenty years, with a privilege of renewal for thirty years more, to such applicant as may first apply for such territory not already appropriated, where there are no natural public beds which have prior to the application been resorted to by the public for the purpose of procuring oysters with the use of tongs for consumption or sale; *provided, however*, that any person who has already planted any ground within said county shall have the preference in obtaining a lease of such grounds, and upon the application of any other person for said territory, the proper authorities for executing such leases shall give thirty days notice of such application, by posting a notice at the court house door, and if the person who has planted oysters thereon shall make application therefor, before the expiration of said thirty days, it shall be leased to him, but otherwise to the aforesaid applicant; *provided*, that the provisions of this section shall not apply to oyster beds staked out under laws heretofore existing; nor to territory within 120 feet of the line of ordinary mean low tide, in front of, and adjoining habitable highlands returned for taxation.

SECTION 8. *Be it further enacted by the authority aforesaid*, That said leases shall convey the exclusive privileges of bedding or planting oysters thereon to the distance of 1,000 feet beyond mean low-water mark; and within such limits each applicant shall be entitled to not more than five acres of such territory, which need not be continuous, but within such allotment such lessee shall not be entitled to more than two planting places, and provided that such lessee deposits at least one hundred bushels of dead shells, or plants one hundred bushels of oysters to every acre of planting ground, at the rate of one acre or more each year, until the five acres have been planted; *and provided also*, that he cause to be placed at intervals of one hundred yards along the line of ordinary mean low tide of such planting ground, a post not less than eleven feet in height, and board attached, the latter not less than one foot square, upon which a black letter, not less than eight inches long, has been plainly painted on a white ground; *provided also*, that along navigable streams, subject to entry under this Act, the right of no lessee of a five-acre tract under this Act herein provided for, shall extend beyond the middle of the stream; *provided further*, that said lessee shall have no authority to sublet or to assign his lease until after the expiration of five years from the date of his entry thereunder; *and provided further*, that in the event the said lessee shall fail to comply with the requirement of this section as to the cultivation of this territory, he shall forfeit so much of said territory as has not been cultivated as hereinbefore required, and if said lessee shall at any time during the term of his lease, abandon said territory, and cease to cultivate oysters thereon for the space of one year, said lease shall be void, and the territory shall revert to the State.

SECTION 9. *Be it further enacted by the authority aforesaid*, That upon the application of any person or persons made to the County Commissioners of the county within which said territory may be situated, or where there are no County Commissioners, then to the Ordinary for said county, for territory within the navigable waters of this State, for which no applica-

tion has already been duly made, and which is located more than 1,000 feet distant from any shore line at ordinary mean low tide, upon which to cultivate oysters, or propagate the same by artificial methods, which said application shall particularly describe the territory desired, said County Commissioners or said Ordinary, shall require the applicant to advertise in the newspaper which is the official paper of the county in which the said territory is located, for thirty days, a notice of said application, particularly describing the territory desired, and its location in reference to the nearest lands and upon the expiration of said advertisement the said County Commissioners or said Ordinary shall, unless satisfactory proof is made to them, on a hearing duly had, that said territory prior to the filing of said application has been resorted to by the public for the purpose of procuring oysters by the use of tongs for consumption or sale, grant, in the name of, and in behalf of the State, to such person or persons, by written instrument, a lease of such territory for fifty years, for the purpose of cultivating and propagating oysters; and thereupon the person or persons to whom the same may be leased shall, under the direction of the County Surveyor, distinctly stake or buoy the same, and shall cause a survey of said territory to be made and placed on file in the office of the Clerk of the Superior Court for record with said lease; *provided*, that no applicant shall be entitled to receive from said authority a lease for more than five hundred acres within said waters; *and provided further*, that the planting, cultivating, and dredging of oysters therein shall in nowise interfere with navigation.

