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Fishing trends in the Gulf of St. Lawrence and Eastern Scotian Shelf of the Maritime Shrimp Fishery for 1981 and Shrimp Biomass Review for Eastern Scotian Shelf

by

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[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 timeframes required and the Research Documents it contains are not intended as definitive statement on the subjects addressed but rather as progress reports on ongoing investigations.

ABSTRACT

A shrimp biomass survey of eastern Scotian Shelf was conducted in the fall (Sept-Oct) of 1981. Variations in biomass estimates of 1979 and 1981 for the Misaine area (4Vc) may be the result of a patchy distribution of shrimp.

Most of the commercial fishing effort in 1981 was directed at the Esquiman Channel (north of latitude 50°N) because of an increase in CPUE This resulted in a lower fishing effort in the areas of eastern Scotian Shelf and Anticosti Channel.

RESUME

La biomasse de crevette dans l'est du plateau Néo-Ecossais a été évaluée durant une croisière à l'automne (sept-oct.) 1981. Des variations entre les estimations de biomasse pour 1979 et 1981 dans la région de Misaine (4Vc) pourraient être causées par une distribution inégale de la crevette.

En 1981, l'effort de pêche commercial a porté principalement dans le secteur nord de la latitude 50°N du chenal d'Esquiman, à cause d'une augmentation de la prise par unité d'effort. Parallèlement, une diminution de l'effort de pêche fut observée dans les secteurs du plateau Néo-Ecossais et du chenal d'Anticosti.

INTRODUCTION

The shrimp fishery on the eastern part of the Scotian Shelf is at a very low level of exploitation, since this area has been mostly exploited on a part time basis by New Brunswick based vessels. Landings for the past four years (1978-1981) have been in the range of 500-1000 mt (Labonté 1980; Cormier 1981). Fishing effort stays mainly in the Gulf of St. Lawrence when the situation is more attractive there.

A biomass survey of the eastern Scotian Shelf and data on the commercial fishing activities is presented.

MATERIAL & METHODS

Biomass survey: eastern Scotian Shelf

The survey was conducted on board the E.E. Prince in the fall (Sept.- Oct.) of 1981.

A Yankee 36 shrimp bottom trawl with 32 mm mesh size (stretched) was used. To enable comparisions with previous cruises, the area was sampled as described by Labonté (1980). Trawling started one hour after sunrise and stopped one hour before sunset (Table 1), to avoid bias introducted by diurnal migrations of shrimp (Barr 1970; Carlsson et al. 1978), in the estimation of biomass.

The minimum trawlable biomass was calculated using the swept area method:

$$B_i = A_i \sum \frac{(Y_{ij}/b_{ij})}{N_i}$$

where: B_i = biomass in stratum i;

A_i = surface area (Km^2) for stratum i;

Y_{ij} = catch per tow j in stratum i;

b_{ij} = area swept (Km^2) per tow j in stratum i;

N_i = number of tows in stratum i.

Mackett's method (1973) was used to calculate standard error ($S\bar{x}$).

Stations were only fished over good trawlable bottom. Out of 44 planned stations, 11 were cancelled due to bad bottom (Fig. 1).

Three areas of concentration (outlined by 180 m isobathe) are considered in this survey. They are: the area south of Canso (N.A.F.O. division 4WE & 4WD), east of Louisbourg (N.A.F.O. division 4VA & 4 VN) and between Misaine and Banquereau Banks (4 VC).

Commercial fishing trends

Commercial landings and CPUE were derived from sale slips and fishermen's log records.

To standardize CPUE to the effort of a Yankee 36, the effort of a Yankee 41 was increased 1.3 times and the effort of a Western 2A was increased 1.5 times (Labonté 1980, Cormier 1981). A few log books with other gear type were not used in the standardizing process.

RESULTS & DISCUSSION

Eastern Scotian Shelf

There is a large difference between the biomass estimates for 1979 and 1981 in the Misaine area (4Vc), (Table 2). Biomass estimates of 1978, 1979 and 1981 do not vary as much for the Canso (4WE & 4WD) and Louisbourg (4VA & 4VB) areas (Table 2).

