

5.—NOTES ON THE OYSTER INDUSTRY OF NEW JERSEY.

PREFATORY NOTE.

The oyster is the most important product of the United States fisheries, and its collection, cultivation, and sale constitute the most extensive fishery industry of the country. In a number of States the oyster has greater economic value than all other water products combined. Oyster fishing and oyster cultivation have received fully as much attention from the general public as any other subject connected with the American fisheries, but it was only at a comparatively recent date that some of the States most vitally interested in the preservation and increase of the oyster supply realized the importance of dealing with the subject in the light of modern experiment and experience.

The Commission, through its several divisions, has aimed to keep well informed regarding the status, methods, and relations of the oyster industry in every region, and has, from time to time, published numerous reports on the subject to meet the very active demand for oyster literature in every part of the country.

The great diversity of the physical conditions of the extensive tidal areas in which the oyster exists, and the extreme variations in the legislative enactments for the protection, regulation, and encouragement of the oyster industry, occasion a greater multiplicity of methods of capture and cultivation than is found in any other fishery industry, and necessitate the institution of special studies in each State in order to thoroughly cover the subject.

The present report deals with a State whose oyster interests are inferior in value only to those of Maryland, New York, and Virginia. The great extent of the oyster business of the State is alone sufficient to warrant the detailed consideration which is accorded it in the present paper. It has been many years since an attempt was made to present in one paper an approximately complete account of the subject. The changes which have ensued since 1880, the year to which the last report relates, have in some instances been marked, and render the present discussion opportune in view of the great attention now being bestowed on the oyster industry in the Middle Atlantic States. It is probable that very few persons in New Jersey appreciate the large interests depending on the State oyster supply and the enormous annual income from this source.

The methods and conditions here observed are, in some respects, dissimilar to those of any other State, and there are many phases of the subject which afford suggestive information of great value to other States, not only to those in which the artificial production of oysters has recently been taken up, but those in which successful cultivation has long been practiced.

The paper has been prepared by Mr. Ansley Hall, field agent in the Division of Statistics and Methods of the Fisheries, and is based entirely on original inquiries conducted by him in 1892. In the course of his work he visited every part of the State having an oyster fishery, and made a careful study of the conditions and methods in each locality, giving special attention to the methods of planting and cultivation.

The oyster industry of the State is here considered by geographical divisions. In each bay, river, county, or center, as the case may be, the subject is discussed with the fullness which the extent of the business warrants. Detailed statistics covering the years 1889 to 1892 are presented. Mr. Hall's inquiries show that, in 1892, 4,351 persons were directly engaged in the oyster industry of the State; \$1,593,892 was invested; and 1,097,228 bushels of marketable oysters were taken, the value of which was \$1,220,878.

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INTRODUCTORY.

The system of oyster-culture practiced in New Jersey does not embrace any artificial methods for the reproduction of oysters from the spat or egg. The seed oysters are derived chiefly from the natural beds. These areas are gradually becoming less productive, and in order to supply the demand considerable quantities of oysters for planting are purchased annually from other States.

The depleted condition of the beds in some sections of the State has become more apparent recently, and the great question is how to restore their original productiveness. The only care that has ever been bestowed upon them was such as could be secured by certain forms of restrictive legislation. The principal regulations imposed were provisions for close seasons and for culling.

In the State of Rhode Island, when the oyster-planting industry was established, the waters abounded in rich natural oyster beds; but protective legislation failed of its purpose, and the beds have finally become almost wholly depleted, and the planters have for many years past purchased their seed elsewhere, chiefly from the State of Connecticut. The natural oyster beds of New Jersey are yet far from being wholly depleted, but that some better methods should be adopted for their care is plainly evident.

If the natural beds are to be restored to their original productive condition, it is scarcely reasonable to assume that it can be accomplished with less expense or by less effective methods than would be necessary to achieve like results upon private areas. The practice of planting shells or other suitable materials on private beds is being operated successfully in Connecticut by planters engaged in the business of seed-growing. If it is practicable for the State to inaugurate a system whereby the same methods, aided by proper culling and close-time regulations, can be faithfully applied to the public grounds, there seems to be no reason why equally good results might not be obtained.

In New Jersey the natural oyster-grounds have always been carefully exempted from private ownership, and any system of oyster cultivation involving proprietary rights in them has been unfavorably regarded. The planters have succeeded in acquiring a legal right to

hold non-producing areas, for the purpose of planting oysters, as against the individual citizen, but not as against the State; and even this advantage has, in some sections, been gained in the face of strenuous opposition.

The following notes are not intended to deal with every phase of the oyster industry of the State, but relate chiefly to the planting and cultivating business, and to the methods and conditions under which it is conducted in the more important localities. The tabulated statistics apply to the years 1889, 1890, 1891, and 1892.

I.—THE NORTHERN COAST OF NEW JERSEY.

That part of New Jersey lying within or west of Sandy Hook maintains an oyster industry of great extent. The importance of the business is owing to the valuable planting-grounds which exist off the shores of this part of the State, to the favorable conditions, and to the proximity of New York, Brooklyn, Jersey City, and other large cities which furnish a constant market. The industry is centered in the cities of Perth Amboy and Keyport, and in the Navesink and Shrewsbury rivers.

HUDSON AND UNION COUNTIES.

These counties, bordering on Newark Bay and the upper part of Staten Island Sound, have no oyster-cultivating industry, but are quite extensively interested in the taking of oysters from the natural grounds. The gathering of the small native oysters found in the waters named is participated in by citizens of Middlesex and other counties as well as by those of Hudson and Union counties, and constitutes an important business, furnishing employment to a large number of persons, most of whom are not otherwise engaged in the oyster industry.

In these waters oysters were formerly very abundant. The crop derived from these grounds in 1892 by citizens of New Jersey was, approximately, 100,000 bushels, and was worth about \$60,000. The product is almost wholly utilized as seed by the planters of New Jersey and other States. For a number of years considerable quantities of small-sized oysters from this section have been purchased by New York dealers for shipment to San Francisco, to be planted chiefly in San Francisco Bay.

PERTH AMBOY.

Perth Amboy, in Middlesex County, is the most northerly point in New Jersey where the oyster-planting industry is systematically conducted. The town has about 10,000 inhabitants, and is situated on Staten Island Sound, about one-fourth of a mile from its southern entrance, and on the north side of the Raritan River, which empties into Raritan Bay. Oyster-planting was begun in this locality about fifty years ago. The business is not now as extensive as it was in former years, but is still of considerable importance.

The planting-grounds.—The grounds in the vicinity of Perth Amboy used for oyster-planting are located at the southern extremity of Staten Island Sound, in the head waters of Raritan Bay, and comprise an area of about 300 acres, more or less, lying off Ferry Point, and extending from the point in a S.E. by S. direction to Great Beds Light. The general shape of the grounds is oblong, narrowing somewhat as they approach the light. The length is about a mile and the average width a little less than half a mile. The average depth of water is about 5 feet. The grounds have various kinds of bottom. In some places it consists of hard mud, made so by a substratum or intermixture of sand; on others the mud seems to predominate and the bottom is softer, while others have a natural shell bottom where, at some time in the remote past, there have undoubtedly been natural oyster beds. This natural shell bottom is considered superior to any other for oyster cultivation, and is correspondingly valuable.

In addition to these grounds, the oystermen occupy limited areas (probably 50 acres) in New York waters, lying off the shores of Staten Island, between Ward Point and Princess Bay light. These grounds are long and narrow, have a hard bottom, with an average depth of water of about 6 feet, and are used for transplanting oysters preparatory to being taken up for market.

It must not be understood that the entire area above described is planted, or has oysters on it every year; some tracts of bottom are more desirable than others, and are used in preference, while the whole is considered available.

Planting methods.—Each planter divides and stakes off his planting grounds into rectangular sections or lots of various sizes, governed in number by the necessities of his business, and also to some extent by his individual opinions as to the most advantageous arrangement of them. The number therefore varies somewhat with different planters, but usually four, five, or more lots are necessary. The reason for this division is that when a lot is planted with small oysters it is customary to allow them to lie undisturbed until they have reached a stage of maturity sufficient for commercial purposes, when they are shifted to another lot to remain one season, or from early spring to September, before being taken up for market. Hence it is necessary to have a number of lots in order to afford space for planting and transplanting or shifting each season.

The growing period, which intervenes between the first planting and final shifting of the oysters, is ordinarily three years, but is not strictly confined to that length of time. It depends upon the size of the seed when planted, the rate of growth, and, within certain limits, the option of the planter. If the seed is large it will require less time to mature. If the quality of the ground is good the rate of growth is more rapid. The longer the oysters are allowed to grow the greater will be the proportion of box (large) oysters among them, and the crop will consequently yield larger returns. The more prosperous planters therefore

frequently extend the period of growth in order to achieve the most profitable results, while others find it necessary to market their oysters as soon as practicable.

A planter requires to have at least one lot, and generally more, reserved as a shifting-ground. The work of shifting the oysters begins about March 1, or as soon after as the weather permits, and is completed between that time and July 1. It consists in taking up the oysters intended for shipment in the fall, and which have grown to marketable size on soft-bottom grounds where they were originally planted, and transplanting them to hard bottom. While the oysterman is not, as a rule, guided by scientific knowledge, he has learned by experience to proceed to a certain extent on scientific principles. He may not know anything of the diatoms, desmids, or other microscopic forms of life found usually in greater abundance upon mud flats, or what is in his vernacular termed "soft bottom," than on sand or gravel (hard bottom), but has developed by actual experiment the fact that the oyster grows faster and does better there than elsewhere. The shifting to hard bottom also proves beneficial to the oyster by freeing it from mud or other extraneous substances, improving its color and possibly its flavor, and giving an opportunity for separating the clusters, when necessary, into single oysters. On the whole, it seems to be a requisite part of the process of perfecting the condition of the oyster for market.

After the oysters have been shifted, the grounds from which they are taken are again planted with seed. The supply of seed is obtained principally from the natural beds in the Raritan River, which extend from the railroad bridge connecting Perth Amboy and South Amboy for a distance of about 5 miles up the river to Sayreville. The oystermen begin taking seed oysters as soon as practicable in the spring and continue until the close of the season. The work is resumed in the fall when the season opens. The natural beds being in close proximity to the cultivated ones, the oystermen sell their catch to the planters, carry it to the grounds, and plant it directly from their skiffs. Seed oysters are also obtained from Staten Island Sound.

Personnel, wages, etc.—The labor in connection with the oyster-planting industry, which is comprised in the planting of seed oysters in spring and fall, the transplanting or shifting of mature oysters in early spring, and taking them up for market after September 1, and various other work incidental to the business, is performed by the oystermen of the neighborhood at the rate of \$2.50 per day for each man, including his oyster skiff, tongs, etc. Nearly every man who engages with any degree of regularity in the oyster fishery owns a skiff and one or more pairs of oyster tongs. The planters also have from one to three skiffs and a number of pairs of tongs each, and if at times it is necessary to hire a man who is not so provided, and furnish him, the rate of wages is \$2 per day. There are 220 men in the locality engaged in the oyster fishery, 16 of whom are planters, and the remaining 204 are

hired for a portion of the year to work on the cultivated grounds. They also engage in taking seed oysters from the natural beds, and a few of them fish for clams. At other times of the year they find employment in various occupations on shore. They are all American-born citizens and residents of the State.

Preparation of the oysters for market.—The season for taking up the oysters from the shifting-grounds for market begins September 1. The work is usually completed by December 1. After the oysters are caught and culled they are placed on board small sloop-rigged vessels, which the planters own for the purpose of transporting their products, and carried to Rahway River, where they are put in floats and allowed to remain in the brackish water at the entrance of the river during one tide, when they are again loaded on the decks of the vessels and taken to New York. This process is termed "drinking" the oysters. The object of drinking is to give them an opportunity to "spit out" the sand that may have found lodgment in the folds of their gills, and also to bloat them, which temporarily improves their appearance and makes them open to better advantage, their flesh being whitened and size slightly increased. When they arrive in New York they are counted and graded into two sizes, and sold to the wholesale dealers by the thousand. The larger size is termed "box" oysters and the smaller "cullens." The box oysters sell usually for \$7 and the cullens for \$3.50 per thousand.

The greater part of the oysters are marketed in this manner, but limited quantities are shipped in barrels by rail or steamboat when it is not convenient to transport them in vessels or their destination is other than New York, which is the principal market for the planters of this section.

KEYPORT.

This town, with a population of about 3,500, is located on Raritan Bay, in Monmouth County. It is more extensively interested in the oyster industry than any other place in the State outside of Delaware Bay. The oyster-planting operations of the entire section east of Perth Amboy center here, and the important grounds lying off this part of the State are utilized by Keyport planters.

The oyster-grounds.—A survey made in 1886, by George Cooper, a civil engineer of Red Bank, showed the area of the grounds devoted to oyster cultivation in Princess Bay to be $2\frac{1}{2}$ square miles, or 1,600 acres. The remainder of the waters of the bay inside of Sandy Hook (outside of Shrewsbury River bar) belonging to New Jersey form the great field of operations for the extensive clam fisheries centering at Keyport, Port Monmouth, and other localities in the vicinity, and comprise an area of $37\frac{1}{4}$ square miles, or 23,840 acres. A comparatively small proportion, therefore, of the entire area of bottom ($39\frac{3}{4}$ square miles, or 25,440 acres) within these limits is utilized for the cultivation of oysters, although it is thought that the larger part is well adapted to oyster-planting.

There has been considerable friction, however, between the oyster-planters and the clam fishermen relative to the acquirement and holding of grounds for planting purposes. The clam fishermen, refusing to recognize the right of the planters to the possession of bottom for private enterprise, have at various times trespassed upon the cultivated beds under the pretext of taking clams, and numerous cases of litigation have ensued, which have usually terminated in favor of the oystermen. Out of these difficulties grew the necessity for the organization and incorporation of what is known as the Oystermen's Protective Association. This association maintains a watch-boat, with a crew of two men, whose duty it is to patrol the locality where oysters are planted and report to the members of the association any person who may be found trespassing upon the grounds. There is also a watch-house, where one man is stationed for a similar purpose. The expense and difficulty of securing protection in the prosecution of the industry has doubtless, in some degree, retarded its progress.

The planting-grounds are located directly opposite the town and within a short distance of the shore. The depth of the water varies from 2 to 16 feet. The central and northeasterly sections consist of mud or soft bottom, while the marginal portions have hard bottom. The soft bottom is utilized for planting small seed oysters and the hard bottom for the large oysters from southern waters, and also as transplanting-grounds for oysters that have been matured on soft bottom.

Planting methods.—Each planter designates the boundaries of his grounds by stakes, which usually serve to identify them, but if the stakes are carried away by storms or ice, or are hidden by high tides, ranges are resorted to as a sure method of determining their location. They are divided into lots in a manner similar to that already described for Perth Amboy. When oysters are being planted or transplanted, these lots are subdivided and staked off in small squares as an assistance to the planter in distributing the proper quantities on the ground. This system of planting lacks the element of completeness practiced by agriculturists. The farmer measures both the seed and the ground on which it is to be sown, and distributes a specific number of bushels to the acre. The oysterman decides the question by the eye. He may possibly know the number of bushels of seed he intends to plant, but generally he does not know the number of acres of ground on which it is to be planted. When the oysters have been planted, the small stakes which have been used for subdividing the lots into squares are removed.

Both native and southern oysters are used for seed. The native oysters are chiefly from the natural beds in the Raritan River, Newark Bay, and Staten Island Sound (Arthur Kill). These are termed "hard oysters," and cost on an average 50 cents per bushel. They are planted on soft bottom in deep water, where they lie from two to three years before being shifted to hard bottom. They usually require a considerable amount of culling when shifted, before being replanted. This the

oystermen term "handling." The dead oysters and shells are removed and the clusters separated. After remaining on hard bottom one season they are taken up for market. It is estimated that not more than one-fourth of the entire quantity of seed used are native oysters. The remaining three fourths are from the Chesapeake Bay region, from points in Maryland and Virginia. Large quantities of them come from Hampton Bar and the Rappahannock and James rivers, the Choptank River, Tangier Sound, etc. They are designated by the general term "Virginias." A part of these oysters is the product of the natural beds of the Chesapeake, but large quantities come from cultivated beds where they have grown to maturity. They vary in price from 20 cents to 60 cents per bushel, according to size and quality. In addition to the cost of the oysters, the planter is also at an expense of about \$300 per each vessel load, of perhaps 2,500 bushels, for transportation, and about \$48 for unloading them from the vessel and planting them on the beds. The transporting vessels are sent south for oysters early in March, and the planting is completed in April. The large "Virginias" are planted directly on hard bottom, whence they are taken up for market the same season without being shifted.

Natural enemies of the oyster.—The only important natural enemies to the oysters in recent years have been drills, winkles, and occasionally crabs, but the loss from these causes has not been great. Fifteen or twenty years ago considerable trouble was experienced from the depredations of fish. The drumfish was the most troublesome species. It is said that they became so abundant at times as to destroy whole beds of oysters. Means were resorted to for frightening them away. One method was to anchor buoys over the beds and attach to them a line with a shingle at the end of it and a weight, either a brick or stone, to carry it to the bottom. The shingle swayed to and fro with the motion of the water, and served to scare the drumfish away. This was called "shingling" the beds. But for the past few years no serious destruction by drumfish has occurred.

Persons, compensation, and lay.—The number of persons engaged in the oyster-planting industry at Keyport, exclusive of crews on vessels, is 112. There are 23 proprietors or oyster-planters and 89 men who are employed by them at daily wages. Of the 23 planters, 11 are occupied largely with work on shore pertaining to the business, and may be classed as shoresmen, and the remaining 12 engage in the practical labor of tonging oysters. The men are all American citizens, 92 white and 20 colored. The colored men come chiefly from Virginia.

The rate of wages paid by the planters is \$2 per day to each man, whether engaged in tonging oysters on the beds or "drinking" them in the creek (for the same men do both), or any other work necessary in preparing the products for market. The planters furnish skiffs, tongs, and all apparatus. When employed planting southern oysters ("Virginias") it is customary to pay each man \$3 per day, and usually

about 16 men are required to unload each cargo from the transporting vessel.

The dredging vessels are hired with their crews at \$7 per day for sail vessels and \$25 per day for steamers. If it becomes necessary for the men to work overtime, as is not infrequently the case, in order to have the oysters ready at the proper time to fill the buyers' order, they receive extra pay, and thus amicable relations are maintained between employers and employes.

The average length of time which the planting business in all its branches is estimated to afford employment each year is about six months.

The oyster boats.—The boats in use are of two kinds, designated, respectively, as skiffs and scows. The skiffs are used as tonging boats and the scows in the various processes of handling the oysters after they are taken from the beds, either for carrying them ashore from the grounds or in connection with operations in the creek.

The oyster skiff is a style of row boat different from that used in any other branch of the fisheries, and is designed especially to meet the needs of the oyster business. It is clinker-built, has a square stern, rounding sides, with moderate sheer, raking stem and stern, and flat bottom. The bottom is about 18 inches wide amidships, and converges with a gradual curve fore and aft, coming to a point at the stem and stern. The object of the flat bottom is for convenience in hauling the boat on the beach, in order that it may be handled easily and lie without listing. The timbers are of white oak and the planking is cedar. The length is 26 feet over all and 22 feet on the bottom. The width is 6 feet. A smaller skiff is also used, being 21 feet long over all, 18 feet on the bottom, and 5 feet wide. The skiffs are ceiled on the inside with white pine, to make a smooth surface for shoveling oysters. The cost of the larger size when new is about \$140, and of the smaller size from \$100 to \$120. The larger size has two thwarts forward of the ceiling and is used as a double skiff, while the smaller size has only one thwart and is used as a single skiff.

The scows are square-ended and very strongly built. They are usually 40 feet in length with a depth of 2 feet inside. The width outside is 8 feet 4 inches on top, and 8 feet on the bottom. The sides and bottom are constructed of white-pine planks and the ends of white oak. The thickness of the sides is $3\frac{1}{2}$ inches at the top and $4\frac{1}{2}$ at the bottom; that of the ends is 2 inches and of the bottom about 4 inches. A keelson, 8 inches high and 5 inches wide, runs through the center, and not only adds strength to the scow, but also forms a partition, which may be used for keeping different grades of oysters separate from each other. At each end there is a platform 4 feet wide, flush with the top. The scows cost when new about \$140 each. They are propelled either by being sculled with an oar or pushed with an oar or pole. The average value of skiffs and scows, new and old together, is estimated to be not more than \$75.

Taking oysters up for market.—The oysters are taken up for market chiefly with tongs. The planters own the tongs, skiffs, scows, and all other apparatus necessary to the fishing operations, and furnish them to the men they hire. Some of the skiffs are operated by one man and others by two. Those having one man are termed single skiffs, and those having two, double skiffs. Sails are not used on the skiffs, as the grounds are near at hand and rowing is more convenient. When the oysters become so scattering that the men can not secure a good day's catch with the tongs, dredging vessels are brought into requisition to (as the oystermen term it) "clean up the beds," that is, to catch the remainder of the oysters on them. Some of the vessels are propelled by sails and others by steam. They are not owned by the planters, but are hired, with their crews, by the day. On the sail vessels the dredges are hauled by hand, one dredge to each man, except in one or two instances, where small winches or "winders" are used. Hauling dredges by hand is extremely laborious, but is more speedy than with hand winders, and is therefore preferred. On the steam vessels a steam winch is used for hauling the dredges. The oysters taken with dredges are brought ashore in scows, but the skiffs land their own catch. Dredging vessels in this region, being owned by men frequently not otherwise interested in the oyster business, and making a specialty of dredging oysters, are not necessarily confined in their operations to any particular locality, but find employment wherever it can be obtained. Their services are usually required for only a short time in the fall.

