Canadian Atlantic Fisheries
Scientific Advisory Committee

CAFSAC Research Document 83/68

Comité scientifique consultatif des
pêches canadiennes dans l'Atlantique

CSCPCA Document de recherche 83/68

STATUS OF SOUTHERN GULF OF ST. LAWRENCE SCALLOP STOCKS - 1982

by

Jean M. Worms and Ghislain Chouinard
Fisheries Research Branch
Department of Fisheries and Oceans
Marine Biology Research Centre
University of Moncton
Moncton, N.B. E1A 3E9

[1] This series documents the scientific basis for fisheries management advice in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the Research Documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research Documents are produced in the official language in which they are provided to the Secretariat by the author.

[1] Cette série documente les bases scientifiques des conseils de gestion des pêches sur la côte atlantique du Canada. Comme telle, elle couvre les problèmes actuels selon les échéanciers voulus et les Documents de recherche qu'elle contient ne doivent pas être considérés comme des énoncés finals sur les sujets traités mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée par les auteurs dans le manuscrit envoyé au secretariat.

ABSTRACT

During the 1982 scallop fishing season, the program of investigation targetted at documenting a starting point for future investigations. A set of experimental surveys and sampling of commercial catches was done throughout the season in lobster districts 7C, 8 and 7bl. Jointly with data from a new log-book, dedicated to scientific use, and landing statistics, good data were obtained giving an overview of the resource, its geographic distribution and condition. Overall results show a weak or fragile resource especially in heavily fished areas. The need for basic research on biological cycles and behaviour appears evident from the study as little is known about such parameters as growth, fecundity, recruitment patterns and their space-time variations.

RESUME

Au cours de la saison de pêche 1982, le programme de travail sur le pétoncle géant avait pour but l'établissement d'un point zéro servant de base aux futures investigations. Une série d'exploration et d'échantillonnages des prises commerciales a été raélisée dans les districts de gestion du homard 7C, 8 et 7bl. Avec les données d'un nouveau carnet de bord à usage exclusivement scientifique et les statistiques de débarquement, nous disposions donc d'un ensemble de données suffisant pour obtenir une image de la répartition géographique de la ressource et de son état. Les résultats globaux montrent des stocks généralement faibles ou fragiles, surtout dans les zones les plus exploitées. Tout au long de l'étude, le besoin s'est fait sentir pour un programme de recherche axé sur les cycles biologiques et le comportement tant les connaissances sont fragmentaires en ce qui concerne des paramètres comme la croissance, la fécondité ou le recrutement et leurs variations spatio-temporelles.

Introduction

Among invertebrate fisheries in the Gulf of St Lawrence, the giant scallop Placopecten magellanicus represents an important income for inshore fishermen, especially in the Southern half of the Gulf (Fig.1). Although far behind snow crab, lobster and shrimp in terms of both landings and landed value this fishery stands as an important resource throughout the Eastern coast of New Brunswick and Northumberland Strait.

Scallop fishing is conducted by vessels 11 to 15 meters in length towing one or two sets of drags (stern or side dragging). Scallops are shucked at sea with only meats being landed in many landing sites scattered along the Southern Gulf coast.

Almost unregulated until 1978, a Scallop Advisory Committee was established to provide advice to management. The type of regulation varies from one fishing district to another but generally includes limited fishing seasons, maximum meat counts (number of meat per half kg) and restrictions on the issue of new licences.

Given the number of active licences and the geographical dispersal of landing sites, management of such a fishery requires a great deal of effort to gather and compile basic data on biology and catch and effort. Considering available data

from previous years (Jamieson 1979, Jamieson et al. 1981a and Jamieson et al.1981b) and information available from earlier work (Dickie & McInnes 1958; Bourne et al. 1965, Bourne & Rowell 1965) we felt it necessary to document our starting point for future investigations. Most of our efforts have been targetted towards providing a global view of fishing effort, relative abundance size structure and distribution of scallop beds in the Southern Gulf.

Materials & Methods

Our sampling program was designed as follows:

1- Sea sampling was performed by summer students on board commercial fishing vessels. The purpose of this sampling was to assess the size structure of commercial catches. Measurements of height of shell (in mm), hinge to outer margin, were done on all the scallops of one bucket for each tow. Selected samples of 50 live scallops were brought back to the laboratory for further detailed biological study. An example of the sampling sheet for recording biological data is given in Appendix 1.

2- Experimental surveys: Twelve areas in lobster districts 7b1, 8 and 7c were explored with commercial fishing boats chartered in each of these areas. (Appendix II). Each survey consisted of a variable number of tows (40 to 110) in order to cover commercial fishing areas and, depending on time available, to conduct exploratory fishing of non exploited zones (Fig. 1A,B and C). A total of 790 tows were done (172 in

district 7b1, 236 in district 8 and 382 in district 7C) using a four gang Digby drag, each bucket 61 cm wide with 7.6 cm diameter rings. Details are given in Appendix III. Two buckets were lined with shrimp net 2 cm stretched mesh size in order to catch the small scallops. All scallops from each tow, including cluckers (dead shells with the two valves still attached thus not previously fished and shucked but died on the bottom) were measured separately for lined and unlined buckets. Bottom types and associated fauna and flora was also recorded (Appendix IV 1,2 and 3). A sample of live scallops and a number of shells were brought back to the laboratory for further biological study and aging. A total of 11,159 scallops were caught and measured during all our surveys. In order to convert number of individuals into weight of meat for each area, we computed an average meat count based on our own sampling and on data forwarded by fishery officers (see Appendix V).

3- Log books: A new log book dedicated to scientific use was designed and discussed with fishermen. Due to printing and distribution delays, many fishermen, especially in district 8 received their log book late in the season. Appendix VI shows the new design of this log book. Jointly with a survey conducted by fishery officers, catch per unit of effort (days and number and size of drags was computed. The estimated number of licensed and active fishermen in 1981 and 1982 is given in Appendix VII.

4- Official statistics: Landing statistics were obtained from statistical coordinators in the three provinces (N.B., N.S. and P.E.I.).

Throughout this paper, we consider 70 mm as the minimum shucking size on commercial fishing boats, although this can vary from one area to the other and from one fisherman to the other. Scallops less than 70 mm length will be called "pre-recruits", i.e. not available for commercial fishing and/or not suitable for marketing. All estimations of catch per unit of effort from our survey data were computed for individuals greater than or equal to 70 mm shell height. One unit of effort is defined as a meter of drag fishing on the bottom for one hour. Catch per unit of effort will be then expressed in kilogramme per meter of drag, per hour on the bottom (kg/m/h). CPUE's were computed for each square where we had enough data available from surveys and/or commercial sampling. We will consider "low" CPUE's less than 1.0 kg/m/h as giving less than 46 kg of meat for a standard 4.6 m dredge fishing for 10 hours on the bottom.

Results

Results are presented area by area for both commercial catches and experimental surveys. Area numbers are quoted as shown on the map (Fig. 1A, B & C).

Area 1 - Belledune/Heron Island (Fig. 2A, 5A, Table 1)

Forty seven(47) experimental tows were done in this area covering 6 squares. Size distribution from survey data show a good range of size between 20 and 145 mm with 22.3% of the catch being prerecruits (L < 70 mm). We have no information on size structure of commercial catches. Mean size of scallops over 70 mm height is 103.8 mm (Table 4). Best squares seem to be #47 for both adults and prerecruits and #48 for adults. CPUE as computed from survey data is low: 0.59 kg/m/h for square 48 and 0.57 kg/m/h for square 47 and consistent with CPUE computed from log books (Table 2 - 0.72 and 0.58 kg/m/h respectively). Most of the scallops were in the depth strata less than 7 fathoms (Table 3).

Area 2 - Nepisiguit/Bathurst (Fig. 2B, 5A, Table 1)

Seven (7) squares were surveyed for a total of 71 tows. Size distribution from survey data range from 15 to 145 mm, with modes at 50, 80 and 120 mm. Mean size of scallops over 70 mm height is 100.01 mm for survey catches and 97.04 mm for commercial catches. Commercial concentrations were found in squares 49, 63,64, 77 and 78. Percentage of prerecruits overall is 28.3 with best concentration in square 63. Commercial data show a similar distribution with modes at 80 and 110 mm. The best CPUE is found in squares 63 (2.03 kg/m/h), 49 (0.89 kg/m/h) and 78 (0.81 kg/m/h). The commercial CPUE

from log books are 0.80 kg/m/h from square 49 and 0.85 kg/h/m for squares 78. Scallops were most abundant in the 7 to 10 fathoms strata. Although more heavily fished than area 1, the scallop resource in this area seems to be in good condition. Renewal of commercial stock should be good over the next few years as percentage of small scallops on the bottom is high.

Area 3 & 4 - Miscou East and West (Fig. 2C and Table 1)

Sixteen (16) squares were surveyed for a total of 96 tows. Size distribution from survey data indicates a good range of sizes between 40 and 135 mm with modes at 70 and 115 mm. We have no data on commercial catches for this area as only one boat made occasional tows west of Miscou Island. Mean size of survey catches excluding prerecruits is 102.76 mm. Percentage of prerecruits in survey catches was very high (up to 56%) especially in squares 61 and 74. In term of CPUE very poor results occur in the Western part (area 3). Best CPUE occurs in square 61 (eastern part, area 4) with 1.01 kg/m/h. A percentage of 84.5 of the catch was made between 10 and 15 fathoms.

Area 5A - Shippagan/Tracadie (Fig. 2D, 5A and Table 1)

One hundred and eleven (111) tows were done in this large area, covering eleven (11) squares. Range of size distribution is 30 to 140 mm from survey catches and 55 to 145 mm from commercial catches with modes at 80 and 120 mm for both and an other mode at 50 mm for survey data. Mean sizes, excluding

prerecruits, are 102.16 mm for survey catches and 97.99 for commercial catches. Prerecruits are most abundant in squares 99 and 100 and account for 35.2% of the survey catches. CPUE's are low all over the area with the best results, 0.64 kg/m/h, in square 99 off Tracadie. According to log books, the commercial CPUE is quite low; however, poor return of log book from this area makes this data unreliable. Most scallops were caught in the 10 to 15 fathoms depth strata.

Area 5B - Miramichi Bay (Fig 2E, 5A and Table 1)

Fifty seven (5 7 tows were made from Tabusintac to Pointe Escuminac. Size distribution ranges from 45 to 140 mm for survey catches and from 70 to 145 mm for commercial catches. Mean size of individuals over 70 mm is 108.8 mm and 125.50 mm respectively. Percentage of prerecruits is 11.3% in survey catches. CPUE is low with a maximum of 0.88 kg/m/h in square 130. Average CPUE from log book is 0.66 kg/m/h. Most catches were done in the 10 to 15 fathoms strata.

Area 6 - Richibucto (Fig 3A, 5B and Table 5)

Forty nine (49) tows were performed during the survey of this area. Range of size for survey catches and commercial catches is 30 to 140 mm and 40 to 140 mm respectively. A high percentage of prerecruits, ranging between 30 and 70 mm, was found in survey catches (45.6%). The large number of prerecuits

found in commercial catches confirm this point. Maximum CPUE from survey data is 0.93 kg/m/h in square 147. CPUE as computed from log book data are high at 1.85 kg/m/h giving estimated fishing performance of 66 kg and 85 kg for standard drags of 3.56 m and 4.60 m respectively. Most scallops (97.04%) were caught in the 10 to 15 fathoms depth strata.

Area 7 - Miminegash (Fig 3B, 5B and Table 5)

Thirteen (13) squares were surveyed fro a total of 43 tows. Size distribution ranges from 50 to 140 mm for both survey and commercial catches. Mean size for scallops over 70 mm is 105.83 mm and 101.45 mm respectively. Percentage of prerecruits is low (11.5%). During our survey, maximum CPUE value was found in sqares 162 (1.09 kg/m/h) and 156 (0.98 kg/m/h). CPUE as computed from log books are 1.53 and 1.20 kg/m/h respectively, A percentage of 36% of the scallops were caught in the 15 to 17 fathoms depth strata and almost 10% over 17 fathoms.

Area 8 - Egmont Bay (Fig. 3D, 5B and Table 5)

Forty three(43) tows were done in this area including Egmont Bay and south of Cape Egmont. Size distribution ranges from 30 to 125 mm and 50 to 135 mm for survey and commercial catches respectively. Overall, prerecruits accounts for only 9.4% of survey catches. The highest CPUE is found in squares 177 (1.14 kg/m/h) and 191 (0.97 kg/m/h). Average CPUE as computed from logbooks for this area is 1.50 kg/m/h. Catches according to depth strata show that scallops are more or less evenly distributed between 5 and 15 fathoms.

