

FISHERIES RESEARCH BOARD OF CANADA

The Lobster Fishery  
of the  
Southern Gulf of St. Lawrence

by  
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by

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Figure 1. Setting day at Tignish Run, Prince Edward Island.

The lobster fishery of the Maritime Provinces is by far the most important fishery to the shore fishermen. In recent years Prince Edward Island fishermen, for example, have made three quarters of their fisheries' income from lobsters. In 1951 over 17 thousand fishermen in the Maritime Provinces and Quebec caught over 45 million pounds of lobsters that had a landed value of more than 12 million dollars. The 1951 catch was the largest since 1917 except for 1932, when 48 million pounds were landed. The landed value in 1953 was the highest on record.

Lobsters are in very high demand and are readily caught, because they are largely restricted to shallow water. The fishery is continually in danger of overfishing by those interested mainly in quick financial returns. Proper management to make the best continuing use of

this extremely valuable resource is of utmost importance to all those engaged in the fishery.

Recent changes in the size limits for lobsters have stimulated a great deal of discussion and debate. Seldom, however, has it been possible for fishermen from different provinces or even from different parts of the same province to agree on the steps that should be taken to maintain and increase the catch of lobsters.

The purpose of this circular is to review the situation to determine which of the lobster fishery regulations have real conservation value and what further steps should be taken to get even greater value from this fishery. Since sound management depends to a large extent on knowledge of the lobster itself, a brief review of its life-history is given. Emphasis has been placed on the lobster canning areas in the southern Gulf of St. Lawrence.

## HISTORY OF THE FISHERY

Lobster fishing started in Canada about 1850 but continued on a small scale for the next 20 years. About 1870, when the first official statistics were recorded, the fishery started to expand rapidly. During the next 15 years new grounds were discovered and more men, boats and gear were employed. As a result, the catch in the Maritime Provinces and Quebec rose rapidly to reach a peak of nearly 100 million pounds in 1885 and 1886. This period of expansion was followed by a 30-year period during which the catch dropped drastically to reach a low of 26 million pounds in 1918. Since 1919 the fishery has had a number of ups and downs with peaks in 1932 and 1951 and low points in 1924 and 1940, but there is no evidence whatever of a general decline during this period. Production during the past 35 years has averaged about 36 million pounds. The course of the fishery from 1870 to 1953 is illustrated in Figure 2.

When fishing started in Canada the grounds were heavily populated with large, old lobsters that had accumulated for many years. In 1873 the lobsters in Northumberland, Kent and Westmorland Counties, for example, were reported to average 2 to 3 pounds in weight. As the fishery expanded there was a rapid decline in the average size and even before the fishery reached its peak in 1885 fishermen throughout the Maritimes were alarmed at the decreasing size of the lobsters. This decline in size gradually levelled off and in most Maritime areas there has been no great change in the sizes of lobsters caught during the past 40 years.

These abundant large lobsters provided excellent fishing for a number of years but gradually the accumu-

lated stock was fished out. Since 1917 the fishery and the lobster stocks have been in a state of balance, the catch representing the crop of lobsters that the grounds can produce each year under the existing regulations as they are now observed. It is too much to expect that the lobster catch in Canada will ever again approach 100 million pounds. There is, however, every reason to expect that with the right fishery regulations, properly observed, the fishermen can make much better use of this valuable resource than they are now doing.

## LIFE-HISTORY OF THE LOBSTER

The American lobster is found only on the eastern coast of North America, where it occurs from the Strait of Belle Isle in the north to North Carolina in the south. Within this range it is generally abundant in the Maritime Provinces, the Magdalen Islands, parts of Newfoundland, and in the New England States. The richest fisheries occur in southern Nova Scotia, in the southern Gulf of St. Lawrence and in the State of Maine. The North American lobster catch for 1950, which totalled about 73 million pounds, is shown in Figure 3 by Provinces and States. In recent years about two thirds of this total have been caught in Canadian waters. A very close relative of the American lobster is fished in northern Europe but the catch is only about one tenth as large as in North America. Although lobsters have been caught by draggers at depths up to 200 fathoms, the great bulk of the lobster population lives in the coastal waters at depths of less than 20 fathoms.

## Sizes of lobsters caught commercially

The sizes of lobsters caught commercially differ considerably from place to place. For example, in parts of

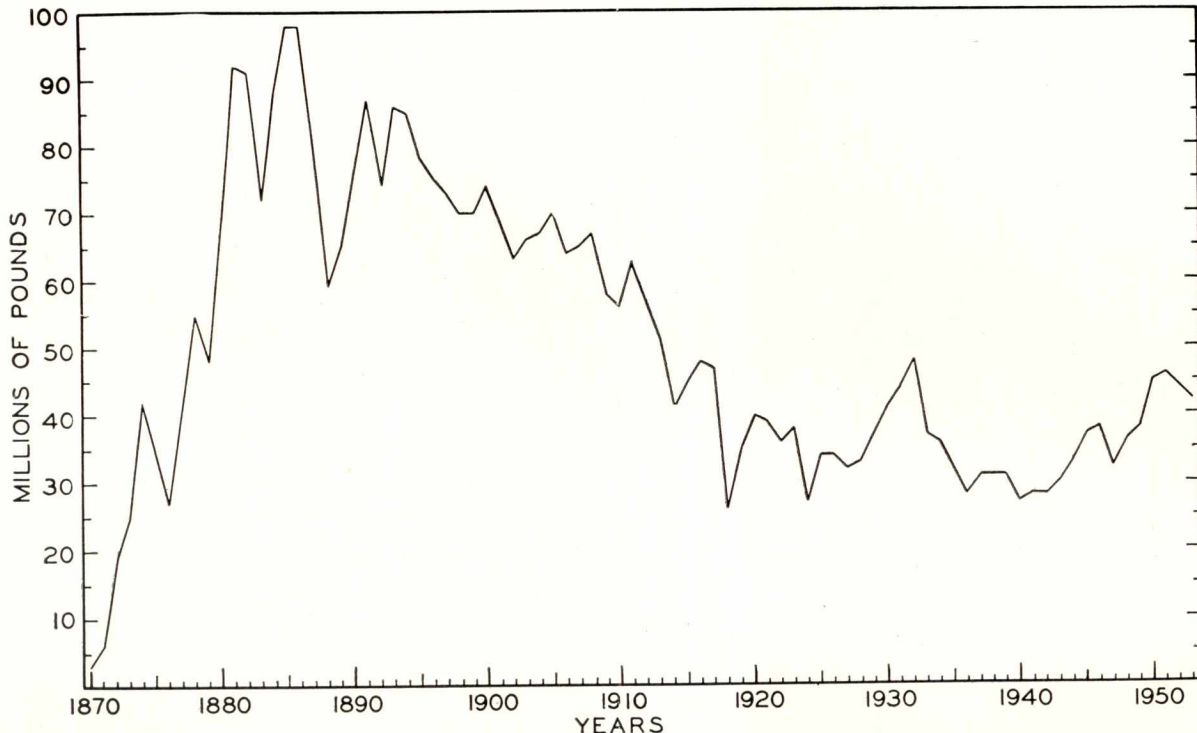


Figure 2. Lobster landings in the Maritime Provinces and Quebec from 1870 to 1953.

the upper Bay of Fundy legal-sized lobsters average about 3 pounds in weight whereas those in southern Nova Scotia average about 1¼ pounds. The smallest lobsters are caught in the southern Gulf of St. Lawrence where in some areas the legal-sized lobsters average about 8 inches in length and ⅝ of a pound in weight. The average total lengths of legal-sized lobsters in the Maritime canning areas are shown in Figure 4.

Fishermen to-day seldom catch lobsters over 16 inches in length (weighing 5 to 6 pounds) but occasionally much larger lobsters are captured. In October, 1951, the 21-inch, 23 pound lobster shown in Figure 5 was taken in the Bay of Fundy. A 23-inch, 24-pound lobster was caught off Yarmouth County in the spring of 1953. With their claws fully stretched out these two lobsters were slightly more than 3 feet long over-all. The world's record lobster taken in deep water south of Boston in 1935 weighed 45 pounds. These extremely large lobsters are always males.

