Fishery trends and stock assessments for four snow crab, Chionoecetes opilio fisheries in the Gulf of St. Lawrence - 1985

by

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ABSTRACT

Fishery statistics and biological characteristics of the snow crab populations exploited are presented for Gulf of St. Lawrence snow crab fisheries: off northern Prince Edward Island (areas 25 and 26), western Cape Breton Island (areas 1 and 7), northwest Newfoundland, and in the southwest Gulf of St. Lawrence (the midshore fishery).

The P.E.I. inshore snow crab fishery (areas 25 and 26) was initiated in 1985 with the issuance of 16 experimental permits. Fishing effort was concentrated into two small areas: one in the mid-northern region of area 26, and one in the northwest corner of area 25. Season closures, due to high incidences of white crab, coupled with variable catch rates, negated the use of Leslie analysis for assessment.

The area 1 and area 7, western Cape Breton Island fisheries both exhibited the lowest catch rates since their inception (mean CPUE's were 34.8 kg/trap haul and 31.4 kg/trap haul respectively). Fishermen in area 1 frequently shifted the location of their fishing effort thereby biasing estimates of catchability, initial biomass, B_0 (3291t) and exploitation level, EL (37.5%) from Leslie analysis. Depressed catch rates, a low estimate of B_0 (753t) and a high EL estimate (71.3%) indicate that the snow crab resource in area 7 is continuing on a downward trend initiated in 1983. Lower TAC's should be considered in order to stabilize the area 7 fishery.

Leslie analysis of catch and effort data for the midshore fishery in the southwest Gulf of St. Lawrence gave a B_0 estimate for the whole area of 87418t, with a corresponding EL of 28.8%. These estimates do not consider regional differences in snow crab biomass and exploitation. To illustrate this point, the fishery was partitioned into five zones. Leslie analyses were performed for three zones and the estimates of EL obtained ranged from 37.1% to 52.5%.

The experimental fishery in northwest Newfoundland was initiated in 1985. Data for this fishery was incomplete; nevertheless, a Leslie analysis was performed and the results are presented.

RESUME

Les statistiques des pêcheries et les caractéristiques des populations exploitées de crabe des neiges sont présentées pour les pêcheries du golfe du Saint-Laurent: le nord de l'Ile-du-Prince-Edouard (zones 25 et 26), la côte ouest du Cap-Breton (zones 1 et 7), le nord-ouest de la côte de Terre-Neuve ainsi que le sud-ouest du golfe du Saint-Laurent (la pêcherie semi-hautière).

La pêcherie côtière de l'Ile-du-Prince-Edouard (zones 25 et 26) a débuté en 1985 avec l'émission de 16 permits expérimentaux. L'effort de pêche a été concentré dans deux petites régions: l'une au nord de la partie centrale de la zone 26 et l'autre dans la partie nord-ouest de la zone 25. Les fermetures des saisons de pêche, dû à l'apparition des crabes blancs et la variabilité des taux de capture, ont rendu impossible l'analyse de Leslie pour l'évaluation des stocks.

Les zones 1 et 7 du Cap-Breton présentent les valeurs de PUE les plus faibles depuis les débuts de ces pêcheries (34.8 kg/casier levé et 31.4 kg/casier levé respectivement). Les pêcheurs de la zone 1 ont fréquemment déplacé leurs efforts de pêche en 1985, ce qui a eu pour effet de biaiser les estimations de capturabilité, de biomasse initiale, B_0 (3291t) et du niveau d'exploitation, EL (37.5%) de l'analyse de Leslie. Une diminution du taux de captures, une faible biomasse estimée B_0 (753t) et un niveau d'exploitation elevé (71.3%) indiquent une tendance de diminution de la ressource de crabes des neiges dans la zone 7 depuis 1983. Une baisse du TPA devrait être considéré afin de stabiliser la pêcherie de la zone 7.

L'analyse de Leslie effectuée sur les données des captures et des efforts pour l'ensemble de la pêcherie semi-hauturière du sud-ouest du golfe du Saint-Laurent donne une B_0, estimée de 87418t avec un EL correspondant de 28.8%. Ces estimations ne tiennent pas en considération les différences régionales dans la biomasse et le niveau d'exploitation du crabe des neiges. Pour démontrer ce point, la pêcherie a été séparée en cinq zones. L'analyse de Leslie a été calculée pour trois zones et les estimations de EL obtenues varient le 37.1% à 52.5%.

La pêcherie expérimentale du nord-ouest de Terre-Neuve a débuté en 1985. Les données de cette pêcherie sont incomplètes; néanmoins, une analyse de Leslie a été effectuée et les résultats sont présentés.

INTRODUCTION

The snow crab, Chionoecetes opilio, fishery in Atlantic Canada has increased steadily in econonic importance since its inception in the mid 1960's. In an effort to elucidate the biological consequences to snow crab populations imposed by the growth and development of the fishery, and to provide management advice, various assessment techniques have been tried (Bailey, 1978a, 1978b, unpublished data; Elner and Robichaud 1981; Taylor and O'Keefe, 1981). The most widely accepted and common method of assessment currently utilized, applies catch per unit effort (CPUE) and cumulative catch (K_t) data to a Leslie analysis (Ricker, 1975) to obtain estimates of initial biomass and exploitation levels for various regions. Assumptions inherent to the use of Leslie analysis, sources of error, and its

applicabilty to snow crab management have been discussed by previous authors (Ricker, 1975; Elner and Robichaud, 1981; Conan et al. 1984).

This paper presents an assessment and review of trends in four commercial snow crab fisheries: northwestern Newfoundland, western Cape Breton Island, Prince Edward Island, and the southwestern Gulf of St. Lawrence. Seasons, quotas and fishing effort vary greatly between fisheries (Table 1).

Experimental snow crab fisheries were initiated in northwest Newfoundland and off Prince Edward Island in 1985. Both fisheries involve snow crab populations for which little or no prior biological or assessment related information is available. Their biological characteristics and their response to fishing pressure may vary significantly from previously exploited populations. Careful observation of these populations may be instructive in developing and refining snow crab management techniques.

The snow crab fisheries off western Cape Breton Island and in the southwestern Gulf of St. Lawrence have been established for a minimum of 7 years (area 7, western Cape Breton Island). The southwestern Gulf of St. Lawrence snow crab fishery involves fishermen from both New Brunswick and Quebec (Table 1). It is subject to high levels of fishing effort and is the most economically important of the Gulf's snow crab fisheries. Management has imposed total allowable catches (TAC's) based upon historical trends in total catch and CPUE (Table 2). The first assessment was completed in 1985 using trends catch and effort data (Moriyasu et al., unpublished data). The western Cape Breton Island snow crab fisheries (areas 1 and 7) have been managed according to TAC's and quotas based upon estimates of exploitation levels and biomass changes obtained, where possible, from Leslie analyses (Elner, 1982; Cormier and Bailey, 1984; Cormier and Comeau, 1986).

MATERIAL AND METHODS

Data for each of the four fisheries (northwest Newfoundland, western Cape Breton Island, Prince Edward Island and the southwestern Gulf of St. Lawrence) were obtained from fishermen's log books and processors sales slips by the Department of Fisheries and Oceans Electronic Data Processing and Statistics Branch. The resulting data set was comprised of entries containing the following information:

a) area - N.W. Newfoundland, W. Cape Breton Island, P.E.I. S.W. Gulf of St. Lawrence

b) boat number - each licensed boat has a number. These numbers are utilized for subdividing the W. Cape Breton fishery into areas 1 and 7 and for determining the origins (New Brunswick or Quebec) of the boats in the S. W. Gulf.
c) date fished
d) fishing position - reported by a grid system consisting of 5' x 5' squares for the Cape Breton Island fishery and 10' x 10' squares for the P.E.I. and southwest Gulf of St. Lawrence fisheries and/or geographic position.
e) number of traps hauled
f) trap soak time
g) trap type - box traps (1.2 m x 1.2 m, 1.5 m x 1.5 m, 1.8 m x 1.8 m) or Japanese conical traps
h) catch - in pounds

From these data, cumulative catch (converted to kg) and CPUE (daily catch/# of trap hauls per day) were calculated and summarized into weekly intervals for each fishery and/or area. Bailey and Cormier (1983a) suggest that variability of CPUE was less for traps hauled after three or less soak days therefore, two estimates of CPUE were calculated: one ($CPUE_{1-3D}$) used only data for which the traps had been fished 3 soak days or less and the other ($CPUE_t$) included all data, regardless of soak time. The weekly data summaries for each area (Tables 3, 4, 6, 7, 8) were used in Leslie analysis (Ricker, 1975).

In order to establish the overall distribution of effort in each fishery, the fishing effort (number of trap hauls) distribution per square was plotted for the season (Figures 1, 7, 14, 19, 20).

In addition to the above, the data for the Cape Breton Island area 1 fishery was subdivided into two subsets. One subset consisted of data for "old" boats (boats which had been part of the fishery prior to the fleet expansion of 1984) and the other consisted of data for "new" boats (boats entering the fishery since 1983). Each data set was further subdivided into three periods:

Period 1 - the first 3 weeks of the season
Period 2 - weeks 4 - 6
Period 3 - weeks 7 - 10

For each period, the percentage of the total fishing effort attributable to both "old" and "new" boats was calculated and the distribution of each group's fishing effort was plotted (Figure 8).

Size distribution data for crabs in each of the four fisheries was obtained through sea sampling. Carapace width (CW), of crabs caught, was measured to the nearest mm and recorded. The periodicity of this sampling varied between areas.

RESULTS AND DISCUSSION

Prince Edward Island Fishery

The P.E.I. snow crab fishery is composed of two management areas (25 and 26) with fishermen being permitted to fish in either area. The distribution of fishing effort (Figure 1) indicates the presence of two major fishing grounds; one in area 25 (concentrated in square 72), and one in area 26 (concentrated in squares 18 and 19). Frequent shifts in fishing effort between these grounds were not evident.

The season was effectively divided into two sub-seasons due to a closure from the 14th to the 22nd week (Table 1) caused by a high incidence of white crabs in the catch.

In the first sub-season (weeks 1-13), CPUE increased for the initial 8 weeks and then declined up to the time of the closure (Table 3, Figure 2). The CPUE increases observed during the first 8 weeks may reflect an increase in efficiency of the fishermen and/or the presence of unexploited snow crab biomass. The decreases in the CPUE during weeks 9 to 13 may have been precipitated by a number of factors:

1) a depletion of the available snow crab resource due to fishing mortality

2) a change in catchability incurred by biological changes within the snow crab population (e.g. the increased occurrence of white crabs)

3) changes in fishing effort in response to either of the above

In area 26, the season was re-opened on August 9 (Table 1) in the hope that the percentage of white crabs in the catch would have decreased; however, the percentage did not drop and the season was re-closed on August 14 (Table 1). The catches during week 18 (Table 3) occured during this 4 day period.

CPUE's during the second sub-season were generally lower than those of the first (Table 3, Figure 2). Poor weather during the last 3 weeks of the season hindered fishing and is reflected in the low CPUE's during this period.

Whether combined for the entire season or subdivided into subseasons, the weekly CPUE and cumulative catch data for the P.E.I. snow crab fishery (Table 3, Figure 2) is not amenable to use in a Leslie analysis, thereby negating the possibility of estimating initial biomass (B_0) and exploitation levels. Mean CPUE for the season was 52.8 kg/trap haul and a total catch of 801.7 t was realized (Table 3).

The size distribution over the whole season for area 25 (Figure 3) shows a plateau from 96 mm to 117 mm CW while area 26 (Figure 4) shows a peak at 109 mm to 111 mm CW (this is biased by a disproportionately large sample size taken in May). Area 25 shows an increase in mean CW from June to July (104.4 mm to 106.0 mm respectively, Figure 5) indicating a recruitment of crabs to the larger size classes. Area 26 displays an opposite trend, with a decrease in mean CW between season opening and the first closure (mean CW was 108.1 mm in May and 105.4 mm in June, Figure 6) implying a removal of larger crabs from the population due to fishing or other factors. Both areas 25 and 26 showed an increase in mean CW (117.0 mm and 111.6 respectively, Figures 5, 6) with the re-opening of the season thereby indicating that the late summer and early fall are periods of recruitment for these fisheries.

The differences in both seasonal and subseasonal size distributions of snow crab populations between areas 25 and 26 (Figures 3-6), coupled with the indication of a distinct zone of fishing effort withing each area, indicate that a better approach to the management of the P.E.I. snow crab fishery could be obtained through separate assessments of each Area. This can not be achieved without either a better knowledge of seasonal effort distribution and/or the imposition of area restrictions on the fishermen.

Western Cape Breton Island Fishery

The western Cape Breton Island snow crab fishery is divided into areas 1 and 7. Vessels licensed to fish in one area are not permitted to fish in the other.

Area 1:

Overall fishing effort appears most intensive in the southern two thirds of area 1 with the highest concentrations occurring in squares 228 and 245 (Figure 7). When compared to historical patterns of effort distribution for this fishery (Bailey, 1978b; Elner and Robichaud, 1981; Bailey and Cormier, 1983a) the 1985 effort distribution (Figures 7 > 8) indicated a slight expansion of the fishery - most notably into the southern extremity of the area (squares 227, 244 and 262) and westward into squares 171, 172 and 192.

Although it was most pronounced for "new" boats, both "old" and "new" boats shifted their fishing effort southward and to the west (Figure 8) as the season progressed. Most of the expansion of the

fishery mentioned above appears attributable to the "new" boats (Figure 8). The large decrease in total effort during the last 4 weeks of the fishery (Table 4) is mainly due to the withdrawal of the old boats from the fishery during this period (Figure 8).

Both $CPUE_{1-3D}$ and $CPUE_t$ were calculated (Table 4, Figure 9) and utilized in Leslie analyses to produce the following predictive regressions and their associated estimates of initial biomass:

1) using $CPUE_t$

$$CPUE = 43.74 - 1.33 \times 10^{-2} K_t$$
$$r = - 0.91$$
$$B_o = 3291 \text{ t } (2591 \text{ t} - 4830 \text{ t}, P < 0,05)$$

2) using $CPUE_{1-3D}$

$$CPUE = 43.69 - 1.32 \times 10^{-2} K_t$$
$$r = - 0.90$$
$$B_o = 3316 \text{ t } (2590 \text{ t} - 4963 \text{ t}, P < 0.05)$$

Only 5% of all trap hauls were made after more than 3 soak days, therefore the two predictive equations above, and their corresponding lines (Figure 9), differ only slightly. The higher cor- relation coefficient obtained using all CPUE data (regardless of soak time - $CPUE_t$) suggests that this represents the preferred CPUE - catch relationship for the fishery. Using this model's intial biomass (B_o) estimate of 3291 t, an exploitation level of 37.5% is indicated.

Compared to previous years, the estimated exploitation level (EL) and mean CPUE experienced in this fishery during 1985 were low (Table 5, Figure 10). Apparently, in response to low CPUE's, fisherman were shifting their effort spatially and temporally to achieve better catches (Figure 8). In addition to this, the decreased overall fishing effort during the last 4 weeks of the season (Table 4, Figure 8) allows the remaining fishermen to re-deploy their effort from marginal areas to more favourable fishing grounds. The result of these practices is to maintain CPUE's at artificially high levels thereby biasing the estimate of catchability (the slope) in the Leslie analysis. Such an occurrence may explain the disproportionately high estimate of B_o (given such low EL and CPUE levels) in 1985 compared to previous years (Table 5, Figure 11).

The size frequency distribution of crabs caught in area 1 has undergone two trends since 1977. From 1977 to 1979 the average size of crabs caught was shown to decrease (Elner and Robichaud, 1980). This trend was reversed from 1979 to 1982 where an overall increase in the average size of crabs caught was indicated (106.0 mm CW to 116.0 mm CW, Bailey and Cormier, 1983 a). No data are available for 1983 or 1984. The 1985 data show the mean CW of crabs caught to be 111.0 mm with a mode at 112-114 mm (Figure 12) which, if differences

in sampling technique are taken into account[1], compares favourably to 1982 values.

As observed in previous seasons (Elner and Robichaud, 1980, 1981; Bailey and Cormier, 1983 a; Bailey, personal communication), the proportion of small crabs in the fishery increased as the season progressed in 1985 (Figure 13). The average CW of crabs caught shifted from 114.0 mm (mode = 112-114 mm) in July to 109.0 mm (mode = 109-111 mm) in August.

A decrease in average size of the crabs caught as the season progresses was expected due to reliance of the fishery on crabs of greater than 95 mm CW.

Area 7:

Fishing effort appears to be concentrated in the northern half of area 7, focusing mainly in grids 261, 277 and 284 (Figure 14). It shows little change throughout the season.

Estimates of both $CPUE_{1-3D}$ and $CPUE_t$ (Table 6) were used in Leslie analyses. Data for the last week of the season represented the catches of only one fisherman and were excluded from the analysis. The predictive regressions from the analyses, and their associated estimates of initial biomass (B_o) are:

1) using $CPUE_t$: $CPUE = 55.23 - 7.21 \times 10^{-2} K_t$
$r = - 0.97$
$B_o = 766$ t (692 t - 880 t, $P < 0.05$)

2) using $CPUE_{1-3D}$ $CPUE = 55.58 - 7.38 \times 10^{-2} K_t$
$r = - 0.97$
$B_o = 753$ t (688 t - 849 t, $P < 0.05$)

Approximately 97% of all trap hauls were made after 3 or less soak days therefore there was little difference between the results of the two analyses above and their predictive lines (Figure 15). Using the results of the $CPUE_{1-3D}$ analysis (because of its smaller confidence interval), B_o is estimated at 753 t (688 - 849 t) which indicates an exploitation level of 71.3%.

