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# Comparison of three lobster (*Homarus americanus*) trap escape mechanisms and application of a theoretical retention curve for these devices in the southern Gulf of St. Lawrence lobster fishery.

by

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## ABSTRACT

A twofold investigation was conducted to 1) compare fishermen's lobster (*Homarus americanus*) catch from traps equipped with one of three types of escape mechanisms (plastic lath with 38.1 x 203 mm rectangular opening, wooden lath with three 44.3 mm diameter round holes and wooden lath spacing with a 37.1 mm opening) to the catches from standard traps, and 2) to determine the retention of lobsters in traps as a function of the escape mechanism opening by developing a predictive model.

The results of the escape mechanism comparison study in Baie des Chaleurs showed that the plastic lath released 97.49% and 19.80% by weight of sublegal and canner sized lobsters respectively; the wooden lath with round holes released 35.30% and 1.62% by weight of sublegal and canner sized lobsters respectively; and the wooden lath spacing released 83.60% and 6.32% by weight of sublegal and canner sized lobsters respectively.

A model was developed which can be applied to the carapace size frequency distributions of the lobster catches of specified areas and determine the lobster retention characteristics of traps equipped with various sizes of either: wooden lath spacing, plastic laths with rectangular openings or wooden laths with three round holes.



## RESUME

Une étude à double-but a été menée afin de 1) comparer les prises de homards (*Homarus americanus*) dans les casiers de pêcheurs munis de 3 types de mécanismes d'évasion (latte de plastique avec une ouverture rectangulaire de 38.1 mm x 203 mm, latte de bois avec trois ouvertures circulaires de 44.3 mm de diamètre, espacement de lattes de bois de 37.1 mm) comparativement aux prises de casiers conventionnels et 2) développer un modèle de prédiction afin de déterminer la retention des homards dans les casiers en fonction du type et de la dimension des mécanismes d'évasion.

Les résultats de la comparaison des mécanismes d'évasion dans la Baie des Chaleurs ont démontré que la latte de plastique libère 97.49% et 19.80% du poids de homards sublégaux et de conserves respectivement; la latte de bois avec les ouvertures circulaires libère 35.30% et 1.62% du poids de homards sublégaux et de conserves respectivement; l'espacement des lattes de bois libère 83.60% et 6.32% du poids de homards sublégaux et de conserves respectivement.

Un modèle fut développé afin d'être appliqué à la distribution des fréquences de longueurs de carapace des prises de homards de régions spécifiques. Ce modèle détermine les caractéristiques de retention des homards dans des casiers munis de diverses dimensions d'espacement de lattes de bois, de lattes de plastique avec une ouverture rectangulaire ou bien de lattes de bois munies de trois ouvertures circulaires.

## INTRODUCTION

The potential benefits of escape mechanisms on lobster traps in the Atlantic region lobster fishery have long been advocated. Escape mechanisms would permit the sublegal ( 63.5 mm carapace length) lobsters to escape from the trap while reducing injury, predation and sorting time (Wilder 1949). The presence of a smaller number of sublegal lobsters will reduce the saturation effect of the trap and may allow a greater number of larger size lobsters to enter and be retained, (Wilder 1943, Templeman 1958, and Nulk 1978).

Researchers have evaluated the performance, which is the functional effectiveness, of several types and sizes of escape mechanisms in the New England States and Quebec lobster fishery (Krouse and Thomas 1975, Nulk 1978, Krouse 1980, and Gauthier and Hazel 1986). Each evaluation addressed pertinent questions for each area's particular minimum legal size in context of the local lobster population size distributions.

The first aspect of our investigation was to compare the lobster catches from fishermen's traps equipped with one of three types of escape mechanisms, to the catches of the standard commercial trap and a retention efficiency (Clay, 1981), curve was calculated for each type of escape mechanisms.

The second aspect of our investigation was to determine the proportion of lobsters retained in traps as a function of the size of each type of escape mechanism openings. In determining the selectivity as a function of the size of the escape mechanisms, (either mesh size in nets, the space between laths or special openings in traps), (Pope *et al.*, 1975)), it is experimentally, labour intensive and therefore expensive to derive empirically selectivity curves (percent retention versus size of the animal) for each size of escape mechanism. A more practical solution is to develop a model which will allow the prediction of a retention curve for any given size of escape mechanism. Data from the fishing experiments were analysed to develop a preliminary, predictory curve for lobster retention in traps with various sizes of wooden lath spacing. The model of this predictory curve was then applied to data from other types of escape mechanisms to predict retention for various sized opening of these types of mechanisms.

In the following paper, we shall: 1) determine the performance of three types of lobster trap escape mechanisms proposed by fisheries management; 2) develop a model for the prediction of sublegal and legal sized lobster escapement for various sized openings of these devices; 3) show how differences in the size frequency distributions of lobster catches for specific areas can affect the results of proposed lobster escape mechanisms and 4) how adjustments in lobster escape mechanism opening sizes would have to be adjusted accordingly for changes in minimum legal carapace size.

## MATERIALS AND METHODS

The retention (relative to a standard commercial trap) of an experimental trap in a given location is defined as:

$$P = \frac{N_e}{N_c}$$

where:

$N_e$= number of lobsters in experimental traps for a given size class.
$N_c$= number of lobsters in standard traps for the same size class as $N_e$.
P = relative proportion of lobsters retained for a certain size class.

The retention curve is defined as the curve representing the variation of P as a function of the carapace length of lobsters. It is assumed that both the standard and experimental traps work as efficiently for larger size lobsters i.e. the ratio of large lobster catches are asymptotic to a value of one.

The comparison of the three lobster trap escape mechanisms was conducted at Salmon Beach, Baie des Chaleurs, (lobster district 23) New Brunswick, during the lobster fishing season (May 1st to June 30th, 1986, Fig. 1). The data were collected aboard three different fishermen's vessels, each using identical commercial fishing gear and fishing the same grounds. Fifteen traps were modified with each of the following types of escape mechanisms (water soaked measurement), for a total of sixty traps:

1- a 100 x 610mm plastic lath with a 38.1 x 203mm rectangular opening (Fig. 2).

2- a 80 x 450mm wooden lath with three 44.3 mm diameter circular holes (Fig. 3).

3- a 37.1mm wooden lath spacing above the bottom lath of the parlor section of the trap (Fig. 4).

4- a 34.9mm wooden lath spacing above the bottom lath of the parlor section of the trap (Fig. 4).

A non-modified commercial trap with an average lath spacing of 31.8mm, measurement taken after lath had soaked, was considered as a standard trap. Experimental and standard traps were set on the same line (12m apart). Therefore, the experimental and standard traps were always fishing on the same grounds thus minimizing effects of variation in the local lobster abundance between experimental and control traps.

Lobster catches were monitored in the experimental and standard traps every day of the fishing season. The weights, carapace lengths and widths of a random sample of 111 male and 111 female lobsters were taken and molt stages were determined by pleopod observations (Aiken 1973, Aiken and Waddy 1982). Lobster measurements were rounded to the closest millimeter, bringing the legal size from 63.5mm to 64mm. The data for the carapace length of 55mm includes all lobsters of 55mm and less while carapace length of 81mm includes all lobsters of 81mm and more. The allometric relationships between carapace widths of the male and female lobsters were tested using an ANOVA (Snedecor and Cochran, 1980) to determine if the carapace widths were significantly different.

For the escape mechanism evaluation project, only the results of the first six weeks of the fishing season were used in order to have a constant one day soak over time. Retention values (P) were then calculated by 1mm carapace length increments and a simple logistic curve was fitted to the results. This procedure was repeated for each type of escape mechanism and separately for males and females.

Linear regressions on the log transformed carapace length and animal weights were used to calculate carapace length-weight relationships for male and female lobsters. Using these length-weight relationships, the retention curves and the standard trap catches, the observed weight retention of sublegal lobsters and "canner" size (63.5 to 80mm carapace length) lobster, weight escapement were calculated for each type of escape mechanisms.

A retention study was also conducted at Miminegash, Northumberland Strait (lobster district 25), Prince Edward Island, during the lobster fishing season, (August 10th to October 10, 1986, Fig. 1). The experimental traps for Miminegash were modified with each of the following types of escape mechanisms:

1- a 38.1mm wooden lath spacing above the bottom lath of the parlor section of the trap (Fig. 4).

2- a 44.4mm wooden lath spacing above the bottom lath of the parlor section of the trap (Fig. 4).

As in Salmon Beach, non-modified commercial traps with an average lath spacing of 31.8mm were used as standard traps. For the calculation of predictive curve, the male and female data were combined to provide larger sample sizes.

We have assumed that the lobster escape characteristics would be the same in Salmon Beach and Miminegash. A comparison of the total size frequency distributions showed no difference between the two areas (Fig. 5). The calculations of a predictive retention model were the same for both areas. Retention curves, P, were calculated by 1 mm carapace length increments, weighted by the number of observations for each increment and a simple logistic curve fitted to the results. The logistic curve is of sigmoid shape, it is asympototic to 0 towards the direction of the origin and to 1 towards the positive direction of infinity.

To test this assumption (that there was no improvement in catchability of large lobsters), we used a Wilcoxon paired test ($\alpha$ = 0.05) to compare the catch of large sized lobsters caught in the standard and experimental traps of each project and type of escape mechanism. The sizes of larger lobsters were differenciated by examining the retention curves and chosing the carapace size at which 100% retention in the traps occured at the following:

| Mechanisms type and measurements | Carapace size at 100% retention: |
|---|---|
| plastic lath with 38.1mm opening | 71mm carapace length |
| wood lath with 44.3mm round holes | 65mm carapace length |
| wood lath spacing 37.1mm | 67mm carapace length |
| wood lath spacing 34.9mm | 65mm carapace length |

The retention model is as described by Conan (1987). The model used and the equations required to calculate the percentage of numbers and weight of lobster escapement for various sizes of openings of escape mechanisms, as defined by the carapace size frequency distributions of the lobster catches of specified areas, is in Appendix A.

A lobster fishing area, Pugwash, Nova Scotia which has a carapace size frequency distribution different (Fig. 6) from that of Salmon Beach or Miminegash was used to show the variation of percentage of lobster escapement possible in different areas even if the same size opening of a mechanism is used. By changing the parameters of the minimum legal carapace size, it is possible to use the retention prediction curve to determine what would be the optimum size openings of escape mechanisms for an increased legal carapace size. We have calculated this for the areas of Salmon Beach, and Pugwash, assuming an increase in carapace size from 63.5mm to 65mm.

## RESULTS

The escape mechanism comparison data for males and females were separated due to a significant difference in the allometric relationship of the carapace widths vs carapace lengths of male and female lobster, (alpha = $6.37 \times 10^{-4}$, comparison of elevation).

To calculate sublegal retention and the "canner" (63.5 to 81mm carapace length) weight loss of the experimental traps, the data for males and females for the standard traps were combined because results in standard traps for each sex did not differ significantly (contingency tables; chi = 50.864 with 52 df and p = 0.518 for the females, chi = 56.541 with 52 df and p = 0.309 for the males).

The retention curves of experimental traps/standard traps for each type of escape mechanism are presented in Figs 7 to 9. The carapace length-weight relationship for male and female lobsters are presented in Table 1. A summary of the percentages of sublegal retention and "canner" escapement are given in Table 2. As a general rule, the swelling of the wood once it was soaked diminished the lath spacing by approximately 2% of the dry measurement. The wooden lath with the three holes was not significantly affected by wood swelling, probably due to the type of wood used.

The results of the Wilcoxon paired test ($\alpha = 0.05$) showed that there was no significant difference in the catch of larger lobsters in standard traps and traps equipped with escape mechanisms, except for the wooden lath with three round holes of 44.5 mm which has less larger lobsters (significant at the 1% level).

Pleopod molt staging towards the end of the season showed that 80% of the lobsters examined were in stage C (intermolt), which are hard shelled lobsters.

The calculation of the prediction of retention model, used retention values of the curves (Figs 10 et 15) for the experimental traps with escape mechanisms, standardized with catch data from the standard traps.

Using the retention curve equations, S and $L_{50}$ were calculated and are presented in the following table for each mechanism. These results were applied to equation 5b in Appendix A, assuming a simple direct proportionality.

| Mechanism type and opening | S | $L_{50}$ | Proportionality factor of S | Proportionality factor of $L_{50}$ | Location of study |
|---|---|---|---|---|---|
| Plastic 38.1x203mm | 0.6736 | 65.16 | 0.0177G | 1.7102G | Salmon Beach |
| Holes 44.3mm diam. | 0.6039 | 58.77 | 0.0136G | 1.3266G | Salmon Beach |
| Lath spacing 37.1mm | 0.9577 | 63.26 | 0.0258G | 1.7051G | Salmon Beach |
| Lath spacing 34.9mm | 1.2030 | 61.11 | 0.0345G | 1.7510G | Salmon Beach |
| Lath spacing 38.1mm | 0.8956 | 68.36 | 0.0235G | 1.7942G | Miminegash |
| Lath spacing 44.4mm | 0.7103 | 77.42 | 0.0160G | 1.7437G | Miminegash |

For the lath spacing, the average proportionality factors are: S = 0.0301 and $L_{50}$ = 1.7280 for Salmon Beach, S = 0.0198 and $L_{50}$ = 1.7689 for Miminegash. For the plastic lath and the wooden lath with circular holes, we only have one set of S and $L_{50}$ for each type of mechanism.

Applying these proportionality factors to Appendix A equation (2), we get the following generalized equation:

$$P = \frac{1}{1 + \exp\left[-SG\,(L - L_{50}G)\right]}$$

where:

P = the proportion of the lobsters retained by the traps.
L = carapace length (mm) of the lobsters.
G = size of escape mechanism opening.

The percentages of sublegal size lobsters which escaped and percentage of the canner weight which escaped, for various sizes and types of escape mechanisms were calculated. Fig 15, (Appendix B, Tables 1 and 2) presents the calculation results of lobster escapement from wooden lath spacing using the proportionality factors S and $L_{50}$ from Salmon Beach (Table 1) and Miminegash (Table 2). The predictive retention of wooden lath spacing calculated from the proportionality factors S and $L_{50}$ from Salmon Beach gave a result closer to the observed values than did the predictive selectivity calculated from the Miminegash proportionality factors (Fig. 16). Therefore, in the remainder of the prediction of retention calculations we shall use the Salmon Beach proportionality factors.

The tables and accompanying graphic representations of the prediction of retention calculations for each type of escape mechanism are as follows:

| Appendix B Table number | Miminum legal caparace size | Type of escape mechanism | Area from which the size frequency was applied |
|---|---|---|---|
| 3 | 63.5mm | plastic lath with rectangular opening | Salmon Beach |
| 4 | 63.5mm | wooden lath with three round holes | Salmon Beach |
| 5 | 63.5mm | wooden lath spacing | Pugwash |
| 6 | 63.5mm | plastic lath with rectangular openings | Pugwash |
| 7 | 63.5mm | wooden lath with three round holes | Pugwash |
| 8 | 65mm | wooden lath spacing | Salmon Beach |
| 9 | 65mm | wooden lath spacing | Salmon Beach |

| Figure | Predictive Curve of mechanism | Area from which the size frequency was applied | Comments |
|---|---|---|---|
| 17 | wood lath spacing + plastic lath rectangular opening | Salmon Beach | Empirically observed values agree with prediction curve |
| 18 | plastic lath with rectangular opening + wooden lath with round holes | Salmon Beach | Empirically observed values agree with prediction curve |
| 19 | plastic lath with rectangular opening + wooden lath with round holes | Pugwash | |

The above listed tables and figures shows the prediction of retention of each type of escape mechanism, for Salmon Beach and Pugwash which have different lobster size frequency distributions. The prediction model's adaptability to changes in the minimum carapace size for a particular area is also shown.