SECTION 10. *Be it further enacted by the authority aforesaid*, That each person applying for and receiving a lease of five hundred acres or less under Section 9 of this Act, shall plant at least one-tenth of said leased territory, at the rate of not less than one hundred bushels of oysters or shells per acre in each and every year, beginning with the planting season next after a lease therefor has been executed; and for a failure thereof, the lessee of said territory shall forfeit to the State so much of said territory as is not so cultivated as prescribed by this section; and if said lessee shall at any time during the term of his lease, abandon said territory and cease to cultivate oysters thereon for one year, said lease shall be void, and said territory revert to the State. Oysters shall not be taken from said territory for sale or for consumption until at least one year after oysters or shells have been planted thereon.

SECTION 11. *Be it further enacted by the authority aforesaid.* That all leases under the provisions of this Act, and all transfers thereof shall be recorded by the person or persons to whom such leases or transfers are made in the office of the Clerk of the Superior Court, in like manner as deeds of real estate are required to be recorded, in a separate book to be kept for that purpose, but no lessee of tracts larger than five acres shall be authorized to sublet or assign his lease, or any portion of the territory conveyed thereby, until he shall have reduced to cultivation at least one-tenth of the territory leased by him.

SECTION 12. *Be it further enacted by the authority aforesaid*, That for all the leases provided for by this Act the person or persons to whom such leases are made shall pay to the proper authority making such leases the sum of one dollar for each and every acre so leased, and all the money so paid shall be appropriated to the school fund of the State, and in addition to said sum a fee of fifty cents for leases of five-acre tracts or less; and for all leases of territory beyond said limit of 1,000 feet, a fee of two and a half per cent., estimated upon the amount paid for the territory thus leased, shall be paid to the authority making the lease.

SECTION 13. *Be it further enacted by the authority aforesaid*, That the application and leases hereinbefore provided for shall be in like manner and form as shall be approved by the Attorney General of this State.

SECTION 14. *Be it further enacted by the authority aforesaid*, That it shall not be lawful without authority from the owner or owners for any person to take or catch any oysters from any private bed, nor to remove nor deface any oyster marks; and any person violating this section shall, upon conviction, be deemed guilty of a misdemeanor and punished as prescribed in Section 4310 of the Code.

SECTION 15. *Be it further enacted by the authority aforesaid*, That the lessees of all such leased territory shall return the same for State and county taxation in the same manner as other property is returned.

SECTION 16. *Be it further enacted by the authority aforesaid*, That no provision of this Act shall be so construed as to in any manner, during the open season herein provided, abridge or interfere with the rights of any citizen of this State, to enter upon and take from any public beds oysters by the use of such implements as may have been heretofore in general use in this State; *and provided further*, that no provisions of this Act shall be so construed as to interfere with or abridge the wharfing privileges of riparian owners; *and provided further*, that it shall not be lawful for any applicant for territory upon which to replant oysters to receive a lease for any of the beds or planting grounds of the natural oyster beds which are resorted to by the public for the purpose of procuring oysters by the use of tongs for consumption or sale.

SECTION 17. *Be it further enacted by the authority aforesaid*, That this Act shall go into effect on the first day of January, 1890.

SECTION 18. *Be it further enacted by the authority aforesaid*, That all laws and parts of laws in conflict with this Act be and the same are hereby repealed.

Approved September 19, 1889.

J. B. GORDON, *Governor.*

[FORM OF APPLICATION FOR OYSTER GROUND.]

STATE OF GEORGIA, }
COUNTY OF ..... }

TO THE HONORABLE COMMISSIONERS OF ROADS AND REVENUES

FOR SAID ..... COUNTY.