Area 9 - Buctouche (Fig. 3C, 5B and Table 5)

Fifty two (52) tows were done in this area where no commercial sampling was done as nobody is fishing in this area. Size of survey catches range from 30 to 135 mm with a mean size of 96.36 mm. Percentage of prerecruits was low at 12.6% ranging mainly from 50 to 70 mm height with very few individuals between 30 and 50 mm. Only a small spot in square 176 shows good results with a CPUE of 1.04 kg/m/h (concern 3 tows). Overall CPUE is very low at 0.25 kg/m/h. Only four (4) log book records concern this area and they come from a boat fishing from Cape Egmont on a bed located in squares 170 and 176 (Fig. 5). Most scallops (65.6%) were fished in the 10 to 15 fathoms strata.

Area 10 - Cape Tormentine/Borden (Fig. 3E, 5B and Table 5)

A 49 tow survey was done in this area. Size distribution ranges from 50 to 130 mm for survey data and from 55 to 120 mm from commercial data. Both distributions look the same with a single mode at 85 mm. Percentage of prerecruits is the lowest observed in all our surveys with only 7% of individuals less than 70 mm height. Average size of individual over 70 mm height was 91.95 mm for survey catches and 91.50 mm for commercial catches. Best CPUE from survey data was found in squares 228 (1.34 kg/m/h) and 243 (1.03 kg/m/h). Higher values were computed from log books but returns from this area were poor

except for square 227 (59 records) where CPUE reached 1.78 kg/m/h. Survey catches were evenly distributed between 7 and 15 fathoms.

Area 11 - Pugwash/Wallace

No information is available as we did not succeed in chartering a vessel in this zone where little commercial fishing is done.

Area 12 - Pictou/Woods Island (Fig. 4A, 5C and Table 6)

Seventy-nine (79) tows were done during our survey in the most heavily fished area in lobster district 7b1. Sizes range from 15 to 135 mm for survey catches and from 35 to 140 mm for commercial catches with a main mode at 90 mm for both distributions. Mean sizes are 93.96 mm for survey catches and 97.60 mm for commercial catches. Overall percentage of prerecruits in survey catches is 18.3% ranging from 15 to 70 mm. CPUE from survey data is high in square 305 (1.72 kg/m/h) and good in squares 285 (1.04 kg/m/h) and 306 (1.00 kg/m/h). According to log records, CPUE is 1.38 kg/m/h in square 305 and 1.61 kg/m/h in square 306. Most catches were done in the 10 to 15 fathoms depth strata.

Area 13 - St George's Bay (Fig 4C, 5C and Table 6)

Fifty one (51) tows were done in this area for which we have no commercial sampling. The size distribution for commercial catches shows a good range from 40 to 130 mm with a main

mode at 95 mm. Mean size of individuals greater then 70 mm is 91.27. Overall, prerecruits accounts for 13.8% of the catches. Best CPUE was found in squares 294 (1.91 kg/m/h) and 312 (1.44 kg/m/h). Average CPUE from the 19 log records received from this area is 1.10 kg/m/h. Most catches were done in the 10 to 15 fathoms strata (46.1%) with a good consistant amount in the 15 to 17 (28.1%) and over 17 fathoms (9.8%) stratum.

Area 14 - Souris/Montague (Fig 4B, 5C and Table 6)

Size structure from the 42 tows survey indicates a good range of size between 20 and 140 mm for survey catches and between 60 and 140 mm for commercial catches. Mean sizes were 95.91 mm for survey catches and 106.76 mm for commercial catches. A percentage of 26.2 of survey catches were prerecruits ranging mainly from 25 to 70 mm. Best CPUE value was found in square 251 with 1.55 kg/m/h. We did not receive any log return from this area. More than 86% of catches was done in the 10 to 15 fathoms depth strata.

Landing statistics

Historical values (Jamieson 1981a) were used for years 1976-1980. Conversion of round weight to meat weight, Jamieson (ibid) used a conversion factor of 8.3. According to our observations, the conversion factor is highly variable between areas and possibly between seasons. By using our biological samples from several months, we calculated an average ratio of 11.2 for lobster district 7b1 and 9.3 for lobster district 8.

We recalculated Jamieson's data with these conversion factors and the following table gives results of this calculation.

	1976	1977	1978	1979	1980	1981	1982
7b1	88.3	44.8	60.1	70.2	63.9	96.5	86.8
8	194.5	104.1	153.2	109.6	89.1	139.9	106.0

Since district 7C had not been studied in previous years, and we did not have historical landings, we did not make any calculations for this district.

Data are expressed in metric tons of meat. It is hard to draw any conclusion from these figures for several reasons:

- the great number of landing sites makes difficult an efficient data collection;
- landing statistics are drawn from sale slips, i.e. what the fisherman sells to fish plants. A variable percentage of catches is sold out of the system to restaurants, tourists or relatives and thus not recorded.

One must be careful when using figures which are underestimated.

It must also be noted that fishing effort (number of days fished per active licence) will be highly variable from year to year. Most fishermen hold several licences and when prices are not good for one species, they will turn to another. If prices are high, many of what is called "back-pocket licences",

which are rarely fished, will be. Weather conditions are also very important as scallop fishing is impossible when winds over 25/30 knots occur and many fishing days are lost because of rough weather conditions.

Discussion

From the results, it appears that all areas surveyed are different in terms of resource availability and structure.

In some of these areas (Area 9- Buctouche; Area 11- Pugwash/ Wallace) fishing pressure is very light if not nil as just a few boats fish there occasionally. These areas did not show any major commercial beds and we cannot foresee any commercial exploitation of giant scallops in the future.

Several areas hold small but healthy beds: Area 1- Belledune/Heron Island and Area 2- Nepisiguit/Bathurst in lobster district 7C, Area 13- St George's Bay in lobster district 7b1. These areas, if fished by only a few boats, should be able to support stable level of exploitation for the next years. Recruitment, as drawn from percentages of prerecruits, seems to be stable.

Area 5- Richibucto (district 8) and area 14- Souris/ Montague (district 7b1) although more heavily fished than the above mentionned areas it offers good outlooks for the next ten years as percentages of prerecruits are high. Even if CPUE are not outstanding, except in some small areas, abundance of prerecruits should ensure the stability of stocks for the next few years if the level of exploitation does not increase.

Our numerical results for Area 3-4- Miscou east and west must be considered minimum estimates. Most of our experimental fishing was done in the 7 to 15 fathoms depth stratum. It is likely that we missed some of the main commercial concentrations as discussions with fishermen tend to prove that scallops range much deeper in Miscou east than in other parts of the Southern Gulf.

Shippagan/Tracadie area (area 5A) is the most heavily fished area in district 7C. Even if CPUE's are low, high percentage of prerecruits should ensure a stable renewal of beds. But lack of historical data makes it difficult to project any conclusion. A conservative approach should be followed to avoid mistakes.

Area 5B - Miramichi Bay seems to be a good example of a declining area. Most of the beds are composed mainly of old scallops with very few prerecruits. Thus renewal of beds is somewhat uncertain. As for areas 3, 4 and 5A, exploration of waters deeper than 17 fathoms could bring about some new beds.

Area 7 - Miminegash and 8 - Egmont Bay show good commercial CPUE's but low percentage of prerecruits. This lack of prerecruits is worrying and the future of the commercial fishery in these areas could be compromised if no recruitment occurs during the next few years.

The case of Area 10 - Cape Tormentine/Borden is the most complex. Both experimental survey and commercial sea sampling gave the same image of the population: an almost unimodal structure with a low mean size and a very low abundance of prerecruits and larger sizes. But CPUE computed from both log books and survey data are much higher than in most other areas. One can only make assumptions to explain this situation. It is likely that a high level recruitment took place in the mid seventies building up a strong and healthy stock. In the mean time, the number of active licences fishing on this area stayed at a high level. For unknown reasons, recruitment suddenly collapsed and the rate of stock renewal became very low. However fishing pressure has remained the same and the stock was slowly fished up with a decrease of catches and average size from year to year. Our results are quite difficult to compare with those of Jamieson et al. (1981b) as this author do not give too much information on size (or age) structure of populations from either survey or commercial catches. From their Figure 11, it appears that 70% of scallops landed in the central Northumberland Strait were aged 3 to 6 years. This (based on 437 scallops) will correspond, according to the growth curve given by Jamieson (1979) to a size range between 65 and 90 mm and will be consistent with our own results (based on 5074 scallops).

Another type of problem can be addressed when considering Area 12- Pictou/Wood Island. As above mentioned, this area shows a good range of sizes for either prerecruits and commercial sized scallops, but the overlapping of distribution areas for both size groups is disturbing as fishermen, while dragging, may destroy a lot of small scallops on the bottom. Meanwhile, even commercial drags catch a certain amount of small scallops, despite the diameter of the rings (and thus the theoretical selectivity). Even if these small scallops are not shucked but discarded at sea, it is likely that some of them die before reaching the bottom, so future recruitment could be badly compromised.

It should be noted that boats and gears did not change much in past years. The main improvement to the fishing efficiency is the use of sophisticated navigation equipment. The Loran-C navigation system gives fishermen a precise means of relocating a good bed, much better than the buoys formerly used. It is obvious that the wide use of such a system increases the fishing efficiency. Although it seems difficult to include this parameter in the unit of effort, anyone working on scallops should keep this fact in mind.

Comparisons between CPUE calculated from log books and from experimental surveys must be considered with care. While fishing, fishermen always target at optimizing the efficiency of their drag, i.e. obtaining best yield, by fishing only on

beds with sufficient densities. During our surveys, we aimed at giving an idea of the distribution of beds as well as of their relative importance and density. CPUE as computed from surveys will then be more or less underestimated when compared to commercial CPUE which can be considered as maximum. On the other hand, poor log returns from some areas make calculations of CPUE unreliable and some results must be considered as only rough approximations.

Conclusion

The setting up of the new Gulf Region brought the opportunity of concentrating more effort than ever on the main Gulf fisheries. The relative importance of the Southern Gulf scallop fishery is small compared to George's Bank and the Bay of Fundy, however, it is important to obtain a good image of the resource in order to be able to provide management advice.

A review of the existing literature shows that very little is known on the life cycle of the giant scallop in the Gulf. Due to the geographical situation of the Gulf of St Lawrence, species inhabiting the Gulf waters experience very peculiar conditions in terms of environmental factors. Thus, it seems difficult to extrapolate all results from other works on Placopecten from George's Bank or the Digby area.

Throughout the 1982 season, we have tried to establish a starting point in order to give a precise image of the condition of stock(s) in the Southern Gulf. Most of our data have not been processed yet. To take a single example, it is unrealistic to work with size structures on a species with a low growth rate and a long life span. Ageing of samples of scallop should allow us to work in terms of age structure.

The extent of the area of interest makes it difficult to have a consistent sampling all over. Travelling time and weather conditions are the main problems. Considering all this and the lack of basic biological data, it is quite unrealistic to expect to give accurate and detailed advice on stock status, exploitation rates, etc... This year's results and discussions with fishermen tend to show that the scallop resource in the Southern Gulf does not appear to be in very good condition. Some areas are more worrying than others especially in terms of available prerecruits, for example see Cape Tormentine area. Figures 5A, B, and C show prerecruit concentrations.

It is difficult by now to tell if the Southern Gulf scallop fishery is based on a single stock or on several more or less isolated populations. Examination of various parameters (meat counts, average size of catches during surveys, ratio total weight/meat weight) suggest the existence of four distinct geographical sub units:

Unit 1 - areas 1 to 3

Unit 2 - areas 4 to 7

Unit 3 - areas 8 to 12 (at least western part)

Unit 4 - areas 13 and 14

Movement of water masses and presence of gyres in the strait (Lauzier 1965) could partly explain the isolation of those areas.

It will be possible, after a complete study of biological and environmental parameters to verify this pattern.

This makes it very important to carry out a long term study on the biological cycle of Placopecten in the Gulf and to have a much more precise idea of environmental parameters, especially temperature, salinity and current patterns.

We plan to start a long term program of biological investigations mainly concentrated on:

1- Growth and age: on the basis of a systematic sampling of individuals on a yearly cycle, analysis of size structure and age reading on shells will allow the establishment of an age/length key. It will be necessary to determine the most suitable growth model for Placopecten (e.g. Von Bertalanffy, Gompertz...) and calculate parameters of the growth curve in each area.

Age reading could be done by direct reading of shell rings, hinge ligament or in some cases by more sophisticated

techniques. First trials with acetate peels did not give good results. It will be interesting to deal with problems of relative growth in order to explain differences in meat weight and size for the same size of shell between areas.

2- Sexual cycle: precise determination of spawning periods, individual fecundity and gonadal cycle will allow us to anticipate the potential of recovery of stocks. Histological techniques and computation of gonado-somatic index (G.S.I.) will be used as well.

3- Recruitment: it is one of the most important aspects of the biology of exploited stocks, but the most difficult to assess. As far as we know, larval drifting is dependent mainly upon movements of water masses. That makes it difficult to obtain a good understanding of the recruitment pattern as we have no precise knowledge of current patterns in the Southern Gulf, especially in the Northumberland Strait.

