

THE OYSTER FISHERY

ON THE

CANADIAN ATLANTIC COAST

BY

WM. A. FOUND

SECOND EDITION

APRIL, 1927

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1927

SPECIAL APPENDED REPORT—1

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By WM. A. FOUND, Department of Marine and Fisheries

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SPECIAL APPENDED REPORT—I.

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BY WM. A. FOUND, DEPARTMENT OF MARINE AND FISHERIES

The writer is in no sense of the term a scientist, and the subject is therefore approached and dealt with from an entirely practical standpoint, in the hope that practical minds may be turned to the possibilities of an abundant harvest, readily convertible into currency, that may be gathered from beneath the limpid waters of the many bays and other coastal areas around our Atlantic seaboard.

In British Columbia a different species of oyster from that on the Atlantic coast flourishes, but already private culture has taken a firm foothold there, and is being carried on quite successfully, and doubtless in the course of a few years that province will be a large factor in supplying the markets. Hence, in the present article, attention is entirely devoted to the Atlantic seaboard, where the natural beds have practically altogether been relied on to keep up the supply; but which, owing to comparative exhaustion, do not longer produce in any great quantities.

What the Canadian oyster fishery is, and what it might have been under different conditions, form a subject for serious, and from many points of view, painful reflection; but the possibilities for the future are so magnificent, if proper lines of procedure are adopted and followed, that the subject is one which calls for the closest and most thoughtful attention.

While the table of statistics attached to this report, shows a serious falling off in the yield of the fishery, particularly in more recent years, a study of the fishery itself indicates a still more serious condition of things, and the wonder is that the beds have remained productive so long.

In the earlier days only the best known and most productive beds were resorted to, and as the demand increased, not only did more men resort to the fishery, but greater and greater efforts were made to obtain large catches, so that year after year the beds were raked and reraked, other and less important beds were resorted to, which being smaller were the sooner denuded, until now the whole oyster-producing areas of the maritime provinces are in a seriously depleted condition.

To obtain an understanding of the conditions under which the fishermen operated, the regulations which were adopted for its control, may, with advantage, first be considered, from which it will be observed that in later years, they have rapidly become more and more restrictive; but notwithstanding, the fishery continues to decline.

REGULATIONS

Even before Confederation the industry had assumed such proportions as to call for regulation.

In the reign of William IV an Act was passed by the Government of the then colony of Prince Edward Island to prevent the practice of burning live oysters for use as lime, and by another Act, oyster fishing was limited to the residents of the colony. In 1865 regulations were made for leasing by auction certain localities, and persons owning creek lands were encouraged to apply for a grant of their water frontages for oyster culture.

On September 18, 1865, an Act was passed amending the Consolidated Statutes of Canada so as to enable the spending by the Commissioner of Crown Lands, in the formation of oyster beds and the restocking of exhausted fisheries, of a sum not exceeding \$1,000 per year.

This provision was continued and amplified following confederation by "An Act for the Regulation of Fishing and Protection of Fisheries," assented to May 22, 1868, subsections 5 and 6 of section 15 of which read as follows:—

"5. The minister may authorize to be expended annually any sum appropriated by parliament for the formation of oyster beds in various waters, and places found adapted for that purpose, and transplanting oysters, and towards restocking exhausted fisheries by natural or artificial means.
* * * *

"6. With a view to protect the oyster beds in different parts of the bays and coasts of the Dominion, it shall not be lawful for any person to take oysters, or in any way to injure or disturb such oyster beds, excepting during times and on terms permitted by regulation or regulations under this Act, under a penalty of not more than one hundred dollars nor less than forty dollars, together with the forfeiture of the vessel and all the apparatus employed therein, and in default of payment, the party convicted shall be imprisoned for not less than one month, nor more than two months."—

and on May 28, 1868, an Order in Council was approved, under the authority of the Fisheries Act, providing a close season for oyster fishing, from June 1 to September 1 in each year.

No further change was made in the law until August 8, 1885, when an Order in Council was approved, amending the one above cited, so as to extend the close season for oyster fishing to September 15 in each year.

This amended close season was continued in the Consolidated Fishery Regulations of July 18, 1889.

On September 1, 1891, an Order in Council was approved, setting apart a certain area in Shediac harbour, New Brunswick, for the purpose of natural and artificial oyster culture.

On February 9, 1892, an Order in Council was adopted prohibiting oyster fishing through the ice.

On December 16, 1892, the Order in Council of September 1 of that year was amended so as to increase the area set apart in Shediac harbour, and on December 28, 1893, the first extended code of regulations was adopted, which were as follows:—

"1. No person shall fish for, or catch, oysters without a lease or license from the Minister of Marine and Fisheries.

"2. The owner, person or persons interested in a fishing boat employed in the oyster fishery shall cause a memorandum in writing, setting forth the name of the owner, person or persons interested, to be filed with the local fishery officer, who, if no valid objection exists, may, under instructions from the Minister of Marine and Fisheries, issue a fishery license for the same, and any boat or fishing apparatus used without such license, shall be deemed to be illegal and liable to forfeiture, together with the oysters caught therein, and the owner or person using the same shall be subject to the penalties prescribed by the Fisheries Act.

"3. All boats fishing for oysters shall have a registration number corresponding with that of the license legibly marked or painted on the bow of the boat, in white coloured letters on a black ground, and the initial letter of the port to which such boat belongs, such letters to be at least eight inches in length.

"4. Oysters shall not be fished for, caught, killed, bought, sold or had in possession between June 1 and September 15, in each year, both days inclusive.

"5. Fishing for oysters, or any other shell fish through the ice is prohibited.

"6. No person shall fish for, catch, kill, buy, sell or have in possession any round oysters of a less size than two inches in diameter of shell, nor any long oysters measuring less than three inches of outer shell.

"Round oysters of a less size than two inches in diameter, and long oysters measuring less than three inches on the outer shell that may be accidentally caught, shall be returned to the water alive, at the cost and risk of the person so fishing, on whom, in every case, shall devolve the proof of actual liberation.

"Provided always, that persons holding fishery licenses may obtain from the Minister of Marine and Fisheries, permission to fish for and catch small oysters for the purpose of planting or stocking oyster beds.

"7. Fishing for oysters is prohibited on Sunday, and from sunset to sunrise on any other day of the week.

"8. No person shall dig mussel mud within two hundred yards from any live oyster bed, and then only at such place or places as may be prescribed in writing by a fishery officer.

"9. The use of rakes for the purpose of taking oysters on any beds prepared or planted by the Department of Marine and Fisheries, is prohibited."

On February 7, 1894, an area in Tracadie harbour, Antigonish county, Nova Scotia, was set apart for the natural and artificial propagation of oysters.

On September 10, 1896, the use of drags or dredges on the public beds of Prince Edward Island, was prohibited for that season.

This regulation was repeated for the season of 1898 by Order in Council of June 20 of that year and again in the seasons of 1900 and 1901 by Orders in Council of March 27, 1900, and May 11, 1901.

On September 13, 1901, an Order in Council was adopted extending the close season to the 22nd September, and on the 21st May, 1905, it was still further extended so as to prohibit fishing from May 21 to September 22, both days inclusive, it being provided that the change would be effective in Richmond bay, Prince Edward Island, only, in 1904, and elsewhere in 1905, and the size limit for oysters was increased to three inches, for round oysters and three and one half inches for long oysters. It was however, provided that the minister might give permission to take small oysters for stocking purposes.

About the year 1900 the quahaug or hard-shell clam fishery, which previously had been carried on in a small and desultory way, sprang into prominence, following the opening therefor of large and remunerative markets in the United States, and in the course of a few years it by far outstripped the oyster fishery both in volume and value. As a natural consequence, the fishermen in many localities concentrated their energy on the quahaug fishery and desired to be allowed to take quahaugs wherever they could be found, regardless of the effect upon the oyster fishery, as it was entirely of secondary value.