The application and petition of ..... shows that ..... desires to, and does apply for a lease of ..... acres of OYSTER LANDS under the waters of the State of Georgia, in pursuance of An Act of the General Assembly of the State of Georgia, entitled, "An Act to repeal Section 1618 of the Code of 1882, providing in what manner oysters may be taken, and providing forfeitures for unlawful taking thereof; also, to repeal Section 1619 of said Code, providing proceedings for violations of said Section 1618 of the Code; also to repeal Section 1621 of the Code, giving exclusive rights to oyster privileges to certain land owners; also to repeal Section 1623 of the Code, so far as it applies to penalties for violation of Section 1621 of the Code; also to repeal Section 1621 ("C") of said Code, providing a penalty for disturbing oyster beds; also to repeal the Act of 1873, approved February 20th, 1873, entitled, "An Act to encourage the oyster business in this State, and providing that the Mayor and City Council of Savannah, Brunswick, St. Mary's and Darien may make rules and regulations to encourage and protect the people of this State in making oyster beds and propagating oysters, and giving said cities jurisdiction over the waters within their limits, and in the counties within which the said cities are located, and in lieu and place thereof of substituting an Act providing in what manner, at what seasons, and for what purposes oysters may be caught in the State of Georgia; the method of lease of public domain within the State of Georgia for oyster planting, propagation and cultivation; the revenue to be paid therefor; the penalties for violation of this Act, and for other purposes therein mentioned, approved the 19th day of September, 1889. Said land herein applied for located and described as follows, to wit:

.....

.....

.....

and being ..... 1,000 feet from the shore at ordinary mean low tide, and petitioners will ever pray.

This ..... day of ....., 18 .

OFFICE COMMISSIONERS OF ROADS AND REVENUES.

..... County, Georgia, ... of ....., 18 .

The foregoing application having been duly filed, and notice thereof published in accordance with the laws of this State, and it appearing that there is no good and sufficient reason why the same should not be granted, it is ordered that a lease do issue to said applicant in terms of the law, the title of which is recited in said application.

Chairman Commissioners Roads and Revenues.

..... *County, Georgia.*

[Form of Indorsement of Application for Oyster Ground.]

APPLICATION

FOR

OYSTER GROUND

OF

.....

.....

Filed in Office Commissioners of Roads and Revenues,

this ..... *day of* ....., *18* .

....., *Clerk.*

PROJECTION No. 1.

PROJECTION No. 2.