[1] Elner and Robichaud (1980) show that size distributions based on port sampling data have higher mean values (approximately 6 mm. CW in their case) than those based upon sea sampling. The size distributions presented by Bailey and Cormier (1983 a) are based upon port sampling data.

The 1985 fishery exhibited depressed catches, a low B_0 and a high exploitation level compared to previous years (Table 5, Figure 16). This was a continuation of a downward trend which has been exhibited by the fishery over the last 3 years (Figure 10).

The recommended total allowable catch (TAC) for this fishery from 1981 to 1983 was 519 t, based upon 1980 catch levels. The recommended TAC for 1984 and 1985 was increased to 900 t. Changes in recommended TAC's have imposed no changes in the fishery. The operational TAC has remained at 835 t since 1980 (based on an individual boat quota of 36,288kg x 23 boats). The fact that the operational TAC has never been reached, combined with the current depressed state of the fishery, suggests that lower TAC's should be considered.

The overall size frequency distribution for 1985 (Figure 17) showed that more than 50% of the crabs were under legal size (95 mm CW). Two modes exist; a lower mode at 82-84 mm CW and an upper mode at 103-105 mm CW (Figure 17). The size frequency distribution changed during the season with a decrease in the magnitude of the lower mode and an increase in the percentage of crabs in the inter-mode size classes (Figure 18). These results were similar to those presented for 1979 and 1980 (Elner and Robichaud 1980, 1981). In August of 1982 and 1983, modes were observed at 105-110 mm CW and 120-125 mm CW (Cormier and Bailey, 1984): by September of those same years, only the mode at 120-125 mm was observed. When compared with 1985, the 1982 and 1983 size distributions indicated that the snow crab population in this fishery had decreased in average size (CW). This comparison may be biased by differences in sampling techniques (see footnote 1 on page 10).

Southwestern Gulf of St. Lawrence Fishery:

Fleets from both New Brunswick and Quebec exploit the southwestern Gulf of St. Lawrence snow crab resource. The New Brunswick fleet concentrated its fishing effort in a region over the Bradelle Bank (zones 3 and 4, Figure 19). The Quebec fleet exhibited a more diffuse pattern of fishing effort with areas of concentration in the Baie des Chaleurs/eastern Gaspé coast region, the western Bradelle Bank region, and the eastern Bradelle Bank region (zones 1, 3 and 4, Figure 20). Zones 1, 3 and 4 (Figures 19 and 20) accounted for 90% of all effort for which location was given. There was evidence of frequent shifts in effort throughout the area over the season.

Both $CPUE_t$ and $CPUE_{1-3D}$ values were calculated for the New Brunswick fleet (Table 7). Soak day information was not available for the Quebec fleet therefore only $CPUE_t$ could be calculated (Table 7). Two mean CPUE's were calculated. Mean $CPUE_t$ (Table 7) was obtained using the $CPUE_t$ from both fleets, weighting each by the

number of trips over which they were calculated (Table 7) and then calculating a weighted mean. Substituting the New Brunswick fleets $CPUE_{1-3D}$ values for its $CPUE_t$ values, the above calculation was again performed to give Mean $CPUE_{t\ +\ 1-3D}$ (Table 7). The resulting statistics (Mean $CPUE_t$ and Mean $CPUE_{t\ +\ 1-3D}$) were then used in Leslie analyses. The low effort, CPUE and cumulative catch statistics obtained for the first week of the fishery (Table 7) were not deemed to be representative of "normal" events in the fishery and were therefore excluded from the Leslie analysis.
The results of the Leslie analyses are:

1) using Mean $CPUE_t$: $CPUE = 66.91 - 7.83 \times 10^{-4} K_t$
$r = - 0.74$
B_o = 87418 t (57091 t - 213762 t, $P < 0.05$)

2) using Mean $CPUE_{t\ 1-3D}$:
$CPUE = 65.29 - 7.47 \times 10^{-4} K_t$
$r = - 0.71$
B_o = 87444 t (57042 t - 250856 t, $P < 0.05$)

There was little difference between the results of the two analyses (Figure 21). The use of Mean $CPUE_t$ (Table 7) in a Leslie analysis produces a smaller confidence interval for B_o (see above) which indicates that its estimated B_o of 87418 t (57091 - 213762 t) should be preferred. Using this estimate of B_o, an exploitation level of 28.8% was indicated.

The above results only consider trends for the overall fishery and do not account for regional differences in snow crab biomass and exploitation. To illustrate this point, data for which location was given was repartitioned by zone (Figures 19 and 20). Assuming these data sets were representative of the fishery in each zone, weekly catch and effort statistics were generated (Appendices 1 to 5) and Leslie analyses were performed. Data from zones 3 and 5 did not fit the Leslie model well enough to justify further analyses. Correlation coefficients (r) of -0.70 to -0.92 indicate marginal to good fits of the Leslie regression to the data from zones 1, 2, and 4 (Appendices I, II, IV). Initial CPUE ($CPUE_o$) and final CPUE ($CPUE_f$) were calculated for zones 1, 2 and 4 using the predictive equations from the Leslie regressions (Appendices I, II, IV). These values were assumed to be directly proportional to the biomass available at each time, therefore exploitation levels can be estimated using the following equation (D. Rivard; personal communication)

$$\text{Exploitation level} = \left(1 - \frac{CPUE_f}{CPUE_o}\right) \times 100$$

Using this method, the exploitation level estimates for zones 1, 2, and 4 (46.3%, 52.5%, and 37.1% respectively) all exceeded the overall estimate for the fishery (28.8%).

Historical size frequency distributions for snow crab caught in the southwestern Gulf of St. Lawrence indicated a decrease in average size (CW) from 1977 to 1979, with a shift in modes from 115-120 mm CW to 95-100 mm CW respectively (Bailey and Cormier, 1983a). This trend then reversed with an increase in average size occurring up to 1982 and a stabilization in 1983 where the principle mode in the catch's size distribution was 110-115 mm CW (Bailey and Cormier, 1983a, 1983b). The 1985 size frequency data showed a mean size of 109 mm CW and a mode at 109-111 mm CW (Figure 22) implying little change from 1983 values (no data was available for 1984).

As has been observed in previous years (Bailey and Cormier, 1983b), the size frequency distribution in 1985 indicated a decrease in the average size of crabs caught as the season progressed. There was a shift in modes from 112-114 mm CW in April to 109-111 mm CW in May (Figure 23). A polymodal distribution occurred in June with a high proportion of the catch being 97 mm - 114 mm CW in size.

Indications are that (given existing overall exploitation levels, high biomass and stable size distributions) the southwestern Gulf of St. Lawrence snow crab population should be able to sustain current levels of fishing effort. It should, however, be stressed that, in response to regional concentrations of fishing effort, localized depletions of the snow crab resource may occur. These depletions would not be revealed using current assessment techniques. As mentioned for the Prince Edward Island fishery, a better means of determining the partitioning of effort within the fishery would lead to more sound management of the resource.

Northwest Newfoundland Fishery:

All logbook data for this fishery had not been collected prior to the writing of this paper. Preliminary data for 1985 consisted of 14 weeks of logbook records from two fishermen fishing near St. John Island in area 48 (Figure 24). It was not known if this small sample was representative of overall trends in the fishery; however it was used in a Leslie analysis. If the first two weeks of data were excluded from the analysis a reasonable regression can be achieved ($r = -0.78$, Figure 25). The corresponding estimate of B_o is 151 t which infers an exploitation level of 72% over the first one third of the season.

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Table 1: Season duration, number of licenses and gear and quota specifications for western Cape Breton Island, Prince Edward Island, northwest Newfoundland and southwestern Gulf of St. Lawrence snow crab, Chionoecetes opilio, fisheries in 1985.

Fishery		Season	Number of Licenses	# of traps	Quota
Western Cape Breton Island	Area 1	July 15 - Sept 15	61 inshore (2 offshore)	20	22680kg/licence
	Area 7	Aug. 3 - Oct. 31	23 inshore	30	36288kg/licence
Prince Edward Island	Area 25	Apr. 15 - July 16, Sept. 10 - Oct.10	16(experimental permits)	30	N/A
	Area 26	Apr. 15 - June 23, Aug. 9 - Aug. 14		30	N/A
Southwestern Gulf of St. Lawrence		Apr. 1 - June 22	79 (N.B.) 47 (P.Q.)	150 150	28,000 t
Northwest Newfoundland		Apr. 20 - Dec. 31	4 (experimental permits	200(Japanese conical)	N/A

Table 2: Trends in catch, effort and quotas for the southwestern Gulf of St. Lawrence snow crab, Chionoecetes opilio, fishery (1968-1985).

Year	C.P.U.E. (kg/trap haul)	Total catch (t)	# of trap haul	Quota t
1968	30.32(1)	3758(1)	25960(1)	-
1969	38.28(1)	7145(1)	21694(1)	-
1970	52.22(1)	5482(1)	45364(1)	-
1971	47.51(1)	5388(1)	2893(1)	-
1972	42.18(1)	4896(1)	888(1)	-
1973	19.74(1)	6744(1)	13713(1)	-
1974	25.80(1)	6621(1)	1584(1)	-
1975	31.88(1)	4630(1)	3951(1)	-
1976	23.01(1)	4384(1)	3873(1)	-
1977	29.38(1)	9450(1)	159825(1)	-
	N.B. Quebec			
1978	27.9(3) 18.0(3)	10462(4)	438697(4)	-
1979	35.7(3) 23.8(3)	15794(2)	506853(4)	-
1980	50.6(3) 34.9(3)	14854(2)	328178(4)	-
1981	61.8(3) 34.7(3)	20067(2)	396759(4)	-
1982	66.8(3) 41.2(3)	28495(2)	499709(4)	-
1983	65.5(3) 42.7(3)	24342(2)		-
1984	66.7(3) 43.9(3)	26062(2)		26000
1985	57.3 - combined	25158	439096	28000

(1) Bailey, R. 1978a CAFSAC Res. Doc. 78/27
(2) CAFSAC Advisory Document 85/20
(3) CAFSAC Advisory Document 86/2
(4) CAFSAC Advisory Document 83/12

Table 3: Weekly effort and catch data for the 1985 Prince Edward Island snow crab, Chionoecetes opilio fishery.

Week	Total Catch, C_t (kg)	$C_t/2$ (kg)	# of trap hauls	CPUE (kg/trap haul)	Cumulative Catch, K_t (t)
1	3624.7176	1812.3588	168	21.9	1.8
2	40107.3120	20053.6560	795	48.6	23.7
3	64740.0600	32370.0300	1213	52.6	76.1
4	51814.7280	25907.3640	1148	42.9	134.4
5	54020.5840	27010.2920	740	51.7	187.3
6	92705.4072	46352.7040	1631	56.3	260.7
7	91724.7240	45862.3620	1424	64.4	352.9
8	122199.8400	61099.9200	1570	60.0	459.8
9	74861.2368	37430.6190	1138	41.0	558.4
10	52501.9320	26250.9660	1206	45.1	622.0
11	3709.0872	1854.5486	118	31.4	650.2
12	15049.9944	7524.9970	429	36.7	659.5
13	5491.2816	2745.6408	176	31.2	669.8
14	-	-	-	-	-
15	-	-	-	-	-
16	-	-	-	-	-
17	-	-	-	-	-
18	2172.7440	1086.3720	110	18.3	673.6
19	-	-	-	-	-
20	-	-	-	-	-
21	1080.4752	540.2376	30	36.0	675.3
22	30424.7664	15212.3830	830	36.1	691.0
23	4840.8192	2420.4000	150	32.3	708.6
24	54551.7504	27275.8750	1281	42.7	738.3
25	34313.4792	17156.7400	973	36.5	782.8
26	1453.7880	726.8940	45	31.0	300.7
27	273.0672	136.5336	15	18.2	801.5
Total = 801661.79			Total = 15190	Mean = 52.8	

Table 4: Weekly effort and catch data for the 1985 western Cape Breton Island, area 1, snow crab, Chionoecetes opilio, fishery.

Week	Total Catch C_t (kg)	$C_t/2$ (kg)	# trap hauls	$CPUE_t$* (kg/trap haul)	$CPUE_{1-3D}$** (kg/trap haul)	Cumulative Catch K_t (t)
1	133047.7	66523.9	2818	47.1	47.1	66.5
2	231889.4	115944.7	5771	39.8	40.1	249.0
3	169734.4	84867.2	4962	34.1	33.7	449.8
4	192364.0	96182.0	6039	31.8	31.4	630.9
5	172010.6	86005.3	5188	33.0	33.3	813.0
6	146501.9	73250.9	4577	31.4	32.0	972.3
7	94628.2	47314.1	2961	31.6	31.6	1092.9
8	52766.1	26383.2	1626	31.0	30.5	1166.6
9	27871.0	13935.5	1028	26.6	26.9	1206.9
10	13669.2	6834.6	533	26.3	26.5	1227.6

Total= 1,234,482.7 Total = 35503 Mean = 34.8

* - calculated for all data regardless of soak days.

** - calculated for data for which soak days were 3 or less.

Table 5: Trends in initial (B_0) and final (B_f) biomass estimates, exploitation level, and initial ($CPUE_0$), final ($CPUE_f$) and mean (CPUE) catch per unit effort for the snow crab, Chionoecetes opilio, fishery off western Cape Breton Island.

	Area 1							Area 7						
Year	Exploitation (level%)	B_0(t)	B_f(t)	Trap hauls	$CPUE_0$ (kg/trap haul)	$CPUE_f$ (kg/trap haul)	CPUE(max-min) (kg/trap haul)	Exploitation level(%)	B_0 (t)	B_f (t)	Trap hauls	$CPUE_0$ (kg/trap haul)	$CPUE_f$ (kg/trap haul)	CPUE(max-min) (kg/trap haul)
1978	64	3016(6)	1075	26301*	86.4	55.0	73.8(86.4-51.8)		-	-		-	-	-
1979	62	2239(5)	848	20436	69.3	45.2	68.0(75.1-45.2)	50.3	428(5)	212.8	4449	37.3	30.7	47.8(61.0-37.3)
1980	60	1838(7)	733	12360	112.0	52.6	89.4(112.0-52.6)		-	-	10242	61.2(7)	47.7	48.3(61.2-39.4)
1981	47	1690(8)	894	13413	-	-	59.3		-	-	7554	-	-	48.4(8)
1982	44.7	2282(3)	1329	9896	114.0	45.0	96.0(114.0-45.0)		-	-	13365	98.0(3)	23.0	62.0(122.0-23.0)
1983	54.7	1654(4)	748	10541	98.5	36.3	81.8(98.5-32.8)	45.8	1577(2)	854	16669	41.4	34.0	43.4(49.9-33.8)
1984	67.2	2240(1)	925	26034	93.2	51.5	50.5(93.2-33.9)	40.1	1147(1)	687	12877	41.9	27.2	35.8(41.9-27.2)
1985	34.8	3291	2057	35503	47.1	26.3	34.8(47.1-26.3)	71.3	753	216	17109	49.1	24.1	31.4(49.1-17.2)

(1) Cormier and Comeau, 1986
(2) Cormier and Bailey, 1984
(3) Bailey and Cormier, 1983a
(4) Cormier and Bailey, unpublished data
(5) Elner and Robichaud, 1980
(6) Bailey, 1978b
(7) Elner and Robichaud, 1981
(8) Elner, 1982
* 23616 (1.5m x 1.5m) trap hauls + 4540 conical trap hauls - see Bailey 1978 for calculation of total trap hauls.

Table 6: Weekly effort and catch data for the 1985 southwestern Cape Breton Island, area 7, snow crab, Chionoecetes opilio, fishery.

Week	Total Catch C_t (kg)	$C_t/2$	# of traps haul	* $CPUE_t$ (kg/trap haul)	** $CPUE_{1-3d}$ (kg/trap haul)	Cumulative Catch K_t (t)
1	81515	90757.645	3694	49.1	49.2	90.76
2	113696	56848.1	2781	40.9	40.9	238.36
3	82868	41433.865	3082	26.8	26.8	336.65
4	48342	24170.76	1768	27.3	26.6	402.25
5	48934	24466.957	2449	19.8	19.9	450.89
6	21758	10878.916	1116	19.5	18.8	486.23
7	20361	10180.598	1183	17.2	17.1	496.41
8	15429	7714.375	798	19.0	19.0	525.19
9	3782	1891.0584	178	20.7	19.3	534.79
10	-	-	-	-	-	-
11	722	361.179	60	24.1	-	537.05
Total = 537407		Total = 17109		Total = 31.4		

* - calculated for all data regardless of soak days.
** - calculated for data for which soak days were 3 or less.

Table 7: Weekly effort and catch data for the 1985 Southwestern Gulf of St Lawrence snow crab, Chionoecetes opilio, fishery - overall fishery.