## DISCUSSION

The purpose of comparing the three escape mechanisms to the standard commercial traps was to provide fisheries management with estimates of the short term effects of proposed escape mechanisms on the actual commercial catch.

The lobster's ability to escape from specific size rectangular escape mechanisms is dependent on its maximum carapace width (Nulk, 1978). Since the carapace widths differed significantly between sexes we separated male and female lobsters in order to analyse the results, as was done by other authors (Gauthier and Hazel, 1986). The ability of the lobsters to escape from the traps through different escape mechanisms was not significantly affected by the compression factor (Krouse and Thomas, 1975), since the majority of lobsters were hard-shelled (intermolt stage C).

The plastic escape mechanism of 38.1mm was the most effective in letting (97.49% by weight) sublegal lobsters escape while permitting only 19.80% of "canners" to escape (Table 2). The 37.1mm lath spacing let less legal sized lobsters escape (6.32% by weight) while still permitting a good percentage by weight of sublegals to escape (83.6%). The 44.3mm round holes retained a high weight percentage of sublegals (64.70%) while letting only a 1.62% weight percentage of legals escape. It is evident that each of the proposed escape mechanisms perform differently, each with its attribute and draw back, which comes down to either letting out a majority of the sub-legals and a large amount of legal lobsters, or retaining all the legal lobsters and a large proportion of the sublegals.

It has been previously noted for a majority of the areas in the southern Gulf that a large proportion of the catch by weight is found between 2mm below and above the legal size (Maynard, et al., 1986). We can observe from the comparison study (Table 2) that for a one millimeter in size difference between the plastic lath and the wood lath space there was a difference in sublegal retention of 13.89% and loss of canner weight of 13.48%. This indicates that due to the type of carapace size frequency distribution of the lobsters, there will be an abrupt change (knife-edge) in retention of legal size lobsters over a few millimeters difference in escape gap width (Bougis, 1976).

We undertook the development of a selectivity prediction model so fisheries management would be able to choose an escape mechanism size that would release a maximum proportion of sublegals without affecting the proportion of legal lobsters retained. Since we have relatively small numbers of lobsters measured, we therefore preferred not to separate the data into different sexes as in the first part of the study but rather to work with as a large sample as possible to test the method.

From the view point of the industry, it is not the proportion of retention of each size class that is important, but the percentages of weights escaping within the commercial category of "canners" for a particular lath space size. From a biological view point it is important to know what proportion of the number of sublegal lobsters are escaping for a particular lath space size. Fisheries management requires the knowledge of both the proportion of the sub-legal lobsters escaping and the percentages of legal lobster weights escaping through various sized openings of escape mechanisms.

Unlike other studies (Wilder 1943, Templemen 1958, and Nulk 1978) in which more "market" size lobsters were caught in traps equipped with escape mechanisms due to trap de-saturation, we did not detect any increase in quantity of "market" or even larger size lobsters in the experimental traps. This may be explained by the fact that larger legal size lobsters are not abundant in the area of Salmon Beach and Miminegash, Fig. 5. The fact that more larger size lobsters were caught in standard traps than traps equipped with a wooden lath with three circular holes of 44.3mm diameter may be explained by the influence of lobster behavior in a trap saturated with lobster.

The predictive retention for wooden lath spacing calculated from the proportionality factors S and $L_{50}$ from Salmon Beach gave a result closer to the observed values than did the proportionality factors from Miminegash. This may be explained by different retention effects in different seasons in relation to the molt period of lobsters. The Miminegash data were gathered in the fall and Salmon Beach in the spring. We choose to use the Salmon Beach predictive model for wooden lath spacing because it better matched the observed field data.

There was little difference between the performance of plastic laths with rectangular openings and the wooden lath spacings (Fig. 17). The performance of rectangular openings and of round holes differed widely (Fig. 18).

The trap retention model can be applied to the size frequency distributions of lobster samples in areas which differ from Miminegash, for example Pugwash, Fig. 6. In Fig. 17, Tables 7, 8 and 9, we have used the Salmon Beach parameters of plastic and wood with round holes escape mechanisms to provide an estimate for the size frequency distributions sampled in the Pugwash area. We have also calculated effects of escape mechanisms for Salmon Beach and Pugwash in the legal carapace size increased to 65mm, Appendix B, (Tables 8 and 9 respectively). Should a legal carapace size be increased then the escape mechanism opening size should be changed accordingly.

Due to a limited budget, experimental data are available only for two opening sizes for each type of mechanism. Although, the model developed already allows for generalization to any opening size, actual field verification will be required to test and refine the accuracy of the predictions.

## CONCLUSIONS

1- The three escape mechanisms in the comparison study have significant retention differences for sublegal and legal sized lobsters (Table 2).

2- The variation of the lobster carapace size frequency distributions from area to area will vary the quantity of specific sizes of lobsters retained in the traps for specific lath space sizes.

3- The selectivity of the lath spaced traps is sensitive to small variations in the lath space size.

The repetitive field observations required to derive trap selectivity data empirically can be very costly. The use of the predictive retention model (Conan, 1987) allowed a low cost comparison of escape mechanisms, so as to provide a preliminary insight and comparison of the performance.

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Table 1 - Carapace length-weight relationships for the male (n=111) and female (n=111) lobsters in Salmon Beach.

| Sex | Equation |
|---|---|
| M | $weight = 0.0011867*length^{2.904}$ |
| F | $weight = 0.0018907*length^{2.797}$ |

Table 2 - Sublegal weight retention and "canner" weight escapement in Salmon Beach, N.B. The male to female weight ratio is 1:1. Canner commercial category is 63.5 to 80mm carapace length.

| Type of escape mechanism | Sex | Retention of sublegal lobster (% weight) | Escapement of canner lobsters (% weight) |
|---|---|---|---|
| Plastic lath | M | 0.60 | 31.29 |
| Rectangular vent | F | 4.29 | 7.85 |
| 38.1mm | M+F | 2.51 | 19.80 |
| Lath spacing | M | 14.50 | 6.20 |
| 37.1mm | F | 18.15 | 6.47 |
| | M+F | 16.40 | 6.32 |
| Wooden lath | M | 57.21 | 3.01 |
| Round holes | F | 71.63 | 0.67 |
| 44.3mm | M+F | 64.70 | 1.62 |

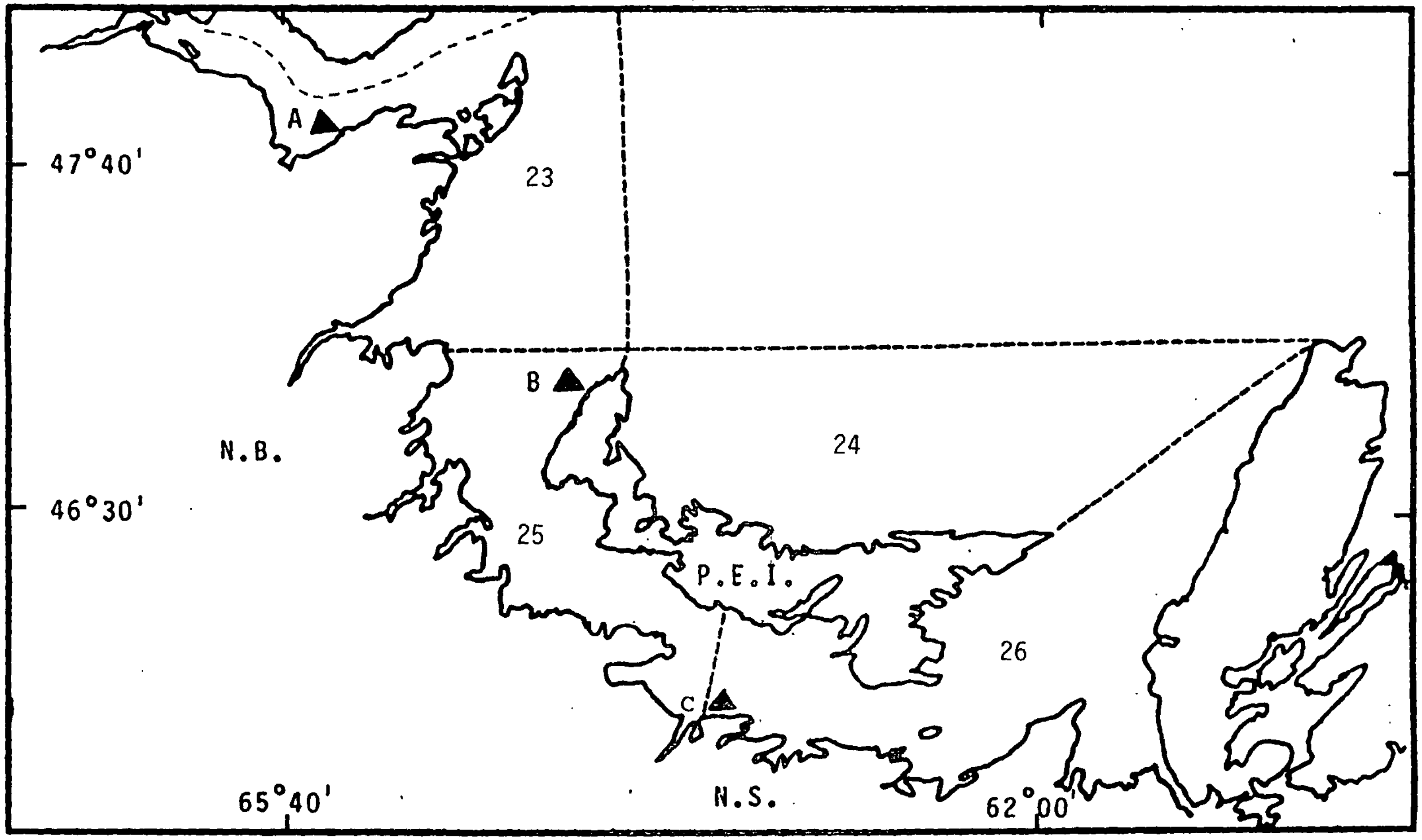



Figure 1. Areas of study and lobster statistical districts.
A-Salmon Beach B-Miminogash C-Pugwash

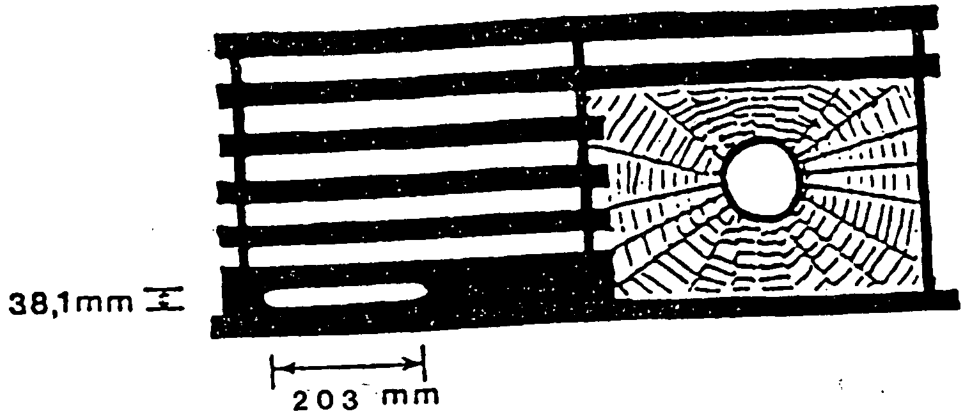



Figure 2 - Diagram of a lobster trap used in the Salmon Beach study with a plastic lath containing a 38.1 x 203 mm rectangular opening.

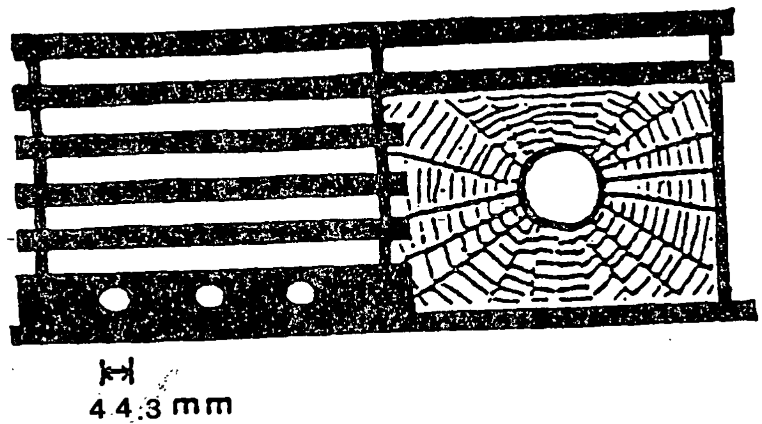
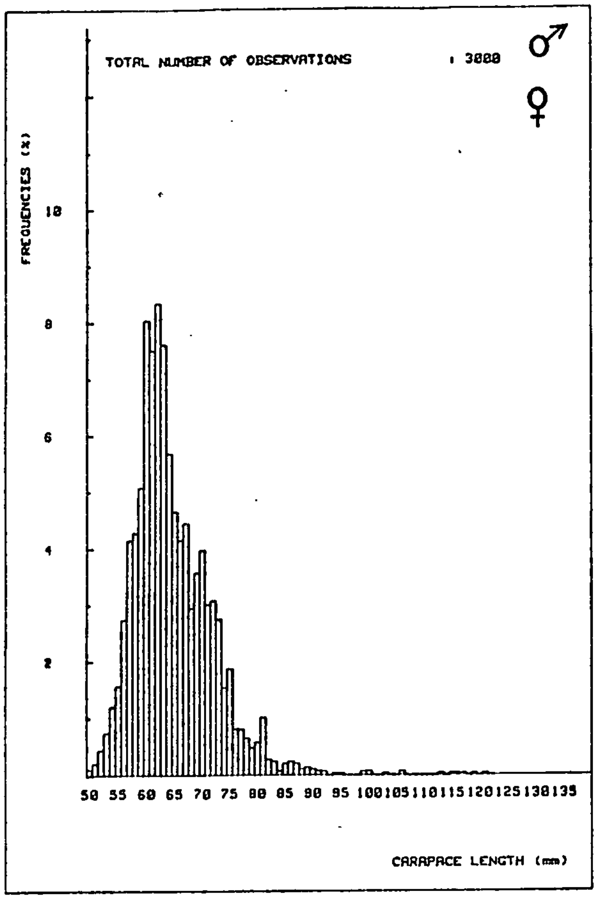



Figure 3 - Diagram of a lobster trap used in the Salmon Beach study with a wooden lath containing three 44.3 mm diameter round holes.


Figure 4 - Diagram of a lobster trap used in the Salmon Beach or Miminegash study where the wooden lath space, X, is varied to 34.9, 37.1, 38.1 or 44.4 mm.