Due to the constant presence of fishing boats, it is difficult to plan on extensive use of larvae collectors. Also it is a very time consuming method whose success highly depends upon larval density. This method could however, be used on a very limited scale in restricted unfished areas. Plankton netting raises the same kind of problems and cannot be used except on very peculiar occasions.

Enzymatic genetic techniques could be of help in stock discrimiation by looking for genetical affinities between more or less scattered beds. Identification of genetic markers present in both larvae and adults would give valuable information on possible relationships between populations through larval drifting.

4- Mortality: besides estimating fishing mortality, assessment of natural mortality according to age will be essential. This includes predation and possible emigration to non-fishable grounds.

5- Behaviour on the bottom: use of an underwater video camera mounted on a sled will allow assessment of behaviour of scallops towards gear and, on the other hand, to estimate density on the bottom and percent of individuals escaping the drag. The main advantages of video are the possibility of real time surface monitoring and recording and covering wide areas in a minimum of time.

Besides starting this long term program, we will carry on routine sampling and surveys in order to assess stock(s) condition and its change.

References

BOURNE, N., T.W. Rowell 1965. Gulf of St Lawrence scallop survey, 1963. Fish. Res. Bd. Canada Ms rept. (Biol.) 808, 25pp

BOURNE, N., E.I. Lord & A.R. McIver, 1965. Gulf of St Lawrence scallop survey - 1961. Manuscr. Rep. Ser. (Biol.) Fish. Res. Board Can. (807): 52p.

DICKIE, L.M. & C.D. McInnes, 1958. Gulf of St Lawrence scallop explorations 1957. J. Fish. Res. Bd. Canada. Ms. Rept.(Biol.) #650, 62pp.

JAMIESON, G.S. 1979. Status and assessment of Northumberland strait scallop stocks. Fish. Mar. Ser. Tech. Rept. 904, 34pp.

JAMIESON, G.S., N.B. Witherspoon & M.J. Lundy 1981**a**. Assessment of Northumberland Strait scallop stocks-1980. Can. Tech. Rept. Fish. Aquat. Sci. Nr 1017, 44pp.

JAMIESON, G.S., G. Robert & M.J. Lundy, 1981b. Assessment of Northumberland Strait scallop stocks. 1981. CAFSAC Research Document 81/72.

LAUZIER, L. 1965. Drift bottle observations in Northumberland Strait, Gulf of St. Lawrence. J. Fish. Res. Board Can. 22: 353-368.

Table 1 - Summary of results obtained from surveys in District 7C.

AREA	Number of the best square	Total # of tows (in best square)	Duration (min)	Number of individuals			% of individuals <70 mm			% of cluckers	CPUE		Estimated fishing performance			
				Lined	Unlined	Total	Lined	Unlined	Total		kg/m/h	lb/ft/h	kg/3.56m/10h	kg/4.60 m/10h	lb/12ft/10h	lb/15ft/10h
Belledune		47	380	389	247	636	36.6	2.4	22.3	5.4	0.50	0.34	17.71	22.73	39.28	50.44
	(49)	(4)	32	59	27	86	50.8	-	34.9	7.5	0.68	0.45	24.04	30.86	52.98	68.04
Nespisiquit		71	564	982	572	1554	41.9	5.4	28.3	7.3	0.76	0.51	27.07	34.74	59.62	76.57
	(63)	(6)	48	337	143	480	61.1	15.3	47.3	8.8	2.03	1.36	72.17	92.64	158.97	204.15
Miscou		96	771	725	256	981	59.7	21.5	50.2	2.6	0.34	0.23	12.03	15.44	26.36	33.86
	(61)	(3)	24	191	23	214	85.3	21.7	78.5	2.3	1.01	0.68	36.09	46.33	79.81	102.50
Shippagan		111	1040	880	466	1346	49.7	7.8	35.2	0.5	0.49	0.33	17.27	22.18	38.32	49.21
	(99)	(23)	224	291	116	407	53.3	6.0	39.8	-	0.64	0.43	22.61	29.03	50.15	64.41
Miramichi Bay		57	445	241	222	463	18.7	3.6	12.7	1.3	0.50	0.34	17.85	22.92	39.45	50.67
	(130)	(12)	92	90	81	171	22.2	3 7	13.4	1.2	0.88	0.60	31.46	40.39	69.78	89.62
TOTAL		382	3200	3217	1763	4980										

Table 2 - Commercial CPUE computed from log books in the Southern Gulf.

Area number	Square no.	No. of log sheets	CPUE (kg/hr/m)
1	47	12	0.58
	48	32	0.72
	Total	44	0.69
2	49	11	0.80
	78	18	0.85
	Total	95	0.90
3	Total	6	1.71
4	-	-	-
5	99	15	0.30
	113	19	1.44
	Total	118	0.66*
6	147	39	1.35
	154	44	1.17
	Total	162	1.26
7	156	63	1.21
	162	11	1.53
	Total	208	1.34
8	Total	35	1.50
9	Total	4	1.85
10	227	59	1.78
	243	5	1.83
	Total	76	1.70
11	Total	6	1.29
12	305	42	1.38
	306	22	1.61
	Total	262	1.34
13	Total	19	1.10

* CPUE does not include scallop roe which was also landed in this area.

Table 3 - Relative abundance of scallops in each depth strata as % of total catch of each area of survey.

	<7Fa	7<D<10	10<D<15	15<D<17	>17Fa
Belledune	60.22	32.55	7.23		
Nespisiguit	16.93	66.67	16.41		
Miscou	1.03	14.52	84.45		
Shippagan	-	6.63	91.81	1.56	
Miramichi	-	3.90	96.10		
Richibucto	-	2.78	97.04	0.19	
Miminegash	0.24	-	53.94	36.04	9.79
Egmont Bay	31.44	20.8	47.75		
Buctouche	1.69	32.68	65.63		
Cape Tormentine	1.00	40.72	58.87		
Pictou	19.85	18.19	59.37	-	2.59
George's Bay	9.79	6.22	46.08	28.11	9.79
Souris/Montague	-	10.95	86.54	2.51	

Table 4 - Mean size of scallops in each area studied.

AREA	MEAN HEIGHT (mm)			
	All individuals		Individuals > 70 mm	
	Commercial data	Survey data	Commercial data	Survey data
Belledune	-	91.97	-	103.80
Nespisiguit	91.38	87.29	97.04	100.01
Miscou	-	80.71	-	102.75
Shippagan	91.33	87.05	97.99	102.16
Miramichi Bay	121.66	103.40	122.54	108.75
Richibucto	93.72	78.76	102.48	94.69
Miminegash	99.27	100.91	101.45	105.83
Egmont Bay	92.80	90.52	94.66	94.26
Bouctouche	-	91.69	-	96.36
Cape Tormentine	90.75	89.73	91.50	91.95
Pictou	95.53	86.65	97.60	93.96
George's Bay	-	89.63	-	91.27
Souris/Montague	106.10	82.89	106.76	95.91

Table 5 - Summary of results obtained from surveys in District 8.

AREA	Number of the best square	Total # of tows (in best square)	Duration (min)	Number of individuals			% of individuals <70 mm			% of cluckers	CPUE		Estimated fishing performance			
				Lined	Unlined	Total	Lined	Unlined	Total		kg/m/h	lb/ft/h	kg/3.56m/10h	kg/4.60 m/10h	lb/12ft/10h	lb/15ft/10h
Richibucto		49	431	381	160	540	54.5	25.5	35.2	5.3	0.35	0.24	12.53	16.10	27.67	35.54
	147	(5)	49	141	42	183	58.9	31.0	52.5	1.1	0.93	0.63	33.15	42.55	73.09	93.87
Miminegash		43	392	194	197	391	18.6	5.1	11.5	0.5	0.48	0.32	17.22	22.10	37.84	48.60
	162	(3)	28	33	29	62	18.2	-	9.7	-	1.09	0.74	38.94	50.01	86.29	110.82
Egmont Bay		43	336	328	340	668	15.9	3.2	9.4	16.0	0.62	0.42	22.18	28.47	49.12	63.08
	177	(9)	79	125	165	290	22.4	3.0	11.4	28.8	1.14	0.77	40.73	52.28	89.78	115.30
Bouctouche		52	461	183	172	355	18.6	5.8	12.4	31.0	0.25	0.17	9.08	11.65	20.01	25.70
	170	(3)	25	48	34	82	20.8	11.8	17.1	20.4	1.04	0.70	37.20	47.75	82.01	105.32
Cape Tormentine		49	453	533	443	976	10.1	4.1	7.0	16.0	0.65	0.44	23.24	29.83	51.18	65.72
	228	(2)	20	59	40	99	25.4	5.0	17.0	2.9	1.34	0.90	47.54	61.02	104.68	134.44
TOTAL		236	2073	1619	1312	2930										

Table 6 - Summary of results obtained from surveys in District 7bl.

AREA	Number of the best square	Total # of tows (in best square)	Duration (min)	Number of individuals			% of individuals <70 mm			% of cluckers	CPUE		Estimated fishing performance			
				Lined	Unlined	Total	Lined	Unlined	Total		kg/m/h	lb/ft/h	kg/3.56m/10h	kg/4.66 m/10h	lb/12ft/10h	lb/15ft/10h
Pictou		79	633	794	827	1621	28.0	8.6	18.3	11.4	0.66	0.45	23.63	30.34	52.07	66.87
	305	(13)	104	296	370	666	29.1	11.2	19.5	6.5	1.72	1.16	61.29	78.68	135.13	173.54
George's Bay		51	482	466	402	868	23.2	3.2	14.2	4.5	0.44	0.30	15.66	20.11	34.69	44.55
	294	(4)	33	158	109	268	21.5	10.1	16.9	2.9	1.91	1.29	68.00	87.86	154.80	193.50
Souris/		42	340	436	324	760	36.4	9.6	23.8	4.6	0.57	0.38	20.38	26.16	44.89	57.65
Montague	251	(8)	64	285	158	443	42.1	13.9	33.2	3.7	1.55	1.04	55.35	71.05	121.91	156.56
TOTAL		172	1455	1696	1533	3249										

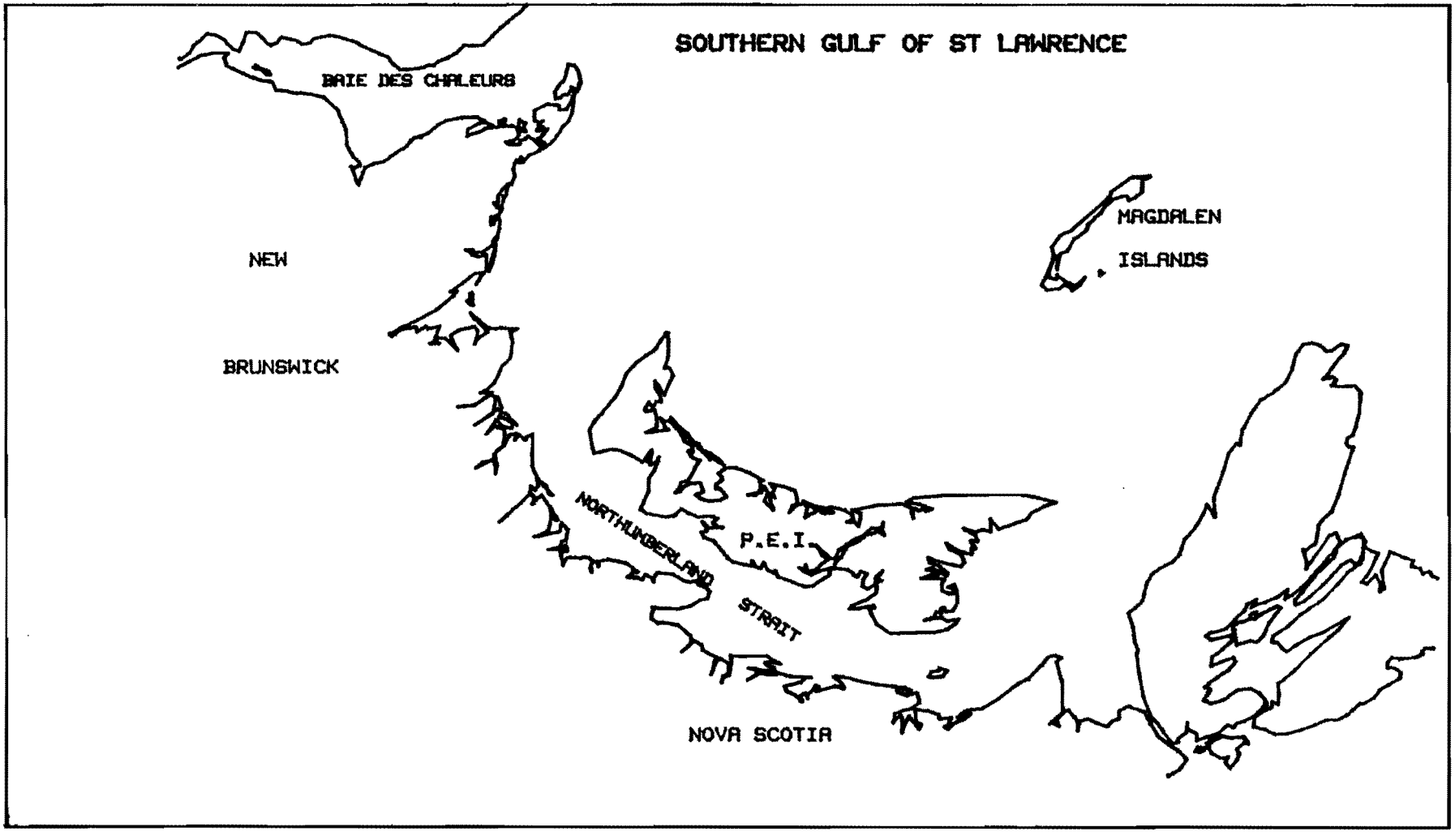


Fig.1 - Map of the Southern Gulf of St Lawrence.

