Supplement No. 1, to the Thirty-First Annual Report of the Department of Marine and Fisheries

FISHERIES

REPORT

OF THE

CANADIAN LOBSTER

COMMISSION

1898

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Lobster Commission.

PREFATORY NOTE BY THE CHAIRMAN OF THE COMMISSION.

A brief explanatory word appears desirable in respect to the framing of the report and recommendations of the Commissioners.

Upon a subject of such proportions and complexity as the Lobster Industry of Canada, the perfect unanimity of eight or nine Commissioners on every detail was not to be expected; but the findings set forth in the following pages, represent the consensus of opinion as expressed at the final meetings of the Commission in Ottawa. Upon certain points which two or three Commissioners strongly differed from their colleagues this dissent has in all cases been clearly recorded in the text of the report.

The Commissioners agreed in the decision to include in their report some notes on the habits, etc., of the lobster, which I had published two years ago, and thus add to the completeness and interest of the report. For the statements contained in these pages on the life history of the lobster I am alone responsible. For the rest of the report and the Commissioners' recommendations based thereon, the eight Commissioners are on the other hand responsible, as my own relation to the whole work of the Commission was purely of a formal nature. It was my custom to explain at each public sitting of the Commission this relation, in order to avoid any misapprehension as to the influence a Dominion official might be supposed by some to have upon the conclusions of the Commissioners.

As Dominion Commissioner of Fisheries, I was precluded from incorporating my views with those of my colleagues on the Commission; but as Chairman of the Commission I felt it to be my chief duty to facilitate in every way the progress of its work. Each Commissioner recorded in writing his conclusion upon the various points raised, and the report and recommendations were compiled, in the presence of the Commissioners, from the written views thus recorded. The mutual forbearance and spirit of concession exhibited at the sittings lightened my labours as Chairman of the Commission, labours which otherwise would have been beset by unusual difficulties. No members of a Commission of this nature could have shown more interest or zeal during a lengthy series of sittings, often extremely protracted, and involving during long journeys much personal discomfort from inclement weather. Finally, it is only just to acknowledge the warm interest taken in the Commission's work not only by Sir Louis Davies, Minister of Marine and Fisheries, who kept in communication with the Commission during its tour; but also by the Hon. A. G. Blair, Minister of Railways and Canals, and the Hon. W. S. Fielding, Minister of Finance, who met the Commission personally at two points on the coast.

EDWARD E. PRINCE,
Chairman of the Lobster Commission.

OTTAWA, April, 1899.

REPORT

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CANADIAN LOBSTER COMMISSION

1898.

OTTAWA, 25th April, 1899.

To the Honourable
SIR LOUIS H. DAVIES, K.C.M.G.,
Minister of Marine and Fisheries.

SIR,—In submitting the following report upon the lobster industry of Canada, the Commissioners—appointed by Order in Council of 27th September, 1898—realize that the subject that they have been charged to investigate and report upon is one of great magnitude and of no little complexity.

The lobster industry, during the last quarter of a century, has grown to be one of such importance along the seaboard of the maritime provinces, including Quebec, as to rank as of vital concern to the present population. The industry, while standing third in regard to its estimated value annually, has, it cannot be denied, become of first importance owing to the fact that there are many localities in which the population may be said to depend very largely upon the lobster fishery.

In accordance with the instructions attached to the Order in Council authorizing the Commission, a series of sixty-five sittings in the provinces of Quebec, New Brunswick, Nova Scotia and Prince Edward Island, was arranged. The places visited embraced the following:—Digby, Yarmouth, Lower East Pubnico, Lower Woods Harbour, Barrington Passage, Clark's Harbour, Halifax, Shelburne, Lockeport, Liverpool, Port Matoun, Lunenburg, Jeddore, Tangier, Salmon River, Sherbrooke, Goldborough (Isaac's Harbour), Canso, Guysborough, Arichat, Lower L'Ardoise, Louisburg, North Sydney, Neil's Harbour, North Ingonish, C.B., Bathurst, N.B., Shippegan, Douglastown, Newport, Percé, Port Daniel, P.Q., Chatham, N.B., Richibucto, Kingston, Buctouche, Shediac, Summerside, P.E.I., Egmont Bay, Tignish, Cape Bauld, N.B., Port Elgin, Pictou, Antigonish, River John, Port Hood, Margaree Harbour, Cheticamp, C.B., Pugwash and Wallace, N.S. On the north shore of the Gulf of St. Lawrence and the Magdalen Islands, where the lobster industry is of considerable proportions, sittings were not held, but at some of the sittings a certain amount of evidence in regard to these localities was obtained. Had it been possible, the Commissioners felt that they would have been considerably aided by visits to these two localities. It must be admitted, however, that on the whole the sittings were well attended and excited very general interest. In some cases the sittings were crowded, and the fishermen and packers exhibited the utmost willingness in aiding the Commission's work, by giving valuable evidence.

The work of the Commission was divided into two sections. Three of the Commissioners, Messrs. Moses H. Nickerson, of Clark's Harbour, William Whitman, of Guysborough, and Henry C. V. Le Vatte of Louisburg, Cape Breton, with the chairman (Professor Prince), commencing their work early in October and holding the opening sitting on 6th October at Digby, N.S., and proceeding around the coast of western Nova Scotia from Digby to Halifax, and thence eastward to Guysborough and onward to Neil's Harbour in Cape Breton, concluding the first series of sittings at N. Ingonish, C.B. on 5th November. The remaining members of the Commission, Messrs.

Archibald Currie, of Souris, P.E.I.; Patrick J. Sweeney, Shediac, New Brunswick; Stephen E. Gallant, Richmond, P.E.I.; Robert Lindsay, Gaspé, P.Q.; Donald Campbell, Margree Forks, Cape Breton, and the chairman, commencing the second series of sittings at Bathurst, N.B. on 17th November, and holding over thirty sittings at various points on the coasts of Nova Scotia, New Brunswick, Quebec and Prince Edward Island, the sittings being held in October, November and December, and the concluding ones in the months of March and April of this year.

Notwithstanding that the weather, during the whole time that the commission was holding its sittings, was unprecedentedly bad, rendering the tour of the commissioners extremely difficult and unpleasant, the sittings, with three or four exceptions, were held on the dates arranged for, and the Commissioners cannot forbear stating that the witnesses, both packers and fishermen and other parties interested, willingly attended and at considerable disadvantage, on account of the bad state of the roads and the stormy weather. Thus a large amount of valuable evidence based on practical experience was obtained at every sitting.

This information secured by the Commission will undoubtedly be of permanent value to the Department of Marine and Fisheries in connection with the future regulation of the lobster industry, and in addition to the evidence personally given by witnesses who appeared at the sittings, the Commissioners have received memorials and statements of views from parties who wished to add to the evidence given or to set forth the opinions which they were unable to personally present to the Commission. Indeed the Commission at the various sittings invited such additional evidence in writing, so that there might be no ground for complaint that any interested parties who had evidence to give, had not an opportunity of laying it before the commission.

The Commissioners, in justice to themselves, beg to say that they have left nothing undone to make the evidence as complete as possible, and to obtain from every available source, information which would aid them in making the report as thorough and complete as possible. In some places a second sitting was held, and where necessary as at Halifax, a third sitting took place in order that all the evidence offered might be received.

While the points visited by the Commissioners included such localities as are of importance in connection with the lobster industry, there were many points which it would have been desirable for the Commissioners to have visited and to have locally obtained evidence, but the urgency of the Commision's work and the necessity of bringing it to a conclusion consistently with securing as great a completeness as possible, as well as the extreme inclemency of the weather prevailing during the time the sittings were being held, rendered a more extended tour out of the question, especially as the Honourable the Minister of Marine and Fisheries desired to have the report in his hands with all possible despatch.

The Commissioners, with a view to giving greater completeness to their report, and to render accessible to all parties interested in the lobster industry, information upon the lobster, its habits, propagation, mode of life, &c., as well as details respecting the artificial incubation of the lobsters' eggs, and the method of shipping lobsters alive adopted in other countries, decided to include in these pages certain portions of a special report, (published by the Department of Marine and Fisheries), from the pen of Professor Prince, Dominion Commissioner of Fisheries, and Chairman of the Lobster Commission. Only the more important parts of the article are here given, the full text being contained in Supplement No. 1, to the 29th Annual Report of the Department of Marine and Fisheries.

Lobster Commission.

Habits of the Lobster, &c., by Professor Prince.

The Atlantic shores of Canada are perhaps the most remarkable lobster grounds in the world. Their extent and the abundant supplies of lobsters which, during the last twenty-five years they have produced, are not to be paralled elsewhere. Not many years ago it was no uncommon spectacle to see, after a storm, miles of the shore strewn, between tide-marks with lobsters. In some localities in New Brunswick and Quebec lobsters in wind-rows four or five feet high were cast up by the waves and left stranded and dead along considerable lengths of the coast. As many as one thousand dead lobsters have been counted along two rods of shore and in some years, as in 1873, the destruction of lobsters in this way, especially along the Shippegan shore, Gloucester county, New Brunswick, was memorable. Former abundance of lobsters.

Lobsters were so common that their value was not appreciated. Not only so, but extremely erroneous views prevailed as to the inexhaustibility of the Canadian lobster supply, and the peculiarities of the lobster's habits, migrations and distribution. It is only very recently that the possibility of the depletion of these crustaceans was realized by the fishing population and packers.

Sweden 200 years ago enacted laws to protect its lobster fisheries, the earliest lobster regulations being enacted in 1686, and the Scandinavian lobster supply has outlasted that of all other European countries. Many considerations might be adduced to show that, unless overfishing and illegal capture be prevented, the lobster must inevitably become extinct in Canada as it has become practically in many other countries. Lobsters are admittedly becoming more and more scarce, while the demand and the market price continue to increase. A live lobster of 11 inches in length which ten years ago could not be sold for more than 1 or 2 cents will bring to the fishermen, especially early in the year 10 to 20 cents. A case of canned lobsters which sold in 1897 for $4 or $5 can now readily be sold for $8 or $9, or even more. Increased value.

Among other reasons worthy of mention are its limited geographical range, its extremely local habits and migrations, its perils when shelling, the dangers that threaten the lobster's eggs, and the delicate character of the young fry for many months of their life. The enemies of the lobster are legion, and man adds infinitely to its dangers by spreading baited traps over the grounds which it haunts when it comes in from water to hatch its young. The principal fishing season covers the very months when the parents are hatching out their broods of fry. Causes of depletion.

The lobster is an inshore creature and does not wander far out to sea. Its geographical range along the Atlantic shore is very limited, as no lobsters are found north of Chateau Bay in Labrador or south of Delaware Breakwater. A specimen is recorded as far south as Cape Hatteras, N.C., as taken by the United States Fish Commission Steamer "Albatross" in 1884, and this appears to be the most southerly record of its occurrence. The vast waters off Northern Labrador, Hudson's Bay and the Arctic circle appear to be destitute of this valuable crustacean, nor do the prolific shores of British Columbia yield any lobsters. Each particular bay or inshore area within the range above referred to may be said to have its own local supply of lobsters. Such localities, when once cleaned out, are not replenished in the way they would be, did schools of lobsters constantly move over extensive areas. Certain bays could be named which once abounded with lobsters, but reckless and illegal fishing cleaned them out and lobsters from the localities have not migrated in to take their vacant place. Lobster's geographical range.

In England, Scotland and Ireland as well as along the Atlantic coast of the United States grounds have been overfished, which were once prolific and valuable, and the lobster fisheries in those areas have practically ceased. Decrease in other countries.

The New York *Fishing Gazette*, February 26, 1897, significantly published the following intimation :—

"It is believed that there will be no lobsters packed on the coast of Maine during the coming season. The principal packing will be done in the British Provinces."

In the Dominion of Canada there remains the last great lobster fishery of the world, and it is not too much to say that this fishery has reached a critical stage.

Small size in markets.

The signs of exhaustion are unmistakable. Small immature lobsters, 5 to 8 or 9 inches long, which a few years ago were rejected with contempt are now eagerly taken, and form in some districts the staple article upon which the lobster canners depend. Instead of two or three lobsters sufficing to fill a 1 lb. can, not less than five, six, seven and even ten lobsters are now required.

Ten years ago the average size of lobsters was of 10 inches (2 lbs. weight), while thirty years ago an old fisherman has testified that 13 inches (3½ lbs.) was the average.

Increased lobster gear.

In order to keep up the catch each season the quantity of gear is being increased year by year all around the coast. Yet the average number of lobsters taken per trap has been steadily diminishing.

A prominent packer in Prince Edward Island publicly stated that in a certain cannery with which he was acquainted, the number of cans packed as compared with the number of traps fished from that factory showed this startling decrease :—during a period of six seasons at that factory the average number of 1 lb. cans to each trap fished was in 1891, 24 ; in 1892 it was 16¾ ; in 1893 it was 13½ ; in 1894 it was 12½ ; in 1895 it was 7¾, and in 1896 it was 5½.

The capture and packing of lobsters inferior in size and quality cannot continue, and the taking of "berried" females and even soft shell lobsters indicates the desperate efforts now being made to keep up the aggregate pack. In prolific inshore waters such as those of Newfoundland these strenuous attempts are viewed with the gravest fears by those qualified, by knowledge and business experience to judge. The best authority on United States fishing matters made a few weeks ago this announcement :—

Newfoundland lobster-packers propose to enter into the packing of this fish more largely than ever the coming season, and many new men will operate small factories in various parts of the island. This, in view of the fact that the ground all about the island is being overfished, would indicate that unless some restrictions other than those now in force are placed upon the fishery, the lobster in Newfoundland will soon be extinct.

Local distribution of lobsters.

Fishermen have discovered that lobsters can be caught in deeper water than was formerly fished ; but their occurrence in deeper water merely shows that the lobsters when they forsake the inshore shallow areas resort to these greater depths. Instead of moving, as many still think, over great portions of the coast, the lobsters, as the fact stated shows, migrate from deeper water into shallower and back again. No doubt the great schools pass the winter at depths of 40 or 50 fathoms ; but during the warm summer months they move into shallow water, 2 to 10 fathoms, where the females ripen their eggs and hatch them out.