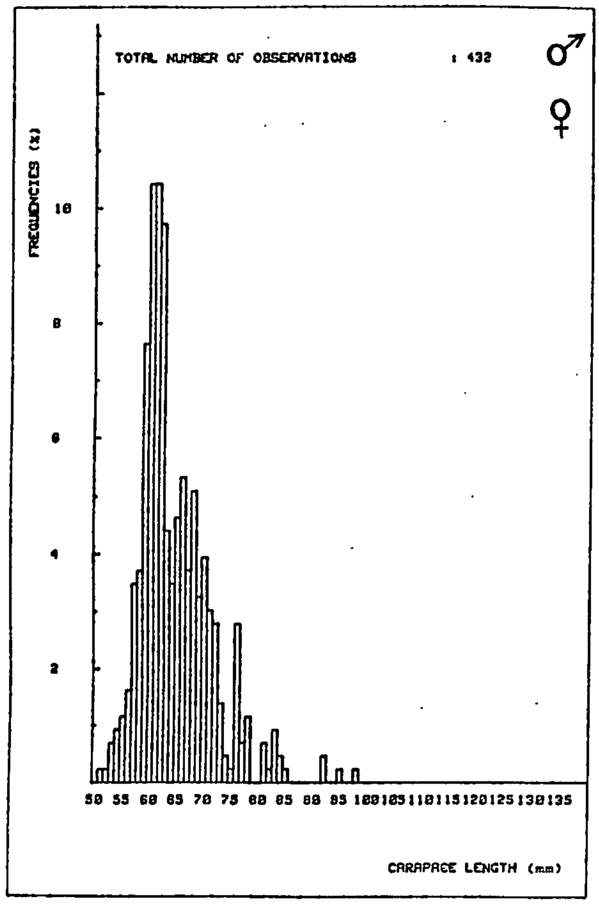




Figure 5 - Length frequency distribution of carapace size of lobsters caught in traps with a wooden lath space of 31.8mm, Salmon Beach, left, Miminegash right.

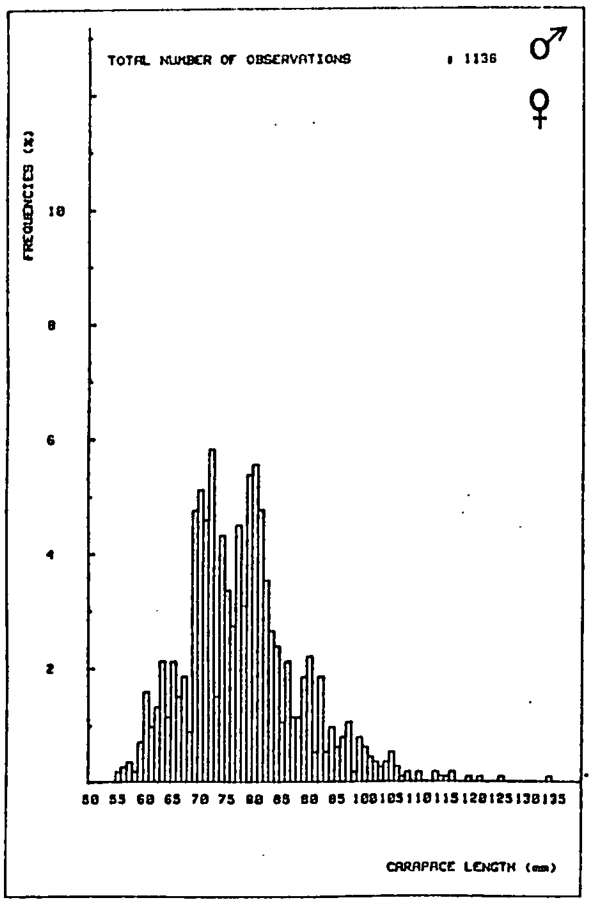



Figure 6 - Length frequency distribution of carapace size of combined male and female lobsters caught in traps with a wooden lath space of 28.6mm, Pugwash sea sampling.

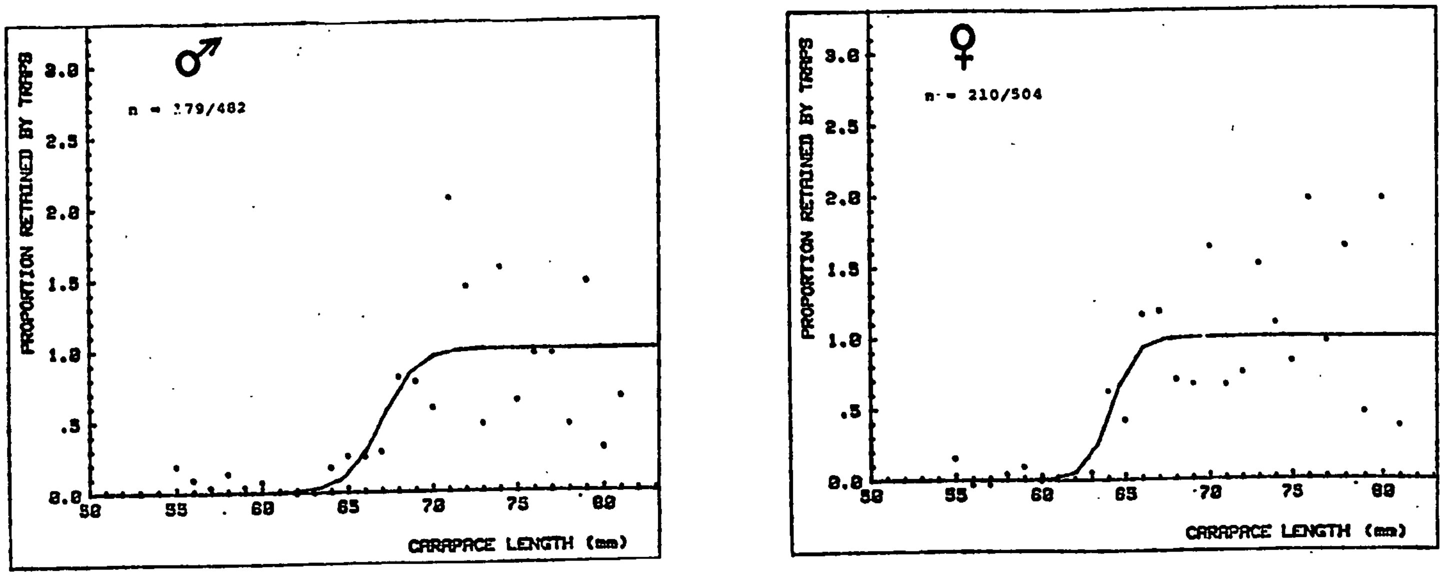



Figure 7 - Retention curve (experimental trap/standard trap) for lobsters for traps with a 38.1mm plastic lath escape mechanism, in the Salmon Beach study.

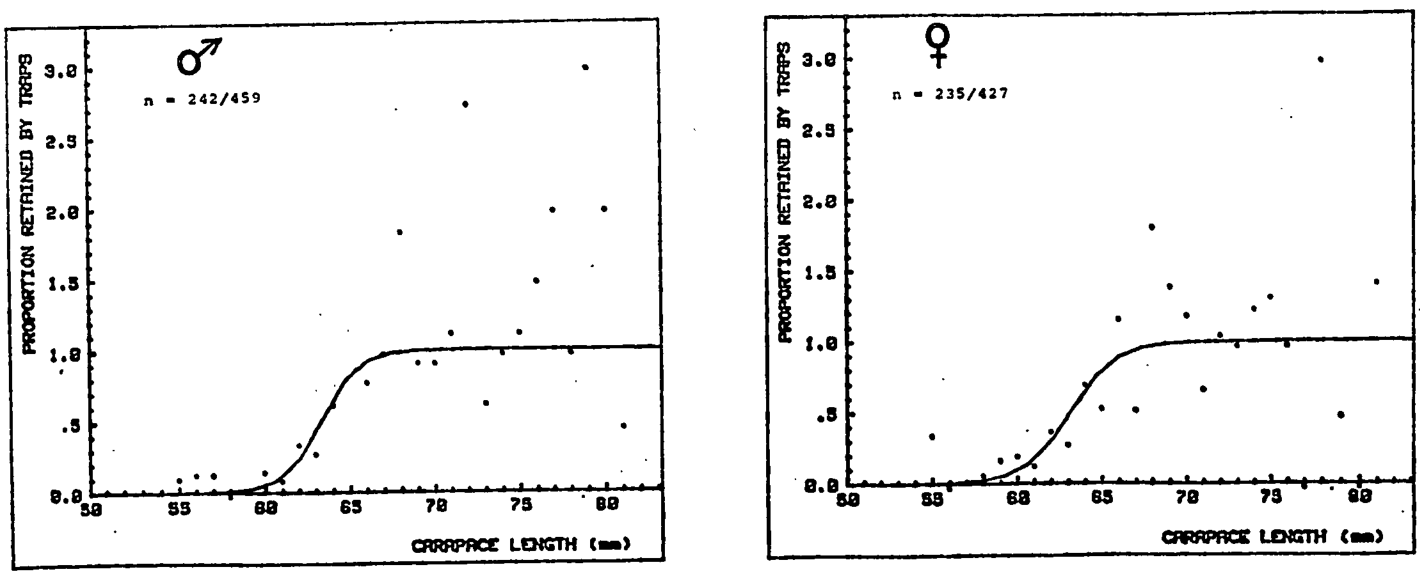



Figure 8 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with a 37.1mm water soaked wooden lath spacing, in the Salmon Beach study.

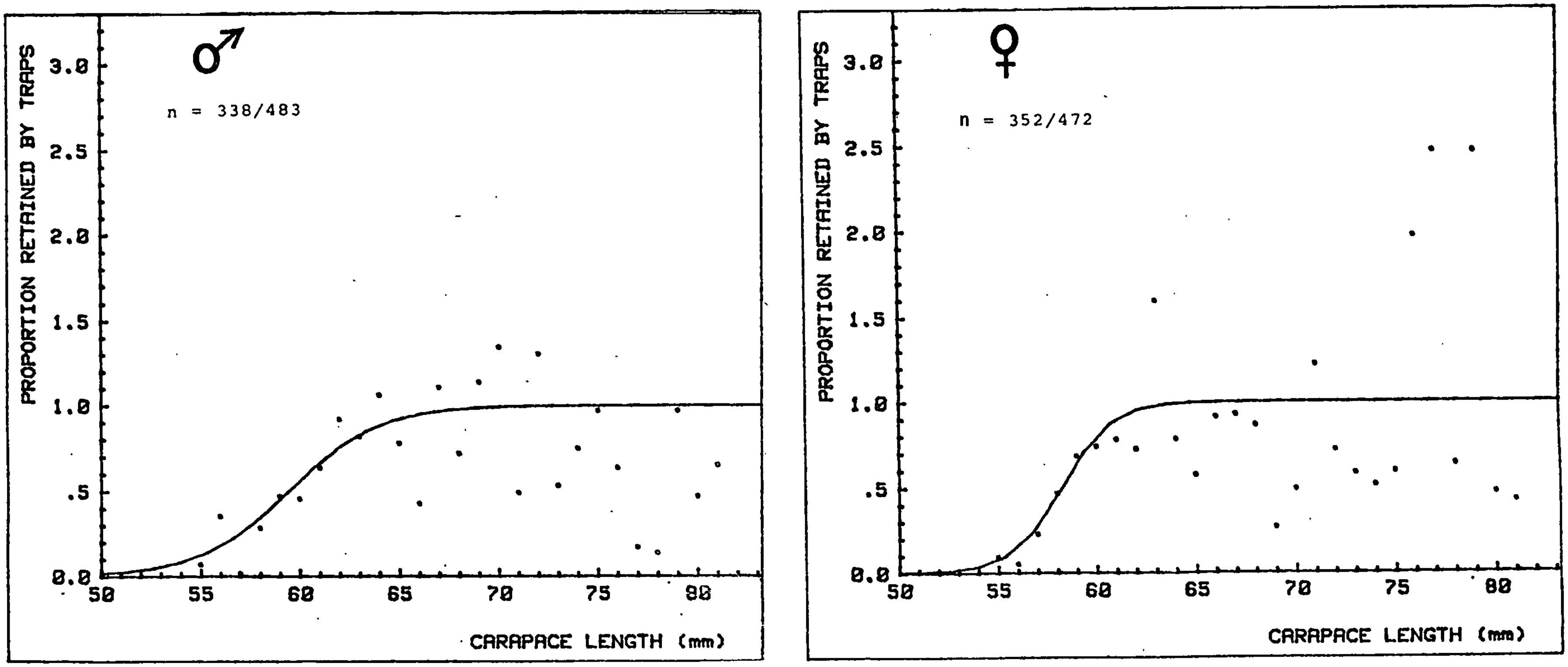



Figure 9 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with three 44.3mm round holes in a wooden lath, in the Salmon Beach study.

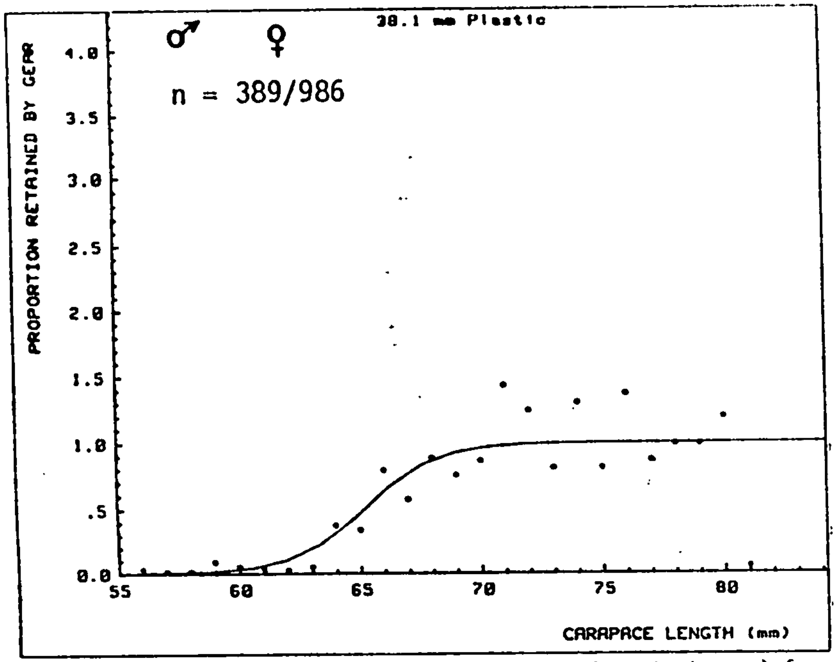



Figure 10 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with 38.1mm plastic lath, in the Salmon Beach study.