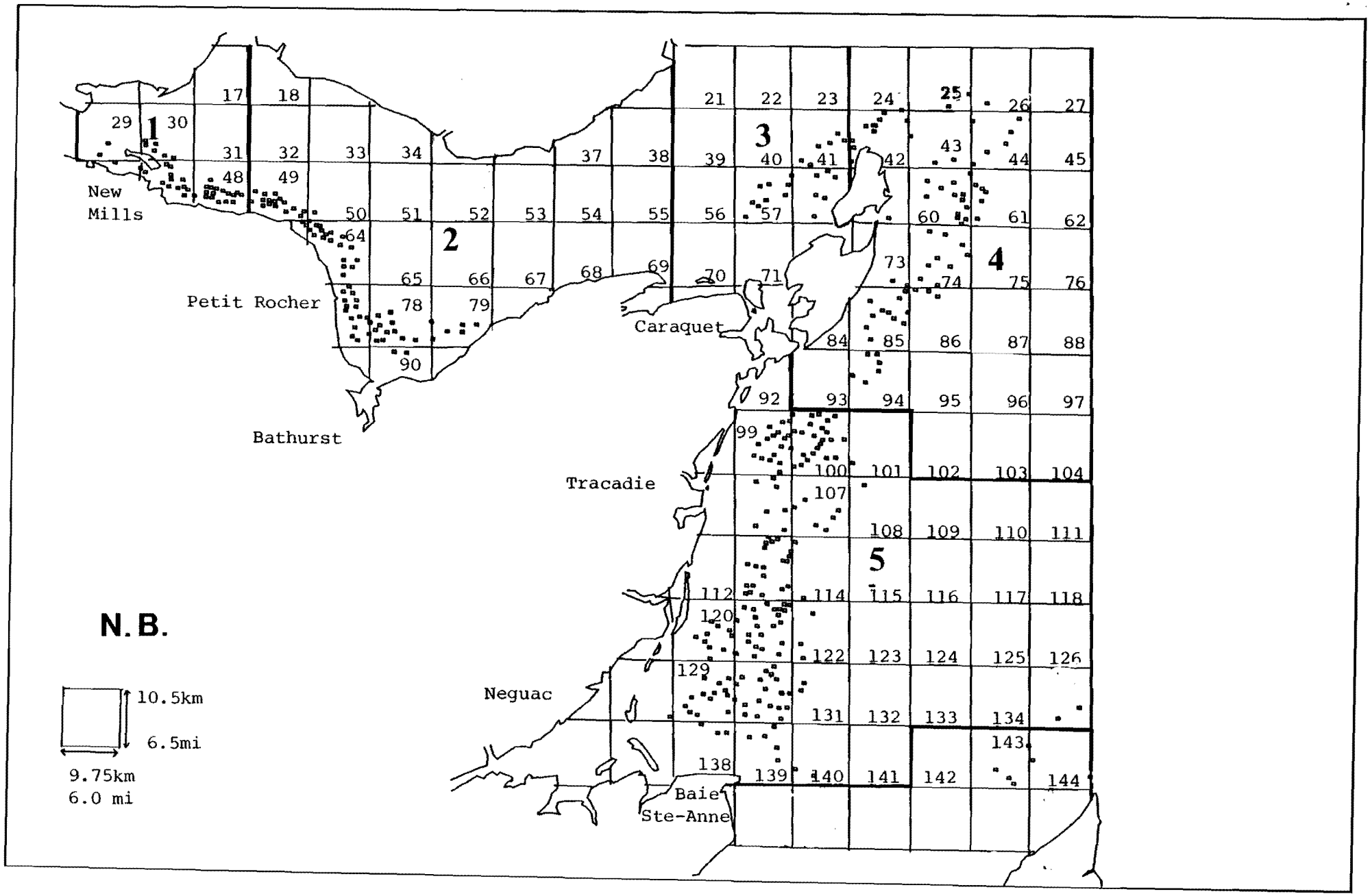


Fig. 1A - Survey stations in areas surveyed in district 7C. Large numbers correspond to areas cited in the text.

▫ Survey stations

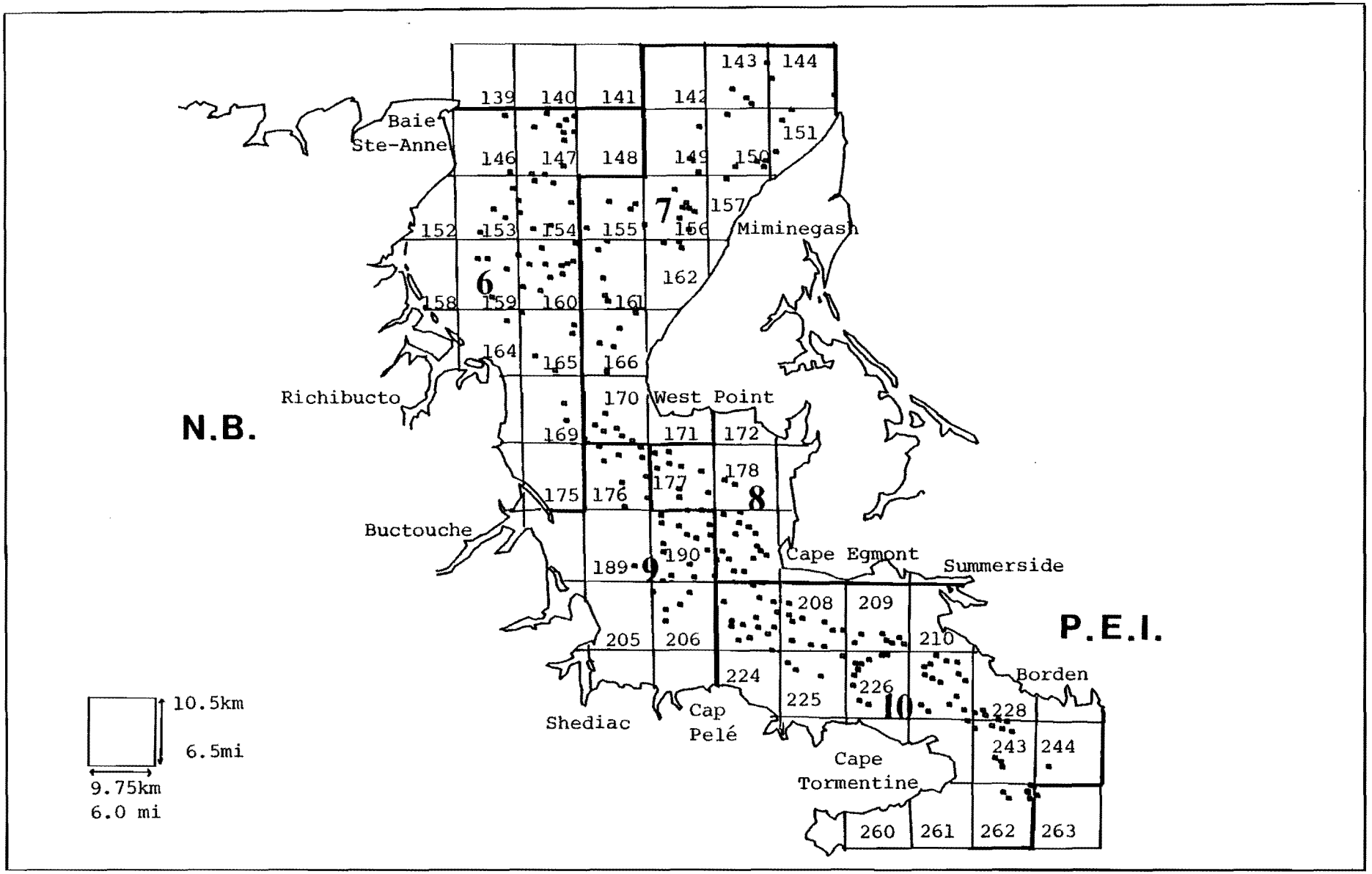


Fig. 1B - Survey stations in areas surveyed in district 8. Large numbers correspond to areas cited in the text.

▪ Survey stations

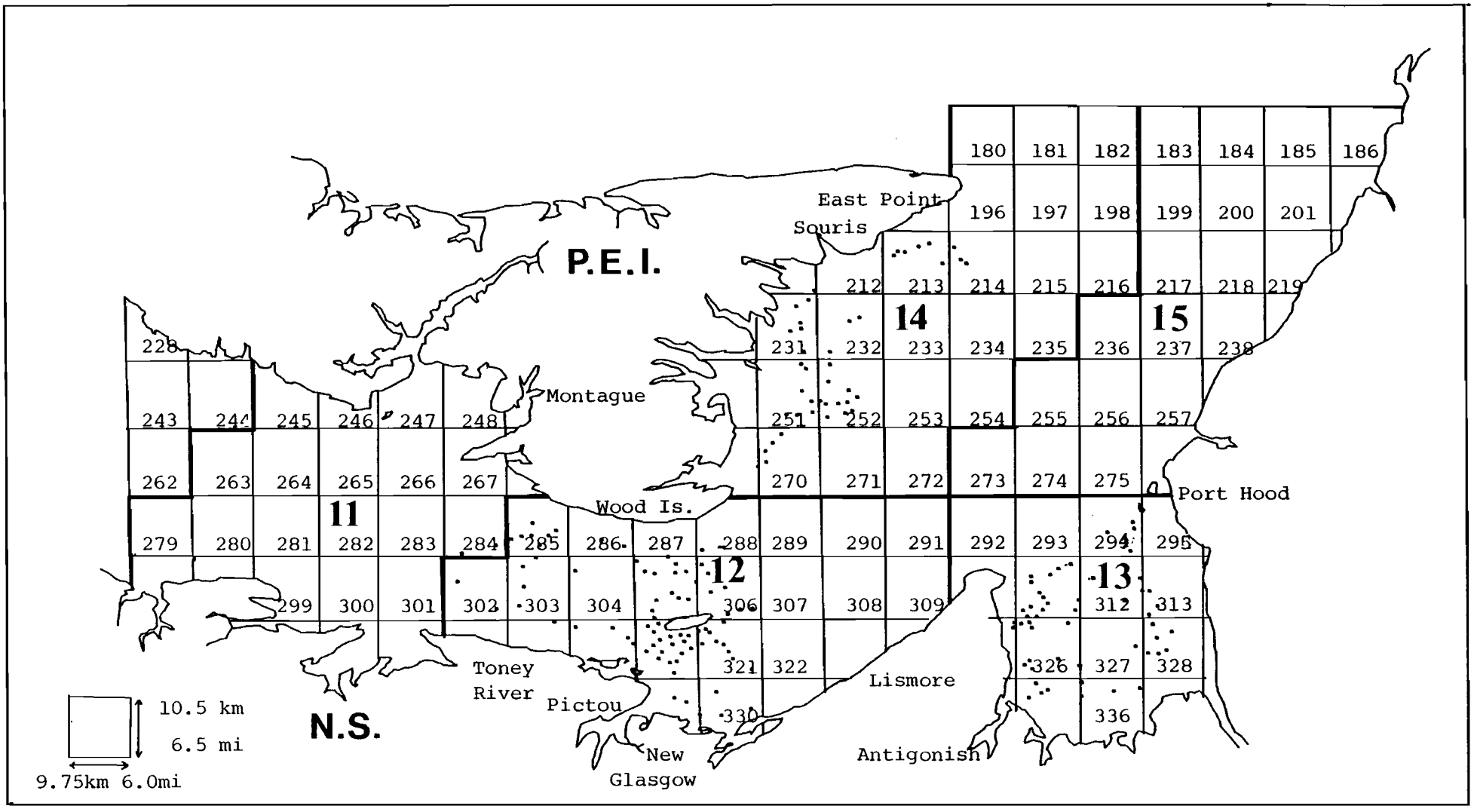


Fig. 1C - Survey stations in areas surveyed in district 7b1. Large numbers correspond to areas cited in the text.