Compared to Canso and Louisbourg, the holes in the Misaine area where shrimp is found are narrow with steep embankments. Hydrographic charts show a variation of bottom type from rock, gravel, sand to mud. During the survey, the area had to be scanned several times by sonar to find suitable bottoms for trawling. Therefore, biomass estimates may be biased because of patchy distribution of shrimp or because of inadequate sampling of the area due to bad bottom.

By-catch during the survey was mainly redfish, cod and plaice (Table 3). Redfish was of commercial size (larger than 14.5 cm) (Fig. 2). Size range of cod and plaice is presented in Figures 3 and 4.

The eastern Scotian Shelf has been exploited more or less from 1977 to 1981 (Labonté 1980; Cormier 1981). Most of the fishing effort has been concentrated in the Canso and Louisbourg areas (Cormier 1981). Because of bad bottom, Misaine is not ideal for commercial shrimp exploitation, leaving Canso and Louisbourg as prime fishing grounds. In 1981, most of the fishing effort occured in the Louisbourg area (Fig. 5). Only 455 mt was landed for the whole areas, since higher CPUE in the Gulf of St. Lawrence caused a shift in the fishing effort distribution, lowering the effort directed to the Scotian Shelf (Table 4).

For the past four years, CPUE has not varied much (Table 4) and biomass estimates of 1978, 1979 and 1981 for Canso (4WD & 4WE) and Louisbourg (4VA & 4VB) have also stayed at similar levels (Table 2). Keeping this in mind and taking into account the relatively small annual catches compared to the estimated available biomass, these biomasses can still be considered as almost virgin. Caution is needed for the Misaine area and an experimental fishery may be an optional approach for this area. It would determine if this area is commercially viable or not.

Gulf of St.Lawrence

Esquiman Channel:

CPUE increased from 1980 to 1981 (Table 4). The increase in CPUE caused a shift in the fishing effort distribution towards this area.

Fishing occurred mostly on the northern side of latitude 50^{o}N (Fig. 6) with 820.5 mt landed. Only 56.2 mt was caught on the southern side of that line.

Anticosti Channel:

In 1981, there was a small increase in CPUE in this area compared to 1980 (Table 4). Fishing effort was distributed over the same surface area as in previous years (Fig. 7). Landings were 239.7 mt. There was little fishing activity south of the Anticosti Island, with only 13 mt caught.

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Table 1 - Stations covered during September-October 1981.

Station #	Latitude-Longitude	Depth (m)	Time (min)		Distance	Catch (kg)				
			Started	Ended	covered (km)	Shrimp	Cod	Redfish	Other	total
C1	44°55'04"-61°03'00"	194	14:07	14:37	3.5	28	14	-	131	173
C2	44°58'22"-60°58'34"	190	15:20	15:50	3.2	145	41	3	10	199
C4	44°56'15"-60°52'09"	183	08:15	08:45	3.1	61	3	-	35	99
C5	44°50'09"-60°56'47"	225	10:49	11:19	3.0	36	-	-	116	152
C6	44°51'25"-60°56'47"	241	12:21	12:51	3.0	30	10	-	85	125
C7	44°52'14"-60°50'20"	192	09:26	09:56	2.9	39	31	-	117	187
C8	44°56'37"-60°46'47"	215	08:02	08:32	3.2	99	9	1	99	208
C14	44°41'27"-60°12'09"	211	08:14	08:44	3.2	31	-	-	94	125
M15	44°42'05"-60°00'38"	212	17:45	18:15	3.4	43	20	-	22	85
M16	44°47'19"-59°57'34"	207	16:17	16:47	3.4	37	19	31	9	96
M17	44°53'46"-59°58'04"	195	14:53	15:23	3.3	38	71	-	55	164
M18	44°52'46"-59°47'17"	183	11:10	11:35	2.8	24	140	45	65	274
M19	44°51'28"-59°42'51"	218	12:50	13:20	3.4	62	335	85	38	520
M20	44°51'04"-59°27'33"	228	15:45	16:15	2.6	58	169	-	62	289
*M23	44°46'56"-59°05'01"	249	18:25	18:55	2.5	10	172	-	92	274
M24	44°45'41"-58°56'24"	263	16:11	16:41	2.9	156	105	-	84	345
M25	44°46'46"-58°52'33"	243	14:52	15:22	3.1	58	59	-	45	162
M26	44°47'48"-58°38'25"	190	12:35	13:01	2.4	121	65	48	76	310
M28	44°50'16"-58°32'21"	205	10:25	10:55	3.1	39	173	1285	55	1552
M29	44°54'40"-58°19'52"	222	08:02	08:32	2.5	93	84	8	151	336
**A32	45°42'51"-58°14'03"	282	17:51	18:29	3.7	6	-	26	-	32
**A33	45°46'38"-58°21'51"	226	16:27	16:57	3.1	-	22	59	-	81
**A34	45°36'43"-58°36'06"	193	14:14	14:44	3.4	3	89	70	14	176
L35	45°37'47"-58°52'42"	226	11:05	11:35	3.1	99	72	109	34	314
L36	45°43.54"-58°54'44"	247	09:35	10:00	3.1	39	83	215	12	349
L37	45°40'20"-59°05'38"	192	08:04	08:34	3.2	126	92	14	124	356
L38	45°46'51"-59°02'58"	197	09:24	09:54	3.2	64	124	9	64	261
L39	45°48'06"-58°53'23"	221	11:37	12:07	3.0	21	39	35	78	173
L40	45°48'27"-58°47'29"	262	13:03	13:33	2.6	105	42	7	30	184
L41	45°45'25"-58°43'31"	270	14:31	15:01	2.9	66	27	4	18	115
L42	45°51'39"-58°39'04"	267	16:14	16:44	2.8	68	10	2	5	85
*L43	45°47'10"-58°38'20"	282	19:29	19:59	2.5	23	28	2	9	62
L44	45°52'23"-58°35'32"	232	17:51	18:21	3.1	36	16	18	19	89