The sizes of lobsters caught in an area depend on: (1) the number of young lobsters produced, (2) how hard the lobsters are fished, (3) the size-limit and how well it is observed, and (4) the design of the traps used. In many areas of the southern Gulf of St. Lawrence reproduction is excellent and great numbers of small lobsters are produced. As these approach commercial size they attract many fishermen who fish them so hard that few escape to grow large. In the southern Gulf of St. Law-

rence lobsters can be taken legally at a body or carapace length of 2½ inches measured from the eye socket to the back edge of the body shell. A body length of 2½ inches corresponds to a total length of only 7 1/3 inches. Many lobsters are taken illegally at even smaller sizes. Lobster traps with narrow lath spaces and small fishing rings hold more small lobsters and so reduce the average size.

### Growth

To decide how to make best use of our lobster stocks we must know how fast lobsters grow.

To increase its size a lobster must get rid of its hard, rigid shell. This "moulting" or "shedding" occurs in the southern Gulf of St. Lawrence principally from July to September. A lobster ready to moult can be recognized by its dull colouring, by the reddish tint of the joints and underside of the tail, and by a softening of the shell along the mid-line of the back, along the edges of the gill covers and on the inner sides of the claws near the body. When moulting the lobster lies on its side; the membrane joining the body and tail splits and the lobster gradually works its way out through this slit. The process, which usually takes from 5 to 20 minutes, is shown in Figure 6.

The shell of the newly-moulted lobster is extremely soft and the large claws are shrunken and shapeless. Immediately after moulting the lobster absorbs sea water and swells within 4 to 5 hours to reach its new size. The

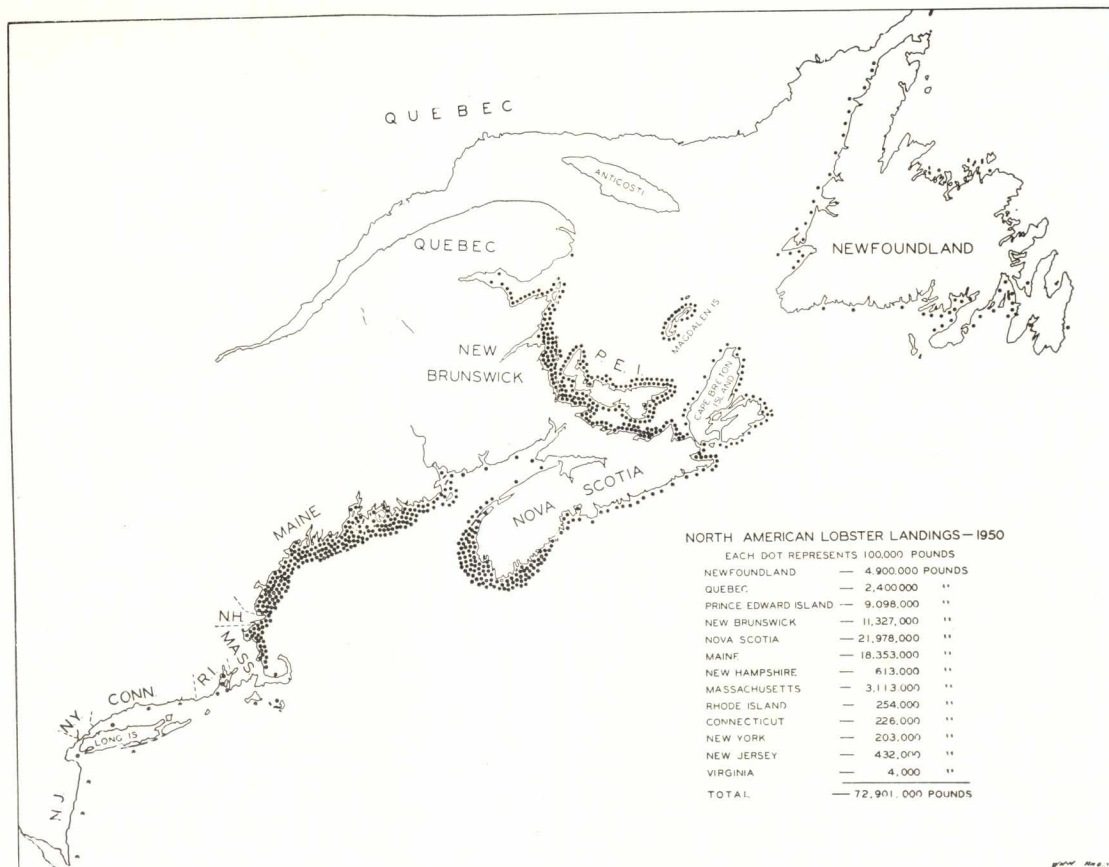


Figure 3. North American lobster landings in 1950.

water that is taken up after moulting is gradually replaced by solid flesh and the new shell gradually hardens. Small lobsters moulting in mid-summer harden within a few weeks but larger lobsters take longer. Those that moult towards the end of the summer may require several months to become fully hardened.

Where lobster fishing is carried on during the summer months most of the catch is made up of lobsters that have recently moulted and those that are preparing to do so. Such lobsters are difficult to hold and ship alive at any time of the year but particularly so during the summer when water and air are warmest. Since the flesh of such lobsters is watery they yield less meat on boiling than do hard-shelled lobsters.

Most of the early information on the growth of lobsters was obtained by holding lobsters in captivity. These studies gave some valuable information but it is doubtful whether lobsters held in captivity grow the same as they do under natural conditions. To determine their natural growth rate, a total of over 27 thousand, 6 to 10-inch lobsters were carefully measured and marked by means of small holes punched in their tail fans. These were liberated on the fishing grounds at six widely-separated points in the Maritimes. Those recaptured up to one year later could be readily recognized (Figure 7) and by re-measuring them their growth could easily be determined. These experiments showed that in the southern Gulf of St. Lawrence lobsters of the size marked usu-

ally moult once a year and grow about 14 per cent in length and 50 per cent in weight. Growth was about the same in all of the six areas where lobsters were marked.

A lobster with a body or carapace length of 2½ inches weighs about 7 ounces. If released, this lobster would in



Figure 5. A 21-inch, 23-pound lobster caught in the Bay of Fundy, October, 1951.

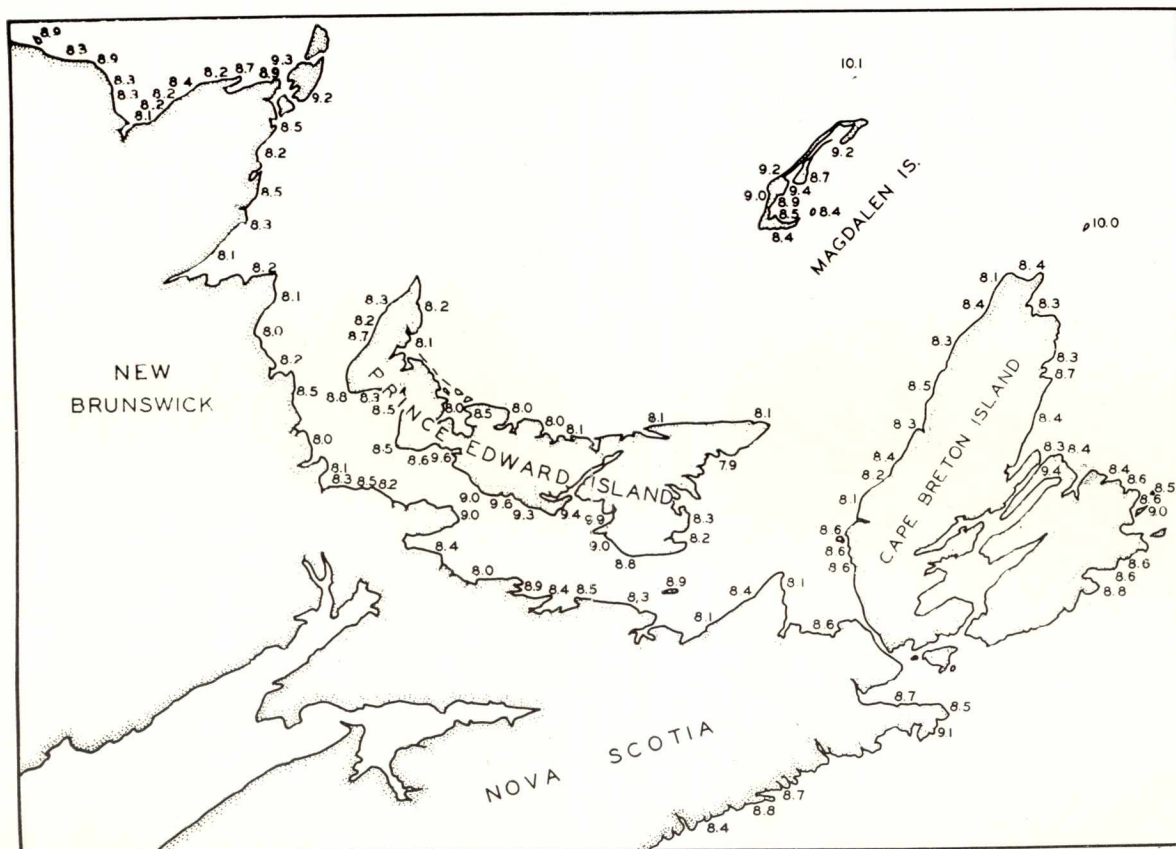
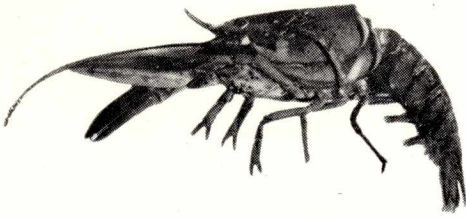
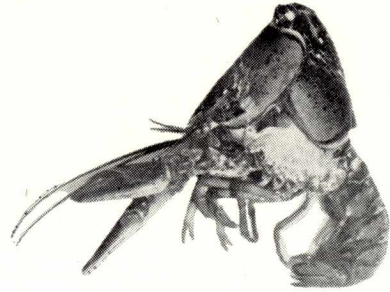