Oysters lie on the top of the beds and require a smooth, firm surface. Quahaugs, on the other hand, burrow in the mud, and are found broadcast, in the tidal rivers, bays, harbours, etc., around the coasts. They find a home in the mud even on the edges of the oyster beds, and frequently they are located in large numbers on soft spots scattered over the beds themselves.

Quahaugs are taken with rakes, having long iron teeth. The rakes are driven into the mud and are lifted to the boat's edge loaded with mud, and any quahaugs that may be found therein are removed and the mud thrown back into the water.

The use of such rakes on the oyster beds themselves will be readily appreciated. The crust would be broken through, and the whole surface roughened. Moreover, the mud and silt that would be carried away by the tides and currents when the rakes were being lifted, or when it was thrown back therefrom into the water, would be carried over all the area round about, and finally deposited on the surface of the beds, not only smothering the oysters thereon, but ruining the possibility of a favourable "set" of spat, as such will only adhere to hard, clean surfaces. This latter detrimental effect would be also experienced when quahaug fishing was being carried on anywhere in the near vicinity of oyster beds.

Hence, a new but grave enemy to the permanence of the natural oyster beds arose, in the instance of a somewhat kindred fishery, of considerably greater value, necessitating its control, and from the point of view of the protection of the fishery itself, its needless curtailment, if the oyster fishery was to be maintained.

This, it may be added, by way of parenthesis, is one of the perplexing conditions that so frequently arise in the protection of the fisheries generally.

An Order in Council was accordingly approved, on the 22nd October, 1901, providing that fishing for quahaugs in the bays, harbours and other waters of Canada, where oysters were taken, should be restricted to areas marked out by the local fishery officer.

On November 14, 1901, to prevent further destruction of the beds in the locality by mud diggers, a regulation was adopted prohibiting mud-digging in a certain portion of Trout river, Prince county, Prince Edward Island; also in a portion of Bideford river in the same county.

As, however, the oyster fishery was still going down, on April 15, 1907, a regulation was adopted, extending the close season from May 21 to September 22, both days inclusive, to from April 1 to September 30, both days inclusive.

As the fishing of oysters through the ice had already been prohibited, the effect of this regulation was to curtail fishing to what might be carried on between October 1 and the time the ice makes in the fall, which taking into consideration the tempestuous weather usually prevailing at that season of the year, limited fishing to about a month or six weeks in the year.

The same regulation, with a view to further safeguarding the beds and fishery, prohibited the use of any implements on oyster beds, other than the ordinary oyster tongs and rakes.

These regulations, with the various amendments, were embodied in the Consolidated General Fishery Regulations, adopted by Order in Council of September 12, 1907, and have not since been changed in any way. They are as follows.—

"1. No person shall fish for or catch oysters without a lease or license from the Minister of Marine and Fisheries.

"2. The owner, person or persons interested in a fishing boat employed in the oyster fishery shall cause a memorandum in writing, setting forth the name of the owner, person or persons interested, to be filed with the local fishery officer, who, if no valid objection exists, may, under instructions from the Minister of Marine and Fisheries, issue a fishery license for the same, and any boat or fishing apparatus used without such license, shall be deemed to be illegal and liable to forfeiture, together with oysters caught therein, and the owner or person using the same shall be subject to the penalties prescribed by the Fisheries Act.

"3. All boats fishing for oysters shall have a registration number corresponding with that of the license legibly marked or painted on the bow of the boat, in white coloured letters on a black ground, and the initial letter of the port to which such boat belongs, such letters to be at least eight inches in length.

"4. Oysters shall not be fished for, caught, killed, bought, sold, or had in possession from April 1 to September 30, both days inclusive, in each year.

"5. Fishing for oysters or any other shell fish through the ice is prohibited.

"6. No person shall fish for, catch, kill or buy, sell or have in possession any round oysters of a less size than three inches in diameter of shell, nor any long oysters measuring less than three and a half inches of outer shell.

"Round oysters of a less size than three inches in diameter, and long oysters measuring less than three and a half inches on the outer shell, and that may be accidentally caught, shall be returned to the water alive, at the cost and risk of the person so fishing, on whom, in every case, shall devolve the proof of actual liberation.

"Provided always that persons holding fishery licenses, may obtain from the Minister of Marine and Fisheries, permission to fish for and catch small oysters for the purpose of planting or stocking oyster beds.

"7. Fishing for oysters is prohibited on Sunday, and from sunset to sunrise on any other day of the week.

"8. (a) No person shall dig mussel mud within 200 yards from any live oyster bed, and then only at such place or places as may be prescribed in writing by a fishery officer.

"(b) No person shall dig mussel mud in Trout river, Prince county, Prince Edward Island, excepting above a line drawn from Peter Miller's middle point to a point of land at the end of Yeo's portage road.

"(c) No person shall dig mussel mud in Bideford river, Prince county, Prince Edward Island, excepting above a line drawn from Bideford shipyard to Colin McKay's point, including Pawes creek.

"9. The use of rakes for the purpose of taking oysters on any beds prepared or planted by the Department of Marine and Fisheries is prohibited.

"10. The use, for taking oysters on oyster beds, of quahaug rakes, tongs operated by purchase power, or tongs or rakes other than the ordinary ones now in use in oyster-fishing in the provinces of Prince Edward Island and New Brunswick, is prohibited.

"11. All the waters of the York or North river, Queen's county, Prince Edward Island, included between the bridge from Poplar island to the west shore on the said river and a due east and west line drawn from the mouth of Forkey creek to the opposite shore, are hereby set apart for the natural and artificial propagation of oysters.

"12. All the waters of Big Tracadie harbour lying east of a line drawn due north and south (true) across the narrowest part of the entrance of the West arm, situated at Tracadie, in the county of Antigonish, in the province of Nova Scotia, are hereby set apart for the natural and artificial propagation of oysters.

"13. All the waters of Shediac harbour, extending from a line drawn south, 67° west (due west magnetic) from Mr. Petitpas' house on Shediac island, to Mr. Wilbur's tannery, on the north side of Wilbur's cove, southwardly to a line drawn from the south extremity of Snake point, 50° 7' 30" west (west by south one-half south magnetic) to the corner of Moncton road, the points where the boundary lines above described cut the high water on shore being marked in each case by a square cedar post, inscribed O.R., and the whole including below low water mark an area of 980 acres, be the same more or less.

"And all the waters of Shediac harbour extending from a straight line drawn south 60° 19' east, between the station established on the south shore of Shediac island, at its mouth, being the point of Shediac island (this being the north limit of the said reserve) and the north boundary of the reserves set apart by the next preceding paragraph, the whole containing an area of 482 acres, more or less."

THE OYSTER AND THE DISTRIBUTION OF OYSTER BEDS

As to the excellence of the quality of the Canadian oyster, there is no question. Not only has it received the highest awards at the different exhibitions at which exhibits have been made, but the price received therefor is extremely high, the Malpeque oyster—the fame of which is broadcast throughout the length and breadth of the country—which grows on the natural beds in Richmond bay, on the north shore of Prince Edward Island, usually bringing the fishermen from \$6 to \$7 per barrel, of two and one-half bushels, whereas a barrel of the same size, in the state of Virginia say, would not bring the producer more than about \$1.40 as a general thing, and yet the fishermen on the Virginia beds would make more in a day, or in a season, than an operator on the famous Malpeque beds, owing altogether to the differences in the quantities taken.

The question immediately arises as to the reason for this tremendous difference in productiveness, and the answer is not far to seek: In Canada the natural beds are practically altogether relied on. In Virginia artificial oyster culture is the great feature in production.