* Not used in biomass estimation because of a diurnal migration bias.

** Exploratory stations.

Table 2 - Biomass estimates for the years 1978, 1979 and 1981.

Biomass survey, 1981

Area	Surface area (Km^2)	# sets	Mt/Km^2 $\bar{x}$	$S\bar{x}$	Total biomass (MT)
Canso	1083.1	8	1.85	0.46	2000.96
Louisbourg	1189.9	9	2.29	0.39	2726.27
Misaine	1520.6	11	2.21	0.42	3358.20

Minimum trawlable Biomass (MT)

	Canso		Louisbourg		Misaine	
	N.adj.	adj.**	N.adj.	adj.**	N.adj.	adj.**
*1978	2607	3911	3706	5559	-	-
*1979	1943	2915	2845	4269	6417	9625
1981	2001	3001	2726	4089	3358	5037

* Labonté, 1980

** Adjusted to the fishing power of a Western 2A (Labonté, 1980).

Table 3 - Percentage of different species caught during the September - October 1981 survey.

	Shrimp	Cod	Redfish	Plaice	Silver Hake	Other
Canso	36.99	8.52	0.32	6.15	47.40	0.63
Louisbourg	29.91	25.51	24.44	5.84	12.58	1.71
Misaine	16.77	32.04	34.08	14.82	1.82	0.48

Table 4: Catch and CPUE by Maritime boats - 1977 to 1981.

Area	Year	Catch (mt)	Effort (hrs)	CPUE Kg/h	CPUE Std Kg/h
Cape Breton	*1977	269.0	2093	128.5	104.5
South Esquiman		50.0	535	93.5	75.6
North Anticosti		633.5	9709	65.2	56.5
		952.5	12337		
Cape Breton	*1978	306.4	2513	121.9	97.3
South Esquiman		83.6	768	108.9	75.6
North Anticosti		843.1	11519	73.2	63.4
		1233.1	14800		
Cape Breton	'1979	838.0	4800	174.6	128.0
Esquiman Channel		432.6	3656	118.3	89.6
Anticosti Channel		634.9	9132	69.5	59.8
		1095.5	17588		
Eastern Scotian Shelf	'1980	983.8	7514	130.9	97.3
Esquiman Channel		502.9	5178	87.1	69.3
Anticosti Channel		444.2	6400	69.4	52.9
		1930.9	19092		
Eastern Scotian Shelf	"1981	453.7	3440	131.8	92.8
Esquiman Channel		876.8	6602	132.8	97.8
Anticosti Channel		253.1	2905	87.1	71.6
		1583.6	12947		

