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**Overview of lobster (*Homarus americanus*) research  
conducted in Malpeque Bay, P.E.I.:  
Research recommendation for 1989/90**

by

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## ABSTRACT

Opposing views on the status of lobster populations of Malpeque Bay, Prince Edward Island have focused on the need for additional biological research in this area. Previous studies determined two molting seasons and a high incidence of injured lobster in the area. Examination of commercial catches indicated more advanced stages of molting inside the Bay compared to outside. The trawling technique is a potentially valuable tool for examining recruitment; it also indicated large numbers of injured lobster in the area. To determine the contribution of Malpeque Bay to lobster stocks of the north shore, P.E.I., tagging will be conducted inside and outside the Bay. Molting seasons, causes of injury and recruitment will also be examined.

## RESUME

Des opinions divergentes sur l'état de la population de homards de la baie de Malpèque, Ile-du-Prince-Edouard, ont suscité le besoin d'y faire des études biologiques supplémentaires. Des études antérieures ont permis d'identifier deux saisons de mue ainsi qu'un taux élevé de homards blessés. L'examen des captures commerciales indiqua des stades d'intermue plus avancés à l'intérieur de la baie en comparaison avec l'extérieur. Le dragage est un outil potentiellement valable pour étudier le recrutement; il indiqua aussi un grand nombre de homards blessés dans la région. Pour déterminer la contribution de la baie de Malpèque sur les stocks de homard de la côte nord de l'I.P.E., une étude de marquage aura lieu à l'intérieur et à l'extérieur de la baie. Les saisons de mue, les causes de blessures et le recrutement seront aussi étudiés.

## INTRODUCTION

The status of the lobster population in Malpeque Bay, P.E.I. (Figure 1) concerns a number of local lobster fishermen. They believe the Bay is a molting area for many lobster of the north coast of P.E.I.; lobster move into the Bay in late spring, molt and may reproduce, and return to outside waters in autumn. They also feel the Bay is a recovery area for injured lobster.

Each year, fishing activity begins in the coastal areas outside Malpeque Bay and as the season progresses, fishing moves toward shore and into the Bay by late June. Molting and/or injured lobster are encountered during this period. Fishermen are concerned that the increased fishing pressure in Malpeque Bay over the past five years will deplete the population and seriously affect lobster stocks outside the Bay. Fishermen report catches of lower quality in late June with high numbers of newly molted and injured lobster (claws missing or regenerating). They are also concerned that the large number of females being landed will reduce population sizes in the future.

A group of fishermen request that Malpeque Bay be closed to lobster fishing from June 20 to the end of season beginning in 1989. They feel the closure, ten days before end of season in Area 24, would protect lobster from

over-fishing and reduce the amount of soft-shelled product on the market. A second group of fishermen do not want the Bay closed, they believe the status of populations inside and outside the Bay are good and the quality of the landings are satisfactory.

To broaden the understanding of the lobster populations of this area and assist with management decisions on the issue, the Gulf Region lobster group was asked to conduct research in Malpeque Bay. A summary of information available, and future studies are presented.

## MATERIALS AND METHODS

On July 5, 1988, commercial catches were sampled from the outside, at the entrance and inside Malpeque Bay to determine molt stages of lobster. This sampling was conducted in response to an immediate concern when the fishing season was extended beyond the June 30 closing date to July 9. Ninety-seven lobster were examined for shell hardness, molt stage (Aiken, 1973), sex (male, female, berried female) and missing or regenerating claws.

A trawling experiment was conducted in Lennox Channel (Figure 1) in Malpeque Bay August 1-12, 1988, using a three meter trawl with doors. Ten minute tows (32 total) were performed at depths ranging from 6 to 12 meters at a constant speed of 3 to 3.5 km/hr. The 450 lobster collected were separated by sex, carapace length measured and shell hardness, missing limbs recorded.

## RESULTS AND DISCUSSION

Lobster landings from fisheries statistical district 93, which includes Malpeque Bay, range from 125 metric tons in 1958; to 499 metric tons in 1988 (Figure 2). Since 1974, catches in district 93 have been increasing, which reflects the same trend for all of the southern Gulf of St. Lawrence (Figure 3).

