



MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

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by

G. F. M. Smith

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The lobster investigations on the Atlantic coast of Canada have been in the last two years concerned with several divergent themes. Firstly, statistical aspects of the commercial fishery have been considered and secondly, life history problems of the lobster.

For several years investigators of the Fisheries Research Board have been recording average sizes of lobsters taken in commercial catches. There have appeared significant differences, some of which can be evaluated and others not at present.

One of the significant features of these measurements has been a decline in the general average size of the lobsters caught in the southern Gulf of St. Lawrence area. This decrease in average size of lobsters making up the commercial catches has been coincident with a general decline in the total weight of lobsters landed. It should be borne in mind that under the present fishing regulations a two-month open season of lobsters is allowed with no size limit restrictions in this area. These figures have been taken to indicate that further protective measures for the lobster population would be desirable. This variation in average size of lobsters is a relatively long term phenomenon. There is another variation which is evident during the fishing season. By the collection of special statistics from lobster canners and lobster shippers and by actual measurement of lobsters comprising

commerical catches it has been observed that the average size of the lobsters caught at one place varies throughout the season. In general there is a larger run of lobsters during the first part of the fishing season with a decline towards the end. This general trend is further modified if the fishing season happens to include one of the seasonal moults or shell-shedding periods of the lobsters. This is the case in the fall fishing season in the Gulf of St. Lawrence which extends from the 10th of August to the 5th of October. Usually the "market" lobsters which are those over "8½ or 9" inches long in total length moult about the last part of August. Shortly before moulting these lobsters do not seem to be attracted by bait in lobster traps. After moulting, while the lobsters are still in buckle shell condition, they seem to be very easily attracted by bait and are taken in relatively large numbers as compared with lobsters of harder shell. About the time that the "Market" lobsters have completed their one moult of the year the smaller or "canner's" lobsters are beginning their second moult and the catches for smaller lobsters become considerably larger. Usually lobsters do not moult during a spring season which is in May and June. In this case the lobsters taken in the traps are all relatively hard-shelled as they have not moulted since the previous fall. Sometimes, however, the first moult of the year for the "canner's" lobsters takes place during the last two weeks of the spring season. In this case the catches increase quite significantly during this period whereas it often happens when the lobsters do not moult until after the fishing season that they are so scarce towards the end of the season that many fishermen have landed their traps and sometimes factories have closed before

the legal closing date of the open fishing season.

These observations on the variation in size of lobsters caught during a season and from year to year have made it desirable to collect more comprehensive statistics. This has not been possible during the current season but it is hoped that next year a program will be initiated in the Gulf of St. Lawrence area whereby the primary buyers of lobsters will record daily the number of pounds of "markets" and the number of pounds of "canner's" lobsters bought by them. This in addition to further measurements of average size of lobsters should after a period of years give valuable information with regard to the trend of the commercial fishery.

For the last three summers investigations have been conducted on the habits of the larval lobsters.

On hatching from the egg the larval lobster is about one third of an inch in length and is planktonic. The planktonic life continues until the larvae has moulted four times, has lost its larval features and becomes a lobsterling.

These investigations on the larval lobsters have been conducted by using coarse mesh plankton nets and pelagic trawls of various types. It has been observed that during the day time the free-swimming larvae are concentrated at the surface of the water, being taken in abundance with a net that skims the top two or three inches of the water. At night, however, there does not seem to be such a concentration at the surface and the larvae are taken in almost equal numbers at any depth. The change in vertical distribution occurs rather rapidly as very few lobsters are found below the surface more than an hour after sunrise and

the scattering into greater depths is almost as rapid at sunset. While swimming at the surface during the day time the horizontal distribution appears to be governed largely by the wind as very large concentrations of larvae have been taken within one hundred yards of a lee shore and a mile to windward from this position almost no lobster larvae were found.