The present conditions in Canada ought not to exist, and should not be allowed to continue. That artificial oyster culture could be carried on along practically the whole coasts of the Maritime Provinces is amply demonstrated by the fact that natural beds exist, or have existed at intervals. In New Brunswick, natural beds have been found between the Caraquet banks, at Caraquet, St. Simon, Shippigan harbour, and Gully Tabusintac, Burnt Church, Bay du Vin, and many other places, in Miramichi bay; Kouchibouguac, Richibucto, Buc-touche, Cocagne, Shediac and Bay Verte. In Nova Scotia oyster beds have been found at River Philip, Pugwash, Tatamagouche, River John, Pietou, Tracadie, Mabou, Margaree, Sydney and nearly everywhere in the Bras d'Or lakes, Albert bridge, Country harbour, St. Mary's river, Liscomb harbour and Jeddore head, and practically the whole coast line of Prince Edward Island is dotted with oyster beds.

At the present time there are possibly 5,000 acres of producing natural beds in New Brunswick, 4,300 acres in Prince Edward Island and 1,250 acres in Nova Scotia, or in all 10,550 acres. The area that might be made oyster-producing, with the expenditure of some capital, and considerable industry and energy is, broadly speaking, limitless, as the conditions as previously stated, appear favourable for oyster culture on practically the whole coast.

Even as long ago as 1889, Canada imported 1,698 barrels of oysters in the shell, 234,502 gallons in bulk and 198,543 pounds in tins, and it was then claimed that only one-third of the oysters consumed in Canada were produced there.

During the fiscal year which ended on March 31, 1910, there were imported into Canada from the United States, 4,150 barrels in the shell, 226,128 gallons in bulk, 454,850 cans of one pint and under, 17,258 cans containing over one pint, but not more than one quart, and 37,703 pounds otherwise prepared, or preserved, the total value of which is placed at \$368,412.

There is no valid reason why, under proper conditions, the supply of Canadian oysters should not only be great enough to fully supply our own markets, but to enable an export trade to be carried on as well.

HISTORY

It seems most probable that many oyster beds ceased to be productive long before the Cabots first sighted the shores of this continent, as beds have been cut through which were thirty feet in thickness, made up of mud and decomposed shells throughout. In the natural process of reproduction and decay, the unfished oyster beds would year after year rise nearer the surface of the water, until finally they would come within reach of the winter ice, the weight of the heavy masses

of which moving over the beds, would soon kill off the oysters. In fact beds have frequently risen so high as to be exposed at every low tide.

The equipment required to carry on oyster fishing is cheap, a small boat and a pair of tongs or a rake being all that is really necessary. In fact in the earlier days, the boats used were estimated to cost ten dollars, and the tongs or rake one dollar, so that for the small sum of eleven dollars a person desirous of engaging in the fishery could fit himself out. Of course barrels were also needed; but empty flour barrels could be had from the grocers for twelve and one-half cents each.

Under such conditions practically any one who had the opportunity and inclination, could arrange to engage in the oyster fishery. No restrictions were considered necessary in the early days, and that even live oysters were largely used for other than food purposes is evidenced by the fact that during the reign of William IV an Act was passed by the then colony of Prince Edward Island prohibiting the burning of live lobsters for lime.

It will thus be seen that the oyster fishery was quite largely carried on from early times, and that even before confederation the fishery was overworked is clear from the fact that the earliest reports of this department indicate an over-exploited fishery, and as a consequence, seriously depleted beds.

In his annual reports, in the early days of the Dominion, the inspector of fisheries for the provinces of New Brunswick and Nova Scotia, Mr. W. H. Venning, who was one of the ablest officers ever on the staff of the department, referred to the denuded condition of the hitherto most productive beds, and urged the advisability of further protecting the existing beds and planting new ones in favourable localities, and particularly the leasing of areas to private individuals. In his report for 1873 he stated that "the simplest, wisest and most effective means of increasing the production of oysters in New Brunswick and Nova Scotia, is to lease all localities favourable to their growth, (whether old beds exist there or not) on such terms as will induce practical men to invest capital in their cultivation. This is the means adopted in other countries, and no other will, in my opinion, ever succeed."

The pity is that this advice was not largely acted upon at that time, as intervening experience has the more clearly shown that even the most highly protective regulations, adequately enforced, will not, unaided, provide against a failure of the fishery on natural beds.

The reasons for this are obvious. In the first place, the natural beds are comparatively small in area, and it is quite impossible to control the number of persons engaging in the fishery as the beds are public property. Then, again, the fishery is of a character, and is carried on at a season that makes it readily possible for others than ordinary fishermen to engage in it, and with an increasing demand for oysters, at attractive prices, the incentive for taking this means of adding to the ordinary source of income is not light. As the supply of oysters begin to fail, greater efforts are made to keep up at least the usual catch, and the whole oyster-producing area is so raked and reraked that it is scraped bare of a sufficient quantity of mature oysters to sufficiently seed the beds.

While the statistics appended to this report appear to indicate a comparatively steady fishery until recent years, it must not be concluded that the supply was kept up from the same beds. The fact is that as the larger and better beds became exhausted, those which at first were not considered worth exploiting were resorted to, and being smaller and not so productive, the sooner gave out. Also minor patches of beds were from year to year being found in the vicinity of the larger ones, which, owing to their insignificant size, had not previously been located, and being well stocked, aided in keeping up the supply; but as all such have now been located and worked, there is small reason to hope that the future can do otherwise than show a continual decrease in the present small yield, unless new methods are adopted.

The extraordinary productiveness particularly of some of the larger beds, notwithstanding excessive fishing from year to year, calls for more than passing notice, as it indicates what could be done, in such localities at least, by means of private culture.

Let us take, for instance, Richmond or Malpeque bay, Prince Edward Island, which has probably 3,000 acres of oyster beds. As long ago as the season of 1883 boats to the number of 150 operated there, with two men to a boat, and the average catches then made were six barrels per boat per day, or three barrels per man.

This heavy fishing had been going on for years before, and with increasing energy since, and yet the bay, though seriously depleted, yielding pecks now where barrels were taken then, is still productive.

While the existing regulations limit oyster fishing to practically a month or six weeks, between the 1st October and the time the ice makes in the fall—the weather usually being too stormy in November to permit of oyster fishing operations—and provide a size limit below which oysters may not be taken, in the earlier days it will be remembered that the only restriction on the fishermen was a close season from the 1st June to the 15th September, there being no stipulation as to size, or fishing through the ice.

The result was that the fishermen, with little thought for the future, did not take time to cull their catches when on the beds; but took everything to shore, where culling took place, and the smaller oysters were then thrown away and wasted, instead of being replaced on the beds, and left there to help keep up the future supply.

Great harm was also done the fishery by fishing through the ice. In this fishery a rake with curved iron teeth, and a handle about forty feet long was used. It was inserted through a hole cut in the ice, and the area round about, as far as the rake would reach, was covered, thus not only breaking up the surface of the oyster bed, but bringing a pile of mud, shells, etc., immediately under the hole, and all small oysters taken were left on the ice to freeze and perish.

In fact it was estimated by a commission, which in 1887 investigated the conditions and requirements of the fishery, that from 20,000 to 30,000 barrels of undersized oysters were being annually destroyed without benefit to any one, by being taken ashore and thrown away during the spring and autumn fishery, and left on the ice to perish during the winter fishery.

MUD-DIGGING

A practice exists in the Maritime Provinces, which, so far as the writer can ascertain, is unknown in any other portion of the globe, viz., mud-digging.

The oyster beds, which have been built up through the process of ages, consist largely of decomposed oyster shells, and marine deposits, and contain a very large percentage of lime.