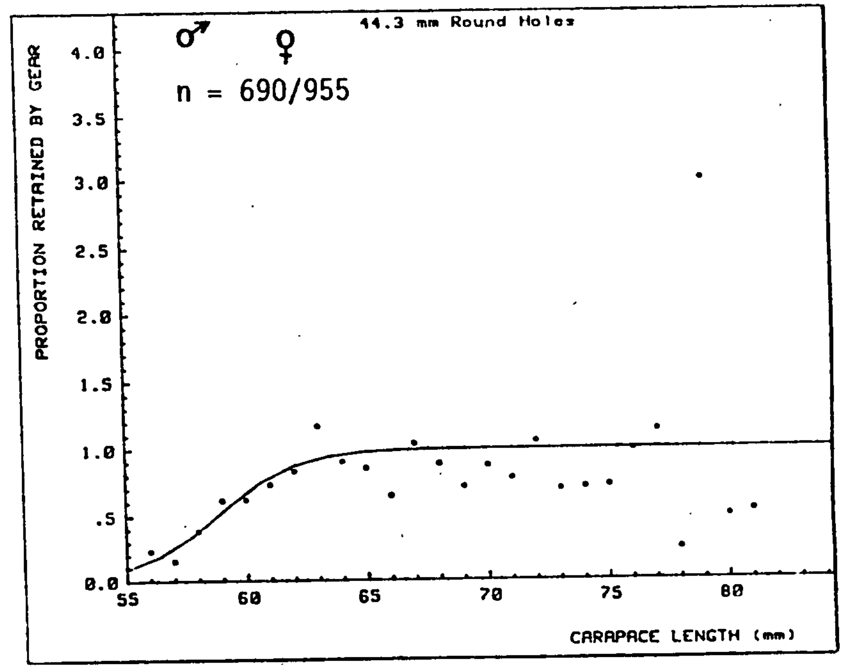



Figure 11 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with three 44.3mm round holes in a wooden lath, in the Salmon Beach study.

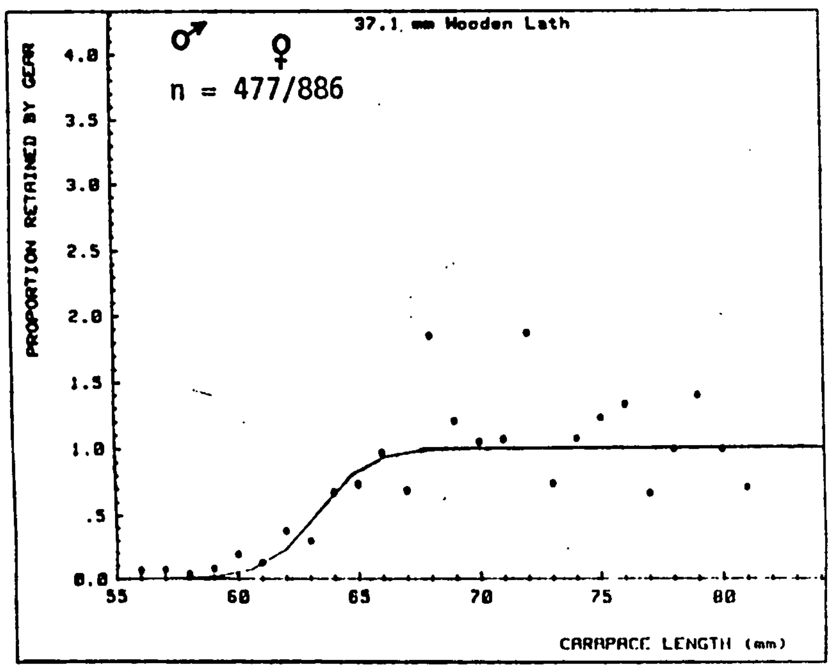



Figure 12 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with a 37.1mm wooden lath spacing in the Salmon Beach study.

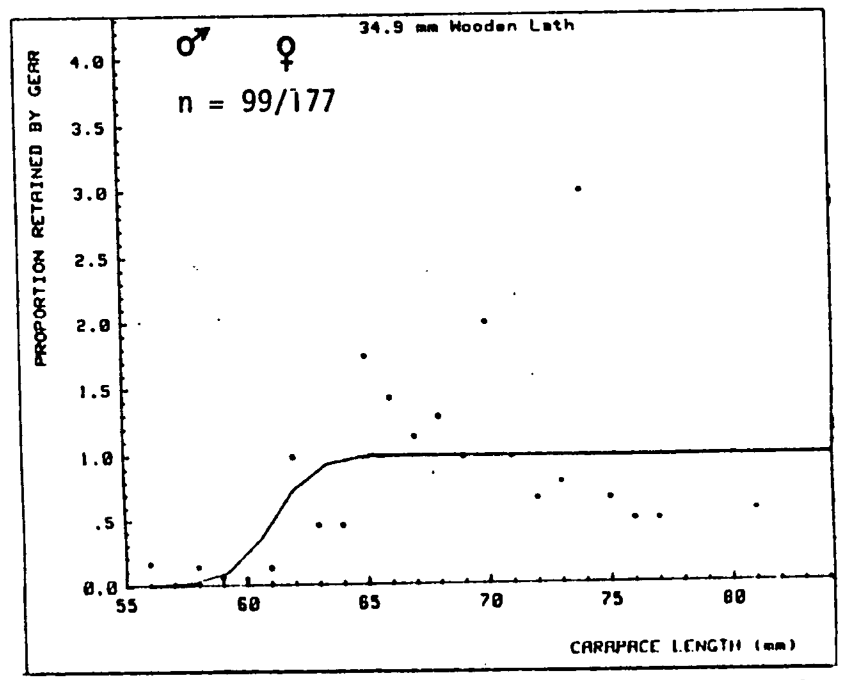



Figure 13 - Retention curve (experimental trap/standard trap) for lobsters caught in traps with a 34.9mm wooden lath spacing in the Salmon Beach study.

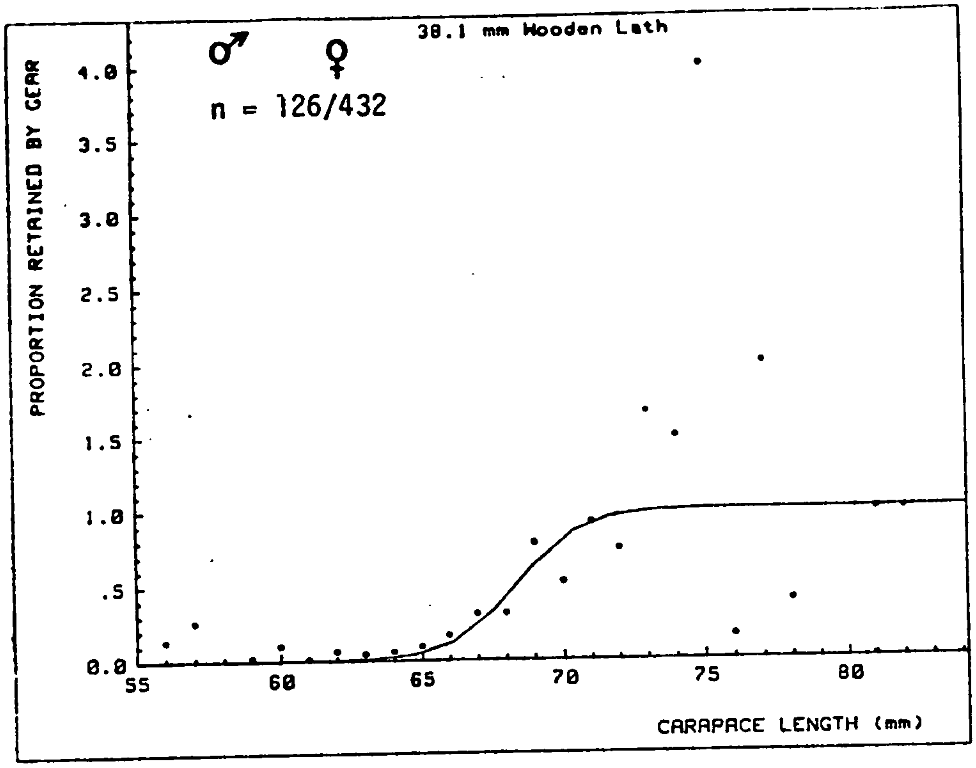



Figure 14 - Retention curve (experimental trap/standard trap) for total lobsters caught in traps with 38.1mm wooden lath spacing, in the Miminegash study.

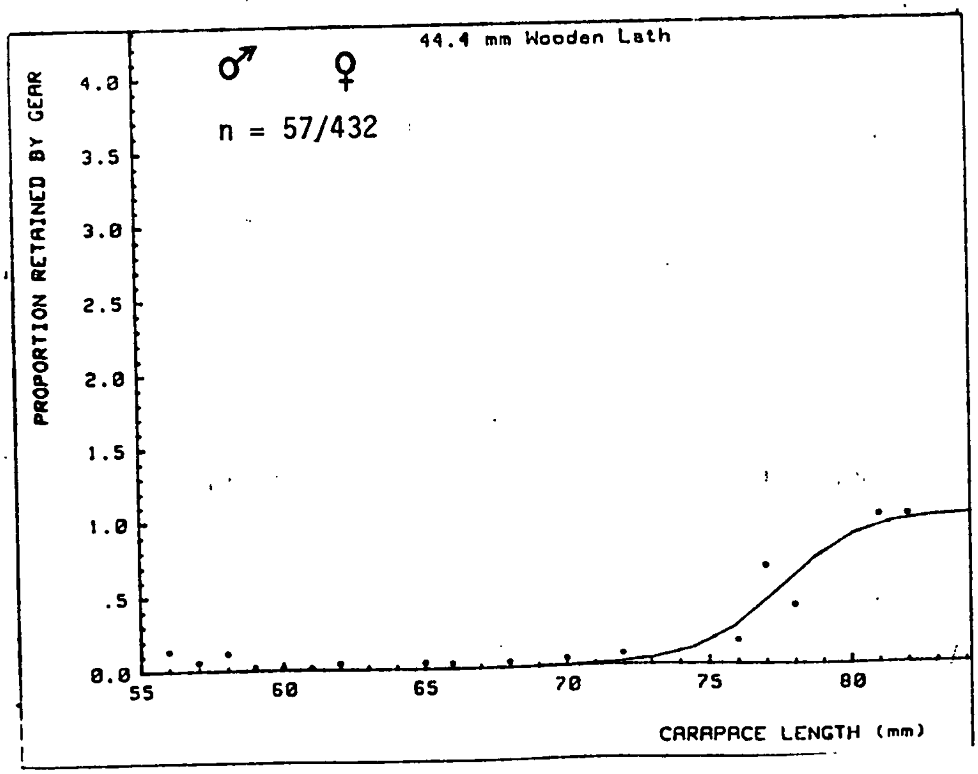



Figure 15 - Retention curve (experimental trap/standard trap) for total lobsters caught in traps with 44.4mm wooden lath spacing, in the Miminegash study.

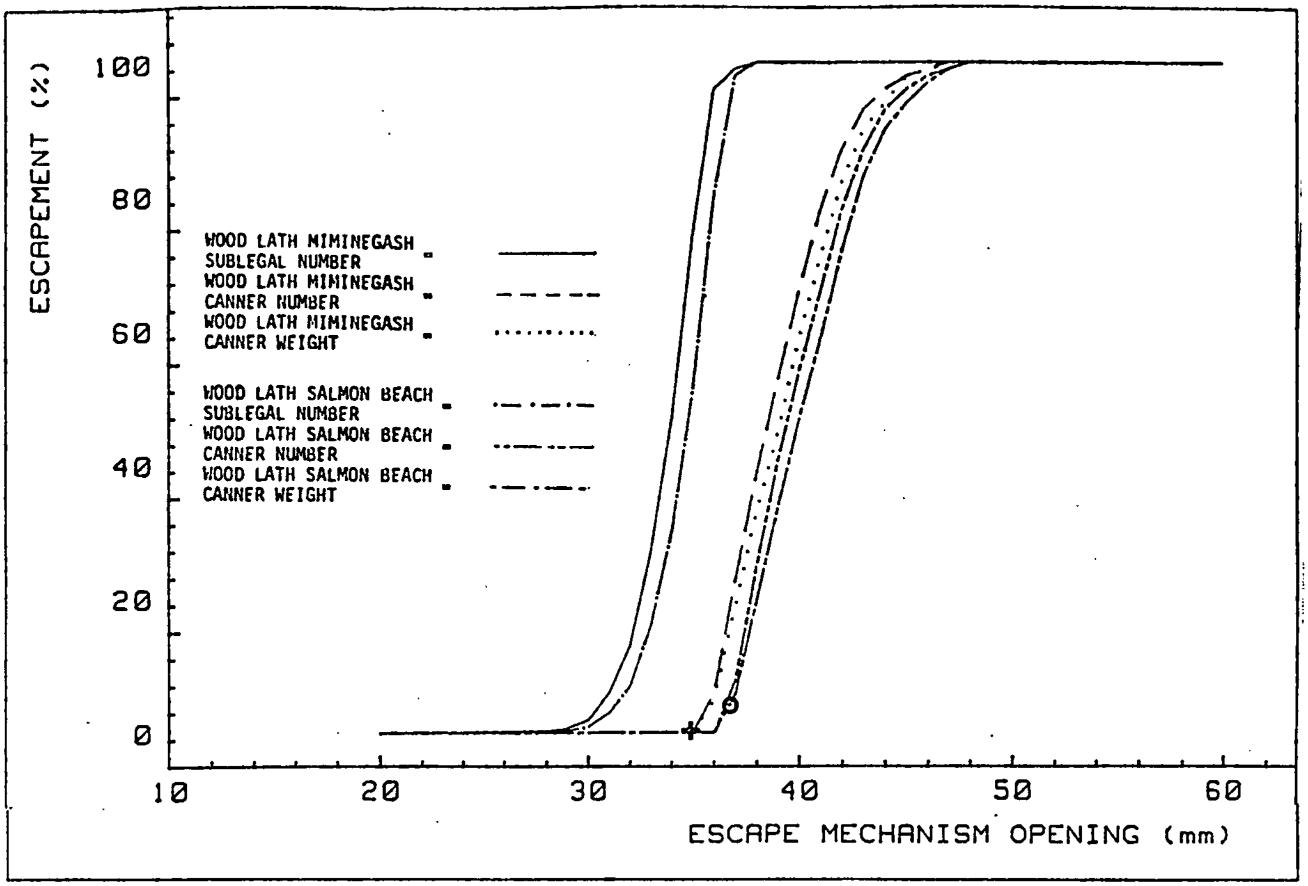



Figure 16 - Estimates of percentages of lobster in the escapement categories of sublegals and legal canner lobsters from wooden lath spacing with the predictive retention calculated from the proportionality factors S and $L_{50}$ from Salmon Beach and Miminegash. Observed percent canner weight escapement represented by (+) and (0) for lath spacing 34.9 and 37.1mm, respectively.