Habits of lobster.

When moving at leisure the lobster walks nimbly along on the tips of its toes holding its nipping claws slightly raised in front, waving its long feelers aloft, while the short second pair is held straight to the front like rigid bayonets. It turns its protruding stalked eyes in every direction. The tail is held spread out behind so as not to touch the ground.

When alarmed or in danger instead of proceeding forward, it swims backward by the convulsive and powerful strokes of its tail. It shoots along at a rate of twenty-five or thirty feet per second ; but rapid swimming is so exhausting to the lobster that it is physically unable to continue this violent

method of progression very long. Moreover, when swimming the lobster cannot see where it is going; it only sees the danger from which it is fleeing; but observers have noted with astonishment how accurately it directs its course. A lobster, it is said, will at times bound tail formost out of the narrow entrance of a lobster-trap in which it finds itself confined. The very young lobster uses its feathery feet for swimming, as will be described on a later page, and progresses rapidly head foremost quite in contrast to the habit of swimming backward in the adult.

The lobster is most active at night and shuns excess of light. It is impatient of heat or extreme cold, and under such conditions becomes sick and inactive; but in water of a temperature of 40° to 50° F. it is most vigorous and healthy. The heart and principal blood-vessels of the lobster as well as the main venous sinuses lie in the back of the creature, hence exposure to the hot rays of the sun is rapidly fatal. Lobsters confined in inshore ponds and in floating cars die in great numbers from heat and exposure for the physiological reason just stated.

Food.

Lobsters may be almost said to be omnivorous, they are certainly not particular in their diet and greedily devour fish alive, dead, or even putrid, seaweed, eelgrass (*Zostera*) shrimps, starfish, indeed anything in the shape of edible material. At times they turn cannibal and will devour each other, while they are fond of tearing off and eating the bunches of eggs attached to the lobster in a "berried" condition. Just as the owl and kingfisher reject the bones and indigestible portions of fish or animals which they have eaten, so the lobster ejects from its mouth the hard parts of the creatures which it has devoured. Such pieces cannot pass down the intestine, which is a slender delicate tube lying along the fleshy jointed tail of the lobster. The lobster has a keen sense of smell which is believed to be located on the under surface of the outer limb of each small pair of feelers (the antennules). No doubt it is mainly by the sense of smell that it is led into the baited cage or trap used in the lobster fishery. There is certainly no just reason for regarding putrid bait as more attractive than fresh bait. It is possible that semi-decayed fish may have a certain amount of luminosity or phosphorescence, which affects the lobster's sense of vision; but the Norwegians have for centuries proved by practice that pieces of fresh flounder placed as bait in their cane traps form the best possible bait.

Structure of shell.

The dense armour of hard limy material which encases the lobster permits only of limited growth so that the shell must be cast off repeatedly, as the lobster increases in size, season after season. This growth is most rapid in the very young or infant stages, hence moulting is then most frequent, as will be shown on a later page in the account of the life of the larval lobster. A lobster cannot continue to wear the same shell any more than a growing youth could continue to wear a small boy's suit after he has become a man. The shell consists of four layers:—(1) An outside horny layer, which shows no definite structure. Professor Herrick calls it the enamel layer. (2) A thicker canaliculated layer, crowded with lime salts, and coloured with pigment. Dr. Carpenter called it the "areolar" layer. (3) A very thick, non-coloured, laminated layer, recalling the structure of dentine in a tooth. It is Carpenter's "tubular" layer, and is the gleaming white part of the shell, which is so noticeable at the broken edge when a lobster shell is fractured. It is this layer which is absent in the case of *Phyllosoma*, and the glass crabs, *Portunus*, and others. (4) A very thin lamellar layer which is not calcified.

The inside lining is formed by a soft layer consisting of epithelial cells. These cells build up the shell, and become greatly enlarged and cylindrical, when actively secreting a new shell.

All four layers are pierced by delicate canals, viz.: the skin-gland ducts, the hair-pores, and the tegumental gland tubes. Inside the shell, of course, lie the great masses of white flesh or muscles; but there is an intervening

space between the shell and the muscles which is occupied by loose connective tissue, large blood-spaces, and the great glands, called by Professor Herrick "tegumental" glands.

Moulting.

The shell undergoes peculiar changes when the "shelling" period arrives. Some of the salts, which impart hardness to it, begin to disappear in such places as the middle of the great shield covering the head and thorax, and along each side of the snout and other parts. This change gives the elasticity required to allow of the shell being more easily thrown off. A thin skin forms underneath the shell, and the lobster then shows very evident signs of the painful process about to begin. A lobster about to moult loses its bright colour, acquires a loose lax appearance, and becomes very uneasy and shy. It seeks the shelter of rock clefts, or if these be not at hand, immerses itself in a soft sandy bottom, lying sidewise. It bends upon itself so that the skin connecting the shield and the tail burst. There are no violent convulsions such as some writers have described. The muscles of the limbs tug vigorously, and the great claws, soft and pliable as indian rubber, are withdrawn like the hand from a glove. The creature pushes itself through the gaping slit, the head being pulled out leaving the tail to be drawn out last of all. The newly shelled lobster has a limp and collapsed appearance, but its colours are extremely fresh and bright. Water is so rapidly absorbed through the soft new shell that the lobster enlarges and swells up with surprising rapidity. The empty cast-off shell resembles a dull dingy live lobster, as it is not always split although extremely brittle. At the end of a month the shell is not really hard; but still has a pliable leathery character. Many observers have declared that within twenty-four hours, or at most within a week the shell is perfectly hard. This is not so. A lobster is really not completely hard for seven or eight weeks after moulting. The process of shelling takes place every year, especially during the summer months, for which two reasons can be adduced. The water is warmer then, and the soft and sensitive lobster at that time escapes the peril of extreme cold. A vast number of females hatch their young in the warmer months, and, after hatching, they invariably cast-off the shell, partly no doubt to get rid of the clinging empty eggs, and their attachments, which become foul; but chiefly, as already indicated, owing to the growth of the animal inside its covering whereby the old shell becomes too small for it. Actual observations on the shelling process are very meagre, indeed those of my friend the late George Brooke are almost the only continuous observations on record. His studies were carried on in Scotland for about sixteen months, viz., from July, 1883, to 19th November, 1884, during which time he found that four moultings took place, the size at each moult being:—$6\frac{15}{16}$ inches, 8 inches, $8\frac{14}{16}$ inches and $9\frac{6}{16}$ inches, a total increase of $2\frac{7}{16}$ inches. The dates, when the shelling process was effected were, 1st July and 25th December, in the first year, and 25th July and 19th November, in the second year. Professor Herrick justifiably calculates that, under natural conditions, a 6 inch lobster would attain a length of 9 or 10 inches in two years and that a 10 inch lobster is probably four and a-half or five years old. Of course during its more rapid growth in infancy, the shell is cast-off much more frequently. During the first six or eight weeks after hatching the young lobster moults not less than five or six times.

Features of sexes.

Before describing in detail the breeding habits, the production of eggs and hatching of the young, a few words may be here said regarding the external features of the male and female lobsters. A comparison of a large number of specimens has shown that the male is more slender than the female and he possesses larger and stronger claws. The body of the female is not only broader, but the side plates or flaps at the margin of each tail ring are deepened in order to provide a larger space under the tail for the reception of the bunches of eggs. The first pair of legs in the lobster are the "nipping claws" or large forceps, and there are four pairs of true walking limbs.

Behind the walking legs there are five pairs of smaller limbs called "swimmerets." In the male the first pair of swimmerets are transformed into stout rods each consisting of two joints, while at the inner edge of the basal joint of the fourth or last pair of walking legs a minute opening may be noted, on close examination, which is the aperture of the seminal duct. In the female, on the other hand, the first pair of swimmerets consists of a slender feathery rod, composed of one long joint and twelve or thirteen very small joints. The second pair of walking legs show a couple of small opening (oviducal apertures) at the base similar to those in the male, but in the interspace between the third pair of walking limbs is placed the V-shaped sperm pouch. It is a very sensitive organ studded with small sensory hairs, and in the male deposits a thick gummy matter which acquires a somewhat solid character after a short time. A most reliable distinguishing external feature in the two sexes is the position of the small sex apertures. In the female they are at the base of the second pair of walking legs, and in the male at the base of the fourth, or last pair.

Male's spermaries.

It is necessary to describe the structure of the egg-forming and sperm-producing organs before the peculiar features seen in the breeding of lobsters can be understood. The latter organs or spermaries can be seen upon cutting open the back of a male lobster. A pair of slender much corrugated tubes appears passing down the back, and placed immediately above the massive green liver. They rudely resemble the letter H as the two tubes are connected by a slender bridge, immediately behind which connection there passes off on either side a duct. Each duct swells to form a sperm vesicle before terminating in the small external opening or sperm aperture, already described as occurring at the base of the last pair of walking legs.

Female's ovaries.

In the female, the ovaries where the eggs are formed have also the character of a pair of tubes passing along the back behind the eyes and immediately under the shield or shell forming the forepart of the back of the lobster. When in a mature condition they extend along two-thirds of the length of the body from the fourth or fifth ring of the jointed tail almost to the eye-sockets. They exhibit much variation in colour as they approach the ripe stage, recalling the green, pink and yellow ovaries of certain fish such as *Cyclopterus*, for the ovaries of the female lobster may be either of a cream yellow, a pale flesh tint, or a light olive green colour. When the lobster is boiled, the eggs contained in the ovaries, if fairly ripe, turn to an intense red colour and are known as coral. In some great markets (as for instance London) lobsters containing coral are prized for culinary purposes especially for lobster sauces, etc., and this demand for ripe females has no doubt had much to do with the depletion of lobsters in Britain.

Egg deposition.

At the spawing time the eggs enlarge and become loose in the ovary. They then glide down the oviducal tubes, their passage being facilitated by a fluid, which is secreted at that time by the swollen cells lining the oviduct and they are rapidly ejected from the two orifices, already described as occurring at the bases of the second pair of walking legs. Each egg is globular or rather spheroidal, about $\frac{1}{16}$ inch in diameter. They are received in the space inclosed by the incurved tail of the lobster, and become glued to the five pairs of feathery swimmerets so that they hang like crowded bunches of grapes. The liquid glue is secreted by the glands in the skin or rather shell, in the tail region, and it hardens on exposure to water. The eggs are dark green, almost black; the colour being due to the yolk which is visible through the transparent shell or chorion. Unless they are vivified the eggs come to nothing; but the further changes in the progress of the fertilized eggs will be briefly described below.

Pairing process.

In order that the sperms emitted from these two small openings, in the male lobster, shall be transferred to the female, pairing must take place. No doubt the peculiar first pair of swimmerets are utilized in pairing; but full and accurate observations regarding the pairing of lobsters remain yet

to be made. Sufficient information is afforded by the structure of the organs described in the foregoing account, and by what is known in many other creatures of the same subkingdom (*Arthropoda*) to establish the fact. That pairing takes place admits of no doubt. It must, in many respects, resemble the pairing of spiders, in which creatures, we know that the male takes a quantity of sperms from underside of its body, and by means of its pointed second pair of limbs (the pedipalps) transfers these sperms to the special receptacle of its mate. The sperms of the lobster differ from those of most animals, because they are apparently motionless and are able to retain their vitality for a long period of time. In most animals the sperms exhibit wonderful activity for a very short time, when they lose their activity and vitality. The lobster's sperms may be described as star-like in form and massed together in a gelatinous capsule (distinguished as a spermatophor). Probably the first pair of swimmerets, which in the male are of very peculiar shape, convey the spermatophors to the female. They are received, no doubt, when lying in a reverse position, and the female stores them in the triangular sperm-receptacle. In the animal kingdom, as a rule, pairing takes place just before or coincidently with the spawning time, and the eggs are at once and directly vivified or fertilized. But in the lobster the conditions are peculiar, and wholly different. The male does not directly fertilize the eggs; but the motionless sperms, transferred to the female at the pairing time, are stored up by the female until required. If pairing occurs in the fall, when lobsters are found to migrate inshore in great numbers (say in October or November and several months after the hatching period is over), the sperms emitted by the male at that time must be carried by the female for from six to nine months when the female deposits her eggs in spring or summer. April to July seems to be the main time on our shores, then extruded eggs come into contact with the stored up sperms which are now poured out. By the contact of the eggs and the sperm the eggs are at once vivified.

Cleavage.

Changes immediately commence within each egg. The dark-coloured yolk divides up into segments during the first two or three days. This is what is called the cleavage of the egg, and at its conclusion it has the appearance of a thimble-berry or bramble-berry. A thin skin forms inside the egg-shell, and both unite to form a double capsule. It has been frequently noticed that when a young embryo lobster is artificially removed from the shell, the antennæ or horns are found attached to this inner layer of the capsule and are often torn off with the shell.

The embryo within the egg.

During the first ten to fifteen days, while one side of the yolk remains dark, the other side becomes clear and shows a little creature like a spider lying on its back inside the egg. This is the embryo lobster.

The formation of this embryo embracing the process of cleavage just described, may be rapid, under a high temperature, or very slow if the temperature of the surrounding water be very low.

Hatching.

There can be no doubt that lobsters, which extrude their eggs in April, May and June, accomplish the hatching of their fry in a few weeks, whereas the late spawners, during the months of September, October and November, probably do not hatch their young for six or eight months. This accounts for the fact noticed by Dr. Fullerton, that a female lobster in the middle of November was found carrying eggs which were in the stage that in the case of other female lobsters was not reached until about the middle of May. Professor Herrick, it is true, quotes a case of the hatching out of eggs in the latter part of January, under a temperature of 36° F., which had been removed from a female at Christmas. Such facts support the assertion that lobsters may hatch during every month in the year. "I am satisfied," said an experienced fisherman in Prince Edward Island, "that lobsters spawn all the year around." Yet certain months, June, July and August, embrace the principal part of the year during which most female lobsters are in

Canada found carrying berries. The Department of Marine and Fisheries has been able to confirm this after conducting artificial lobster hatching at Pictou, N.S., for the last five years, the supplies of eggs being mainly obtained from May 15th to early in July or late in June, and the fry as a rule hatching out in from seven to fourteen or twenty-one days. Some very mature eggs hatch within twenty-four hours after being received at the hatchery.