• Survey stations

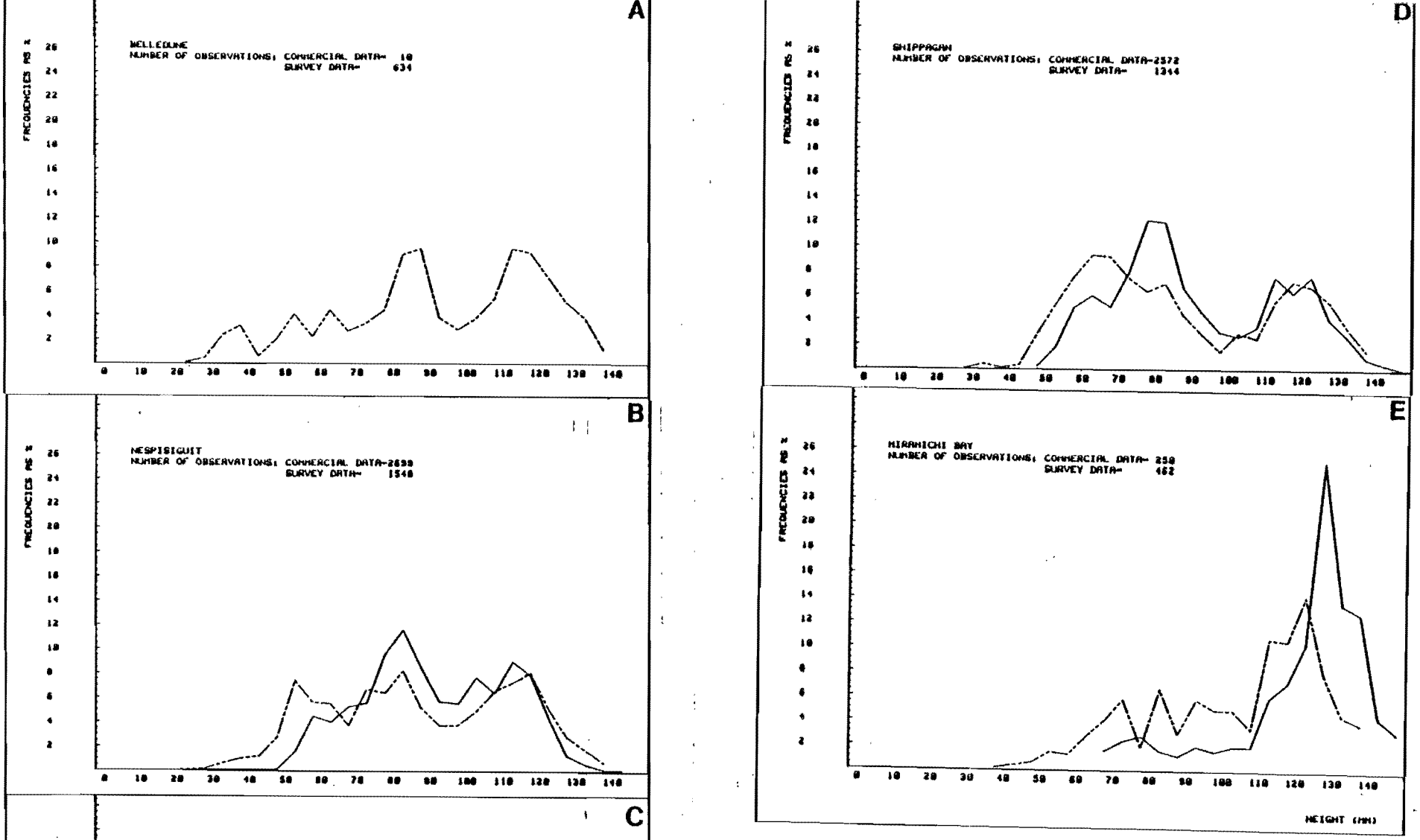


Fig. 2 - Relative size frequency distributions in areas of District 7C

_____ commercial catches

_ _ _ _ survey data

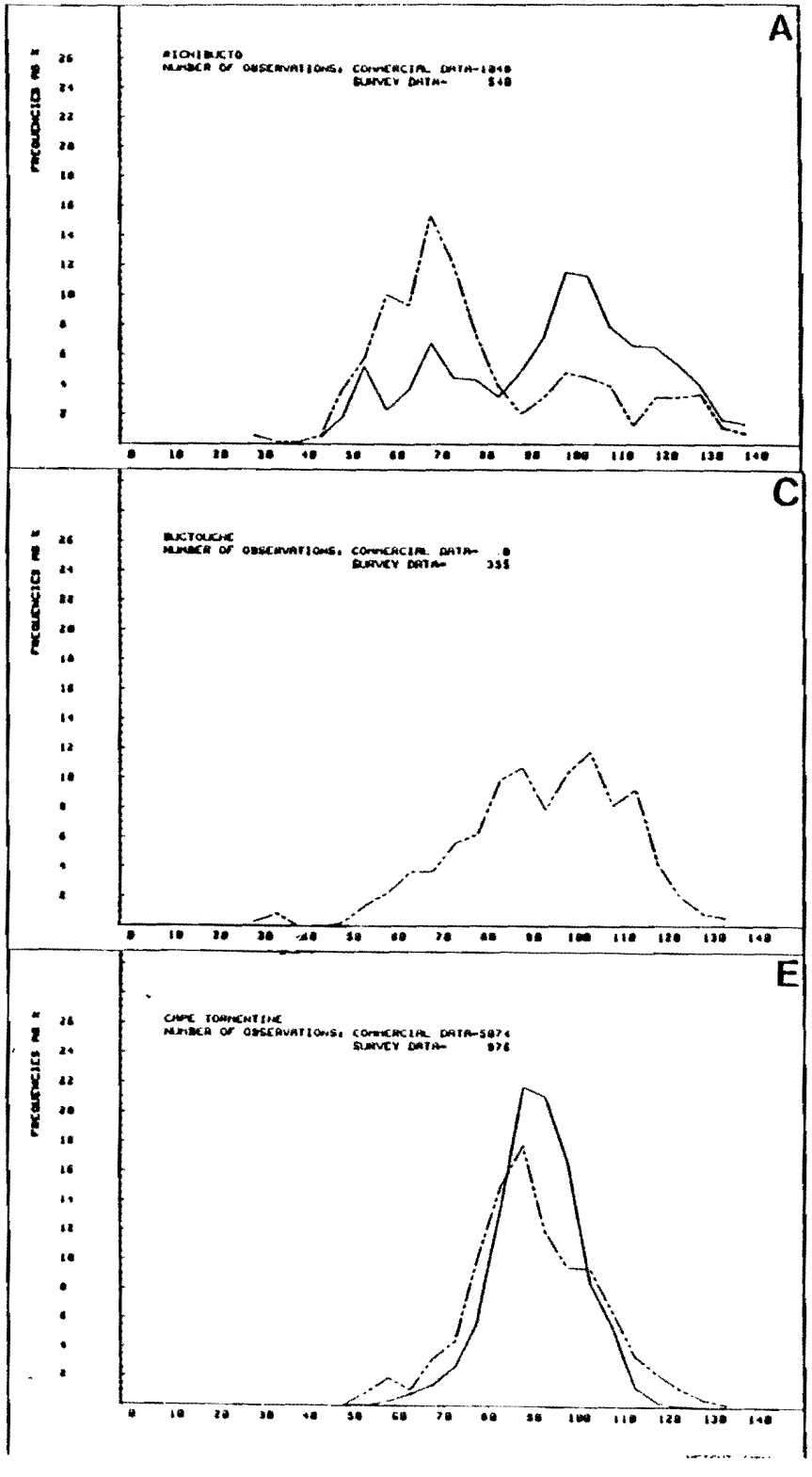


Fig. 3 - Relative size frequency distributions in areas of District 8.

commercial catches

survey data

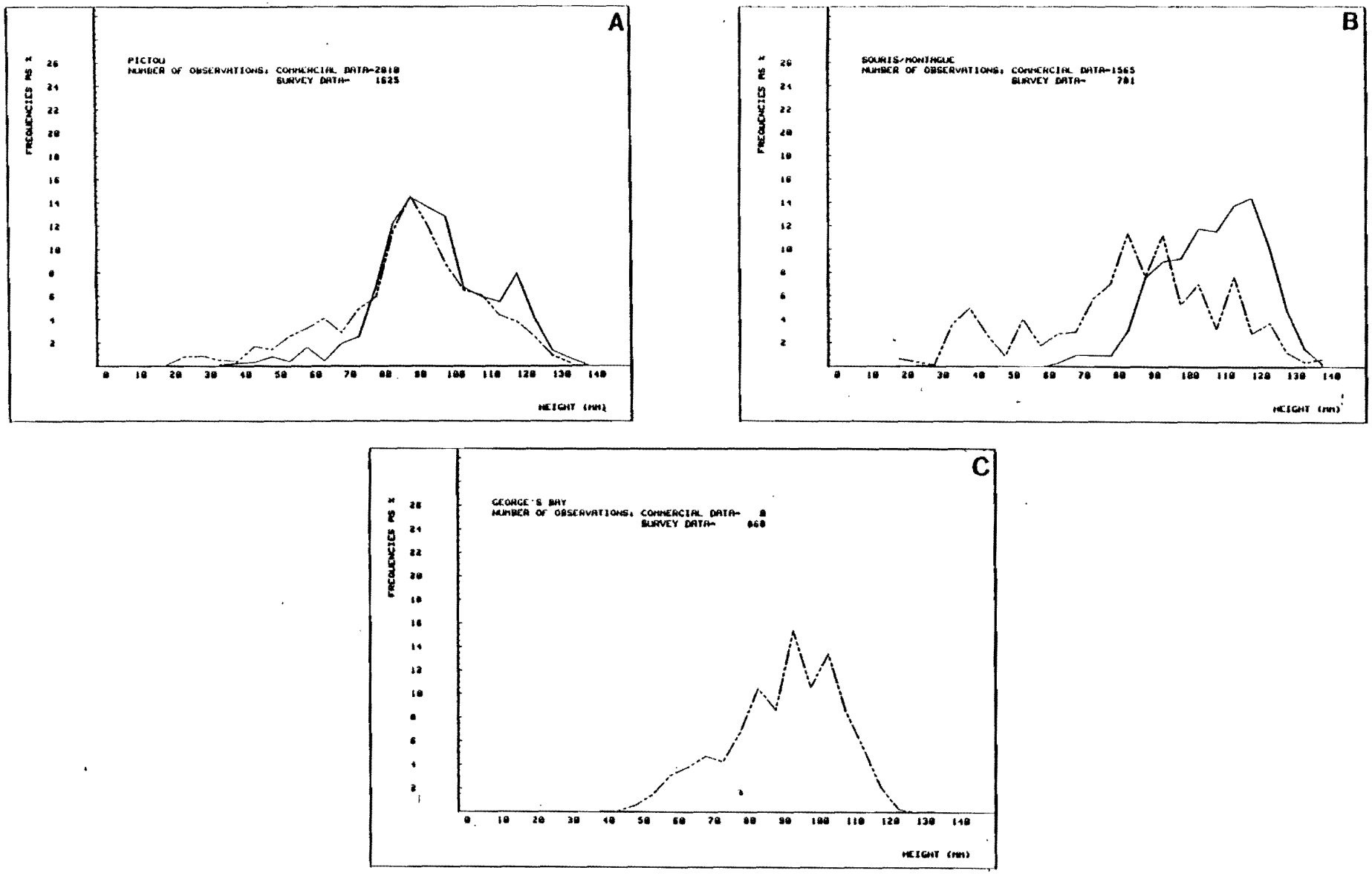


Fig. 4 - Relative size frequency distributions in areas of District 7b1.