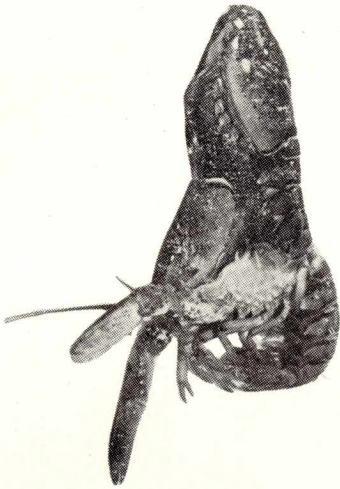
Figure 4. Average total length (inches) of legal-sized lobsters caught in the lobster canning areas.



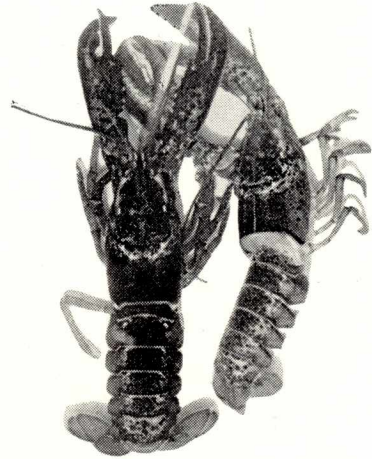
(1) Start of moult



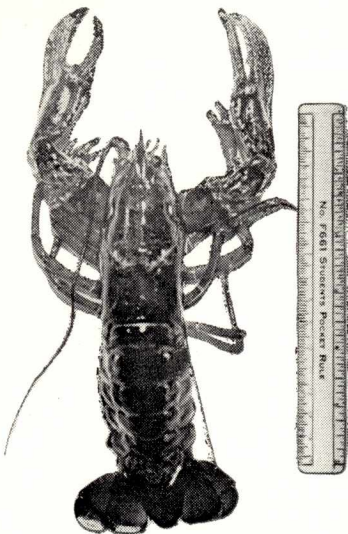
(2) 10 minutes later



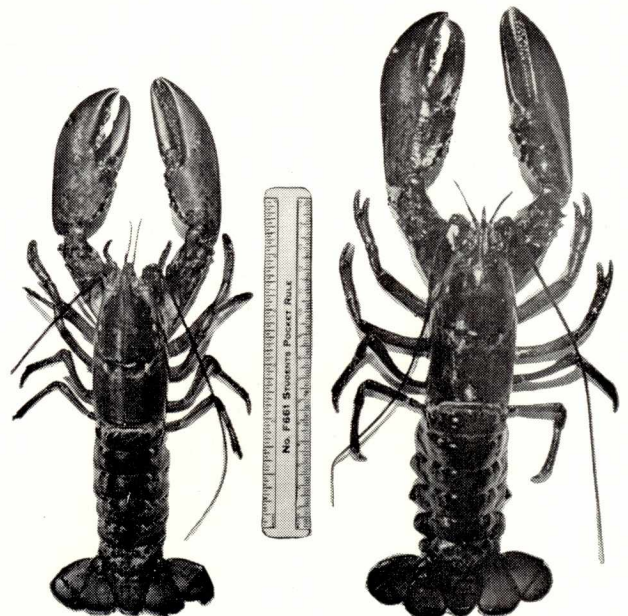
(3) 14 minutes later'



(4) 15 minutes later — moult completed



(5) 15 minutes after moult — claws not filled out



(6) 5 hours after moult — old shell on left; newly moulted lobster on right has swollen to full size.

Figure 6. Lobster moult (Photographs by G. F. M. Smith)

only two moults reach a carapace length of  $3\frac{1}{4}$  inches and a weight of about 16 ounces — an increase in weight of over 100 per cent. It is not yet possible to determine accurately how many of the short lobsters released by

tagging and marking many thousands of lobsters does, however, indicate that, if the "shorts" are properly handled, a very high proportion of those released will live and be caught again at considerably larger, more valuable sizes.

#### Differences between male and female lobsters

To understand how lobsters reproduce it is necessary to know something of the differences between male and female lobsters. Possibly the most striking difference is in the first of the five pairs of swimmerets or small "paddles" on the under side of the tail. On the male the first pair are relatively large, hard, smooth and tapering. During mating these transfer sperm to the sperm sac of the female. On the female the first swimmerets are soft and much smaller. The sperm ducts of the male open through a pair of small openings at the bases of the last pair of walking legs. The egg ducts of the female open through similar openings at the bases of the second pair of walking legs. The female has a sperm sac between the bases of the last two pairs of walking legs. Mature, male lobsters usually have larger claws, longer bodies, narrower tails, longer and sharper spines on the under side of the tail and weigh more than females of the same total length. Some of these differences can be seen in Figure 8.

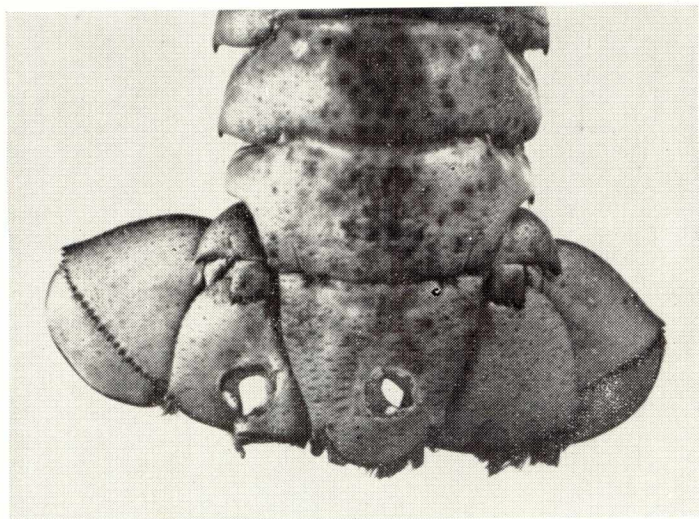


Figure 7. Tail of marked lobster showing appearance of punch marks when recaptured a year after marking.