OSSABAW SOUND

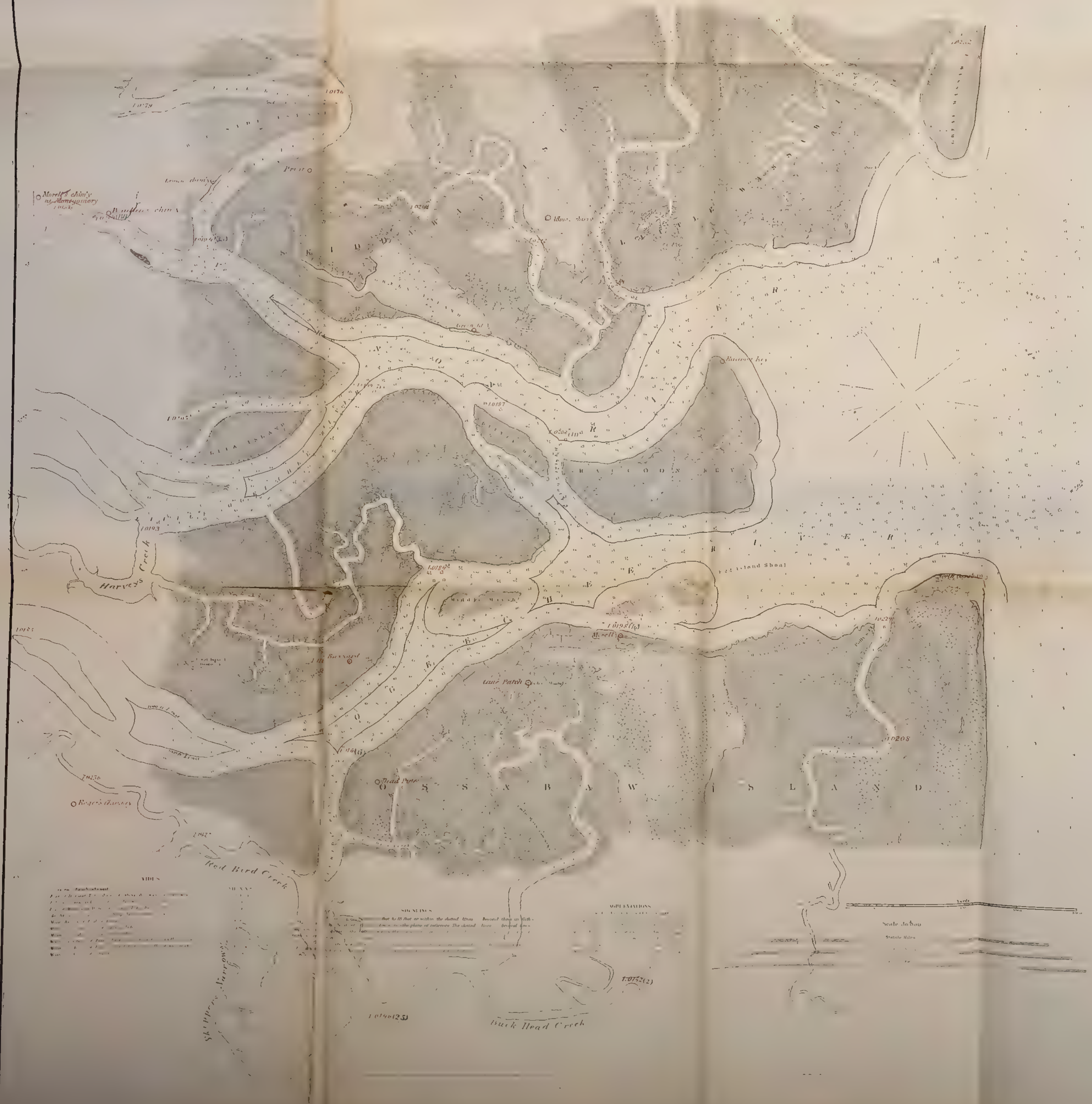
VERNON AND OGEECHEE RIVERS

GEORGIA

CHART TO ACCOMPANY REPORT ON OYSTER SURVEY.

As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.,
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready

Position of Oyster Beds shown in green.
Density of Water shown in red.
Number of Density Observations at one point, shown in blue.
The 1000-ft. line from shore shown in black.