_____ commercial catches

_ _ _ _ survey data

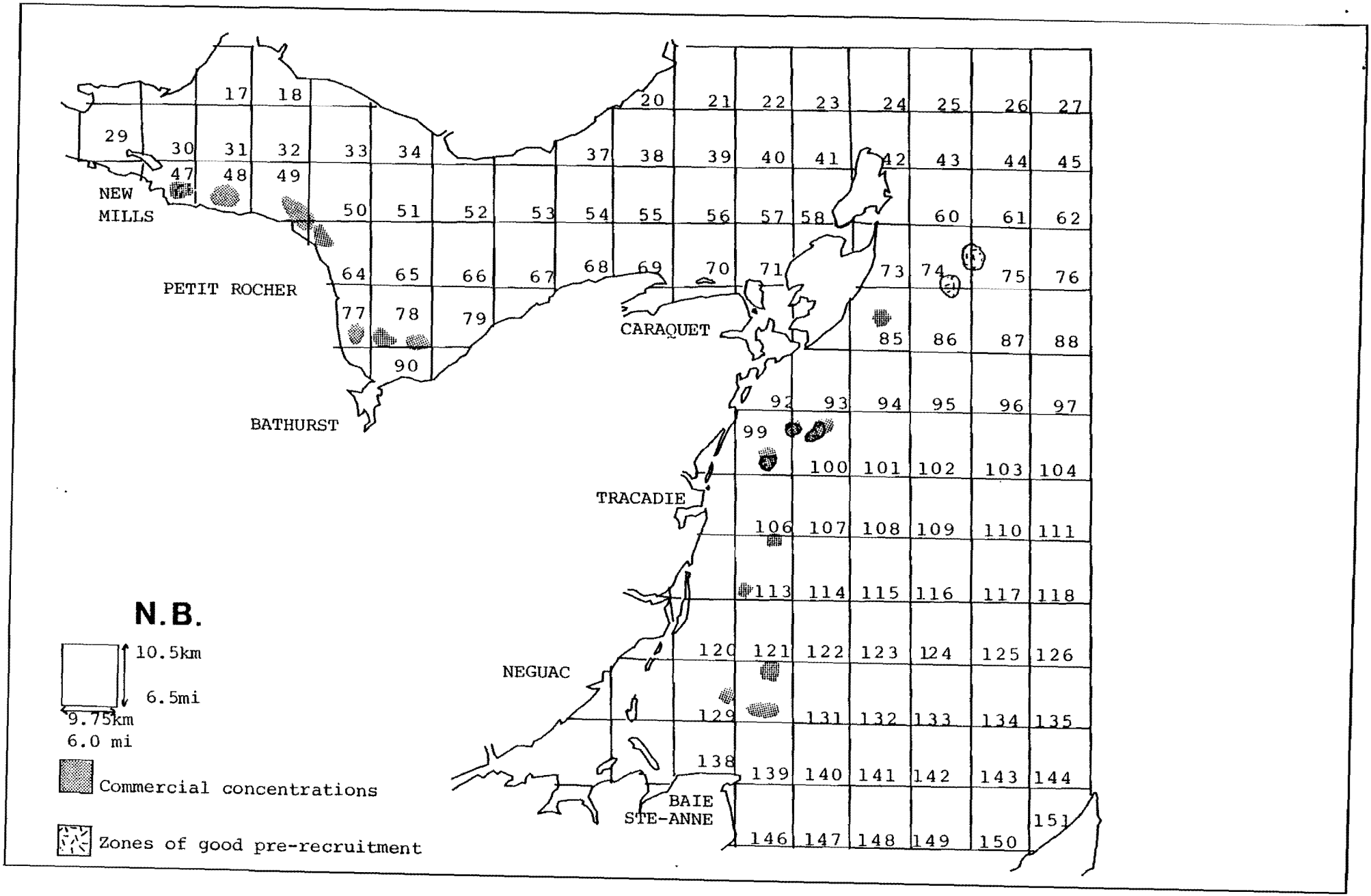


Fig. 5A - Zones of commercial concentrations and good pre-recruitment of scallop as determined by surveys in District 7C.

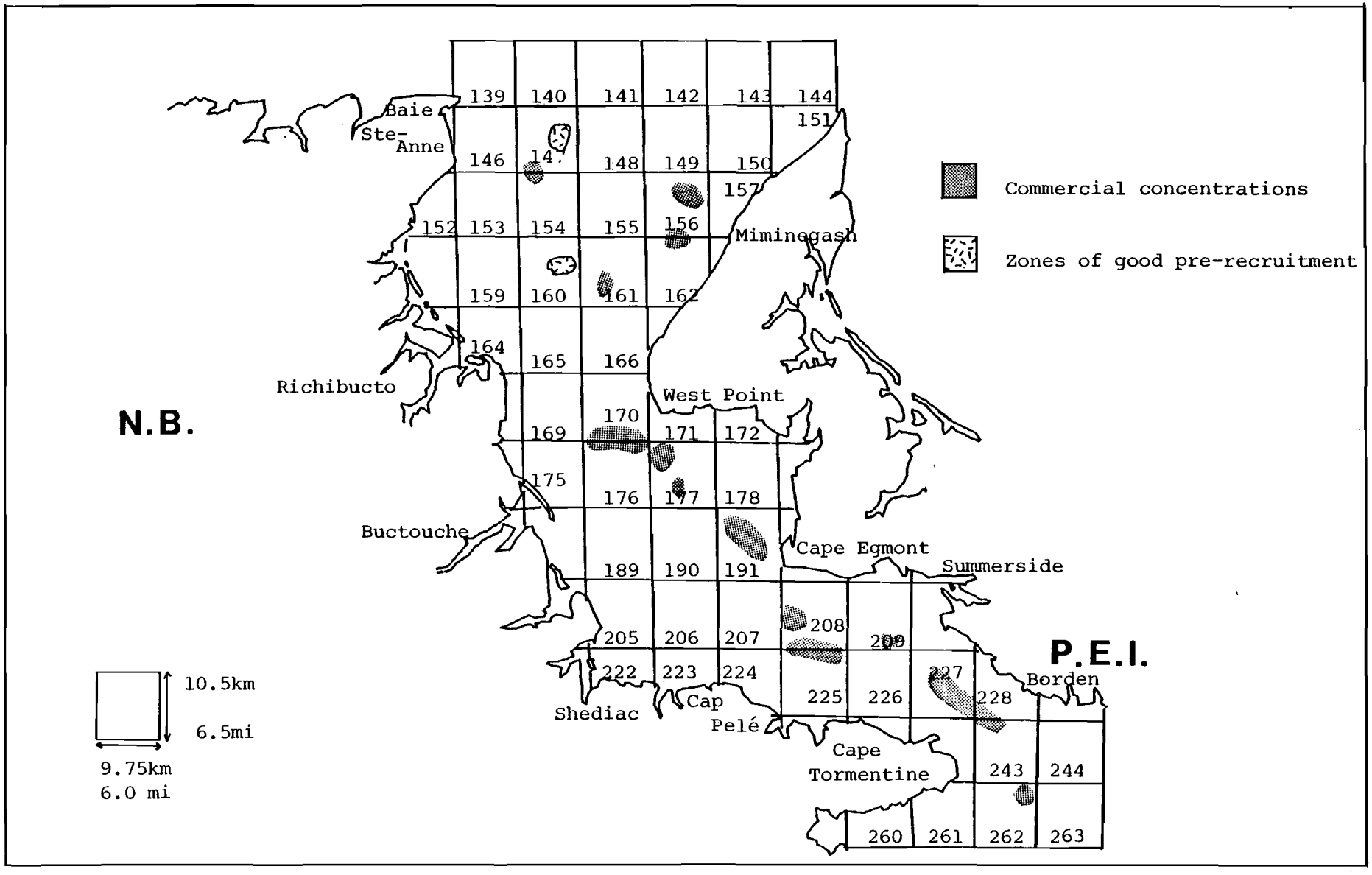


Fig. 5B - Zones of commercial concentrations and good pre-recruitment of scallops as determined by surveys in District 8.

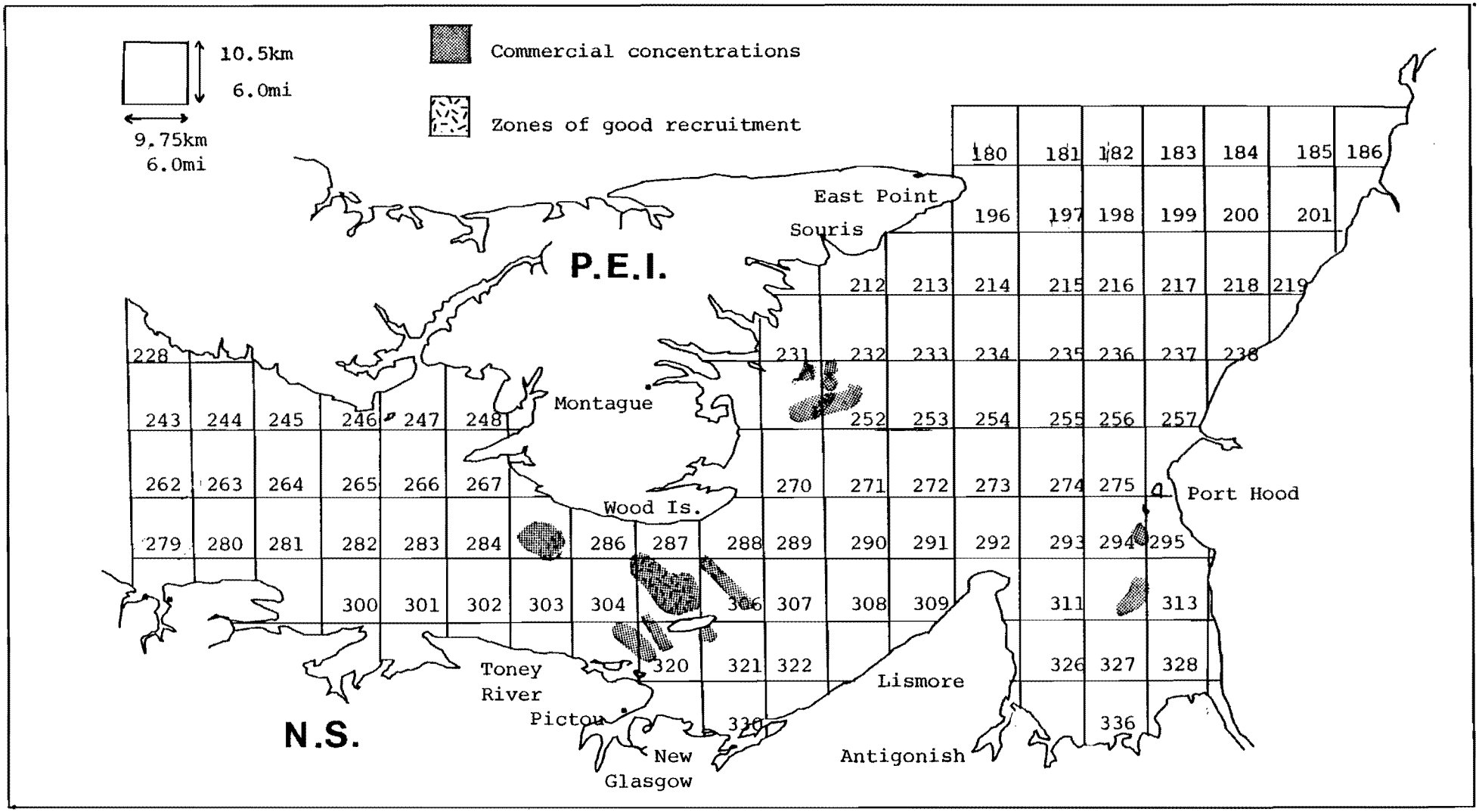


Fig. 5C - Zones of commercial concentrations and good recruitment of scallop as determined by surveys in District 7b1.

Appendix I - Example of sampling sheet for recording biological data.

SAMPLE ANALYSIS - ANALYSE DE L'ECHANTILLON

Sample #: No.de l'échantillon:	Fisherman: Pêcheur:	Port: Port:
	Date of analysis: Date de l'analyse:	Technician: Technicien:

umber/ uméro	Whole weight Poids entier gr (0.0)	Shell - Coquille Weight/ Poids gr(0.0)	Height/ hauteur mm(0.0)	Thickness/ Epaisseur mm (0.0)	Meat - Viande Weight/ Poids gr (0.00)	Diameter Diamètre mm (0.0)	Height/ Hauteur mm (0.0)	Gonad weig Poids de Gonade gr (0.00)

Appendix 11 - List of boats chartered for survey program.

Area	Fisherman	Name	Overall L	Type	Date	No.of tows
Belledune	O. Chambers	Tippy	42 ft	A frame	30-31 August	47
Nespisiguit	E. Lagacé	Louveteau	40 ft	A frame	11-13 August	71
Miscou	John Vibert	Dell-Lynn	46 ft	Side	21-25 August	97
Shippagan	E. Comeau	Alphee	43 ft	Side	2- 8 August	111
Miramichi Bay	Pea Breau	Emmanuel B	43 ft	A frame	26-28 July	58
Richibucto	Max. Vautour	GMV	40ft	Side	10-11 June	49
Miminegash	Fred Wedge	Witness	42ft	Side	31 May-1 June	43
Egmont Bay	P. Arsenault	Monica Lisa	42ft	Side	22-23 June	43
Buctouche	Bellmont Carll	B-Carll	45ft	Side	16-18 June	52
Cape Tormentine	Carl Trenholm	Miss Darlin'	45ft	Side	24-25 May	49
Pictou	Alex Falconer	Come Easy	42ft	A frame	6-8 July	79
George's Bay	Daniel Boyd	Theresa Michael	41ft	A frame	20-21 May	51
Souris/Montague	Basil Lavie	Elaine L	45ft	Side	24-24 June	42

Appendix III - Detailed results by explored squares for each area of survey.