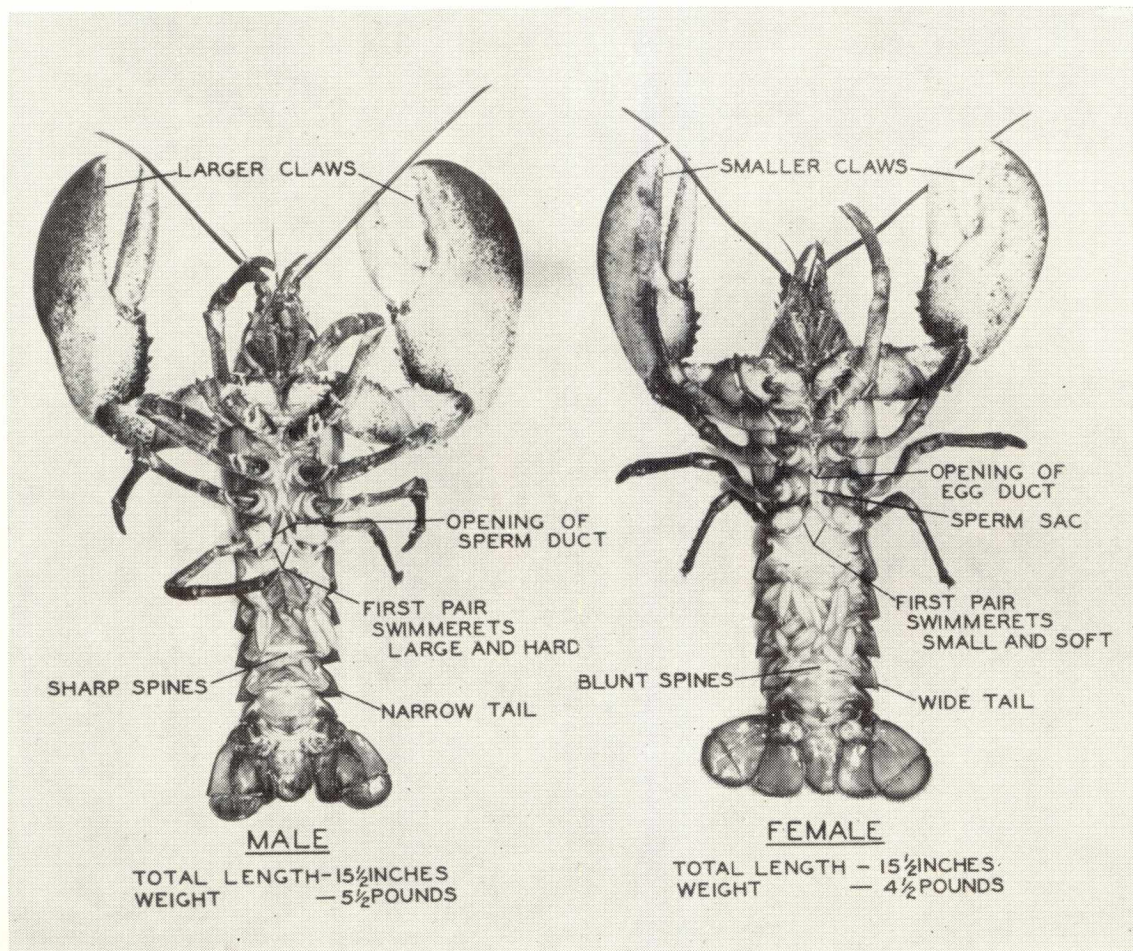


Figure 8. Photographs of a mature male and a mature female lobster each  $15\frac{1}{2}$  inches long.

### Maturity and Mating

Throughout the Maritimes there is a striking difference in the size at which lobsters become mature. In the southern Gulf of St. Lawrence where the water is warm in summer a few lobsters mature when they are as small as 7 inches, weighing less than half a pound. At a length of 9 inches probably over half the lobsters in this area are mature. In the Bay of Fundy area the water is much cooler during the summer months. Here the smallest mature lobsters are about 12 inches long and weigh about 2 pounds.

Mature lobsters usually mate a few hours after the female has moulted when her shell is still very soft. At this time the male, which usually moults several weeks earlier, is fairly hard-shelled. During mating, which lasts about one minute, the male transfers sperm to the sperm sac of the female. When the eggs are laid (from one month to a year or more after mating) the female releases enough sperm from the sac to fertilize the eggs. The male lobster is usually slightly larger than the female it mates with but lobsters differing greatly in size do not mate successfully.

### Lobster movements

On a fishing ground catches of lobsters vary from day to day and sometimes the changes are striking and sudden. These day to day changes and the big differences in the catches at different seasons have led some fishermen to believe that lobsters make seasonal migrations. Fishermen generally believe that lobsters migrate onshore in the spring and offshore in the fall. Some fishermen, particularly those in western Northumberland Strait, maintain that the bulk of the lobster population moves out of their territory at certain times of the year.

Over 80,000 tagged lobsters have been liberated in Canadian waters and these are by far the most extensive lobster taggings that have been conducted anywhere. The kind of tag used in recent years is shown in Figure 9. Over half of these lobsters were tagged in the canning areas of the southern Gulf of St. Lawrence. Fishermen have recaptured more than half of these tagged lobsters and their reports show clearly that lobsters are not migratory. Some of the tagged lobsters wandered along the coast in both directions but the average distance moved was less than 2 miles. About 25,000 lobsters tagged at Neguac, Pt. Sapin, Tignish and Miminegash near the entrance to Northumberland Strait gave no evidence whatever of a migration into or out of the Strait at any time of the year. The tagged lobsters gave no indication of a mass movement from deep to shoal water in the spring or the reverse in the fall. Lobster taggings in other countries have given about the same results.

Since these taggings indicate that lobsters do not migrate, some other explanation must be found to account for the day to day and seasonal differences in the catch. From a study of the lobster fishery throughout the year in many different areas it seems probable that these changes in the catch are often the result of changes in water tem-

perature. In the winter and early spring when the water is cold the lobsters are inactive and difficult to trap. As the water warms they become much more active and trap readily. Sudden changes in water temperature often follow moderate to heavy winds which move large masses of water. In the southern Gulf of St. Lawrence water temperatures at a depth of 10 fathoms may rise or fall as much as 15 degrees F. in 24 hours. The activity of the lobsters is greatly affected by such sudden changes and the catch goes up or down accordingly. Moulting also has a marked effect on the catch. Just before the moult lobsters trap poorly whereas for several weeks after the moult they are hungry and particularly easy to trap. In some areas the very intensive fishery quickly reduces the stock of lobsters and the catches drop off rapidly.

### Egg laying

Freshly laid lobster eggs are round, about 1/16th inch in diameter and are dark green, almost black in colour. In the southern Gulf of St. Lawrence the egg-laying period is from early June to September and occurs in two bursts. The first burst of egg laying is in June and July by old-shelled lobsters that have not moulted since the previous summer; the second burst occurs in August by new-shelled lobsters that have moulted earlier in the same summer the eggs are laid.

When laying eggs the female lobster turns over and raises the front part of her body by spreading her two

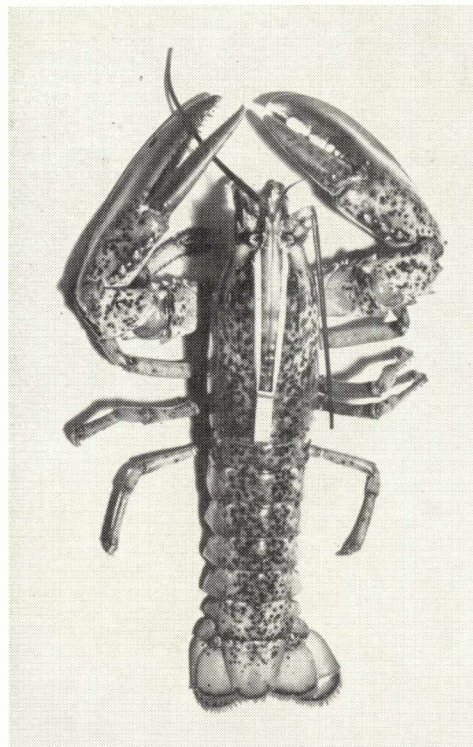


Figure 9. Tagged lobster. Numbered metal strap hooked over back edge of body shell and held in place by rubber band around the "horn".

large claws as shown in Figure 10. The eggs are laid through two small openings at the bases of the second pair of walking legs and flow down six to eight abreast into the pocket formed by the curled tail. There they become fastened to the five pairs of swimmerets. As the eggs flow over the sperm sac between the last two pairs of walking legs they are fertilized by the sperm deposited there by the male during mating. The female usually takes several hours to lay a complete batch of eggs. As a rule mature females lay eggs every other year.