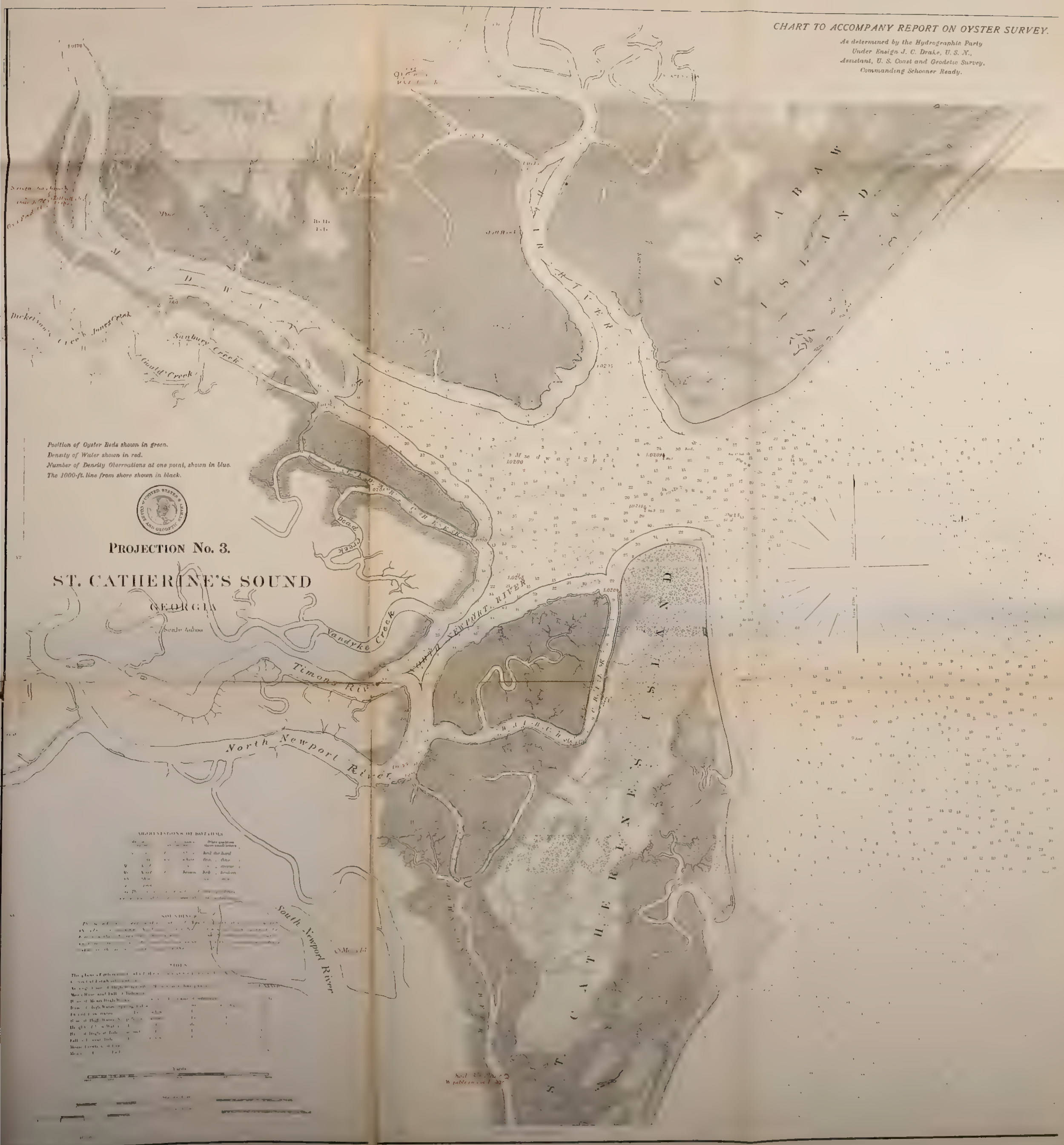


CHART TO ACCOMPANY REPORT ON OYSTER SURVEY.
As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.,
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready.
Position of Oyster Beds shown in green.
Density of Water shown in red.
Number of Density Observations at one point, shown in blue.
The 1000-ft. line from shore shown in black.
PROJECTION No. 3.
ST. CATHERINE'S SOUND
GEORGIA
Dickerson's Creek
Jones Creek
Sunbury Creek
Gould Creek
Dead Creek
Vandyke Creek
Timons River
North Newport River
South Newport River
NEWPORT RIVER
OSSABAW ISLAND
ST. CATHERINE'S ISLAND
Midway Sprit
ABBREVIATIONS OF BOTTOMS
SOUNDINGS
TIDES

PROJECTION No. 4.

CHART TO ACCOMPANY REPORT ON OYSTER SURVEY

As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready

SAPELO SOUND

GEORGIA

Position of Oyster Beds shown in green.
Tensity of Water shown in red
Number of Density Observations at one point, shown in blue.
The 1000-ft. line from shore shown in black.

Scale 1:20000


CHART TO ACCOMPANY REPORT ON OYSTER SURVEY.
As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.,
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready.
PROJECTION No. 5.
DOBOY AND ALTAMAHA SOUNDS
GEORGIA
Position of Oyster Beds shown in green
Density of Water shown in red.
Number of Density Observations at one point, shown in blue.
The 1000-ft. line from shore shown in black
SAPELO
ISLAND
DARIEN
GENERAL'S ISLAND
ROCKDEDUNDY
ISLAND
BROUGHTON ISLAND
ALTAMAHA SOUND
LITTLE ST. SIMONS ISLAND
ST. SIMONS ISLAND
TIDES
ABBREVIATIONS