Two molting seasons for lobster can be seen in areas of the southern Gulf of St. Lawrence: Egmont Bay (Wilder, 1956), the Magdalen Islands (Templeman, 1936, Munro and Therriault, 1983), and Malpeque Bay (Templeman, 1936). Two molting seasons were identified in the Bideford River estuary (Figure 1), one from late May to mid-June and the second from late August to late September (Moriyasu, 1984a). Molting frequency was higher during the first season (45-50%) than the second (14-19%) (Figure 4). The peak in molt frequency occurred June 10-15 for females and June 20-25 for males during the first molt season; September 10-20 the second season for both sexes (Moriyasu, 1984a). Commercial size lobster molt twice a year in Magdalen Island bays (Munro and Therriault, 1983). However, it is not known what percentage of lobster, if any, undergo two molts a year in the Malpeque Bay area. Elevated water temperatures, within the range of 8°C to 25°C, accelerate metabolic processes and have a direct effect on molt frequency of homarid lobster (Aiken, 1980). Water temperatures in the Bideford River estuary ranged from 1.4°C to 21°C, with a peak in July (Figure 4). This did not correspond to a peak in molting activity, and it was suggested either

a temperature increase or decrease triggers molting rather than a stable high temperature (Moriyasu, 1984a).

Data collected from commercial traps on July 5, 1988 are presented in Table 1. All lobster sampled outside Malpeque Bay were hard shelled. Post-molt stages were encountered in the Bay (approximately 41%), and pre-molt in both the channel and Bay (approximately 3%). All lobster sampled by trawling in August 1988 had newly molted shells, and 4% of these exhibited a 'paper shell'. Percentages of lobster missing one or both claws increases during the summer to 30% and 40% (legal and undersize lobster respectively) in July-September in the Bideford River estuary (Moriyasu, 1984b). A total of 56.5% of lobster collected by trawling in August 1988 were missing one or both claws or walking legs. Causes of high incidence of injured lobster in this area are not known, although it has been suggested that predation and/or competition are important (Moriyasu, 1984b).

Movements of lobster in Malpeque Bay and adjacent areas are largely unknown. Tagging conducted in July-August 1931, at locations inside Malpeque Bay, indicated approximately 45% of recaptured lobster were recovered outside the Bay the following spring (Templeman, 1935). The majority of these were recaptured near the entrance to Malpeque Bay, indicating possible seasonal migration.

The length frequency distribution of 450 lobster collected August 1-12, 1988 by trawling indicates three modes of sub-legal lobster at approximately 41, 46 and 55 mm carapace length (Figure 5). This distribution suggests a potentially good fishery in Malpeque Bay for the next 2 to 3 years, depending on the extent of movement out of the Bay and the natural mortality. This survey was experimental and not quantitative, however, the trawling technique is a potentially valuable tool for examining yearly recruitment. Greater numbers of small lobster can be collected, which are not sampled by conventional methods.

## RECOMMENDATIONS

To determine lobster movement in and out of Malpeque Bay, tagging studies are planned for 1989; these will also provide growth information for the area. Molting frequencies and seasons in the Bideford River estuary and Lennox Channel may not be indicative of Malpeque Bay; examinations within the Bay are required during the year. Causes of high incidence of injury should also be determined. A trawling survey is proposed to provide additional data on abundance, distribution and recruitment.

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Table 1. Data collected from commercial traps in the Malpeque Bay area, July 5, 1988.

	Site 1	Site 2	Site 3
	Offshore	Channel	Bay
Number sampled	28	32	37
Hard shell	25	31	21
Pre-molt shell	0	1	1
Post-molt shell	0	0	15
Berried females	3	0	0
Male:Female ratio	1.8:1	1:1	2.4:1
Number missing claws	0	3	5
Number regenerating claws	1	6	2