The female lobster protects the eggs on the under surface of the tail for almost a year before they hatch. During this period the tiny lobster develops within the egg, living on the dark green yolk. As the dark yolk is used up the egg grows somewhat larger, becomes oblong in shape and lighter in colour. Shortly before hatching the black eyes of the young lobsters can easily be seen in the eggs.

The number of eggs laid varies with the size of the lobster, a 7-inch female laying 3,000 and an 18-inch female

about 75,000. The average number of eggs laid per female varies of course, with the average size of the mature female lobsters. Off Miminegash, P. E. I., a small-lobster area, the mature females average 9¼ inches in length and lay on the average 11,000 eggs.

### Hatching

When the eggs are ready to hatch the female stands on the tips of her walking legs with the large claws stretched out in front and the tail raised at an angle as shown in Figure 11. The swimmerets with the attached eggs are waved violently for about half a minute. This makes a current which carries hundreds of newly-hatched lobsters away from the female and towards the surface. This operation may be repeated several times at short intervals. The female usually takes two weeks to hatch her complete batch of eggs. In the southern Gulf of St. Lawrence hatching starts in mid-June, reaches a peak in July and continues to the end of September.

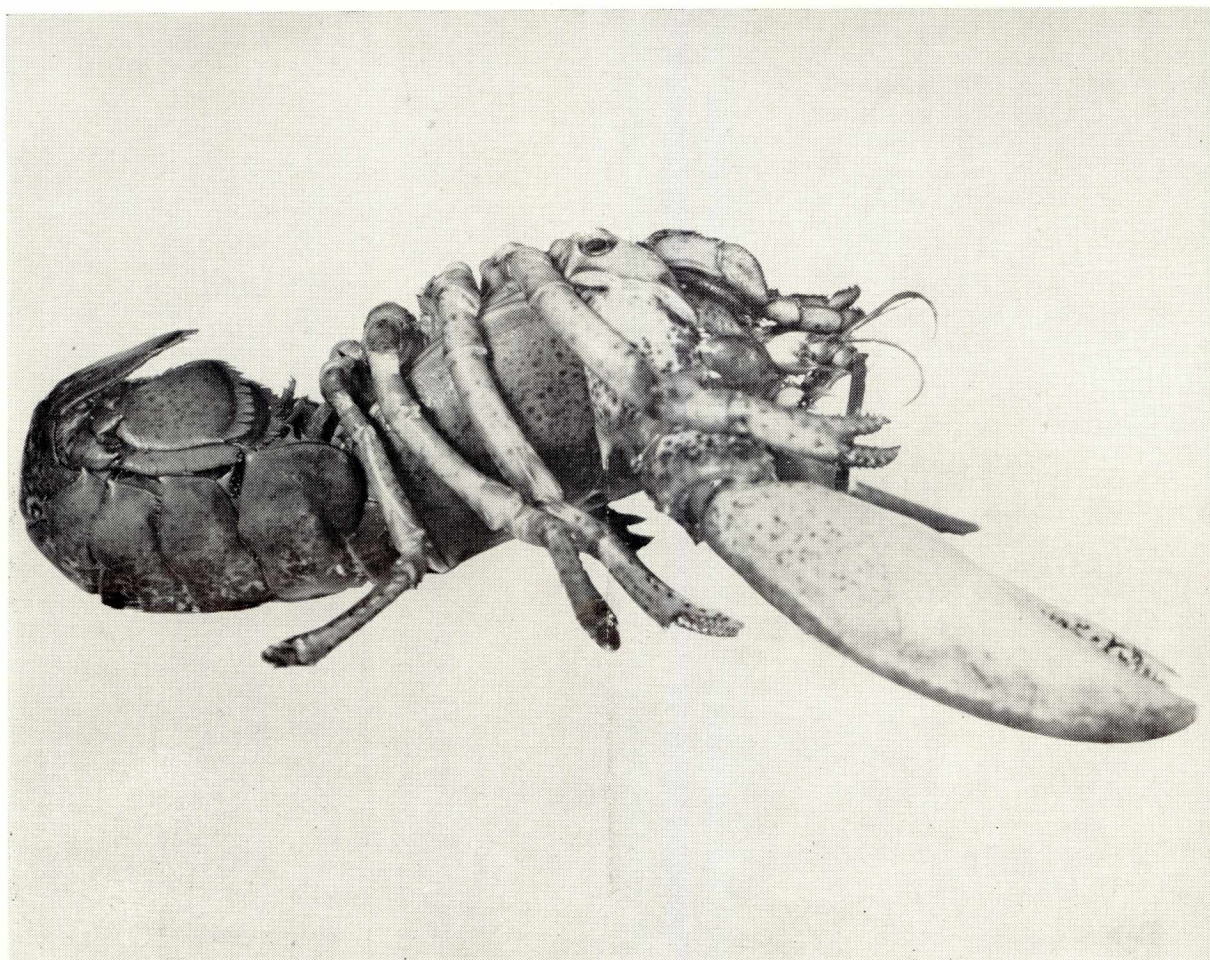


Figure 10. Photograph of mature female lobster in egg laying position.

### Young lobsters

Newly-hatched lobsters are about 1/3 of an inch long and reddish in colour. These tiny lobsters are adapted for swimming and bear little resemblance to the adult lobster. During daylight hours most of them swim at or near the surface. This free-swimming period lasts from one to two months, depending on the water temperature. The young, free-swimming lobsters moult or shed three times to reach the fourth stage at a total length of a little more than 1/2 inch. These fourth stage lobsters now resemble the adults in shape and colour. In the free-swimming period the young lobsters may be carried by surface currents many miles from the place where they were hatched. Towards the end of the fourth stage the young lobsters settle to the bottom wherever they happen to be. The free-swimming period is probably the most vulnerable period in the life of the lobster and there is good evidence to show that not over 10 per cent of those hatched survive to settle to the bottom.

As far as is known the southern Gulf of St. Lawrence is the richest lobster breeding ground in the world. Off Richibucto for example, as many as 1,600 young lobsters have been caught in a half-hour surface tow with a 12-foot net. During the past 6 years over 100,000 free-swimming young lobsters have been caught in this area. In contrast, only 3 free-swimming lobsters have been

caught in the Bay of Fundy area where towing with similar gear has been conducted for 45 years.

The number of young lobsters hatched varies somewhat from year to year. In the Richibucto area the best hatch during the past 6 years was in 1952 when over twice as many hatched as in 1949, the worst year. The number of young lobsters that survive the free-swimming period is much more variable. In 1952 about 23 times as many young lobsters survived to reach the fourth stage as in 1949. Such variations in the numbers hatched and surviving the free-swimming period undoubtedly play a large part in determining the ups and downs of the commercial fishery. The day may come when it will be possible to predict trends in the commercial fishery from the catches of young lobsters.

Until recently almost nothing was known in nature about young lobsters from the time they settle to the bottom until they reach the sizes caught in the commercial fishery. In October, 1952, for the first time newly-settled lobsters were taken in a bottom drag off Richibucto. More of the same sizes were caught in May, 1953. This showed that these small lobsters do not grow during the late fall, winter and early spring. It is now clear that in this area lobsters moult only 5 to 7 times to reach a total length of about one inch during their first growing season. These early bottom stages are shown life size in Figure 12 where they are compared with the four free-swimming stages.