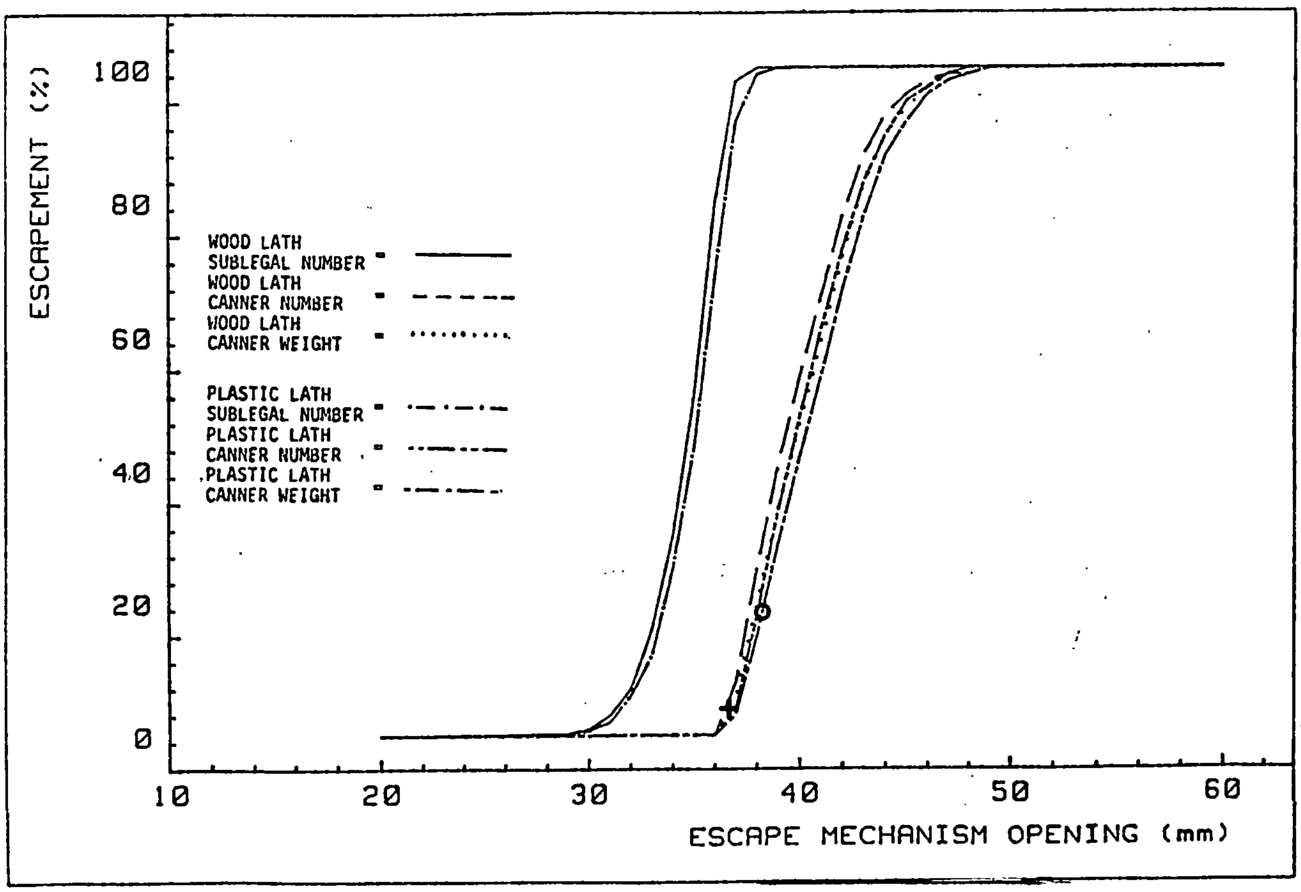



Figure 17 - Estimates of percentages of lobster in the escapement categories of sublegals and legal canner lobsters from wooden lath space and plastic lath with openings, with the predictive retention calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Observed percent canner weight escapement represented by (+) and (O) for wood lath spacing 37.1 mm and plastic lath with an opening 38.1 mm.

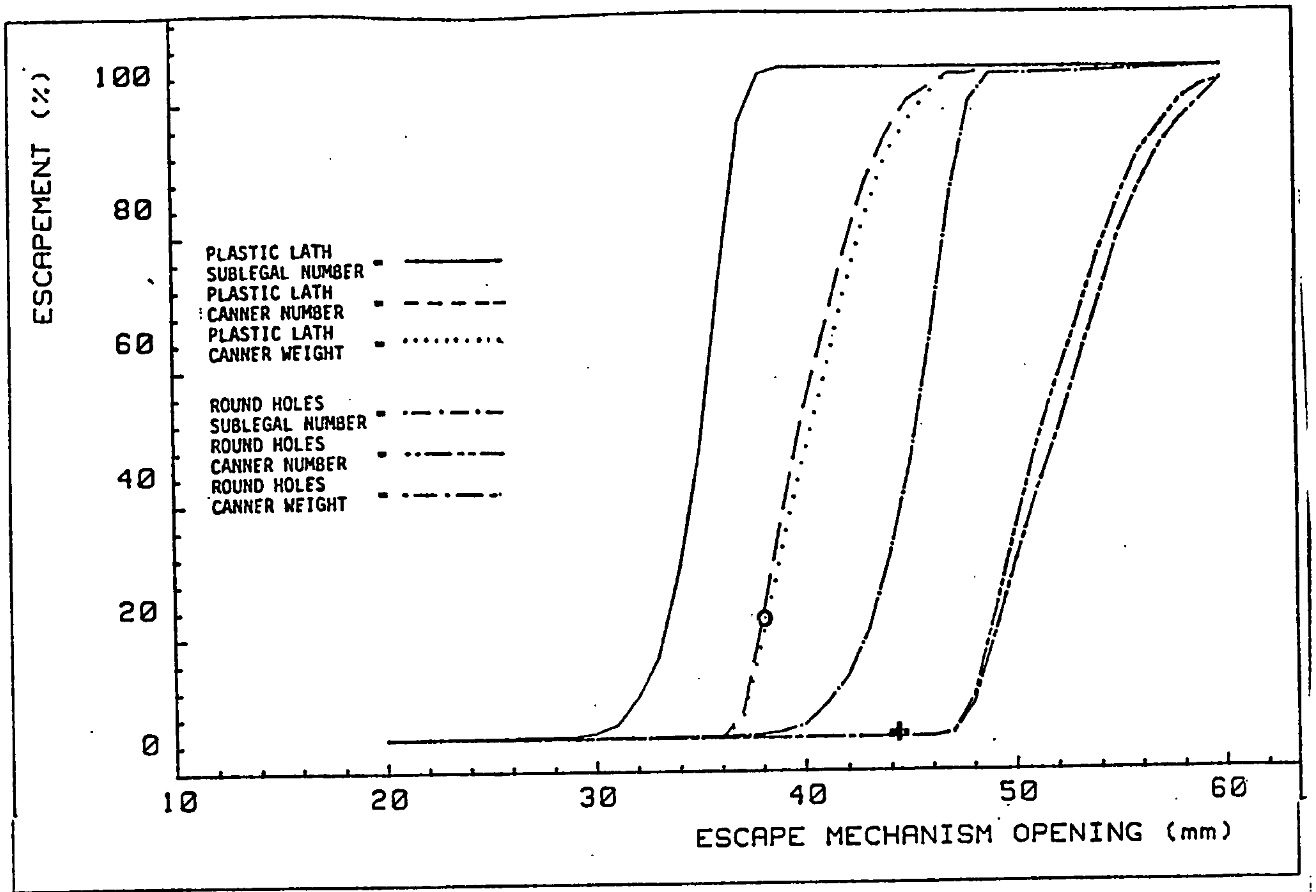



Figure 18 – Estimates of percentages of lobster in the escapement categories of sublegals and legal canner lobsters from plastic lath with openings and wooden lath with three round holes, with the predictive retention calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Observed percent canner weight escapement represented by (0) and (+) for plastic with openings 38.1mm and wood with round holes diameters 44.3mm, respectively.

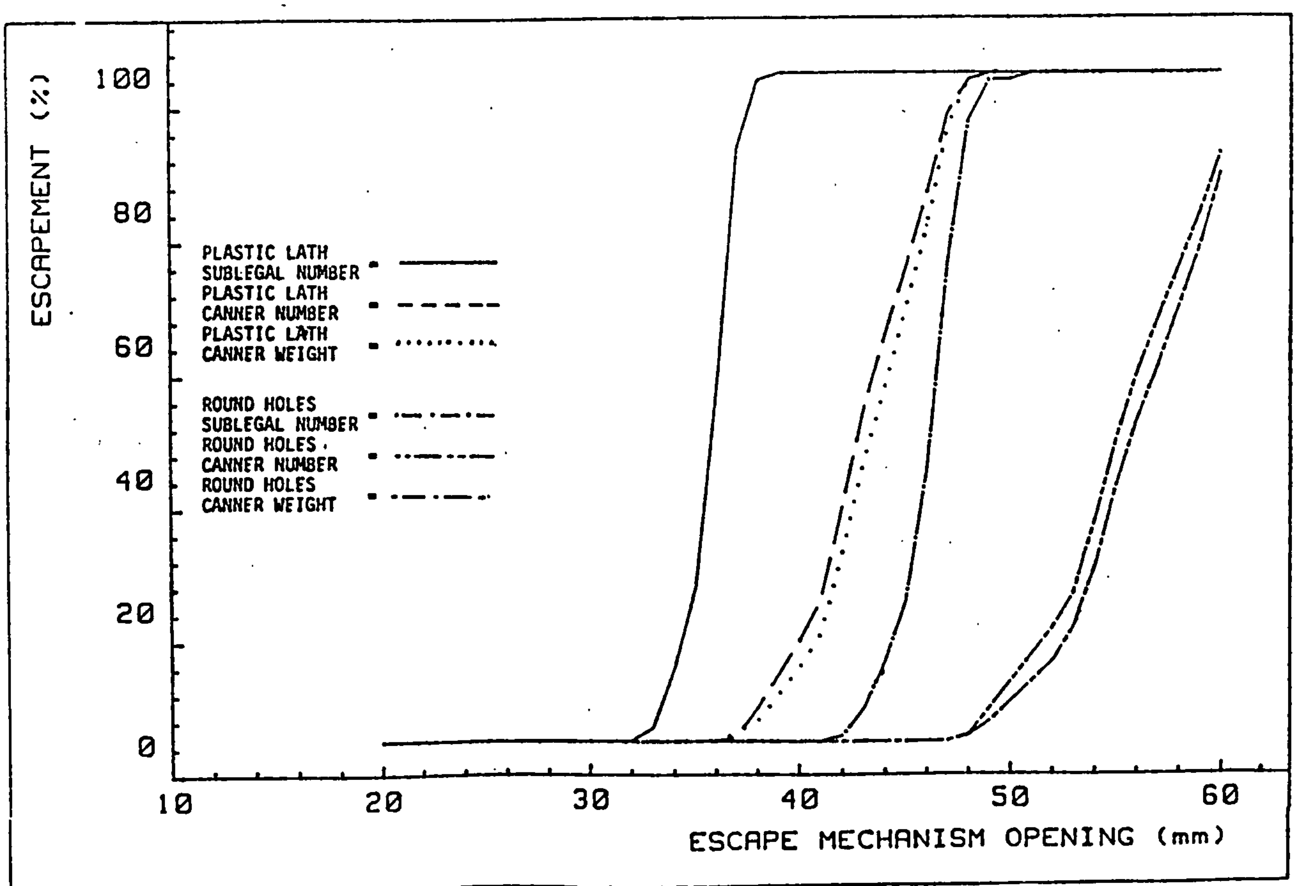


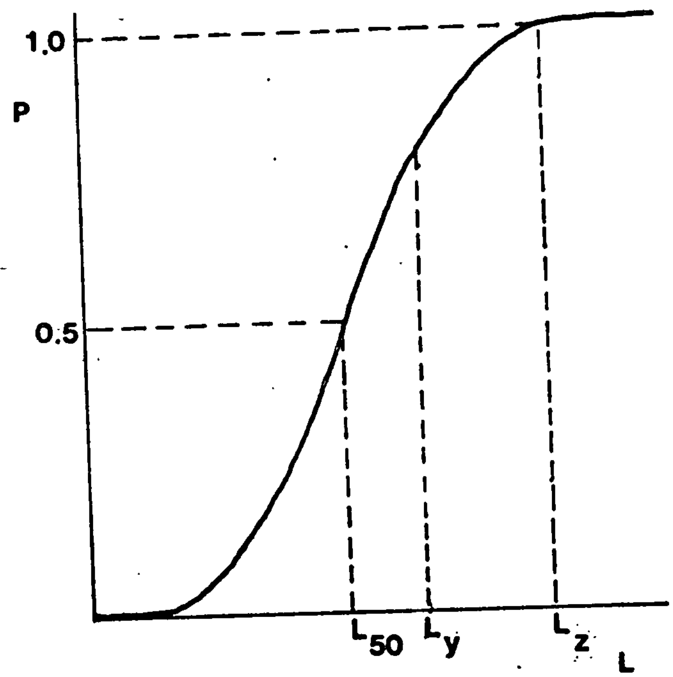

Figure 19 – Estimates of percentages of lobsters escaped from Pugwash size frequencies in the categories of sublegals and legal canner lobsters from plastic lath with openings and wooden lath with three round holes, with the predictive retention calculated from the proportionality factors S and $L_{50}$ from Salmon Beach study.

APPENDIX A

The retention curve is a logistic curve which is a sympototic to 0 towards the direction of the origin and to 1 towards the direction of positive infinity, with an inflection point at an "$L_{50}$" point of coordinates ($x = L_{50}$, $y = 0.50$). The curve is symetrical around the $L_{50}$ point. The equation is:

$$p = \frac{1}{1 + \exp(-(aL + b))} \qquad (1)$$

where: p = proportion retained
L = carapace length
a,b = parameters of the curve




where:
L = lobster carapace length;

$L_y$ = legal carapace size

$L_z$ = commercial market size;

P = proportion retained with lath space X.

The parameters of the curve may be defined as a function of the values of $L_{50}$ and the slope S of the tangent of the curve at this inflection point. Following de Verdelhan (1979):

$$\frac{dp}{dL} = \frac{a \cdot \exp(-(aL + b))}{[1 + \exp(-(aL + b))]^2}$$

Therefore, equation (1) at the inflection point offers the following:

$p = 0.5$; $\exp(-(aL_{50} + b)) = 1$

then $L_{50} = \frac{-b}{a}$

and $S = \left(\frac{dp}{dL}\right)_{L_{50}} = \frac{a}{4}$

Substituting these values into (1), we obtain:

$$p = \frac{1}{1 + \exp\left(-4S(L - L_{50}\right)} \tag{2}$$

and p may be applied to any retention data after the linear transformation of:

$$\ln\left(\frac{1}{p} - 1\right) = 4SL_{50} - 4SL$$

In order to find p for any lath space size, equation (2) must be generalized (Conan, 1987) by defining a relationship between the parameters $L_{50}$ and S, and the lath spacing size G. A very general model would be:

$$L_{50} = C_0 + C_1 G + C_2 G^2 + \ldots C_n G^n \tag{3}$$
$$S = C'_0 + C'_1 G + C'_2 G^2 + \ldots C'_n G^n \tag{4}$$

where $C_0$, $C_1$, $C_2 \ldots$ $C_n$ and $C'_2$, $C'_1$, $C'_2 \ldots$ $C'_n$ are parameters of the curve.

Quite frequently in net mesh selectivity experiments, it is assumed that the slope "S" is a constant and that the relationship between $L_{50}$ and G is a simple relationship of direct proportionality:

$$L_{50} = C_1 G$$
$$S = \text{constant}$$

In this study, we were limited to only two lath spacing dimensions. Therefore, there is only two possible combinations of models from the equations (3) and (4) as well as the above assumption:

$$\left.\begin{array}{lll} L_{50} = C_1 G & & \\ S = \text{constant} & (a) & \\ & & \\ L_{50} = C_1 G & & \\ S = C'_1 G & (b) & \\ & & \\ L_{50} = C_0 + C_1 G & & \\ S = C'_0 + C'_1 G & (c) & \end{array}\right. \tag{5}$$

From these models, we can generalize the retention model to the retained proportions of lobsters using different lath spacings, a plastic lath with a rectangular opening and a wooden lath with circular holes. For this purpose, we used equation 5(b) which is a simple relationship of direct proportionality.