Week	Total Catch C_t (t)	$C_t/2(t)$	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t(N)$	(2) N.B. * $CPUE_t(N)$	(3) N.B. ** $CPUE_{1-3D}(N)$	Mean $CPUE_t$ [(1)+(2)]	Mean $CPUE_{t+1-3D}$ [(1)+(3)]	Cumulative catch, $K_t(t)$
1	212.1	106.0	540	3309	56.4(61)	53.0(6)	91.2(3)	56.1	58.0	106.0
2	1845.3	922.6	10310	12885	73.3(167)	85.9(94)	83.6(58)	77.8	76.0	1134.7
3	1518.9	759.4	11394	13351	59.2(159)	69.7(61)	76.3(61)	63.3	63.9	2816.8
4	1801.1	900.5	16313	15685	48.7(177)	59.7(144)	57.3(90)	53.6	51.6	4476.7
5	3102.3	1551.1	31943	18005	53.0(201)	62.2(237)	59.6(176)	57.9	56.0	6928.5
6	3266.4	1633.2	32541	17249	62.5(205)	67.1(235)	62.5(166)	65.0	62.5	10111.2
7	2696.5	1348.2	29607	16739	55.8(200)	58.6(209)	57.2(144)	57.2	56.4	13092.6
8	2609.6	1304.8	30456	17217	51.9(200)	51.3(221)	47.8(143)	51.6	50.2	15745.6
9	2380.0	1190.0	30398	18346	44.1(201)	50.4(220)	48.8(146)	47.4	46.1	18240.4
10	1752.0	876.0	23380	14096	43.2(161)	48.6(179)	48.3(111)	46.0	45.3	20306.4
11	1724.3	862.1	19944	12869	47.9(152)	54.2(144)	53.7(90)	51.0	50.1	22044.5
12	1741.4	870.7	17611	15752	44.7(180)	55.5(158)	54.5(103)	49.7	48.3	23777.3
13	507.7	253.8	3844	5312	50.3(82)	61.2(47)	68.2(29)	54.3	55.0	24901.8
		Subtotal	258281	180815						
Total	25157.6		Total (a+b) = 439096					Mean = 57.3		

* - calculated for all data regardless of soak days.

** - calculated for data for which soak days were 3 or less.

N = # of trip

CPUE unit = kg/trap haul

Table 8: Weekly effort and catch data for the 1985 northwestern Newfoundland snow crab, Chionoecetes opilio, fishery.

Week	Total Catch, C_t (kg)	$C_t/2$(kg)	# of trap hauls	CPUE (kg/trap haul)	Cumulative Catch, K_t (t)
1	19380.9672	9690.4835	1640	12.3	9.7
2	27123.012	13561.506	1600	17.0	32.9
3	23671.5696	11835.785	1260	20.3	58.3
4	16087.8312	8043.9155	1410	12.2	78.2
5	9218.5128	4609.2564	750	12.1	90.9
6	4797.2736	2398.6368	300	16.4	97.9
7	2747.4552	1373.7276	285	9.4	101.7
8	4439.3832	2219.6916	400	11.1	105.2
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-
13	-	-	-	-	-
14	889.9632	444.9816	160	5.6	107.9
Total =108355.96			Total = 7805	Mean = 13.9	

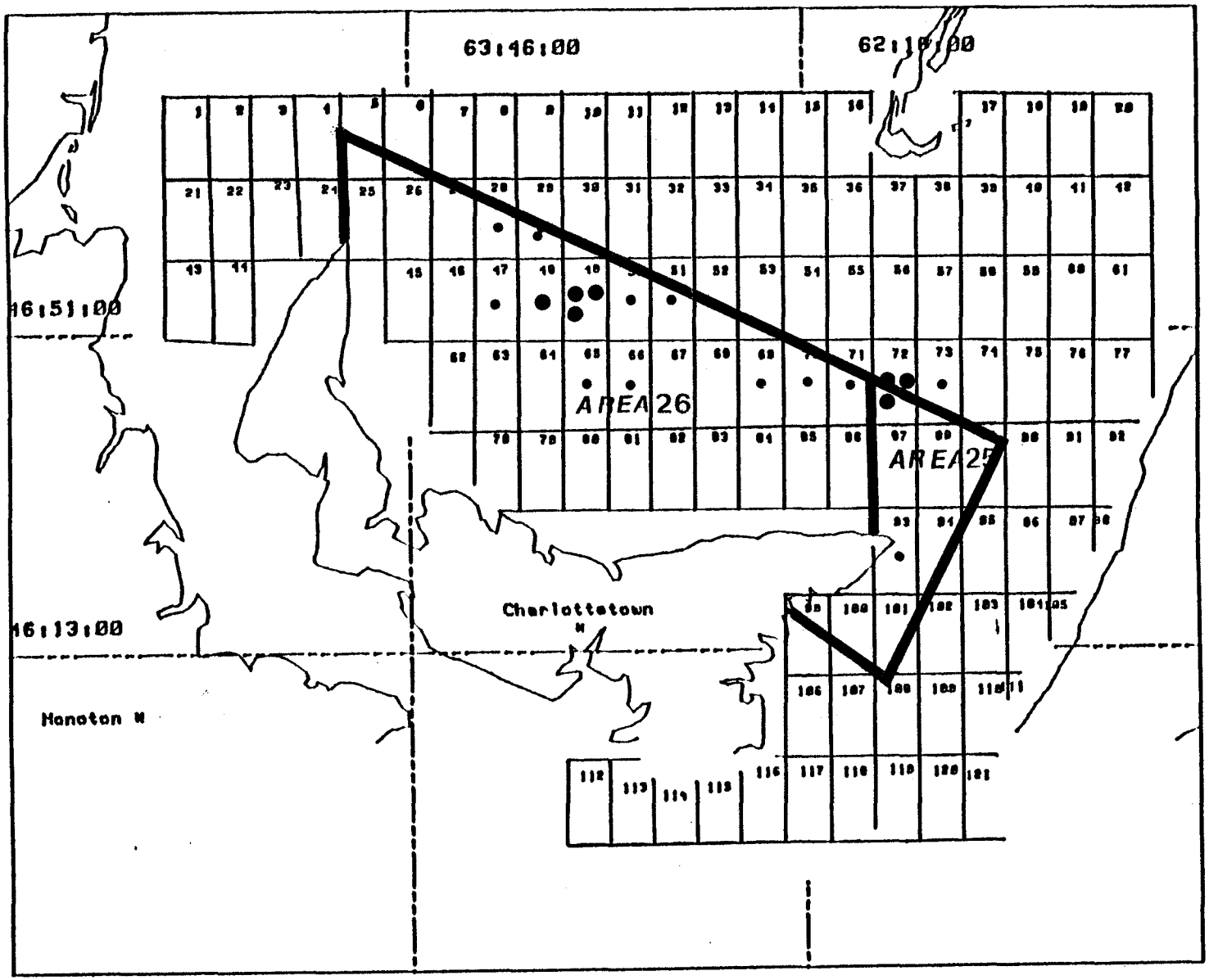

Figure 1. Distribution of fishing effort for the Prince Edward Island snow crab, Chionoecetes opilio, fishery in 1985.

•< 1000 traps hauled ● = 1000 traps hauled

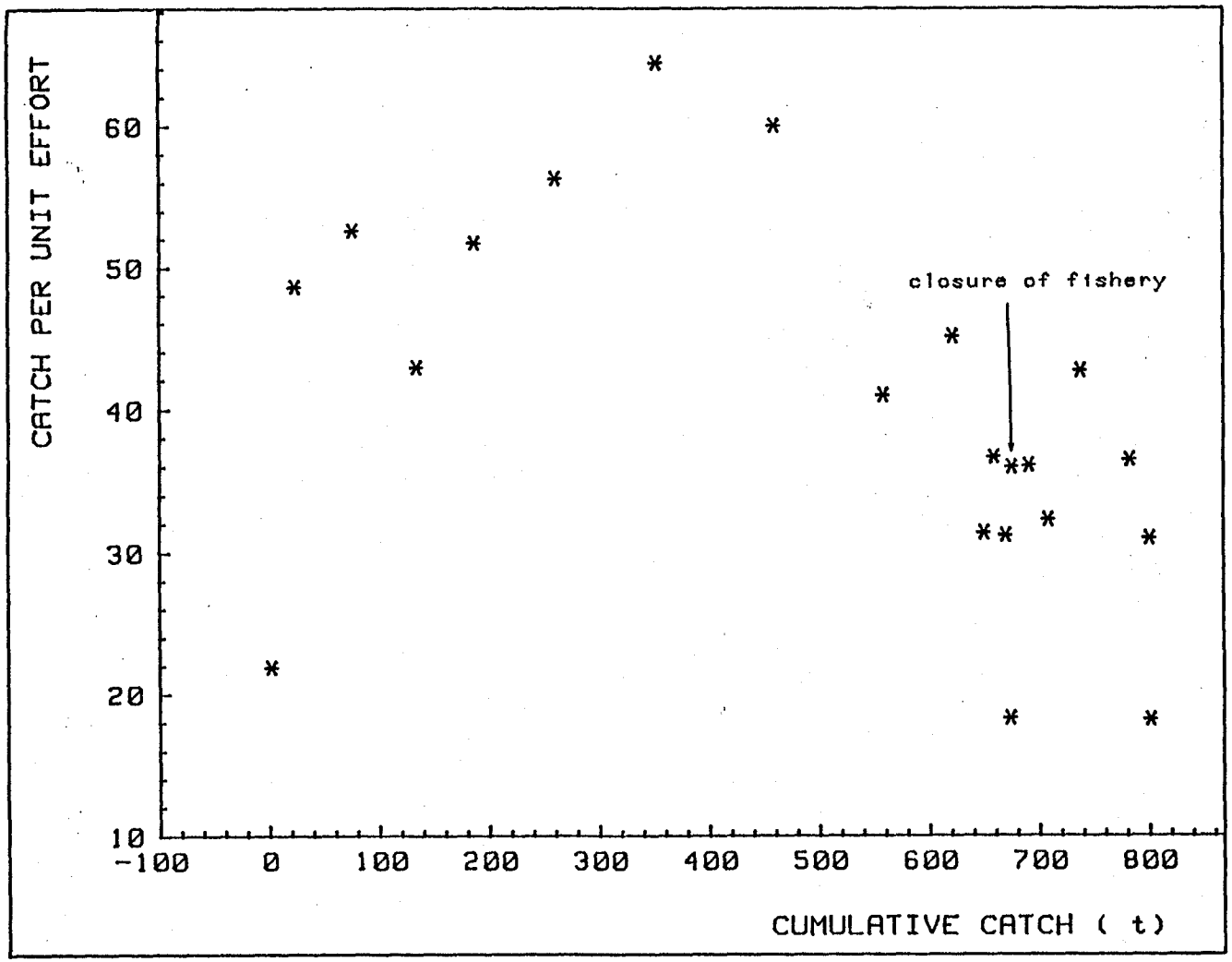

Figure 2. Cumulative catch (t) versus mean weekly catch per unit effort (kg/trap haul) for the 1985 Prince Edward Island snow crab, Chionoecetes opilio, fishery.

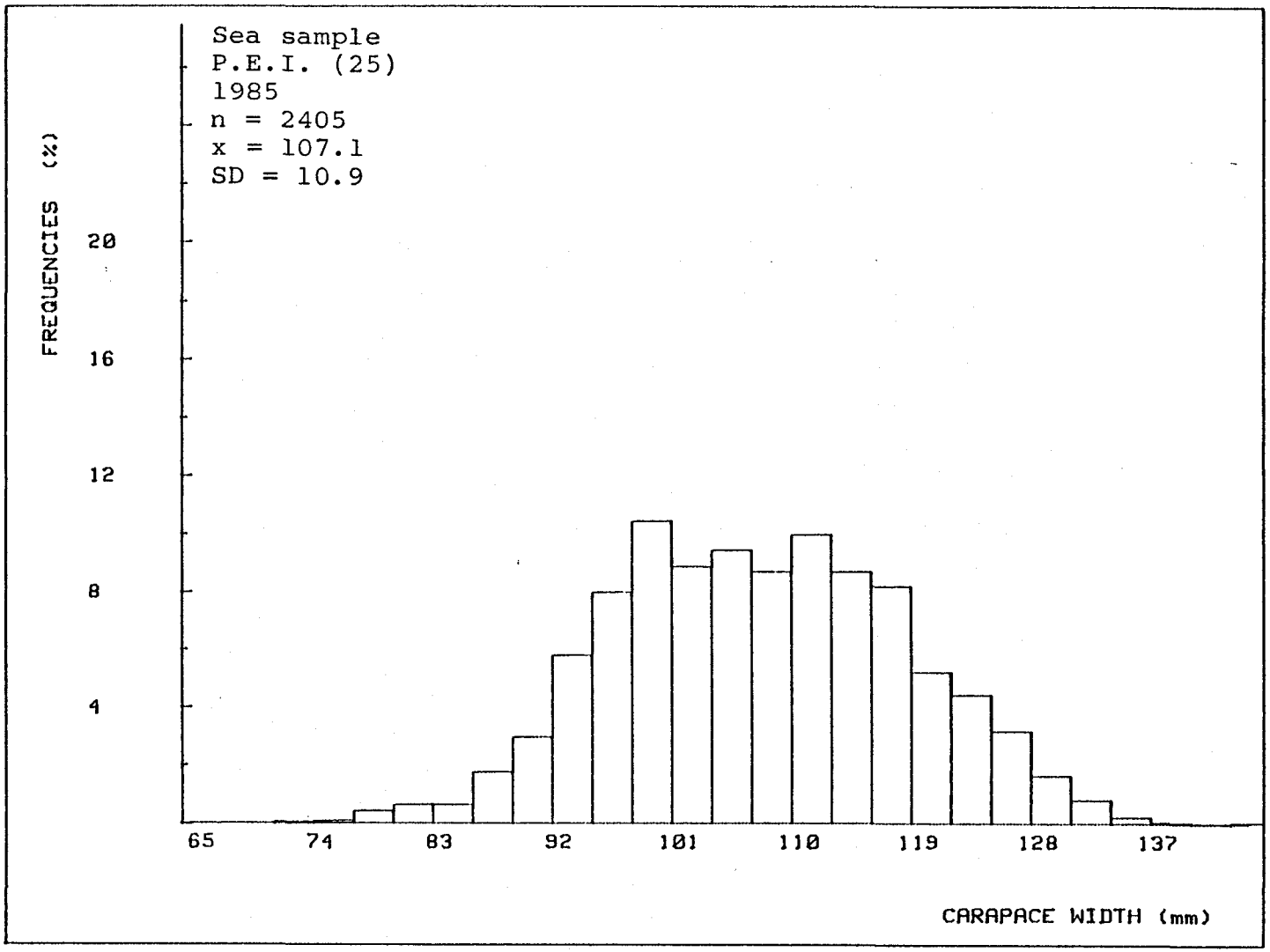

Figure 3. Carapace width frequency distribution for 1985 in Prince Edward Island area 25.

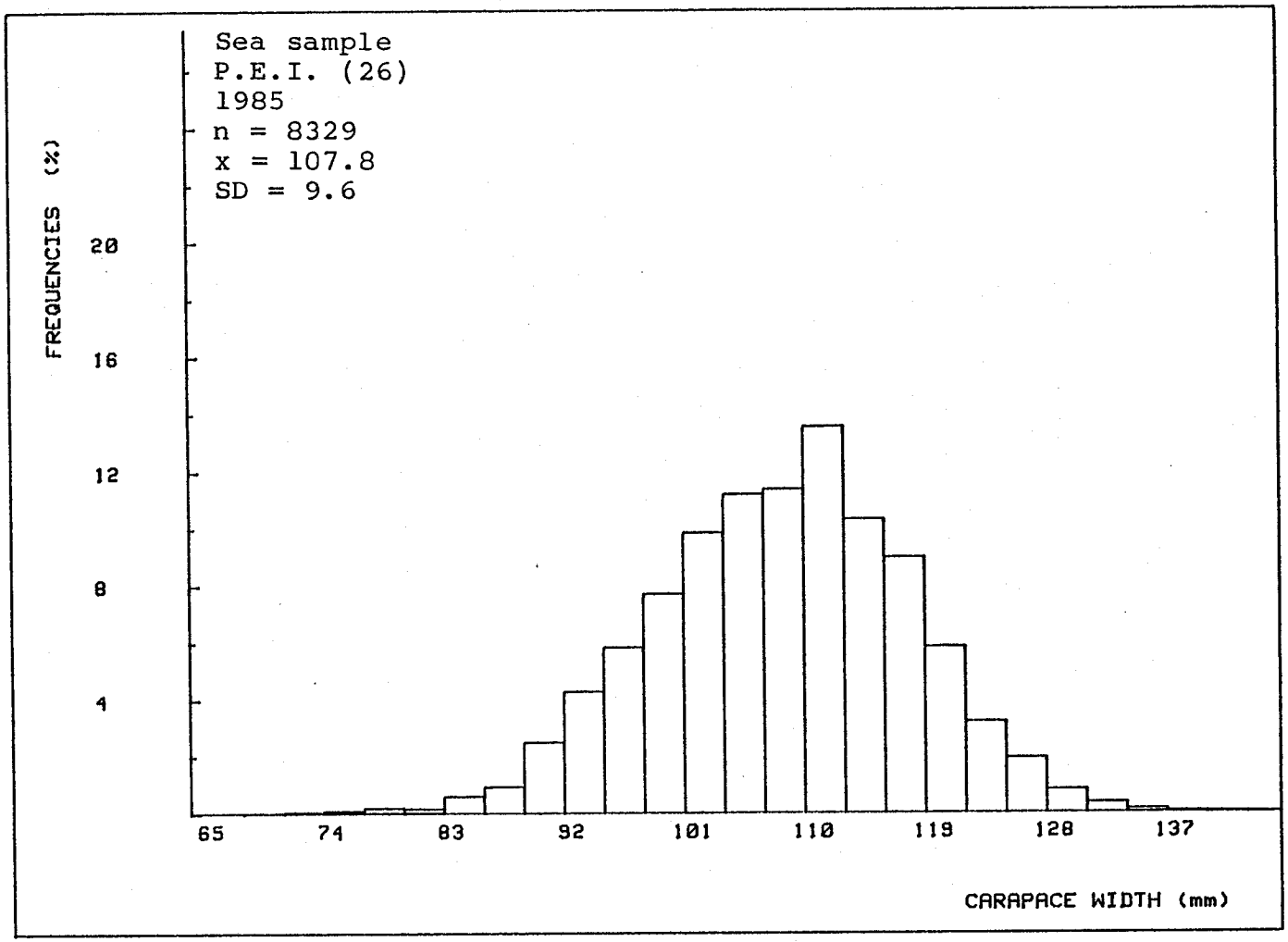

Figure 4. Carapace width frequency distribution for 1985 in Prince Edward Island area 26.