AREA	SQUARE	# TOWS	# INDIVIDUALS*	% <70MM	C.P.U.E. KG/M/JR	C.P.U.E. LB/FT/HR
Belledune	49	4	56 (86)	34.9	0.68	0.45
	48	18	230 (284)	19.0	0.59	0.40
	47	14	161 (215)	25.1	0.57	0.38
	30	4	29 (31)	6.5	-	-
	29	4	18 (20)	10.0	-	-
	46	3	-	-	-	-
Total		47	494 (636)	22.3	0.30	0.34
Nepisiguit	90	2	22 (30)	26.7	0.53	0.36
	79	4	16 (23)	30.4	-	-
	78	15	255 (325)	21.5	0.81	0.55
	77	16	169 (198)	14.6	0.53	0.36
	64	16	181 (215)	15.8	0.54	0.36
	63	6	253 (480)	47.3	2.03	1.36
	49	12	225 (289)	22.1	0.89	0.60
Total		71	1115 (1554)	28.3	0.76	0.51
Miscou	94	7	20 (20)	-	-	-
	85	14	104 (128)	18.8	0.47	0.32
	60	15	147 (333)	55.9	0.67	0.45
	42	9	19 (21)	9.5	-	-
	57	9	103 (171)	39.8	0.73	0.49
	86	2	1 (4)	-	-	-
	59	1	-	-	-	-
	43	4	-	-	-	-
	26	1	-	-	-	-
	44	4	1 (2)	50.0	-	-
	74	9	14 (49)	71.4	-	-
	61	3	46(214)	78.5	1.01	0.68
	73	1	10(10)	-	-	-
	58	6	4(4)	-	-	-
	41	9	20(25)	20.0	-	-
	25	2	-	-	-	-
Total		96	489(981)	50.2	0.34	0.23

* First number is the number of individuals > 70 mm, the number in brackets is the total number of individuals captured.

Appendix III - continued.

AREA	SQUARE	# TOWS	# INDIVIDUALS*	C. P. U. E. % <70MM	KG/M/JR	LB/FT/HR
Buctouche	170	3	68 (82)	17.1	1.04	0.70
	176	11	94 (111)	15.3	0.37	0.25
	189	1	-	-	-	-
	190	7	32 (32)	-	0.20	0.14
	205	1	-	-	-	-
	206	7	18 (20)	10.0	0.10	0.07
	207	10	45 (52)	13.5	0.19	0.12
	208	5	41 (45)	8.9	0.40	0.27
	224	1	-	-	-	-
	225	4	8 (8)	-	0.09	0.06
	226	2	-	-	-	-
Total		52	306 (350)	12.6	0.25	0.17
Cape Tormentine	209	5	63 (63)	-	0.51	0.34
	226	8	3 (3)	-	0.02	0.01
	227	17	382 (415)	8.0	0.74	0.49
	228	2	82 (99)	17.2	1.34	0.90
	242	2	23 (27)	14.8	0.47	0.31
	243	8	228 (247)	7.7	1.03	0.69
	244	1	5 (5)	-	0.16	0.11
	262	6	49 (49)	-	0.26	0.17
Total		49	835 (908)	7.0	0.65	0.44
Pictou	303	5	19 (19)	-	0.14	0.09
	286	2	8 (11)	27.3	0.15	0.10
	305	13	536 (666)	19.5	1.72	1.16
	320	21	208 (210)	1.0	0.44	0.29
	306	9	236 (315)	25.1	1.00	0.67
	319	4	82 (96)	14.6	0.76	0.51
	302	3	1 (1)	-	-	-
	284	2	12 (12)	-	0.24	0.16
	285	6	170 (220)	22.7	1.04	0.70
	304	2	33 (46)	28.3	0.69	0.47
	321	6	20 (25)	20.0	0.14	0.09
	331	3	-	-	-	-
	330	3	-	-	-	-
Total		79	1325 (1621)	18.3	0.66	0.45
George's Bay	328	6	27 (27)	-	0.13	0.09
	327	1	10 (10)	-	0.35	0.24
	326	11	142 (152)	6.6	0.38	0.26
	311	15	113 (114)	0.9	0.22	0.15
	312	4	208 (266)	21.8	1.44	0.97
	294	4	222 (267)	16.9	1.91	1.29
	335	6	22 (28)	21.4	0.11	0.08
	336	2	3 (3)	-	-	-
	313	2	1 (1)	-	-	-
Total		51	748 (868)	13.8	0.44	0.33
Souris/ Montague	211	1	-	-	-	-
	213	6	21 (26)	19.2	0.14	0.09
	214	3	15 (19)	21.0	0.17	0.11
	231	6	13 (13)	-	0.10	0.07
	232	3	-	-	-	-
	251	8	296 (443)	33.2	1.55	1.04
	252	10	167 (186)	10.2	0.69	0.47
	269	1	45 (51)	11.8	3.78	2.54
	270	4	22 (22)	-	0.20	0.14
Total		42	579 (760)	23.8	0.57	0.38

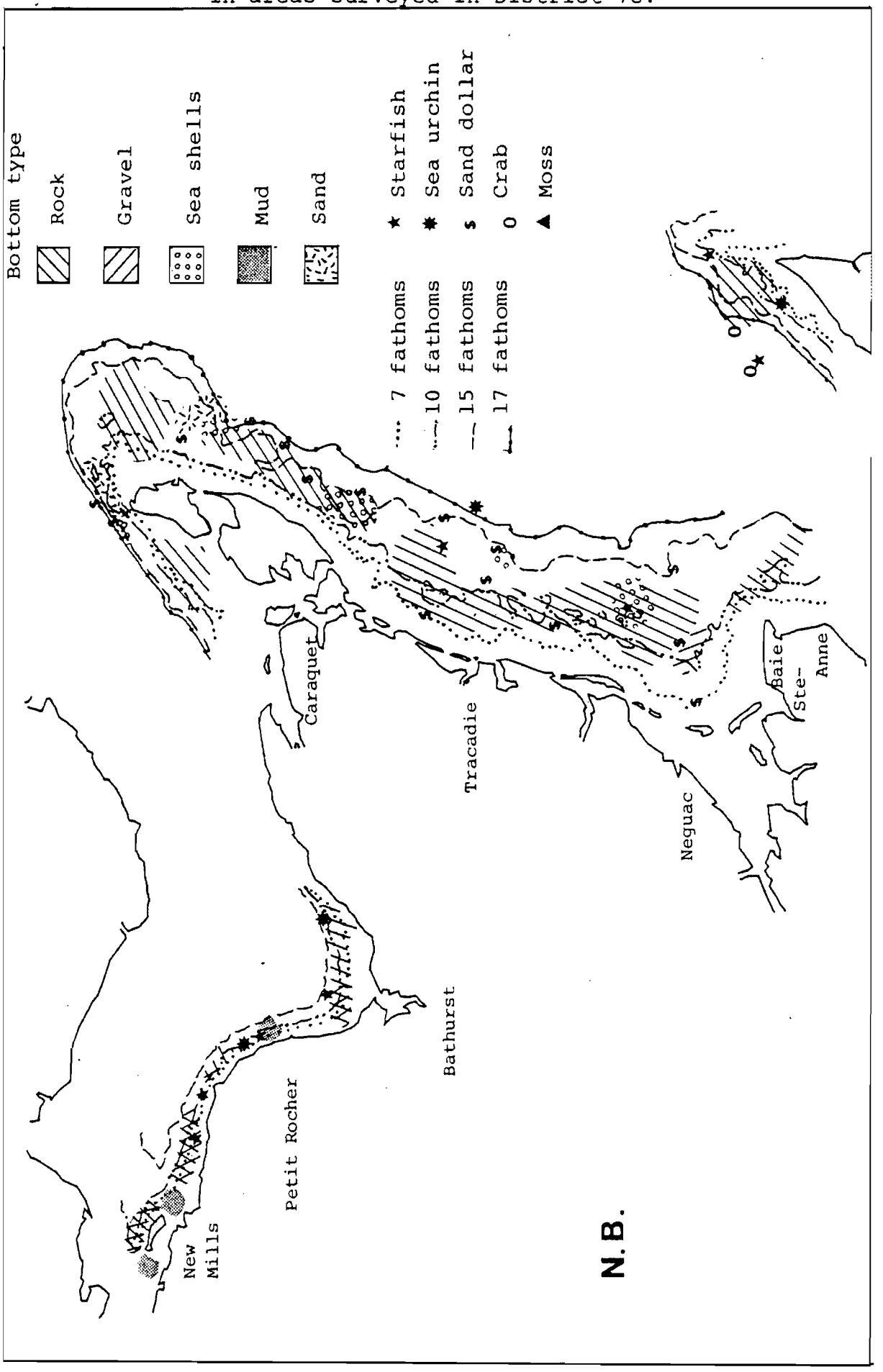
*First number is the number of individuals > 70 mm, number in brackets is the total number of individual captured.

Appendix III - continued.

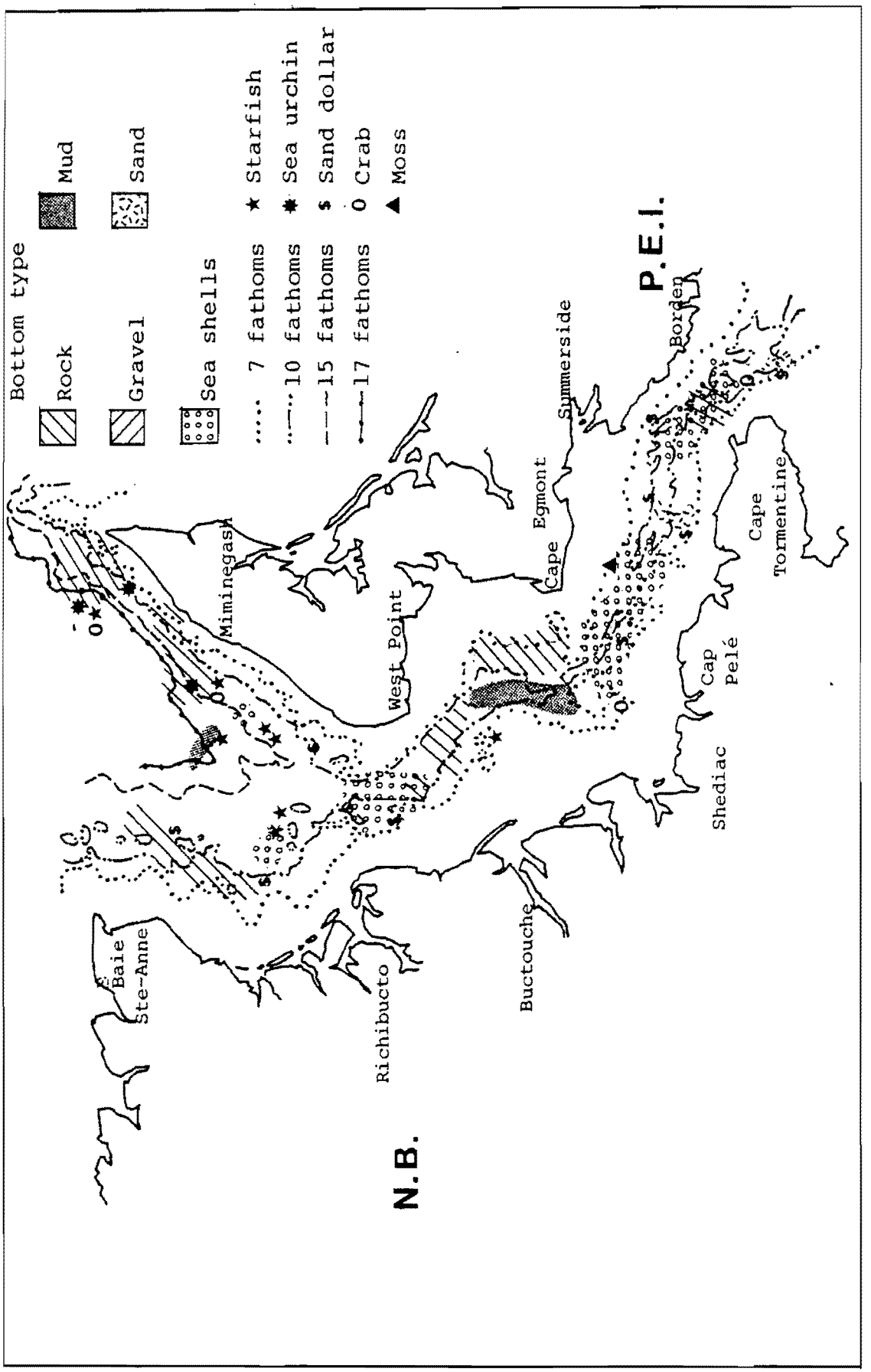
AREA	SQUARE	# TOWS	# INDIVIDUALS*	%<70MM	C.P.U.E. KG/M/JR	C.P.U.E. LB/FT/HR
Shippagan	130	5	38 (44)	13.6	0.45	0.30
	131	2	6 (7)	14.3	-	-
	122	3	2 (2)	-	-	-
	121	19	153 (248)	38.3	0.56	0.38
	113	22	191 (218)	12.4	0.57	0.38
	107	5	15 (22)	31.8	-	-
	108	1	2 (2)	-	-	-
	106	9	26 (32)	18.8	-	-
	99	23	245 (407)	39.8	0.64	0.43
	114	1	- (1)	-	-	-
	100	21	194 (363)	46.6	0.56	0.38
Total		111	872 (1346)	35.2	0.49	0.33
Miramichi Bay	120	12	53 (66)	19.7	0.30	0.21
	121	3	17 (26)	34.6	0.36	0.24
	129	15	149 (160)	18.1	0.67	0.45
	130	12	148 (171)	13.4	0.88	0.60
	128	1	2 (2)	-	-	-
	147	3	5 (5)	-	-	-
	139	6	30 (33)	9.1	0.41	0.28
	138	3	-	-	-	-
	146	1	-	-	-	-
	140	1	-	-	-	-
Total		57	404 (463)	12.7	0.50	0.34
Richibucto	147	5	87 (183)	52.5	0.93	0.63
	153	6	31 (60)	48.3	0.33	0.22
	154	7	100 (119)	16.0	0.87	0.59
	155	1	1 (1)	-	-	-
	159	6	4 (4)	-	-	-
	160	10	41 (143)	71.3	0.23	0.16
	164	2	6 (6)	-	0.20	0.13
	165	4	5 (5)	-	0.09	0.06
	166	3	10 (10)	-	0.20	0.14
	169	2	1 (1)	-	-	-
	170	2	7 (9)	25.0	0.23	0.15
	146	1	1	-	-	-
Total		49	294 (540)	45.6	0.35	0.24
Miminegash	135	3	16 (24)	33.3	0.24	0.16
	143	5	1 (1)	-	-	-
	144	1	1 (1)	-	-	-
	145	1	-	-	-	-
	149	3	22 (22)	-	0.46	0.31
	166	2	2 (4)	50.0	-	-
	150	5	34 (36)	5.6	0.57	0.38
	151	3	14 (14)	-	0.36	0.25
	155	4	10 (10)	-	0.16	0.11
	156	7	132 (157)	15.9	0.98	0.66
	161	5	53 (55)	3.6	0.68	0.46
	162	3	56 (62)	9.7	1.09	0.74
	157	1	5 (5)	-	0.25	0.17
Total		43	346 (391)	11.5	0.48	0.32
Egmont Bay	177	9	257 (290)	11.4	1.14	0.77
	178	2	11 (12)	8.3	0.24	0.16
	190	7	70 (71)	1.4	0.41	0.28
	191	14	264 (291)	9.3	0.97	0.65
	207	4	3 (4)	25.0	0.03	0.02
	208	5	-	-	-	-
	209	2	-	-	-	-
Total		43	605 (668)	9.4	0.62	0.42