For a certain lobster carapace size class $L_i$ of a $\Delta L$ interval, the proportion of retention P of the number of lobsters n of a class i would be:

$$P_{n(i)} = \int_{L_i - \frac{\Delta L}{2}}^{L_i + \frac{\Delta L}{2}} p(L)\, dL \qquad (6)$$

The quantity of lobsters escaping or being retained depends on the lobster size frequency distribution which is defined by a function f(L) determined by the catches of standard traps or by sea sampling data.

Therefore, the proportion of retention R of the number of lobsters n of a class i of lobster sizes would be:

$$R_{n(i)} = \int_{L_i - \frac{\Delta L}{2}}^{L_i + \frac{\Delta L}{2}} f(L) \cdot p(L)\, dL \qquad (7)$$

Since our classes are discrete, the size frequency for a certain class Fi, would be:

$$F_i = \int_{L_i - \frac{\Delta L}{2}}^{L_i + \frac{\Delta L}{2}} f(L)\, dL \qquad (8)$$

Since our size class intervals $\Delta L$ are small, equation (6) may be approximated:

$$P_i \approx \frac{1}{2} \left[p \left(L_i - \frac{\Delta L}{2}\right) + p \left(L_i + \frac{\Delta L}{2}\right)\right] \Delta L \qquad (9)$$

therefore, the numerical approximation of the retention of the number of lobsters Rn for a certain class i would be:

$$R_{n(i)} \approx Fi \cdot Pi \qquad (10)$$

Equation (10) may be applied to a certain category of commercial lobster sizes such as $L_y$ to $L_z$, so we can calculate the retention of the number of lobsters in this category:

$$R_{n(y,z)} \approx \sum_{i=y}^{z} F_i \cdot P_i \qquad (11)$$

Weight retention $R_w$ of lobsters can be calculated using the length-weight relationship $w(L) = u \cdot L^v$ such presented by Moriyasu (1984) for the Northumberland Strait and the length derived during the Salmon Beach project.

Therefore,

$$R_{w(i)} = \int_{L_i - \frac{\Delta L}{2}}^{L_i + \frac{\Delta L}{2}} f(L) \cdot w(L) \cdot p(L)\, dL \qquad (12)$$

Since the classes are discret and small, the weight of a size class $W_i$ would be:

$$W_i \approx \frac{1}{2} \left[ w\left(L_i - \frac{\Delta L}{2}\right) + w\left(L_i + \frac{\Delta L}{2}\right) \right] \Delta L \qquad (13)$$

and the numerical approximation of the weight retention of lobsters $R_w$ of a class i would be:

$$R_{w(i)} \approx F_i \cdot W_i \cdot P_i \qquad (14)$$

This equation may also be applied to a commercial category of lobsters ($L_y$ to $L_z$) to calculate the weight retention of lobster from this category:

$$R_{w(y,z)} \approx \sum_{i=y}^{z} F_i \cdot W_i \cdot P_i \qquad (15)$$

APPENDIX B 

Table 1 - Estimated escapement (%) of lobsters in the Salmon Beach area, from traps with wooden lath spacing, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63.5 mm and a commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.5 | .02 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.0 | .04 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.5 | .06 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.0 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.5 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.0 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.5 | .09 | 0.00 | -0.00 | -0.00 | -0.00 |
| 26.0 | .15 | 0.00 | -0.00 | -0.00 | -0.00 |
| 26.5 | .22 | 0.00 | -0.00 | -0.00 | -0.00 |
| 27.0 | .27 | 0.00 | -0.00 | -0.00 | -0.00 |
| 27.5 | .28 | 0.00 | -0.00 | -0.00 | -0.00 |
| 28.0 | .28 | 0.00 | -0.00 | -0.00 | -0.00 |
| 28.5 | .29 | 0.00 | -0.00 | -0.00 | -0.00 |
| 29.0 | .35 | 0.00 | -0.00 | -0.00 | -0.00 |
| 29.5 | .55 | 0.00 | -0.00 | -0.00 | -0.00 |
| 30.0 | .94 | 0.00 | -0.00 | -0.00 | -0.00 |
| 30.5 | 1.63 | 0.00 | -0.00 | -0.00 | -0.00 |
| 31.0 | 2.79 | 0.00 | -0.00 | -0.00 | -0.00 |
| 31.5 | 4.57 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | 7.05 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | 10.63 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 15.82 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 22.44 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 30.16 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 39.26 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 51.32 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 65.37 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | 79.54 | .12 | .09 | -0.00 | -0.00 |
| 36.5 | 91.06 | 2.26 | 1.80 | -0.00 | -0.00 |
| 37.0 | 97.73 | 7.74 | 6.19 | -0.00 | -0.00 |
| 37.5 | 99.90 | 15.98 | 12.88 | -0.00 | -0.00 |
| 38.0 | 100.00 | 24.91 | 20.30 | -0.00 | -0.00 |
| 38.5 | 100.00 | 33.02 | 27.32 | -0.00 | -0.00 |
| 39.0 | 100.00 | 40.91 | 34.42 | -0.00 | -0.00 |
| 39.5 | 100.00 | 47.77 | 40.82 | -0.00 | -0.00 |
| 40.0 | 100.00 | 53.73 | 46.60 | -0.00 | -0.00 |
| 40.5 | 100.00 | 59.82 | 52.73 | -0.00 | -0.00 |
| 41.0 | 100.00 | 66.09 | 59.23 | -0.00 | -0.00 |
| 41.5 | 100.00 | 72.09 | 65.66 | -0.00 | -0.00 |
| 42.0 | 100.00 | 77.67 | 71.86 | -0.00 | -0.00 |
| 42.5 | 100.00 | 83.03 | 78.02 | -0.00 | -0.00 |
| 43.0 | 100.00 | 87.11 | 82.87 | 0.00 | 0.00 |
| 43.5 | 100.00 | 90.30 | 86.79 | 0.00 | 0.00 |
| 44.0 | 100.00 | 92.80 | 89.96 | 0.00 | 0.00 |
| 44.5 | 100.00 | 94.65 | 92.37 | 0.00 | 0.00 |
| 45.0 | 100.00 | 96.01 | 94.21 | 0.00 | 0.00 |
| 45.5 | 100.00 | 97.29 | 95.98 | 0.00 | 0.00 |
| 46.0 | 100.00 | 98.33 | 97.49 | 0.00 | 0.00 |
| 46.5 | 100.00 | 99.30 | 98.93 | .42 | .33 |
| 47.0 | 100.00 | 99.87 | 99.80 | 12.70 | 10.09 |
| 47.5 | 100.00 | 100.00 | 100.00 | 28.65 | 22.84 |
| 48.0 | 100.00 | 100.00 | 100.00 | 39.87 | 31.93 |
| 48.5 | 100.00 | 100.00 | 100.00 | 45.74 | 36.87 |
| 49.0 | 100.00 | 100.00 | 100.00 | 49.92 | 40.48 |
| 49.5 | 100.00 | 100.00 | 100.00 | 54.01 | 44.19 |
| 50.0 | 100.00 | 100.00 | 100.00 | 60.36 | 50.09 |
| 50.5 | 100.00 | 100.00 | 100.00 | 66.63 | 56.08 |
| 51.0 | 100.00 | 100.00 | 100.00 | 71.08 | 60.44 |
| 51.5 | 100.00 | 100.00 | 100.00 | 74.41 | 63.79 |
| 52.0 | 100.00 | 100.00 | 100.00 | 77.41 | 66.89 |
| 52.5 | 100.00 | 100.00 | 100.00 | 80.46 | 70.11 |
| 53.0 | 100.00 | 100.00 | 100.00 | 82.87 | 72.76 |
| 53.5 | 100.00 | 100.00 | 100.00 | 84.86 | 74.99 |
| 54.0 | 100.00 | 100.00 | 100.00 | 85.90 | 76.16 |
| 54.5 | 100.00 | 100.00 | 100.00 | 86.43 | 76.80 |
| 55.0 | 100.00 | 100.00 | 100.00 | 87.17 | 77.71 |
| 55.5 | 100.00 | 100.00 | 100.00 | 87.82 | 78.52 |
| 56.0 | 100.00 | 100.00 | 100.00 | 88.17 | 78.96 |
| 56.5 | 100.00 | 100.00 | 100.00 | 88.17 | 78.97 |
| 57.0 | 100.00 | 100.00 | 100.00 | 88.20 | 79.01 |
| 57.5 | 100.00 | 100.00 | 100.00 | 89.19 | 80.42 |
| 58.0 | 100.00 | 100.00 | 100.00 | 91.03 | 83.07 |
| 58.5 | 100.00 | 100.00 | 100.00 | 92.10 | 84.62 |
| 59.0 | 100.00 | 100.00 | 100.00 | 92.47 | 85.17 |
| 59.5 | 100.00 | 100.00 | 100.00 | 92.59 | 85.35 |
| 60.0 | 100.00 | 100.00 | 100.00 | 93.06 | 86.10 |

Table 2 - Estimated escapement (%) of lobsters in the Salmon Beach area, from traps with wooden lath spacing, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Miminegash. Legal size of 63.5 mm and commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| 20.5 | 0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| 21.0 | 0.00 | 0.00 | 0.00 | -0.00 | 0.00 |
| 21.5 | .01 | 0.00 | 0.00 | -0.00 | 0.00 |
| 22.0 | .02 | 0.00 | 0.00 | -0.00 | 0.00 |
| 22.5 | .04 | 0.00 | 0.00 | -0.00 | 0.00 |
| 23.0 | .06 | 0.00 | 0.00 | -0.00 | 0.00 |
| 23.5 | .07 | 0.00 | 0.00 | -0.00 | 0.00 |
| 24.0 | .07 | 0.00 | 0.00 | -0.00 | 0.00 |
| 24.5 | .08 | 0.00 | 0.00 | -0.00 | 0.00 |
| 25.0 | .11 | 0.00 | 0.00 | -0.00 | 0.00 |
| 25.5 | .17 | 0.00 | 0.00 | -0.00 | 0.00 |
| 26.0 | .23 | 0.00 | 0.00 | -0.00 | 0.00 |
| 26.5 | .27 | 0.00 | 0.00 | -0.00 | 0.00 |
| 27.0 | .28 | 0.00 | 0.00 | -0.00 | 0.00 |
| 27.5 | .29 | 0.00 | 0.00 | -0.00 | 0.00 |
| 28.0 | .32 | 0.00 | 0.00 | -0.00 | 0.00 |
| 28.5 | .44 | 0.00 | 0.00 | -0.00 | 0.00 |
| 29.0 | .72 | 0.00 | 0.00 | -0.00 | 0.00 |
| 29.5 | 1.27 | 0.00 | 0.00 | -0.00 | 0.00 |
| 30.0 | 2.19 | 0.00 | 0.00 | -0.00 | 0.00 |
| 30.5 | 3.65 | 0.00 | 0.00 | -0.00 | 0.00 |
| 31.0 | 5.78 | 0.00 | 0.00 | -0.00 | 0.00 |
| 31.5 | 8.84 | 0.00 | 0.00 | -0.00 | 0.00 |
| 32.0 | 13.31 | 0.00 | 0.00 | -0.00 | 0.00 |
| 32.5 | 19.51 | 0.00 | 0.00 | -0.00 | 0.00 |
| 33.0 | 27.07 | 0.00 | 0.00 | -0.00 | 0.00 |
| 33.5 | 35.88 | 0.00 | 0.00 | -0.00 | 0.00 |
| 34.0 | 46.87 | 0.00 | 0.00 | -0.00 | 0.00 |
| 34.5 | 60.01 | .02 | .02 | -0.00 | 0.00 |
| 35.0 | 74.06 | .20 | .16 | -0.00 | 0.00 |
| 35.5 | 86.87 | 1.64 | 1.30 | -0.00 | 0.00 |
| 36.0 | 95.70 | 6.15 | 4.89 | -0.00 | 0.00 |
| 36.5 | 99.26 | 14.03 | 11.24 | -0.00 | 0.00 |
| 37.0 | 99.94 | 22.99 | 18.62 | -0.00 | 0.00 |
| 37.5 | 100.00 | 31.32 | 25.73 | -0.00 | 0.00 |
| 38.0 | 100.00 | 39.14 | 32.69 | -0.00 | 0.00 |
| 38.5 | 100.00 | 46.24 | 39.23 | -0.00 | 0.00 |
| 39.0 | 100.00 | 52.62 | 45.35 | -0.00 | 0.00 |
| 39.5 | 100.00 | 58.98 | 51.71 | 0.00 | 0.00 |
| 40.0 | 100.00 | 65.60 | 58.55 | 0.00 | 0.00 |
| 40.5 | 100.00 | 71.81 | 65.20 | 0.00 | 0.00 |
| 41.0 | 100.00 | 77.44 | 71.46 | 0.00 | 0.00 |
| 41.5 | 100.00 | 82.64 | 77.44 | 0.00 | 0.00 |
| 42.0 | 100.00 | 86.81 | 82.39 | 0.00 | 0.00 |
| 42.5 | 100.00 | 90.14 | 86.50 | 0.00 | 0.00 |
| 43.0 | 100.00 | 92.80 | 89.90 | 0.00 | 0.00 |
| 43.5 | 100.00 | 94.75 | 92.46 | 0.00 | 0.00 |
| 44.0 | 100.00 | 96.18 | 94.41 | 0.00 | 0.00 |
| 44.5 | 100.00 | 97.41 | 96.14 | .01 | 0.00 |
| 45.0 | 100.00 | 98.43 | 97.63 | .11 | .09 |
| 45.5 | 100.00 | 99.33 | 98.98 | 2.27 | 1.77 |
| 46.0 | 100.00 | 99.87 | 99.80 | 14.68 | 11.47 |
| 46.5 | 100.00 | 99.99 | 99.99 | 31.13 | 24.43 |
| 47.0 | 100.00 | 100.00 | 100.00 | 41.50 | 32.82 |
| 47.5 | 100.00 | 100.00 | 100.00 | 47.08 | 37.50 |
| 48.0 | 100.00 | 100.00 | 100.00 | 51.19 | 41.11 |
| 48.5 | 100.00 | 100.00 | 100.00 | 55.80 | 45.31 |
| 49.0 | 100.00 | 100.00 | 100.00 | 61.85 | 50.96 |
| 49.5 | 100.00 | 100.00 | 100.00 | 67.77 | 56.65 |
| 50.0 | 100.00 | 100.00 | 100.00 | 72.23 | 61.06 |
| 50.5 | 100.00 | 100.00 | 100.00 | 75.77 | 64.62 |
| 51.0 | 100.00 | 100.00 | 100.00 | 79.07 | 68.07 |
| 51.5 | 100.00 | 100.00 | 100.00 | 81.73 | 70.97 |
| 52.0 | 100.00 | 100.00 | 100.00 | 83.80 | 73.29 |
| 52.5 | 100.00 | 100.00 | 100.00 | 85.29 | 74.93 |
| 53.0 | 100.00 | 100.00 | 100.00 | 86.12 | 75.86 |
| 53.5 | 100.00 | 100.00 | 100.00 | 86.72 | 76.60 |
| 54.0 | 100.00 | 100.00 | 100.00 | 87.59 | 77.73 |
| 54.5 | 100.00 | 100.00 | 100.00 | 88.09 | 78.39 |
| 55.0 | 100.00 | 100.00 | 100.00 | 88.17 | 78.49 |
| 55.5 | 100.00 | 100.00 | 100.00 | 88.20 | 78.54 |
| 56.0 | 100.00 | 100.00 | 100.00 | 88.81 | 79.45 |
| 56.5 | 100.00 | 100.00 | 100.00 | 90.18 | 81.50 |
| 57.0 | 100.00 | 100.00 | 100.00 | 91.69 | 83.79 |
| 57.5 | 100.00 | 100.00 | 100.00 | 92.43 | 84.93 |
| 58.0 | 100.00 | 100.00 | 100.00 | 92.55 | 85.12 |
| 58.5 | 100.00 | 100.00 | 100.00 | 93.00 | 85.88 |
| 59.0 | 100.00 | 100.00 | 100.00 | 93.47 | 86.66 |
| 59.5 | 100.00 | 100.00 | 100.00 | 93.58 | 86.85 |
| 60.0 | 100.00 | 100.00 | 100.00 | 94.27 | 88.03 |