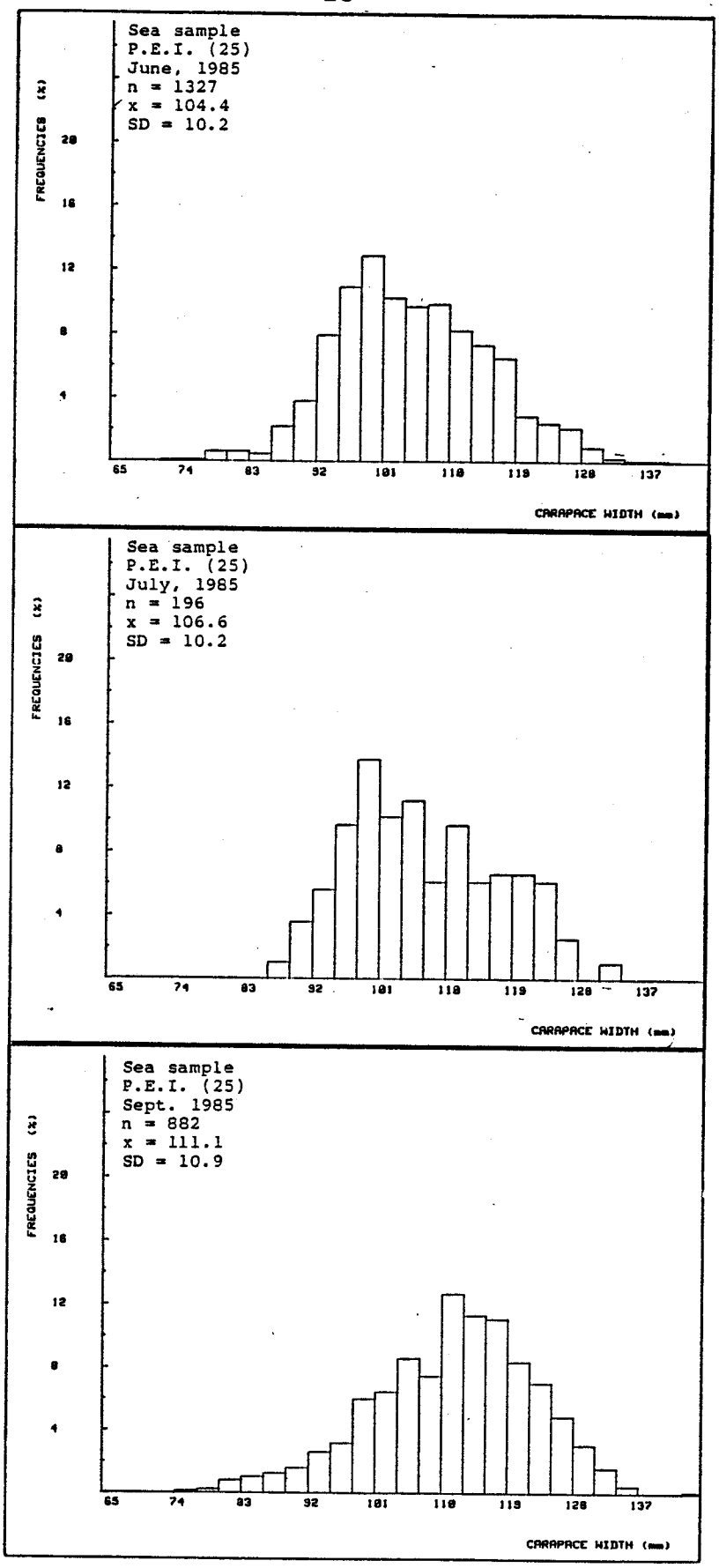

Figure 5. Monthly carapace width frequency distributions for 1985 in Prince Edward Island area 25.

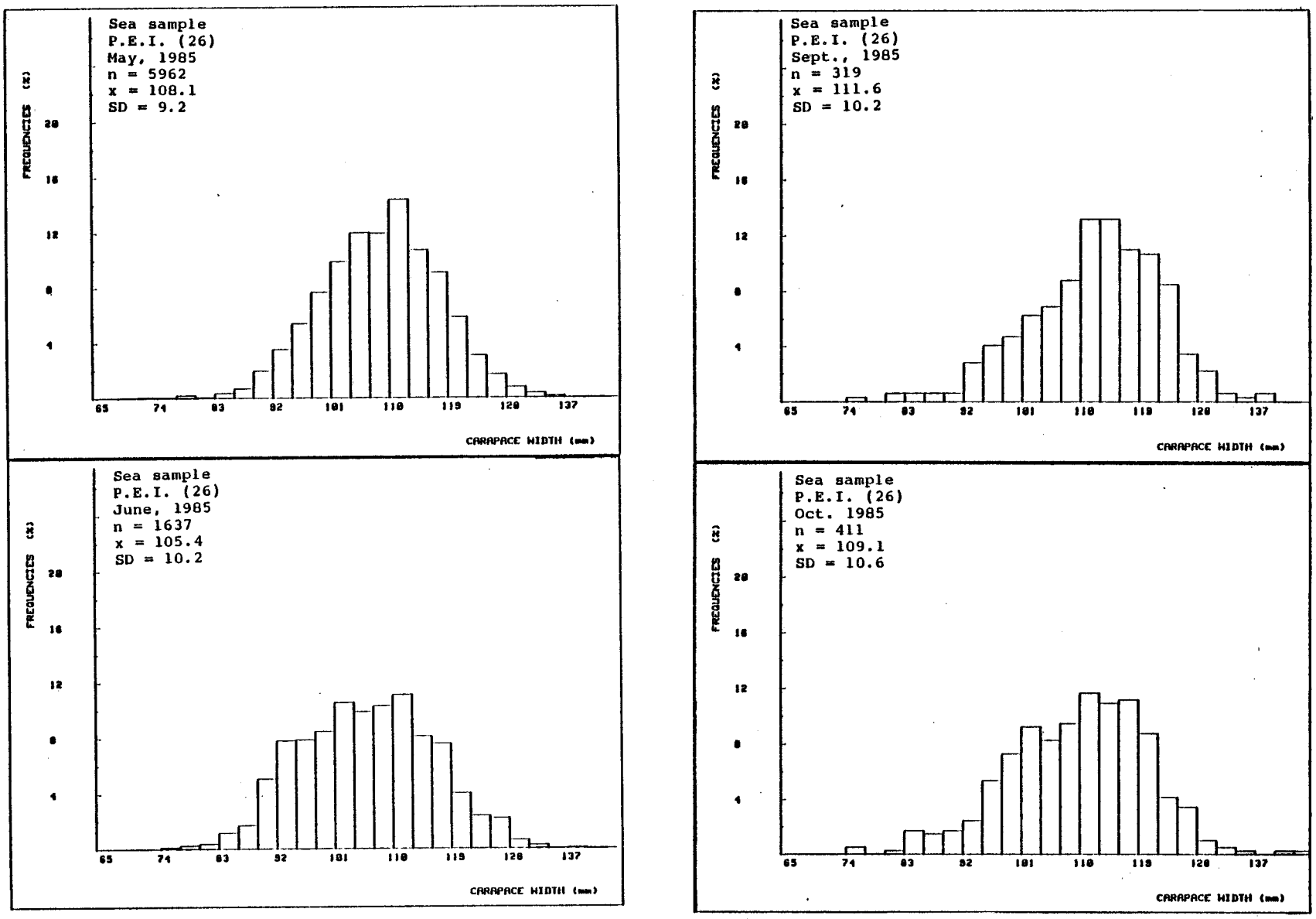

Figure 6. Monthly carapace width frequency distributions for 1985 in Prince Edward Island area 26.

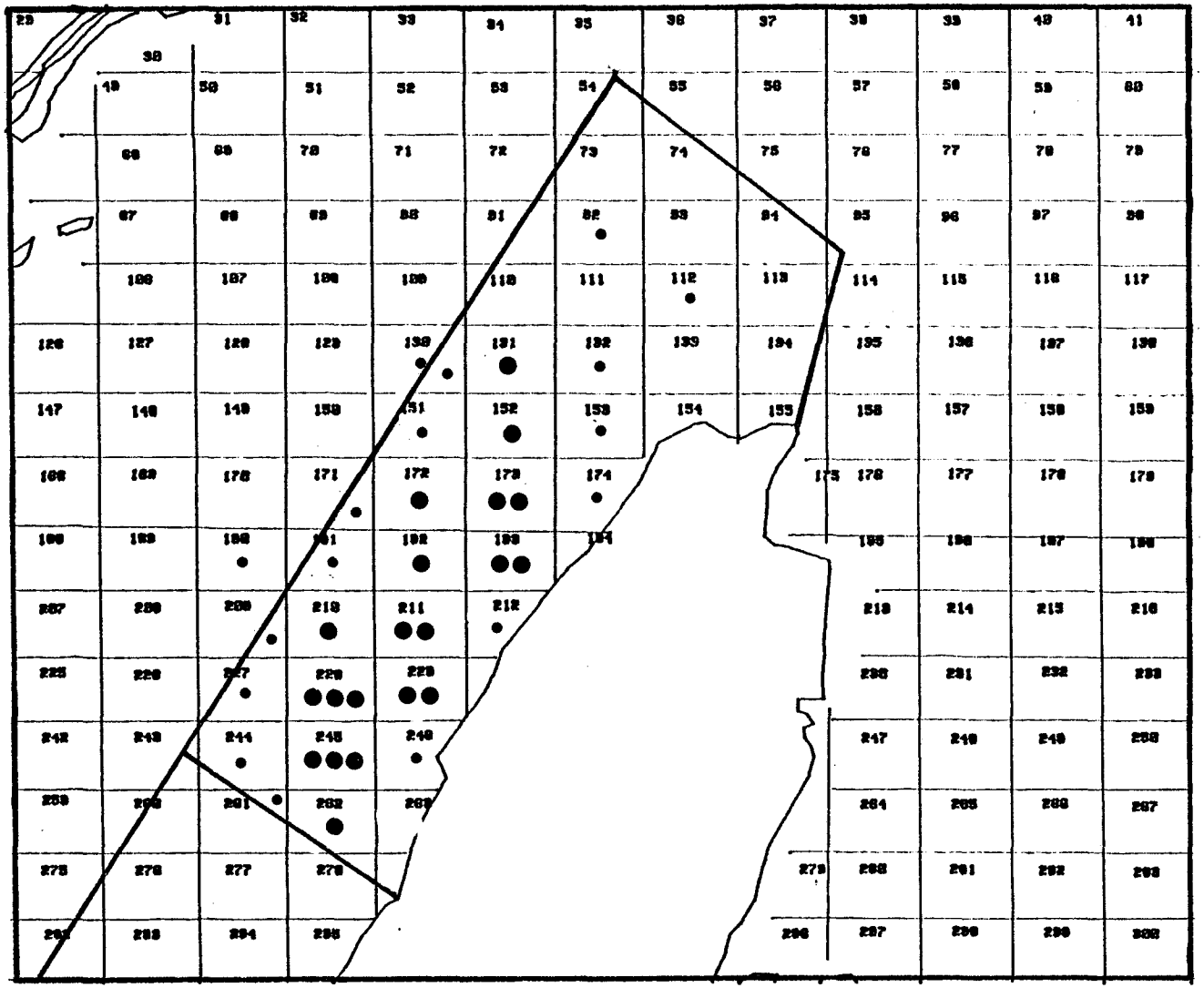

Figure 7. Distribution of fishing effort for the western Cape Breton Island snow crab, Chionoecetes opilio fishery in 1985 - Area 1.

•< 1000 traps hauled ●= 1000 traps hauled

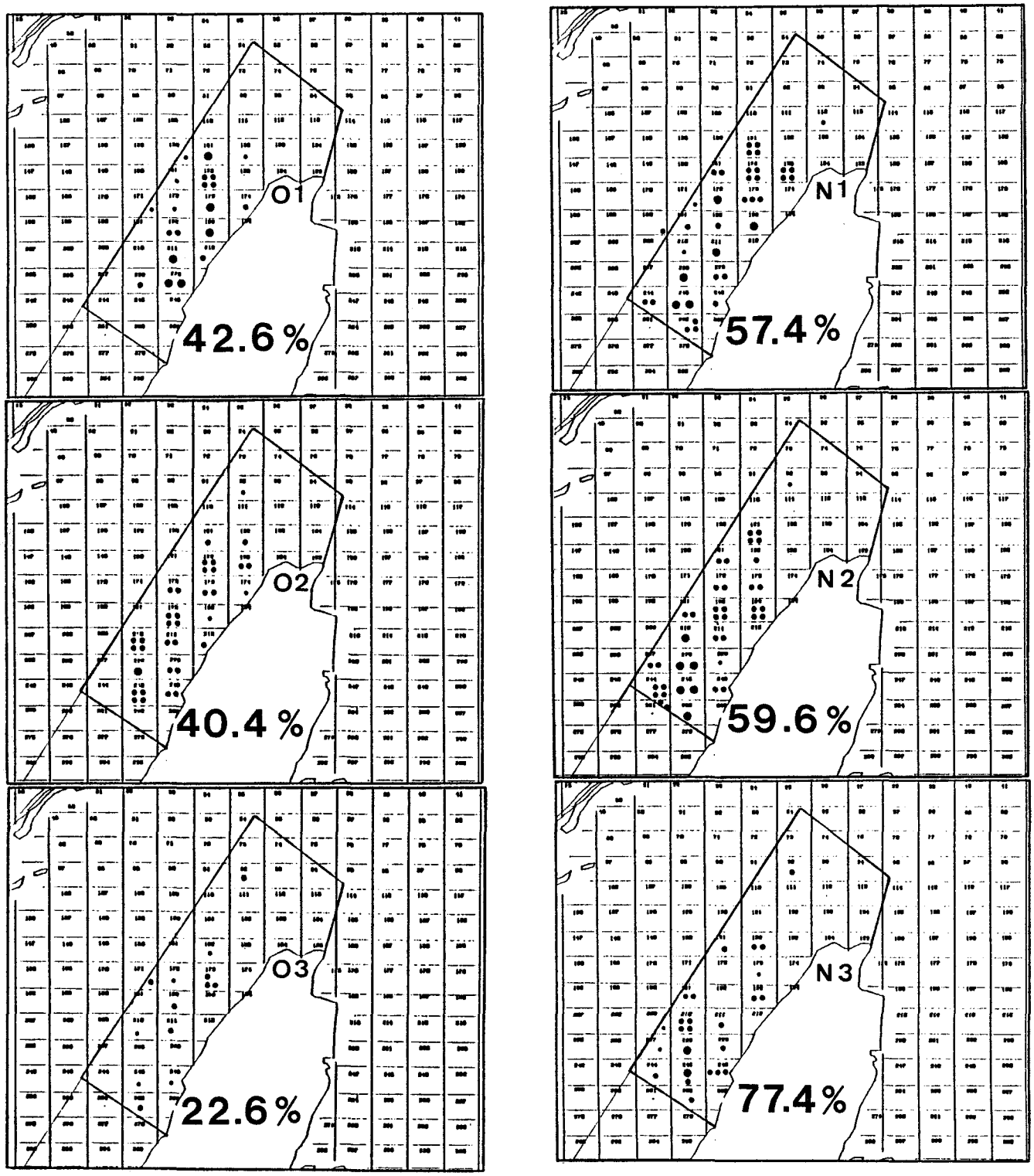

Figure 8 - Distribution of fishing effort and percentage of total effort for "old/ boats (o) and "new" boats (n) participating in the 1985 Area 1, western Cape Breton Island, snow crab (C. opilio) fishery.