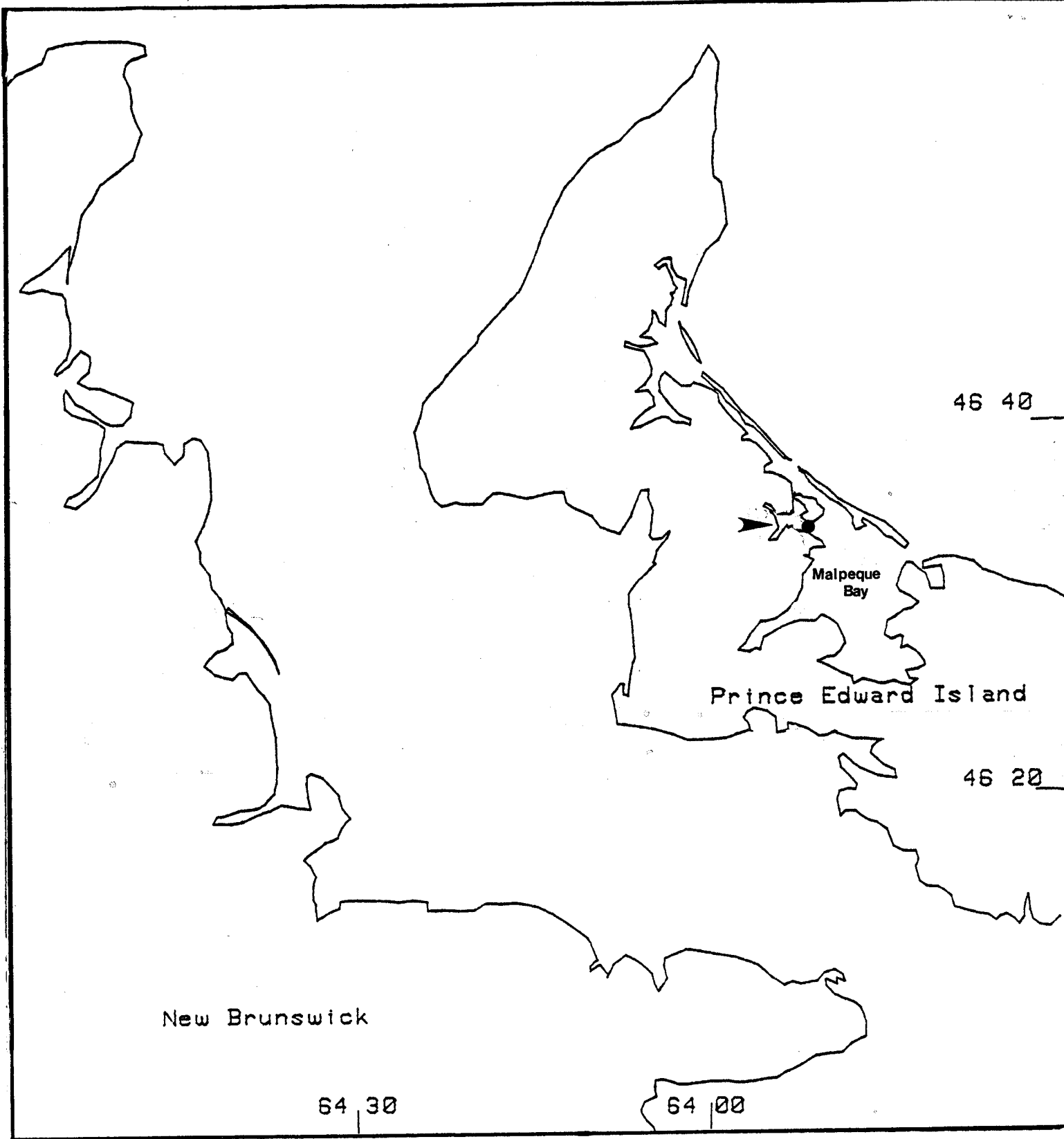


Figure 1. Geographic location of Malpeque Bay, Prince Edward Island.  
Arrow indicates location of Bideford River estuary.  
Circle indicates location of Lennox Channel.