Preparing the oysters for market.—The oyster-planters have their shore houses or shops for storing implements, such as tongs, baskets, forks, shovels, barrels, etc., located on either side of a small winding stream, designated on the charts of the U. S. Coast Survey as Middletown Creek. This creek is used as a place for drinking the oysters, and is claimed to be exceptionally well adapted for that purpose. Its banks are supported by a perpendicular bulkhead constructed of planks and piling. The bottom of the creek, on both sides, is divided into lots by a row of stakes in the center, which also serve to subdivide the lots into small squares to accommodate different grades of oysters, and each planter either owns or hires a lot in front of the shop he occupies.

When the oysters are brought in from the grounds they are first culled and graded into box oysters, cullens, and cullentines. They are then put overboard in the creek to "drink," the several grades being kept separate by placing them in different squares. This is usually done at slack high water, and they are allowed to remain overboard until low water. Experiments have frequently been made in drinking the oysters at other times of tide, but slack high water is, as a rule, believed to yield the most satisfactory results.

The reason for drinking the oysters at this particular time of tide rests upon the theory that, while it is requisite for them to have fresh or slightly brackish water, it would be injurious to bring them in contact with it too abruptly. At low tide the water of the creek is as fresh

as that of any other fresh-water stream. As the tide rises the fresh and salt waters mingle with each other and become brackish at first, but gradually more salt as the tide continues to flow and force back the fresh water until it slacks. Its density is then but slightly lessened by the influence of the fresh water of the creek. The ebbing tide reverses the order of these conditions. The greatest degree of saltness possible to the water in the creek attains at full flood tide, and as the tide ebbs the salinity of the water diminishes. This diminution is supposed to be rendered more gradual by the salt water, on account of its greater specific gravity, remaining at the bottom.

High water is, therefore, considered to be the most favorable time for drinking the oysters, as it not only removes the danger possibly consequent upon introducing them too suddenly into fresh water, but also facilitates their drinking. They might be placed in the water two or three hours sooner, but the only effect would be to lengthen the time they would have to remain there, which is not generally thought necessary. As no floats are used, and the oysters are spread directly on the bottom, they can not be taken up conveniently until low water. The depth of water in the creek does not then average more than 10 or 12 inches, and sometimes less, during neap tides. The men go into the creek with rubber boots on and take the oysters up with forks and put them in baskets. The time of day for doing the work in the creek is governed by the tide and also the time when the oysters are to be shipped. It frequently happens when shipments are to be made early in the morning that the oysters are given a drink during the night. Whether they drink as copiously in the night as in the day may not have been definitely determined, but that they do so to a degree sufficient to freshen their flavor, and in other respects answer the purpose for which drinking is intended, there is no doubt.

Marketing the oysters.—The season for shipping the oysters opens about the 1st of June and closes in November. During the months of June, July, and August shipments are made regularly to the various seaside resorts along the coasts south of Sandy Hook. This "summer trade," as it is termed, has been steadily increasing and has reached considerable proportions, but does not, even through these months, equal the trade with New York. The oysters are put in barrels and shipped by rail to points along the coast, while those for the New York market are sent in baskets by the regular steamboat plying between Keyport and New York, or in bulk on the transporting vessels. After the hotels close in September the oysters are all sold in New York.

The "box oysters" and "cullens" are sold by count, and range in price from \$7 to \$7.50 per thousand for boxes, and \$3 to \$3.50 per thousand for cullens. The "cullentines," which are the smallest oysters sold, are not counted, but are usually disposed of at about 50 cents per bushel. When the oysters are sold without being assorted into different grades, as is sometimes the case, they are said to be "rough-culled." The usual price for "rough-culled" oysters is \$1 per bushel.

NAVESINK AND SHREWSBURY RIVERS.

Shrewsbury River is the general name frequently applied to the two rivers designated on the charts of the U. S. Coast Survey as the Navesink and Shrewsbury rivers, which empty their waters by a common outlet into Sandy Hook Bay. The Navesink, or northern branch, is known locally as the Shrewsbury, or North Shrewsbury, and the Shrewsbury, or southern branch, as the South Shrewsbury. Oyster cultivation is carried on in both rivers, but more extensively in the Navesink or northern branch.

Planting-grounds.—The extent of the planted area in these rivers can not be definitely stated. In the Navesink the beds are located on both sides of the river, and frequently reach across it, from the railroad bridge at Red Bank (immediately above the town) to Claypit Creek, just below Oceanic, a distance of about 4 miles. It is not probable that more than 400 acres are utilized for oyster-planting. In the South Shrewsbury the planting-grounds lie in the vicinity of Little Silver, Oceanport, and Branchport, and also in the locality known as Pleasure Bay, a small indentation below Branchport. Their extent is small, and the oyster business is conducted on a comparatively limited scale.

The bottom in both branches of the river is usually soft mud, and is in some localities covered with eelgrass. Near the banks of the river, where there is more sand, the bottom is harder than it is farther off in the bed of the stream, but the water is usually shallow. The softness of the bottom is one of the greatest difficulties with which the planters have to contend, as the oysters are liable to become submerged with mud. There are no natural oyster beds.

Oyster-planting.—The season for planting oysters corresponds with that in other localities already discussed, but the methods of cultivation vary in accordance with the natural conditions of the bottom. The scarcity of hard bottom, in sufficient depth of water to allow the oysters to remain safely through the winter, precludes the practicability of planting large quantities of seed oysters; consequently the greater part of the oysters have to be of marketable size, or nearly so, when planted. On the Navesink there is only one firm of planters who use small seed extensively; the others, without exception, buy large oysters and plant them in the spring and take them up for market in the fall. The planters claim that very little and perhaps nothing is gained in quantity by the growth of the oysters; that while they increase in size individually a great many of them die, and the increase from the one cause does not more than offset the loss from the other.

When small oysters are planted they are generally allowed to lie three years, and are then shifted to hard bottom, which is found only in narrow strips near the banks of the river in shoal water. This is done in the spring, and in the fall of the same year they are taken up for market.

A part of the oysters for planting are uncultured stock from the natural

beds in the Hudson River, and are termed "North river roughs." They usually cost about 15 cents per bushel, and consist of oysters and shells together. The proportion of oysters to the entire quantity of oysters and shells is estimated to be not more than one-fourth. Large oysters are obtained quite generally from South Amboy, where they have lain two years on the cultivated beds, and cost from 50 cents to 90 cents per bushel; the general price is 86 cents per bushel, which includes the cost of transportation and planting. It is not now customary to plant Chesapeake Bay oysters in the Navesink. In the South Shrewsbury they are used quite extensively. "North river roughs" are also used. During recent years there has been a set of spat on the beds, which has to some extent reduced the necessity of obtaining seed elsewhere. At Pleasure Bay, however, Chesapeake oysters are planted regularly every year; this is believed by the oystermen of Little Silver and Oceanport to be the cause of the set of spat on the various artificial oyster beds in the river. An opinion prevails among them that the spawn of the southern oysters is more liable to fixation than that of the native oysters from the Hudson or Raritan rivers.

Mr. George B. Snyder, of Fair Haven, is authority for the statement that a set of spat occurred in the Navesink in 1869, when a load of Chesapeake oysters was planted there.

Enemies of the oyster.—The principal enemies of the oysters are the borers, hard-shell crabs, and the toadfish or oyster-fish (*Batrachus tau*), which is known locally among the oystermen as the "sally growler," a name applied to it probably on account of the savage disposition which it exhibits if molested while guarding its young. The borers are especially destructive to the young oysters. They do more or less damage every year, but occasion great loss some seasons. The crabs and toadfish undermine or burrow holes in the hard bottom into which the oysters drop and are smothered. Aside from these causes there is generally no serious loss, except such as may ensue at times in consequence of freshets of water washing the mud over the beds. Great care has to be exercised to select locations for planting-grounds that will not be too much exposed to alluvial deposits.

Another menacing feature, arising from natural conditions, which endangers the life of the oyster in the Navesink, is pointed out by Prof. Julius Nelson in the bulletin of the New Jersey Experiment Station of April, 1889. He says:

In the upper part of the river in July a sort of fermentation of the bottom takes place by which a poisonous scum is produced that kills the oyster. One planter at the head of the tidal area lost \$10,000 worth through this cause, combined with the coming on of a freshet of water. This "fermentation" needs more careful study. It is probably not all due to simple decay of vegetation, though that in itself is a process due to the action of living germs, and thus a biological phenomenon.

The condition above referred to probably occurred in 1888. It is said by the oystermen to be present in the river not oftener than once in eight or ten years, and is believed by them to be precipitated by

heavy freshets of water during the warm weather in the latter part of July.

An aquatic mowing-machine.—Eelgrass grows abundantly in some parts of the Navesink River, and, as in other localities where it is found, acquires in due time full possession of the areas where it grows, rendering them useless for oyster-culture. In combating this enemy of the oyster-planting industry, Mr. Charles T. Allen, of the firm of Snyder & Allen, Oceanic, N. J., has achieved a degree of success heretofore unequaled. After expending much fruitless labor in efforts to mow the eelgrass with a scythe, a method which proved impracticable because the water was sometimes too deep and also on account of the difficulty of cutting grass growing under water, he invented in 1885, and has since used, a device which may be termed an aquatic mowing-machine. The machine is rigged on a square-ended scow 20 feet long by 8 feet wide. On the forward end of the scow is suspended, by a framework, a double set of knives, each set being similar to those of mowing-machines used by agriculturists. The object in having double knives is to enable the machine to cut when moving backward as well as when moving forward, thus avoiding the necessity of having to turn the scow around when the end of the swath is reached. The knife bar is 12 feet long and consequently cuts a swath 12 feet wide. The power for propelling the machine is supplied by a six-horse power, high pressure, condensing engine, which is located in the middle of the scow. A line 1,000 feet in length is passed with three turns around a winch-head, and drawn taut by an anchor at each end, placed a short distance beyond the extreme boundaries of the area to be mowed. It is held in position by a fair-leader or chock, having a shive on each side similar to the shive of an ordinary tackle-block. The shives facilitate the passage of the line through the leader by lessening the friction, and correspondingly decrease the wear upon it. The leader or chock is placed on the forward end of the scow, and not only serves to hold the line in position but also keeps the scow straight in its course.

When the engine is started the winch-head revolves, and the pressure of the line, encircling it in three turns tightly drawn, forces the scow through the water. The rate of speed at which it can be operated is 1,000 linear feet in 5 minutes, thus enabling it to mow an area of 2,000 square feet or more per minute, or 1 acre in from 20 to 22 minutes, making allowance for time spent in moving anchors or otherwise adjusting the machinery.

When fitted for work, with coal and water, and manned with 3 men, including an engineer, which is the number requisite to operate the machinery and attend to shifting the anchors, the draft of the scow is about 8 inches of water. When the anchors have once been adjusted several swaths can be mowed before they require to be shifted over toward the uncut grass, as the line can not easily be drawn so taut, nor does it need to be, as not to allow the scow to be moved

(pushed with a pole) sidewise for a short distance. When necessary the anchors are shifted by the use of a small boat. Thus the scow is guided back and forth across the lot, cutting the grass with equal facility in both the forward and backward movements. When the grass is cut, it floats to the surface of the water and is carried away by the current. The knives are set in motion by a vertical iron shaft which passes through a horizontal cogged wheel. This wheel is geared to a pulley which is run by a belt from the engine. The vertical shaft is so arranged as to slip up or down in order to gauge the machine to any depth of water within the range of its capacity. The extreme depth of water in which mowing can be successfully done, as it is now adjusted, is about 8 feet. It could doubtless be so arranged as to operate in deeper water.

If there are no obstacles in the way the grass can be cut within 1 inch of the bottom. If there are oysters on the ground some allowance for that fact has to be made, and while the grass can not be sheared so close to the bottom, it can be mowed sufficiently close to the oysters to answer all practical purposes. The only thing requisite is to mow it short enough to preclude the possibility of any large quantity of sediment settling in it and choking the oysters. This object is easily attained, as grass a few inches long will not injure the oyster crop. It is when its length is measured by feet, and it is filled with sediment, that it becomes dangerous.

In the locality where this machine is used the water is about 6 feet deep. It has been customary to mow the oyster beds quite frequently, five or six times perhaps during the growing season, from the first of May to the last of October. The result has been that tracts of bottom that would have otherwise been worthless for oyster-growing purposes have been converted into beds as productive as any in the river. The cost of building a similar machine is estimated by Mr. Allen to be from \$450 to \$500.

Persons, wages, etc.—The planters, as a rule, are also prosperous farmers, having comfortable homes pleasantly located in the various small towns and villages on the banks of the rivers, the more important of which are Red Bank, Fair Haven, and Oceanic on the southwesterly, and Middletown on the northwesterly side of the Navesink; Little Silver on the northwesterly, and Oceanport and Branchport on the southwesterly side of the Shrewsbury.

The men hired to work in connection with the oyster business are, in many instances, primarily employed on the farms and are transferred from one branch of labor to the other as occasion may require. The rate of wages paid to men while engaged in the oyster fishery is usually \$2 per day. The planters furnish them with boats, tongs, and other apparatus. The total number of men engaged in the business is 92, including proprietors or planters. Eight at Pleasure Bay are employed as shoresmen, two of whom are colored; the remainder are white men, and all are American citizens.

The business is not so large as formerly, and the number of men engaged in it is correspondingly reduced. At Little Silver and Oceanport it is not customary to hire help. The planters do the work themselves. On the Navesink there are 32 men who are proprietors of grounds and plant oysters. Some of them, however, do a very small business.

Boats.—The boats used in the oyster fishery are a small, square-stern, flat-bottom, clinker-built row boat of the bateau kind. The largest of them are 22 feet in length over all with an extreme width of 5 feet on top, and have a carrying capacity of about 40 to 50 bushels of oysters. Some of them are smaller, being not more than 19 feet in length. They cost when new from \$40 to \$50.

Marketing the oysters.—The only thing requisite in the preparation of the oysters for market, after being caught, is to cull and grade them into two sizes. The large ones are called "box oysters," and the small ones "cullens" or "cullings." They are not placed in the brackish water to drink as at Perth Amboy and Keyport, the waters of these rivers not being considered sufficiently salt to render that process necessary.

Floats are used to some extent for keeping the oysters in good condition while they are being prepared for market or held on hand awaiting the buyer's orders. If the planter is not supplied with floats for this purpose, the oysters are laid on the shore, in shoal water, until required for shipment.

The average price which the producers receive for box oysters is \$8 and for cullens \$4 per thousand. They are shipped in flour and sugar barrels. A flour barrel will hold about 650 box oysters or 1,000 cullens and a sugar barrel about 900 box or 1,200 cullens. New York is the principal point of shipment, although a great many are marketed within the State, especially during the summer when the hotels along the coast are open. The oysters are all sold in the shell, except at Pleasure Bay, where about 3,000 to 4,000 bushels per year are opened and sold by the thousand, the greater part being sent by express to Chicago.

Two steamboats, running regularly in summer between Red Bank and New York, furnish means of transportation for about one-half of the oyster products of the river, and the remainder are shipped by rail.

II.—THE OCEAN SIDE OF NEW JERSEY.

Description of the coast.—The northern part of the coast of New Jersey is singularly destitute of indentations suitable for the existence or cultivation of oysters. Proceeding southward from Sandy Hook, the first inlet of any importance is Shark River, in which there is a limited oyster business. With this exception there is no oyster industry on the Atlantic coast of the State north of Barnegat Bay.

From the head of Barnegat Bay (in Ocean County) southward the coast is skirted by desolate sand beaches, broken into sections by numerous inlets which connect the waters of the inside bays with those of the ocean. Of these inlets the principal are Barnegat, New, Absecon, Great Egg Harbor, Townsend, and Hereford. The general contour of the coast is quite regular, forming a graceful curve (the convexity seaward) from Sandy Hook to Cape May. These sand beaches serve as a sort of natural breastwork, protecting the inside bays, which lie between the outer beaches and the mainland, from the violent storms of the ocean, and rendering them favorable localities for the operations of the oyster-planters. The sheltered location of these bays imparts to them some resemblance to Long Island Sound or the sounds along the coast of North Carolina.

Next to Barnegat Bay, the most important indentations on this section of the coast are Little Egg Harbor, Great Bay, and Great Egg Harbor. The inside coast or shore of the mainland is irregular and indented by creeks and mouths of rivers and small streams, and is usually low and marshy.

Oyster boats.—The boats used in the oyster fisheries of this section are of several varieties. Those of large size are propelled by sails exclusively, while the smaller ones are generally provided with sails and oars, either of which may be brought into requisition whenever the occasion demands. The kind of boat most used in tonging oysters is the one known as a "garvey," which is a small, square-ended, flat-bottomed scow, with raking ends and flaring sides. It is about 20 feet in length over all, and 16 feet on the bottom. The width is usually about 5 feet at the top and 4 feet at the bottom. It costs approximately \$30 when new. This type of boat is more numerous than any other. It is not designed for speed, but is well adapted and serviceable as a tonging boat in the shallow waters of the inland bays and creeks along the coast. A peculiar-shaped boat is also used for tonging purposes, which is called by the fishermen a "sneak box." Its form resembles that of a pumpkin seed, with the exception that it is more elongated. The convexity of the top is nearly as great as that of the bottom. The stern is square, straight, and moderately wide, and the steering gear is hung outside. These boats vary from 12 to 18 feet in length. The top is decked over, leaving an open space or manhole in the center, the size of which varies according to the size of the boat, but is usually about 4 feet long and $2\frac{1}{2}$ feet wide. Some of these boats are

quite expensive, costing \$45 or more when new. They are ordinarily propelled by oars, but are also provided with a sprit sail, and have a scimitar-shaped centerboard. The mast is placed well forward, as in a cat-rigged boat. Their carrying capacity is from 10 to 20 bushels of oysters. They were designed originally for a gunning boat in which to hunt ducks or other sea fowl, and seem to be more suitable for that purpose than for oyster tonging. They are not much used in the oyster fisheries, except at Barnegat.

Large sail boats are used for towing the tonging boats and carrying oysters. The majority of these are cat boats about 23 feet in length, and similar in construction to those used in the New England States. They cost about \$500 each. Sloop-rigged boats are used for the same purpose. They are usually 25 feet in length, and sometimes cost as high as \$800. The cat and sloop boats have a round bottom with centerboard. In addition to these there are a number of sharpies (found chiefly at Barnegat) of the Connecticut pattern, about 23 feet long and costing \$200 each. They are propelled by sails mostly, but frequently with oars. Some of the larger cat boats and sloops are used during the summer for carrying pleasure parties at Atlantic City. The tonging boats are not strictly confined to the "garvey" and "sneak box" types, but sharpies and other sailboats are used for that purpose, when not too large.

SHARK RIVER.

Shark River is a broad, shallow stream connecting with the ocean by a narrow inlet at Belmar. It was, at one time, considered important on account of its natural adaptability for the cultivation of oysters, but in recent years the shifting sands of the coast have had a gradual tendency to fill up the inlet, thus impeding the free circulation of tide waters, until the river has degenerated into what is now little more than a large pond. Sometimes the inlet closes and the water becomes almost stagnant.

The character of the bottom is diversified. There are extensive flats of mud, smaller tracts of sand, and considerable areas of natural oyster beds. The oystermen believe that if the inlet were dredged to a depth sufficient to admit light-draft vessels, and properly secured by bulkheads to prevent the sand from drifting in again, the river would become very valuable for oysters and fish.

An act was passed by the legislature in 1861 providing that the freeholders of the county (Monmouth) should appoint commissioners whose duty it should be to survey the bottom of the river, within certain specified boundaries, and stake it off in lots or subdivisions not exceeding 2 acres each, and lease them at public sale to the highest bidder for the purpose of planting and growing oysters; that no person should own more than 2 acres, and no company more than 5, for a period of not less than one year or exceeding five years; that after the necessary expenses imposed on the commissioners by the act and compensation

for their services had been paid, the residue of the money received by them from rents, if any, should be paid to the board of freeholders and forwarded to the trustees of the State school fund to be used in the support of the public schools. In 1870 this act was supplemented by another extending the original boundaries and the term of the lease from five to ten years. These regulations are still in force, and the grounds are rented by the planters at rates varying from 50 cents to \$5 per acre, according to quality and desirability for oyster-planting purposes. In 1881 the first section of the act of 1861, relating to the boundaries, was amended, and the board of freeholders were authorized to possess the oyster-grounds of the river to let for oyster-planting purposes for an additional term of twenty years, or until March 14, 1901.

Although there is a comparatively large number of persons engaged in planting oysters, the business has declined to very small proportions, and the planters derive less income from it than from farming and other branches of industry.

The greater part of the seed oysters used is obtained from the river, being either the product of the natural beds or of the set of spat secured by artificial means on the cultivated grounds. Considerable quantities are also brought from Barnegat Bay. These are planted in September.

One of the most interesting features of the system of oyster cultivation practiced in this river is the use of tin cans as spat-collectors. For the past two or three years many wagonloads of tin cans have been distributed every season upon the cultivated grounds with results that have been gratifying to the oystermen. The cans possess the advantage not only of being successful spat-collectors, but also, when having served that end, of disintegrating and leaving the beds unencumbered. Shells are also planted for a similar purpose. The river being closed to navigation, except for small boats, the need of cheaper means of transportation than by rail causes considerable difficulty in obtaining shells for planting, and was no doubt instrumental in suggesting the use of tin cans, but these can not be procured in quantities large enough to supply the demand. A fairly good set occurs quite regularly in the river every year on the natural beds and also on the cultch planted on the cultivated grounds, due probably to the favorable conditions afforded by the warm water and muddy bottom for breeding food for the oysters.