1= weeks 1-3
2= weeks 4-6
3= weeks 7-10

• < 100 traps hauled
• = 100 traps hauled
• = 500 traps hauled

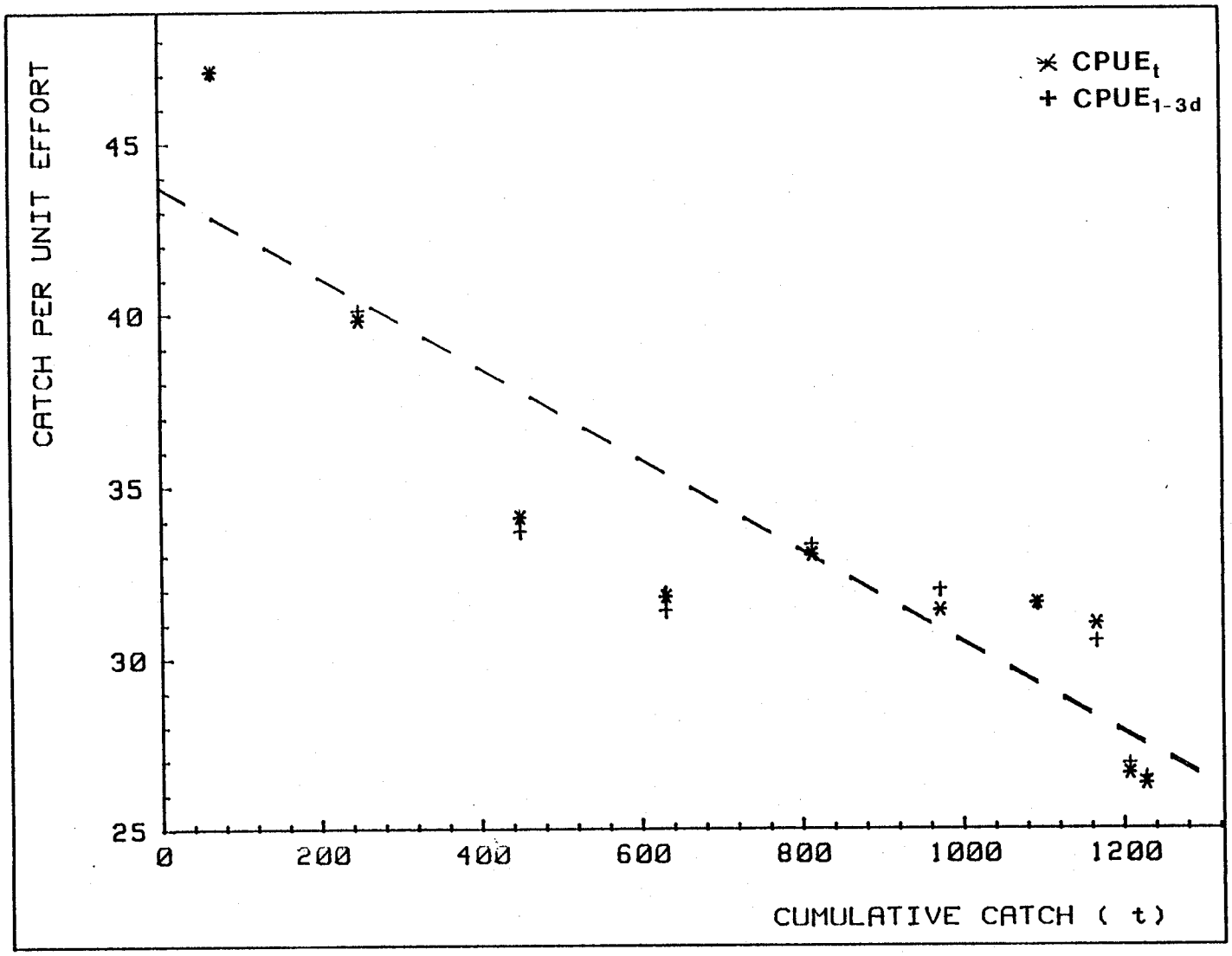

Figure 9 - Cumulative catch (t) versus mean weekly catch per unit effort (kg/trap haul) for the 1985 western Cape Breton Island snow crab, Chionoecetes opilio, fishery - Area 1.

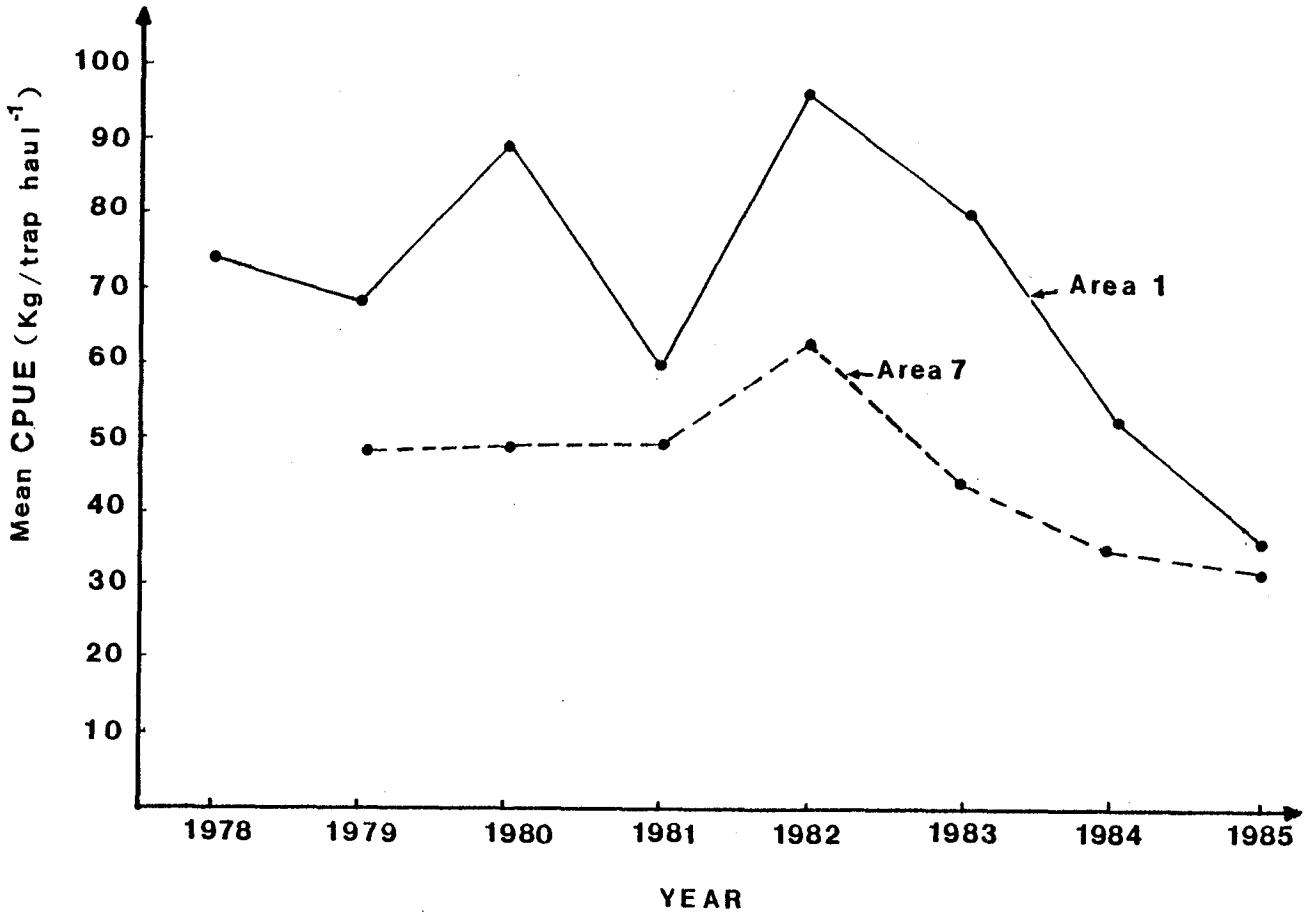

Figure 10 - Trends in mean CPUE (kg/trap haul) for the snow crab, Chionoecetes opilio fishery off western Cape Breton Island. (areas 1 and 7).

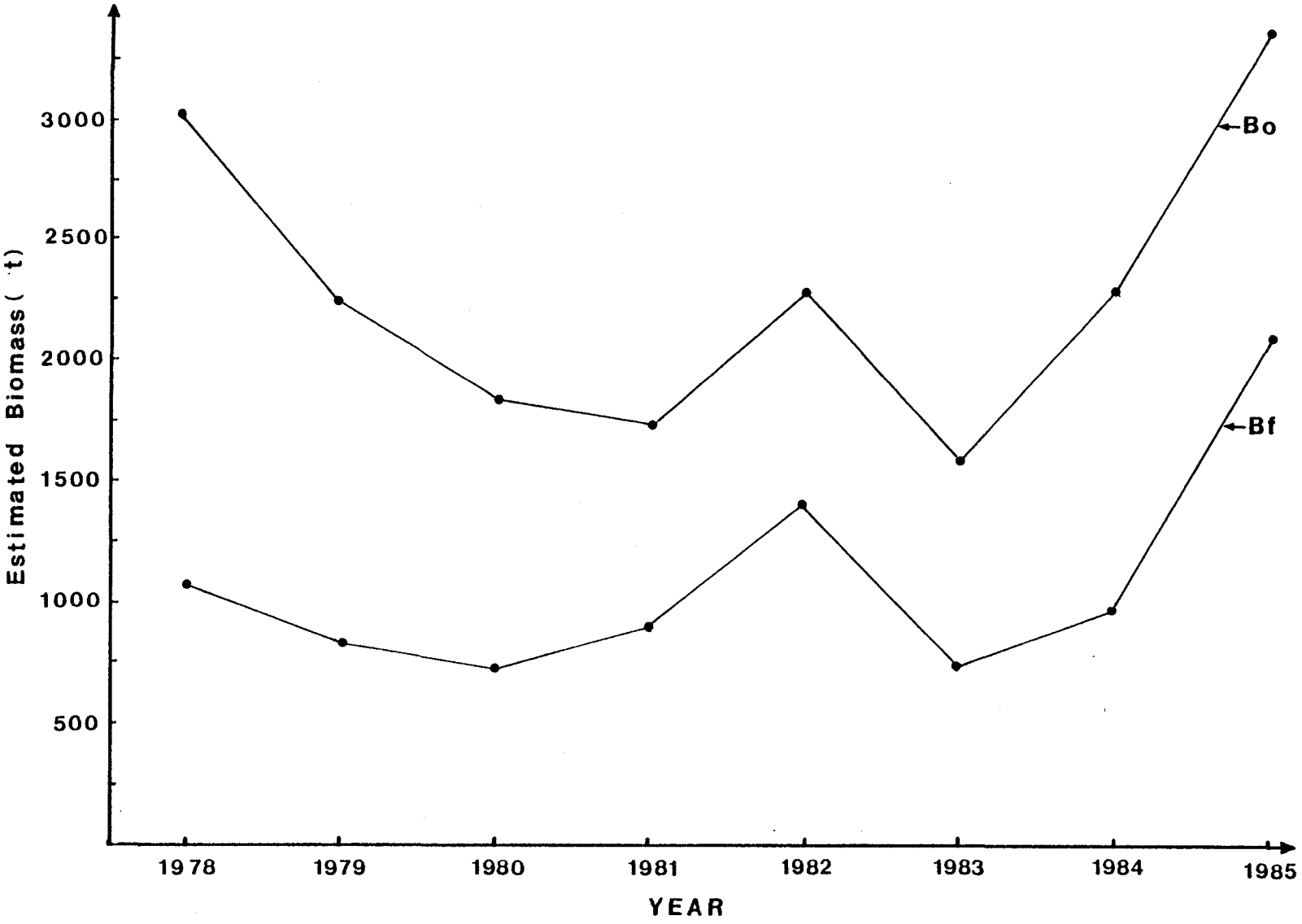

Figure 11 - Trends in initial (B_o) and final (B_f) biomass estimates for the snow crab, Chionoecetes opilio fishery off western Cape Breton Island - Area 1.

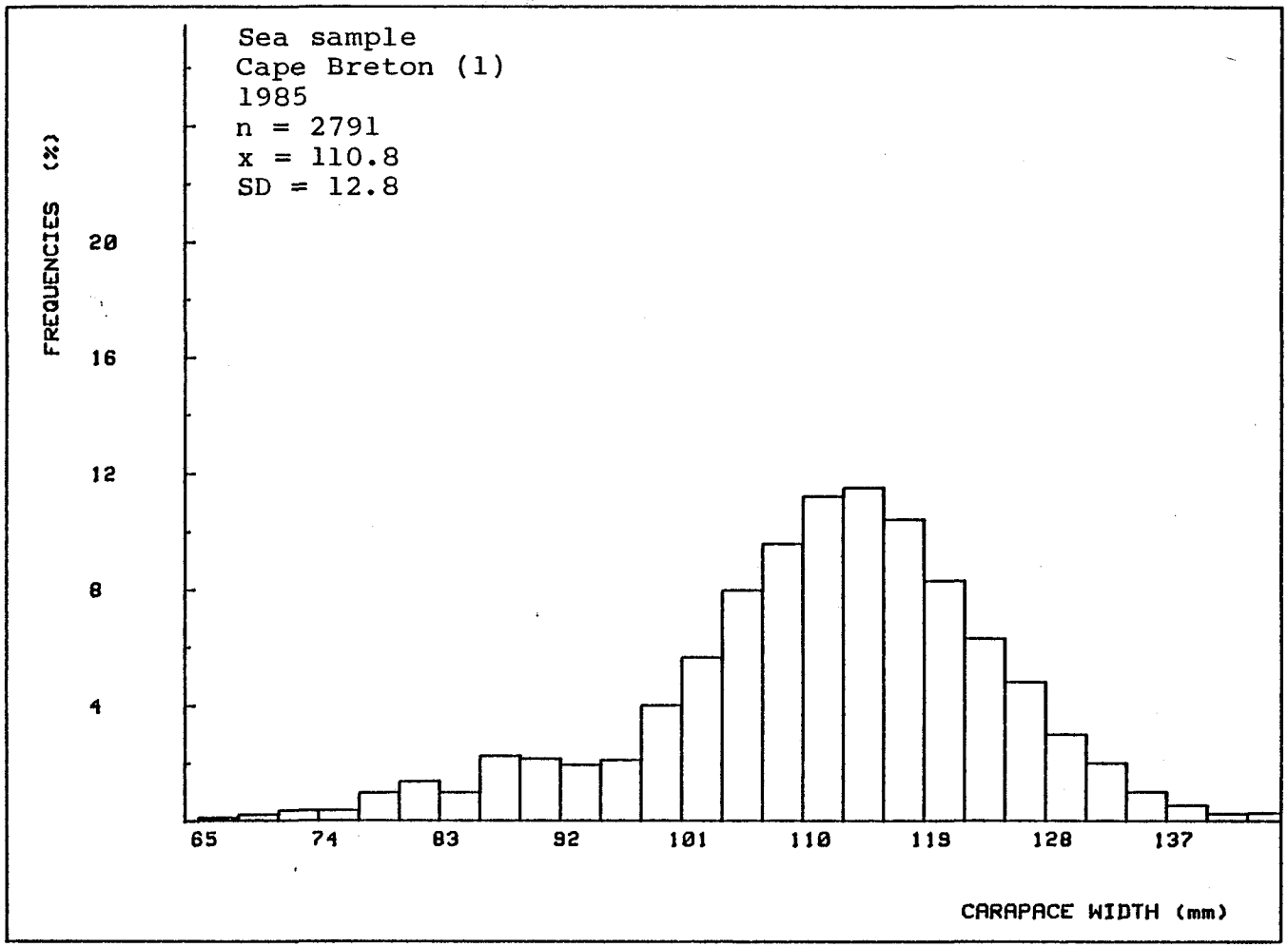

Figure 12 - Carapace width frequency distribution for 1985 in Cape Breton area 1.

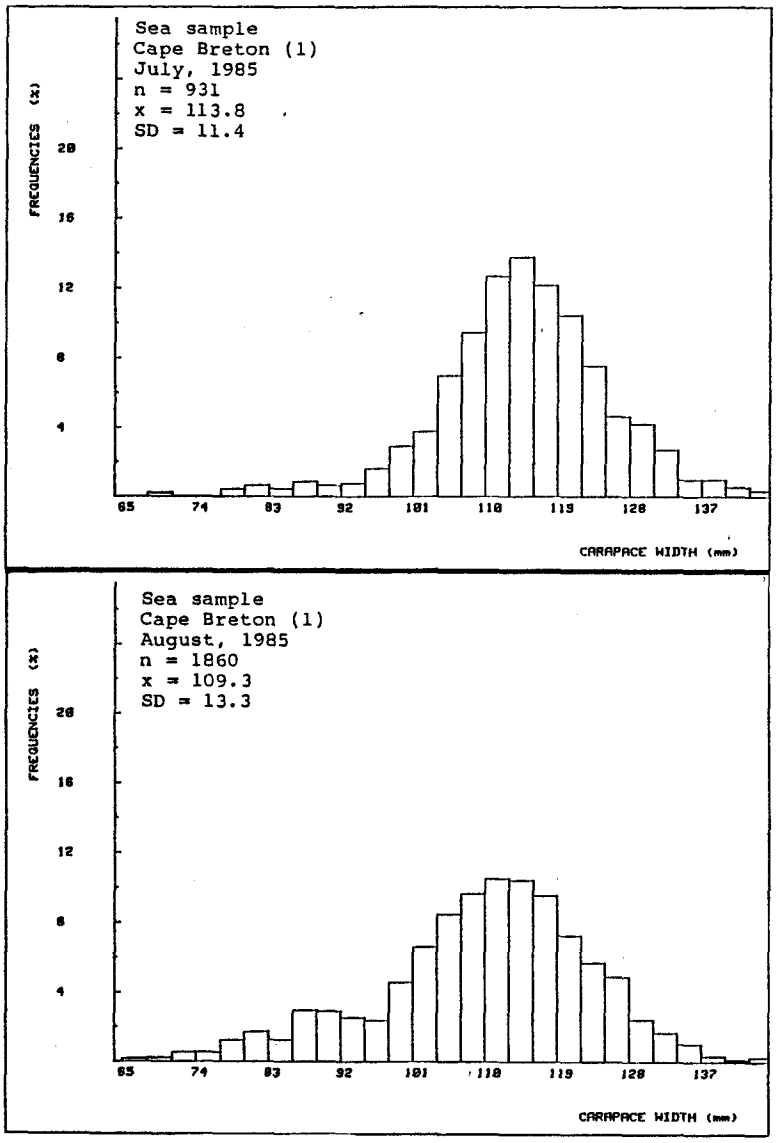

Figure 13 - Monthly carapace width frequency distributions for 1985 in Cape Breton area 1.