The soil, of at least Prince Edward Island, is a light sandy loam, from disintegrated red sandstone, and so deficient in lime, it has been stated as to effervesce with acids, making the use of lime proper, or substances containing it, an absolute necessity. Hence the digging up of the oyster beds, as a means of economically finding the required lime, suggested itself, as the work could be carried on most readily in the winter time, through the ice, when the farmer has time to spare, and when the hauling is good.

The mud is usually called "mussel-mud," and it is possible that this misnomer saved it for a long time from attracting that attention which ultimately resulted in its regulation.

Machines called "mud-diggers" were built for raising the mud, consisting of a strong wooden frame-work, about eight feet high, and ten or twelve feet wide, and from 25 to 30 feet long. At one end is a capstan, around which a string

chain is wound, which is carried through a block at the other end, and attached to what is known as a "scoop," consisting of long, sharp iron teeth, somewhat in the shape of a large spoon, which is fastened to a long wooden handle, the length of which depends on the depth of water in which mud digging is to be carried on. The scoop is on a hinge, and can be "tripped" from the opposite end of the handle by the men operating it, so as to readily empty the contents into the sleighs. To the capstan a long arm is attached, to the outer end of which a horse, or, if required, a team of horses is hitched, thus providing the power for raising the scoop full of mud, the chain being wound round the capstan as the horse or horses turn it.

As those seeking the so-called "mussel-mud" wished to obtain it as readily and easily as possible, the largest beds were chosen, without any regard as to whether or not it was a producing oyster bed, and at the beginning, a large hole through which to operate the scoop was cut, at the edge of the bed, and when all the mud that could be taken just there was obtained, the "digger" was moved on ten feet or so, and the hole enlarged to that extent, and so on until the whole bed was cut through.

The amount of mud that has been taken in this way is enormous. As long ago as 1880, it was estimated that at least 200,000 loads were taken from around the coast of Prince Edward Island, and this amount was there largely increased by those living inland in later years, having it shipped to them by the railway.

In this way, it is not too much to say that thousands of acres of producing beds have been destroyed, not only by being cut to pieces, but the silt carried away by the water when the mud was being raised, depositing upon the live oysters on adjacent areas, would smother them, and so cause their death.

This, of course, is not an entirely one-sided question, as it has been strongly urged that the yearly increased yields of the farms on account of the use of the mud was much in excess of the value of the annual output of the oyster fishery; but on this point even the farmers are not agreed amongst themselves. There can be no doubt that the first applications of the lime fertilizer was answered by a vast increase in the acreage yield; but it is evident that in many instances the truth of the old adage:—

"The use of lime without manure, will make the farm and farmer poor," has been experienced, following continual applications of the stimulating material.

As will be observed from the portion of this article under the heading "Regulations," besides mud-digging now being altogether prohibited in certain places, no one is allowed to engage in it within 200 yards of a live oyster bed, and then only on such areas as may be described in writing by a fishery officer; but it is a pity that the matter was not so dealt with at a much earlier date, as there are considerable areas scattered about on which mud-digging could be carried on, without any grave danger to the future of the oyster industry.

A highly interesting course is pursued by the farmers in obtaining this mud in at least one instance in the knowledge of the writer, viz., in the Southwest river, at the district of Clinton, Prince Edward Island.

A large oyster bed formed there through the process of the ages, and grew so high that nearly its whole surface was exposed at every low tide, so that oyster life was practically destroyed on it; but the farmers were unable to avail themselves of it, as owing to the water receding from its surface each tide, the ice could not form on it.

As, however, the water was deep all around it, ice made up to its edges, and the idea was conceived of the farmers working together, and cutting loose a large area of ice of possibly a couple of acres in extent, and at high water, floating it on to the bed, and securely anchoring it to the field ice on the other side.

This was done most successfully, and the mud-diggers hauled on to this ice cake, making it an easy matter to obtain the mud. The practice was followed year after year, and in this way many thousands of tons of the best mud procured, and without injury to the oyster fishery, as the bed had years before ceased to be productive.

INVESTIGATIONS INTO CONDITIONS AND REQUIREMENTS OF THE FISHERY

As long ago as 1886 the inspector of fisheries for New Brunswick, previously referred to, pointed out that the only beds in that province which repaid the labour of raking, were those in Gloucester and Northumberland counties, the valuable beds at Shediac, Shemogue, Cocagne, Buctouche and Richibucto having all been depleted, and as a consequence an abnormal number of fishermen were resorting to the beds that remained productive, so that if something were not done, the fishery would soon be a thing of the past.

Reports of similar conditions were being submitted by the inspectors for Prince Edward Island and Nova Scotia, and with a view to obtaining full information, on which to base remedial regulations, a commission, consisting of Messrs. Edward Hackett, Alfred Ogden, W. B. Deacon and J. Hunter Duvar, was in 1887 appointed to investigate and report on the conditions and requirements of the fishery. As the report of this commission is brief, and contains some valuable information and recommendations, it is embraced herein, with the exception of some preliminaries of an unimportant nature, as follows:—

“The commissioners have personally visited the greater number of the oyster grounds in the four provinces margining the gulf of St. Lawrence, and have to express their view that the live oyster beds are of much larger extent than they anticipated, and, if judiciously supervised, must form a not unimportant item in the national resources of Canada.

“The quality of the oysters on the natural live oyster beds of the lower provinces varies much, owing to the nature of the bottom in oyster waters, the depth, and differing salinity of the water, the shelter, thermal difference, and other natural features that have a bearing on the case.

“Along the greater part of the shore of the gulf of St. Lawrence, east of Gaspé, are evidences that oysters once existed in immense quantities, as is shown by deposits of dead oyster shells, which in places are not less than twenty feet in depth. In some places (but not in all) these beds could be replanted or revived.

“The decadence (death) of the oyster in these places is explainable by the encroachment of the sea on the shifting beaches, by the clearing away of forests, altering the shallow margins of the shores, and from other causes too obtruse for the commissioners now to go into.

“The commissioners have, however, found that the natural live oyster beds of the provinces of New Brunswick and Prince Edward Island, and perhaps of Cape Breton and elsewhere in Nova Scotia, are of large value as a fishing resource, and that there is much ground available in all the Atlantic maritime provinces for profitable private culture under a liberal system that would induce private persons to devote their care to the industry.

“The oyster fishery is different from lobster and other fisheries in that it is prosecuted without expense. A boat worth \$10 and an oyster-tong, costing \$1, are all the material required. So far as the commissioners can learn, there are no vessels specially built for the oyster trade. Large numbers of schooners move annually to the oyster beds and fish them with their own crews, but these vessels are a part of the ordinary coasting marine and cannot be taken into account as part of the oyster fishing plant. It may be mentioned that for want of a system of registration of license, no account

can be obtained of the quantities taken by this fleet of one or two hundred sail. It is, however, evident that much greater quantities of oysters are taken than appear in the official returns. And it is not too much to say that half as many young oysters are destroyed by reckless fishing as appear in the Blue-book. Say a further 20,000 to 30,000 barrels recklessly destroyed annually without benefit to any one, and to the great detriment of the beds.

"In the absence of any system of registration, the value of plant employed in the Canadian oyster fishery is a matter of mere calculation. Perhaps the following approximates as nearly as possible to accuracy:—

	Value	Produce last year
P.E.I.—650 boats and tongs... ..	\$10,650	33,125 barrels.
N.B.—550 boats and tongs... ..	6,150	28,083 "
N.S.—30 boats and tongs... ..	330	1,397 "
Total..	\$17,130	62,605 "

An outfit (total first value) of \$17,000 would cover the whole oyster fishery,—giving partial employment during three months to perhaps 1,500 men, who may be described as only "occasional fishermen."

"The boats are not used solely for oyster fishing. They are the ordinary all-work boats that every farmer with a water-frontage possesses.

"In addition to the floating plant, about sixty thousand barrels are annually required, but these are empty flour barrels at 12½ cents a piece.