Most of the oysters are taken up for market in October, November, and December. They are graded into two sizes, "box oysters" and "cullens," and sold at an average price of \$7 per thousand for box oysters and \$3.50 for cullens. The annual yield is not more than from 4,000 to 5,000 bushels. They are taken with tongs in small boats, which are either the kind known in this region as "garveys" (a small square-ended scow), which are about 15 feet in length and cost when new from \$8 to \$10, or small bateaux which cost from \$20 to \$30 each. There are 90 men engaged to a very limited extent in the planting operations, all of whom are native American citizens. The extent of area utilized for oyster cultivation does not probably exceed 200 acres.

BARNEGAT BAY.

Description.—This bay is the largest and perhaps the most important of the bays along this section of the coast. It is about 27 miles long and 1 to 4 miles wide, and its waters are shallow. Immediately to the south and adjoining it is Little Egg Harbor, which is a continuation of Barnegat Bay. These two bodies of water extend the entire length of the shores of Ocean County, and are the field of an extensive clam fishery and of oyster fisheries of considerable importance.

Natural oyster beds.—Originally the natural oyster beds of the bay were quite productive, but in recent years they have been of less importance, although still producing a considerable quantity of small oysters suitable for planting. From the Pennsylvania Railroad bridge, which spans the bay at Seaside Park on the ocean beach, connecting that village with Island Heights Junction on the south bank of Toms River on the mainland, they are more or less important throughout the entire length of the bay to Little Egg Harbor inlet.

Cultivated grounds.—Within this region, also, there have been taken up and marked by stakes areas of ground for oyster-planting purposes. They are located chiefly at Cedar Creek, Forked River, Barnegat, Manahawken and vicinity, West Creek, Parkertown, and Tuckerton. The area of these grounds is not definitely known, but may be from 1,500 to 2,000 acres, and are held by approximately 300 persons. The planters, however, do not actually operate the entire area held by them. This fact has given rise to a good deal of dispute and bitter feeling between the oyster-planters and persons engaged in the clam fisheries and in taking oysters from the natural beds. The claim is made by those depending entirely on the products of the natural beds that the privilege which the State accords to its citizens of reserving unproductive sea bottom for oyster cultivation is being abused, and that under a pretext of reserving unproductive lands for the cultivation of oysters the planters have fraudulently appropriated many valuable clam beds and natural oyster reefs, thus monopolizing areas which, it is claimed, are being used by them for oyster-planting contrary to law, or in some instances not used for that purpose (except ostensibly), but held illegally in order to secure the natural products of oysters and clams from them, thereby infringing upon the rights of the clam and oyster fishermen who have no private holdings and are confined in their operations to the public domain.

Various remedies for this evil have been suggested by individuals, but no systematic effort has been made to settle the dispute between the contending factions. The result has been that the oyster-planters have met with considerable loss at times from depredations committed upon their beds by those who questioned their right of possession, and persons committing such trespasses have in turn been occasionally subjected to much inconvenience when having to pay the penalty therefor by fine or imprisonment.

One of the most important suggestions, perhaps, that has been made looking toward the satisfactory adjustment of the question is the introduction of some system of taxation which would provide for the imposition of a tax either upon the grounds, or upon the seed oysters annually planted upon them. But the proposition has not been advanced beyond the sphere of contemplation. It would, for obvious reasons, seem to be more tangible to tax the grounds, than the oysters which are planted on them, and this would be more liable to produce the effect desired—that of deterring the planters from taking up more land than they require for immediate use.

That there may be some foundation for the variances above referred to is not improbable, but that it is the source of as much interference with the interests of the clam and natural oyster fisheries as is sometimes supposed by those engaged in them is not so certain. The feeling of insecurity which the existing unsatisfactory conditions engender has doubtless retarded in some degree the prosperity and growth of the planting industry.

The surface of the bottom is generally composed of mud, but not too soft to bear oysters. The adaptations with regard to the abundance of food seem to be more favorable for the production of seed oysters than for fattening those of mature growth for market. A fairly good set of spat can also be secured on shells or other cultch nearly every year, tending to indicate that with skillful management the available tracts of bottom might be turned into a seed-producing region of considerable value. In some localities a very good quality of oysters of marketable size are grown, although they are not large and their growth not rapid, while in others they do not fatten sufficiently every season for market purposes.

Methods.—The methods of conducting the industry are less systematic in this region than in some of the other localities in the State. There is no organization of the oyster-planters except at Barnegat, where an effort was made in 1892 to establish an oystermen's protective association similar to the one existing at Keyport. In this effort the experience common to such movements was met with. Many of the planters did not join the new association, and many of those who did reported a much smaller number of bushels of oysters on their grounds than there really were, in order to diminish the tax levied upon them by the association. The rules of the organization provided for a tax of a few cents per bushel, to be assessed on the oysters held in stock on the grounds, to be paid annually to the treasurer, the fund thus collected to be used for paying watchmen to patrol the grounds, or in the prosecution of persons trespassing upon them. At West Creek there is no protective association, but the oystermen employ a watchman about three months of the year to guard the beds.

While the number of persons engaged in cultivating oysters is quite large, the quantity planted by each is very small. A great many do not plant more than from 200 or less to 500 bushels per year, others

from 1,000 to 3,000 bushels, and a few from 5,000 to 14,000 bushels. The average per man would not exceed 500 bushels. The planting is done during the fall and spring, when the seed is being taken from the natural beds. The average cost of oysters for planting, to those who have to buy, is about 25 cents per bushel. Nearly all, if not the whole, of the seed used comes from the natural beds of the bay and from Great Bay. The greater number of the planters, in addition to doing a small cultivating business, engage also in taking oysters from the natural beds, and many of them plant only their own catch, while others buy the necessary supply of seed from oystermen not interested in the industry otherwise than in the catching of natural oysters. Thus the two branches of the industry, the artificial and natural, are inseparably connected with each other, many persons engaging in both at the same time. When the supply of natural oysters exceeds the demand for seed in this immediate locality, as it usually does, the surplus is sold to planters at Shark River and elsewhere.

After the oysters have been planted on the cultivated areas it is customary, as in other sections, to allow them to remain about three years and then shift them to other grounds in order to perfect their condition for market.

Apparatus.—The only method employed for taking oysters, either from the cultivated or natural beds, is that of tonging. The tongs are of the ordinary kind, but generally a cheaper quality is used than in localities where the business is more extensive. Their cost when new is about \$5 per pair. The law does not permit the use of dredges on the natural beds of the State (except in Delaware Bay) and the planted areas are not sufficiently large to require them.

Marketing.—Practically the entire product of marketable oysters is taken from the cultivated grounds. The shipping is done in the fall and spring, and to some extent during the summer. In the more important localities, where the business in a measure centralizes, as at West Creek, Barnegat, and Tuckerton, a number of the planters who engage in the business on a larger scale than the rest are also local buyers and shippers. Some of the planters, therefore, who have only small quantities to dispose of, sell them to the shippers. A very small proportion of the oysters are opened, nearly all being shipped in barrels in the shell. The price received averages 80 cents per bushel. The principal markets are New York, Philadelphia, and Atlantic City.

GREAT BAY.

Description.—Directly south of Little Egg Harbor and continuous with it is an extensive sheet of water known as Great Bay. It is inclosed on the north by the shores of Little Egg Harbor Township, formerly a part of Burlington County, but recently of Ocean County, and on the south by Atlantic County. Into it flows a number of small rivers, the largest and most important of which is the Little Egg Harbor, or Mullica. New Inlet connects the waters of the bay with the ocean.

The natural oyster-grounds.—Some of the most extensive and productive natural oyster-grounds to be found on this section of the coast are located in these waters. Among the beds most frequented are those which are termed by the oystermen the "Gravellings," lying at the head of the bay in the mouth of Mullica River, deriving their name probably from the gravelly nature of the bottom. They begin at the head of the bay and extend up the Mullica River for a distance of 6 or 8 miles, to a point just above the mouth of Bass River. On these grounds there is a set of young oysters nearly every year, although more abundant some seasons than in others. Large tracts of bottom in various parts of the bay proper are also quite productive.

The season for taking oysters in this region begins on the 1st day of October. The law provides that for the first ten days no oysters shall be taken except between the hours of sunrise and sunset. These beds probably furnish the greater quantity of native seed oysters used in the adjacent counties, and are visited annually by boats along the coast from West Creek to Somers Point. The large congregation of crafts of so many and varying types and sizes lends an element of interest to the scene which is here presented on the first day of the season. Each succeeding day, however, marks a perceptible decrease in the number, indicating that the oysters are proportionately becoming scarcer. The fishing continues for about six weeks. By that time the crop is well-nigh exhausted, and the fishing becoming unprofitable is consequently abandoned for the season. This is repeated every fall except in occasional years when the set of spat and the growth of oysters has been less successful than usual. In such cases the inducements are not sufficient to attract the oystermen from remote localities and the bay is therefore not visited by so large a number of boats.

In the most abundant seasons many of the boats do not find it profitable to make more than two or three trips to the bay. In making these trips large sailboats with crews of three or four men are used, frequently having in tow a number of garveys or other small boats convenient for the work of tonging oysters. When the large boat is loaded the oysters are carried to the planting-grounds. In many instances the sailboats obtain their freight by purchasing seed from the tongers on the grounds. Thus a great many of the oystermen who do not plant find a ready market for all the seed they can catch. The planters also send vessels to the bay to obtain seed in a similar manner.

The oysters are said to be not so large, or rather the proportion of large ones not so great, as in earlier years. This condition is doubtless due to the persistent and exhaustive manner in which the beds are tonged each season. So large a percentage of their yield is harvested that the crop for the ensuing year has come to be substantially dependent upon the growth of the set, which occurs during the summer next preceding the beginning of the tonging season. If this chances to be unsuccessful, the result will be a small harvest. Under the most favorable conditions the catch must necessarily consist largely of what

is termed blister oysters, those of very small size adhering to the old shells. The beds were very productive in 1892, more so, it was believed, than for fifteen years previous.

It would be difficult to determine the annual yield of these beds very closely, but considering the fact that the quantity of natural oysters taken by the residents of Ocean, Burlington, and Atlantic counties combined, in 1892, from the inland waters along the coast, was nearly 200,000 bushels, valued at more than \$58,000, and that more than 50 per cent of that quantity was derived from Great Bay, it is evident that the catch must have exceeded 120,000 bushels. The important relation, also, which these seed-producing areas sustain to the existence as well as the development and growth of the cultivating industry of these counties will be apparent when it is remembered to how great an extent the planters are dependent upon them for their annual supply of seed.

Oyster-planting in Great Bay.—Although Great Bay is chiefly valuable for its natural oyster beds, it is not wholly without cultivated areas. In various sections and on both sides of the bay there are grounds staked up which are held and used for oyster-planting. These are not extensive, although a complaint, similar to the one urged against the planters in Barnegat Bay, that they encroach upon the natural beds, and hence infringe upon the rights of other oystermen and clam fishermen, is also heard in this locality. The planting business is small and does not seem to be so prosperous as one would think it should be with natural conditions apparently so favorable.

The entire quantity of seed oysters planted in 1892 did not exceed 39,000 bushels, while that for each of the three years preceding was considerably less. The quantity taken up for market was about 25,000 bushels, valued at \$18,000, a small proportion of which was not placed upon the market directly, but was sold to planters in other sections to replant. The grounds are operated chiefly by planters living at New Gretna, in Burlington County, and at Port Republic, in Atlantic County. A few persons living at Tuckerton have planting-grounds there. The planters at New Gretna number about 45, and there are also 9 at Port Republic. The persons engaged in cultivating also participate in the natural fisheries. At New Gretna, which is now the only place in Burlington County where oyster fisheries are prosecuted, there are 76 persons engaged in the natural fishery. Prior to 1892 Tuckerton belonged to this county, but a change in the county line placed it in Ocean.

Green oysters and clams.—Great difficulty was experienced in 1892 by the oystermen and clam fishermen in selling their products. In September a number of ships from Hamburg, Germany, were quarantined at New York on account of cholera infection. The belief soon became prevalent among the people in many localities that debris thrown into the water from the pestilential ships might serve as a medium to convey cholera germs to the shellfish along the shores. It was not long before the fears of this not very probable event began perceptibly to affect the markets, and for a period of about six weeks the demand for

clams and oysters was appreciably diminished. Meanwhile, there appeared an unusual viridity of the clams and oysters of Barnegat Bay and Little Egg Harbor, chiefly in the vicinity of Manahawken and Tuckerton. The greenness was first noticed about the 15th of August. It began near Tuckerton, and by the 1st of October had spread over a large area. The parts infected were, so far as the eye could discern, the gills and lips (palps) of the mollusks.

Among the fishermen and others in the section where the phenomenon occurred some persons supposed it to have been caused in part by the extremely dry and hot weather for which the past summer had been more than ordinarily remarkable. It had been noticed, also, that the waters of the bay were unusually clear and that no storms had occurred to disturb the sediment from the bottom and place it in circulation in the water. The extraordinary clearness of the water was therefore considered to indicate a corresponding greater deposit of sediment on the bottom than there would have been under normal conditions. Others thought it might be due to a disease of the oysters and were inclined to regard it as a sort of epidemic, while in the minds of many it became very naturally associated with the current rumors of the supposedly possible infection by cholera germs.

According to the fishermen a similar infection occurred about twenty years ago, and was then attributed by the people to the abundance of seaweed. An idea has also long prevailed in certain localities that when the clams and oysters turn green there must be some poisonous matter in the water, such as copper or Paris green, or that it may be due to pollution by paint or by preparations used for preserving the piling in wharves; in which there is crude petroleum oil or penetrating chemical ingredients. In the present instance, however, there seemed little reason to think that the water had been polluted by any such preparation as above alluded to, but the green color suggested the presence of copper or other mineral substances which might render the oysters unwholesome. Persons entertaining this theory affirmed that the eating of one green oyster had caused them sickness and vomiting, but no evil results followed.

Aside from the objectionable coloration, which served to produce an unpleasant impression on the mind of the consumer and thereby interfere with the sale of the products, the clams and oysters were generally fatter and in better condition for market than they had been for a number of years. For a time the green color was not sufficiently pronounced to be seriously detrimental to the marketing business, but as the season advanced the greenish appearance became so decided that the shippers grew apprehensive lest the trade, and consequently the fishery, might have to be wholly discontinued. This would entail a loss to the community which would be severely felt, especially by the large number of fishermen who were mainly dependent upon the clam and oyster fisheries for a livelihood. A few instances occurred in which the dealers had declined to receive the shipments and had

returned them. It was finally deemed advisable that an investigation should be made with a view to ascertaining the cause and nature of the viridity and removing, so far as practicable, false impressions on the part of consumers regarding it. Accordingly the services of Prof. Julius Nelson, PH. D., biologist of the Agricultural College Experiment Station at New Brunswick, N. J., were secured by Messrs. Horner and Austin, wholesale dealers and shippers of oysters and clams at Tuckerton. On October 6 Prof. Nelson made a personal inspection of the grounds and an investigation of the oysters and clams, the results of which were transmitted to Messrs. Horner and Austin, October 18, and published in the Tuckerton Beacon of November 3, 1892. The essential parts of Prof. Nelson's report, as addressed to Messrs. Horner and Austin, are subjoined:

I have examined the clams you sent and have carefully looked over the grounds at Tuckerton, and can report that the color is due to the presence of a species of microscopically-small vegetable organism, which the dryness of the past summer has allowed to multiply in the waters on the beds and which the clams have eaten in large quantities, so that their tissues have become stained by the color of their food. The dye is perfectly harmless. Numerous tests and analyses made by several scientists, both of this country and Europe, show that copper is not present; neither does microscopical examination show any disease nor any parasites present. Oysters affected in a similar way are in special demand in Europe, not for their color, but because of their careful cultivation, the fine qualities being in no wise deteriorated by the fact that their tissues are stained by their food.

My investigation of the green clams and oysters of Tuckerton Bay brings out the following facts:

(1) The peculiar pea green is for the most part confined to the gills, but some specimens have the so-called "liver" also changed from its natural brownish to a brownish-green tint.

(2) The water taken from the clam beds has a marked greenish color and deposits a green sediment on standing.

(3) This sediment consists of a nearly infinite number of very small vegetable cells or microscopic plants known as *algæ*, among which are many diatoms, but especially a species of *Botryococcus*.

(4) The digestive canal of the clams was found crowded with these low organisms in process of digestion, but the color was not changed by the digestive juices.

(5) After the clams are removed from the water the color fades somewhat day by day, and would probably very soon disappear if they could be placed in water free from those *algæ*.

(6) The "infection" began on the flats, in shoal water, amidst floating eelgrass, which, owing to the dry and stormless summer, was little disturbed and therefore presented the most favorable conditions for the development of this species of food.

(7) The "infection" began in August and has now succeeded in gradually covering the entire bay.

(8) The clams become colored within a very few days after the water in which they live has become impregnated by the *algæ* in question.

(9) These clams are in as fully excellent condition of fatness and flavor after "infection" as before, owing, doubtless, to the abundant food thus furnished them.

(10) No evil results have followed the free eating of them by persons having even very sensitive stomachs.

(11) The color is naturally suggestive of "copper" or "Paris green" to people ignorant of the true nature of the "infection," but no trace of copper or other injurious substance has been found.

(12) It is not a disease, is not due to parasites, no disease germs are present in the colored tissues.

(13) The dye is readily dissolved out of the algæ in the stomach into the blood, from which it is absorbed, of course, most readily by the most active tissues.

(14) That it has any connection with a cholera epidemic is absurd, although it is probable that the climatic conditions which favor the growth of these low forms of green vegetation are also favorable to the propagation of disease germs whenever the latter may be lodged by winds in places having sufficient moisture.

(15) If any case of sickness has followed the eating of green clams and oysters it should be attributed to any other cause rather than to the harmless vegetable dye.

(16) The advent of wet weather will doubtless soon destroy this food of the clam, and the "infection" will disappear as quickly as it came, not to return until the rare and favorable conditions of last summer are repeated.

(17) It is natural that people who do not know the cause of the unusual color should reject green clams, deeming them disease-causing. Such persons may be assured, not only on our authority but on that of every scientific investigator who has studied the subject, that the clams are wholesome and of good, sometimes of superior, quality.

In addition to being published in the weekly newspaper at Tuckerton, previously alluded to, the foregoing report of Prof. Nelson's investigation was also printed in circular form to be distributed by the oyster and clam shippers among their customers, in order to counteract, so far as possible, by disseminating proper information regarding the harmless character of the green coloration, the damaging effect which it had produced upon the markets. Efforts in that direction were naturally confronted by many obstacles. There was not only the difficulty of reaching consumers over a sufficiently wide area, and convincing them by a presentation of scientific facts that their preconceptions relative to the subject were ill-founded, but there was also the greater difficulty of reversing an unfavorable popular sentiment and eradicating an ingrained prejudice. The shipping season was, however, practically closed early in December, on account of the severity of the weather, and very little opportunity was afforded for testing the effectiveness of the movement.

The greenness continued throughout the entire winter and spring, and did not wholly disappear until the middle of the following May. During the summer of 1893, conditions obtained in the bay similar to those which were present in 1892, indicating a recurrence of the viridity; but this was averted by a heavy storm-tide which disturbed the algæ and cleansed the bottom before the oysters and clams became affected.

ATLANTIC COUNTY.

The oyster centers.—The principal localities in Atlantic County interested in the oyster fishery are Port Republic, on the south side of the Mullica River, opposite New Gretna; Leeds Point, Oceanville, Conovertown, Absecon, Brigantine, Atlantic City, Pleasantville, Smith Landing, Linwood, Steelmanville, Sea View, Somers Point, and Scullville. From Leeds Point to Smith Landing, inclusive, however, is the region where the greater part of the business is conducted.

In all of these localities there are persons who do more or less oyster-planting, although many of them do not plant more than from 25 to 100 bushels per year. Others engage in the business on a larger scale, and plant from 5,000 to 10,000 bushels annually. In 1892 the total number of oyster-planters in the county was 180. The average number of bushels planted by each was less than 800. In addition to planting operations a majority of the planters, together with a large number of other oystermen who do not cultivate, engaged in tonging oysters from the natural beds. The total number of persons thus engaged in 1892 was 443, and the quantity of oysters taken by them was 88,510 bushels, valued at \$19,822. The oysters are chiefly used by the planters for seed. A few thousand bushels were picked by hand from the grass or thatch, and are termed "thatch oysters." In all of these localities a majority of the people earn a substantial part of their living by means of one branch or other of the fisheries, the most important of which are the oyster and clam fisheries.

Grounds.—The grounds upon which the oyster-planting operations are conducted are located chiefly in the small inland bays of the county. With the exception of the planters at Port Republic, whose planting-grounds are in Great Bay, the oyster-planting areas are located in the bays between Leeds Point and Great Egg Harbor Inlet. The most important of these are Little Bay, Reed Bay, Absecon Bay, and Lakes Bay. At the southern extremity of Atlantic County, and separating it from Cape May County, is Great Egg Harbor Bay, into which empties the Great Egg Harbor River. This bay and river produce a small quantity of natural oysters, which are used for seed, but have practically no cultivated oyster beds. The bays in which the cultivated grounds are located are interspersed with numerous low, marshy islands. The water is generally very shallow and the bottom soft and muddy. In many regions there are large areas covered with a luxuriant growth of eelgrass.

Methods.—The methods resorted to in the cultivation of oysters in this section are in most respects very similar to those employed elsewhere in the State. The seed oysters are obtained in part directly from the natural beds of the various bays from Great Bay to Great Egg Harbor Bay, inclusive. Considerable quantities, also, of large native oysters, which have laid on cultivated grounds for about two years and become nearly large enough for market, are bought and replanted for one season, when they are taken up and marketed. The small natives cost about 25 cents per bushel and the large ones from 50 to 75 cents. The average cost of native oysters for planting, large and small together, is about 40 cents per bushel. Planters who engage in the business to any great extent generally buy all of their seed from oystermen who operate on the natural beds or from planters who cultivate on a small scale, while those who plant only small quantities usually catch their own seed.