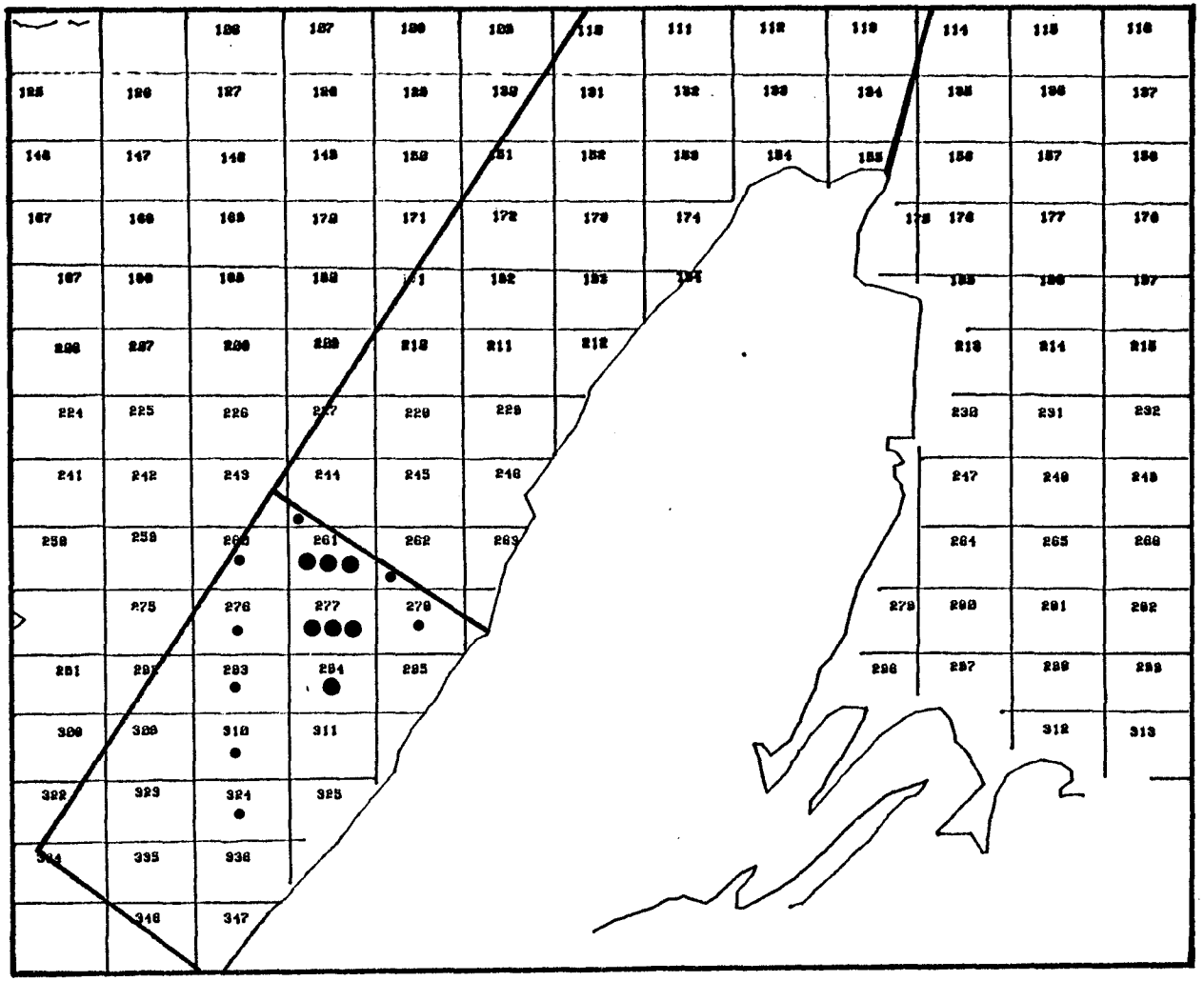

Figure 14 - Distribution of fishing effort for the western Cape Breton Island snow crab, Chionoecetes opilio fishery in 1985 - Area 7.

•<1000 traps hauled ●= 1000 traps hauled

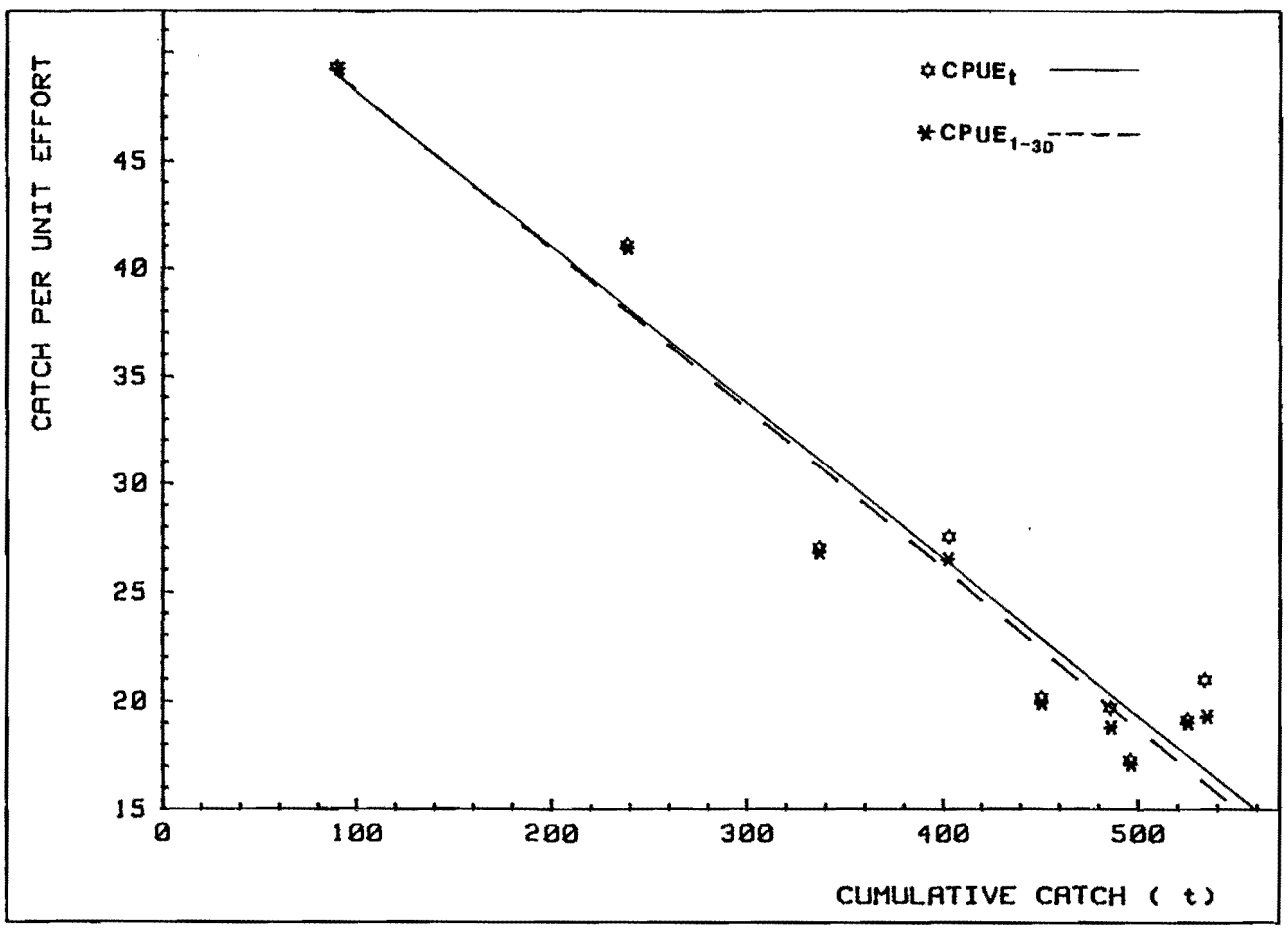

Figure 15 - Cumulative catch (t) versus mean weekly catch per unit effort (kg/trap haul) for the 1985 western Cape Breton Island snow crab, Chionoecetes opilio fishery - Area 7.

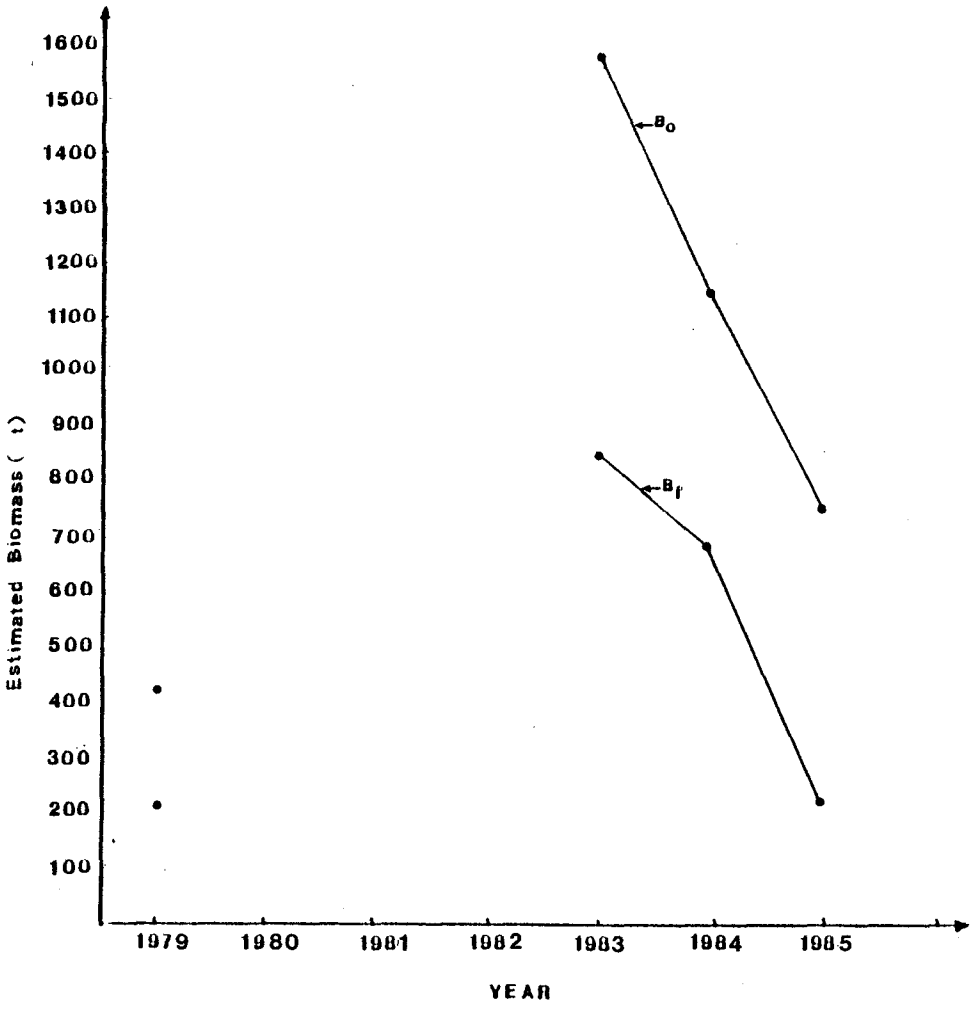

Figure 16 - Trends in initial (B_o) and final (B_f) biomass estimates for the snow crab, Chionoecetes opilio, fishery off western Cape Breton Island - Area 7.

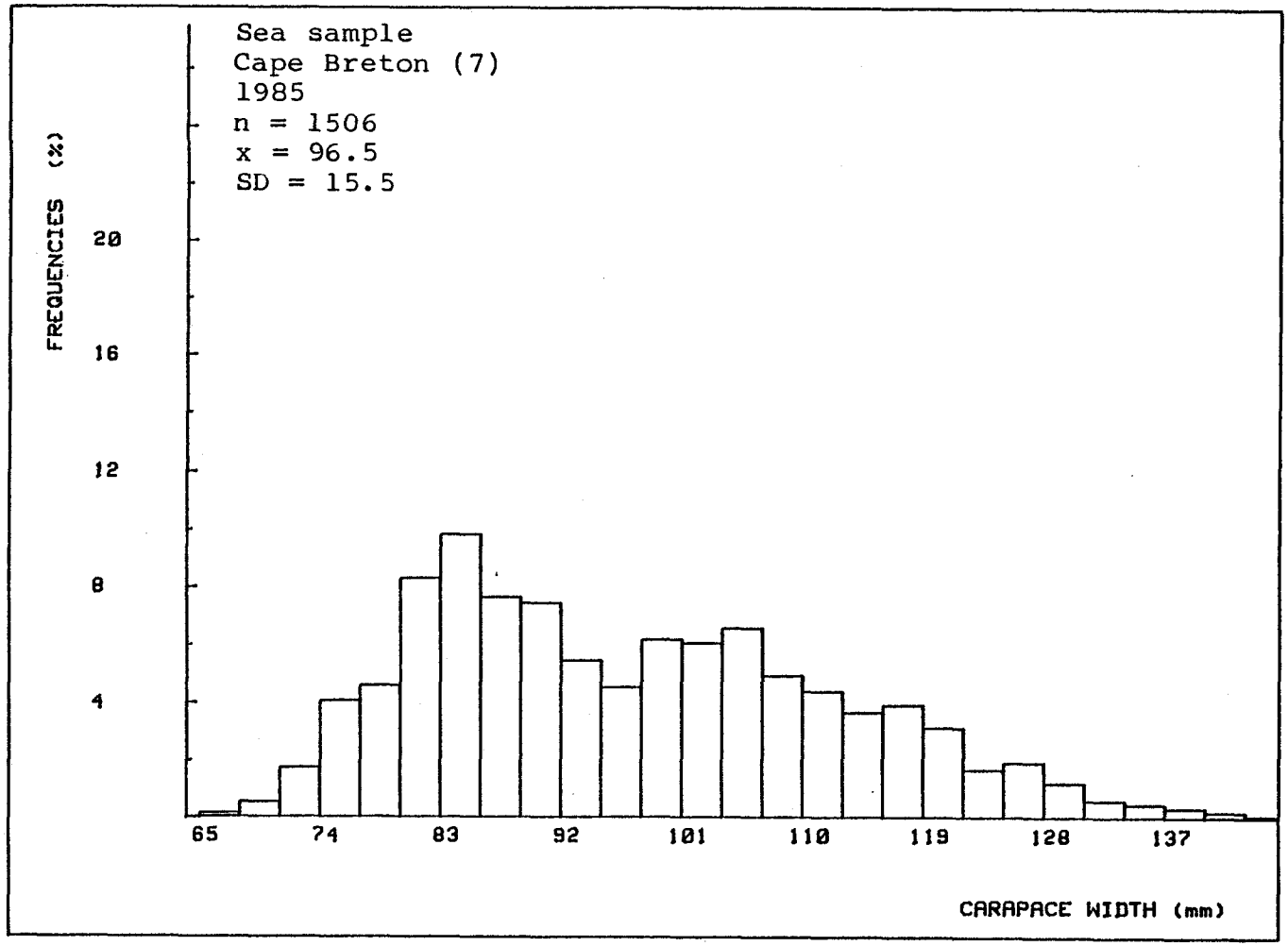

Figure 17 - Carapace width frequency distribution for 1985 in Cape Breton area 7.

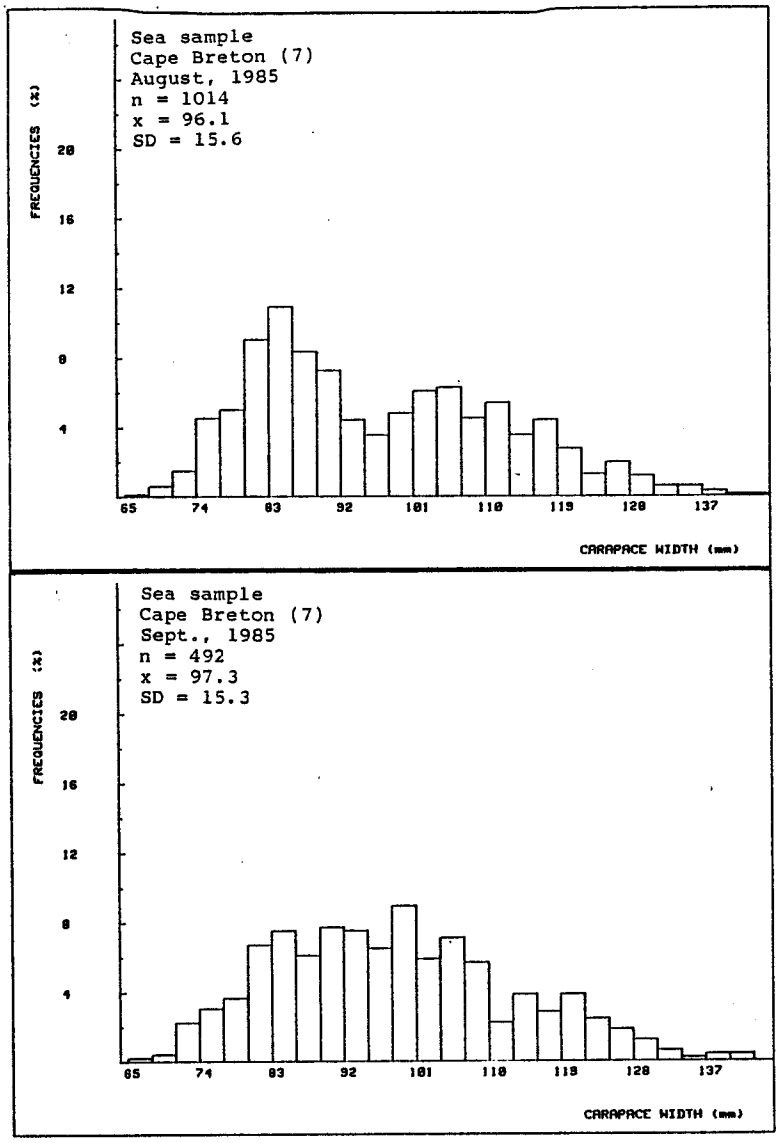

Figure 18 - Monthly carapace width frequency distributions for 1985 in Cape Breton area 7.