In the first two years of this investigation plankton nets about thirty inches in diameter were used and the larvae taken were almost exclusively first stage. During the current year, however, a larger gear was constructed which was essentially a twenty-foot pelagic beam trawl towed behind the Atlantic Biological Station's boat, the "ZOARCES", in such a manner that the beam was clear of the surface of the water and the lead line submerged. With this apparatus larvae up to fourth stage, which is presumably the last swimming stage, were taken in statistically significant numbers.

The survey with this gear was conducted in the Straits of Northumberland. It was found as in previous years that the distribution of larval lobsters was discontinuous but it was also observed that the four stages of larvae were not found together. On the same day perhaps the first stage would be taken in large numbers at one side of the straits and the fourth stage in large numbers at the other side of the straits perhaps twenty miles away. This has been taken merely as an indication that the distribution of the larvae horizontally is controlled by the water movements and the fourth stage having been free-swimming for a greater period of time have become distributed differently from those that have been under the influence of water movements for perhaps only a day or so.

In the course of this work there has been no indication whatever that bays or estuaries are of particular importance in natural lobster reproduction. This is in direct opposition to the views of many fishermen who contend that larval lobsters and lobsterlings are found only in protected or land-locked areas. It is assumed that this view of the fishermen has arisen through the mistaken identification of shrimps as lobsterlings.

In the latter part of this summer an effort was made to determine the distribution of the lobsterlings, or the first post-larval and bottom seeking stages of lobsters. The apparatus used in this work consisted of specially constructed traps, beam trawl and dredge. Shore collection at low tide on reefs and more open shores was also resorted to. Up to the present, however, success has not attended our efforts in the Gulf of St. Lawrence. Small lobsters, however, have been found in Passamaquoddy bay by searching along boulders at extreme low tide. These are presumably lobsters that are almost a year old and, therefore, past the immediate post-larval period.

Up to the present methods of tagging lobsters have been somewhat unsatisfactory as the tags used have been of such a type that they were lost with the old shell when the lobster moulted. A "market" size lobster would, therefore, remain tagged for about a year at the most and a "canner's" size lobster a shorter period.

Experiments were initiated in an attempt to find a method of tagging lobsters so that the tag would be retained when the lobster moulted and yet the lobster be uninjured by the tag. Such a method has been devised and has been successful on an

experimental scale with lobsters kept in tanks for observation.

The tag consisted of a thin piece of white celluloid about 4 cm. long and 6 mm. wide, pointed at one end and barbed along the sides. The tag was inserted between the segments of the abdomen pointing in an anterior direction and to one side of the mid-dorsal line and the barns embedded in the muscle of the abdomen. In the first series of experiments an attempt was made to insert the tag as shallowly as possible into the muscle as it was thought that injury to the lobster and hindrance of movements would be least. On moulting, however, it was found that these lobsters developed sores near the point of insertion of the tag and the shell began to rot. Also in the first experiments the tag was inserted at the posterior margin of the third abdominal segment. In such a position the tag protruded beyond the end of the body when the abdomen was curled up and it came in contact with external objects such as the edge of the tank when the lobster was moving backwards as was often the case in the tanks. Therefore, a second series of experiments was carried out altering the method to some extent. The tag was inserted at the posterior margin of the second abdominal segment and also inserted as deeply as possible into the abdominal muscles. Lobsters tagged in this way were apparently in no way inconvenienced by the presence of the tag and on moulting did not exhibit any sores whatever. The presence of the tag seems to be no hindrance to the moulting act of the lobster.

In addition to this method of tagging being promising for a longer term tagging experiment than was previously possible, this tag is in a much more conspicuous position on the lobster than the previous type which was clipped to the telson. In such

a position a tag might be overlooked as a lobster quite frequently curls up the abdomen when handled. As a further test of the efficiency of this new method of tagging it is planned next year to tag a number of lobsters at the same place using both methods immediately before the fishing season and to compare the returns.

A photograph of a tagged lobster that has moulted successfully accompanies this report and also a photograph of some tags. This photograph is of a lobster tagged by the first method tried and was one in the first lot that was successful. However, tagging at the posterior margin of the second abdominal segment seems to be preferable.

G. F. M. Smith,  
September 28th, 1938.