*Labonté, 1980
'Cormier, 1981
"Log records

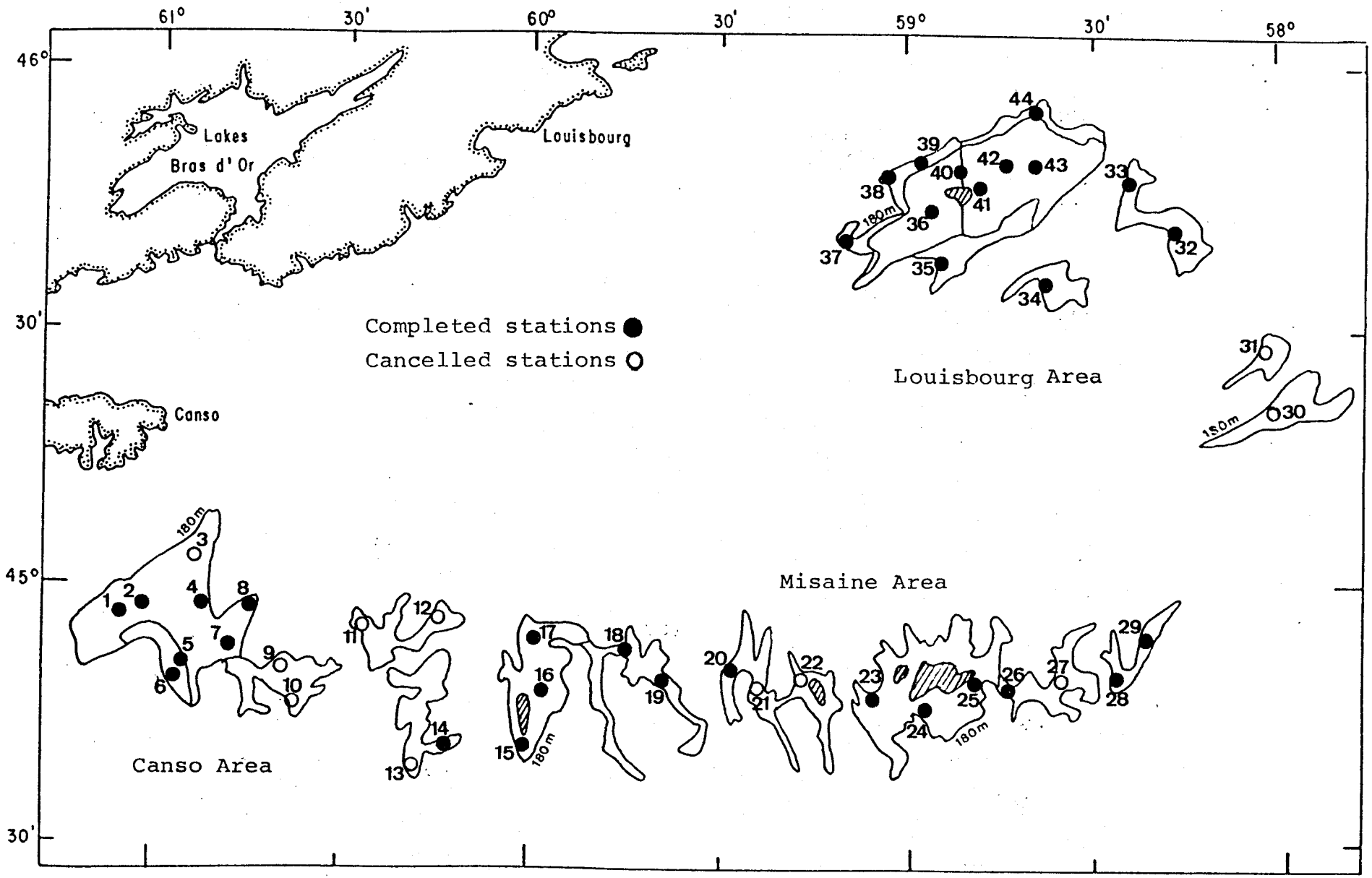

Figure 1: Stations covered during shrimp biomass survey cruise - Fall 1981.