In addition to the native seed there are also planted from 35,000 to 40,000 bushels per year of Chesapeake Bay oysters, which are obtained by means of transporting vessels. They cost on an average about 70 cents per bushel, and, like the large natives, are of nearly marketable size when planted. Large oysters, whether natives or Chesapeakes, are usually planted in the spring and taken up during the summer following, to supply the constantly increasing summer trade of Atlantic City and Philadelphia. It is not generally expected that during the few months they are allowed to remain on the grounds they will increase very much in size; but there is some growth and also some loss, the one usually being sufficient to offset the other. The price received for oysters when marketed is from \$1.25 to \$1.65 per bushel, or an average of about \$1.50. The small native seed is planted in the spring and fall and is allowed to grow about three years before being taken up for market. They are planted in from 2 to 5 feet of water, or as much deeper as may be available.

Deterioration of the oyster supply.—The oyster-planting industry has been prosecuted quite extensively in the waters of Atlantic County from an early date. It apparently reached its climax of prosperity and importance in 1880. Since that time the planting operations have not been attended with so good results as formerly, but the diminution in the yield has been more appreciable since 1888. That the industry is not now so prosperous as in 1880 is doubtless due to a combination of causes.

In the early history of oyster-planting in these bays, Great Bay was a much more productive source of seed supply than it has been in recent years. Natural oysters could also be obtained in considerable quantities in the smaller bays and in the creeks along the shores, whereas they have now become very scarce. Great Egg Harbor Bay and River were also noted for their abundant yield of natural oysters. The beds in these waters were not extensive, but extremely productive, and were annually visited by a large number of boats from Atlantic and Cape May counties. It is said to have been not uncommon for a boat or large scow to be loaded with oysters without having to change its place of anchorage, and that more than 100 bushels were frequently taken by one man in a day. As the beds began to be exhausted they gradually spread over larger areas and the oysters became more thinly distributed. At the present time the yield of these beds is comparatively small, and they are not relied upon to any great extent to furnish seed for the use of the planters.

The most important cause, perhaps, assigned for the decline in the planting industry is the damage and frequently the total destruction of many of the most valuable planting areas by the growth of eelgrass, which is especially abundant in the bays where the planting-grounds are principally located. It would seem that the tendency of the inlets connecting the bays with the ocean to fill up with sand and

thus render the circulation of the inside waters more sluggish than they would be with freer intercourse with the sea is highly favorable to the growth of the eelgrass and correspondingly unfavorable to that of the oysters. It is claimed that the grass has extended its area more rapidly since 1880, and for two or three years immediately preceding, than was before noticeable, and that the oysters which have been planted have not yielded so large an increase.

An example which illustrates the rate of growth under favorable conditions, and, at the same time, the damaging effects of the eelgrass, was furnished by a planter operating in Lakes Bay. In 1877 he planted on a small piece of ground, which he estimated to be not more than half an acre, 625 bushels of native seed oysters, at a cost, including the expense of planting, of 30 cents per bushel, amounting to \$187.50. They were taken up for market in the fall of 1879 after remaining on the ground two years, and were found to have yielded 1,176 bushels of marketable oysters, which were sold at \$1.25 per bushel, aggregating \$1,470. In the same fall the ground was again planted with the same kind and quantity of seed (625 bushels), at a cost of 50 cents per bushel, or a total of \$312.50. This crop was harvested in 1881, after lying the same length of time as the former one, and yielded 928 bushels of oysters for market, which were sold at \$1.25 per bushel, or a total of \$1,160. In the spring of 1881 the ground was again planted with 665 bushels of native seed, costing 35 cents per bushel, or \$232.75. During the two ensuing years the eelgrass completely covered the ground and destroyed all the oysters. The ground has since been valueless, though it had previously been estimated to be worth not less than \$1,000.

Eelgrass becomes especially injurious to the beds from the fact that it facilitates the accumulation of sediment at the bottom. It has the effect of keeping the water calm and thus allowing large quantities of sea cabbage, mud, and various sorts of débris to settle down upon the oysters and smother them.

It is claimed by the oystermen that the oysters (native seed) do not grow so rapidly nor yield so abundantly as they did formerly. It was not unusual in earlier years for planters to receive a largely increased number of bushels as the result of planting, while at present it is seldom that they take up a greater quantity than they plant. The profits of the business are said to arise from the increase of the oysters in value rather than in quantity. It used to be customary to allow them to lie on the grounds about two years, but it has now become necessary to extend the period to three years, and sometimes longer. From the time the oysters are planted until they are taken up for market they are in constant danger of being destroyed. During the first year they frequently (as near as can be determined) double in quantity. In the second and third years a large proportion of them die, so that for the

three years the loss in numbers is not more than compensated for by the increase in size.

These losses are not wholly due to eelgrass. The formation of ice during the winter season also causes considerable damage. Heavy and continued winds often blow the water out of the bays to an extent sufficient to perceptibly lessen its depth. These are called by the oystermen "blow-out winds." If the ice forms immediately after one of these storms, the oysters in some instances become attached to it and are carried away when it breaks up in the spring. Some of the grounds also, in very shallow water, become dry at low tide and the oysters are destroyed by the extreme cold weather. But these conditions have always prevailed and are not probably more destructive now than in former years. There is also some destruction caused by borers and winkles, but it is not very considerable.

CAPE MAY COUNTY.

The principal localities on the east or Atlantic Ocean side of Cape May County where oysters are planted are Ocean City, Beesley Point, Clermont, Townsend Inlet, Swain Station, Holmes Landing, Cape May C. H., Rio Grande, and Cold Spring. In 1892 the total number of planters or proprietors of planting-grounds in all of these localities was 97. This number does not include help employed by the planters. The business in most instances is conducted on a very limited scale. Many of these planters plant less than 100 bushels of oysters per year, while comparatively few plant more than 1,000 bushels annually. The greater part of the seed oysters used are brought from the Chesapeake Bay, by transporting vessels, during the month of April. These vessels usually make about three or four trips to the Chesapeake each spring. The quantity of seed planted is about 46,000 bushels. Of these, fully 40,000 bushels are southern oysters and the remainder are native seed.

The grounds utilized for oyster-planting are located in the numerous coves and thoroughfares along the shores inside of the sand beaches which front the ocean. These inside waters are in most cases very shallow. The work incidental to the planting operations is done in small boats, and the oysters are taken with oyster tongs. The total quantity of oysters taken from these grounds for market in 1892 was 40,775 bushels, valued at \$46,456. This crop was not in any considerable measure related to the planting done in the spring of the same year, but resulted chiefly from oysters planted two or three years previously. The greater part of the seed is small when planted and requires from two to three years to grow to marketable size. The methods of conducting the industry do not differ essentially from those practiced in the counties of Ocean and Atlantic. The dredging vessels owned in Cape May County operate in Maurice River Cove.

III.—THE NEW JERSEY SIDE OF DELAWARE BAY (MAURICE RIVER COVE).

The oyster-grounds.—That part of Delaware Bay subject to the jurisdiction of New Jersey is the State's most extensive and most productive oyster region and is generally designated as Maurice River Cove. Originally Maurice River Cove was considered to embrace the waters at the mouth of Maurice River, lying inside of East Point on the south and Egg Island Point on the north, and comprised the greater part of the area which, in the early history of the oyster industry in this section, was used for planting purposes. At an early period, however, the name "Maurice River Cove" was applied not only to the cove proper, but also to the adjacent waters of the bay, and has become, in common usage, a general term to designate the waters of Delaware Bay between Egg Island Point and Cape May Point. The oyster-planting territory was also extended, reaching farther south, and off shore. The inshore grounds, within the first-named limits, were practically abandoned, being considered to be worn out or exhausted, and new areas of bottom lying in deeper water were appropriated. At the present time the region which includes the oyster-planting grounds may be approximately bounded as follows: Beginning at Egg Island light-house and running direct toward Cross Ledge light-house about $2\frac{1}{2}$ miles, thence SSE. $\frac{1}{2}$ E. about $9\frac{1}{2}$ miles, thence easterly by an irregular course (excluding Dead Man's Shoal) to the cape shore near the north end of Fishing Creek Shoal, thence following the line of the shore at a distance therefrom varying from $\frac{1}{2}$ to $1\frac{1}{2}$ miles and sweeping several miles seaward off the mouth of Maurice River to the place of beginning, and containing about 68 square nautical miles, or 57,654 acres. Of this area probably not more than one-fifth is under cultivation. The depth of water on the cultivated beds varies from about 5 to 24 feet and the extreme distance from land is about 10 miles.

The beds are located in various portions of the above-described territory wherever the conditions are thought to be most favorable for oyster-cultivation. If a ground proves unsuccessful it is abandoned and a new one is selected. In this way the greater part of the entire space has been planted at one time or another. It not unfrequently happens that a ground which has yielded unsatisfactory results and has therefore been vacated by one planter, is taken up the next year by another and the oysters do well. Experiences of this kind have given prevalence to the idea among the oystermen that the constant use of the same ground either exhausts the food supply or superinduces an unfavorable condition of bottom, which requires a period of rest to correct. The general character of the bottom in the lower part of the cove toward Cape May is mud, while that of the upper part, in the vicinity of Egg Island, is sand. In many localities the sand is shifting and renders the bottom unsuitable for oyster-planting, and in some instances entirely useless.

Before any grounds can be planted it is required by law that they shall be marked by buoys or stakes, to which a number, painted in black figures 18 inches long and 4 inches wide, shall be securely fastened. It is also required that the vessel operating these grounds shall have a corresponding number of the same color and dimensions painted in the middle of her mainsail one-third from the head, on the starboard side, and in the middle of the jib one-third from the head on the port side. The grounds are divided into lots of such form and size as are most convenient for dredging. They are usually made as nearly square as possible and are approximately 5 acres in area.

A line running direct from Egg Island light-house to Cross Ledge light-house forms the legal boundary line between the cultivated grounds on the south and the territory which includes the natural oyster beds on the north of said line. The natural grounds extend from this line for a distance of about 20 miles up the river to Stony Point and embrace all the territory between these points lying in the waters of New Jersey, or from the shore to the main ship channel, and contain an area of about $87\frac{1}{2}$ square nautical miles, or 74,187 acres. It is not entirely covered with oyster beds, although there are, probably, few places where oysters can not be found. Beds of various sizes lie scattered all over this part of the bay. Some of them are large and afford ample space for dredging, while others are so small that a vessel can not dredge continuously upon them; but when she reaches the end of the bed the dredges are hauled in and she returns to the other end to begin again. These are called by the oystermen "one-haul places," and are frequented by small vessels, large ones requiring more room to operate profitably. From this vast field of natural oyster-grounds is obtained the greater part of the native seed oysters used for planting on the cultivated beds in Maurice River Cove and Delaware Bay.

The planting and cultivating industry of the cove as it now exists is practically the result of the progress achieved in oyster-culture in these waters in the past thirty years. During that period the oyster interests, chiefly of three counties of the State, viz, Camden, Cumberland, and Cape May—those of Cumberland greatly predominating in importance—have centralized at Maurice River Cove. Other counties are represented to a limited extent, the privileges of the waters being free to residents of all parts of the State choosing to avail themselves of them.

The oyster centers.—The oyster industry of Delaware Bay has its headquarters at Bivalve and Maurice River, two small villages situated on the west and east banks, respectively, of the Maurice River near its mouth. These places are the chief receiving and shipping points for the entire region and have become the greatest oyster centers of the State.

As an oyster-shipping center Bivalve takes precedence of all others in the State. During the busiest part of the season the quantities shipped daily reach at times as high as 40 carloads. The name

Bivalve has been recently given to this locality; it was formerly called Long Reach. Extending along the bank of the river for nearly a quarter of a mile is a row of oyster houses, some 25 in number (exclusive of stores and other buildings), provided with wharves and railroad platform.

A spur of the Central Railroad of New Jersey connects Bridgeton and a number of other localities interested in the oyster industry with Port Norris and Bivalve, furnishing convenient means of travel to the oystermen and shippers living in the various towns and villages along the line, and also speedy facility for transporting the oysters to market. The resident population of Bivalve is very small, there being only a few families. The large number of men who may be seen there pursuing their vocation come not only from all parts of Cumberland County, but from each of the other counties to which allusion has been made.

Bivalve is interesting in many respects. In all its appointments it is extremely characteristic of the industry to which it owes its existence. Formerly the nearest post-office, telegraph office, and not many years ago, railroad station also, were located at Port Norris, 1 mile distant. Now this unique business center has all of these conveniences, as well as many others. There are stores at which the oystermen may be furnished with clothing, supplies, outfittings, implements, etc., necessary to their occupation; blacksmith shops, where oyster dredges, chains, and various other appliances are made and repaired, and where a great deal of work in the line of ship smithing is done; and marine railways and dry dock conveniently located. The requirements of the large fleet of vessels centering here engaged in the oyster industry furnish employment to a considerable number of men in the various auxiliary trades incidental to it, especially through the winter and early spring, and to some extent during the entire year. But the work of repairing and painting vessels is not all done at Bivalve. So much of it requires attention at the same time that it would be impracticable to accommodate the whole fleet at this place. Consequently a number of other localities on Maurice River, and also at Cohansey and Dividing creeks, where many of the vessel-owners and captains live, are provided with marine railways and other facilities adapted to the needs of the oystermen.

Maurice River, which empties into Maurice River Cove, is a comparatively small stream, furnishing navigable communication to a number of towns and villages along its banks, as far inland as Millville, about 15 miles from its mouth. These localities are usually interested in the oyster business in one respect or another, either as places of residence of the oystermen and oyster-shippers, or as the hailing ports of vessels. The more important of those on the east side of the river, after leaving Millville, are Mauricetown, Dorchester, Leesburg, Heislerville, and the oyster-shipping center called Maurice River. From Bivalve the river pursues a winding course through the marshland to the cove. Looking toward the cove the view is at times rendered picturesque by the white sails of hundreds of oyster sloops sailing up and down

through the marshes to and from the oyster-grounds, their dark hulls hidden by the tall reeds or intervening upland, and only the snowy sheets of canvas and the tall, tapering spars-showing above the river bank. A large number of vessels owned at Port Norris and the various towns on either side of the river make their home port at Bivalve, while many others, owned in localities more remote, land their catch there, and for that reason, and also on account of the safe and convenient harbor facilities which it affords, seek it as a place of rendezvous.

Second in importance to Bivalve as an oyster-shipping center is Maurice River. It is the terminus of a branch of the West Jersey Railroad, which connects with the main line at Manumuskin. The shipping business at Maurice River is not so extensive as at Bivalve, but is constantly increasing.

About 20 miles farther up the Delaware River is Greenwich Pier, where within the past few years quite a large oyster-shipping trade has been established.

Regulations and methods.—In order to arrive at anything approximating a clear understanding of the methods now employed in the oyster industry of Maurice River Cove, it will be necessary to consider briefly the origin, growth, and some of the principal characteristic features of the system under which this fishery is conducted. At an early period the value of the oyster industry, not only as a means of support to a large number of the inhabitants, but as a source of wealth capable of extensive development, was recognized. In all the coast waters of the State oysters were abundant, but the larger areas of sea bottom in Delaware Bay that were richly populated with these mollusks were considered especially valuable and important. The improvement of these natural resources, therefore, became at an early date a question of much interest, and such steps as were deemed wise and proper by the people of those times for the care of the oyster beds were promptly taken. It is an interesting fact also that every effort put forth looking to the advancement of the industry in any particular locality, or throughout the entire State, was characterized by two great fundamental ideas or principles. These are, first, the preservation and care of the natural oyster beds in order to insure the continuance of an abundant supply; second, the protection of the interests of resident citizens of the State in their exclusive right to engage in the industry on terms of equality, unmolested by citizens of other States, and to the enjoyment of all benefits and emoluments arising therefrom. These two principles were embodied in the first act passed by the legislature of the State (then a province) relative to the oyster fisheries, and have been apparent in the intention of all subsequent legislation bearing on the subject covering a period of one hundred and seventy-five years. The act alluded to was passed in 1719 with the following preamble:

Whereas it is found by daily experience that the oyster beds within this province are wasted and destroyed by strangers and others at unseasonable times of the year, the preservation of which will tend to the great benefit of the poor people and others inhabiting this province.

The first section of the act following this preamble provided for a close-time season from May 10 to September 1 of each year, and the second section was directed against non-residents, making it unlawful for them, either directly or indirectly, to take any oysters or shells from the beds and put them on board any boat or vessel not wholly owned by residents of the province, under penalty of seizure and confiscation of the boat or vessel with all apparatus, together with the oysters that had been illegally taken. These provisions were broad enough to allow the use of proper methods necessary to the successful prosecution of the natural oyster fisheries, or the introduction of any good system of oyster-culture, and are at the same time sufficiently conservative, if strictly applied, to protect the rights of the citizens from infringement by citizens of other States or abridgment by unjust legislation.

Prior to 1856 operations in the Delaware River and Bay were confined almost exclusively to the natural beds. Considerable difficulty was experienced in protecting the beds from depredations committed by citizens of the neighboring States. In 1825 an incorporated stock company, known as the "New Jersey-Delaware Oyster Company," was formed, with a view to rendering the protection of the beds more effectual and improving the industry. This was the first organized effort that had been made in connection with the oyster industry in these waters. It failed, however, to accomplish the object desired, and its management was so unsatisfactory to the stockholders that the company soon became involved in litigation.

In 1856, by an act of the legislature, the planting of oysters in Maurice River Cove was authorized under regulations similar to those now in operation in Shark River. It is evident from the preamble of this act that during the long period of one hundred and thirty-seven years since the passage of the law of 1719, which was general in its application, little progress had been made in developing the great natural resources of this region, and no satisfactory system for regulating and conducting the industry on the broad lines above indicated had been crystallized. The disadvantages under which persons engaged in the business were then laboring were set forth by the preamble of this act as follows:

Whereas, it has been represented to the legislature of the State of New Jersey that Maurice River Cove, on the southern shore of the township of Downe, in the county of Cumberland, is particularly adapted to the growth of oysters, but that by reason of the interference of citizens of other States, and the want of more adequate protection to persons planting oysters therein, the same has become almost valueless as oyster-ground; now for the purpose of encouraging the planting and growth of oysters in said cove, and thus creating and confining at home a source of wealth which is now either undeveloped or enjoyed by citizens of other States.

The act was approved March 14, 1856, and one year, or until April 1, 1857, was allowed for making the preparations and arrangements necessary to render its provisions available to the oystermen. It provided that the board of chosen freeholders of the county of Cumberland should be authorized and empowered to occupy Maurice River Cove for

oyster-planting purposes during a term of twenty years from the date of the passage of the act, within the following boundaries:

Beginning at low-water mark directly opposite East Point in the township of Maurice River, Cumberland County, and running thence a south course to the main ship channel; thence by a straight line to low-water mark directly opposite to Egg Island Point, in the township of Downe, in said county, and thence by low-water mark the several courses and distances of the shore bordering on said cove, and crossing the mouths of the several streams that empty into said cove, to the place of beginning.

The board of freeholders were further authorized to appoint one or more persons as commissioners, who should hold office for one year or until their successors were appointed, and whose duty it should be to make a survey of the grounds within the limits above prescribed (all natural oyster beds to be excepted), and file a plan of the same in the office of the county clerk; to lay off and mark by stakes such subdivisions of said grounds, not exceeding 10 acres each, as in their discretion would seem best designed to promote the planting and growth of oysters, provided, however, that navigation should not be obstructed and that no person should own more than 10 acres and no company more than 30 acres.

It was further provided that, after staking off the grounds in the manner aforesaid, the commissioners should lease or rent the same at public vendue to the highest bidder for a period of not less than one year or exceeding five years; but no person was eligible to bid on or lease grounds who had not been a resident of the State for six months.

The commissioners were also authorized to collect the rents due from the leases of oyster-grounds annually, and, after paying all necessary costs and expenses of discharging their duties and receiving such further compensation as the board of freeholders should agree they ought to have for their personal services from the proceeds arising from said rents, to pay the residue of the money, if any, to the board of freeholders, to be apportioned among the several townships of the county in the ratio of the county tax paid by each township, to be used in the support of the public schools. The commissioners were also required to make an annual report of their proceedings, submitting therewith a sworn statement of receipts and expenditures.

It was further provided that any person who should enter within the boundaries of grounds so leased without having first obtained the consent of the lessee in writing, or who should commit any trespass upon said grounds, should be liable to the party injured in treble damages for the first offense, to be recovered in an action of trespass; and for the second offense should be deemed guilty of a misdemeanor, and upon conviction should be punished by a fine not exceeding \$100, or imprisonment not exceeding sixty days, or both. It was also the duty of the commissioners to enforce the law in preventing persons who were not residents of the State from obtaining grounds, and in protecting the rights of the lessees.

The oyster industry was apparently conducted under these regulations for a period of about fourteen years, but the need of more adequate protection against depredations upon the planted grounds, which annually entailed considerable loss to the oystermen, was keenly felt. The laws then in existence for that purpose were embodied chiefly in an act passed April 14, 1846, entitled "An act for the preservation of clams and oysters," and the supplements thereto. These were general laws, and while they were sufficiently comprehensive in their provisions, they were, in some measure, rendered ineffectual, owing to the difficulty experienced in enforcing them. The fact was finally realized that legislation based upon abstract principles would not meet the requirements of the business and insure the growth and development of the industry; and that a more thorough organization of the interests of the oystermen was the only means by which existing laws could be enforced and the necessary degree of protection secured.