Table 3 - Estimated escapement (%) of lobsters in the Salmon Beach area, from traps with plastic laths with rectangular opening, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63.5 mm and a commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.5 | .01 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.0 | .03 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.5 | .05 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.0 | .06 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.5 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.0 | .08 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.5 | .09 | 0.00 | -0.00 | -0.00 | -0.00 |
| 26.0 | .13 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.5 | .18 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.0 | .24 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.5 | .27 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.0 | .28 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.5 | .29 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.0 | .33 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.5 | .46 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.0 | .75 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.5 | 1.27 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.0 | 2.16 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.5 | 3.54 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | 5.53 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | 8.36 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 12.43 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 18.08 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 25.09 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 33.23 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 43.10 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 55.15 | .01 | .01 | -0.00 | -0.00 |
| 36.0 | 68.57 | .11 | .09 | -0.00 | -0.00 |
| 36.5 | 81.75 | .84 | .67 | -0.00 | -0.00 |
| 37.0 | 92.20 | 3.91 | 3.04 | -0.00 | -0.00 |
| 37.5 | 97.85 | 10.06 | 8.08 | -0.00 | -0.00 |
| 38.0 | 99.70 | 18.32 | 14.84 | -0.00 | -0.00 |
| 38.5 | 99.97 | 26.70 | 21.88 | -0.00 | -0.00 |
| 39.0 | 100.00 | 34.49 | 28.68 | -0.00 | -0.00 |
| 39.5 | 100.00 | 41.86 | 35.33 | -0.00 | -0.00 |
| 40.0 | 100.00 | 48.50 | 41.55 | 0.00 | -0.00 |
| 40.5 | 100.00 | 54.60 | 47.50 | 0.00 | 0.00 |
| 41.0 | 100.00 | 60.91 | 53.88 | 0.00 | 0.00 |
| 41.5 | 100.00 | 67.20 | 60.44 | 0.00 | 0.00 |
| 42.0 | 100.00 | 73.02 | 66.72 | 0.00 | 0.00 |
| 42.5 | 100.00 | 78.36 | 72.68 | 0.00 | 0.00 |
| 43.0 | 100.00 | 83.25 | 78.30 | 0.00 | 0.00 |
| 43.5 | 100.00 | 87.18 | 82.97 | 0.00 | 0.00 |
| 44.0 | 100.00 | 90.35 | 86.87 | 0.00 | 0.00 |
| 44.5 | 100.00 | 92.89 | 90.09 | 0.00 | 0.00 |
| 45.0 | 100.00 | 94.76 | 92.53 | 0.00 | 0.00 |
| 45.5 | 100.00 | 96.15 | 94.41 | 0.00 | 0.00 |
| 46.0 | 100.00 | 97.35 | 96.08 | .01 | .01 |
| 46.5 | 100.00 | 98.35 | 97.53 | .13 | .10 |
| 47.0 | 100.00 | 99.23 | 98.84 | 1.91 | 1.52 |
| 47.5 | 100.00 | 99.80 | 99.70 | 12.56 | 9.98 |
| 48.0 | 100.00 | 99.98 | 99.98 | 27.86 | 22.21 |
| 48.5 | 100.00 | 100.00 | 100.00 | 39.55 | 31.70 |
| 49.0 | 100.00 | 100.00 | 100.00 | 45.79 | 36.93 |
| 49.5 | 100.00 | 100.00 | 100.00 | 50.05 | 40.62 |
| 50.0 | 100.00 | 100.00 | 100.00 | 54.22 | 44.40 |
| 50.5 | 100.00 | 100.00 | 100.00 | 59.90 | 49.67 |
| 51.0 | 100.00 | 100.00 | 100.00 | 65.76 | 55.26 |
| 51.5 | 100.00 | 100.00 | 100.00 | 70.48 | 59.85 |
| 52.0 | 100.00 | 100.00 | 100.00 | 74.14 | 63.62 |
| 52.5 | 100.00 | 100.00 | 100.00 | 77.34 | 66.83 |
| 53.0 | 100.00 | 100.00 | 100.00 | 80.35 | 70.01 |
| 53.5 | 100.00 | 100.00 | 100.00 | 82.71 | 72.58 |
| 54.0 | 100.00 | 100.00 | 100.00 | 84.57 | 74.66 |
| 54.5 | 100.00 | 100.00 | 100.00 | 85.69 | 75.92 |
| 55.0 | 100.00 | 100.00 | 100.00 | 86.33 | 76.68 |
| 55.5 | 100.00 | 100.00 | 100.00 | 87.00 | 77.50 |
| 56.0 | 100.00 | 100.00 | 100.00 | 87.74 | 78.42 |
| 56.5 | 100.00 | 100.00 | 100.00 | 88.13 | 78.91 |
| 57.0 | 100.00 | 100.00 | 100.00 | 88.17 | 78.97 |
| 57.5 | 100.00 | 100.00 | 100.00 | 88.24 | 79.07 |
| 58.0 | 100.00 | 100.00 | 100.00 | 88.99 | 80.13 |
| 58.5 | 100.00 | 100.00 | 100.00 | 90.43 | 82.21 |
| 59.0 | 100.00 | 100.00 | 100.00 | 91.78 | 84.15 |
| 59.5 | 100.00 | 100.00 | 100.00 | 92.43 | 85.11 |
| 60.0 | 100.00 | 100.00 | 100.00 | 92.56 | 85.31 |

Table 4 - Estimated escapement (%) of lobsters in the Salmon Beach area, from traps with wooden laths with three round holes, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63.5 mm and commercial market of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 22.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 23.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 24.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 25.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 26.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 26.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 27.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 27.5 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 28.0 | 0.00 | 0.00 | -0.00 | -0.00 | -0.00 |
| 28.5 | .01 | 0.00 | -0.00 | -0.00 | -0.00 |
| 29.0 | .01 | 0.00 | -0.00 | -0.00 | -0.00 |
| 29.5 | .03 | 0.00 | -0.00 | -0.00 | -0.00 |
| 30.0 | .04 | 0.00 | -0.00 | -0.00 | -0.00 |
| 30.5 | .06 | 0.00 | -0.00 | -0.00 | -0.00 |
| 31.0 | .06 | 0.00 | -0.00 | -0.00 | -0.00 |
| 31.5 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 32.0 | .07 | 0.00 | -0.00 | -0.00 | -0.00 |
| 32.5 | .08 | 0.00 | -0.00 | -0.00 | -0.00 |
| 33.0 | .10 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | .13 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | .17 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | .21 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | .25 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | .27 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | .28 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.5 | .28 | 0.00 | 0.00 | -0.00 | -0.00 |
| 37.0 | .30 | 0.00 | 0.00 | -0.00 | -0.00 |
| 37.5 | .35 | 0.00 | 0.00 | -0.00 | -0.00 |
| 38.0 | .45 | 0.00 | 0.00 | -0.00 | -0.00 |
| 38.5 | .65 | 0.00 | 0.00 | -0.00 | -0.00 |
| 39.0 | .98 | 0.00 | 0.00 | -0.00 | -0.00 |
| 39.5 | 1.48 | 0.00 | 0.00 | -0.00 | -0.00 |
| 40.0 | 2.23 | 0.00 | 0.00 | -0.00 | -0.00 |
| 40.5 | 3.27 | 0.00 | 0.00 | -0.00 | -0.00 |
| 41.0 | 4.67 | 0.00 | 0.00 | -0.00 | -0.00 |
| 41.5 | 6.51 | 0.00 | 0.00 | -0.00 | -0.00 |
| 42.0 | 8.92 | 0.00 | 0.00 | -0.00 | -0.00 |
| 42.5 | 12.13 | 0.00 | 0.00 | -0.00 | -0.00 |
| 43.0 | 16.30 | 0.00 | 0.00 | -0.00 | -0.00 |
| 43.5 | 21.33 | 0.00 | 0.00 | -0.00 | -0.00 |
| 44.0 | 27.11 | 0.00 | 0.00 | -0.00 | -0.00 |
| 44.5 | 33.58 | 0.00 | 0.00 | -0.00 | -0.00 |
| 45.0 | 41.08 | 0.00 | 0.00 | -0.00 | -0.00 |
| 45.5 | 50.01 | .01 | .01 | -0.00 | -0.00 |
| 46.0 | 59.99 | .03 | .02 | -0.00 | -0.00 |
| 46.5 | 70.45 | .15 | .12 | -0.00 | -0.00 |
| 47.0 | 80.71 | .73 | .58 | -0.00 | -0.00 |
| 47.5 | 89.34 | 2.60 | 2.07 | -0.00 | -0.00 |
| 48.0 | 95.43 | 6.30 | 5.04 | -0.00 | -0.00 |
| 48.5 | 98.56 | 11.97 | 9.63 | -0.00 | -0.00 |
| 49.0 | 99.70 | 18.48 | 14.97 | -0.00 | -0.00 |
| 49.5 | 99.95 | 25.03 | 20.46 | -0.00 | -0.00 |
| 50.0 | 99.99 | 31.25 | 25.82 | -0.00 | -0.00 |
| 50.5 | 100.00 | 37.12 | 31.03 | -0.00 | -0.00 |
| 51.0 | 100.00 | 42.68 | 36.09 | -0.00 | -0.00 |
| 51.5 | 100.00 | 47.85 | 40.94 | 0.00 | -0.00 |
| 52.0 | 100.00 | 52.59 | 45.51 | 0.00 | 0.00 |
| 52.5 | 100.00 | 57.32 | 50.22 | 0.00 | 0.00 |
| 53.0 | 100.00 | 62.36 | 55.38 | 0.00 | 0.00 |
| 53.5 | 100.00 | 67.20 | 60.44 | 0.00 | 0.00 |
| 54.0 | 100.00 | 71.77 | 65.35 | 0.00 | 0.00 |
| 54.5 | 100.00 | 76.07 | 70.10 | 0.00 | 0.00 |
| 55.0 | 100.00 | 80.04 | 74.60 | 0.00 | 0.00 |
| 55.5 | 100.00 | 83.67 | 78.80 | 0.00 | 0.00 |
| 56.0 | 100.00 | 86.75 | 82.45 | 0.00 | 0.00 |
| 56.5 | 100.00 | 89.29 | 85.55 | 0.00 | 0.00 |
| 57.0 | 100.00 | 91.49 | 88.30 | 0.00 | 0.00 |
| 57.5 | 100.00 | 93.35 | 90.68 | 0.00 | 0.00 |
| 58.0 | 100.00 | 94.73 | 92.49 | 0.00 | 0.00 |
| 58.5 | 100.00 | 95.84 | 93.98 | 0.00 | 0.00 |
| 59.0 | 100.00 | 96.84 | 95.36 | 0.00 | 0.00 |
| 59.5 | 100.00 | 97.67 | 96.64 | .02 | .02 |
| 60.0 | 100.00 | 98.42 | 97.63 | .17 | .13 |

Table 5.- Estimated escapement (%) of lobsters in the Pugwash area, from traps with wooden lath spacing, with the predictive selectivity, calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63..5 mm and commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | .12 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | 1.32 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 4.26 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 8.79 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 14.03 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 19.46 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 28.68 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 46.16 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | 70.49 | .02 | .01 | -0.00 | -0.00 |
| 36.5 | 87.06 | .38 | .25 | -0.00 | -0.00 |
| 37.0 | 96.34 | 1.68 | 1.11 | -0.00 | -0.00 |
| 37.5 | 99.64 | 3.69 | 2.59 | -0.00 | -0.00 |
| 38.0 | 100.00 | 6.43 | 4.35 | -0.00 | -0.00 |
| 38.5 | 100.00 | 9.08 | 6.26 | -0.00 | -0.00 |
| 39.0 | 100.00 | 11.96 | 8.43 | -0.00 | -0.00 |
| 39.5 | 100.00 | 14.65 | 10.53 | -0.00 | -0.00 |
| 40.0 | 100.00 | 16.93 | 12.37 | -0.00 | -0.00 |
| 40.5 | 100.00 | 20.25 | 15.19 | -0.00 | -0.00 |
| 41.0 | 100.00 | 25.66 | 19.93 | -0.00 | -0.00 |
| 41.5 | 100.00 | 33.19 | 26.67 | -0.00 | -0.00 |
| 42.0 | 100.00 | 41.02 | 33.93 | -0.00 | -0.00 |
| 42.5 | 100.00 | 49.34 | 41.96 | -0.00 | -0.00 |
| 43.0 | 100.00 | 55.48 | 48.04 | -0.00 | -0.00 |
| 43.5 | 100.00 | 60.27 | 53.01 | 0.00 | 0.00 |
| 44.0 | 100.00 | 65.50 | 58.62 | 0.00 | 0.00 |
| 44.5 | 100.00 | 70.62 | 64.24 | 0.00 | 0.00 |
| 45.0 | 100.00 | 75.46 | 69.76 | 0.00 | 0.00 |
| 45.5 | 100.00 | 81.24 | 76.58 | 0.00 | 0.00 |
| 46.0 | 100.00 | 87.51 | 84.16 | 0.00 | 0.00 |
| 46.5 | 100.00 | 94.33 | 92.75 | .18 | .13 |
| 47.0 | 100.00 | 98.89 | 98.57 | 5.54 | 4.02 |
| 47.5 | 100.00 | 99.99 | 99.99 | 14.93 | 10.96 |
| 48.0 | 100.00 | 100.00 | 100.00 | 24.24 | 17.96 |
| 48.5 | 100.00 | 100.00 | 100.00 | 32.13 | 24.07 |
| 49.0 | 100.00 | 100.00 | 100.00 | 38.71 | 29.34 |
| 49.5 | 100.00 | 100.00 | 100.00 | 44.37 | 34.05 |
| 50.0 | 100.00 | 100.00 | 100.00 | 48.42 | 37.54 |
| 50.5 | 100.00 | 100.00 | 100.00 | 52.03 | 40.60 |
| 51.0 | 100.00 | 100.00 | 100.00 | 55.48 | 43.96 |
| 51.5 | 100.00 | 100.00 | 100.00 | 58.15 | 46.48 |
| 52.0 | 100.00 | 100.00 | 100.00 | 60.70 | 48.98 |
| 52.5 | 100.00 | 100.00 | 100.00 | 64.09 | 52.40 |
| 53.0 | 100.00 | 100.00 | 100.00 | 68.58 | 57.04 |
| 53.5 | 100.00 | 100.00 | 100.00 | 71.80 | 60.42 |
| 54.0 | 100.00 | 100.00 | 100.00 | 74.58 | 63.46 |
| 54.5 | 100.00 | 100.00 | 100.00 | 77.17 | 66.33 |
| 55.0 | 100.00 | 100.00 | 100.00 | 78.94 | 68.36 |
| 55.5 | 100.00 | 100.00 | 100.00 | 80.44 | 70.14 |
| 56.0 | 100.00 | 100.00 | 100.00 | 82.04 | 72.10 |
| 56.5 | 100.00 | 100.00 | 100.00 | 83.67 | 74.15 |
| 57.0 | 100.00 | 100.00 | 100.00 | 85.81 | 76.89 |
| 57.5 | 100.00 | 100.00 | 100.00 | 87.29 | 78.79 |
| 58.0 | 100.00 | 100.00 | 100.00 | 88.40 | 80.34 |
| 58.5 | 100.00 | 100.00 | 100.00 | 89.76 | 82.25 |
| 59.0 | 100.00 | 100.00 | 100.00 | 90.93 | 83.91 |
| 59.5 | 100.00 | 100.00 | 100.00 | 91.91 | 85.35 |
| 60.0 | 100.00 | 100.00 | 100.00 | 92.76 | 86.64 |