The course followed in artificial hatching in the Department's establishment is briefly described below.

Artificial hatching in Canada.

After the eggs are received from the lobster canneries, usually at the rate of 1½ millions per day, they are placed in glass hatching jars through which pure sea-water constantly passes, and this circulation keeps them in motion. The hatching jars are upright cylindrical vases, with a central glass tube supplying water which passes up through the jar and escapes by a conical tip at the top of the jar.

About the middle of June the earliest lobster fry hatch out, and are carried by the circulating stream into a capacious reception trough, which receives the waste water.

When the hatching-out begins the assistants are kept busy night and day attending to the eggs and fry to see that they do not collect and clog together, as they soon die under such circumstances.

When the time for distribution comes, the fry are placed in barrels of sea-water, open at the top, and conveyed out to sea on a small steam tug.

They are not simply thrown overboard; but from a low steamer are scattered by means of small tin dippers, or passed through a hose, one inch in diameter and about eight feet long, provided with a funnel-shaped box at the top; they are scattered about one million to the mile over a distance of 60 miles. The bottom is rock and kelp, and the fry are distributed not less than three miles from shore.

The number of eggs placed in the hatching jars is about 65 millions each season, and the eggs are so healthy that at no time have more than a hundred dead eggs been found in all the jars.

Female lobsters are found from 6 inches to 8 inches in length bearing eggs, but the larger lobsters carry proportionately far more eggs.

Since the Bay View hatchery, Pictou, N.S., was opened, over 500,000,000 of fry have been hatched, the number being as below for the following years, viz.:—

1891	7,000,000
1892	63,500,000
1893	153,600,000
1894	160,000,000
1895	100,000,000

Before emerging from the egg, the advanced embryo lobster is shielded very effectively from harm. Thus there are (1) the shell of the lobster, (2) a temporary larval skin, which fits around the shell like a glove, (3) the egg-shell or primary chorion: (4) the secondary egg-membrane which is outside. The chorion is formed in the oviduct and is attached only at the stalk to the secondary, outside shell, the latter is thick and translucent and secreted in the cement glands. Both shells split, like a bean, into two halves at the time of hatching, and the larva comes out tail foremost. It is very unlike the lobster in form and habits. It rises to the surface of the sea and appears to frequent the upper waters for over two months, as Professor G. O. Sars, the famous Norse naturalist long ago conjectured, during which time it undergoes a series of changes described as follows, in which seven stages may be distinguished.

Larval life.

(1.) The newly hatched larva which exhibits a short shrimplike body and ringed tail stretched out almost horizontally. It is of glassy transparency, with gleaming emerald eyes, and possesses a huge pointed snout or rostrum, consisting of a central blade and a lateral spike on each side. Two pairs of very short horns protrude in front (antennæ and antennulæ), the second pair being forked or split into two. Four of the six tail-joints bear spines, two on each side, and one in the middle standing erect. Most young marine larvæ, having the pelagic habits of the lobster, carry for some days a small bag of yolk; but all trace of the green yolk has disappeared by the time the young lobster hatches out. The yellow liver is plainly visible through the translucent shell. There are no swimmerets along the under surface of the tail; but minute buds indicate their future position. The jointed foot jaws and the five pairs of legs are paddle-like, and the creature shoots forward through the water with great rapidity. The triangular tail is provided with spines and is fringed with hairs. In length the larvæ is over $\frac{1}{3}$ of an inch (7·50 to 8·50 mm. long.) from the tip of the snout to the end of the tail.

(2.) During the second week after hatching five changes may be noted: (*a*) the snout becomes toothed and is less blade-like in character; (*b*) paired swimmerets grow out along the under side of the tail: the second to the fifth tail rings; (*c*) green colour appears along the back region. The length increases by nearly one-twelfth of an inch, and the larva is now about half an inch long (9.50 to 11 mm.)

(3.) During the third week the principal change is the development of the nipper-claws or chelæ. All the feet hitherto were adapted for swimming and the first pair (or nippers) differed little from the rest; but at this stage they become proportionately much larger and their inner margins exhibit serrations or tooth-like projections. The eye still shows a bright metallic lustre, and green spots distinctly appear in the thin shell mingled with a brown coloration. This stage appears to rarely last more than a week.

(4.) The fourth or fifth week witnesses further changes. In outline the small lobster shows a resemblance to the adult lobster greater than it has hitherto exhibited. It has, after moulting, increased in length, and measures more than half an inch (13 to 15 mm.) The erect spines down the back have gone, while a deeper colour, brown or green, extends over the shell, and the nipping claws are of a warm brown or reddish colour.

(5.) The young lobster, six weeks to two months old, still swims about actively near the surface. Though its prevailing reddish brown tint renders it less inconspicuous than in its younger stages when its glassy translucency is more marked, yet it is really a small insignificant object $\frac{3}{4}$ inch to $\frac{3}{5}$ inch long, and not readily distinguished from the small fishes, young cod, gurnard, sculpins, &c., which abound in the same surface waters. A young lobster at this stage is often mistaken for a larval gurnard (*Prionotos*) as both swim rapidly forward in a similar way, and the moving reddish claws of the lobster bear no little resemblance to the orange tinted pectoral wings, or fins, of the minute gurnard. The snout is narrower and therefore appears more prominent and pointed, while the feathery outer joint or exopodite of the swimming feet becomes much diminished. This last feature, with the loss of the glassy translucency, characteristic of previous stages, indicates that the young lobster is about to take to the bottom.

Swimming larva descends to sea bottom.

(6.) One or two weeks later when the lobster measures a fraction more in length (15 to 17 mm.) it changes its swimming pelagic habit and comes inshore. Its colour is darker than hitherto, though there is great variation in this respect. Dark green, pale bluish or greenish brown are most frequent. As Professor Herrick points out there appear at this time on the head shield two white spots, really points of internal attachment for tendons. very apparent a little behind the eyes. The projecting edge (pleuron) on

each side of the first tail ring is also white. The snout or rostrum measures about one-quarter of the length of the head shield (or cephalothorax).

(7.) During the third month of larval life which Herrick divides into two stages, the changes are mainly internal, and only the trained specialist is able to notice the slight external modifications which take place. The most important point is the assumption of the external characters of sex. The males and females, in early larval stages cannot be distinguished. Up to the sixth or eighth week the first pair of swimmerets beneath the tail are mere rounded tubercles, and up to the stage now described the oviducal openings on the second pair of walking limbs are not apparent in the female. They now appear distinctly, and from this stage onwards the changes which take place are mainly connected with growth and increase in size. The young lobster thus passes through changes in early life of a very striking character. In outline it changes less no doubt than the shore crab, but in habits, mode of progression, food, &c., the changes are momentous. From a transparent free swimming, almost translucent, mite in the open sea, it becomes transformed into a heavy opaque, bottom-living scavenger. As the length of ¼ of an inch is approached (19·5 or 20 mm.) the eyes begin to grow more rapidly and during the stages immediately subsequent are unduly prominent. This in fact is true of young marine larvæ generally. Of course young lobsters, like other developing aquatic organisms vary in rate of growth and features of colour, &c., but the foregoing brief sketch may be said to represent the average larval life of the lobster. As in its mature adult stages so in its early days its food is varied. Minute marine plants, algae, diatoms, as well as minute crustaceans, copepods or water fleas, &c., chiefly constitute its food. Cannibalism is frequent, and the method adopted of attacking each other is very striking, as the young lobster barely a few weeks old invariably selects the most vulnerable point, viz.: the opening behind the head-shield. The stronger larva springs upon the back of the weaker and savagely bites him at the point named. Larval lobsters feed chiefly at night, hence their illimitable myriads are not readily noted by fishermen or sailors; but on bright sunny days they rise to the surface of the sea. Light has a fascination which is common to many creatures in the water.

Rare captures of larval lobsters.

Considering the countless millions scattered every season through the sea, near the lobster breeding grounds, it is astonishing that so few have been seen or captured. I have myself received specimens of some of the stages described on three occasions only. They were captured in the Straits of Northumberland, where, during the latter portion of the summer, certain areas must be crowded with various stages. Prior to the capture of my specimens the only actual record in Canadian waters which I can find is that of Mr. J. F. Whiteaves, of the Geological Survey, who eighteen years ago, captured specimens half an inch long in the months of July and August off Pictou Island, N.S. The fact is that the free-swimming lobster larvæ, like other young pelagic creatures, range within one or two fathoms of the surface of the sea, not quite at the surface where the concussion of the waves would be hurtful. The late Dr. Honeyman (of Halifax, N.S) is recorded to have computed the following table of growth:—

Young reddish transparent lobster. 6 weeks old is ½ in. in length.
Small, but perfect lobster .....16 do 1 in. to 1½ in.
Larger hard shelled lobster ..... 1 year old is 4 in. to 4½ in.

I have not been able to ascertain on what grounds this computation was made, though some of the details given are very remarkable and of extreme interest, dating back as they do ten or fifteen years. The post-larval growth of the lobster, it must be confessed, is even now largely a matter of conjecture; but some data exist. Professor Herrick succeeded in keeping one specimen alive, which hatched out on 27th May and lived until 11th

September, a period of 107 days, in which period it increased about three times its original size.

Growth and maturity.

We have seen that the adult lobster has been proved by actual observations to grow about 2½ inches in sixteen and a half months, and the larval lobster has been demonstrated to grow in three and a half months no less than half an inch, and these facts go to show that in four or five years it is quite possible for the mature size to be reached, and at that age no doubt many females carry spawn.

They continue to grow for a period of many years as is proved by the capture occasionally of gigantic specimens. These are more rare than formerly, but in 1897 a fine specimen was taken off the New Jersey coast, which measured three and one-half feet in length, two feet round the body, feelers one and one-half feet long, small legs one foot long, left claw two feet long and ten inches wide, tail fourteen inches from end of tail to body.

Quite recently (27th April, 1899), a monster example was taken by Mr. Eben Crosby, and his two boys, when lobster fishing off Chebogue Point, near Yarmouth, Nova Scotia. It had one claw in the trap when it was hauled up, and is stated, in the *Yarmouth Times*, to have measured three feet in length. When the two large claws were spread apart the distance from the tip of one claw to the tip of the other was nearly seven feet, while the walking legs were described as of the thickness of a man's thumb. It was 25 pounds in weight, and was too large to place in the usual crates used for shipping live lobsters. It was sold to an American buyer and shipped the same evening to Boston.

Number of eggs.

Professor Herrick arrived at the conclusion that very few spawn before reaching a length of 9 inches; but so many "berried" specimens 7½ to 8 inches in length have reached me from various parts of the Canadian coast that a considerable proportion of females would appear to carry spawn at 8 inches and under. The ratio of reproductiveness is, however, so low in these small female lobsters that the abundance of lobsters in any locality must depend upon the larger females. A 7-inch lobster will produce 5,000 eggs, whereas when one inch larger the number of eggs carried is just about double that quantity. A 10-inch lobster carries as a rule 18,000 or 20,000 eggs; but when 14 inches long the number of eggs is 40,000, and at 16 inches the number is estimated at no less than 80,000 eggs. Variations are not infrequent, and a 10-inch lobster may produce only 12,000 or 14,000 eggs; but on the other hand one specimen of this size is recorded which carried 21,000 eggs.

Lobster's fertility compared with fishes, etc.

These figures might appear large did we not know, by comparison with other marine creatures of economic importance, that the lobster is perhaps the least productive numerically of all. A herring deposits double the number of eggs produced on an average by the lobster; a mackerel four times as many, a cod four hundred times, and a Canadian oyster four thousand times as many. No wonder that no lobster fishery in any country has been able for many years to withstand the tremendous annual drain implied by a large market. The lobster fishery of Canada, it is estimated, annually destroys between sixty and one hundred millions of lobsters, a considerable proportion of these being females about to spawn, or recently spawned. It is indeed astonishing that our lobster grounds have been able to hold out so long with this gigantic destruction going on year after year.

Waste of eggs.

The destruction does not end merely with the annual loss of many millions of parent lobsters, for the loss of the spawn about to be laid, or already deposited and scraped from the lobsters before being landed, cannot be ignored. In the department's report for 1890, the late Lieut. Gordon laid stress, and rightly so, on this waste of eggs, which is so readily overlooked, and he referred to certain means which might effect (to quote from his report p. 18) "the saving of the ova, the destruction of which now, perhaps, more than anything else, militates against the speedy restoration of the

fishery. To show that this is no idle statement, the case of a cannery putting up 2,000 cases, or 96,000 lbs., may be taken; these require say half a million lobsters to put up, and my inquiries show that probably 1 in 5 are 'berried' lobsters—say 100,000. Now, take even one-half of this, and say that 50,000 'berried' lobsters each carrying about 20,000 exuded ova, were destroyed in putting up the 2,000 cases, we have no less than 1,000,000,000 ova destroyed; and if this rule be applied to the 220,000 cases which constituted the product of the fishery for the year 1889, we have a number of 110,000,000,000 as the wanton destruction of ova which it is possible to save—at any rate, in some small measure; for even a saving of 1 per cent of such a total represents a number the magnitude of which figures fail to bring home to the mind."

Biennial spawning.

Closely connected with the interesting questions respecting the reproductive capacity of the lobster, and the probable interval elapsing before it reaches maturity and reproduces, is the further question as to the frequency of spawning.