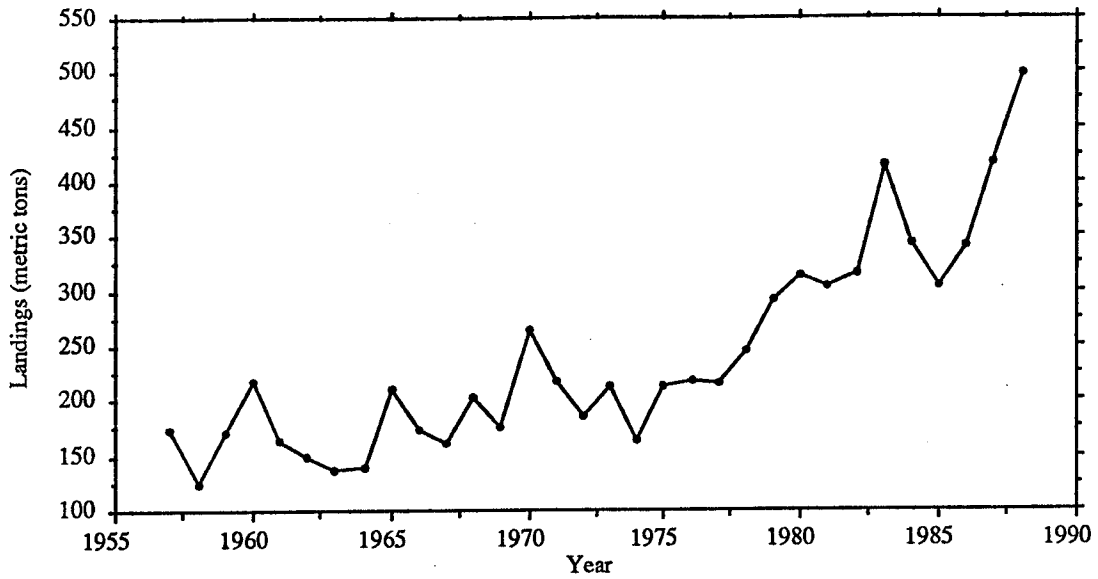


Figure 2. Lobster landings in metric tons in fisheries district 93, Prince Edward Island, 1957 to 1988.

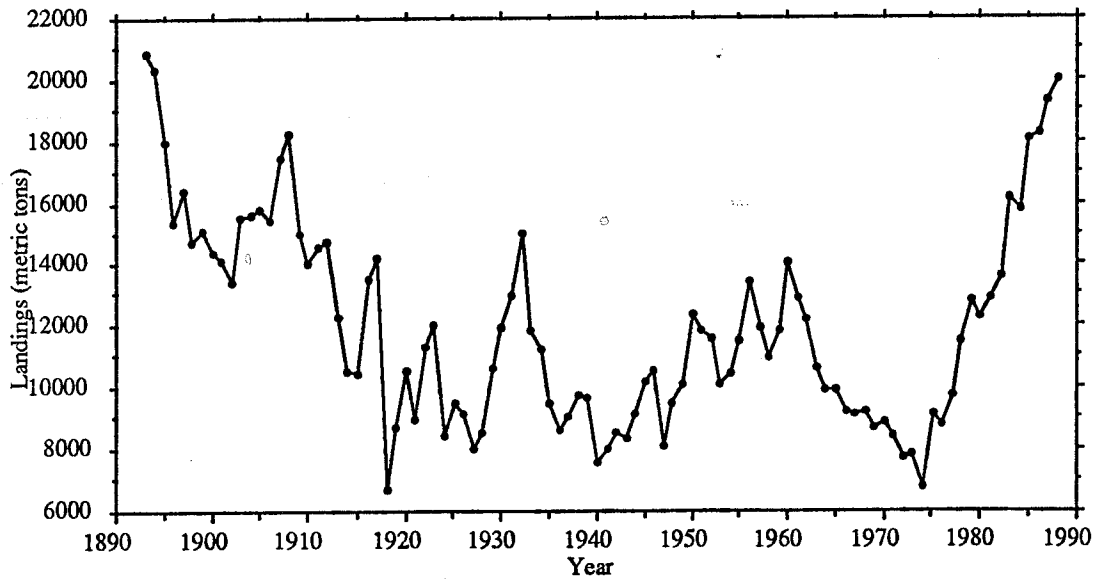


Figure 3. Historical landings of lobster in metric tons in the Southern Gulf of St. Lawrence from 1893 to 1988.