Table 6 - Estimated escapement (%) of lobsters in the Pugwash area, from traps with plastic laths with rectangular openings, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63.5 and a commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.5 | .02 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | .12 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | .68 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 2.44 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 5.86 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 10.61 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 15.91 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 22.80 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 34.77 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | 53.47 | .02 | .01 | -0.00 | -0.00 |
| 36.5 | 73.57 | .15 | .10 | -0.00 | -0.00 |
| 37.0 | 88.56 | .76 | .50 | -0.00 | -0.00 |
| 37.5 | 96.67 | 2.32 | 1.54 | -0.00 | -0.00 |
| 38.0 | 99.52 | 4.57 | 3.07 | -0.00 | -0.00 |
| 38.5 | 99.95 | 7.05 | 4.81 | -0.00 | -0.00 |
| 39.0 | 100.00 | 9.65 | 6.70 | -0.00 | -0.00 |
| 39.5 | 100.00 | 12.36 | 8.74 | -0.00 | -0.00 |
| 40.0 | 100.00 | 14.95 | 10.77 | -0.00 | -0.00 |
| 40.5 | 100.00 | 17.50 | 12.86 | 0.00 | -0.00 |
| 41.0 | 100.00 | 21.31 | 16.13 | 0.00 | 0.00 |
| 41.5 | 100.00 | 27.27 | 21.38 | 0.00 | 0.00 |
| 42.0 | 100.00 | 34.59 | 27.99 | 0.00 | 0.00 |
| 42.5 | 100.00 | 42.18 | 35.08 | 0.00 | 0.00 |
| 43.0 | 100.00 | 49.63 | 42.28 | 0.00 | 0.00 |
| 43.5 | 100.00 | 55.59 | 48.19 | 0.00 | 0.00 |
| 44.0 | 100.00 | 60.57 | 53.35 | 0.00 | 0.00 |
| 44.5 | 100.00 | 65.91 | 59.09 | 0.00 | 0.00 |
| 45.0 | 100.00 | 71.14 | 64.85 | 0.00 | 0.00 |
| 45.5 | 100.00 | 76.22 | 70.67 | 0.00 | 0.00 |
| 46.0 | 100.00 | 81.82 | 77.30 | 0.00 | 0.00 |
| 46.5 | 100.00 | 87.79 | 84.55 | .06 | .04 |
| 47.0 | 100.00 | 93.94 | 92.27 | .84 | .61 |
| 47.5 | 100.00 | 98.36 | 97.90 | 5.74 | 4.18 |
| 48.0 | 100.00 | 99.88 | 99.84 | 14.71 | 10.81 |
| 48.5 | 100.00 | 99.99 | 99.99 | 24.33 | 18.06 |
| 49.0 | 100.00 | 100.00 | 100.00 | 32.35 | 24.28 |
| 49.5 | 100.00 | 100.00 | 100.00 | 38.80 | 29.45 |
| 50.0 | 100.00 | 100.00 | 100.00 | 44.10 | 33.86 |
| 50.5 | 100.00 | 100.00 | 100.00 | 48.09 | 37.28 |
| 51.0 | 100.00 | 100.00 | 100.00 | 51.60 | 40.42 |
| 51.5 | 100.00 | 100.00 | 100.00 | 55.00 | 43.54 |
| 52.0 | 100.00 | 100.00 | 100.00 | 57.94 | 46.30 |
| 52.5 | 100.00 | 100.00 | 100.00 | 60.70 | 48.99 |
| 53.0 | 100.00 | 100.00 | 100.00 | 64.14 | 52.47 |
| 53.5 | 100.00 | 100.00 | 100.00 | 68.24 | 56.70 |
| 54.0 | 100.00 | 100.00 | 100.00 | 71.40 | 60.01 |
| 54.5 | 100.00 | 100.00 | 100.00 | 74.06 | 62.91 |
| 55.0 | 100.00 | 100.00 | 100.00 | 76.56 | 65.67 |
| 55.5 | 100.00 | 100.00 | 100.00 | 78.61 | 67.99 |
| 56.0 | 100.00 | 100.00 | 100.00 | 80.26 | 69.93 |
| 56.5 | 100.00 | 100.00 | 100.00 | 81.93 | 71.97 |
| 57.0 | 100.00 | 100.00 | 100.00 | 83.55 | 74.00 |
| 57.5 | 100.00 | 100.00 | 100.00 | 85.46 | 76.44 |
| 58.0 | 100.00 | 100.00 | 100.00 | 86.93 | 78.34 |
| 58.5 | 100.00 | 100.00 | 100.00 | 88.07 | 79.88 |
| 59.0 | 100.00 | 100.00 | 100.00 | 89.30 | 81.60 |
| 59.5 | 100.00 | 100.00 | 100.00 | 90.66 | 83.53 |
| 60.0 | 100.00 | 100.00 | 100.00 | 91.77 | 85.15 |

Table 7 - Estimated escapement (%) of lobsters in the Pugwash area, from traps with wooden laths with three round holes, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 63.5 mm and commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 20.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 20.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 21.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 22.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 23.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 24.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 25.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 26.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 27.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 28.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 29.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 30.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 37.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 37.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 38.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 38.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 39.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 39.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 40.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 40.5 | .02 | 0.00 | 0.00 | -0.00 | -0.00 |
| 41.0 | .06 | 0.00 | 0.00 | -0.00 | -0.00 |
| 41.5 | .25 | 0.00 | 0.00 | -0.00 | -0.00 |
| 42.0 | .68 | 0.00 | 0.00 | -0.00 | -0.00 |
| 42.5 | 2.29 | 0.00 | 0.00 | -0.00 | -0.00 |
| 43.0 | 4.72 | 0.00 | 0.00 | -0.00 | -0.00 |
| 43.5 | 8.03 | 0.00 | 0.00 | -0.00 | -0.00 |
| 44.0 | 11.96 | 0.00 | 0.00 | -0.00 | -0.00 |
| 44.5 | 16.14 | 0.00 | 0.00 | -0.00 | -0.00 |
| 45.0 | 21.28 | 0.00 | 0.00 | -0.00 | -0.00 |
| 45.5 | 29.01 | 0.00 | 0.00 | -0.00 | -0.00 |
| 46.0 | 41.12 | .01 | 0.00 | -0.00 | -0.00 |
| 46.5 | 56.32 | .03 | .02 | -0.00 | -0.00 |
| 47.0 | 71.99 | .13 | .09 | -0.00 | -0.00 |
| 47.5 | 84.55 | .50 | .33 | -0.00 | -0.00 |
| 48.0 | 93.11 | 1.35 | .90 | -0.00 | -0.00 |
| 48.5 | 97.75 | 2.83 | 1.68 | -0.00 | -0.00 |
| 49.0 | 99.53 | 4.62 | 3.10 | -0.00 | -0.00 |
| 49.5 | 99.92 | 6.54 | 4.44 | -0.00 | -0.00 |
| 50.0 | 99.99 | 8.53 | 5.88 | -0.00 | -0.00 |
| 50.5 | 100.00 | 10.60 | 7.41 | -0.00 | -0.00 |
| 51.0 | 100.00 | 12.67 | 8.99 | -0.00 | -0.00 |
| 51.5 | 100.00 | 14.69 | 10.57 | -0.00 | -0.00 |
| 52.0 | 100.00 | 16.61 | 12.12 | 0.00 | -0.00 |
| 52.5 | 100.00 | 18.95 | 14.09 | 0.00 | 0.00 |
| 53.0 | 100.00 | 22.45 | 17.13 | 0.00 | 0.00 |
| 53.5 | 100.00 | 27.28 | 21.39 | 0.00 | 0.00 |
| 54.0 | 100.00 | 32.92 | 26.47 | 0.00 | 0.00 |
| 54.5 | 100.00 | 38.64 | 31.93 | 0.00 | 0.00 |
| 55.0 | 100.00 | 44.73 | 37.53 | 0.00 | 0.00 |
| 55.5 | 100.00 | 50.28 | 42.92 | 0.00 | 0.00 |
| 56.0 | 100.00 | 54.94 | 47.54 | 0.00 | 0.00 |
| 56.5 | 100.00 | 58.84 | 51.53 | 0.00 | 0.00 |
| 57.0 | 100.00 | 62.70 | 55.63 | 0.00 | 0.00 |
| 57.5 | 100.00 | 67.87 | 60.35 | 0.00 | 0.00 |
| 58.0 | 100.00 | 71.84 | 64.74 | 0.00 | 0.00 |
| 58.5 | 100.00 | 74.94 | 69.18 | 0.00 | 0.00 |
| 59.0 | 100.00 | 73.27 | 74.26 | 0.00 | 0.00 |
| 59.5 | 100.00 | 83.65 | 79.50 | .01 | .01 |
| 60.0 | 100.00 | 88.28 | 85.16 | .08 | .06 |

Table 8 - Estimated escapement (%) of lobsters in the Salmon Beach area, from traps with wooden lath spacing, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 65 mm and a commercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 31.0 | 2.32 | 0.00 | 0.00 | -0.00 | 0.00 |
| 31.5 | 3.79 | 0.00 | 0.00 | -0.00 | 0.00 |
| 32.0 | 5.86 | 0.00 | 0.00 | -0.00 | 0.00 |
| 32.5 | 8.83 | 0.00 | 0.00 | -0.00 | 0.00 |
| 33.0 | 13.14 | 0.00 | 0.00 | -0.00 | 0.00 |
| 33.5 | 18.64 | 0.00 | 0.00 | -0.00 | 0.00 |
| 34.0 | 25.05 | 0.00 | 0.00 | -0.00 | 0.00 |
| 34.5 | 32.61 | 0.00 | 0.00 | -0.00 | 0.00 |
| 35.0 | 42.63 | 0.00 | 0.00 | -0.00 | 0.00 |
| 35.5 | 54.31 | 0.00 | 0.00 | -0.00 | 0.00 |
| 36.0 | 66.19 | 0.00 | 0.00 | -0.00 | 0.00 |
| 36.5 | 77.84 | 0.00 | 0.00 | -0.00 | 0.00 |
| 37.0 | 88.35 | .05 | .04 | -0.00 | 0.00 |
| 37.5 | 96.20 | 1.76 | 1.41 | -0.00 | 0.00 |
| 38.0 | 99.77 | 7.65 | 6.18 | -0.00 | 0.00 |
| 38.5 | 100.00 | 17.34 | 14.17 | -0.00 | 0.00 |
| 39.0 | 100.00 | 27.86 | 22.51 | -0.00 | 0.00 |
| 39.5 | 100.00 | 35.54 | 30.03 | -0.00 | 0.00 |
| 40.0 | 100.00 | 42.89 | 36.84 | -0.00 | 0.00 |
| 40.5 | 100.00 | 50.40 | 44.06 | -0.00 | 0.00 |
| 41.0 | 100.00 | 58.14 | 51.73 | -0.00 | 0.00 |
| 41.5 | 100.00 | 65.56 | 59.32 | -0.00 | 0.00 |
| 42.0 | 100.00 | 72.44 | 66.63 | -0.00 | 0.00 |
| 42.5 | 100.00 | 79.06 | 73.92 | -0.00 | 0.00 |
| 43.0 | 100.00 | 84.09 | 79.66 | 0.00 | 0.00 |
| 43.5 | 100.00 | 88.02 | 84.31 | 0.00 | 0.00 |
| 44.0 | 100.00 | 91.11 | 88.07 | 0.00 | 0.00 |

Table 9 - Estimated escapement (%) of lobsters in the Pugwash area, from traps with wooden lath spacing, with the predictive selectivity calculated from the proportionality factors S and $L_{50}$ from Salmon Beach. Legal size of 65 mm and a acommercial market size of 81 mm.

| GAP | % Nb SUBLEG | % Nb CANN | % Wt CANN | % Nb MARK | % Wt MARK |
|---|---|---|---|---|---|
| 31.0 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 31.5 | 0.00 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.0 | .08 | 0.00 | 0.00 | -0.00 | -0.00 |
| 32.5 | .88 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.0 | 2.76 | 0.00 | 0.00 | -0.00 | -0.00 |
| 33.5 | 5.59 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.0 | 8.66 | 0.00 | 0.00 | -0.00 | -0.00 |
| 34.5 | 12.33 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.0 | 18.22 | 0.00 | 0.00 | -0.00 | -0.00 |
| 35.5 | 30.51 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.0 | 44.60 | 0.00 | 0.00 | -0.00 | -0.00 |
| 36.5 | 57.64 | 0.00 | 0.00 | -0.00 | -0.00 |
| 37.0 | 73.37 | .01 | .01 | -0.00 | -0.00 |
| 37.5 | 89.62 | .33 | .23 | -0.00 | -0.00 |
| 38.0 | 99.36 | 1.59 | 1.11 | -0.00 | -0.00 |
| 38.5 | 99.99 | 4.29 | 3.03 | -0.00 | -0.00 |
| 39.0 | 100.00 | 7.32 | 5.27 | -0.00 | -0.00 |
| 39.5 | 100.00 | 10.16 | 7.45 | -0.00 | -0.00 |
| 40.0 | 100.00 | 12.56 | 9.35 | -0.00 | -0.00 |
| 40.5 | 100.00 | 16.05 | 12.27 | -0.00 | -0.00 |
| 41.0 | 100.00 | 21.74 | 17.17 | -0.00 | -0.00 |
| 41.5 | 100.00 | 29.67 | 24.14 | -0.00 | -0.00 |
| 42.0 | 100.00 | 37.92 | 31.65 | -0.00 | -0.00 |
| 42.5 | 100.00 | 46.67 | 39.96 | -0.00 | -0.00 |
| 43.0 | 100.00 | 53.14 | 46.25 | -0.00 | -0.00 |
| 43.5 | 100.00 | 58.18 | 51.39 | 0.00 | 0.00 |
| 44.0 | 100.00 | 63.68 | 57.19 | 0.00 | 0.00 |