"It will thus be seen that the oyster fishery is carried on without capital.

"There is no regulation of the fishery whatsoever, excepting a close season from June 1 to September 15 inclusive; and shore wardens without boats are utterly powerless to check poaching in the close season.

"A series of charts of existing oyster beds and of probable oyster grounds would necessitate prolonged and expensive actual survey, and should be made under the care of a general superintendent of oyster culture.

"The commissioners having carefully gone over the evidence, beg to make the following observations and recommendations:—

"They would respectfully recommend to Your Honour's consideration that one general law or regulation should cover the whole of the Canadian Atlantic seaboard, with the following provisions, namely:—

"1. That existing oyster beds be reserved to the public, and that their limits be officially defined;

"2. That mud-digging be prohibited within sixty yards of any officially recognized workable live oyster bed;

"And that suitable portions of bays, creeks, estuaries or harbours be considered closed for oyster fishing, and said closed portions be laid off for the digging of shell manure;

"3. That bays of considerable extent in which are many oyster beds be marked off in two or more divisions, and that the divisions be fished only in alternate years;

"4. That for the present, the present close season be retained, namely, from June 1 to September 15 in each year, both days inclusive;

"5. That under a penalty of forfeiture of boat and appurtenances, no fisherman shall bring ashore (excepting for authorized purposes) any 'round' oyster that does not measure fully two inches in diameter of shell, nor any long (oblong) oyster that does not measure fully three inches of outer shell, and that possession of such undersized oysters by any person shall be punished by fine;

"6. That all winter fishing be prohibited for oysters (Commissioner Ogden dissenting);

" 7. Temporary or permanent proclamation in close localities where the supply is so nearly exhausted as to warrant closure.

" 8. That under section 21, subsection 4 of the Fisheries Act a liberal inducement be offered under a system of leases to persons who will undertake under stringent regulations to grow oysters on private beds. That is to say—that a lease be given (under bonds), for not more than nine years (renewable) at a nominal rent for the first three years, conditional on a sufficiency of brood oysters being planted on the area within one year after date of the issue of lease. The government to have a lien on such planted beds;

" 9. Easy and inexpensive arrangements, by which persons owning water-frontage may lease their own foreshores for oyster culture from the government;

" 10. That parliament be invited to appropriate a sum or sums for the formation of oyster beds in various waters and places found adapted for that purpose, and for transplanting oysters, and restocking exhausted fisheries by natural or artificial means—in accordance with section 21, subsection 5 of the Fisheries Act.

" 11. The appointment of a responsible officer of fisheries, capable of the position, and to rank with the Superintendent of Pisciculture, as General Superintendent of Oyster Fisheries, and to have general superintendence of all public and private oyster culture;

" 12. A system of registration of oyster boats, with other details to be arranged by the department.

" With reference to clause 12, Mr. Commissioner Ogden moved the insertion of the word 'free' system of registration, etc.

" Mr. Commissioner Deacon moved, seconded by Commissioner Duvar that the annual registration fee for oyster-fishing boats be one dollar.—Carried. Mr. Ogden dissenting.

" All of which above written report is respectfully submitted.

" Dated at Shediac, province of New Brunswick, the fifth day of November, A.D. 1887."

While no immediate amendment of the laws or regulations followed this report, the matter continued to much engage the department's attention, and in 1891, it formed a subject for serious consideration at a conference of the inspectors of fisheries, which was that year held in Ottawa, when the following conclusions were reached:—

" 1. That no fee be charged for licenses.

" 2. No one shall fish for, catch, or have in possession, any oysters the product of the Dominion of Canada, between May 1 and September 30 in each year, both days inclusive, and that in all partially depleted beds no fishing in the winter season through the ice be allowed; the several inspectors to furnish the department with a list of such beds, and the department to make the necessary regulations for such prohibition.

" 3. No one shall fish for, catch, or possess any 'round' oysters under 2 inches in diameter of shell, nor 'long' oysters under 3 inches of outer shell. All oysters taken under these dimensions to be immediately restored to the water, under penalty of fine and forfeiture of all materials, implements or appliances used, and the cancellation of the license.

" 4. That all productive oyster beds now in existence in the waters of Canada be divided with as little delay as possible into three sections, which sections shall only be fished alternately, one section in each year, under the control of the local fishery officers, upon some general plan prepared by the department.

" 5. The committee recommend that the department take the necessary measures to restock as many of the exhausted beds as possible, and that

leases or licenses for a term of years be granted to parties willing to cultivate oysters, where no productive beds now exist, upon such conditions as the department may deem best.

"6. Also, that mud digging be prohibited within 200 yards of any live oyster bed; then only at such place, or places, as may be prescribed by a fishery officer."

This was followed by the prohibiting of taking oysters through the ice.

With a view to having authoritative views as to the best course to pursue, it was decided in 1892 to have an expert, or experts, in the culture of oysters come to Canada and look into conditions at first hand, and after considerable correspondence, it was arranged that Messrs. Ernest and Frederick Kemp, who had much experience in connection with the operations of the noted Whitstable Oyster Company, the largest, most important and most influential corporation of its kind in Great Britain, to come to Canada, and they reached this country on June 5 of that year, and at once proceeded to Shediac harbour, and began an examination of the conditions existing there. After careful examination of the whole bay, they reported it to be a suitable place for oyster culture, and on their recommendation it was decided to set apart a large portion of the bay for the natural and artificial propagation of oysters.

The experts went from Shediac to the other portions of the coast where oyster beds were found, and from that province to Prince Edward Island, and on all hands found that though the beds were frequently badly cut to pieces by mud-digging, conditions were of a character to provide against "the Canadian oyster beds becoming depleted, if the laws of nature were observed, and their recommendations carried out."

Richmond bay they found to be "nothing short of a gold mine." Its resources they considered enormous, and though the beds covered a large area, and were well stocked with oysters and brood, in not a single instance did they find a marine enemy to the oyster.

On the completion of their work in the fall of 1892 Mr. Frederick Kemp was allowed to return home, and Mr. Ernest Kemp was engaged for a further period of three years, following which he was appointed permanently as an oyster expert, and has since been employed off the coast of the maritime provinces, in preparing and afterwards restocking depleted areas, and generally in improving the natural beds. He has done much for the fishery; but notwithstanding it has been continually going down, and that it must continue to do so, more rapidly than ever, under present conditions, is unfortunately all that can be expected.

PRESENT CONDITIONS

While the productive and reproductive capabilities of the natural beds have been shown to be nothing short of phenomenal, it is clear from the foregoing that they have now been so seriously depleted as to render it practically impossible for a sufficient seeding of the beds to keep up the supply, and when this point is reached, the practical depletion of the beds is imminent. In fact, so small are the catches now made, that it is only the extraordinarily high prices obtainable for the oysters, that makes the prosecution of the fishery worth while.

From the regulations it will be observed that the fishing season has from time to time been shortened, until now it is in practice, only about six weeks each year; that areas have been set apart from fishing operations for different periods; and that only the least capable fishing engine—the ordinary tongs and oyster rakes—are allowed.

No permanent benefit can result from the setting apart for a brief period of years, any particular area, as even if it becomes well restocked, the fishermen from all about resort to it when it is reopened, so that in a season or two it will

be so thoroughly scraped as to be, if anything, in a worse condition than before.

In the warmer waters, off the coast of the United States, oysters reach maturity in three years, after which they begin to deteriorate and die; but it may be that growth is slightly slower in our colder waters.

It has frequently been suggested that as a means of saving the natural beds, they should be divided into sections and each section fished in alternate years, so that if the different producing areas were divided each into three sections, one would be fished each year, and each one would therefore have alternately two years' rest; but apart from the question of the feasibility of this course, it would appear of rather doubtful expediency.