A very questionable opinion was in circulation some years ago that the female lobster spawns once in two years. Curiously enough this notion first put forward by parties wholly untrained and unqualified to frame a reliable judgment has received countenance recently from men of scientific standing. Professor Garman, and more recently Professor Herrick, have favoured the idea, and Dr. Fullarton has also adopted it in his recent Scottish paper on Lobster Development, though the evidence when analysed instead of establishing biennial spawning all points the other way. Herrick indeed himself found in "paper shell" lobsters in July that just after the brood had hatched and the moulting was over the eggs in the ovaries were no less than half the size of mature ova. Ehrenbaum inferred that the female lobster spawns every fourth year, and the evidence on which this new view is based would just as conclusively prove that the lobster spawns quadrennially. My own embryological studies upon a variety of marine fishes and other creatures have established beyond question in my mind that the growth of the ovarian ovum may be astonishingly hastened after the dispersion superficially of the nucleoli over the surface of the nucleus or germinal vesicle.

In the female *Gastrosteus*, ova developed and ripened in the months of July, August and September, when the conditions were most favourable, in periods of from 60 to 80 days, and passed through stages which later in the year occupied no less than 220 to 240 days. Yet Prof. Herrick does not hesitate to affirm concerning this supposed biennial spawning that to prove it requires only the dissection of a female with eggs ready to hatch in June, July or August, and it will be found that "the ovarian eggs have had, in all these cases, from ten months to a year's growth"—the very point in fact being assumed which requires proof. Further on in his excellent memoir he adds: "That the spawning periods are thus two years apart is a valid inference drawn from the study of the anatomy of these organs."

We have, indeed, available the fullest scientific proof that a Decapod, closely allied to the lobster, spawns not once in two years, but twice in one year, thus the shrimp, *Crangon vulgaris* spawns in April and May as well as in early November. A valid inference would be that the lobster spawns not less frequently than once a year. Dr. Fullarton, in adopting Herrick's view, says: "From an examination of the ovaries of lobsters which had shortly before hatched a brood, and others periodically between that time and the following January, it is certain that lobsters do not breed annually." As I have shown a mere anatomical examination of the ovaries is insufficient to establish any such conclusion, and an embryologist familiar with the various stages of egg-maturation, in different animal types, is bound to pronounce any such inference as unwarranted, collateral evidence being all unfavourable to the theory of biennial spawning.

Annual spawning.

When again Professor Herrick affirms in these words: "When the external eggs are ready to hatch the ovarian ova have had nearly a year's growth," an experienced embryologist could accept this opinion with difficulty. My own observations, for which Canada offers opportunities incomparably greater than those of any other country, lead me to the view that lobsters as a rule spawn annually, and that a female lobster which has hatched her brood early in the season does in many cases produce a second crop of eggs late in the fall which are carried all winter. The details of my examination of a large number of specimens supporting this view cannot be given here; but will be published in due course elsewhere.

There is certainly little justification physiological or anatomical for holding with Fullarton that in no case "lobsters that had just hatched a brood, had eggs in the ovary which could become fully ripe under a good many months." The oftquoted case of the lobster in Rothesay Aquarium, Scotland, which was carrying ova when placed in the tanks in August, 1886, and did not complete the hatching of the same until August, 1887, though larvæ hatched out as early as April, 1887, proves only that the conditions were abnormal and unfavourable. The fact that the brood were hatching for a period of five months, April to August, from eggs which were extruded the summer before fully demonstrates the abnormality of this special case. The fact that the lobster spawns annually is evidenced by:—

(1.) The fairly uniform proportion of "berried" females taken season after season.

(2.) The occurrence of the berried conditions in all sizes of females from 7 inches to 18 inches. It might be expected that females of certain specified sizes would never or rarely be found with eggs were biennial spawning a fact.

(3.) Exact researches upon allied decapod crustaceans prove the greater frequency of spawning.

(4.) The rapid growth of ovarian eggs so familiar to embryologists is unfavourable to the biennial theory.

Enemies and diseases.

As with other valuable inhabitants of the sea the lobster's enemies are legion. In its earliest days the young swimming larvæ are sadly decimated during the first eight or ten weeks of their life, when as we have seen they range from $\frac{1}{3}$ inch to $\frac{3}{4}$ inch in length. Physical and chemical impurities also kill them. Later they are more hardy; but intense cold and excessive heat are equally fatal. Adult lobsters confined in floating cars are found to die in great numbers when the sun's rays are powerful. I have examined such cars and found a large proportion in a sick and dying condition.

Almost every predaceous fish in the sea devours the lobster. The mackerel feeds largely on the larval lobster, while the cod, haddock, pollock, seabass, skate, etc., eat it when it attains a larger size; but to add to its dangers and enemies I have found in Nova Scotia that crows are most destructive for when the tide goes down these birds destroy the lobsters left among rocks and sea-weed. They pierce the shield of the lobster where the heart and main blood vessels are situated and the crustacean is at once rendered helpless and is devoured by its assailant. The flocks of crows busy amongst the rocks inshore must destroy large quantities of this valuable crustacean. Boeckh has described a curious habit in the Scandinavian crows. They seize the lobster and fly up into the air with it and let it fall, breaking its hard shell into fragments and exposing the delicate masses of flesh in the claws and tail.

The lobster suffers from few diseases or parasitic affections. A large Gregarine (*G. gigonteum*) abounds in the intestine as Van Beneden found, and a peculiar Trematode worm occurs in the liver. Prof. Herrick remarks that no specific disease characterizes this crustacean, though Mr. Rathbun has described a tumoid protruberance on the outside of the carapace which was attributed to a wound. As a matter of fact an internal disease does, in

rare instances, affect the lobster, and Professor McIntosh, many years ago, described a tumour which originated in the wall of the grinding stomach and pushed its way through the carapace behind the eyes. The tumour enlarged and finally resulted in the death of the lobster, which was a very large and old specimen.

The lobster has more than the usual quota of perils to face, and man's systematic destruction has not merely added to them, but overbalanced them all. It is probably in early larval life that the decimation of the lobster chiefly takes place, for there are few fishes in the sea that will not eagerly devour the young as they flit in cloudy masses through the water.

The influences fatal, or at least hurtful, to the lobster in mature life have been already pointed out; but there is one to be added, viz., fresh water. Lobsters avoid localities where fresh water streams run in unmingled with salt water. In shipping live lobsters packed in ice, the fresh water trickling down from the melting ice is most harmful and untimately fatal.

Shipping live lobsters.

With proper precautions, however, lobsters may be carried alive and healthy over great distances. Early this century some loyal Nova Scotians shipped in a sailing vessel several barrels of lobsters to King George III. They reached London safely and alive. In 1862, some tubs of sea-water containing live lobsters were sent from Maine, U.S., via Halifax, to the Emperor Napoleon III., and a few years ago the Otago Acclimatisation Society, Dunedin, New Zealand, succeeded in carrying live lobsters from England. In the first attempt only twelve were sent; three died during the first week though the rest survived, feed well during the voyage, and at the end of the 54 days sail were planted in a healthy condition at the Antipodes. The Society was encouraged by this success to arrange for a second shipment; but all died on account of the detention of the ship for a month by a broken shaft at sea. The extensive exportation of live lobsters is in Canada a comparatively new thing, and is growing rapidly. What its effect upon the lobster supply will be, remains to be seen.

For many years very large exportations of live lobsters have been made from Norway averaging in value $150,000 per annum, the number actually taken in the fishery ranging from 800,000 to 1,000,000 lobsters, and most of them destined for the English market.

The method of packing and shipping them may be described as follows:—The boxes generally used have the following outside dimensions: Length, 39 inches; breadt, 19 inches, and height 15 inches. If ice is used they are made 4 inches lower. Each box contains from 100 to 120 lobsters. Sometimes smaller boxes are used, with the following dimensions: Length, 24 inches; breadth, 19; height 13. Between the boards there are suitable openings to admit fresh air.

In summer there is placed at the bottom of the box a layer of ice two or three inches thick, and on this a frame, so that the lobsters are not disturbed in their position even if the ice melts. On this frame there is first spread a thin layer of fresh heather, long thin grass or straw, on which the lobsters are laid carefully, back downward, the tail being bent forward and across the box, with the claws turned inside towards the centre. When the box is full some heather or straw is spread over the lobsters and the box is closed. Heather is preferable to straw, as the latter spoils on account of the moisture caused by the ice, and the lobsters cannot well endure any bad odour. For this reason it is not advisable to use dry sea-weeds, which formerly were often employed. Old sail-cloth dipped in sea-water forms an excellent cover as it keeps moist and cool for a long time. If ice cannot be had, heather soaked in sea-water may be used, dry fresh straw, or sail-cloth. During the cooler season only heather or straw should be placed at the top and bottom of the box.

In winter the sides of the box may be lined on the inside with paper, so as to protect the lobsters against the cold, but there should not be any paper

either at the top or bottom, as the lobsters would be stifled, owing to the lack of air. When the lobsters have not been kept prisoners for more than eight days, they will, when packed in boxes in the manner described above, keep for four days. The fresher the lobsters the better they are able to stand the fatigue of the voyage.

The boxes are placed on the deck in such a position that the water from the melting ice does not reach the lobsters, which cannot well endure fresh water, and so that the lobsters are protected against rain, as rain water is very apt to injure them. Lobsters which during transportation have been exposed to the rain, when placed in tanks generally lose their claws. The persons who ship lobsters usually see to it that the boxes are placed in proper position on board the steamer. It always appears best to place the boxes containing lobsters on the forepart of the steamers, so that the fish may get the benefit of the spray from the waves.

GENERAL REMARKS.

With respect to the growth and present extent of the lobster industry as a whole, the following statistics from official sources are given in accordance with the specific instructions contained in the Order in Council appointing this Commission.

TABLE showing the total yield and value of the Lobster Fishery from 1869 to 1897.

Year.	Lobsters preserved.		Lobsters shipped alive or fresh.		Total Value.
	Number of cans.	Value.	Tons.	Value.	
		$		$	$
1869	61,100	15,275	....	.....	15,275
1870	591,500	92,575	..	.....	92,575
1871	1,130,000	282,500	.	.....	282,500
1872	3,665,863	882,633	. ...	.....	8 82,633
1873	4,864,993	1,214,749	.....	.....	1,214,749
1874	8,117,221	2,022,581	.....	.....	2,022,581
1875	6,514,380	1,638,659	....	.....	1,638,659
1876	5,373,088	795,082	.....	.....	795,082
1877	8,080,819	1,213,085	.....	.....	1,213,085
1878	10,714,611	1,689,681	.....	.....	1,689,681
1879	10,244,329	1,650,290	.....	.....	1,650,290
1880	13,105,072	2,143,312	.....	.....	2,143,312
1881	17,490,523	2,939,221	543	16,640	2,955,861
1882	16,808,730	2,780,445	3,005	69,210	2,849,705
1883	13,361,020	1,889,265	1,860	59,988	1,949,253
1884	15,933,283	2,259,892	3,065	91,967	2,351,859
1885	17,303,038	2,463,780	4,998	149,951	2,613,731
1886	16,434,421	2,356,659	8,662	281,734	2,638,394
1887	12,185,687	1,462,282	9,092	371,826	1,834,108
1888	9,597,773	1,207,053	6,288	276,354	1,483,388
1889	10,637,233	1,276,468	5,247	208,020	1,484,488
1890	11,559,981	1,387,198	6,748	261,146	1,648,344
1891	14,285,157	1,999,021	6,312	252,600	2,252,421
1892	12,524,498	1,753,425	6,028	238,300	1,996,725
1893	13,674,713	1,914,458	7,317	570,110	2,484,568
1194	13,333,693	1,803,237	7,565	367,375	2,370,832
1895	12,315,592	1,666,388	7,374	543,708	2,210,096
1896	10,906,638	1,526,928	8,988	678,834	2,205,762
1897	11,130,554	2,226,111	12,591	1,259,155	3,485,265

Lobster Commission.

TABLE showing the yield and value of the lobster fisheries since 1869, in Canada.

Year.	Lobsters.	
	Lbs.	Value.
		$
1869	61,100	15,275
1870	591,500	92,575
1871	1,130,000	282,500
1872	3,565,893	882,633
1873	4,864,993	1,214,749
1874	8,117,221	2,022,681
1875	6,511,380	1,638,659
1876	5,373,088	795,082
1877	8,086,819	1,213,085
1878	10,711,011	1,689,681
1879	10,214,329	1,650,290
1880	13,105,072	2,143,312
1881	18,576,623	2,085,861
1882	20,818,739	2,819,705
1883	17,084,020	1,949,233
1884	22,063,283	2,351,879
1885	27,209,036	2,013,731
1886	33,738,421	2,638,394
1887	30,369,687	1,831,108
1888	22,173,773	1,483,388
1889	21,131,233	1,481,488
1890	25,055,084	1,648,344
1891	26,909,157	2,252,421
1892	21,880,198	1,990,725
1893	21,021,713	2,484,068
1894	20,898,693	2,370,632
1895	19,719,592	2,210,096
1896	19,894,638	2,205,762
1897	23,721,654	3,485,265

NOTE.--Lbs. includes the number of cans and quantity shipped alive fresh.

STATEMENT—Of the Lobster Industry in Canada for the year 1897.

Provinces.	Number of persons employed.	Plant.					Catch.				
		Number of Canneries.	Value.	Number of Traps.	Value.	Total value of Plant.	Number of Cans.	Value.	Fresh or Alive.	Value.	Total value of Catch.
			$		$	$		$	Cwt.	$	$
Nova Scotia	4,559	218	210,290	602,612	453,456	663,746	5,214,246	1,042,853	229,682	1,148,410	2,191,263
New Brunswick	6,105	201	144,200	220,912	195,305	339,505	2,413,404	482,681	22,065	110,275	592,956
Prince Edward Island	2,631	220	118,613	215,133	124,409	243,022	2,466,682	493,336	.....	.....	493,336
Quebec	1,870	99	44,310	116,695	58,420	102,730	1,036,202	207,240	94	470	207,710
Totals	15,165	738	517,413	1,156,352	831,590	1,349,003	11,130,554	2,226,110	251,831	1,259,155	3,485,265

As illustrating the growth of the canning operations, and showing the increase in the number of canneries, the following figures in connection with the lobster industry in the Province of Quebec may be taken as typical of the phenomenal development which has taken place in the Maritime Provinces generally :—

QUEBEC.