* First number is the number of individuals > 70 mm, the number is the total number of individuals captured.

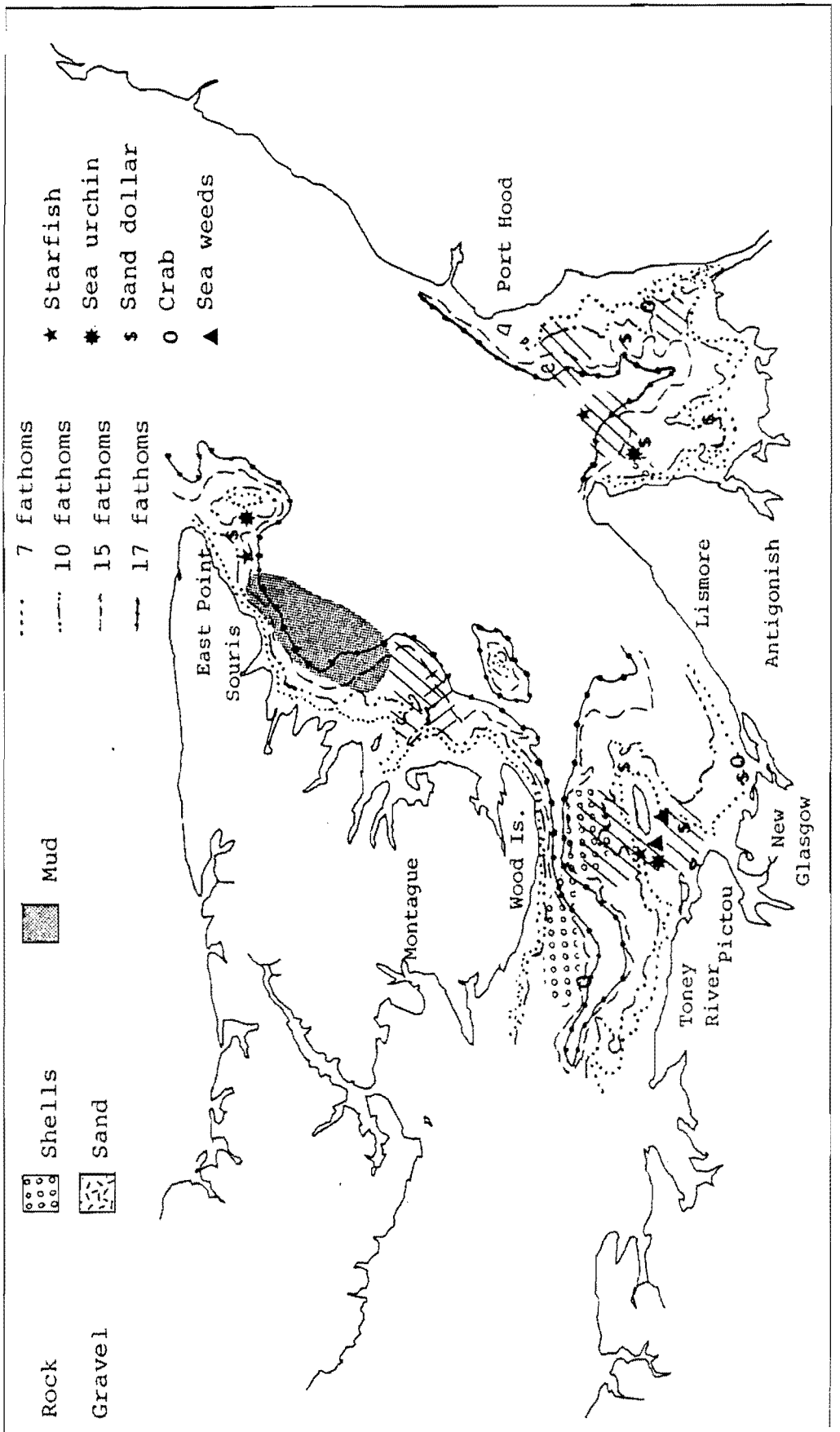
Appendix IV[1] - Bottom types, depth contours and associated fauna and flora in areas surveyed in District 7C.



Appendix IV[4] - Bottom types, depth contours and associated fauna and flora in areas surveyed in District 8.



Appendix IV[3]- Bottom types, depth contour and associated fauna and flora in area surveyed of District 7bl.

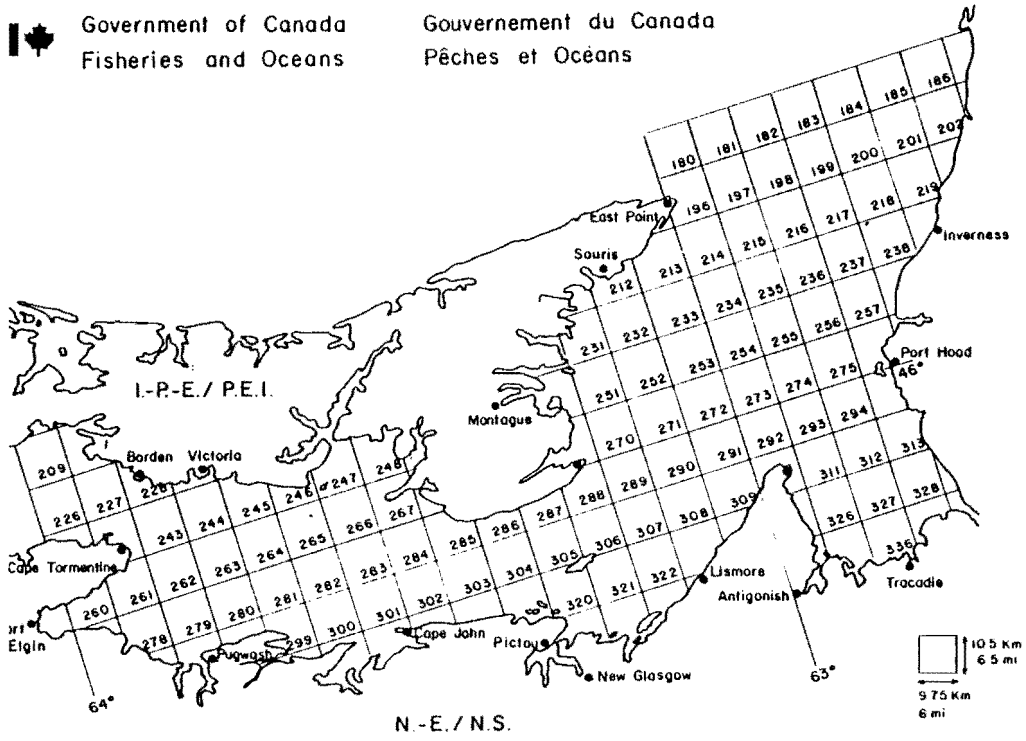


Appendix V - Meat counts computed from sea sampling and information obtained from fishery officers.

AREA	MC/500g	MC/lb
Belledune	34.8	31.6
Nespisiquit	34.9	31.7
Miscou	25.2	23.0
Shippagan	23.0	21.0
Miramichi Bay	24.3	22.0
Richibucto	25.7	23.3
Miminegash	24.5	22.3
Egmont Bay	38.8	35.2
Bouctouche	35.1	31.8
Cape Tormentine	41.4	37.6
Pictou	40.2	36.5
George's Bay	47.3	42.9
Souris/Montague	40.1	36.4

Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans



1 Date landed / Date de debarquement 20/09/82

2 Place landed / Lieu de débarquement Woods Island

3 Location fished / Lieu de pêche

Square no / No du carré or/ou Loran C	No tows / No traits	Tow time / Durée d'un trait	Mean depth / Profondeur moyenne	Bottom type / Nature du fond		
				soft / mou	rocky / rocheux	other / autre
305	12	15	65 ft.		✓	
285	15	15	60 ft		✓	

4 Gear / Engin
Rock drag / Drague fond dur ☒
Sweep drag / Drague fond mou ☐

5 Sea conditions / Etat de la mer
Calm / Calme ☒ Windy / Agitée ☐ Heavy / Forte ☐

6 Estimated catch (lb) / Prise estimée (lb) Meat / Viande 115 165
Roe / Rave

7 Catch description / Description de la capture

	Few / Peu	Many / Beaucoup
Young scallops / Pétoncles jeunes	☑	☐
Old scallops / Pétoncles âgées	☐	☑
Clackers / Coquilles vides		
Small / Petites	☑	☐
Medium / Moyennes	☑	☐
Large / Grosses	☐	☑

78134

Appendix VI - Facsimile of a log book sheet filled by fisherman.

Appendix VII- Estimated number of licensed and active fishermen in 1981 and 1982.

Province	Statistical District	1981[1] No. licences	1981[1] No. active	1982[2] No. licences	1982[2] No. active
Nova Scotia	2	2	-	2	-
	3	5	-	5	-
	10	3	-	3	3
	11	62	62	62	52
	12	8	5	8	-
	13	27	22	26	4
	45	1	-	1	-
	46	6	-	6	6
New Brunswick	63	NO		10	4
	64			11	7
	65			9	0
	66			4	2
	67	DATA		1	0
	68			48	30
	69			17	8
	70	AVAILABLE		9	8
	75	13	2	11	10
	76	30	30	33	33
	77	14	-	12	9
	78	18	12	17	5
	80A	66	66	64	59
Prince Edward Island	82A	31	11	31	30
	83	12	-	12	10
	85	6	-	6	-
	86	28	27	28	-
	87	160	122	160	110
	88	83	13	83	9

1- 1981 data from Jamieson et al. 1981
2- 1982 data preliminary