In the first place it would be extremely difficult to satisfactorily lay off the areas, and with oysters as scarce as they are now, the difficulty of enforcing such an arrangement will be quite obvious from the fact that at one time two-thirds of the fishing area would be taken from the fishermen, who are now all too crowded.

Again, the beds are not even in their production, so that while one season the take of oysters might be fairly satisfactory, the next year it might be next thing to nil.

Possibly a more important consideration still is the fact that the closing of an area under certain conditions, is its death warrant, as may be seen from the many dead beds scattered around the coast before being exploited by man at all. If the current is sluggish, weeds will grow luxuriously, and soon spread over the whole area, if not destroyed by fishing operations, or otherwise, so that the oyster spat floating about would not be caught, having no clean shells and such like to settle upon, and in a very short time the area would be ruined.

Then, again, Starfish, one of the oysters worst enemies, is reported to be making its appearance in considerable numbers, and if left undisturbed to multiply, they, and not the young oysters, would soon be in possession of the beds.

A certain amount of working on the beds improves their condition, as it rids them of weeds and cleans up the shells, leaving the conditions favourable for the oyster spat to "set."

In short, experience everywhere has shown, that unassisted, the natural beds can not supply an increasing demand, and the result of attempting to force them to do so, even though safeguarding the position by the most restrictive regulations, must inevitably result in the utter spoliation of the beds sooner or later.

One thing, and one thing only, can save the situation in Canada, viz., oyster culture by private enterprise.

OYSTER CULTURE

Before dealing with the possibilities of private oyster culture in Canada, it will be of advantage to look at what has been done in such connection elsewhere, and while it is interesting to follow such operations in the different countries of the world where they are carried on, it will be more useful to concentrate attention to where the conditions are in most respects similar to our own, viz., on the eastern coast of the United States. What has been done there in the way of cultivating oysters, stupendous though it is, there seems to be no reason that we should not do.

According to the statistical abstract of the United States for 1909, the oyster fishery yielded \$15,713,002, and it must not be forgotten that the valuation placed on oysters is approximately one-fourth that here, so that the same quantity of oysters if produced in Canada would be valued at over \$60,000,000, or about double the present value of our whole fisheries.

Another feature should not be overlooked. There has been no paternalism in connection with the United States oyster fishery, the industry having been required to be self-sustaining.

In the United States instead of the regulations and administration of the fisheries being in the hands of the federal government, each state attends to its own fisheries, both as to the provision of the laws, and their enforcement.

So far as the oyster fishery is concerned, the common practice is for the state to place it in the hands of a board consisting of from three to five members, who hold office for four years, the chairman and secretary being paid salaries and the others paid their travelling expenses, and while a certain amount of money is appropriated each year to enable the board to carry on its work, as a general thing, it must first collect the money, in the way of revenue from the fishery, before it can spend it. In fact, in the state of Virginia, which has possibly a greater revenue from its oyster fishery than all the other Atlantic states combined, the board, after paying all expenses of administration and protection, turned into state treasury, in the ten years from 1898, no less than \$423,401, and in 1907 alone, \$66,811.55. Even in 1908, when depression in trade was general, and the demand for oysters consequently seriously curtailed, \$45,442.39 were turned over to the state by the Board of Shell-fish Commissioners. Virginia estimates that it has 400,000 acres that could be used for oyster culture. Possibly less than one-fourth of this amount is yet under lease. In 1908 this state produced over 5,000,000 bushels, between seed and market oysters.

Leases of areas have been granted under varying terms—some from year to year—others for twenty years, and still others in perpetuity.

A close season from April 1 to September 15 is applied to the natural beds, and boats fishing on the public beds must pay a registration fee of fifty cents, and a license fee to use ordinary tongs of \$2, patent tongs being allowed on payment of a fee of \$5.

With a view to assuring the size limit of three inches in length, from hinge to mouth of the oyster, the boats on the public beds are required to be provided with a culling board, so that all oysters may be culled as caught, the shells and undersized ones being returned to the beds.

In Maryland the leases are for a term of twenty years. Only barren bottoms are leased; but a liberal construction is placed on the term, it being held that on grounds where oysters grow naturally, but not in sufficient quantities to enable a living to be made by fishing thereon, are not natural beds, and are therefore open to leasing. It is estimated that an oysterman must earn \$277.77 per season to make a living, so that any area on which he cannot earn this amount is considered as a "barren bottom."

It is estimated that in 1907 Maryland produced at least 6,250,550 bushels.

The fee charged on the leases is \$1 per acre for the first two years, then increasing by \$1 per acre per year, until the rental reaches \$5 per acre. Over 1,000 acres were under lease in that state in 1907.

Tongmen on the natural beds are required to take out licenses, and are permitted to carry on tonging operations 237 days between September 1 and April 25. A size limit of two and one-half inches from mouth to hinge is provided.

In Connecticut it is stated that the oyster industry increased ten fold since the establishment of the planting system, and the volume of business has increased from not more than \$500,000 per annum to \$5,000,000 per annum.

The industry was in a measure controlled by law in this state, as long as fifty years ago, and effective legislation was procured in the early eighties.

Leases seem to have been largely issued in perpetuity at a fee of \$1 per acre; but in addition there is a tax on the value of the property leased. The acreage under lease is enormous, being over 60,000, the lots running in size from one acre to over 11,000 acres.

There is ten times as much area in this state under private culture as in public beds. On the natural beds a license is required to allow fishing, the fee being based on the size of the boat or vessel. For a boat of five tons or under the fee is \$2, and for each additional ton, the fee is increased by \$1.50.

In Rhode Island the laws have not been substantially changed for the last forty years; but the increase in the productiveness of the fishery under the leasing system has been even greater than in Connecticut. There are upwards of 16,000 acres under lease, but a very small portion of which ever grew oysters in a natural way. The rental from the leased areas amounts to more than \$100,000 per year. The term of the leases is from five to ten years, and the fee varies according to the depth of the water over the area leased. Areas have also been disposed of at public auction.

Fishing on the public beds may be carried on by residents of the state only. Tongs only may be used, and the quantity of oysters taken by any one person in a day may not exceed twenty bushels.

In New York areas are leased for a term of fifteen years. Barren bottoms are leased; but the same liberal construction is placed on the term as in Maryland. Upwards of 30,000 acres have been granted under lease. In 1905 the oyster crop in this state was over 6,000,000 bushels.

It is in the Great South Bay of this state that the famous Blue Point oysters are produced. Oysters must remain on the beds there at least three months to be so classed.

The public beds in this state have been raked and reraked, until now they are practically barren.

The Starfish—one of the oyster's worst enemies—abounds in this state. At times they cover the bottom at places to a depth of 18 or 20 inches.

Different devices to combat the stars have been tried; but the one in general use is the Star-mop, or tangle.

It is described in the New York Shell-fish Culture Report for 1905, as being made of cotton cord or "strings arranged in large tassels, or bunches, attached to a steel frame, and is drawn over the beds by means of dredging chains and machinery. The Stars become entangled in the meshes of these mops and are raised in large numbers."

It has been found that by making a ridge of lime around the beds, as long as it remains intact, the Stars will not cross it. This was ascertained by Mr. Herman D. Pausch. He accomplished the making of the ridge or wall by filling paper bags with quick lime, and dropping these along the line of the bed. The paper prevents the lime from being carried away while sinking, and the water slacks the lime.

The report above referred to states that a minimum yield from an acre under cultivation in that state is 100 barrels per annum.

Year by year leases covering additional areas of barren bottoms to be turned into producing beds are taken out. In 1906 over 4,000 acres were leased and 1908, 885 acres. It is reasonable to suppose that all areas for which leases have been obtained are not found possible, at a reasonable cost, to be converted into paying beds.

In New Jersey an Act to Control the Oyster Fishery was passed as long ago as 1842.