—	Number of Canneries.	Number of Traps.	Number of Cans Packed.
1877	11	.....	448,669
1887	45	.....	857,098
1889	99	116,695	1,036,202

THE FISHING GROUNDS.

The Commissioners were instructed in the first place to describe and define the more important lobster fishing grounds.

It is not now possible to outline, as might have been done at one time, special areas along the coast of the Maritime Provinces, distinguishable as definite lobster fishing localities or principal lobster fishing grounds. The Commissioners found in the course of their tour practically every part of the Atlantic coast of the Dominion is, in a larger or less degree, an important lobster ground. From the upper part of the Bay of Fundy, on both the Nova Scotia and New Brunswick sides, round Cape Sable to Cape Canso and through the Gut of Canso, as well as the entire circuit of Cape Breton and along the Northumberland Straits northward as far as Miscou Island, along the north and south shores of Bay Chaleurs and continuing around the Gaspé coast, the inshore waters form a more or less continuous lobster ground.

Off Prince Edward Island and the Magdalen Islands the littoral waters, as is well known abound in lobsters.

Around Anticosti Island and the north shore of the Gulf of St. Lawrence, as evidence received incidentally by the Commissioners showed, there are northerly lobster grounds which must be regarded as a continuation of the fishing areas extending like an inshore border, prolific in lobsters, all along the Atlantic shores of Canada.

The northern limit of the occurrence of the lobster appears to be Chateau Bay, Labrador, while its most southerly limit is stated to be Cape Hatteras, North Carolina, an extent of 7,000 miles of coast in all, of which nearly 6,000 miles are embraced by our own shores. It is not possible therefore to define any special areas along the coast, which can appropriately be regarded as principal fishing grounds. It is true that the portion extending from St. Mary's Bay to Point Baccaro is regarded by experienced men generally as an area in which lobsters are usually large and plentiful; and the climatic conditions are certainly most favourable for pursuing the industry, while shipping facilities, and comparatively close proximity to remunerative markets have been potent in developing the lobster trade to an amazing extent there. In that region, the waters close inshore are on the whole bold, and the lobster traps are set in depths, from a fathom or two, to twenty or thirty fathoms, the tendency in later years being to relinquish the inshore and harbour fishing and carry on lobstering in deeper water. Further east, the conditions for the pursuit of the fishery become less favourable and from Green Island, Guysborough County, around the Cape Breton coast to Cape

North, the drift ice especially, interferes with the fishery and practically shortens the fishing season by three or four months. Off Victoria and Cape Breton counties the ice holds in for a long period in the spring, and the same disadvantage is largely shared by the Inverness county coast. The ice in the Strait of Northumberland prevents an early start; but along parts of the coast like that west of Cape North, Prince Edward Island, the ice holds in late. It is a remarkable fact that further north, off Northumberland and Gloucester counties, the ice moves off early, drifting south so that the traps can as a rule be fished early in May, and in odd years before the end of April, though the traps set in harbours and inshore shallows cannot of necessity be fished until later, say towards the end of May, as the lobsters do not move in until then. Along the north or Quebec shore of the Bay of Chaleurs, the season also is comparatively early (viz.: about the latter end of April.) A much later fishing season occurs along the Labrador shore from the vicinity of Anticosti Island east, the lobster fishing not being remunerative until well on in June. The shores of the Magdalen Islands form a most amazing lobster ground, the lobsters according to evidence before the Commission, moving in from deep water in May and June. In July they swarm in the large lagoons having passed into the extensive salt water lakes in question from the outside waters.

While lobsters appear to mainly frequent the comparatively shallow inshore areas, yet they are known to occur on grounds nearly forty miles distant from shore, and in depths of from forty to fifty fathoms; but these deep water lobsters were described in evidence given before the Commission as peculiar in colour, viz.: a deep blue tint, and with thicker shell and larger claws and in other details unlike the schools which are found nearer the mainland and at depths not exceeding ten or fifteen fathoms.

LIVE LOBSTER TRADE.

In reviewing the present development of the lobster industry the following points in the opinion of the Commissioners deserve prominence.

Rapid growth in western N.S.

The live lobster trade, that is the exportation of live lobsters to the United States markets has indeed greatly impressed the Commissioners, both on account of its rapid growth and its extremely remunerative character. At first this trade was mainly confined to western Nova Scotia, Shelburne, Yarmouth and Digby counties, but within the last five years it has expanded rapidly eastward as far as Canso, where a large export trade has been done, and more recently it has extended to Louisburg and even as far as Port Morien in Cape Breton. Some shipments from Port Morien were sent by rail during the season of 1898 via Sydney and Port Mulgrave, a mode of transit which is far less favourable than shipping by water, and the Commissioners see no insuperable difficulty in the extension of this branch of the lobster industry along the Northumberland Straits on both sides. With better facilities for transportation, the live lobster trade might be rapidly extended much further north.

Future extension north.

How to avoid glut in markets.

The chief defect in regard to this live lobster trade has been, the danger of over-supply at one particular time. The live lobster market is one that can easily be glutted, and if this trade as it extends eastward can be so arranged as to enable the lobsters from successive parts of the coasts to be shipped during successive months, instead of reaching the markets at one period, the disadvantage referred to will be overcome, and the best returns to fishermen and shippers secured.

English and other markets.

The Commissioners cannot ignore the possibilities of the trans-Atlantic markets, and there is every reason to believe that in England, France, Germany and other European countries there is an almost unlimited opening for the live lobster trade.

The evidence of Dr. Arthur Kendall, M.D., of Sydney, given before the Commission on 3rd November, 1898, is of special interest in this connection. Dr. Kendall stated that Canada really controlled the whole lobster fishery of world. The British Islands and Norway only got two and a half millions of lobsters per annum, and the Norwegan supply goes almost solely to Great Britain and the catch in Belgum, France, Holland and Spain is insufficient for the European markets. They are so scarce and dear that only one Britisher in fifteen eats a lobster in the course of a year. Dr. Kendall's views.

The United States fishery is nearly exhausted. We in Canada could make 25 per cent of our present catch bring as much as all our present take. This could be done by restricting the catch to 9-inch lobsters, as it is quite possible to give 10 cents each for them and ship them to London at a profit. Dr. Kendall sold lobsters in London (which cost 1½ cents each) at 1s. each, i.e., about 25 cents, and they afterwards sold for 36 cents each. The size must be 10½ inches and upwards.

The Commissioners are of opinion that the canning industry has about reached its maximum limit, and the number of canneries in the future instead of continuing to increase will, in all probability decrease, as there is no doubt that the canneries in a great many localities are overcrowding each other and the remedy is already working its own results. Limit of canning business reached.

The reduction of the number of canneries, which many of the present owners claim is now necessary, has had the serious attention of the Commission. If, notwithstanding that the lobster canner pays a license fee before he is permitted to run a cannery, the number of canneries may be increased without limit; the packers, as shown in some of the evidence, have felt that the license gave them no advantage. There would of course be no adequate justification for reducing the number of existing licenses, nor indeed of refusing new applicants, unless the number of canneries appeared to have become excessive, endangering the just and vital interests of those established in the business, The Commissioners advert to this matter later in this report and make a recommendation respecting the limitation and reduction of the number of cannery licenses. Suggested reduction of canneries.

During the last ten years, the total number of pounds of lobsters canned has varied very little. In 1887 it was about twelve and a quarter million; in 1897, a little over eleven million pounds were canned, but it must be added that in 1897 there were over twenty-three million pounds weight of live lobsters shipped to the United States. Lobster pack somewhat stationary.

STATE OF LOBSTER SUPPLY.

The Commissioners naturally directed their attention to the consideration of the present state of the lobster industry as a whole, and though there is some variation of opinion amongst the members of the Commission, as to the precise condition of the supply, the general conclusion was that it is approaching a critical condition, and has already reached that condition in some localities. Two members, Messrs. Whitman and LeVatte, however, dissented, and stated that while the condition in general was not critical, especially where natural conditions prevented excessive drain upon the supply, as on the open sea board, yet that a very strict protection system is necessary to preserve the fishery for the future. Present condition of industry.

The Commissioners further considered the prospects of the fishery for the future under existing conditions, and the general opinion was expressed, that in the near future there would be a total depletion unless effective measures for saving the spawn lobsters were taken. Two members of the Commission, however, strongly held the view, that on many parts of the coasts the danger is not so great, but that the lobsters will hold out on account of the nature of the fishing grounds, and with the enforcement of reasonable regulations. Future of the industry.

Present supply of lobsters on the coast.

In regard to the actual supply of lobsters along the coasts, the Commissioners found it difficult to make a correct estimate. On the whole it was concluded that there has been a decrease in the number of lobsters, and some members held that the decline was very marked, but Messrs. Whitman and Le Vatte placed themselves on record as saying that this decline had not been as marked in some localities as in others; indeed, Mr. Le Vatte's conclusion is, that the total number of lobsters taken has kept up generally.

Diminished size of lobsters.

With regard to the size of lobsters, the Commissioners were unanimous in their view that it had diminished, as compared with former years, but in some localities this decline is less marked than in others; for example, around the south-east coast of Cape Breton and along the shores of Gaspé County and Bonaventure in the province of Quebec, the average size, it is claimed, still continues fairly large.

Kind of gear, has used, &c.

The question of the prevailing size and the number of lobsters occurring on the fishing grounds is naturally connected with the question of fishing gear, its nature, mode of use, baiting, &c., and the Commissioners have found that in some few localities, there has been little change in the kind of gear used, the old fashioned double headed lath trap being set as in former years, seventy-five to one hundred and fifty traps being attached to the bottom or back line; the traps attached by snoods at intervals of from three to six fathoms. In the western and southern Nova Scotia waters there has been a complete change in the setting of the traps, which are now set singly, each trap having a separate buoy, the method of setting on strings or trawls still largely retained elsewhere, having been abandoned. Along the coasts generally the quantity of gear has been increasing year by year in order to keep up the catch, or to enable individual fisherman to better compete with their neighbours on the same grounds. The distance between the laths, in many localities, has been diminished and the traps are also being set further out from shore, the general rule being to fish the traps two to three miles from land, but in western Nova Scotia, from eight to ten miles, and as the season advances the traps as a general rule are moved nearer to the land. For convenience of handling, the traps are in some places being made shorter, namely, from two and a-half to three and a-half feet instead of the former length of four feet, which was practically universal at one time.

Sound bait used.

Respecting bait, the Commissioners also were struck by the fact that the use of fresh or lightly salted bait is almost universal, whereas formerly, bait with a strong, bad odour, that is, foul bait, was considered to have some advantages over sound bait.

Wheeler trap.

A very efficient form of trap was brought prominently to the notice of the Commissioners, called the "Wheeler" trap, invented in 1892 by Mr. E. A. Wheeler, of Botsford, near Cape Tormentine, and it is being used in increasing numbers in many localities, some of the packers using 50 per cent "Wheeler" traps in their total gear; in other cases the Wheeler traps form only a very small percentage, but it is contended that they are more effective in stormy weather, as the lobsters do not readily escape from them when left in the water, and they are also said to be remarkably successful in warm weather. On the other hand many fishermen maintain that the Wheeler trap has no advantage over the ordinary lath trap. In the recommendations which follow this preliminary report, the Commissioners make reference to this and other forms of traps.

Effect of past regulations.

The instructions issued to the Commission required from its members a criticism of the regulations heretofore adopted for the protection of the fishery, and a statement of the effect of the same locally and generally. The main difficulty the Commissioners have felt on this matter has been that the evidence all along the shores has shown a general laxity in the enforcement of past regulations.—As a matter of fact, the size regulation, at almost every sitting, was declared never to have been enforced at all. It is true that in some localities the men have voluntarily put over small and

spawn lobsters, conceiving it to be in their interest to do so; and in certain cases packers have been legally proceeded against for having in possession undersized and seed lobsters, but these voluntary protective efforts on the part of the fishermen, and the official prosecutions referred to, have been very isolated and erratic, and the law, especially respecting size, has been a dead letter on most parts of the coast.

These being the facts, the Commissioners find it really impossible to state, with any attempt at completeness, the effect of past regulations. At most of the sittings, packers and fishermen strongly stated their view, that had past regulations been rigidly enforced, fishing and canning operations would not only have been seriously impeded, but in a number of cases canneries would have been closed, while it was also admitted that had the fishery been left without any protective laws and regulations it might already have succumbed.

Failure of fisheries increased the lobster men.

The failure of the mackerel, cod and other fisheries, has had a great deal to do with compelling a large number of fishermen to take up lobster fishing, with the result that this fishery has become practically the staple industry along large portions of the coast.

Mackerel failure due to purse seines.

It is hardly necessary to say that the universal opinion amongst the fishermen, in regard to the decline of the mackerel, is, that purse seining—carried on almost solely by United States vessels outside the three mile limit—has broken up the schools, frightened the mackerel off the shore, and reduced their numbers seriously.

That the serious decline in such fisheries as that of the mackerel has tended to congest the lobster industry more than any other cause the Commissioners fully agree. The mackerel vessels have, during the last two or three years, it is said, not realized the necessary expenses incurred; and the time appears opportune for some international arrangement on this matter, which would directly benefit the mackerel fishery, and, indirectly, the lobster industry.

Other occupations of lobster men.