With this end in view, therefore, an act was passed by the legislature, March 21, 1871, entitled "An act for the better enforcement, in Maurice River Cove and Delaware Bay, of the act entitled 'An act for the preservation of clams and oysters,' approved April 14, 1846, and of the supplements thereto." By this act was created an organization known as the "Maurice River Cove and Delaware Bay Oyster Association," having for its object the protection of the oyster-grounds, natural and cultivated, in Delaware River and Bay and of the rights of resident citizens of the State in the lawful use of said grounds for the purpose of catching, planting, and growing oysters. Citizens of other States are excluded from sharing in the use of the oyster-grounds so far as may be considered practicable and desirable. In this regard, however, concessions have been made to citizens of Pennsylvania, who are permitted under certain restrictions to obtain licenses from the association and engage in the oyster business on equal terms with the residents of New Jersey.

The association operates in accordance with a system of State laws and is virtually the machinery of the State for regulating and controlling the oyster industry in these waters. During the twenty-three years of its existence its regulations have been changed and added to from time to time, as would best promote the interests of the oystermen. The captains and owners of all vessels having a license from the association to engage in the catching and planting of oysters constitute its membership. The members are authorized by law to meet on the third Monday in March of each year, at Port Morris, Cumberland County, and there organize by the election, by ballot, of three of their number as judges of election, and one as secretary, who shall keep a record of the meeting. They are further authorized to elect, by ballot, five of their number to be designated as the "Executive Committee of the Maurice River Cove and Delaware Bay Oyster Association," who shall hold office for one year, or until their successors are elected. At

this annual meeting, also, is elected a "collector of the oyster fund," whose term of office is one year. The executive committee is invested with power to elect by ballot a "special officer," whose term of office continues or expires at the pleasure of the committee.

Originally the association had only two officers. These were the "special officer" and "collector." In 1875 an auditing committee was added to the official staff. In 1890 the name of this committee was changed, and it has since been called the "executive committee." The duties of the executive committee, in addition to appointing a "special officer," are substantially to superintend the affairs of the association, financial or otherwise, and present at the annual meeting an itemized report of the receipts and expenditures of all officers of the association. They are also empowered to fix the salary or compensation of the "special officer" and "collector"; to fill vacancies caused by death or resignation in either of those offices, and to fix the rate of the tax per ton to be assessed upon all vessels licensed by the association. It is the duty of the executive committee to investigate charges that may be made against captains or owners of boats or vessels found illegally dredging or tonging upon the staked-up grounds of oystermen regularly licensed to plant and catch oysters, and to revoke the license of boats or vessels found guilty of such offenses. The committee may also cause said boats or vessels to be seized by the special officer and prosecute the owners thereof before the courts. If the boat or vessel is condemned, it may be sold, together with all the dredges, tongs, furniture, and apparel, by order of the justice before whom the case is tried, who, after deducting the costs of the trial, is required to pay one-half of the remaining proceeds of the sale to the public-school fund of the State, and the other half to the collector of the oyster fund, for the use of the association. The captain or owner may also be tried and, upon conviction, subjected to a fine of \$1,000, or imprisonment for two years at hard labor, or both, in the discretion of the court, one-half of the fine to be paid to the State school fund and the other half to the oyster association.

The duty of the special officer is to patrol the oyster-grounds and arrest all persons found violating the laws of the State relative to the oyster industry, whether the offenders are members of the association or not. The expenses incurred by the special officer in the performance of his duties are paid out of the oyster fund. He receives a salary of \$500 per annum.

The duties of the collector of the oyster fund are, to issue a license to each and every captain or commander of a boat or vessel lawfully engaged in the business of catching, planting, and growing oysters in Maurice River Cove and Delaware Bay, and to collect the amount of tax assessed on the vessels by the association. He is also required to keep a book in which shall be recorded all licenses granted by him, together with the name and net tonnage of each vessel so licensed, and the names and places of residence of the owners. He is further

authorized to pay all the expenses of the association, including the salaries or other compensation of its officers, and to make a report of the condition of the finances at each annual meeting, and to furnish to all the captains and owners of licensed vessels a printed list each year of the vessels licensed by the association, showing the name of each vessel, the name of her captain, and the number of her oyster-ground. For his services the collector receives 5 per cent of all moneys by him received and collected, and a fee of 25 cents for each license recorded. He is required to give bonds to the county clerk of Cumberland County in the sum of \$2,000 for the faithful performance of his duties.

The financial requirements of the association are provided for by the assessment of a tax on the net tonnage of each vessel. This rate is fixed annually, and varies considerably from year to year. In 1892 the rate per ton was \$1. In 1893 it was 75 cents, and in 1894, \$1.50. Boats and vessels not exceeding 5 tons, U. S. custom-house measurement, are assessed \$5. In this way a large sum of money is collected each year, but the law provides that, whenever at the end of any year the sum arising from the oyster fund, after all expenses have been paid, shall exceed \$2,000, the collector shall pay the amount in excess of that sum to the treasurer of the State, to be applied to the school fund.* This provision went into effect in 1874, and is still in force. Prior to 1874 the annual amount of the oyster fund in excess of \$1,000 was paid to the county clerk of Cumberland County, to be applied to the support of the schools of that county.

Every captain or commander of any boat or vessel engaged in the oyster business is required to take out a license, authorizing such captain and the boat or vessel of which he is in charge to catch, plant, and grow oysters on the flats and grounds of Delaware Bay and Maurice River Cove. This license is granted by the collector of the oyster fund upon the application of the captain, and is good for one year from the date of issue. On making such application, the captain must produce the enrollment papers of the vessel before the collector, and make oath that the vessel is to be regularly engaged in the oyster business and has not been purchased, hired, chartered, or in any way employed for the purpose of temporarily taking oysters from the natural oyster beds in Delaware Bay or Maurice River Cove. He is also required to make oath to the names of the owners, their places of residence, and their respective interest in such boat or vessel; also that he will at all times diligently aid in the enforcement of the laws of the State for the preservation of clams and oysters, and will promptly report to the special officer any knowledge he may obtain of the violation of said laws. If no doubt then exists in the mind of the collector relative to the good faith of the application, he reduces the statement to writing and places

* No funds from this source have been covered into the State treasury up to the date of this report.

it on file in his office. Then, upon payment by the captain of the amount assessed on the tonnage of his vessel, the license is issued. If, however, the collector entertains doubt as to the truthfulness of the statement, the license is refused and the application, with the oath and other papers accompanying it, are referred to the executive committee, who investigate the case and instruct the collector to issue or refuse to issue the license, as they may determine.

The oyster license entitles its holder to plant oysters in Maurice River Cove, and also to take oysters from the natural grounds of Delaware Bay for planting purposes. While licenses may be issued at any time of the year, they are generally taken out by the captains during the month of April. The fact that every man who holds a license is sworn, not only to obey the law, but also to render every assistance in his power for its enforcement, makes the protective character of the association very strong. Every licensed vessel has an oyster-planting ground in the cove. This ground bears a number, which is painted in black figures 18 inches long on white canvas, and attached to a buoy or stake. The number of the ground is entered on the license, and is painted in black figures, 18 inches long, in the middle of the vessel's mainsail on the starboard side and in the middle of the jib on the port side. The penalty imposed upon captains holding license for neglecting or refusing to thus number their grounds or vessels, after having been notified to do so by the special officer, is, for each offense, a fine not exceeding \$200, or imprisonment in the county jail not exceeding six months, or both. The law also makes it imperative that every vessel or boat engaged in the business shall have a license. Any captain or owner found guilty of taking or planting oysters without a license may be punished by a fine not exceeding \$200, or by imprisonment not exceeding one year, or both; and any vessel employed in the commission of such an offense may be seized and sold, with all her apparatus, and the proceeds of the sale, after deducting costs of the court, shall be paid to the collector of the oyster fund. The penalties for engaging in the business without a license and for illegal dredging are so severe, and the means for enforcing the law so efficient, that these offenses are seldom committed. Vessels propelled by steam, whether wholly or in part, are not permitted to be licensed, nor in any way to engage in the business.

It is also unlawful for any person who has not been a resident of the State for six months next preceding to plant and grow oysters in any of the rivers or bays of the State, and any oysters or shells planted by non-residents become public property and may be taken by the resident citizens. Persons so offending are also subject to a fine not exceeding \$500, or imprisonment not exceeding one year, or both. This provision makes it necessary for the captains of all licensed vessels to be residents of the State, but does not preclude the hiring of non-residents as crews on vessels. A considerable number of the licensed vessels are owned

in Philadelphia and other places outside the State, but in such cases the captains are residents of New Jersey and are the nominal owners and proprietors of the oyster-grounds occupied by them. In this way the law is evaded. The law further provides that oysters shall not be taken from the natural oyster beds of New Jersey and planted in the waters of any other State. It is, however, well known that vessels owned in Philadelphia procure large quantities of seed oysters annually from the natural beds in New Jersey and plant them in the waters of the State of Delaware. The penalty for violating this provision is a fine not exceeding \$200, or imprisonment not exceeding one year, or both; but the law on this point has never been enforced against members of the association, for the reason, apparently, that no one desires to enforce it.

The season for taking oysters from the planted areas and for marketing them begins September 1 and continues until June 15, following; that for taking oysters from the natural beds for planting purposes begins April 1 and continues until June 15. During the months of June, July, and August it is unlawful to take oysters for any purpose whatever from certain natural beds in Maurice River Cove and in the creeks along the shores of Cumberland County, known severally as the East Point beds, Andrews Ditch beds, the beds at the mouth of Dividing Creek and Oranoke Creek, and in creeks where there is a natural growth of oysters which become exposed at low tide. These beds are also exempted from dredging.

During the latter part of March all necessary preparations for beginning the work of catching natural oysters from the public beds and planting them on the cultivated areas in Maurice River Cove are completed. The vessels usually leave port on the 31st of March, providing that day does not fall on Sunday, in order to be on the grounds and ready to begin work at sunrise on the morning of the 1st of April. The law prescribes that oysters shall not be taken before sunrise nor after sunset, nor on Sunday. The business of dredging seed oysters is prosecuted vigorously until the 15th of June, when the season ends. The oysters and shells are dredged up from the beds or natural reefs together, and are loaded on the decks of the vessels. No "culling" or separating of the loose shells from the oysters is done. The culling law, which prohibited all persons from taking away any old shells which could be separated from the oysters without injuring them, or any other materials which might be useful to the beds for the young oysters or "spat" to adhere to, was unfortunately repealed in 1877. This law made it compulsory for the oystermen to cull out, or separate from the oysters, all the old shells and throw them back upon the beds. Since that law was repealed the oysters and shells have been taken together and planted in the cove.

Naturally, the proportion of oysters to the entire quantity of oysters and shells in each deck load becomes smaller as the season advances. According to the estimates of the oystermen, the number of bushels

of shells annually taken from the beds during the planting season considerably exceeds that of the oysters. These shells are not altogether useless for planting. Many of them are covered with small or "blister" oysters, which are sometimes not larger than a finger nail. These, if they live, will in time grow to marketable size. Shells that do not have oysters on them are also valuable, especially when planted on soft bottom, for rendering the beds sufficiently hard to bear oysters.

The size of the deck loads are estimated to vary from 100 to 500 bushels, according to the capacity of the vessel and the abundance or scarcity of the oysters. When a vessel is loaded she carries her freight to the cultivating grounds in Maurice River Cove, where the oysters are "thrown off" (overboard) on the oyster lots with shovels in such a manner as to scatter them over the grounds. This process is called "planting" oysters. It is customary during the planting season for the vessels to leave port on Monday morning and remain at work until Friday or Saturday afternoon, unless compelled to seek shelter from storms. The number of deck loads taken by each vessel ordinarily varies from 20 to 40.

Table showing the estimated quantity and value of shells planted in Maurice River Cove in 1889-1892 taken by dredging vessels, belonging in the counties named, in connection with the collection of seed oysters during the planting season.

Counties.	1889.		1890.		1891.		1892.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
Atlantic	3,000	\$120	4,500	\$180	1,500	\$60	4,000	\$160
Cape May	3,000	120	4,000	160	4,000	160	4,000	160
Cumberland	612,850	24,514	851,875	34,065	943,520	37,740	1,393,450	55,665
Gloucester	2,000	80	2,000	80	.....	.....	2,900	116
Camden	81,200	3,048	94,170	3,567	116,900	4,476	187,100	7,484
Total	702,050	27,882	950,545	38,052	1,065,920	42,436	1,691,450	63,585

After the oysters are planted they are allowed to remain undisturbed on the beds from two to four years to give them time to grow large enough for market. They are sometimes shifted, before being taken up for market, from the grounds where they were first planted to other grounds, in order to facilitate their growth and fattening.

The season for marketing oysters is a busy period. Large numbers of vessels may be seen in favorable weather dredging oysters from the cultivated areas. The oysters are hauled up by the dredges and placed on the vessel's deck, where they are culled, or separated, chiefly into two grades, the large ones and the small ones. The large oysters are called "primes" and the small ones "cullens," or "cullings." These are placed in separate heaps on the deck, and the shells, together with such oysters as are unsuitable for market, are shoveled overboard upon the beds again. When the day's work is finished the oysters are carried to Bivalve or Maurice River, where they are put into large floats, which are so arranged as to admit the water. They are left in the floats for a period sufficiently long to allow them to "drink" the brackish water of the river, which makes their meat white and adds to their appearance of fatness.

The oysters are removed from the floats by men whose especial duty it is to prepare them for shipment. These are termed "scowmen," or "scow gangs." The scowmen count out the oysters into baskets and put them in sacks and barrels. The baskets hold 200 "cullens" or 100 "primes," or, approximately, one-half bushel. It is generally considered that 400 "cullens" or 200 "primes" make one bushel. A sack will usually hold from 600 to 700 "primes," or about twice that number of "cullens." The barrels are said to hold about the same number as the sacks. When this work is done the oysters are handed over to the shippers, who purchase them from the oystermen or catchers. The shippers furnish the sacks and barrels, and the owners of the oysters pay the scowmen for their work at a rate per thousand for the number of oysters handled. The prices which the oystermen receive from the shippers have gradually increased during the past few years. In 1888 the price per 1,000 oysters was \$5 for "primes" and \$2 for "cullens." In 1892 it was from \$6.50 to \$7 for "primes" and \$2.50 for "cullens." They are all sold by the thousand. About one-third of the entire quantity in number are "primes" and two-thirds are "cullens," which would make an equal number of bushels of each grade. The catch of almost the entire fleet of vessels is landed at Bivalve and Maurice River for shipment by rail. At the two places combined there were, in 1892, 36 firms, large and small, engaged in the shipping business. A few of the vessels carry their oysters to Philadelphia, or elsewhere, to market. The following table illustrates the extent of the oyster trade in the years 1889, 1890, 1891, and 1892:

Wholesale oyster trade of Maurice River Cove, New Jersey.

Items.	1889.	1890.	1891.	1892.
Number of firms.....	23	26	31	36
Persons engaged:				
Proprietors.....	34	38	46	51
Employees.....	91	104	117	125
Wages paid.....	\$26,942	\$30,375	\$32,573	\$35,080
Value of property.....	\$28,825	\$31,990	\$37,095	\$41,169
Cash capital.....	\$178,500	\$191,500	\$211,500	\$232,500
Oysters handled:				
Primes..... number..	64,718,804	71,850,888	70,025,373	77,744,362
Cost.....	\$340,363	\$402,258	\$418,724	\$466,786
Cullens..... number..	158,298,228	169,140,807	182,817,770	192,171,762
Cost.....	\$327,556	\$385,371	\$453,718	\$480,342
Total oysters..... number..	223,017,032	240,991,295	252,843,143	269,916,124
Cost.....	\$667,909	\$788,129	\$872,442	\$947,128
Selling price.....	\$760,030	\$840,228	\$962,929	\$1,050,830

The shipments of oysters from Bivalve in the years 1889-1893 are shown by months in the following table. For these valuable and accurate data the Commission is indebted to Mr. W. E. Minor, auditor of freight traffic of the Central Railroad Company of New Jersey. The same gentleman has also furnished the accompanying statement of oyster shipments from Greenwich Pier, in Cumberland County, which, come largely from grounds in Delaware Bay belonging to the State of Delaware.

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Table showing by months the number of sacks and barrels of oysters shipped from Bivalve, New Jersey, in 1889-1893, via the Central Railroad of New Jersey.

Months.	1889.		1890.		1891.		1892.		1893.	
	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.
January	2,194	1,594	7,917	3,468	5,032	3,954	6,255	2,889	1,065	400
February	1,168	1,151	3,424	2,149	4,441	2,837	5,002	2,643	1,425	741
March	1,726	1,040	2,782	2,187	5,428	2,651	3,936	1,741	5,919	2,705
April	1,726	403	2,768	1,088	3,850	1,048	5,850	1,233	8,359	2,007
May	5,407	689	7,201	894	9,087	548	8,871	677	10,216	872
June	3,071	261	3,113	278	5,039	189	2,696	211	4,257	254
July	73	6	464	2	519	18	1,239	79	142	8
August			347	23	461	8	1,358	47	263	7
September	25,730	3,513	32,761	4,576	20,572	3,918	30,675	3,728	25,320	3,553
October	32,598	5,821	40,274	7,942	32,447	8,722	38,264	5,521	30,428	4,984
November	27,766	6,415	36,599	8,346	32,816	5,751	31,154	5,978	25,611	4,008
December	17,322	5,351	10,856	7,113	18,735	5,526	21,062	5,905	10,356	2,697
Total	118,781	26,244	154,500	38,168	138,433	35,170	160,971	30,652	123,370	22,291

Table showing by months the number of sacks and barrels of oysters shipped from Greenwich Pier, New Jersey, in 1889-1893, via the Central Railroad of New Jersey.

Months.	1889.		1890.		1891.		1892.		1893.	
	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.	Sacks.	Barrels.
January			117	125	20		2,083		641	23
February			89	124	103		1,319	33	1,183	22
March			37	59	129		265		2,887	46
April			278	81	281	3	365	2	1,058	73
May			51		421		270	6	1,048	21
June					65				144	
July										
August										
September	578	47	2,589	35	5,007	9	9,708	69	6,904	281
October	1,850	98	2,623	97	5,918	26	10,064	336	8,544	123
November	1,391	217	1,179	6	3,190	41	8,154	140	7,779	147
December	752	125	272	1	2,873	11	5,820	64	2,845	7
Total	4,607	487	7,235	478	18,043	90	38,058	656	33,033	723

While the shipment of oysters continues throughout the entire year, except July and August, the quantities are less in May and June and during the extreme cold weather in the winter, and greatest in September, October, and November. If the winter chances to be severely cold, as it was in 1892-93, so that the river is frozen over, the business of harvesting the oyster crop is, to some extent, interfered with and operations temporarily suspended. The vessels then lay anchored in the stream to await more favorable conditions. There is also a lull in the shipping business during the month of March, when the vessels undergo such repairs as may be necessary, and are fitted preparatory to entering upon the work of the seed-gathering season on the natural beds, which begins on the 1st day of April. At such times of the year the greater part of the fleet is moored in the river. The vessels lie in rows close beside each other on both sides of the stream, leaving only a narrow passage open along the main channel, so that a person might walk a long distance across their decks by stepping from one to another. The sails are furled, topsails clewed at the topmast head, and the scene presented is that of a veritable forest of spars. But as spring draws near, each day brings increasing signs of activity and fewer

vessels are to be seen at their moorings. There is much labor to be done on the cultivated grounds before the planting season begins. The storms of winter, and the ice floes which frequently occur with the approaching spring, carry away many of the stakes and buoys that mark the oyster lots. These have all to be replaced, and 4 o'clock in the morning is not an unusual hour for the oystermen to be astir.

The oyster vessels.—The oyster industry of Maurice River Cove may be said to be exclusively a vessel fishery. Certain natural beds along the shores of Cumberland and Cape May counties are reserved for the use of persons operating in small boats and are not allowed to be planted or dredged upon, but the business done in this way is very limited. The planting business in the cove is conducted almost wholly by vessels ranging in size from 5 to 40 tons; a few small craft under 5 tons are also employed.

The number of vessels shown on the license list of the oyster association for 1892, which may be considered a representative year, is 456, of which 434 were registered at the custom-house and 22 were under 5 tons and therefore not required to register. The aggregate tonnage, exclusive of vessels under 5 tons, was 7,608.47. Of the total number of vessels, large and small, shown on the license list of the association for the year above named, 222 were sloops and 234 were schooners.

The home ports of these vessels—that is, where their permanent documents are obtained—are chiefly Bridgeton, Camden, Somers Point, and Philadelphia. Of the total number of tonnaged craft, 343 belong at Bridgeton, 42 at Camden, 31 at Philadelphia, 8 at Somers Point and at other ports in New Jersey, Delaware, and Maryland.

The typical oyster vessels are of light-draft and have a centerboard. They have a wide beam, with raking stem, projecting cutwater or "long head," wide square or elliptical overhanging stern, flaring sides, and designed to give as much deck room as possible for their size. They are strongly built and possess good sailing qualities, combined with large initial stability. They differ from the Chesapeake oyster schooner in having bulwarks. They have a flush deck, and a low but rather large cabin trunk, the latter being situated on the after part of the deck, as is usual in vessels of this size. The winders, with which the dredges are drawn up, stand near amidships. The sloops carry three sails—mainsail, jib, and gaff-topsail. The mast is tall and the topmast of medium length. The schooners carry a single jib instead of a double-head rig. They also have tall masts and one topmast of moderate length. The light sail ordinarily carried is a main gaff-topsail. Many of the vessels now in use were built expressly for the business. They are provided with sufficient cabin room to accommodate a crew of 3 to 7 men. An estimate of their adaptability for the occupation in which they are employed was summed up by an intelligent oyster captain of the locality in the following expression: "There is no better vessel in the United States for a man to get his living in." They vary in cost, when new, from about \$1,000 to \$5,000 each.