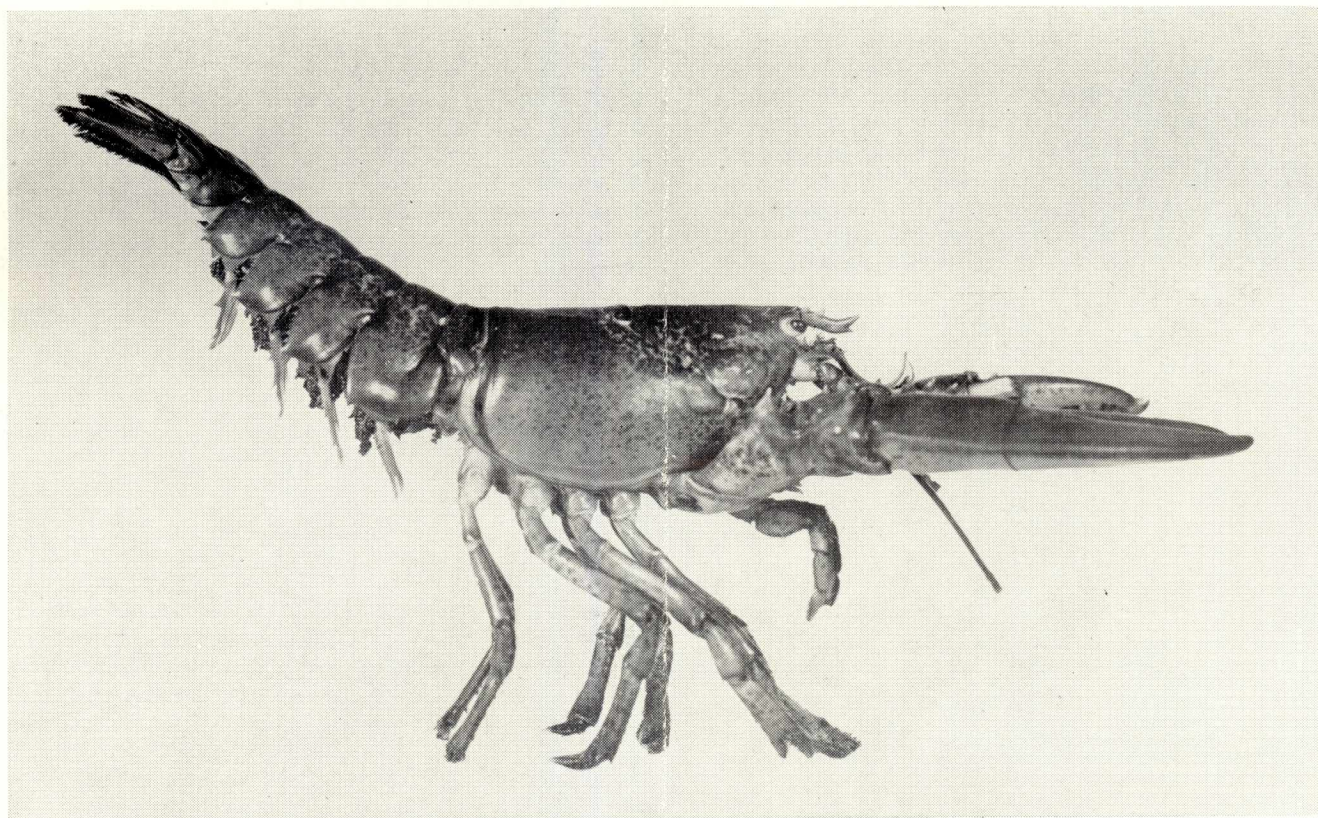


Figure 11. Photograph of mature female lobster in egg hatching position.

### Lobster enemies — particularly man

During the first few weeks when the tiny lobsters are free-swimming and do not appear to be aware of danger, vast numbers are eaten by young fish and a great variety of other swimming creatures. After they settle to the bottom young lobsters are eaten by the smaller fishes, crabs and other lobsters. Great numbers of small 4- to 6-inch and occasionally larger lobsters are eaten by cod, skates and dogfish. Recent investigations have shown, however, that from the time lobsters reach commercial size their worst enemies are the fishermen themselves. This fact is shown clearly by the large numbers of tagged lobsters recaptured by fishermen during the open season.

Most of the 80,000 legal-sized lobsters that have been tagged in Canada were widely scattered over the fishing grounds at the beginnings of the open seasons. These lobsters are no easier or harder to catch than untagged lobsters so the fishermen should catch about the same fraction of these as they do of the total available population. The fraction of tagged lobsters recaptured differs, of course, from place to place and from year to year. On the whole, however, the fraction is extremely high. This indicates that the southern Gulf of St. Lawrence lobster fishery is one of the most intensive commercial fisheries in the world.

For example, consider the Miminegash, P. E. I., area which is typical of the small-lobster areas in the southern Gulf of St. Lawrence. Here the lobster fishing season usually extends from August 10 to October 5, a total of only 57 days. Each year since 1945 about 1,000 tagged lobsters have been spread over these fishing grounds just before the season opened. During the short but warm-water season when lobsters are active and trap easily, fishermen have on the average over the past 9 years recaptured and reported 75 per cent of these tagged lobsters. Since some tags fall off and since all tags are not reported, it seems clear that fishermen in this area actually catch more than three quarters of the legal-sized lobsters that are on their grounds at the start of each season.

This extremely heavy drain on the stocks is also shown by the rapid drop-off in landings during the season. In some years lobsters become so scarce before the end of the season that fishing is no longer profitable. In such areas the fishery is so intensive that most of the lobsters are caught up in one or two years as 7- to 9-inch canners. Only a few escape for another year to grow to the market size for live lobsters.

Throughout a large part of the Maritimes the lobster fishing season is open for only two months of the year whereas in other areas fishing is permissible for four to six months. Surprisingly enough, however, the most intensive fisheries occur in the short season areas. In such areas the fishery has simply adjusted to the shorter season by employing more men, boats and gear in order to harvest the lobster crop more quickly. It appears extremely doubtful, therefore, whether closed fishing seasons have any real conservation value for lobsters.

### THE ARTIFICIAL HATCHING AND REARING OF LOBSTERS

In 1891 in an effort to halt the drastic drop in lobster landings the first Canadian lobster hatchery was built at Bay View, Pictou Co., N. S. From 1903 to 1912 thirteen additional hatcheries were built in the southern Gulf of St. Lawrence and in eastern Nova Scotia. In these hatcheries eggs were removed from berried lobsters and placed in jars in running sea water. When the tiny lobsters hatched they were immediately planted. Investigations showed, however, that heavy losses of eggs occurred in the hatcheries and only a very small fraction of the eggs were actually hatched. Berried lobsters can, however, if left undisturbed hatch practically all their eggs. As a result of these investigations it was concluded that the hatcheries were actually doing more harm than good. All of them were closed in 1917 and they have never been reopened.

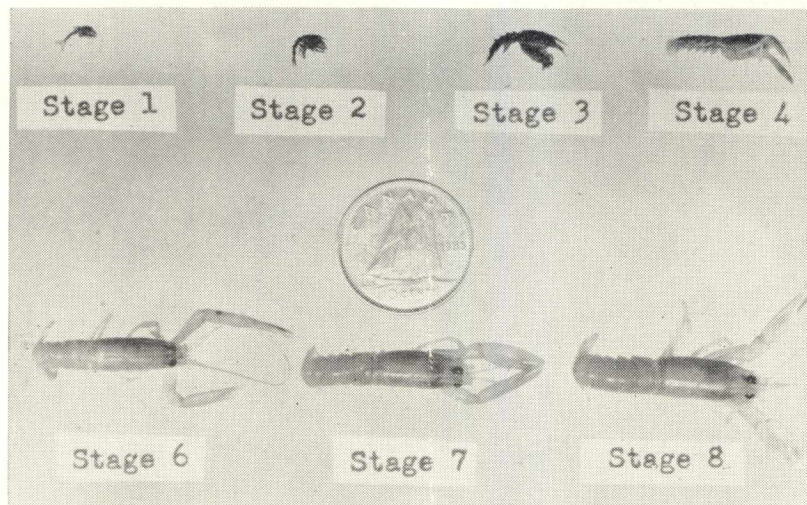


Figure 12. Life size photographs of young lobsters in stages 1 to 8.

Towards the end of the last century investigators in Europe and later in the United States succeeded in rearing lobsters for several weeks until they had passed the free-swimming stages and were ready to settle to the bottom at a length of about  $\frac{1}{2}$  inch. As a result of this work a lobster rearing station was built in the United States in 1900 and several others were completed later. A few are still in operation. It was hoped that more young lobsters could be reared safely through the vulnerable free-swimming period so that the stocks of commercial-sized lobsters could be increased.

Generally speaking, losses of tiny lobsters in the rearing stations have been disappointingly high. In no case have enough young lobsters been liberated to have any noticeable effect on later commercial landings. Another important consideration is the cost of rearing lobsters artificially. In one modern, well-equipped rearing station, losses were so high that the lobsters successfully reared to a length of only  $\frac{1}{2}$  inch cost about 40 cents each. Probably only a small fraction of these would survive to be caught by fishermen. It is clear therefore that the commercial-sized lobsters resulting from this particular operation cost far more to rear than they were worth.