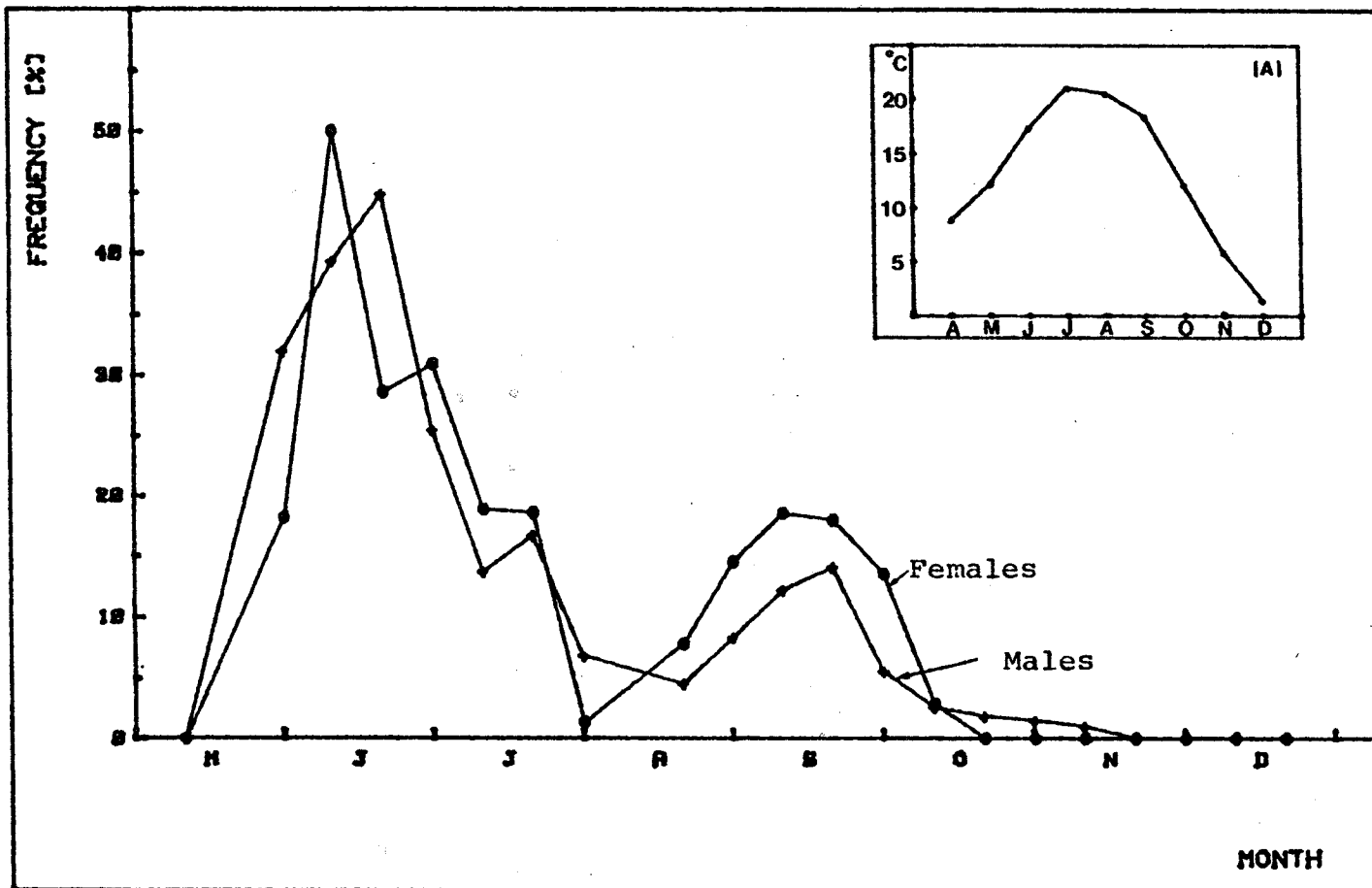


Figure 4.

Molting frequencies (% in number of individual in intermolt stages A - C<sub>2</sub> and D'<sub>2</sub>- E in total sample ) and monthly averaged water temperatures ( A ) in Bideford River estuary, Malpeque Bay, P.E.I., Canada (from Moriyasu, 1984a).