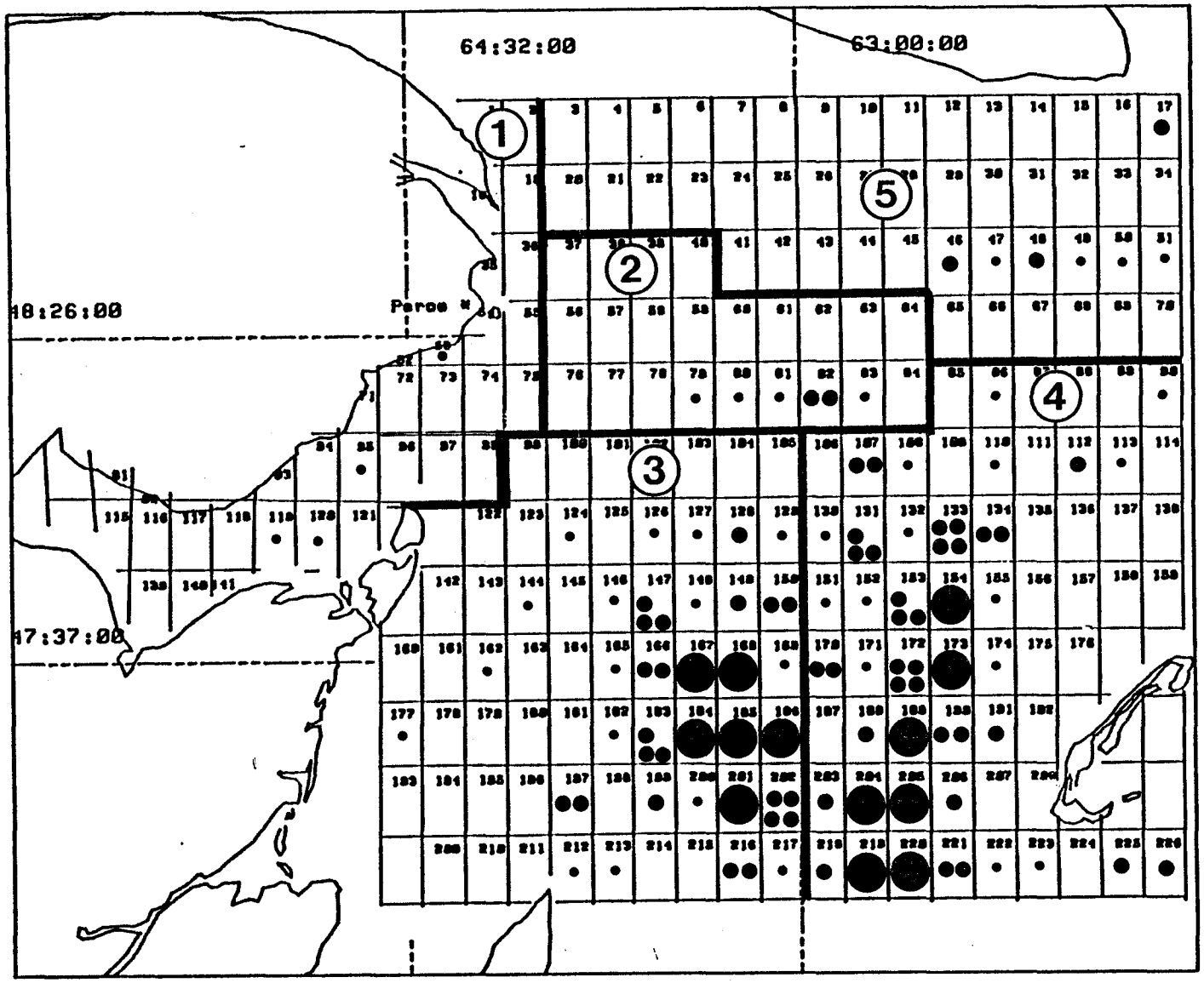

Figure 19 - Distribution of fishing effort for the southwestern Gulf of St Lawrence snow crab, Chionoecetes opilio, fishery in 1985 - the New Brunswick fleet.

• < 1000 traps hauled
● 1000-4999 traps hauled
⬤ ≥ 5000 traps hauled

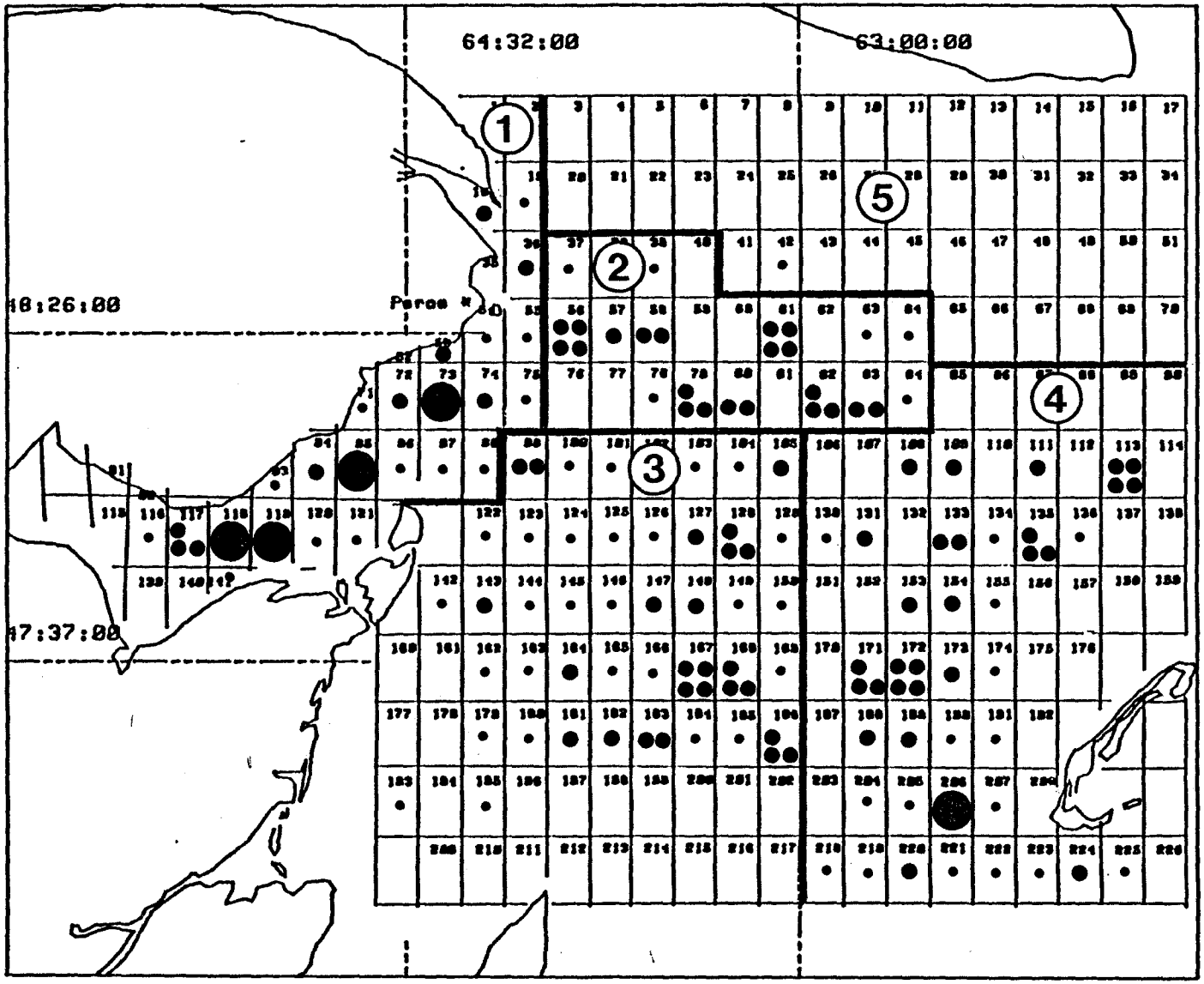

Figure 20 - Distribution of fishing effort for the southwestern Gulf of St Lawrence snow crab, Chionoecetes opilio, fishery in 1985 - the Quebec fleet.

• < 1000 traps hauled
● 1000-4999 traps hauled
● ≥ 5000 traps hauled

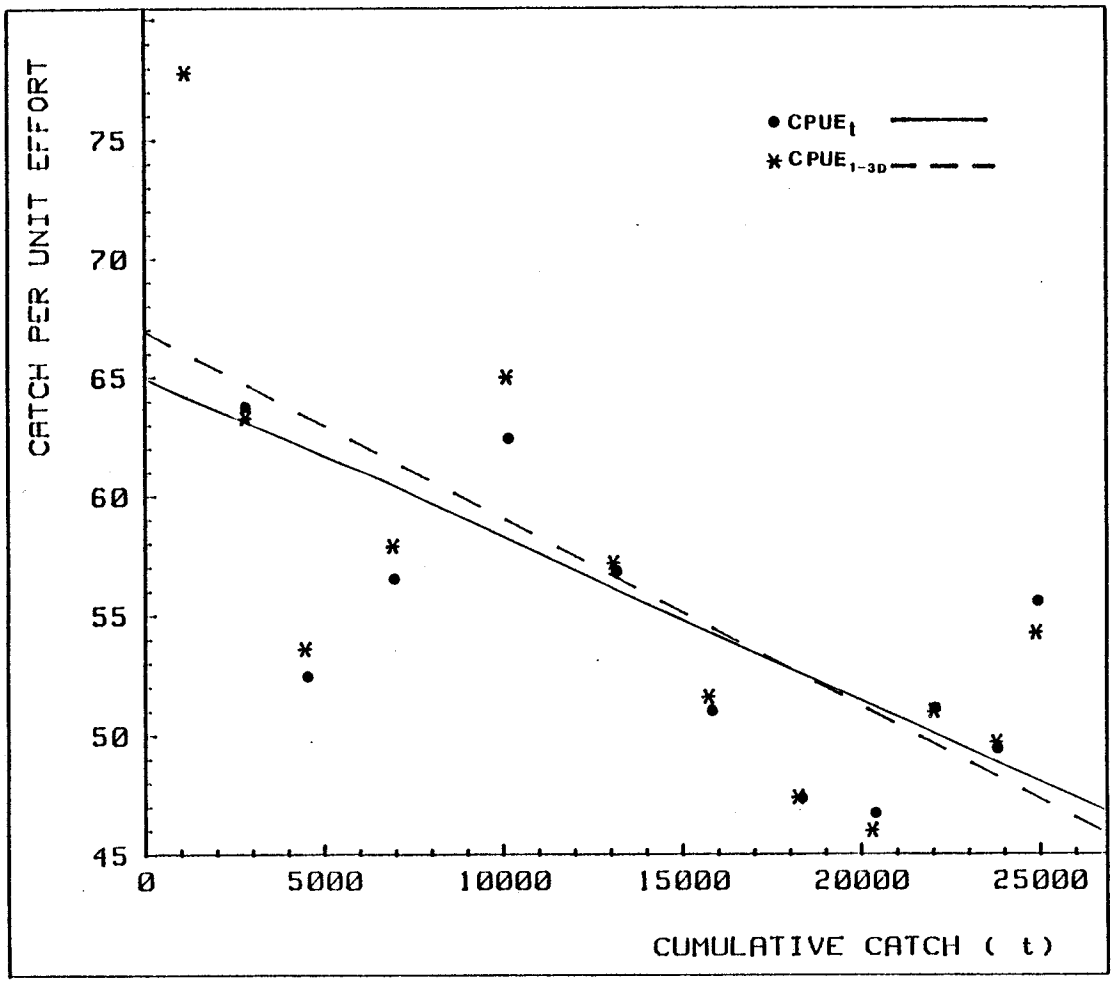

Figure 21 - Cumulative catch (t) versus mean weekly catch per unit effort (kg/trap haul) for the 1985 southern Gulf of St Lawrence snow crab, Chionoecetes opilio fishery.

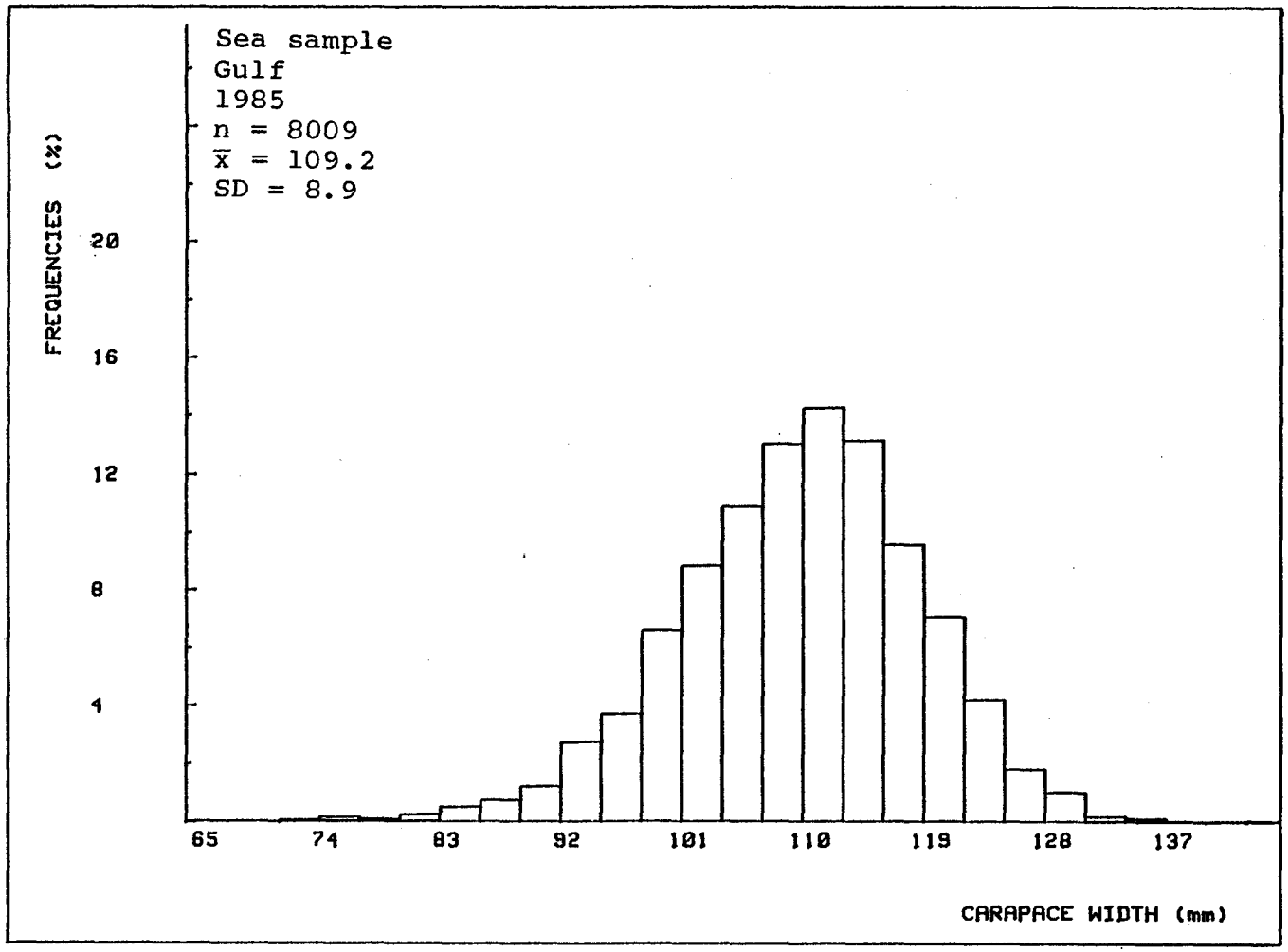

Figure 22 - Caparace width frequency distribution for 1985 in the Gulf.