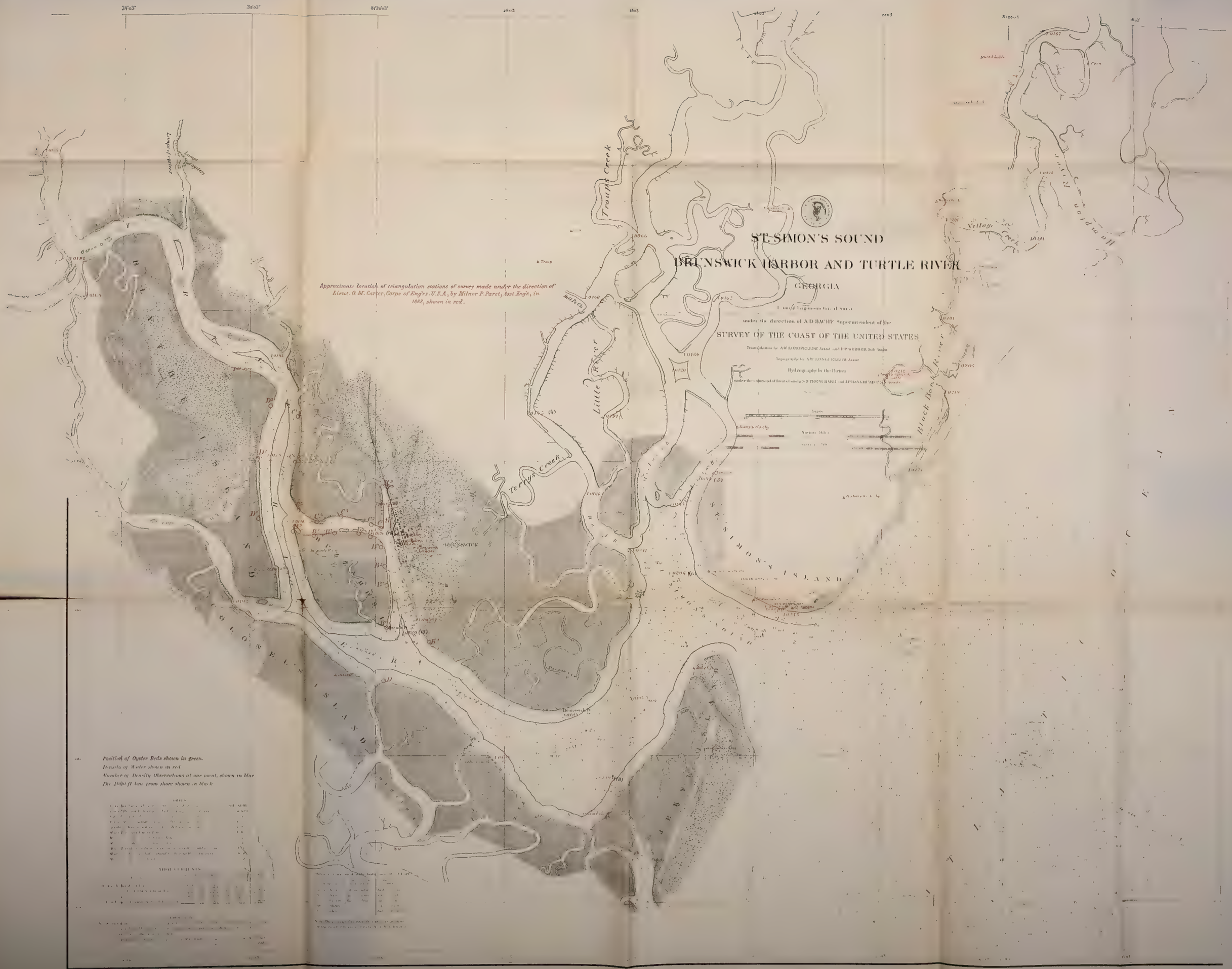


CHART TO ACCOMPANY REPORT ON OYSTER SURVEY.