It seems clear that the artificial rearing of lobsters by present methods can not be relied on to maintain or increase Canadian lobster production.

### LOBSTER FISHERY REGULATIONS

We have considered the history of the lobster fishery and some of the more important parts of the lobster's life-history. We should now take full advantage of our present knowledge and past experience and decide how the fishery should be regulated to make the best continuing use of this valuable resource. Of the many lobster fishery regulations now in effect the following four appear to be the most important:

- (1) Closed Seasons. Fishing is prohibited in different areas for 6 to 10 months each year.
- (2) Berried lobsters. The sale of egg-bearing lobsters is prohibited.
- (3) Size limits. The sale of lobsters below certain sizes is prohibited.
- (4) Lath spaces. Trap laths must be spaced far enough apart to permit the escape of short lobsters.

#### Closed seasons

As early as 1874 a regulation was passed prohibiting lobster fishing throughout the Maritime Provinces during July and August. This was to prevent the sale of lobsters during the moulting season when they are in poor condition. As time went on and lobster landings reached their peak and started to drop rapidly the seasons were gradually shortened. It was hoped that this would reduce the amount of fishing and so maintain the stocks. By 1900 the open seasons in the areas east of Halifax had been shortened to less than three months in the spring and early summer. West of Halifax fishing was allowed for

5 to 6 months in the winter and early spring. As the catch continued to go down the open seasons east of Halifax were further shortened to about two months. Except for a number of relatively small changes the open seasons are about the same to-day as they were in 1918. At present the Maritime Provinces, Quebec and Newfoundland are divided into 14 districts each differing in the opening and closing dates of the lobster fishing seasons.

In so far as closed seasons were intended to prevent summer fishing for newly-moulted, soft-shelled, slack-meated lobsters they have served their purpose reasonably well. In Figure 13, the monthly Canadian lobster landings are compared with those in the State of Maine where fishing is permitted throughout the year. In Maine the peak landings are made in late summer and early fall during or just after the moulting period. The bulk of the Canadian catch is landed in May and June when the lobsters are in the best condition.

The high tag returns, the rapid drop-off in landings during the season and the small sizes of lobsters caught have shown, however, that the fishery in the short open seasons is often more intensive than it is where fishing is permitted for 4 to 6 months. It must be concluded, therefore, that our present system of closed seasons has little, if any, real conservation value. This conclusion is supported by the healthy condition of the lobster fishery in Maine where the season is open all year. It might also be pointed

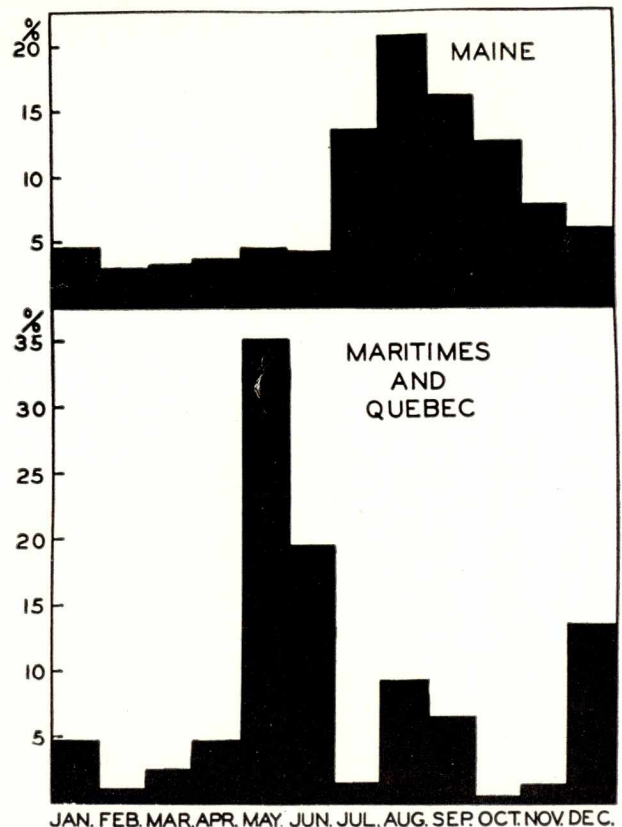


Figure 13 Monthly lobster landing in 1951 in the State of Maine and in the Maritime Provinces and Quebec.

out that no other lobster producing country in the world has felt that closed seasons were necessary to protect the lobster stocks. If our closed seasons are to be continued we must do so in the full understanding that these will be unlikely to have any real effect on the long-term catch of lobsters.

Closed seasons do, of course, have certain advantages and disadvantages. Where conditions are such that fishermen can harvest their crop of lobsters in two months they may be wise to do so. By so doing some of the costs of fishing are reduced and the fishermen have the opportunity to catch other fish at other times of the year. Fishing can be restricted to certain times of the year in order to land lobsters when they are in excellent condition or to take advantage of favourable prices. Short seasons do, however, lead to a keen race among the fishermen, each trying to catch as big a share of the lobsters as possible in the limited time available. To do this they have built such large fleets of traps that in many areas far more traps are fished than are actually needed to harvest the available lobsters. This practice greatly increases the cost of fishing and so reduces the net profit.

Our system of closed seasons has led to additional regulations which restrict fishermen, boats, and gear to one lobster fishing district in a year. These regulations save the lobsters for local fishermen but restrict the freedom of fishermen and necessitate the building of more boats and gear than would otherwise be needed to catch the lobsters.

Closed seasons are difficult and costly to enforce and in attempting to do so, protection officers of the Department of Fisheries are spending a great deal of time and money.

The simplest solution to this problem appears to be a single closed season throughout the Maritime Provinces, Quebec and Newfoundland during July, August and September to prevent the capture of newly-moulted lobsters. With such a closed season fishermen in the southern Gulf of St. Lawrence could decide for themselves, as fishermen in southern Nova Scotia now do, when and how much gear they could set in the early spring. In some years some fishing would be possible in April, and could of course, continue on a larger scale in May and June. Fishing would again be possible in October and could continue on a gradually reducing scale until stopped by poor fishing and bad weather in the late fall. From experience fishermen would learn how much gear to risk in particular months taking into account the weather, the possible catch and the price.

The whole lobster fishing industry is now geared to our present system of short open seasons and this solution would involve many changes in the catching, processing and marketing of lobsters. It is, therefore, unlikely to be popular. The time has, however, certainly come when everyone concerned should give serious thought to the many problems involved in our complicated, difficult, system of closed seasons and decide in what direction we should proceed to obtain the greatest benefits.

### Berried lobsters

The sale of egg-bearing or berried lobsters has been prohibited by law in Canada since 1873. In the early days of the fishery when lobsters were large and plentiful this regulation was almost completely ignored and most of the berried females that were caught were canned or sold alive. When the catch began to drop fishermen became more and more conscious of the wisdom of protecting berried lobsters and observance of this regulation gradually improved. At the present time berried lobsters are rigidly protected in most areas. In a few places, particularly where such lobsters are plentiful, fishermen continue to sell them after removing the eggs.

It is clear that to make best use of a fishing ground enough berried lobsters must be allowed to hatch whatever young lobsters the ground can support. It is equally clear that protection of berried lobsters alone will not guarantee the best commercial production from an area. The lobsters must not be harvested until they have reached the sizes that will give the most valuable crop.

### Size limits

Size limits which prohibit the sale of lobsters under certain sizes have a two-fold purpose: (1) to allow as many as possible of the lobsters to spawn at least once before they are caught and (2) to permit the young, fast-growing lobsters to reach the sizes at which they will yield the most valuable crop.

From the very beginning of the lobster fishery the value of size limits was generally recognized and even before 1900 size limits were reasonably well observed in the Bay of Fundy area. It was not, however, until 1940 that any serious attempt was made to enforce a size limit in the southern Gulf of St. Lawrence. In that year, after a careful study of the sizes of lobsters caught in the various canning areas, a size limit of 6½ inches total length was established. It was recognized that a size limit this small would allow many lobsters to be caught before they had a chance to spawn. It was felt, however, that the sudden introduction of a larger size limit would be a serious blow to fishermen and processors in those areas where many of the lobsters caught were under 7 inches. It was intended that, as the short lobsters that were released grew and the average size increased, the size limit would be gradually raised until the best size limit was reached. In 1942 the size limit was raised to 7 inches where it remained for 10 years.