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The following list comprises the vessels licensed to engage in the oyster business by the Maurice River Cove and Delaware Bay Oyster Association in 1892. The names, rigs, tonnage, and home ports of the vessels are given. The number of vessels here shown will be found to be in excess of that reported in the general statistics appended, for the reason that the latter include only the vessels owned in the State, while the list contains some vessels belonging in Philadelphia and also a number of craft of less than 5 tons burden, which are properly classed as boats in the statistical tables:

List of oyster vessels of Maurice River Cove.

(Vessels designated with asterisk (*) are under 5 tons burden and not documented at custom-house.)

Name of vessel.	Net tonnage.	Rig.	Where documented.
Anna B	(*)	Sch ..	
Anna M	9.92	Slp ..	Bridgeton.
Anna Maria	21.89	Sch ..	Do.
Anna Worrel	27.83	Sch ..	Camden.
Anna M. Harris	26.30	Sch ..	Bridgeton.
Anna M. Robbins	24.43	Sch ..	Do.
Anna R. Ludlan	14.58	Sch ..	Do.
Anna W. Neal	15.72	Sch ..	Camden.
Annie Cooney	23.32	Sch ..	Philadelphia.
Annie Douglass	11.82	Slp ..	Bridgeton.
Annie Neary	8.80	Slp ..	Do.
Annie C. Moore	25.91	Sch ..	Do.
Annie H. Carey	7.83	Slp ..	Do.
Archie Mason	7.51	Slp ..	Camden.
Aurora	15.29	Slp ..	Bridgeton.
A. Hulings	7.90	Slp ..	Do.
A. M. Parris	7.75	Slp ..	Do.
A. S. Mulford	23.57	Sch ..	Do.
Abram S. Bird	14.10	Slp ..	Camden.
Acosta	13.27	Slp ..	Bridgeton.
Accommodator	(*)	Sch ..	
Ada C. Shull	32.80	Sch ..	Bridgeton.
Addie V	7.03	Slp ..	Do.
Addy Lee	6.29	Slp ..	Do.
Admiral	30.27	Sch ..	Camden.
Agnes	23.17	Sch ..	Bridgeton.
Albatross	9.22	Slp ..	Do.
Albert G. Mulford	14.75	Sch ..	Do.
Albert S. Crockett	13.58	Sch ..	Do.
Alice M	13.92	Sch ..	Do.
Alice C. Ogden	32.08	Sch ..	Do.
Almedia	20.43	Sch ..	Do.
Almira Cox	17.58	Sch ..	Do.
Alphonso	23.37	Sch ..	Camden.
Amanda B	9.04	Slp ..	Bridgeton.
Amanda B. Lore	20.24	Sch ..	Do.
Amanda and David	13.20	Slp ..	Do.
Ann Virginia	11.59	Slp ..	Do.
Baltimore	21.27	Sch ..	Camden.
Bay Queen	18.51	Sch ..	Bridgeton.
Belle	15.73	Sch ..	Do.
Belle Sage	8.60	Slp ..	Do.
Bertha S	(*)	Slp ..	
Bertha and Stella	23.59	Sch ..	Bridgeton.
Bessie and Lizzie	7.54	Slp ..	Do.
Benlah and Mary	11.19	Slp ..	Do.
Bicycle	15.41	Slp ..	Do.
Black Bird	7.61	Slp ..	Do.
Boyd H. Sheppard	30.02	Sch ..	Do.
Breeze	8.34	Slp ..	Do.
C. B. Mason	8.77	Sch ..	Do.
C. M. Howell	13.62	Slp ..	Do.
C. and H. Elmer	10.82	Slp ..	Do.
C. W. and S. Peace	20.82	Sch ..	Do.
Callena	11.09	Slp ..	Do.
Calvin Dilks	24.34	Sch ..	Do.
Caroline	16.02	Sch ..	Do.
Caroline H. Means	30.46	Sch ..	Do.
Carrie Cawman	(*)	Slp ..	
Carrie Egner	7.67	Slp ..	Somers Point.

List of oyster vessels of Maurice River Cove—Continued.

Name of vessel.	Net tonnage.	Rig.	Where documented.
Carrie Haley	13.21	Sch.	Bridgeton.
Carrie M. Edwards	6.22	Slp.	Do.
Caabier	23.27	Sch.	Do.
Cecilia B. Sheppard	28.49	Sch.	Do.
Charlie Smith	18.92	Sch.	Do.
Christian Lloyd	9.97	Slp.	Camden.
Clara H.	(*)	Slp.	Do.
Claud Clunn	(*)	Slp.	Do.
Claude	10.72	Sch.	Camden.
Clipper	25.72	Sch.	Do.
Clipper	23.04	Sch.	Do.
Clipper	10.50	Sch.	Bridgeton.
Colfax	14.53	Sch.	Tuckerton.
Columbia	5.51	Slp.	Bridgeton.
Cora Bello	23.83	Slp.	Do.
Cornelius Britton	13.98	Sch.	Do.
Cygnat	18.72	Sch.	Do.
D. Corson, jr	28.12	Sch.	Do.
D. C. Adams	25.65	Sch.	Do.
D. P. Mulford	17.27	Slp.	Do.
D. W. McLean	14.07	Slp.	Do.
Daniel F.	19.80	Sch.	Camden.
Daniel Sharp	21.82	Sch.	Philadelphia.
Daniel A. Davis	14.21	Sch.	Bridgeton.
Daniel B. Harris	10.49	Slp.	Do.
Dart	22.80	Sch.	Do.
David R. Lake	(*)	Slp.	Do.
David and Ellen	22.62	Sch.	Bridgeton.
Dawning Light	16.23	Sch.	Do.
Detector	12.30	Slp.	Perth Amboy.
Dolphin	21.00	Sch.	Bridgeton.
Dove	8.96	Slp.	Do.
Dove	7.32	Slp.	Do.
Dowitcher	13.30	Sch.	Do.
Druzilla B. Lee	32.10	Sch.	Bridgeton.
E. Fowler	24.23	Sch.	Do.
E. B. Fithian	5.82	Slp.	Do.
Echo	98.87	Sch.	Philadelphia.
Eden	18.54	Slp.	Bridgeton.
Edison	19.51	Sch.	Camden.
Edmund S. Conner	30.53	Sch.	Do.
Edmund S. C. Guyant	32.03	Sch.	Bridgeton.
Edna M. Lore	9.02	Slp.	Do.
Edna and Zadok	14.32	Slp.	Philadelphia.
Edward C. Burton	15.10	Sch.	Bridgeton.
Edward C. Vannaman, jr	31.57	Sch.	Do.
Elanora	6.40	Slp.	Do.
Eliza Carlisle	22.42	Sch.	Camden.
Eliza Ann Ballard	33.84	Sch.	Bridgeton.
Elizabeth B. Buckaloo	13.35	Slp.	Do.
Ella D.	14.72	Slp.	Do.
Ella M.	28.47	Sch.	Philadelphia.
Ellen Weissinger	28.41	Sch.	Camden.
Ellen A. Richardson	25.05	Sch.	Bridgeton.
Ellsworth	9.45	Slp.	Do.
Elmira H. Lake	29.98	Sch.	Camden.
Eloise Moore	9.11	Sch.	Bridgeton.
Elsie	26.43	Sch.	Do.
Elvina English	23.40	Sch.	Philadelphia.
Elvina E. Schoch	8.26	Slp.	Bridgeton.
Emily B.	16.47	Sch.	Camden.
Emily Jase	12.44	Slp.	Bridgeton.
Emily Smith	(*)	Slp.	Do.
Emily J. Mulford	13.34	Slp.	Bridgeton.
Emily R. Green	10.25	Slp.	Do.
Emily and Rebecca	8.98	Slp.	Do.
Emlen Hewes Green	19.88	Sch.	Do.
Emma Collins	8.18	Slp.	Do.
Emma Rebecca	23.88	Sch.	Camden.
Emma A. Walsh	17.60	Sch.	Do.
Emma C. Lore	32.02	Sch.	Do.
Ephraim Mulford	24.00	Sch.	Do.
Equal Rights	7.97	Slp.	Do.
Equator	23.20	Sch.	Bridgeton.
Ethel Jerrell	10.16	Slp.	Do.
Etta	24.03	Sch.	Do.
Etta B.	7.08	Slp.	Do.
Eva	8.33	Slp.	Do.
Eva M. Carlaw	7.22	Slp.	Do.
Eva M. Robbins	8.48	Slp.	Do.
Excel	20.22	Sch.	Do.
Falcon	31.25	Sch.	Do.
Fayette N. Bradford	9.87	Slp.	Do.
Fearless			

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List of oyster vessels of Maurice River Cove—Continued.

Name of vessel.	Net tonnage.	Rig.	Where documented.
Flying Fish.....	25.24	Sch...	Camden.
Forest G. Howell.....	22.16	Sch...	Bridgeton.
Frances S. Du Bois.....	21.90	Sch...	Do.
Francis Dow.....	15.59	Slp...	Do.
Francis R. Lake.....	11.86	Slp...	Do.
Freddie Liber.....	5.79	Slp...	Do.
Freeman.....	13.25	Sch...	Somers Point.
Friendship.....	9.20	Slp...	Bridgeton.
G. Gandy.....	27.60	Sch...	Camden.
G. W. Crist.....	20.72	Sch...	Bridgeton.
Galileo.....	7.04	Slp...	Do.
Gem.....	9.28	Slp...	Do.
Gem.....	(*)	Slp...	Do.
Gen. McClellan.....	22.02	Sch...	Philadelphia.
George Green.....	20.56	Sch...	Camden.
George M. Ackerly.....	14.27	Slp...	Bridgeton.
George W. Childs.....	36.04	Sch...	Do.
George and Morton.....	15.84	Slp...	Do.
Georgia A. Maxson.....	12.22	Slp...	Do.
Geranium.....	12.26	Slp...	Do.
Gertrude.....	7.70	Slp...	Do.
Glide.....	9.15	Slp...	Do.
Glide.....	11.44	Slp...	Do.
Globe.....	10.51	Slp...	Do.
Golden Light.....	15.20	Slp...	Somers Point.
Gratitude.....	22.27	Sch...	Bridgeton.
Grover Cleveland.....	33.99	Sch...	Camden.
Gussie.....	(*)	Slp...	Do.
Gypsy.....	16.11	Slp...	Bridgeton.
H. H. Meekins.....	18.20	Sch...	Philadelphia.
H. K. Mulford.....	15.97	Slp...	Bridgeton.
H. L. Steelman.....	18.27	Sch...	Do.
Hannah Mulford.....	17.32	Sch...	Do.
Hannah M. Bell.....	5.99	Sch...	Do.
Hannah and Ida.....	38.65	Sch...	Do.
Harriet Elmer.....	11.43	Slp...	Do.
Harriet E. Loundes.....	12.02	Slp...	Do.
Harry C.....	7.57	Slp...	Do.
Hattie B.....	10.69	Slp...	Camden.
Hattie B.....	5.28	Slp...	Bridgeton.
Hattie Jenks.....	10.15	Slp...	Do.
Hattie B. Robbins.....	17.30	Sch...	Do.
Hattie R. Johnson.....	27.67	Sch...	Do.
Hattie W. Mills.....	13.42	Slp...	Do.
Helen Hurd.....	11.59	Slp...	Do.
Helen and Sallie.....	15.52	Sch...	Do.
Henrietta C.....	24.39	Sch...	Do.
Henry Kielnco.....	7.02	Slp...	Do.
Henry S. Lutta.....	9.58	Slp...	Do.
Henry and Howard.....	13.60	Slp...	Do.
Horace S. Peed.....	13.51	Slp...	Do.
Howard T. Leach.....	9.81	Slp...	Do.
Hunter.....	13.32	Slp...	Somers Point.
I. T. Nichols.....	7.96	Slp...	Bridgeton.
Ida.....	7.38	Slp...	Do.
Ida Belle.....	5.34	Slp...	Do.
Ida Florence.....	9.13	Slp...	Do.
Ida Marte.....	23.78	Sch...	Do.
Ida May.....	11.04	Slp...	Do.
Idella.....	9.59	Slp...	Do.
Industrious M.....	8.91	Slp...	Do.
Irene.....	6.90	Slp...	Camden.
Isaac W. Norris.....	21.13	Sch...	Bridgeton.
John B. Hegeman.....	22.03	Slp...	Do.
John C. Hand.....	6.90	Slp...	Do.
John P. Priefold.....	18.61	Sch...	Do.
John S. Johnson.....	12.41	Slp...	Do.
John S. Myers.....	24.09	Sch...	Philadelphia.
John W. Paul, jr.....	8.66	Slp...	Bridgeton.
John W. Willing.....	22.42	Sch...	Philadelphia.
Jordan.....	24.62	Slp...	Somers Point.
Josiah S. Newcomb.....	30.97	Sch...	Bridgeton.
Julia B.....	24.67	Sch...	Do.
Julia A. Cooke.....	9.88	Slp...	Do.
Julia A. Jones.....	40.15	Sch...	Baltimore.
Julia A. Newcomb.....	31.80	Sch...	Bridgeton.
Julia A. Reid.....	10.84	Slp...	Do.
J. Deever.....	22.20	Sch...	Do.
J. Gordon.....	10.22	Slp...	Do.
J. F. Armstrong.....	8.27	Slp...	Somers Point.
J. F. Penny.....	13.80	Slp...	Bridgeton.
J. L. Thomas.....	7.88	Slp. y	Do.
J. O. Smith.....	17.15	Slp...	Do.

List of oyster vessels of Maurice River Cove—Continued.

Name of vessel.	Net tonnage.	Rig.	Where documented.
J. R. Chambers	30.40	Sch ..	Bridgeton.
J. W. Fennimore	15.07	Sch ..	Do.
J. and P. Bradford	14.07	Sch ..	Do.
Jacob Rivell	33.83	Sch ..	Do.
James Howard	10.93	Slp ..	Do.
James Mulvey	17.14	Slp ..	Do.
James D. Godfrey	15.15	Sch ..	Do.
James H. Nixon	30.66	Sch ..	Do.
James P. Nieu Kirk	24.66	Sch ..	Camden.
James A. Smith	15.30	Sch ..	Bridgeton.
Jennie Reeves	15.05	Sch ..	Do.
John Bierly	26.05	Sch ..	Philadelphia.
John Buzby	12.20	Slp ..	Bridgeton.
John Guyant	34.30	Sch ..	Philadelphia.
John A. English	24.25	Sch ..	Do.
Kate and Melissa	13.05	Slp ..	Bridgeton.
Kate and Sarah	14.53	Sch ..	Do.
Katie C	24.67	Sch ..	Do.
Katie Burton	25.92	Sch ..	Philadelphia.
Kensington	15.48	Slp ..	Camden.
Knight	(*)	Slp ..	
L. Drew	8.36	Slp ..	Bridgeton.
L. McMurray	33.04	Sch ..	Baltimore.
La Fayette	25.13	Sch ..	Philadelphia.
Lady of the Lake	20.61	Sch ..	Do.
Laura G.	12.47	Slp ..	Bridgeton.
Laura May	5.69	Slp ..	Do.
Laura Parsons	22.36	Sch ..	Do.
Laurel	14.88	Slp ..	Do.
Lavinia	29.57	Sch ..	Camden.
Lavinia V. Tall	31.46	Sch ..	Philadelphia.
Lela Boyle	22.52	Sch ..	Bridgeton.
Lela	0.50	Slp ..	Camden.
Lena G. Bateman	13.94	Slp ..	Bridgeton.
Lena and Lina Cosler	7.98	Slp ..	Do.
Lewis Hoss	28.94	Sch ..	Philadelphia.
Lifley	9.21	Slp ..	Bridgeton.
Lillie B	11.54	Slp ..	Perth Amboy.
Lillie D	15.32	Sch ..	Bridgeton.
Lillie Anderson	17.74	Slp ..	Do.
Lillie Smith	6.04	Slp ..	Do.
Linnet	5.53	Slp ..	Do.
Little Giant	8.58	Slp ..	Do.
Lizzie	6.92	Slp ..	Do.
Lizzie	10.42	Slp ..	Do.
Lizzie Burt	26.16	Sch ..	Do.
Lizzie May	10.16	Slp ..	Do.
Lizzie J. Robbins	15.73	Sch ..	Do.
Lizzie M. Weaver	31.75	Sch ..	Do.
Lorell H. Sharp	7.46	Slp ..	Do.
Lottie V	11.61	Slp ..	Do.
Lucius and Beasie	26.03	Slp ..	Do.
Lucy	13.75	Sch ..	Do.
Lucy P.	10.41	Sch ..	Do.
Lucy Hopkins	9.03	Slp ..	Do.
Lucy Turner	15.46	Slp ..	Do.
Lucy and Willie	10.70	Sch ..	Do.
Luther Bateman	32.60	Sch ..	Do.
Lydia B.	14.10	Sch ..	Do.
Lydia Compton	(*)	Slp ..	
Lydia and Sylvia	14.66	Sch ..	Bridgeton.
M. P. Ogden	9.98	Slp ..	Do.
M. and W. Robinson	13.04	Slp ..	Do.
M. D. and Bella Mulford	28.63	Sch ..	Do.
Mabel E. Lore	15.04	Slp ..	Do.
Madalene	7.82	Slp ..	Do.
Madora and Emma	8.53	Slp ..	Do.
Maggie D.	9.36	Sch ..	Do.
Maggie Daniels	20.79	Sch ..	Do.
Maggie L. Tolen	23.58	Sch ..	Do.
Maggie and Ida	10.76	Slp ..	Do.
Magnolia	11.74	Slp ..	Do.
Magnolia	16.12	Sch ..	Do.
Mall	12.70	Slp ..	Do.
Marcus L. Godfrey	22.96	Sch ..	Do.
Maria and Frances	15.84	Sch ..	Do.
Marion Mayne	15.59	Sch ..	Do.
Martha Ann	17.80	Slp ..	Do.
Martha C. Campbell	14.49	Sch ..	Do.
Martin Anderson	30.74	Sch ..	Do.

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List of oyster vessels of Maurice River Cove—Continued.

Name of vessel.	Net tonnage.	Rig.	Where documented.
Mary B.....	26.01	Sch...	Bridgeton.
Mary Agnes.....	5.79	Slp...	Do.
Mary Alice.....	12.73	Slp...	Do.
Mary Carman.....	11.37	Slp...	Do.
Mary Elizabeth.....	16.45	Sch...	Philadelphia.
Mary Emma.....	9.52	Slp...	Bridgeton.
Mary Meerwald.....	16.38	Slp...	Do.
Mary A. Bickley.....	12.57	Slp...	Do.
Mary A. Hand.....	31.87	Sch...	Do.
Mary A. Rogers.....	22.83	Sch...	Do.
Mary C. Sharp.....	14.80	Slp...	Do.
Mary E. Davis.....	7.02	Slp...	Do.
Mary F. Sheppard.....	30.46	Sch...	Do.
Mary H. Lake.....	30.24	Sch...	Do.
Mary L. Byrd.....	21.75	Sch...	Do.
Mary L. Cooper.....	9.98	Sch...	Wilmington.
Mary L. Robbins.....	15.07	Slp...	Bridgeton.
Mary W. Mears.....	22.42	Sch...	Do.
Mary Ann Brown.....	19.98	Slp...	Do.
Mary and Eliza.....	9.68	Slp...	Do.
Mary and Margaret.....	20.27	Sch...	Do.
Mary and Violet.....	(*)	Slp...	
May Bateman.....	15.62	Slp...	Bridgeton.
Mattie B.....	10.37	Slp...	Do.
Mattie Holly.....	7.64	Slp...	Do.
Mattie B. Sheppard.....	14.01	Slp...	Do.
Mattie L. Ford.....	30.59	Sch...	Do.
Mattie P. Flavell.....	32.23	Sch...	Philadelphia.
Maud S.....	6.66	Slp...	Somers Point.
Maud M. Robbins.....	13.30	Slp...	Bridgeton.
May Flower.....	5.84	Slp...	Do.
Melvina.....	33.18	Sch...	Do.
Melvina Condit.....	22.88	Sch...	Philadelphia.
Messenger.....	22.17	Sch...	Bridgeton.
Michael Martin.....	29.35	Sch...	Camden.
Morris R. Lee.....	6.06	Slp...	Bridgeton.
N. B. Smith.....	(*)	Slp...	
N. R. Godfrey.....	24.46	Sch...	Philadelphia.
Nancy L. Cosier.....	14.12	Slp...	Bridgeton.
Nellie and Mary.....	20.79	Sch...	Do.
Nellie and Mattie.....	22.21	Sch...	Do.
Nettie and Lena.....	30.30	Sch...	Camden.
New Jersey.....	26.65	Sch...	Philadelphia.
North Star.....	19.10	Sch...	Bridgeton.
O. P. Smith.....	18.26	Slp...	Crisfield.
Ocean Queen.....	18.55	Sch...	Philadelphia.
Octavia.....	(*)	Slp...	
Oregon.....	12.33	Slp...	Bridgeton.
Ospray.....	8.05	Slp...	Newark.
P. Sheridan.....	(*)	Slp...	
Paris C.....	6.06	Slp...	Bridgeton.
Passport.....	10.81	Slp...	Do.
Pathway.....	17.53	Sch...	Do.
Pearl.....	15.10	Slp...	Do.
Pearlla and Lelia.....	9.08	Slp...	Do.
Percy B.....	(*)	Slp...	
Philip Ford.....	31.20	Sch...	Camden.
Phoebe B. Townsend.....	25.03	Sch...	Bridgeton.
Pilot.....	8.01	Slp...	Do.
Polka.....	15.74	Sch...	Do.
Prize.....	27.18	Sch...	Do.
Protector.....	29.96	Sch...	Philadelphia.
Quickstep.....	8.94	Slp...	Bridgeton.
R. Blackman.....	28.48	Sch...	Do.
R. B. Walling.....	14.74	Slp...	Do.
R. D. Bateman.....	28.08	Sch...	Do.
R. E. English.....	12.91	Slp...	Do.
R. K. Ward.....	31.54	Sch...	Do.
R. S. Burney.....	23.72	Sch...	Do.
Ray.....	10.28	Slp...	Do.
Ray R. Newkirk.....	32.25	Sch...	Camden.
Rebecca.....	15.32	Slp...	Bridgeton.
Rebecca N.....	8.59	Slp...	Do.
Rebecca C. Schoch.....	23.17	Sch...	Philadelphia.
Rebecca F. Brunyato.....	20.07	Sch...	Bridgeton.
Rebie and Ella.....	14.00	Sch...	Do.
Rescue.....	26.30	Sch...	Philadelphia.
Rhoda B.....	12.33	Slp...	Bridgeton.
Richard Vaux.....	23.40	Sch...	Do.
Richard B. Jones.....	22.77	Sch...	Do.
Robert Walter.....	82.72	Sch...	Baltimore.
Robert F. Brattan.....	12.50	Slp...	Bridgeton.
Robert T. Lore.....	81.59	Sch...	Do.