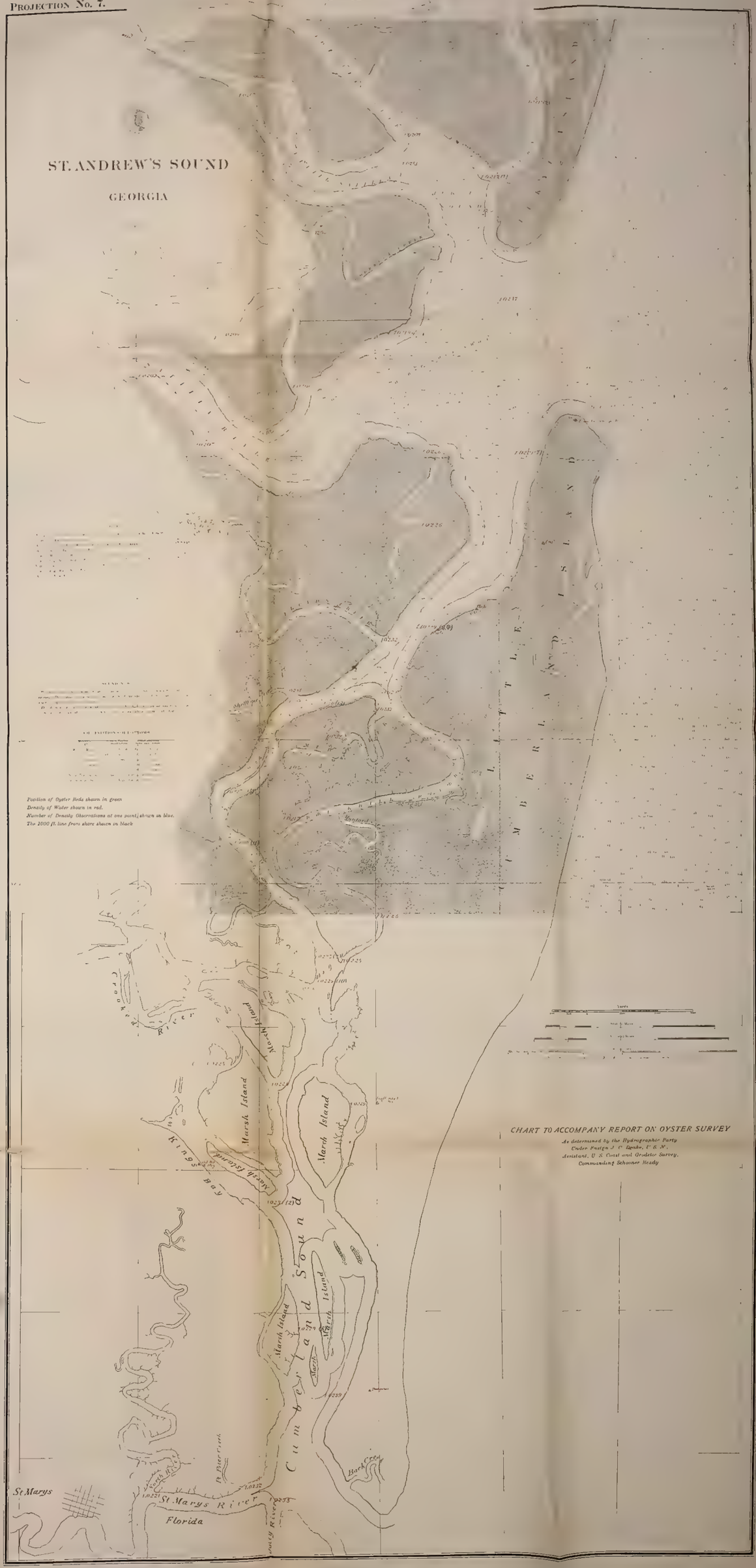
As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready

PROJECTION No. 6.

(St Simon's Sound)

U S C & G S

PROJECTION No. 7.



Position of Oyster Beds shown in green
Density of Water shown in red.
Number of Density Observations at one point shown in blue.
The 1000 ft. line from shore shown in black

CHART TO ACCOMPANY REPORT ON OYSTER SURVEY

As determined by the Hydrographic Party
Under Ensign J. C. Drake, U. S. N.,
Assistant, U. S. Coast and Geodetic Survey,
Commanding Schooner Ready

On sounds and estuaries of Georgia with reference to oyster culture 1890

STAPLES

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