In this state about 30,000 acres are under lease, with an enormous area capable of being cultivated being still available. Leases run for a term of ten years, and the fee charged thereon runs from fifty cents to \$3 per acre per annum for the first ten acres, and \$1 for each additional acre.

The close season in this state is from May 1 to September 1, and in the public beds sail boats only are allowed, and the size limit for oysters is three inches.

The value of the shell fish fishery is placed at about \$6,000,000 per annum.

From the above summary of the conditions in the different states referred to, it will be seen that by means of private oyster culture, a tremendous industry has evolved, and that the natural beds now form a small factor in the supply. By energy, courage and experience, great stretches of barren ocean floor have been turned into producing areas of highly remunerative value and not only have the

lessees derived large profits, but the people generally, in this country as well as in the United States, have benefited by being enabled to procure, at prices within the reach of all, the palatable and nutritious food which the oyster provides.

APPLICATION

In the light of such conditions, why have those living along the Atlantic seaboard not turned their earnest attention to the possibilities at their door? The reason is largely that following the decision of the Imperial Privy Council in the Fisheries Reference in 1898, which unfortunately left unsettled in a great measure the question of fishery rights, as between the federal and provincial governments, neither the one authority nor the other has been in a position to grant a lease that would be sufficiently satisfactory to make the holder feel safe to proceed.

In 1890 the department, realizing the great importance of oyster culture, arranged for an appropriation of \$5,000 by Parliament to enable a survey of the grounds to be carried out, and with a view to facilitating the filing of applications by persons desirous of obtaining exclusive licenses for the cultivation of private oyster beds, the following "Regulations to guide surveyors in preparing plans and descriptions for applications for Oyster Fishing Licenses," were prepared:—

"1. All surveys of oyster license limits are to conform to the largest scale admiralty chart published, of the harbour or locality to which the application refers. Such chart can be seen on application to the fishery overseer of the district in which the limits are situated.

"2. Boundaries are to be fixed by reference to well-defined objects marked on the charts, or by any surveyor's boundaries already existing, but in these last cases, the surveyor's boundaries must be defined for plotting on the chart by reference to points marked on the chart, so that they can be accurately located by the officers of the department from the surveyor's description.

"3. Where surveys are bounded by lines, these lines must be due astronomical east and west and north and south lines.

"4. The extremities of any lines, or other boundaries when on land must be marked by monuments in accordance with the law governing land surveys.

"5. The boundaries of lots, when in water, must be so defined that they can be easily located at any future time. Satisfactory definitions would be two cross ranges on land, separated by an angle of at least 60 degrees, with the objects in range defined on plan, or at least three sextant angles, each of not less than 40 degrees, measured to four prominent objects on shore shown on the chart. Compass bearings alone, unaccompanied by any other check, will not be accepted.

"6. A plan of the survey must be furnished, which is to be made on the basis of the admiralty chart of the locality, as above mentioned, either on the same scale or some multiple thereof, or it may be plotted upon a printed copy of the chart. On the plan, all boundaries, distances, bearings and connections, with reference points, must be distinctly shown, and an error, clerical or otherwise, will condemn the whole survey.

"7. The plan must be accompanied by a description giving the metes and bounds of the lot and its area in acres, in such terms as would, in the case of an ordinary land survey be held in a court of law, to be a legal description for a title deed.

"8. In the event of previous surveys having been made in the same locality, the plan is to show the nearest boundaries of such surveys, and their relation to the new survey.

"After the application and plan are complete it should be submitted to the inspector of fisheries for transmission to headquarters, with his report of the area in question, and if approved of by the department, a form of license is made out in his favour for a period of nine years, on a form similar to the following:—"

That considerable public interest was aroused is evidenced by the fact that by the end of 1897, 1,684 acres had been licensed in the maritime provinces; but while this was a long step in the right direction, unfortunately few of the licensees entered into the preparation of the areas licensed in any serious way, and owing to the uncertainty of their holdings, following the decision above mentioned, nearly all of them allowed their licenses to lapse.

In the face, however, of a rapidly failing fishery from the natural beds, it is realized on all hands that the unfortunate unsettled state of the question of relative fishery rights, should not be allowed to longer intervene to prevent the development of an industry with such far-reaching possibilities, and it is hoped that negotiations which are now proceeding with the maritime provinces will shortly result in a *modus vivendi* which will enable the granting of leases which will fully safeguard the holdings of the lessees, following which, it is trusted, those who are prepared to put the requisite energy and capital into the venture all round the coast, will not be found wanting.

It should not be anticipated by those taking up oyster culture, that no difficulties and problems will be met.

Oyster culture, like many other things, seems perfectly simple in theory; but in practice unlooked for conditions are sure to arise, which can only be met by careful study thereof, and persevering energy, and while disappointments and setbacks must be looked for, chiefly by those engaging in the venture, there can be no doubt that those who are ever watchful of conditions and their effects, and who turn their experience to practical account will find their efforts crowned with success, and that with much less labour, an oyster farm under the water will prove immensely more remunerative than one above high-water mark; yes, than even a western wheat farm. It is practice and intelligent watchfulness that make a good ploughman, a good teamster, or a good farmer. So it will prove in oyster culture.

Practically all around the shores of the maritime provinces, and in many of the rivers, natural oyster beds are scattered, and it is only reasonable to expect that barren bottoms that duplicate, or may be made to duplicate producing ones can be made productive. On the other hand, it is unreasonable to anticipate that areas which are quite dissimilar, or which lack even one important condition, will yield abundant crops.

Oysters do not thrive where the bottom is composed of shifting sand, or where mud is deposited, and in locating an area on which to begin the formation of an oyster bed, besides the above, the following conditions, as compared with those where oysters grow naturally, should be kept in view:—

1. Depth of the water,
2. Velocity of the current,
3. Density (salt contained),
4. Organisms used by oysters as food, and
5. Quantity of food in the water.

While some grounds will support hundreds of bushels of oysters to the acre, others will support only 50 or 80, and if more were planted, the whole would fail of sheer starvation.

The depth of the water is a very important consideration, particularly where tongs are used to take the oysters. For instance: ground under 5 feet of water, stocked with 25 bushels to the acre, would yield a tonger as much as

ground 25 feet under water, stocked with 325 bushels to the acre. In water 5 feet deep, a good tongman should go over an acre in twelve and one-half days. In the deep water beds along the United States coast, steam dredges are used. With such the depth of water matters little.

When a suitable bottom has been located, and the water conditions found to be satisfactory, the question of a supply of culch arises.

In this regard the United States planters have a great advantage. On account of the immense quantities of oysters produced, but a small proportion thereof can be marketed in the shell. Hence, in the vicinity of the beds great "shucking" houses have been established, where the oysters are removed from the shell, and are either canned or shipped away to the different markets all over the continent in bulk. The mass of shells that is accumulated as a result of this process is enormous, and nothing makes such excellent culch as oyster shells.

In the absence of a supply of shells, broken stones, coarse gravel, broken tiles and brick, furnace clinkers, etc., could be used. Three hundred bushels to the acre would be a reasonable amount under most conditions.

After the spat is first thrown off by the spawning oyster it remains for a time free-swimming larvæ. The time that it remains in such condition varies according to the temperature of the water. Careful investigation that was conducted in New Jersey in 1908, indicated that when the temperature of the water is from 70 to 75 Fahrenheit, the free-swimming period lasts three weeks; but if the temperature is from 75 to 80 the time is shortened to two weeks, while in water ranging from 80 to 85 it may be as short as one week, so that in Canada on the same basis the usual free-swimming period would be about three weeks.

After this it drops to the bottom, and if it can find a clean suitable surface to which to adhere, it attaches itself thereto and there remains during its lifetime, or until removed. If a clean surface cannot be found it drifts on to destruction.