The Commissioners made a point of inquiring of the witnesses examined at the sittings, what other employments they pursued; and it appeared that in the Bay of Fundy (along the New Brunswick shore) there is a variety

Bay of Fundy, N.B., shore.

of fisheries, namely, sardine, herring, cod, haddock; that is to say, traps, weir, net and line fishing—which places the men in a better position than on some other parts of the coast. On the opposite, or Nova Scotia shore, there

Bay of Fundy, N.S., shore.

are also shore and bank fisheries, and to some extent lumbering and farming.—At Digby especially, the curing of fish and preparing of finnan haddie, kippered herring, &c., have reached great proportions. From Cape Forchu, near Yarmouth, to Cape Sable, Shelburne County, Nova Scotia, there has been a great decline in the shore and deep sea fisheries, but haddock, halibut and mackerel—the last-named a very uncertain resource—are fished to some

Western, N.S., Atlantic shore.

extent, and herring fishing is carried on almost solely for bait. Further east, in Shelburne, Queen's and Lunenburg, similar fishing is carried on, also lumbering and some farming; and the Lunenburg men have long

Eastern, N.S.,

engaged largely in bank fishing. East of Halifax net and line fishing is carried on, and in some few localities a limited amount of farming is done.

S. and E. Cape Breton.

Along the south and east shores of Cape Breton the same conditions largely hold; shore fishing, net and line, is pursued, but has not been remunerative for some years; and farming operations within small limits are also carried

N. and W. shore Cape Breton.

on. Around the Inverness shore, Cape Breton, the salmon fishery is of some importance. There is an important cod fishery in that locality, which ceases north of Cape Rouge, and at Port Hood the haddock and hake fishery is of some importance. There is fair fishing also, for fat mackerel, in some seasons; and farming is carried on to a certain extent. Along the western

W. side of Northumberland Strait.

shores of Northumberland Strait, opposite Prince Edward Island, there are cod, smelt, herring and some other fisheries, and a considerable amount of lumbering; but from Richibucto to Bay Verte the only important fishery

apart from lobstering is that for smelt, although a few of the men do a little farming.

Prince Edward Island.

On Prince Edward Island, apart from lobstering, the only industry practically is farming, and on the north side of the island there is in addition considerable cod fishing. It is hardly necessary to add that the oyster fishing also is of great extent and of considerable value to the resident population on Prince Edward Island.

Bay of Chaleurs.

Further north, along both sides of the Bay Chaleur, as far as Gaspé, there is considerable cod fishing, and valuable salmon stands occur all along these shores; small farms and lumbering also add to the resources of the population.

Lobster fishery of vital importance.

From this rapid and fragmentary survey, it will be seen that the lobster industry is of vital interest to the population, in view of the fact that neither the shore, nor deep sea fisheries, nor farming operations now yield such ample returns as compared with former years, and the present highly remunerative character of the lobster fishery has attracted a large proportion of the resident people.

The Commissioners were extremely anxious to find out in what particular localities the lobster fishery formed the sole means of livelihood, but it did not appear that in any locality the men had no other means of support whatever. It is important, however, to note that the lobster fishery is now the main means of subsistence to the resident fishing population along the south and east coasts of Cape Breton, and from Isaac's Harbour to White Point in Guysborough County. In New Brunswick, from Richibucto to Bay Verte, 75 per cent of the fishermen almost solely rely on this fishery, and in western Nova Scotia, Wood's Harbour, Clark's Harbour, south side of Cape Sable Island, and Port La Tour, are points where the total depletion of the lobster fishery would be followed by the most serious results, as there is no other important remunerative fishery.

RECOMMENDATIONS OF THE COMMISSION.

Points stated in official instructions.

The points upon which the Commissioners were specifically instructed to report were the following:—

1. Amount and kind of fishing gear, &c.
2. Open fishing season.
3. Size limit.
4. Protection of seed lobsters, &c.
5. Remedies for alleged injuries to other fisheries.
6. Propagation and artificial increase of lobsters.

(1.) AMOUNT AND KINDS OF FISHING GEAR, &C.

The Commissioners cannot recommend that any restrictions be placed upon the amount of gear used by lobster fishermen. It would be extremely difficult to carry out any legal restrictions for various reasons: in some cases the fishermen own their boats and gear, in others these are owned by the canners, and in any event a restriction upon the number of traps per boat would almost invariably lead to an increase in the number of boats used, so that the total amount of gear would not be affected by any such restriction.

No prohibition of kinds of gear except bows and cod heads.

With respect to the kinds of gear, the Commissioners gave very careful consideration to certain new forms of apparatus which had been introduced, especially the Wheeler trap, and it was unanimously decided that no prohibition or special restriction would be justified in regard to any such gear.

The recommendations of the Commissioners respecting hand pots or bows and cod head trawls, are stated on a page later in this report, as is also the suggestion that hand bows, and in fact all forms of traps, should be prohibited in two fathoms of water.

The distance between laths in the lath traps was also very carefully considered, and while some members of the Commission favoured a defined distance by law, the Commissioners on the whole expressed themselves adverse to define any legal limit of space between the laths; nor was it regarded as practicable to establish by law any distance between different men's sets of gear when in the water, or apportion fishing grounds to the fishermen. It is true that in some localities there is considerable friction and confusion at present, but the Commissioners did not think this could be remedied by any legal restrictions, and the matter is one they consider which had better regulate itself. No regulation re slats and setting gear.

(2.) OPEN FISHING SEASON.

One of the most important points, in the eyes of the Commission was the determination of the fishing seasons on different parts of the coast. According to the existing regulations, which have been in force for the last twelve years, two different fishing seasons have been defined by law, namely, January 1st to July 1st, west of Cape Canso on the Nova Scotia and New Brunswick shores, and from 1st January to 15th July, from Cape Canso east and north, including Chedabucto Bay, the shores of Cape Breton, New Brunswick, Nova Scotia, Prince Edward Island and Quebec and Magdalen Islands. The repeated extensions of from 5 to 21 days often varying in different localities have shown in the opinion of the Commissioners that these two seasons were not perfectly applicable to the local conditions in every case, and while they recognize the importance of reducing to a minimum differences in the legal fishing seasons specified by law and the advantage of a simultaneous period they felt bound to recommend a series covering, to some extent successive periods of time along different parts of the coast. No regulations can be satisfactory which ignore local necessities. The Commissioners, therefore, after full and careful discussion favoured the establishing of five separate seasons as follows:— Observations on present two seasons.

(*a*) A season extending from 15th December to 30th May, including the waters of the Bay of Fundy on both shores and extending along Shelburne, Queen's, Lunenburg and the western part of Halifax County, the dividing line running from St. George's Island, Halifax Harbour, in a south-south-east direction coinciding with the fare way buoys in the entrance of the harbour. Division A. 15th Dec., to 30th Nov.

(*b*) Another season extending from 1st April to 30th June, to embrace the waters east of the line just mentioned as far as Red Point near Point Michaud, Richmond County, Cape Breton: the limits to include Chedabucto Bay and the Gut of Canso and defined by a line drawn from the lighthouse in Antigonish County to Flat Point in Inverness County, or such points in proximity which may appear to be workable. Division B. 1st April to 30th June.

(*c*) A season from 1st May to 1st August, applicable to the eastern waters of Cape Breton Island from Red Point around Cape North to Cape St. Lawrence. Division C. 1st May to 1st Aug.

The Magdalen Islands and the north shore of the Gulf of St. Lawrence appear to form two cases, separate in character from the remaining Quebec shore as the local conditions are altogether distinct from those on the mainland generally. On the Magdalen Islands, the most suitable season for the lobster fisheries would appear to be 1st May to 1st August, that is, the same season which has been suggested for the eastern waters around Cape Breton. The same season would also appear to be applicable to the north shore of the Gulf of St. Lawrence and along the Labrador coast.

(*d*) A season extending from 25th May to 10th August, in the Northumberland Strait, defined on the north-west by a line from Chock Fish River, New Brunswick, to West Point, P.E.I., and on the south-east defined Division D. 25th May to 10th Aug.

by a line from Indian Point near Cape Tormentine, New Brunswick, to Carleton Head, Prince Edward Island.

Division E. 20th April to 10th July.

(e) A season extending from 20th April to 10th July, including all the waters of the Strait of Northumberland from the limit last-mentioned eastwardly to the entrance of the Strait of Canso, also around the eastern coast of Prince Edward Island, the Inverness shore, the north shore of Prince Edward Island and the whole coast of New Brunswick north and west of Chock Fish River, Kent County, including Bay Chaleur on both the New Brunswick and Quebec sides and around the south shore of the River St. Lawrence.

(3.) SIZE LIMIT FOR LOBSTERS.

Present law would be largely injurious.

No subject has engaged the more serious attention of the Commissioners than that of the size limit, and the evidence everywhere showed that the strict enforcement of the present law would practically close the canning industry and have the most serious consequences upon the fishing population. The Commissioners, in view of the continued decrease in the size of lobsters, while they have felt unable to recommend the total abolition of size regulations, strongly recommend that the size limit be reduced on all parts of the coast excepting west of Halifax, in which waters the live lobster industry has attained such importance, and the present size limit is in the main approved by those engaged in the fishery. A small minority of the men on the Nova Scotia and New Brunswick sides of the Bay of Fundy have favoured raising the legal size limit to 10½ inches; but the evidence showed that by far the greater number of those who follow the occupation of lobster fishermen in these waters were opposed to this maximum 10½ inch limit.

Size at which lobsters are mature.

In attempting to decide upon a size limit which would be generally applicable without seriously reducing the total catch; the Commissioners took into consideration the evidence bearing upon the size at which lobsters reach maturity and when they generally carry eggs. Some of the evidence showed that lobsters 7 inches long are found carrying eggs, but this in the opinion of the Commissioners is rather a small limit, and they therefore favour a size limit of 8 inches all along the coast with the exception of the two following areas:—

8 in. limit recommended.

In Division A. 9 in. size limit.

1. In the division over which they have recommended a fishing season from 15th December to 30th May. In that division the size limit should remain unaltered, and this would be in accordance with the main mass of evidence received along those shores.

In Division D. 7 in. size limit.

2. A size limit of 7 inches in the district to which the season, 25th May to 10th August applies, in the Northumberland Strait. It appears that in this last named division the lobsters used in the canneries for a number of seasons past, have been very small, smaller indeed than on any other part of the coast, and the Commissioners have felt bound to conclude that the lobsters along this sandy area actually run smaller on the average.

The suspended 10½ in. law.

The above conclusions reached by the Commissioners, render it unnecessary to refer at length to the new regulations, which were legalized on 1st August, 1898, which regulations prohibited the export from any part of Canada, of lobsters less than ten and a half inches in length, and prohibited the catching, preserving or possessing for any purpose whatever, lobsters under ten and a half inches in length, in the waters extending from Cape Sable, westerly around the Bay of Fundy to the international boundary line between New Brunswick and the State of Maine. Certain members of the Commission, in view of the urgency of the matter last fall, decided to recommend that the regulations referred to, be not brought into effect on 1st January, 1899, but that they be suspended for a year. The Honourable the Minister acted upon this suggestion and an opportunity was thus given to the remain-

ing members of the Commission to express their views upon this important matter, as by this postponement the question was not finally settled.

No export size limit.

The proposal of a specified size limit, below which no lobster should be exported from the Dominion, was fully discussed, and while the minority favoured a special regulation, prohibiting the export of any lobsters under nine inches in length, the majority of the Commissioners held the view that there should be no such limit, but that those engaged in the industry should be allowed by law to dispose of their catch, whether by export or otherwise, to the best advantage. It is clear, that were a nine-inch prohibition in regard to the export of live lobsters enacted, and a smaller size limit legalized in certain areas, the effect would simply be to compel the fishermen to sell their lobsters to the canners and thus discourage the live lobster export trade, which might bring them better returns.

Export of seed lobsters.

The export of berried lobster is a very grave matter, which is fully met by the recommendation of the Commission in regard to the total prohibition of seed lobsters.

(4) PROTECTION OF SEED LOBSTERS.

The Commission were unanimous in strongly recommending the protection of seed lobsters by a special regulation, forbidding the taking, killing, canning or possessing of spawn lobsters.

Lobster fishing permit suggestion.

One of the most prominent suggestions brought before the Commission, having for its main object the protection of the seed lobster, was the suggested Fisherman's Lobster Permit, proposed by Mr. H. E. Baker, of Gabarus C.B. Mr. Baker appeared before the Commission at Halifax and fully expounded his views, the main points of which are contained in the following extracts of his evidence:—

"The only way to remedy this evil, is to have a sworn official in each boat, who shall liberate alive every spawn lobster as it comes from the traps. If this could be accomplished, millions of lobsters every one of which carries thousands of eggs, which are now destroyed would be returned to the sea and permitted to hatch their young. It is quite safe to say that three million spawn carrying lobsters, averaging ten thousand eggs each, are annually caught in Canadian waters, deprived of their spawn by the washing system and sent to the canneries in apparently legal condition which means a loss to the supply of thirty billions of eggs each year. These thirty billion of eggs can be saved to the fishery by a very inexpensive system. If, instead of the present absurd regulations, which so hamper and retard the industry as to make it impossible for fishermen to observe them and live at all, we were allowed to fish three months and take all sizes, the fishermen could make profitable catches and these eggs could be saved, and by the following simple system: allow no man to catch lobsters without a permit or license. In the spring let every man about to prosecute the fishery obtain this permit from the fishery officer free of charge, which shall license him to fish from 1st May to 31st July, and take all sizes. In return for this the fisherman is to become a sworn official to the extent that he will liberate alive every spawn lobster that comes from his cages, and that he will report every violation of this clause that may come to his notice to the local fishery officer. Let the penalty for a violation be a proceeding for perjury against the offender, who shall also be debarred from ever receiving a permit to fish for lobsters in Canadian waters. Now, I maintain, if a system similar to this were adopted, millions of lobsters would be saved that are now destroyed while in their eggs, the fishermen instead of being driven to desperate straits, would have three months to fish and the industry would be placed on a permanent footing of prosperity for the fishermen and protection for the supply. We would then have several hundred sworn officials in each district, or one in every boat, and if several hundred sworn officials in

each district cannot carry out a law it is not reasonable to suppose that the present system of having one such official in each district can do so."