In 1952, on the basis of experience in other parts of the Maritimes and in the United States, it was decided that a size limit based on the body or carapace length would be more convenient and reliable than one based on total length. Many careful measurements of lobsters in several areas showed that a lobster with a body length of 2¾ inches averaged slightly less than 7 inches total length but came as close to it as any other reasonable measure. Since lobsters differ somewhat in shape, a size limit of 2¾ inches body length allowed the fishermen to take a

few lobsters as small as 6½ inches total length but also prohibited the sale of a few over 7 inches in length. When the 2¾ inch measure was adopted in 1952 numerous protests were received from fishermen and packers in many areas objecting to the fact that some lobsters as small as 6½ inches could then be landed legally. As a result of these protests a series of fishermen's meetings was held in the fall of 1952. Naturally opinions expressed at these meetings differed but considering the meetings as a whole it was concluded that the majority of the fishermen in the canning areas of the Maritime Provinces and Quebec favoured a larger size limit. In 1953 the size limit was increased to 2½ inches body length which corresponds on the average to a total length of 7 1/3 inches.

Many fishermen, particularly those in parts of Prince Edward Island and New Brunswick, are strongly opposed to this larger size limit and in certain areas the traffic in short lobsters during 1953 was extremely heavy. It now seems clear that no one size limit will be completely acceptable to all the fishermen in the canning areas of the Maritime Provinces and Quebec. It is equally clear that if different size limits for canner lobsters were established for different parts of the southern Gulf of St. Lawrence the regulations would be almost impossible to enforce. The situation is now so serious that the problem must be faced by all concerned in order to reach the best possible solution from the facts that are now available.

In reviewing the evidence in favour of size limits we might consider the following points: (1) the size of mature lobsters, (2) movement, growth and survival of short lobsters, (3) the increase in commercial landings after size limits adopted, (4) size limits in other countries, and (5) what could full protection of short lobsters mean in dollars to the fishermen?

(1) **Sizes of mature lobsters.** In the southern Gulf of St. Lawrence a few lobsters mature when they are as small as 7 inches, but most do not mature until they are considerably larger. Even at a length of 9 inches only about half are mature. To allow all lobsters to spawn at least once the size limit should therefore be greater than 9 inches. It is obvious that if a size limit this large were applied under present conditions it would not be profitable to fish in most of the southern Gulf of St. Lawrence areas. It seems clear, however, that to have as big a hatch of young lobsters as possible the size limit should be as large as the commercial fishery can stand without reducing the long-term landings.

(2) **Movement, growth and survival of short lobsters.** The many thousands of lobsters that have been tagged and marked in Canada and elsewhere show clearly that lobsters do not migrate, the average distance moved by tagged lobsters being less than 2 miles. Recent growth studies have shown that in nature, short lobsters increase about 50 per cent in weight each year. The large numbers of tagged and marked lobsters that have been recaptured show clearly that if short lobsters are carefully handled and promptly released most of them will live. It

is clear from this that if fishermen in an area release short lobsters they alone will reap the benefits. The short lobsters stay on the grounds where they were released and most of them live to be caught again when they have grown 50 per cent or more in weight.

(3) **Increase in commercial landings after size limits adopted.** To many fishermen their actual landings provide the best proof of the value of size limits.

In southern Nova Scotia a size limit was first adopted in 1932. Since that time the quantity and value of the lobster landings have increased so strikingly that fishermen in this area are thoroughly convinced of the wisdom of protecting the small, fast-growing lobsters.

In the Fourchu area of Cape Breton Island which has been under close study for the past 10 years the size limit was increased in 1947 from 7 inches to about 9 inches. This new size limit was rigidly observed by the fishermen and the catch of legal lobsters increased rapidly. By 1951 the landings of lobsters over 9 inches in length were twice as great as they had been before the size limit was raised. The landed value of lobsters over 9 inches in 1951 was one third greater than the former value of all lobsters above 7 inches. In neighbouring areas where the size limit was not changed the catch showed no real improvement. The Fourchu fishermen are now enthusiastic supporters of the larger size limit.

When the 6½-inch size limit was first introduced in the southern Gulf of St. Lawrence in 1940 many fishermen and packers were extremely pessimistic stating that this would force them out of the fishery. The actual course of the fishery has, however, been just the reverse. During recent years the number of fishermen has increased and they are catching a considerably larger volume of lobsters than they did before the size limit was adopted. Average lobster landings for the twelve counties in the southern Gulf of St. Lawrence during the 5-year period just before the size limit was introduced and during the past 5 years were as follows:

	Average landings in pounds	
	1935-1939 no size limit	1949-1953 7-inch size limit
Gloucester Co., N. B.	1,347,000	1,695,000
Northumberland Co., N. B.	867,000	1,503,000
Kent Co., N. B.	2,125,000	3,003,000
Westmorland Co., N. B.	1,757,000	2,125,000
Cumberland Co., N. S.	1,034,000	879,000
Colchester Co., N. S.	67,000	76,000
Pictou Co., N. S.	1,924,000	2,062,000
Antigonish Co., N. S.	1,112,000	901,000
Inverness Co., N. S.	1,198,000	1,687,000
Prince Co., P. E. I.	2,661,000	3,035,000
Queens Co., P. E. I.	1,359,000	1,609,000
Kings Co., P. E. I.	2,432,000	3,008,000
Total for southern Gulf of St. Lawrence	17,883,000	21,583,000

Recent landings have averaged over  $3\frac{1}{2}$  million pounds more than they did before the size limit was introduced. This is convincing evidence in favour of size limits.

(4) **Size limits in other countries.** All of the lobster-producing states in the United States and all of the lobster-producing countries in Europe have adopted size limits as the most effective method of maintaining and increasing lobster production. In all of these countries the size limits are considerably larger than the one now in effect in the southern Gulf of St. Lawrence.

(5) **What could full protection of short lobsters mean in dollars to the fishermen?** If, in one of the smallest-lobster areas in the southern Gulf of St. Lawrence, a fisherman caught and sold 5,000 short lobsters during a season these would weigh only 1,700 pounds. If he received for these the unusually high 1953 price of 30 cents a pound his income from short lobsters alone would total \$510. If, however, he sold these at the short lobster "black-market" price of 10 cents his returns would total \$170.

If, on the other hand, these "shorts" were carefully released and left on the grounds to reach legal canner sizes they would if all lived, weigh about 3,000 pounds. These would then be worth \$900, almost twice what they would have sold for as "shorts" at 30 cents and over 5 times what they would have sold for at "black-market" prices. Even if one of every five of the shorts died before they were caught again, those that lived to reach canner size would weigh about 2,400 pounds and be worth \$720.

### Lath spaces

To obtain the greatest benefit from a size limit the short lobsters should be left undisturbed on their feeding grounds. Even though short lobsters are released they may be injured or killed by rough handling or exposure to wind, rain or sunlight. As the released "shorts" sink to the bottom some are undoubtedly eaten by cod and other fish. These deaths and injuries are largely unnecessary and are a direct loss to the fishermen. This unnecessary loss can be greatly reduced by spacing trap laths far enough apart to allow most of the "shorts" to escape alive and uninjured.

Many experiments carried out in the southern Gulf of St. Lawrence with the help of experienced, high-line fishermen showed beyond question that if the laths are far enough apart most of the short lobsters will escape. If properly spaced, the wide-spaced traps catch at least as many legal-sized lobsters as narrow-spaced traps.

Wide-spaced traps not only catch fewer "shorts" but also fewer crabs and "snails". Because of this the wide-spaced traps can be overhauled much faster. New traps built with wide spaces throughout require fewer laths and less ballast and are lighter and easier to haul.

Since 1949 all lobster traps in the southern Gulf of St. Lawrence are required by law to have the lowest side laths at least  $1\frac{1}{4}$  inches apart. Fishermen should in their own interest observe this regulation fully. By so doing they can build traps for less money, overhaul them faster and give the short lobsters the best opportunity to grow to more valuable sizes.