It is therefore obvious that the culch should be spread over the bed a short time as possible before the time the spat sets, in order that it may be perfectly clean. Hence the importance of experiments of the character above referred to.

It is estimated that the spawning oyster throws off half a million spat each season; but the number that are destroyed by natural enemies and otherwise is enormous.

From the above, one of the uncertainties of oyster culture will be readily appreciated. As the spat rises to the surface after being emitted, and while in its free-swimming stage, it may be carried to a considerable distance from the mother oyster, and away from the bed on which she lay altogether. Hence, under certain conditions of currents and tides one area might be well seeded, while another, equally as well prepared, might not; but with a reasonably large number of spawners, particularly if the area is in a sheltered location, the danger in this regard is largely minimized, as the whole water area will be, so to speak, alive with the young oyster brood.

It will be appreciated that as the industry grows, the chances for a favourable "set" improve, as the amount of spat produced will be relatively increased.

Many suitable areas on the United States coast are devoted to raising what are known as "seed" oysters, which are used to stock the beds instead of trusting to natural seeding.

Areas suitable for growing seed oysters are usually raised bottoms, over which there passes a good flow of water, and as the bottoms are well covered with culch, such areas are in an exceedingly good position for securing an enormous set; but oysters growing so thickly would amount to very little if left to mature, as neither food nor room in sufficient quantity would be available.

This seed is sometimes removed when but a few months old; but it is considered best when about a year old, and indeed it is sometimes two years old, and is so ready for market usually in from two to three years from planting.

A carload of seed will readily stock two acres, and a very large and rapidly growing trade in such oysters has sprung up with the Pacific coast. The young oysters can be taken safely across the continent, and when laid down in the waters of the Pacific, grow and fatten rapidly. An idea of the proportions this transcontinental trade has already assumed will be gathered from the fact that oyster planters in the state of Washington now spend \$300,000 yearly in the purchase of such oysters, and \$150,000 more on their transportation. As this seed sells very cheaply, usually about 25 cents per bushel, the quantity grown, it will be appreciated, is very large.

No doubt these seed oysters, if taken to the maritime province oyster areas, would in growing, largely, if not altogether, acquire that flavour and lusciousness that enable the oysters produced there to command such a high price, and in view of cheapness of these seed oysters, it strongly appeals to the writer that an exceedingly remunerative business might be built up by those going into private culture in the portion of Canada under consideration, having their beds stocked with such seed oysters, particularly on account of the difficulty, owing to the depleted condition of the natural beds, of obtaining oysters with which to stock new beds.

Another difficulty to be encountered in Canada, that does not obtain in United States, is the heavy ice in the winter, which renders impossible the marking of areas with permanent stakes, buoys, etc., so that the bounds of all plots would have to be defined from fixed marks on the shore.

The cost of preparing new oyster beds will, of course, largely depend on the conditions existing; but the requirements are simple: a suitable bottom, consisting of, preferably rather firm mud or clay, superimposed with a coating of culch; a suitable depth of water to not render operations too expensive; a fair amount of current; sufficient salinity; abundant food and an absence or subduing of starfish and other enemies of the young oyster.

In New Jersey, where the value of the oyster is not nearly half what it is in the maritime provinces, it is stated that from \$100 to \$800 of a net profit may reasonably be looked for per acre. It is unquestionable that a successful Canadian culturist must do much better than can be done in New Jersey.

Some sporadic attempts were made in early years to stock certain areas in Quebec, even before 1870; but without success, and no doubt such was due to the fact that the grounds on which oysters were planted were in no wise prepared or suitable for the growth thereof.

It is also a fact that since as long ago as 1871 oyster culture has in a small way been carried on in Prince Edward Island somewhat successfully, and the wonder of it is that from this object lesson, the idea did not spread. Possibly such was largely due to the wonderful fertility and reproductive powers of the natural beds there.

In the year in question (1871) Hon. W. H. Pope (afterwards Judge) acquired a property right to a plot of ground in Squirrel creek, and he was permitted to procure oysters during the months of July and August that year, with which to stock the area. The oysters placed on the beds were bought at 80 cents per barrel and later on, in the open season, when sold in Montreal, they bought from \$2.50 to \$4 per barrel.

Later the area passed into the hands of Hon. J. C. Pope, who at one time was Minister of Marine and Fisheries; but he was unable to give it attention, and disposed of it to Mr. John Richards, of Bideford, in 1885. Mr. Richards improved the area and worked it successfully up to last year (1909), when he sold it to Messrs. Sharp Brothers, of Squirrel Creek, who no doubt will make a brilliant success of the venture.

Another fact should be borne in mind, viz., the price of Canadian oysters is now entirely too high, and they must now be classed in the more remote luxuries.

A well known condition of economics is that if any article becomes too expensive, the people will cease to buy it, and will use some other in its place.

In the present instance, with unlimited supplies available from the United States, though not nearly of such good quality, the interchange is a comparatively simple matter, and in the end the purchasing public will become satisfied "with the next best thing," and so the demand for the Canadian product, at the much higher cost, will cease.

It will therefore be apparent, even from that standpoint, that the present abnormal price cannot hold out long, and if Canada is to remain to be a supplier, even of her own oyster markets, she must produce more, and clearly the only way to do so is by oyster culture by private enterprise.

There is already a large market for oysters, both in the shell and in bulk in Canada, and with new settlers pouring in by the thousands, together with the natural increase, the demand will rapidly grow, and the writer, in concluding, desires to express his hope and confidence that instead of having to be satisfied with unquestionably second best oysters from the United States, Canadian planters will in the not far remote future be wholly supplying the demand, with eminent advantage to the consumer and at wholesome profits to the producer.

TABLE showing the Aggregate Quantities of Oysters caught in the Dominion since 1876, compiled from Annual Reports of the Department of Fisheries.

Year	New Brunswick	Prince Edward Island	Nova Scotia	Totals
	Quantity	Quantity	Quantity	Quantity
	Brls.	Brls.	Brls.	Brls.
1876.....	7,911	7,905	1,040	16,856
1877.....	7,738	20,850	980	29,568
1878.....	11,270	17,902	912	30,090
1879.....	9,420	18,145	1,067	28,632
1880.....	12,280	20,297	1,861	34,438
1881.....	8,413	20,815	2,270	31,498
1882.....	5,859	57,042	1,745	64,646
1883.....	10,317	38,880	1,343	50,540
1884.....	11,851	28,290	1,595	41,736
1885.....	27,368	28,204	1,310	56,882
1886.....	28,083	33,125	1,397	62,605
1887.....	23,196	36,448	1,716	61,360
1888.....	16,384	35,861	1,589	53,834
1889.....	17,760	41,257	2,532	61,549
1890.....	16,710	35,203	3,013	54,926
1891.....	14,934	41,030	4,318	60,282
1892.....	17,840	32,937	3,776	54,553
1893.....	16,365	29,627	3,488	49,480
1894.....	16,960	24,055	2,512	45,527
1895.....	18,070	25,463	2,540	46,073
1896.....	14,700	30,214	2,400	47,374
1897.....	19,835	20,915	2,372	43,122
1898.....	22,675	26,484	2,097	51,256
1899.....	17,250	18,236	2,027	37,513
1900.....	19,240	17,825	1,855	38,920
1901.....	14,460	24,972	1,690	41,122
1902.....	12,719	20,334	1,663	34,716
1903.....	12,470	18,333	1,354	32,157
1904.....	15,320	18,006	1,411	34,737
1905.....	14,300	17,656	1,466	33,422
1906.....	14,920	14,988	1,722	31,630
1907-08.....	15,435	1,672	1,337	26,444
1908-09.....	19,080	11,472	1,515	32,067
1909-10.....	19,340	13,519	1,716	34,575
Total.....	530,473	847,962	65,599	1,444,034