At every sitting the Commissioners particularly questioned the fishermen and canners respecting this proposal, the details of which had been widely published and appeared to have excited considerable interest. There are really three alternative courses with regard to this proposal. First: That the permit should be issued with very simple conditions attached, to which the holder of the permit should simply suscribe his name. Second: That the permit should have an oath attached, strictly binding the fishermen to abide by the conditions of the permit. Third: In addition to the oath attached to the permit, that each holder of a permit should bind himself to act as a protective officer and aid the Government official in each locality by informing him of violations.

With regard to the last proposal, the Commission felt that it would be most unreasonable to suppose that any fisherman would willingly inform against his brother fisherman and in some cases his own relatives, and in making each fisherman practically a detective the Commissioners felt assured that it would be a dead letter. In respect to the oath the difficulty is less, but in many localities the fishermen have a conscientious objection to taking an oath upon a matter of this kind, and there can be little doubt that some of the witnesses who demurred to take the oath are men who would be prepared to do their best to protect the seed lobsters. It must be admitted, however, that a good many witnesses not only favoured the addition of the oath to the permit, but strongly urged it as absolutely necessary. Two members, Messrs. Le Vatte and Sweeney, strongly approved of the permit without the oath, on the ground that it would make the fishermen feel a greater sense of responsibility than they have now, it would enable a register to be kept of the lobster fishermen and it would tend to confine them in their operations to their own localities instead of wandering to other districts as there is a tendency to do. If the fishermen, it was added, are desirous of keeping the law respecting spawn lobsters they cannot seriously object to the permit requiring them to do so. On the other hand, the majority of the Commissioners maintained that requiring a permit would cause complications and trouble without a sufficient benefit resulting therefrom; in fact it was maintained that the system might prove of no substantial benefit.

Lobster permit not approved.

It appeared to some members of the Commission that an effective method of protecting seed lobsters would be by putting on oath the owner, if resident, of the cannery, the manager, weigher and counter. There appeared some difficulty in the minds of some of the Commissioners as to the practicability of putting the weigher and counter on oath, inasmuch as they are frequently not permanent hands and are often changed; but a minority, Messrs. Nickerson, Whitman and Le Vatte regarded the matter as one which would not justify the requirement of an oath by law.

Swearing of canners, &c., approved.

(5.) INJURY TO OTHER FISHERIES BY LOBSTERING.

Alleged harm to salmon, mackerel, herring and cod.

A leading question at all the sittings was that having reference to alleged injuries to other fisheries on account of the present method of baiting and setting lobster traps. Salmon, mackerel and herring, it has been said by some parties, have been disturbed and driven away by the lobster fishing operations. The evidence was of a very conflicting nature upon this point, and the Commissioners feel bound to report that the alleged injuries due to the use of foul bait do not appear to be well founded. The report that large areas along the coast have been polluted by foul bait must be regarded as an exaggeration, and certainly for many years, as stated in this report, sound bait (fresh and lightly salted) has been almost exclusively used. The Commissioners agree that the hauling of traps, disturbing the water especially

Sound bait generally used.

where the traps are set thickly together, must have some effect upon the schools of mackerel, summer herring, &c. Hauling traps harmful.

(5.) RECOMMENDATION *re* SALMON NETS AND LOBSTER TRAPS.

It does not appear that the schools of salmon are diverted or disturbed by the lobster fishing operations, but as the lobster gear, especially in stormy weather, drifts into the salmon nets and in various ways appears to interfere with the proper fishing of the salmon and other stationary fishing gear, the Commissioners unanimously agreed that a regulation should be framed, prohibiting the setting of lobster traps within a distance of 100 fathoms on either side; such a regulation would leave perfectly clear the leader, the door and the heart or terminal portion of the trap from any danger of disturbance or injury.

The disappearance of certain runs of fish from parts of the coast, where they formerly were abundant, is no doubt due to a variety of causes, and it is necessary to point out that the lobster traps on many parts of the coast are not set until late in the spring and cannot interfere with the spring herring; nay, more, on some coasts the spring herring are so strongly impelled to seek the inshore spawning grounds that the presence of lobster traps and gear has had no effect, and the fish, as some evidence shows have been found spawning actually upon the traps. Spring herring not injured

(6.) ARTIFICIAL HATCHING OF LOBSTERS.

Respecting the propagation of lobsters by artificial culture or other means, the Commissioners have several suggestions to make; having already recommended a rigid law requiring the protection of seed lobsters, they consider that if such a law be properly enforced, a great step will have been accomplished towards the preservation of the lobster supply for the future, and the evidence generally showed that canners and fishermen strongly object to the wanton destruction of seed lobsters. Protecti of seed lobsters essential.

Two additional courses appear worthy of the attention of the Government, namely, the reservation of natural inshore lagoons, harbours and coves, which it is generally admitted are natural breeding grounds for the lobster, and it appeared to the Commissioners desirable, if at all feasible, that at times when seed lobsters are especially plentiful, as late on in the season, the Government might at a nominal sum purchase from the fishermen seed lobsters to be planted in these reserves. A few thousand dollars spent in this way would yield results far outreaching the small expense in its benefits to the whole adjacent shore. Spawning reserves.

The second course, namely, the erection of hatcheries, is one which strongly recommends itself to the Commissioners, especially in portions of the coast where the inshore lagoons or natural breeding grounds do not admit of carrying out the scheme just detailed. From all accounts it appears that the method of hatching lobsters which has been carried out for the last seven years at Pictou, Nova Scotia, is completely successful up to the point of hatching. The eggs appear to be easily handled and during the period of incubation are protected from the numberless enemies which would endanger them under natural conditions. The new hatched fry appear to be vigorous and should be able to do well when planted in appropriate localities. Of course it is difficult to exactly estimate the results accomplished, inasmuch as it has been a rule to distribute the fry over quite an extensive area, but the Commissioners cannot too strongly express their opinion in favour of the artificial hatching of lobsters. Unlike the hatching of salmon and many other fishes, which involves the employment of labour over many months, the hatching of lobsters is a comparatively short process, and so far as the experience at Pictou shows, need not last over five or six weeks each season. Immense quantities Building of hatcheries urged. Artifical hatching a success. Hatching is a short process.

amounting to hundreds of millions can be hatched without difficulty in a comparatively small hatchery building, and were eight or ten lobster hatcheries placed in appropriate locations along the coast, the Commissioners feel that a great step would be achieved towards the permanent preservation of the lobster supply.

Effects of hatching in Northumberland Straits.

In the opinion of the Commissioners there is ground for regarding the small run of lobsters in the Northumberland Strait, as probably due to the planting of young lobsters for many years from the Pictou hatchery. These lobsters are distributed every season at pretty near the middle line of the strait for a distance of sixty miles or more. Lobsters are said to migrate more freely on the comparatively clear sandy bottom, than where the ground is rough and rocky, and the Commissioners see no difficulty in the contention that the abundance of small lobsters in some of the bays, such as Egmont Bay, are attributable to the lobster hatchery at Pictou.

Success of floating incubators unlikely.

A cheaper method of lobster hatching has been considered by the Commission, namely, floating incubators, such as those adopted by Mr. Nielson in Newfoundland, and whatever may be said in favour of this ready and inexpensive method it appeared to the Commissioners that the main difficulty in the way of the successful adoption of the Newfoundland scheme is the lack of experience and expert knowledge of the business in the canners' employees who would have charge of them. Floating incubators require to be kept clean and demand almost daily attention or they become foul and the eggs are all lost. If at every cannery a man of experience and an enthusiast in lobster culture could be secured, the system might work favourably, but the risks of failure are too patent to encourage the Commissioners to place implicit reliance in hatching lobsters by floating incubators at canneries.

Former incubation scheme failed.

The Commissioners understand that four years ago a scheme was tried, under the superintendence of an officer of the Department, for placing at a number of canneries, a floating car, containing spruce brush or similar material, upon which were placed lobster eggs. In every instance where reliable information has been received regarding the results of these floating cars, it has been shown that they were not a success. The failure no doubt arose principally from lack of attention, and also from clogging of the eggs and insufficient aeration, and possibly from the impurity of the water near the canneries, so that the eggs became a decayed mass, and the attempt thus proved almost a total failure.

Instance of supposed success of incubator car.

In one case, brought to the attention of the Commissioners, where it was thought to have succeeded on account of the schools of small fry, which appeared to be young lobsters, abounding in the adjacent water, the opinion of a United States expert was obtained, and he declared that the supposed fry were really the enemies of the lobster eggs, and were nothing more than predaceous crustaceans which had been attracted by the decaying lobster eggs in the floating cars placed near the cannery in question.

Suggested hatching flats.

A suggestion was made to the Commissioners that the Government might secure quantities of eggs and place them on sandy portions of the shore, where they might hatch out naturally, but the Commissioners cannot favour such a scheme, which would probably simply provide food for hordes of voracious shore animals and fishes.

SIX MINOR RECOMMENDATIONS.

Sale of broken lobster meat should be prohibited.

Two further recommendations which the Commission felt called upon to make reference are: the handling of lobsters and their treatment in connection with the canneries. On some parts of the coast, especially on the north shore of New Brunswick, the practice has grown up of fishermen supplying canneries, not with whole live lobsters, but with cooked, broken meat, that is to say, the individual fishermen, instead of bringing their catch direct to

the cannery, as has been almost universal since the canning industry began, have adopted the practice of taking their catches home, boiling the lobsters, cooking them and removing the meat. This broken meat is conveyed to the canners who buy it in that form. The Commissioners see not only considerable danger of deterioration in the meat itself, and a lowering in the quality of the canned goods entailed by this method, but they also realize that such a system increases the difficulty of carrying out protective regulations. The prohibition of spawn lobsters and the enforcing of a size limit, would be utterly impossible if such a practice prevailed generally, and the Commissioners think it highly desirable that a uniform system in the interest of all concerned, should be carried out. They are unwilling to suggest unnecessary or superfluous regulations, but the handling of broken meat seems to call for some special regulation. The canner, in their opinion, should be strictly prohibited from receiving at his cannery fragments of lobsters or meat removed from the shell.

Offenders should lose packing privilege for one year after the offence.

In order to make more effective the protective regulations *re* seed lobsters, and packing in close season, the Commissioners are of opinion that after the second violation of the regulations in question the canner should be strictly warned that his license would be cancelled on a further repetition of the offence. No canner in this latter case should be allowed to pack for one year subsequent to the season in which he was detected; and fined for such third offence against the regulations above referred to.

Canning premises should be inspected before license is issued.

Another recommendation which may be associated with the last is the suggestion that canning operations should by law, be permitted to be carried on only in appropriate premises, as it has come to the knowledge of the Commissioners that in recent years, lobsters are, in some localities, being packed in the living rooms of lobster fishermen's houses, in stables and out-buildings. The Commissioners therefore recommend that a report should be required in the case of every application for a license for a canning establishment setting forth that the premises are suitable and adapted for the preparation of so important a food product as canned lobsters.

Each license No. should be permanent.

A further recommendation in connection with the licensed lobster canneries occurs to the Commissioners as one that should be made, namely:—a rule for giving to each cannery a permanent license number, this license number under the present order of affairs, is changed every season, and the rule would, in the opinion of the Commissioners, not only be a benefit to the industry, but would also be an advantage to those canners who wish to establish a reputation for creditable goods. A number should be given to them which shall not be changed from year to year, but be permanent. Under the present system the license number of each cannery is required to appear upon the official stamp placed upon each legal case of canned lobsters, and were this recommendation adopted, and a permanent number given to each cannery, it would facilitate the tracing of cases by the department's officers where this is necessary or desirable. Some important canners strongly urged this suggestion upon the Commission.

Suggested stamping of cans.

A still more effective plan would be, stamping such number upon each can or upon the label, where the cans are labelled in the factory, but the Commissioners do not feel justified in recommending a regulation upon this point at the present stage.

Limitation of canneries not feasible.

The Commissioners had repeatedly brought before them the question of the increase in lobster canneries, and many canners who gave evidence complained that new canneries had been permitted to be erected in the vicinity of established canneries and had been injurious to their business. On the whole the Commissioners decided that in localities where canneries were unduly crowded the department should exercise great care in deciding upon new applications, and it might be desirable to refuse them in certain cases. Two Commissioners, Messrs. Whitman and LeVatte maintained on the contrary that an increase in canneries should not be curtailed by the department,

but that free competition should be allowed in this matter; the increase in the number of canneries, in their opinion, would be a benefit to the fishermen by insuring them better prices for their lobsters, and there is no danger in this increase, inasmuch as the total number of lobster fishermen has probable reached its maximum limit.

Two important points respecting the methods of fishing, additional to the recommendations stated in the body of this report are of such importance, that the Commissioners, though realizing the difficulty of dealing with this matter, would state their views.

Prohibition in two fathom water of breeding resort.

First.—Respecting the suggested prohibition of trapping lobsters in shoal water of a depth of two fathoms or under; the Commissioners are convinced from the large amount of evidence received, that a disproportionate number of seed lobsters are taken as a rule, by this inshore fishing. There is no doubt that spawn lobsters go close in-shore when their spawn is ripening, and such a prohibition would do much to protect them. The variations of the coast and the circumstances of the men in some localities would render its enforcement difficult, but if a two fathom limit could be carried out generally, the results would on the whole be beneficial. On certain parts of the coast there are reefs or sand bars, running in some cases parallel to the shore for a long distance, and the Commissioners are agreed that upon such bars, even though the water is not more than two fathoms, this prohibition should not apply. In cases where this two fathom limit can be clearly shown not to be a breeding ground for lobsters, it might be relaxed. Three of the Commissioners, Messrs. Whitman, LeVatte and Nickerson, objected to the two fathom limit, but the majority favoured its adoption.

Rule to be relaxed when not a breeding ground.

Lastly, the Commissioners in view of the large amount of evidence unfavourable to the use of bows, also called hand pots or ring nets, are bound to conclude that these traps are very destructive for two following reasons:—because they are fished as a rule from close in-shore and secondly, the bait being exposed, the lobsters are taken with extreme readiness. This form of trap which should be prohibited, is also one which can be used with facility by parties who do not depend, in any essential way, upon lobster fishing.

Bows used close inshore and are very destructive.