List of oyster vessels of Maurice River Cove—Continued.

Name of vessel.	Net tonnage.	Rig.	Where documented.
Rollin S.	11.43	Slp	Bridgeton.
Rosa B.	9.25	Slp	Do.
Roxanna Hand	15.64	Sch	Do.
Ruby S.	(*)	Slp	
S. C. Kemble	23.89	Sch	Bridgeton.
S. J. Delau	34.49	Sch	Philadelphia.
S. N. Howman	(*)	Slp	
Sabrina	13.75	Slp	Camden.
Sallie R. A.	13.69	Slp	Bridgeton.
Sallie M. Burton	25.77	Sch	Do.
Samuel Hanners	9.93	Slp	Do.
Samuel Lake	25.00	Sch	Do.
Samuel C. Jacoby	32.16	Sch	Do.
Sarah Cox	10.86	Slp	Do.
Sarah A. Beckett	6.98	Slp	Camden.
Sarah A. Melson	25.42	Sch	Philadelphia.
Sarah C. Lee	12.85	Slp	Bridgeton.
Sarah M. Mulford	19.19	Sch	Do.
Sarah and Hannah	17.33	Slp	Do.
Sea Bird	7.96	Slp	Do.
Seaman's Bride	27.49	Sch	Camden.
Skipjack	(*)	Slp	
Star	31.20	Sch	Camden.
Starlight	17.68	Slp	Bridgeton.
Starlight	9.04	Slp	Wilmington.
Stella	11.54	Slp	Somers Point.
Stella C.	(*)	Slp	
Sus.	9.14	Slp	Bridgeton.
Sun	9.36	Slp	Do.
Sunlight	25.24	Sch	Do.
Susie B.	(*)	Slp	
Susie C. Raynor	28.07	Sch	Philadelphia.
Sylvan Dell	14.21	Slp	Bridgeton.
T. B. Husted	25.73	Sch	Do.
T. C. Sheppard	(*)	Sch	
T. C. Ladow	23.62	Sch	Bridgeton.
Thomas A. Rogers	26.53	Sch	Camden.
Thomas R. Berry	9.48	Slp	Bridgeton.
Thomas S. Lee	12.14	Slp	Do.
Three Sisters	22.66	Sch	Do.
Tidal Wave	29.13	Sch	Do.
Trader	11.93	Slp	Do.
Trade Wind	6.00	Slp	Do.
Trio	17.78	Sch	Do.
Two Davids	10.27	Slp	Do.
Two Friends	9.42	Slp	Do.
Walter H. Hinson	14.78	Slp	Do.
Walter M. Johnson	24.60	Sch	Do.
Wanderer	25.59	Sch	Baltimore.
Water Lilly	11.94	Slp	Bridgeton.
Waters E. Fisher	13.05	Sch	Do.
Welcome	(*)	Slp	
White Wing	21.63	Sch	Bridgeton.
William Dennis	17.18	Slp	Do.
William Edwards	23.18	Sch	Camden.
William Pollock	11.52	Slp	Bridgeton.
William Shriver	15.48	Sch	Do.
William A. Brooks	12.93	Sch	Do.
William B. Stites	18.55	Slp	Do.
William C. Loro	30.26	Sch	Do.
William F. Cullen	31.38	Sch	Philadelphia.
William H. Berry	26.01	Sch	Bridgeton.
William H. Gatzmer	24.22	Sch	Philadelphia.
William H. Vanneman	9.80	Slp	Bridgeton.
William B. and William J. Carlisle	19.87	Sch	Do.
Willie Russell	12.38	Slp	Do.
Wood Duck	17.42	Sch	Camden.
Valentine Cosier	25.00	Sch	Bridgeton.
Vandalia	10.75	Sch	Do.
Vandalia	18.83	Sch	Camden.
Vandalia	10.16	Slp	Bridgeton.
Victory	26.85	Sch	Do.
Village Belle	24.97	Sch	Do.
Volant	16.35	Slp	Do.
Zeph. S. Conover			

Recapitulation of Maurice River Cove oyster fleet by home ports and rigs.

Ports.	Number of vessels.			Tonnage.		
	Schooners.	Sloops.	Total.	Schooners.	Sloops.	Total.
Baltimore, Md.	4	.....	4	131.50	.....	131.50
Bridgeton, N. J.	159	187	346	3,547.90	2,064.46	5,612.36
Camden, N. J.	33	9	42	825.87	91.94	917.81
Crisfield, Md. ....	.....	1	1	.....	18.20	18.20
Newark, N. J. ....	.....	1	1	.....	8.65	8.65
Perth Amboy, N. J. ....	.....	2	2	.....	23.90	23.90
Philadelphia, Pa.	31	1	32	805.19	14.32	819.51
Somers Point, N. J.	1	7	8	13.25	87.28	100.53
Tuckerton, N. J.	1	.....	1	14.53	.....	14.53
Wilmington, Del.	1	1	2	9.98	9.04	19.02
Unclassified	3	21	24	.....	.....	.....
Total	233	230	463	5,348.22	2,317.85	7,666.07

Personnel, wages, etc.—The men who compose the crews of the vessels are usually native-born citizens of the State. They range from 16 to 50 years of age, the majority being from 25 to 40 years old. Those who live in the towns and villages throughout the counties of Cumberland and Cape May are generally experienced oystermen; but in the spring, when the demand for help is greatest, large numbers come from the northern part of the State and are frequently inexperienced in the business. The oyster captains term them “brickyard men.”

Shipping agents sometimes come from Baltimore to engage berths for men from that city and offer to supply crews at reduced wages. The rate quoted for this class of help in the spring of 1893 was \$17 per month. The regular oystermen have an unconcealed dislike for this kind of competition. The rate of wages customarily paid to experienced men is \$35 per month for common hands and \$50 per month, and upward, for captains. When the vessels are engaged in taking up oysters from the planted grounds for market, they do not ordinarily require more than from 4 to 6 men in a crew, including the captain, but this number is generally increased to from 5 to 7 men during the planting season in the spring.

The captains do not all work for wages; many of them own vessels; but in practically all of the localities directly interested in the oyster business there is a class of men who do not own vessels and who rely upon earning a living at “oystering” for wages by the month, either in the capacity of captains or as members of crews. They are, in oystermen’s vernacular, termed “monthlies” or “monthly men.” These men have acquired by long experience and training a thorough knowledge of all the details of the work, which gives them a decided advantage over others less experienced and enables them to command higher wages.

Dredging apparatus.—The apparatus used by each vessel consists chiefly of 2 winders, usually of iron, 2 dredge chains, and 2 dredges. As a matter of fact, nearly every vessel is supplied with 4 dredges, but only 2 are used at a time. The whole equipment for a vessel of the larger class costs, when new, about \$100. The winders have 2 iron cranks

and are operated by hand. The size of the dredges is limited by law to a tooth bar not exceeding 40 inches in length. The dredge chains, when in use, pass over an iron roller attached to the rail of the vessel.

Questions affecting the oyster industry of Delaware Bay.—One of the most serious questions affecting the oyster industry of Maurice River Cove and Delaware Bay at the present time is the depleted condition of the natural oyster-grounds. With the exception of possibly from 75,000 to 100,000 bushels of oysters obtained annually from the Chesapeake Bay for planting purposes, these grounds are the source from which the large quantities of seed oysters necessary to supply the great demand of the business, which has already reached proportions of no inconsiderable magnitude and is still quite rapidly increasing, are obtained. An idea of the rate of increase may be gained from the fact that in 1888 the number of vessels licensed by the oyster association was 385, in 1892 it was 460, and in 1893 it was 480, which is an average increase of nearly 16 vessels per year. While this rate of growth does not seem large, it nevertheless indicates the probability that in ten years, if the conditions continue to be equally favorable, about 160 vessels will be added to the fleet, and the demand for seed oysters correspondingly increased.

Of course there is a limit to the capacity of the resources now being utilized which would preclude the possibility of the indefinite continuance of any rate of growth, however small, in the business. The problem seems to be to preserve the proper relations between the supply and demand for seed oysters to an extent that will not only enable the maximum of prosperity to be reached, but also to be thereafter maintained.

For the past seventeen years, during the planting season, both the oysters and shells have been dredged from the natural beds in immense quantities. This process has resulted in lessening their productiveness and diminishing the abundance of seed oysters. While many of the oystermen claim that the crop of natural oysters is as large as it was twenty years ago, the fact that some means should be employed to increase the yield of the natural beds has been gradually forcing itself into recognition. Recently the two following propositions have been suggested: First, that the State assume control over Delaware Bay and close it for oystering purposes (so far as the natural beds are concerned) for a period of from three to five years, or less; second, that a rough-culling law be enacted, compelling all dredgers to throw the shells taken with the oysters back upon the beds.

Regarding the first proposition, there are a number of strong objections on the part of many of the oystermen. One of these objections is that to close the bay would throw about 2,000 men out of employment. It might also be urged that it would do no permanent good if the same destructive and wasteful methods were, at the expiration of the period, to be resumed.

The second proposition, that of enacting a culling law, would seem to be worthy of favorable consideration. If such a law were rigidly enforced and the shells not only thrown back into the water but returned to the beds in such a manner that they would be properly distributed, and not so as to accumulate in heaps, it is probable that in a very few years the present conditions would be vastly improved and the yield of oysters greatly increased. Such a law would also be in harmony with the system under which the oyster industry in this region is now being conducted. Were it practicable to apply both of these propositions, the benefit derived would no doubt be much greater than could be secured by either applied separately.

Another question which has recently assumed considerable importance is in relation to the granting or leasing by the State of riparian claims in lands under water lying along the shores of Delaware Bay, in the vicinity of Fortescue Cove, in the region which is reserved as natural oyster-grounds. It is claimed by the oystermen that natural oyster beds are embraced in the riparian claims, and that under the laws of the State relating to the oyster industry the oysters upon these natural beds can not become private property. The culminating struggle relative to the question was precipitated in the spring of 1893, when notice was given to the riparian owners of the intended action and a vessel was sent upon the disputed grounds to dredge oysters. In 1894, by a joint resolution of the legislature, a commission was appointed to investigate and report upon the differences existing between the oystermen and the riparian owners.

The following review of the present situation and the questions at issue is from the Philadelphia Press of May 21, 1894, and emanates from the Trenton, N. J., correspondent of that paper:

There is now the liveliest kind of a war on in south Jersey among the 3,000 oystermen. In consequence, from Camden to Cape May there is a general disturbance of commercial and social relations because of the row.

The courts were appealed to and are listening to the various attitudes of the case, but the legal process was too slow and the oystermen wanted the legislature to come to their rescue, which it did. Assemblyman Austin, of Bridgeton, who has several thousand oystermen as his constituents, introduced a joint resolution which created a special investigating committee to go to the oyster war and get the facts for the legislature.

This investigation is regarded as important because it gives official information that has been needed for years. Every session of the New Jersey legislature the oyster matter comes in in some form. There are 100 or more laws now on the statute books. Nothing has given so much trouble to lawmakers as the clam and oyster laws, because so few know the actual status of the industry. The report of this commission has become the most valuable contribution to the legislature of this session.

The most salient features of the report of the legislature are contained in the following statement:

"The extent and value of the oyster industry in Delaware Bay are not generally appreciated by the citizens of the State. The territory within the bay where oysters will naturally grow or can be profitably cultivated is, roughly speaking, about 200 square miles. Between 500 and 600 vessels, carrying crews of from 3 to 10 men each, are engaged in the business, and, as appears by the last census, the annual

value of the oyster crop, including that of the western shore, is about \$2,000,000. Fifty years ago, when the population was sparse and the means of communication limited, the business was restricted in extent. In early times it consisted in picking up oysters from the natural beds left exposed by the falling tide and catching them with tongs. About forty years ago the business was commenced of taking the young natural oysters and planting them upon the grounds in the deep waters of the bay, where they were left to grow until of marketable size.

"The places where the oysters were planted were marked off by stakes, and the lands thus selected were situated under the waters of the bay in Maurice River Cove. The title to the lands thus appropriated to the cultivation of oysters was in the State, and they were taken without any legislative permission. By a common consent of the persons engaged in this business, the staking out of unoccupied lands in Maurice River Cove and the planting of oysters thereon gave the holder exclusive right to the possession of the lands so appropriated, and the invasion of this right has always been vigorously resented. The territory thus set apart by common consent for the cultivation of oysters is in the vicinity of 50 square miles, or about 32,000 acres, in extent. These lands are held without compensation to the State, and no taxes are levied upon them, or upon the oysters cultivated thereon."

From the time the planting and cultivation of oysters commenced the territory thus used for the purpose has been confined to that part of Delaware Bay included in and adjacent to Maurice River Cove, a locality where, generally speaking, oysters do not naturally propagate. The great body of the bay north of the cove, extending for a distance of some 35 miles in length and of an average width of between 4 and 5 miles, constitutes the natural oyster beds and grounds where the oysters spawn and grow without cultivation. It has been the custom to dredge upon this latter territory for the seed oysters used for planting in Maurice River Cove.

By the twelfth section of the act approved March 8, 1882, it becomes unlawful to take oysters from any of the natural oyster beds or grounds in Delaware Bay north of a line running direct from Egg Island light-house to Cross Ledge light-house from June 15 to April 1 in the succeeding year. This legislative action confirmed the long-recognized custom of dividing the bay into two parts, all south of the line thus established being appropriated for the cultivation of oysters and the territory north of it being retained to secure natural seed oysters for planting purposes. This line was, by the act approved April 3, 1893, moved farther north to the mouth of Straight Creek, and is generally called the "southwest line."

A few miles north of the "southwest line" is what is known as Fortesque Cove, and in that vicinity grants or leases of lands under water have been made from time to time by the riparian commissioners of the State under the act approved March 31, 1869, and the supplement thereto. These grants or leases are 15 in number, 1 being made in 1879, 3 in 1886, 9 in 1892, and 1 in 1893. They embrace a frontage on the exterior line of 13,334 $\frac{2}{3}$ feet, extend out from the shore an average length of 2,876 feet, and include about 973 acres of land under water, and the total amount of consideration paid the State therefor was \$12,143.96. They were all made to owners of the upland adjoining high-water mark, who under the provisions of the eighth section of the riparian act are entitled to a grant or lease upon paying to the State such reasonable compensation or rental as the riparian commissioners may fix.

The occupation by private parties of these lands has been a matter of irritation and dissatisfaction to the men engaged in the oyster business as represented by the Oyster Association. They look upon the privilege of taking oysters from the bay north of the "southwest line" as a natural right. On the other hand, the riparian owners claim that, having purchased or leased these lands from the State in good faith and for a valuable consideration, they are entitled to the exclusive possession of them. The controversy culminated in the spring of 1893, when, under the advice of the counsel of the Oyster Association, and on notice to the riparian owners, a boat was sent upon these disputed grounds and a few oysters taken, the object

being to raise an issue to be decided by the courts. The counsel of the association were desirous that the questions involved should be raised, through the advice of counsel elected to proceed by criminal process, and Capt. Chew, in command of the alleged trespassing vessel, was arrested under the tenth section of the act approved March 8, 1892, which makes it a misdemeanor to dredge or catch oysters upon an oyster bed duly staked out or belonging to any other person. The case was presented to the grand jury of Cumberland County at the October term, 1893, but no indictment was then found. At the January term, 1894, Capt. Chew was indicted, but the trial was postponed until the present May term.

The excitement has been increased because of the delay of the trial of Capt. Chew. Counsel of the Oyster Association, on March 19, advised the executive committee that the best way to settle the matter was for the men to peaceably take the oysters from the natural bed, and for those who claim them under riparian grants to resist and bring action at law. At the last annual meeting of the Oyster Association it voted to increase the tax on vessels to \$1.50 per ton, so as to provide a fund to defend such members as should be prosecuted for dredging upon riparian grants. This will provide a fund of \$6,000. It is, however, denied that the raids were authorized by the association, but the captains acted individually. The riparian owners gave notice that everybody would be prosecuted that raided the riparian lands. The sheriff was notified to summon a posse comitatus to protect property or the county would be held for damages. The sheriff secured a steam vessel and with posse proceeded to the disputed grounds. Several boats were warned off. The sheriff, after watching several days, discharged his posse and returned to Bridgeton. Soon after his departure many vessels appeared and began dredging. One of the riparian owners shot at the invaders for the purpose of frightening them off. Over thirty persons were subsequently arrested and held for court. A bill was then filed in chancery and a temporary order was obtained restraining the officers of the association from using the moneys raised by the tonnage tax in the defense of persons.

The riparian owners claim that in the recent raids they lost \$50,000 worth of oysters.

The questions at issue between the parties are nearly all of a legal character which it is not within the province of this commission to decide, and for the solution of which the courts and the ordinary proceedings therein afford adequate means. While not assuming to decide the legal questions involved, or to pass upon the merits of the claims of the respective parties, the commission deem it their duty, for the information of the legislature, to call attention to these points:

"That the disputed area consists of about 976 acres, being but a very small proportion of the territory which, under existing laws, is open to the public and which is approximately 35 miles long by 4 miles wide; the dispute on the part of the Oyster Association being one of principle rather than one of actual damage.

"That the title of the State to the lands under tide water is, under the decision of our courts, absolute, and that it has been the policy of former legislatures to reserve to the State the right to grant the same to private parties, whether such lands be staked up and occupied for the cultivation of oysters or not. The act passed April 28, 1890, confirmed the right to possession to all the citizens of this State to lands under water occupied by them since January 1, 1880, for the cultivation of oysters, and made oysters grown thereon their private property, provided the lands so occupied do not include natural oyster beds. This act, however, contains this limitation: 'That nothing in this act contained shall give any person or persons the right or title to any of the said lands as against the State, and the State may at any time alter or repeal this law, or the riparian commissioners may make grants the same as if this act had not been passed.'

"That so far as this commission is aware no legislative limitation was placed upon the power of the riparian commissioners to make grants including oyster lands or beds, whether natural or otherwise, prior to the act approved March 6, 1888, which provides: 'That no grant or lease of lands under tide water, whereon there

are natural oyster beds, shall hereafter be made by the riparian commissioners of this State, except for the purpose of building wharves, bulkheads, or piers.' Four of the thirteen grants or leases on the disputed grounds were made and the rights of the parties thereto vested prior to the passage of this act. As to the remaining nine grants made subsequent to 1888, the question of whether they include within their lines any natural oyster beds, and are thus limited in their operation to the building of wharves, bulkheads, and piers, is a question of fact. The ascertainment of the fact is dependent upon the correct definition of the term 'natural bed.'

"On the part of many members of the Oyster Association it is strongly asserted and vigorously maintained that all the bottom of Delaware Bay north of the 'south-west line,' including these riparian lands, constitutes a natural oyster bed. On the other hand, while it appears that scattered natural oysters may be found over nearly all this territory, there are well defined and easily located places where, by reason of the nature of the bottom, oysters will naturally grow in large numbers. These locations are where the bottom is hard, so that the young oysters will not sink into the mud, and usually consist of a mound or elevation above the general level of the bottom, composed of oyster shells, accumulated through years, and to which the spawn attach.

"In view of the testimony presented before the commission, the commission are of the opinion that nearly the entire bottom of Delaware Bay for about 35 miles north of Maurice River Cove constitutes a 'natural oyster ground,' but they are not of the opinion that it is all a 'natural oyster bed,' as the term is generally understood and as it is used in the statutes. The 'natural oyster beds' are distinct and separate from the general bottom of the bay.

"From the testimony of witnesses, and from a personal inspection of the disputed lands, the commission find, as a matter of fact, that within the limits of the foregoing definition the riparian grants in question do not all, nor do the larger part of them, embrace 'natural oyster beds,' but the commission is of the opinion that a large part of some of the grants may, and probably do, include within their bounds what now is, or heretofore has been, such beds.

"In the course of these investigations the commission were impressed with the great depression existing in the oyster industry. Although the planting season is not yet half over, many boats are laid off, others have gone to other States, many men are out of employment, and a feeling of discouragement is general. The commission have endeavored to ascertain the cause for this deplorable situation. The consensus of opinion is, that no adequate measures have been adopted to protect the natural productiveness of the bay. The large number of vessels employed, the improved dredges in use, and lack of proper regulations as to size of the oysters taken, have all combined to practically clean the bay of all natural growth, and, in addition, owing to the absence of any law requiring the separation of the oysters from the shells in dredging, the beds themselves have, in many cases, been either destroyed or seriously injured. This removal and destruction of the beds results in the loss of the oyster spawn, as no material remains to which it can become attached. Last season at least one-half the oysters planted were purchased outside the State, and this season the result will be much worse.

"From the testimony received and the investigations made, the commission find that a majority of the persons in the business agree as to the following points:

"First. That unless some radical change is made in the laws the industry will be extinguished.

"Second. That State control of the oyster lands, under proper regulations as to their use, is desirable.