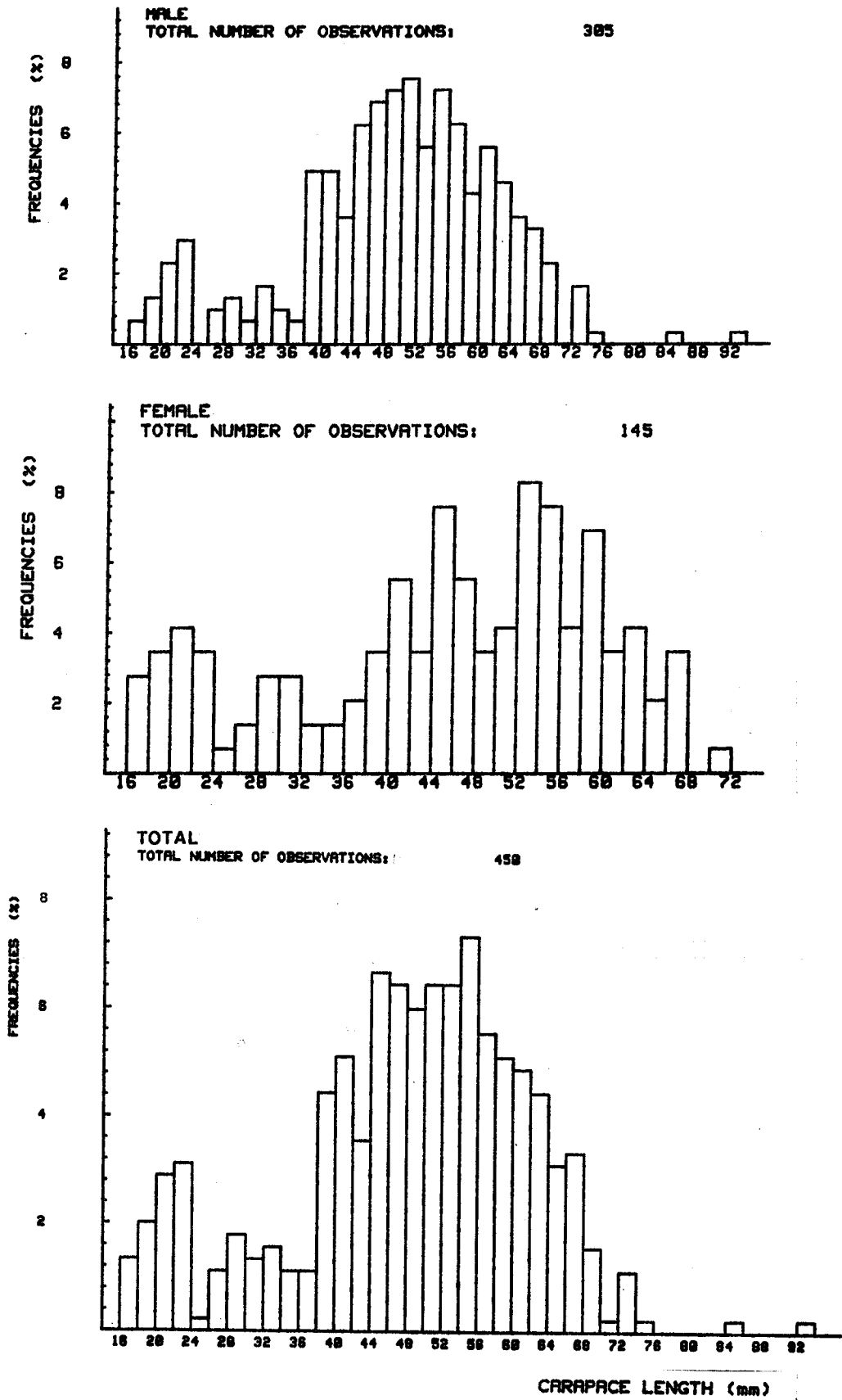


Figure 5. Size frequency distributions (carapace length) of lobster collected by trawling in Malpeque Bay, P.E.I. : males, females and total. August 1 - 12, 1988.