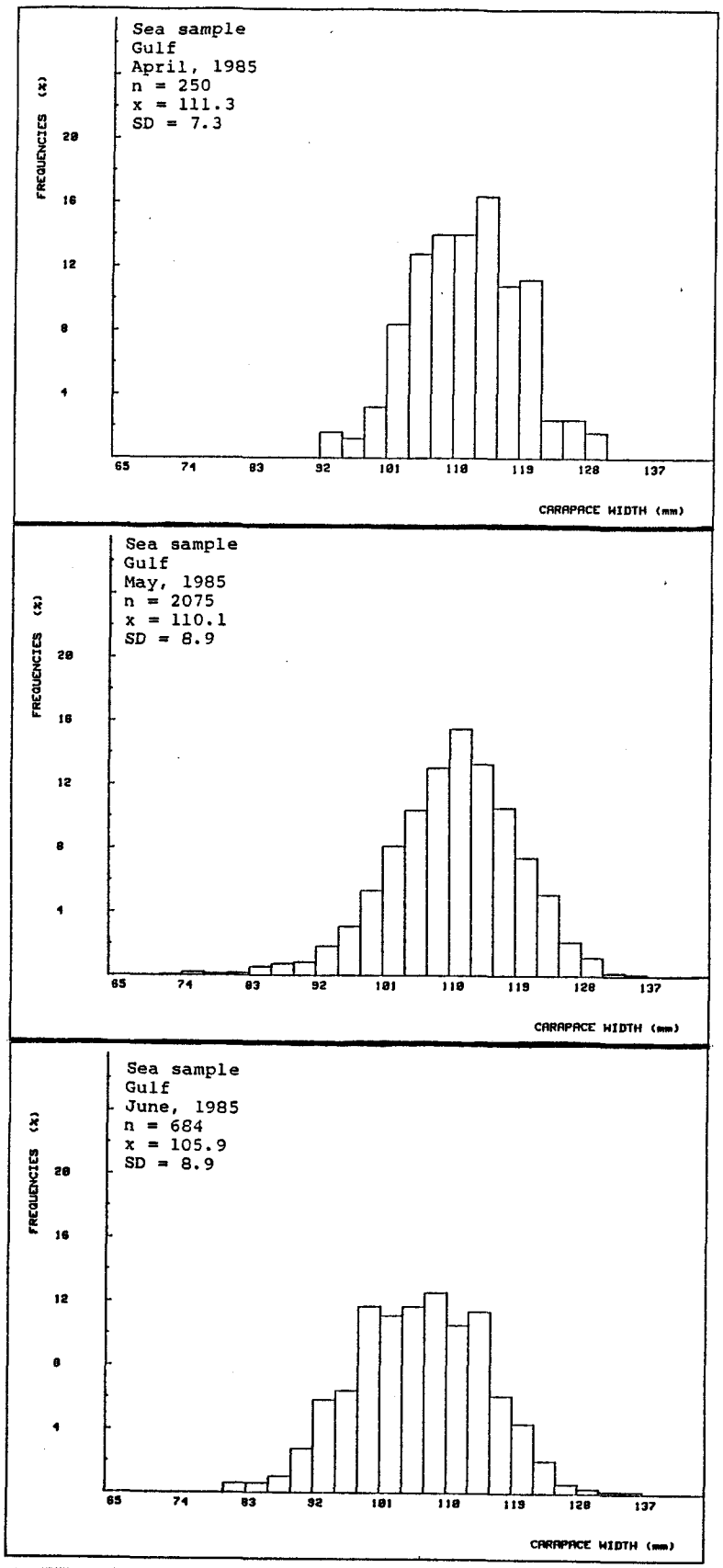

Figure 23 - Monthly carapace width frequency distributions for 1985 in the Gulf.

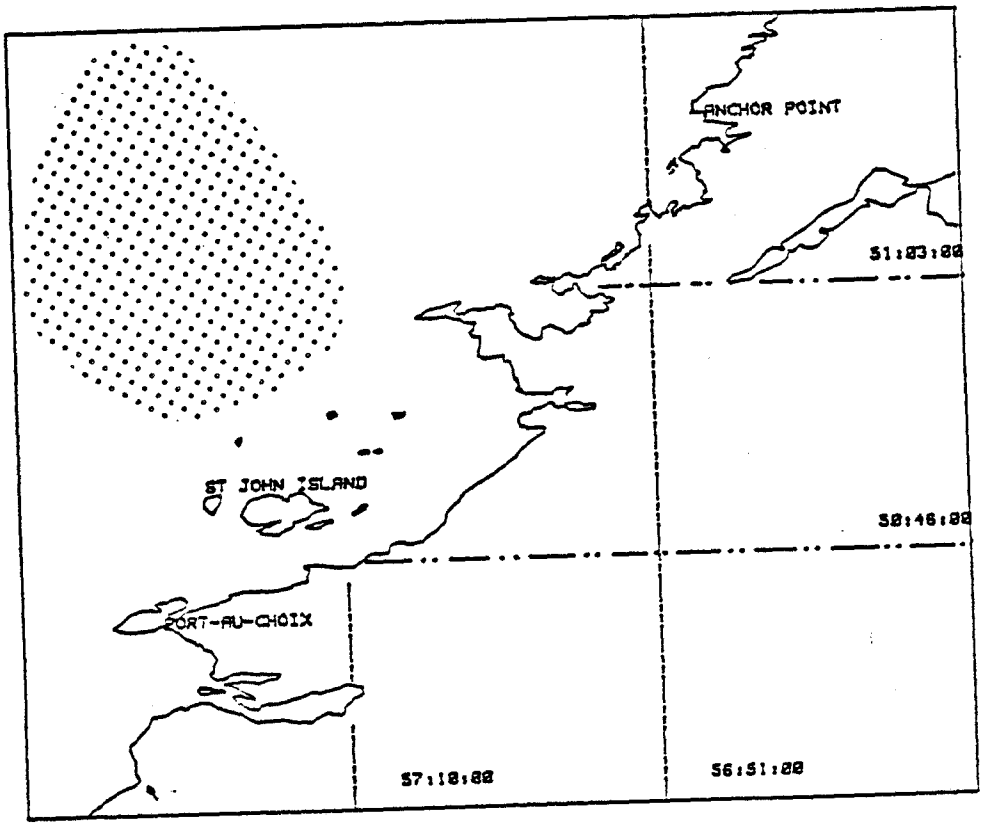

Figure 24 - Fishing grounds in the area 48 of the northwestern Newfoundland snow crab, Chionoecetes opilio, fishery.

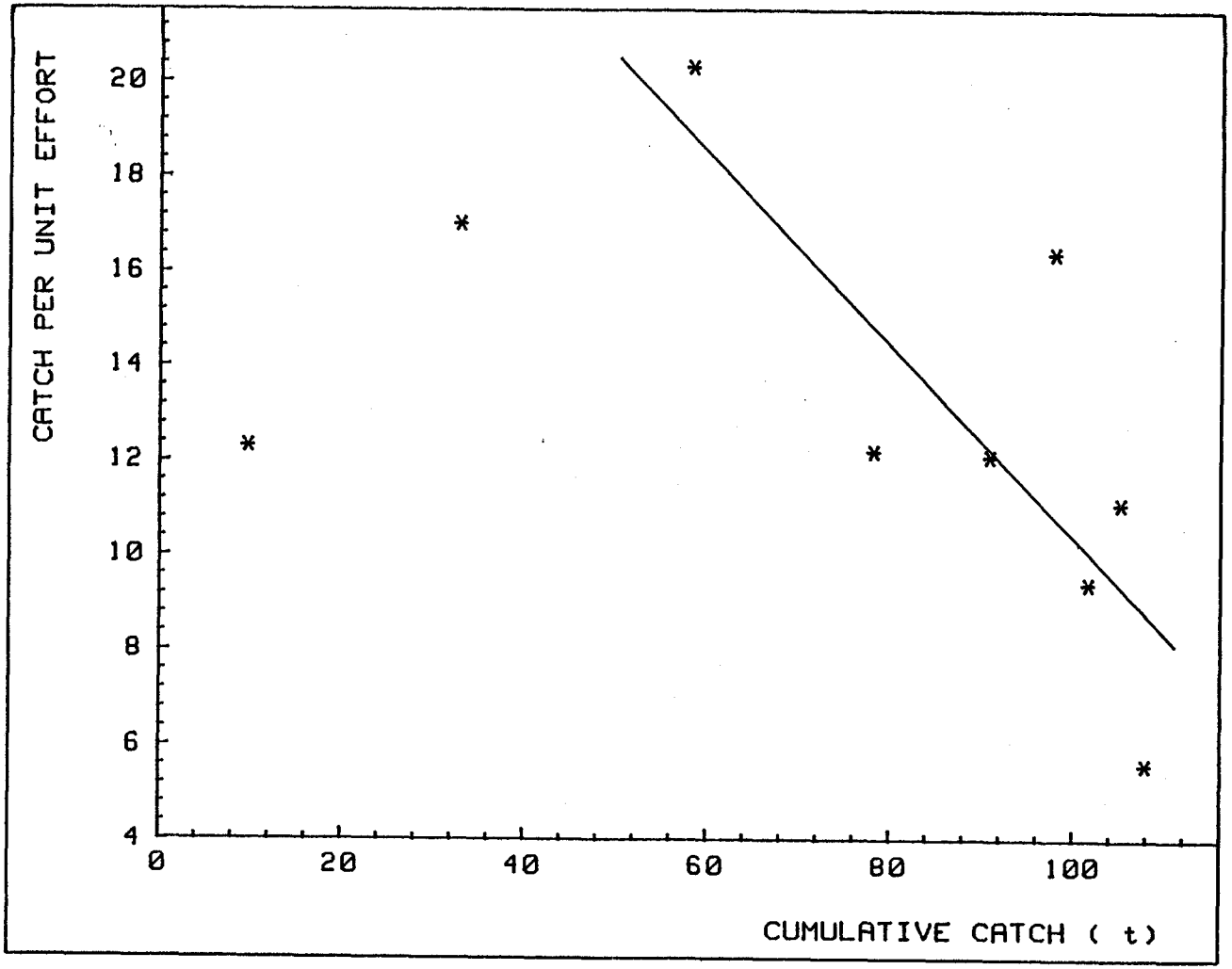

Figure 25 - Cumulative catch (t) versus mean weekly catch per unit effort (kg/trap haul) for the 1985 northwestern Newfoundland snow crab, Chionoecetes opilio, fishery.

Appendix 1 - Weekly effort and catch data for the 1985 southwestern Gulf of St Lawrence snow crab, *Chionoecetes opilio*, fishery - Zone 1

Week	Total Catch C_t (t)	$C_t/2$(t)	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t$(N)	(2) N.B. * $CPUE_t$(N)	Mean $CPUE_t$ [(1)+(2)]	Cumulative catch, K_t(t)
1	35.5	17.7	0	580	68.5(9)	0	68.5	17.7
2	242.8	121.4	0	4097	66.0(55)	0	66.0	156.8
3	268.8	134.4	0	5795	51.9(60)	0	51.9	412.6
4	219.1	109.5	50	5525	43.9(59)	35.5(1)	43.8	656.5
5	189.3	94.6	412	5481	37.6(56)	31.0(4)	37.2	860.0
6	148.0	74.0	454	3378	45.9(43)	25.6(4)	44.2	1029.2
7	152.8	76.4	395	3367	45.5(37)	30.9(3)	49.3	1179.6
8	87.3	43.6	545	2946	36.2(33)	15.6(3)	34.5	1299.6
9	76.2	38.1	230	2521	32.4(28)	15.9(2)	31.3	1381.3
10	85.6	42.8	0	2394	44.1(29)	0	44.1	1462.2
11	144.0	72.0	300	3138	44.8(38)	58.3(1)	45.1	1577.0
12	112.8	56.4	0	3886	30.9(42)	0	30.9	1705.4
13	34.2	17.1	0	1045	37.6(18)	0	37.6	1778.9
		Subtotal	2386	44153				
Total	1796.4		Total (a+b) = 46489		Overall CPUE = 44.95			

* N = # of trips

CPUE unit = Kg/trap haul

Predictive equation from Leslie analysis: $CPUE = 62.1 - 3.14 \times 10^{-2} K_t$
(all weeks were used) $r = -0.81$

Appendix II - Weekly effort and catch data for the 1985 southwestern Gulf of St Lawrence snow crab, *Chionoecetes opilio*, fishery - Zone 2

Week	Total Catch C_t (t)	$C_t/2$(t)	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t$(N)	(2) N.B. * $CPUE_t$(N)	Mean $CPUE_t$ [(1)+(2)]	Cumulative catch, K_t(t)
1	14.0	7.0	0	202	80.0(5)	0	80.0	7.0
2	98.3	49.2	0	1321	87.6(18)	0	78.6	63.2
3	61.8	30.9	0	941	79.0(13)	0	74.0	143.3
4	56.6	28.3	0	1724	36.7(26)	0	36.7	202.5
5	128.2	64.1	363	2211	50.7(23)	67.3(3)	52.6	294.9
6	77.9	39.0	0	1999	40.5(23)	0	40.5	398.0
7	112.3	56.2	0	2607	47.7(26)	0	47.7	493.2
8	133.2	66.6	296	2252	37.4(20)	70.5(2)	40.4	616.0
9	73.7	36.9	198	2722	27.5(22)	30.4(2)	27.7	719.5
10	73.5	36.7	380	2165	33.2(18)	42.7(4)	34.9	793.1
11	141.9	70.9	1198	2022	35.1(21)	59.8(10)	43.1	900.7
12	105.0	52.5	870	2073	32.0(21)	38.3(9)	38.1	1024.1
13	26.2	13.1	197	455	26.1(9)	71.1(2)	34.3	1089.7
		Subtotal	3502	22694				
Total	1102.6		Total (a+b) = 26196		Overall CPUE = 48.35			

* N = # of trips

CPUE unit = Kg/trap haul

Predictive equation from Leslie analysis: $CPUE = 63.3 - 3.14 \times 10^{-2} K_t$
(first week excluded) $r = -0.70$

Appendix III- Weekly effort and catch data for the 1985 southwestern Gulf of St Lawrence snow crab, *Chionoecetes opilio*, fishery - Zone 3

Week	Total Catch C_t (t)	$C_t/2$(t)	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t$(N)	(2) N.B. * $CPUE_t$(N)	Mean $CPUE_t$ [(1)+(2)]	Cumulative catch, K_t(t)
1	48.3	24.2	76	530	70.0(8)	143.4(1)	78.2	24.2
2	901.6	450.8	6300	4002	84.0(44)	90.1(56)	87.4	499.1
3	518.7	259.3	5653	2828	45.3(32)	67.1(53)	58.9	1209.2
4	666.4	333.2	7777	4400	48.0(51)	57.4(74)	53.6	1801.7
5	991.0	495.5	11660	4337	49.3(62)	60.5(92)	56.0	2630.4
6	850.5	425.3	9177	4193	57.8(59)	63.4(68)	60.8	3551.2
7	459.1	229.6	4516	3360	46.5(49)	55.3(33)	50.0	4206.1
8	404.3	202.1	3839	3273	40.2(48)	54.3(36)	46.2	4637.8
9	459.1	229.6	6121	3525	33.7(48)	51.2(46)	42.3	5069.5
10	359.5	179.8	5083	2823	35.0(41)	45.9(41)	40.5	5478.9
11	322.0	161.0	3974	2035	36.2(31)	52.4(29)	44.0	5819.7
12	591.0	295.7	5350	3416	63.0(47)	56.4(54)	59.5	6276.4
13	152.7	76.3	792	961	73.4(20)	72.6(15)	73.1	6648.1
		Subtotal	70318	39683				
Total	6724.2		Total (a+b) = 110001				Mean = 61.1	

* N = # of trips

CPUE unit = Kg/trap haul

Predictive equation from Leslie analysis: $CPUE = 67.1 - 2.78 \times 10^{-3} K_t$
(first week excluded) $r = -0.42$

Appendix IV - Weekly effort and catch data for the 1985 southwestern Gulf of St Lawrence snow crab, Chionoecetes opilio, fishery - Zone 4

Week	Total Catch C_t (t)	$C_t/2(t)$	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t(N)$	(2) N.B. * $CPUE_t(N)$	Mean $CPUE_t$ [(1)+(2)]	Cumulative catch, $K_t(t)$
1	8.9	4.5	130	120	20.6(2)	48.8(1)	30.0	4.5
2	232.0	116.0	1672	1072	83.7(17)	88.9(15)	86.1	124.9
3	373.4	186.7	2928	2224	85.2(30)	81.3(27)	83.3	427.9
4	562.6	281.3	5438	2527	86.4(23)	62.7(43)	71.0	895.6
5	1115.6	557.8	11268	3950	81.2(39)	69.6(81)	73.4	1734.7
6	1356.6	678.3	13020	5163	88.1(55)	70.9(94)	77.2	2970.8
7	1191.2	595.6	14376	4582	72.4(56)	60.6(104)	64.7	4244.7
8	1039.9	519.9	13228	5254	68.2(63)	49.6(92)	57.2	5360.2
9	858.8	429.4	10829	5757	57.9(65)	49.1(82)	53.0	6309.5
10	568.2	284.1	7695	3125	51.0(36)	53.1(59)	52.3	7023.0
11	452.6	226.3	4866	2929	66.0(31)	57.5(36)	61.4	7553.4
12	349.9	175.0	3172	3457	45.8(33)	63.2(29)	53.9	7934.7
13	140.8	70.4	1162	1422	45.1(17)	61.1(11)	51.4	8180.1
		Subtotal	89784	41582				
Total	8250.5		Total (a+b) = 131366				Mean = 62.8	

* N = # of trips

CPUE unit = Kg/trap haul

Predictive equation from Leslie analysis: $CPUE = 81.9 - 3.76 \times 10^{-3} K_t$
(first week excluded)

Appendix V - Weekly effort and catch data for the 1985 southwestern Gulf of St Lawrence snow crab, *Chionoecetes opilio*, fishery - Zone 5

Week	Total Catch C_t (t)	$C_t/2$(t)	(a) Trap haul N.B.	(b) Trap haul Quebec	(1) Que. * $CPUE_t$(N)	(2) N.B. * $CPUE_t$(N)	Mean $CPUE_t$ [(1)+(2)]	Cumulative catch, K_t(t)
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	41726.7	20.9	300	-	-	139.1(1)	139.1	20.9
4	570.6	0.3	-	30	19.0(1)	-	19.0	42.1
5	38506.1	19.3	300	433	50.4(7)	54.1(1)	50.9	61.7
6	17998.8	9.0	568	-	-	43.5(2)	43.5	90.0
7	33511.5	16.8	900	-	-	37.7(3)	37.7	155.8
8	11247.5	5.6	325	-	-	34.6(2)	34.6	138.2
9	23058.3	11.5	780	-	-	29.6(2)	29.6	155.3
10	42447.4	21.2	1160	-	-	37.7(5)	37.7	188.0
11	39463.2	19.7	775	-	-	47.6(4)	47.6	228.9
12	38519.3	19.3	1055	-	-	36.3(6)	36.3	267.9
13	-	-	-	-	-	-	-	
		Subtotal	6163	463				
Total	287.0		Total (a+b) = 6626				Mean = 43.3	

* N = # of trips

CPUE unit = Kg/trap haul

Leslie analysis not performed