"Third. That the dredging for natural oysters in the bay should be prohibited, either in whole or in part, for a period of a year.

"Fourth. That a 'rough-cull' law should be enacted; that is, a law requiring the dredger to separate the oysters from the shells of the bed, and prevent the carrying away of the beds themselves.

"This commission strongly recommends that the oyster lands in Maurice River Cove and Delaware Bay be placed under State control, as necessary to their preservation. Connecticut, Delaware, Maryland, and Virginia, all States having large oyster interests, have adopted this policy to the benefit and satisfaction of their citizens.

"A law should be enacted providing for the leasing by the State to private persons of lands to be used for the cultivation of oysters, and for which a small annual rent per acre should be charged. In thus taking control of lands for the cultivation of oysters the State should respect the rights of persons who now occupy staked-up grounds, and they should have the first right to leases for the same and have the title to all oysters now placed thereon. All vessels engaged in the business should pay a tonnage tax to the State and receive licenses; only vessels owned by citizens of this State should be so licensed. Proper legislation for the use of the bay and for the protection of the natural oysters should be made and should include the power to prohibit dredging on the natural oyster-grounds for a time; the introduction of a 'rough-cull' rule; provision for replenishing the oyster beds with shells at State expense. Adequate means should be provided, by guard boats, to enforce the law and protect the bay. Severe penalties should be provided for violations of the law, and in the case of offending vessels the licenses should be revoked. A reasonable rental and license fee will provide sufficient funds to properly protect the industry and enforce the law.

"In case the oyster lands are placed under State control the commission advise that the State acquire title, by condemnation or otherwise, to the lands covered by these riparian grants, to the end that all oyster territory may be held by the State and the use regulated for the benefit of all its citizens."

The outcome of this investigation will be some important legislation next September, when the legislature reconvenes after the summer recess. The attorney-general has taken the report and evidence and read it over carefully, and will prepare a bill which will give the State power to condemn these lands and award to the riparian owners such damages as may be properly assessed. Then these oyster beds will be made public property, subject to the general oyster laws of the State.

IV.—STATISTICS OF THE INDUSTRY.

The following statistics relate to the four years, 1889, 1890, 1891, and 1892, and exhibit in detail the condition and extent of the oyster industry of New Jersey. The figures are specified by counties, twelve of which have oyster interests. These are Hudson, Essex, Union, Middlesex, Monmouth, Ocean, Burlington, Atlantic, Cape May, Cumberland, Gloucester, and Camden. The three first-named counties abut on New York Bay, Newark Bay, and the northern part of Staten Island Sound. The taking of seed oysters is the only branch of the industry carried on there. Middlesex County includes the lower part of Staten Island Sound and the most of Raritan Bay, with Perth Amboy as its principal oyster center. The western part of Raritan Bay, Sandy Hook Bay, the Navesink and Shrewsbury rivers, and the ocean shore of the State as far south as the Manasquan River, are embraced within the limits of Monmouth County. Ocean County contains Barnegat Bay and part of Little Egg Harbor. Most of the latter, however, is in Burlington County, in which is also a large part of Great Bay. Atlantic County embraces the southern and western parts of Great Bay, and has within its limits Little, Reed, Absecon, and Lakes bays, as well as the northern side of Great Egg Harbor. Cape May County constitutes the

projecting tongue of land at the southern end of the State, intervening between Atlantic County on the ocean side and Cumberland County on the Delaware Bay side. Most of Delaware Bay, including Maurice River Cove proper, is off the shores of Cumberland County. The oyster interests of Camden and Gloucester counties consist of a fleet of vessels engaged in oystering in Cumberland County.

Table showing by counties the number of persons employed in the oyster industry of New Jersey in 1889-1892.

Counties.	On vessels.							
	Dredging and tonging.				Transporting.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	4	6	4	4		2	4	4
Essex.....								
Union.....								
Middlesex.....	4				10	16	16	16
Monmouth.....	57	40	40	36	15	22	30	24
Ocean.....					5	14	10	30
Burlington.....	2	2	2		8	16	18	2
Atlantic.....	45	44	26	39	38	30	40	38
Cape May.....	55	52	58	72	11	14	16	17
Cumberland.....	1,211	1,269	1,357	1,481	3			
Gloucester.....	5	5		5				
Camden.....	152	146	166	164	3	3		
Total.....	1,535	1,564	1,647	1,800	111	128	134	131

Counties.	On tonging boats.				On shore.				Total.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	100	105	108	110					104	113	116	118
Essex.....					26	26	26	20	26	26	26	26
Union.....	125	110	90	100	4	6	6	4	129	116	96	104
Middlesex.....	257	257	249	249					280	273	265	265
Monmouth.....	294	298	294	279	22	21	21	21	388	381	385	360
Ocean.....	288	281	285	568					302	297	295	603
Burlington.....	304	318	328	76					314	330	348	78
Atlantic.....	364	300	383	431	12	12	12	12	459	455	461	520
Cape May.....	128	136	143	149					194	202	217	238
Cumberland.....	54	54	62	106	222	241	264	283	1,490	1,504	1,683	1,870
Gloucester.....									5	5		5
Camden.....									155	149	160	164
Total.....	1,914	1,919	1,942	2,068	286	300	329	346	3,846	3,917	4,052	4,351

Table showing by counties the number, tonnage, and value of vessels employed in the oyster industry of New Jersey in 1889-1892.

Counties.	Number.				Tonnage.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
<i>Vessels fishing.</i>								
Hudson.....	2	3	2	2	25.30	45.26	32.03	82.93
Middlesex.....	2				15.18			
Monmouth.....	26	17	15	13	275.76	149.85	136.14	121.00
Ocean.....				2				16.32
Burlington.....	1	1	1		9.05	9.05	9.05	
Atlantic.....	16	16	10	14	192.38	181.12	112.47	157.65
Cape May.....	18	18	20	24	201.37	206.28	228.83	288.83
Cumberland.....	288	303	323	338	4,817.79	5,045.05	6,332.53	5,596.00
Gloucester.....	1	1		1	24.97	24.97		24.97
Camden.....	31	29	31	30	650.42	614.13	688.17	689.33
Total.....	385	388	402	429	6,212.22	6,275.71	6,540.12	6,028.53

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Table showing by counties the number, tonnage, and value of vessels employed in the oyster industry of New Jersey in 1889-1892—Continued.

Counties.	Number.				Tonnage.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
<i>Vessels transporting.</i>								
Hudson		1	2	2		5.50	17.92	17.92
Middlesex	7	6	6	6	98.37	82.89	86.04	86.04
Monmouth	7	10	14	12	80.52	116.75	178.28	160.92
Ocean	7	8	5	13	71.74	90.44	53.50	189.18
Burlington	3	6	7	1	54.30	104.76	129.13	12.90
Atlantic	15	15	15	15	302.78	418.25	420.63	372.37
Cape May	4	5	6	6	98.17	131.20	147.45	146.00
Cumberland	1				32.90			
Camden	1	1			22.64	22.64		
Total	45	52	55	55	851.42	972.61	1,032.85	980.05
<i>Total.</i>								
Hudson	2	4	4	4	25.30	50.85	50.85	50.85
Middlesex	9	6	6	6	113.55	82.89	86.04	86.04
Monmouth	33	27	29	25	356.28	266.60	314.42	282.52
Ocean	7	8	5	15	71.74	90.44	53.50	205.50
Burlington	4	7	8	1	63.35	113.81	138.18	12.96
Atlantic	31	31	25	29	585.16	509.37	533.00	530.02
Cape May	22	23	26	30	299.54	337.57	376.28	435.40
Cumberland	289	303	323	336	4,850.69	5,045.05	5,332.53	5,500.90
Gloucester	1	1		1	24.97			24.97
Camden	32	30	31	30	673.00	636.77	688.17	689.33
Total	430	440	457	477	7,063.64	7,248.32	7,572.97	7,914.58

Counties.	Value.				Value of outfit.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
<i>Vessels fishing.</i>								
Hudson	\$2,650	\$5,700	\$4,500	\$4,500	\$110	\$260	\$120	\$120
Middlesex	1,000				80			
Monmouth	21,300	13,450	21,050	19,800	2,090	1,875	2,417	2,055
Ocean				800				210
Burlington	500	500	500		115	115	115	
Atlantic	13,600	13,150	7,250	9,950	3,003	2,721	1,626	2,449
Cape May	15,450	16,000	16,250	20,850	2,395	2,470	2,440	3,360
Cumberland	296,215	315,415	334,145	368,240	68,697	74,747	78,607	86,123
Gloucester	1,000	1,000		1,000	210	200		135
Camden	45,600	41,900	47,300	49,150	9,215	9,250	9,845	10,325
Total	397,315	407,115	430,995	474,290	85,975	91,698	95,170	104,777
<i>Vessels transporting.</i>								
Hudson		700	1,900	1,900		50	200	200
Middlesex	9,900	8,700	8,000	8,000	1,010	930	930	930
Monmouth	5,100	7,400	13,000	13,200	400	917	1,881	1,453
Ocean	6,200	7,200	4,700	14,300	330	520	395	1,735
Burlington	3,850	7,150	8,650	350	505	970	895	20
Atlantic	23,800	24,200	25,400	21,150	2,235	2,645	2,815	2,783
Cape May	5,500	6,800	8,600	8,800	360	380	520	540
Cumberland	1,700				25			
Camden	1,800	1,700			115	115		
Total	57,850	63,850	70,250	67,700	5,070	6,527	7,636	7,661
<i>Total.</i>								
Hudson	2,650	6,400	6,400	6,400	110	310	320	320
Middlesex	10,900	8,700	8,000	8,000	1,090	930	930	930
Monmouth	26,400	20,850	34,050	33,000	2,490	2,792	4,298	3,508
Ocean	6,200	7,200	4,700	15,100	330	520	395	1,945
Burlington	4,350	7,650	9,150	350	710	1,085	1,010	20
Atlantic	37,400	37,350	32,650	31,100	5,298	5,366	4,441	5,232
Cape May	20,850	22,800	24,850	29,650	2,755	2,850	2,960	3,900
Cumberland	298,015	315,415	334,145	368,240	68,722	74,747	78,607	86,123
Gloucester	1,000	1,000		1,000	210	260		135
Camden	47,300	43,600	47,300	49,150	9,330	9,365	9,845	10,825
Total	455,165	470,905	501,245	541,990	91,045	98,225	102,806	112,438

Table showing by counties the number and value of boats employed in the oyster industry of New Jersey in 1889-1892.

Counties.	Number.				Value.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	42	45	48	50	\$1,050	\$1,125	\$1,200	\$1,250
Union.....	75	65	55	60	3,750	3,250	2,750	3,000
Middlesex.....	251	255	251	251	17,125	17,535	17,065	17,175
Monmouth.....	282	281	276	274	11,765	11,800	11,420	11,315
Ocean.....	325	327	330	676	62,009	53,140	52,250	78,984
Burlington.....	380	397	409	108	20,815	23,060	23,635	6,750
Atlantic.....	490	488	532	584	24,875	26,510	28,689	80,248
Cape May.....	163	172	180	186	4,410	4,645	4,800	4,950
Cumberland.....	37	37	42	70	3,375	3,375	3,730	6,525
Total.....	2,045	2,067	2,123	2,259	139,174	143,330	145,599	160,197

Table showing by counties the quantity and value of apparatus employed in the oyster industry of New Jersey in 1889-1892.

Counties.	Dredges carried on vessels.							
	Number.				Value.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	4	6	4	4	\$80	\$130	\$90	\$90
Middlesex.....	5				75			
Monmouth.....	48	43	40	35	750	1,340	2,204	2,109
Ocean.....								
Burlington.....								
Atlantic.....	38	30	22	26	920	730	520	610
Cape May.....	61	60	68	84	1,040	1,575	1,725	2,125
Cumberland.....	1,128	1,175	1,257	1,304	28,050	29,146	31,281	33,291
Gloucester.....	4	4		4	100	100		100
Camden.....	120	114	123	117	2,975	2,800	3,050	2,925
Total.....	1,406	1,432	1,520	1,574	34,590	35,821	38,930	41,250

Counties.	Tongs carried on vessels.							
	Number.				Value.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	4	2	2	2	\$16	\$10	\$10	\$10
Middlesex.....								
Monmouth.....	8			4	48			28
Ocean.....				5				18
Burlington.....	3	3	3		12	12	12	
Atlantic.....	10	16	8	18	46	74	38	92
Cape May.....								
Cumberland.....								
Gloucester.....								
Camden.....								
Total.....	25	21	13	29	122	96	60	148

Counties.	Tongs, rakes, dredges, etc., carried on boats.							
	Number.				Value.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	60	65	68	70	\$300	\$325	\$340	\$350
Union.....	150	130	110	120	1,050	910	770	840
Middlesex.....	507	513	496	502	3,042	3,078	2,970	3,012
Monmouth.....	600	595	581	665	3,102	3,072	2,982	2,882
Ocean.....	328	321	325	621	1,341	1,312	1,325	2,467
Burlington.....	304	318	328	76	1,103	1,141	1,177	228
Atlantic.....	364	360	383	431	1,533	1,517	1,620	1,685
Cape May.....	128	136	143	149	240	247	202	271
Cumberland.....	54	54	64	108	790	790	855	1,555
Total.....	2,495	2,492	2,498	2,642	12,501	12,392	12,307	13,470

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Table showing by counties the value of shore property and the amount of cash or working capital employed in the oyster industry of New Jersey in 1889-1892.

Counties.	Value of shore and accessory property.				Amount of cash capital.			
	1889.	1890.	1891.	1892.	1889.	1890.	1891.	1892.
Hudson.....	\$1,000	\$1,000	\$1,000	\$1,000				
Essex.....	17,400	17,400	17,500	17,500	\$15,200	\$16,000	\$15,000	\$13,500
Union.....	1,000	2,400	2,400	1,000	2,500	3,000	2,500	1,500
Middlesex.....	19,675	19,825	19,675	13,525	23,900	25,800	25,300	20,800
Monmouth.....	37,995	37,985	37,960	37,890	110,950	111,150	107,650	111,100
Ocean.....	5,300	5,415	5,445	7,320	8,500	8,500	9,500	18,000
Burlington.....	1,137	1,300	1,600		6,000	6,000	6,000	
Atlantic.....	13,353	14,400	14,460	13,060	44,400	44,900	43,400	48,400
Cape May.....	4,325	4,335	4,245	4,245	10,500	11,600	12,000	13,500
Cumberland.....	111,825	114,990	122,695	128,650	203,500	216,500	216,500	272,500
Total.....	213,010	219,110	226,380	225,090	425,450	443,450	467,850	499,300

Table showing by counties the quantity and value of market oysters taken in the oyster industry of New Jersey in 1889-1892.

Counties.	1889.		1890.		1891.		1892.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
<i>Taken by vessels.</i>								
Hudson.....	2,300	\$2,450	9,300	\$9,300	5,500	\$5,500	6,000	\$6,000
Middlesex.....	1,000	1,000						
Monmouth.....	38,908	37,642	73,250	70,936	80,620	82,195	67,415	67,600
Ocean.....							100	80
Atlantic.....	8,500	8,570	7,952	9,417	5,560	6,657	11,100	10,075
Cape May.....	14,813	12,186	23,900	25,694	11,650	14,650	18,280	20,680
Cumberland.....	539,164	470,524	565,359	573,718	527,528	577,061	597,940	619,050
Gloucester.....	1,000	750	1,200	900				
Camden.....	51,058	47,294	51,914	52,990	56,534	61,070	67,050	73,625
Total.....	656,743	580,416	732,875	742,025	687,308	748,333	707,885	827,710
<i>Taken by boats.</i>								
Hudson.....	8,500	10,200	7,500	9,000	7,000	8,400	6,000	7,200
Middlesex.....	33,500	39,865	40,200	47,838	34,200	40,698	36,700	43,673
Monmouth.....	151,431	206,429	142,180	197,288	150,201	202,710	115,122	158,164
Ocean.....	47,300	40,215	45,280	39,212	41,325	35,726	64,288	52,499
Burlington.....	38,695	27,868	39,185	28,502	39,932	29,288	10,150	6,598
Atlantic.....	99,200	122,145	96,550	117,833	97,350	116,908	105,150	124,903
Cape May.....	28,050	31,241	30,850	34,329	38,525	43,081	40,775	46,456
Cumberland.....	1,925	1,805	2,025	1,865	2,025	1,865	3,525	3,365
Total.....	408,601	470,766	403,770	475,867	410,048	479,576	381,708	442,858
<i>Total.</i>								
Hudson.....	10,800	12,650	16,800	18,300	12,500	13,900	12,000	13,200
Middlesex.....	34,500	40,865	40,200	47,838	34,200	40,698	36,700	43,673
Monmouth.....	190,339	244,071	215,430	268,194	230,911	284,905	182,537	225,704
Ocean.....	47,300	40,215	45,280	39,212	41,325	35,726	64,288	52,579
Burlington.....	38,695	27,868	39,185	28,502	39,932	29,288	10,150	6,598
Atlantic.....	107,700	130,713	104,502	127,250	102,916	123,565	116,250	134,978
Cape May.....	42,863	43,427	54,750	60,023	56,175	58,031	59,055	67,136
Cumberland.....	541,089	472,320	597,384	575,583	529,553	579,520	601,465	653,015
Gloucester.....	1,000	750	1,200	900				
Camden.....	51,058	47,294	51,914	52,990	56,534	61,070	67,050	73,625
Total.....	1,065,344	1,060,182	1,136,645	1,218,702	1,098,046	1,227,909	1,149,593	1,270,568

* The quantity of oysters credited to the vessels of this county includes the product of certain grounds in New York adjacent to New Jersey, on which some of the oyster fleet of Perth Amboy operated. The yield thus obtained consisted of 19,993 bushels in 1889, valued at \$15,133; 55,320 bushels in 1890, valued at \$49,569; 50,407 bushels in 1891, valued at \$56,952, and 52,365 bushels in 1892, valued at \$49,690.

Table showing by counties the quantity and value of seed oysters taken in New Jersey in 1889-1892.

Counties.	1889.		1890.		1891.		1892.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
<i>Taken by vessels.</i>								
Middlesex	375	\$310						
Monmouth	41,950	30,955	12,000	\$6,000	600	\$300		
Ocean							3,400	\$1,000
Burlington	2,500	750	2,500	750	2,500	750		
Atlantic	9,119	2,700	19,280	5,830	18,850	4,905	18,975	5,116
Cape May	25,100	7,455	18,100	6,325	20,650	7,358	33,500	12,005
Cumberland	509,732	147,517	621,325	198,958	688,261	228,606	841,015	291,965
Gloucester	2,000	500	2,500	875			2,500	875
Camden	62,400	17,470	69,800	22,130	81,500	28,050	94,100	32,970
Total	713,176	207,663	745,505	240,874	812,361	269,969	994,490	343,931
<i>Taken by boats.</i>								
Hudson	36,000	18,000	35,400	17,700	35,000	17,500	30,000	15,000
Union	120,000	60,000	85,000	42,500	75,000	45,000	60,000	30,000
Middlesex	48,500	24,250	40,500	20,250	43,000	21,500	40,800	20,400
Monmouth	3,000	1,500	2,400	1,200	2,500	1,250	2,200	1,100
Ocean	57,000	14,425	61,530	15,533	65,825	16,000	138,395	34,812
Burlington	20,870	6,867	49,606	10,876	48,900	10,224	18,000	3,600
Atlantic	50,700	12,000	54,800	13,350	67,000	15,190	88,510	19,822
Cape May	5,800	2,070	6,700	2,480	6,000	2,225	7,530	2,620
Cumberland	36,940	9,735	40,949	10,625	48,449	12,275	71,325	18,775
Total	387,819	148,847	376,785	134,514	391,674	141,770	456,530	152,129
<i>Total.</i>								
Hudson	36,000	18,000	35,400	17,700	35,000	17,500	30,000	15,000
Union	120,000	60,000	85,000	42,500	75,000	45,000	60,000	30,000
Middlesex	48,875	24,500	40,500	20,250	43,000	21,500	40,800	20,400
Monmouth	44,950	32,455	14,400	7,200	3,100	1,550	2,200	1,100
Ocean	57,000	14,425	61,530	15,533	65,825	16,000	141,795	35,812
Burlington	32,370	7,617	52,006	11,626	51,400	10,074	18,000	3,600
Atlantic	50,819	14,708	74,080	19,186	85,850	20,095	108,485	24,998
Cape May	30,900	9,525	24,800	8,805	20,650	9,583	40,800	14,625
Cumberland	606,081	157,252	662,274	200,583	736,710	240,881	912,340	310,740
Gloucester	2,000	500	2,500	875			2,500	875
Camden	62,400	17,470	69,800	22,130	81,500	28,050	94,100	32,970
Total	1,100,995	356,510	1,122,200	375,388	1,204,035	411,739	1,451,020	496,060

Table showing by counties the quantity and value of the oysters planted in New Jersey in 1889-1892.

Counties.	1889.		1890.		1891.		1892.	
	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.	Bushels.	Value.
Middlesex	20,400	\$10,250	10,600	\$9,800	22,300	\$11,150	17,700	\$8,850
Monmouth	200,975	105,905	163,940	87,705	140,881	74,732	169,034	91,174
Ocean	47,715	12,163	49,365	12,491	61,050	15,412	115,450	29,088
Burlington	39,630	9,407	50,560	11,549	48,885	10,720	15,800	3,160
Atlantic	108,300	58,815	118,300	61,885	123,450	59,248	130,000	65,085
Cape May	34,500	9,284	38,200	9,984	40,000	10,385	46,400	12,016
Cumberland	671,081	175,222	734,674	232,588	818,210	268,931	1,008,940	344,585
Total	1,122,601	380,986	1,174,630	426,002	1,254,776	450,578	1,513,824	553,956

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