Under the same prohibition the Commissioners would favour the inclusion of cod-head trawls, which have for many years been forbidden in the Gaspé and Bonaventure waters. One Commissioner, Mr. LeVatte, while on the whole favouring the prohibition, laid stress upon the fact that in some localities, as for instance in Cape Breton County, the fishermen would have suffered very seriously if they had not been able to supplement their catch of lobsters in exceptional seasons, by the use of hand bows. Destructive storms destroyed their ordinary gear, which they could not readily replace, and the men resorted to hand traps or bows to some extent to make up their deficiency, hence this Commissioner urged that to meet such special cases, there should be an addendum to the prohibition specified, providing that if the majority of the fishermen in any particular locality petitioned the Minister of Marine and Fisheries and established the fact that they had lost their gear and were unable to fish lobsters the prohibition might be withdrawn and the concession be granted.

Prohibit bows and cod-head trawls.

FURTHER SUGGESTIONS CONSIDERED.

Suggested closure of canneries, &c., to prevent depletion.

Among the suggestions brought before the Commission with a view to prevent the lobster industry from being overdone was the closure of the canneries for one or more years, the establishing of a minimum distance between adjacent canneries, the granting of lobster areas to individual canneries and finally with reference to the fishermen's operations, the limitation or reduction of gear used, and the establishing of specified distances between the different sets of gear occupying the grounds. All have been discussed and carefully considered by the Commission.

Doubtful benefit of drastic measures.

The dangers attached to any legislative restrictions in regard to these matters were too serious to justify the Commission in making recommendations, as it appeared that while the benefit would be doubtful, the effect in any case would be disastrous to both the canneries and the fishermen. Some of the Commissioners were convinced that were the critical stage reached when some of these drastic restrictions should be carried out, there should at any rate be ample notice given, so that all parties might be prepared for any such proposed changes.

Equidistant location of canneries impracticable.

The circumstances under which both the fishing and the canning operations are carried on, have in many respects changed in recent years and render impracticable the establishment of minimum intervals between canneries. The canneries are more and more obtaining their supply of lobsters from widely separated points, and steam smacks are being employed in collecting lobsters from the fishermen along lengths of 30 to 50 miles of coast. As already pointed out, the fishermen are also setting their gear in deeper water, for the most part, principally outside the three mile limit along the greater part of the cost. All these changes prevent territorial and fishing area limits. While it may be admitted that the canners, especially those with capital, would be less vitally effected by drastic restrictions such as closing for a longer or shorter period than the resident fishermen, who are to a large extent poor, and would find it difficult to turn to any other employment equally remunerative, yet even the canners would be too disasterously affected to make the suggestions feasible.

As to the fishermen along the Quebec coast, they more largely engage in cod fishing, but along the New Brunswick shore the majority might be compelled to migrate to the United States, except along the Bay Chaleur, where the cod fishery would give them employment. On Prince Edward Island and along the Strait of Northumberland, the lobster men would be largely compelled to seek employment elsewhere, though there is reason to believe that along the north shore of the island the cod fishery would be open to them. Pressure would be perhaps iess felt along Pictou, Antigonish and Inverness counties but along the eastern and southern shores of Cape Breton and eastern Nova Scotia, many lobstermen would be less favourably situated. Upon the western shores of Nova Scotia, no doubt other branches of the fishery would be more largely developed if the lobster industry were restricted and in the Bay of Fundy, the various fisheries already mentioned in this report, could be extended considerably.

The Commissioners are aware that the fishermen generally desire a few days grace at the close of the season to take up their gear, and if required to take it up on the date recommended or specified by law, they would, as a matter of fact be compelled to begin to take up the gear and bring it ashore, some days before the end of the legal season, it is therefore suggested to the Minister, that from three to five days be allowed after the close of the season for bringing their gear ashore, at the discretion of the local officer, in case bad weather should interfere with the taking in of the traps.

One Commissioner, Mr. Gallant, strongly maintained that some days should be allowed prior to the commencement of the fishing season, in order to allow the men to put out their gear, and thus be ready to fish at the opening of the legal season. Upon this point, the Commissioners, in the absence of evidence of an urgent character do not feel justified in making any recommendation.

A very prominent subject, during the last few years, connected with the lobster industry has been, the proposal to sanction a fall fishing season. This suggestion for the most part included a short spring season as well, in other words, the proposal really amounts to a double season, with an interval between the two seasons of one or of several months, during which it has been generally held that the lobsters are engaged in spawning. There are several difficulties which appear insuperable to the Commissioners in this proposal. It is doubtful

Canneries would not re-open.

Ill effect on markets.

Storms in fall.

Spawning months specified.

whether the canneries, after operating in the spring and closing down would be prepared to reopen in the fall. There would be difficulty in many localities in obtaining hands and no doubt the best markets would be unfavourably affected, if any uncertainty as to the extent of the pack occurred, an uncertainty which a fall season would create. The evidence showed also that during fall fishing a great deal of stormy and uncertain weather would be encountered, and the concession on the whole would, therefore, be of doubtful benefit both to the fishery and to the fishermen. The spawning season, which it is claimed would be avoided by the spring and fall fishing, appears to vary in different parts of the coast. In the Bay of Fundy and west of Halifax, according to the evidence, June is the principal month. East of Halifax it appears to be at least a month later, and coming further east, spawn lobsters are not found in great abundance until August. In the Gulf of St. Lawrence generally, that is on the Quebec and New Brunswick shores, July seems to be the principal month, and the evidence brought out the unexpected fact that in the Northumberland Straits the main spawning season is as early as May and extends into June. In the Magdalen Islands the period appears to be the month of July, while in the deep and cold waters of the north shore and Labrador, the lobsters are at the height of their spawning in August.

Uniform length of fishing season unworkable.

At quite a number of the sittings witnesses strongly urged that a uniform length of fishing season should be allowed, commencing on a date movable according to the early or late seasons prevalent along certain portions of the coast. However reasonable this suggestion might at first sight appear, the Commissioners regard it as unworkable and likely to cause confusion. Certainly a decision as to when the season should commence each year would be open to much local dispute, and in deciding upon the period during which fishing should be allowed by law along various parts of the coast, the Commissioners have specified fixed and definite dates for beginning and closing the season.

Harm done by extensions.

The question of extensions came up prominently in the evidence given, and many important canners and fishermen did not hesitate to denounce extensions of the fishing season as tending to cause uncertainty and as demoralizing the industry. The opinion of the Commisssioners is that such extensions, while a benefit for the time being in giving the fishermen a longer period in which to fish, and in some localities said to have been absolutely necessary, have, in the opinion of the majority of the Commissioners, been an injury, and here it must be remarked that in recommending various fishing seasons along the coast, the Commissioners have also specified a definite date upon which the fishery shall by law end. They have done so in order to obviate the necessity in the future of those extensions, which, in the opinion of many witnesses who appeared before the Commission, have been harmful to the industry as a whole.

Seasons defined by specified dates.

Suggested temporary lobsters reserves.

While laying stress upon the preservation of the seed lobsters and upon limiting the open season for fishing, and also adhering to the size limit and recommending artificial propagation as a means of keeping up the supply, the Commissioners also carefully considered some other suggestions with this object in view; thus, the setting apart of reserves of a specified number of miles in every one hundred miles of coast, such reserves to be for one, two or more years regarded as breeding grounds, has engaged the Commissioners serious attention. A fatal objection to such reserves, even though they be changed from year to year or at longer or shorter intervals, is that their effect would be wholly disturbed by the setting of baited traps all around their borders, and thus drawing the lobsters off and rendering non-effective any system of setting apart such areas.

U. S. ownership of canneries.

A review of the lobster industry in Canada would be incomplete without some reference to the remarkable fact that a large part of this industry is controlled by citizens of the United States, and certain packing companies,

principally with headquarters in Portland, Maine. To some of these United States firms quite a large number of canning licenses are issued annually, and the question has been discussed by the Commissioners as to whether any special steps are necessary, with a view to in any way altering the system at present in force. The Commissioners held the view that they would rather see Canadians favoured in regard to this matter, but on the other hand, as some members of the Commission pointed out, those foreign firms have been the pioneers in the industry and have encouraged its extension, and the Commissioners make no recommendation in this matter. Three members of the Commission urged that while they see no objection to the established canning firms receiving canning licenses, new foreign applications should be refused.

The great aim is preservation of the industry.

In conclusion, the Commissioners have felt that the great object which they have had before them, in the course of their work has been the permanent preservation of the lobster industry, and while the framing of regulations with this object in view is surrounded with difficulties, the recommendations which they have made will in their opinion, tend in the direction of preserving the lobster industry for the future. It is of course essential that any regulation having for its object the protection of the lobster fishery, should be faithfully and unswervingly carried out. In attempting to secure observation of the fishery regulations, whether in regard to the lobster industry or any other fishing industry, the Commissioners are impressed with the necessity of using in as great a measure as possible, moral suasion, and if the Honourable the Minister of Marine and Fisheries could see his way to supply information concerning the lobster industry, for the general enlightenment of the fishing population in regard to points which it is desirable that they should know, the Commission think that far reaching benefits must result. In many countries the dissemination of useful information, respecting the habits of fish, their migrations, etc., as well as the best technical methods of handling fish products, has been attended with very satisfactory results.

Effective enforcement of laws.

Power of moral suasion.

Spread of information desirable.

Fishermen's intelligence and information.

A survey of the evidence plainly shows that the fishermen, as a body, have a great interest in everything that concerns their occupation and the resources which provide that occupation. They possess a large amount of real information, much of which they have freely laid before this Commission, and they in general evince a power of observation which is surprising, considering the opportunities which most of them have; but at the same time there remains a large amount of information of which they should be in possession, and were these suggested educative influences brought to bear, it would act as a moral persuasive and in the opinion of the Commissioners would render the task of enforcing reasonable laws far more easy in the future than the carrying out of regulations appears to have been in the past. While perhaps somewhat beyond the limits laid down for this Commission to report upon, a project has repeatedly come before the Commission, namely, some mode of encouraging other industries, whether connected with the fisheries or with other marine resources, by Government countenance, and in this way drawing off the over pressure from the lobster industry.

Live lobster trade may relieve strain on the supply.

Some scheme of cold storage and of greater facilities for the transhipment of fish products, would effectively aid in this matter, and the Commissioners have learned with interest that recently practical proposals have been placed before the Government. No doubt the extension of the live lobster trade and the shipment of boiled or cured lobsters in the shell would add much to relieve the pressure upon the lobster supply, which has been brought about by the fact that canning lobsters has been along the greater part of the Canadian coast almost the only method of introducing them into the markets. In some localities the fishermen receive 80 cents per hundred lobsters by count, whereas in other localities, as in western Nova Scotia, the fishermen get as high as from $20 to $30 per hundred. The proximity of live lobster markets

makes these most startling differences in the returns for their catch, but more distant areas would derive increased benefits from these markets were transportation facilities available.

Lobster men neglect other resources.

The Commissioners in their tour passed through country districts where, while certain wild fruits appeared to be abundant, they were almost wholly unutilized and allowed to waste.

Last fall there was a very serious scarcity of raspberries in the Toronto markets, and on account of the immense demands from the mining districts in British Columbia, it was found impossible to find a sufficient supply of this fruit to fill the orders. As a result of this short supply, the market was unprecedentedly strong, and many commercial houses advanced their prices for canned raspberries as high as $1.65 per dozen, and the lowest price was $1.35. While this particular fruit abounds in some of the districts adjacent to where the lobster fishermen reside, and remains largely unutilized, the Commissioners have felt that the question was worth bringing up, as anything which will tend to relieve the pressure on the lobster fishery and enable the shore population to engage in any other remunerative pursuit would be a substantial step in the right direction. Various wild fruits would find a ready market, if the resident people were encouraged to gather these fruits.

Great demand for canned raspberries.

Were it possible to develop other industries, such as the preparation of fruit or vegetable products, the results would be beneficial indirectly to the lobster industry. At present many lobster canners, after closing their operations on the sea coast, continue operations putting up other fish and fruit products there, or temporarily carrying on work inland, or in many cases they move to the United States and carry on the canning of corn and other vegetables, and in eastern Nova Scotia the people along the coast in many places have found it profitable to gather fox berries and other wild fruits, and ship them in a fresh condition to the markets with benefit to themselves.

Corn and other vegetable products.

The cultivation of cranberries could be vastly extended in the opinion of the Commissioners.

Cranberries.

There is a demand for many marine products, amongst others Irish moss, which is used for various purposes, mainly in the culinary arts, for making blanc mange, and for clarifying beer, &c. Quahags, clams, and a variety of other shell fish can also find a sale. The Commissioners offer no detailed recommendations on these matters, but they have thought it desirable to bring them to the notice of the Honourable the Minister, when reporting upon the industry which is so largely engaging the activity of no less than 15,000 or 20,000 fishermen along the eastern coast of the Dominion of Canada.

Irish moss, quohogs, &c.

In a final note, the Commissioners cannot omit to recognize the valuable aid and assistance rendered them in the course of their tour from point to point along the sea coast, given by Captain J. H. Pratt, of the Dominion fishery cruiser "Curlew." The members who held sittings west and east of Halifax were greatly indebted for his active help and kind attention. The Commissioners, while on board the "Curlew," were able to overtake a large amount of work, which would otherwise have occupied them a much longer period of time.

The Commissioners owe their thanks to Dr. Kendall, M.P.P., and Mr. Thomas Robertson, M.P.P., for kindly offices rendered, while to the Honourable G. H. Murray, Premier of Nova Scotia, the Commissioners were indebted for the use of the provincial buildings, Halifax. To Mr. Onésiphore Turgeon of Bathurst, Mr. Le Marquand and Mr. Touzeau, Sheriff of Gaspé, the thanks of the Commissioners are due for much assistance rendered.

It would be invidious to further specify the names of local parties who in every district volunteered most willingly to assist the Commission in carrying out its work, and in many ways, the Commissioners were indebted to them for services which facilitated the progress of their labours.

Respectfully submitted

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