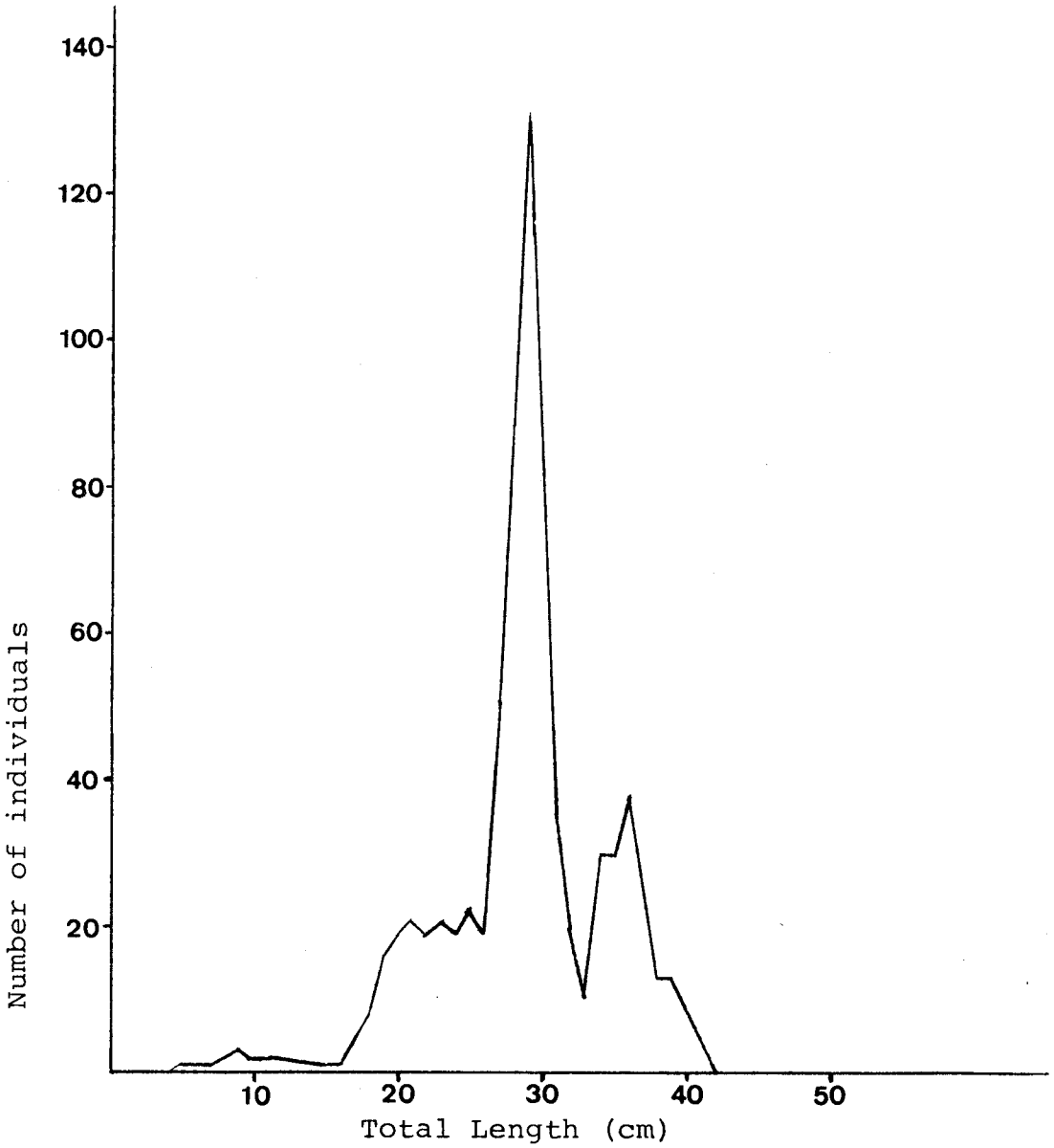

Figure 2 - Redfish length frequency distribution for eastern Scotian Shelf.

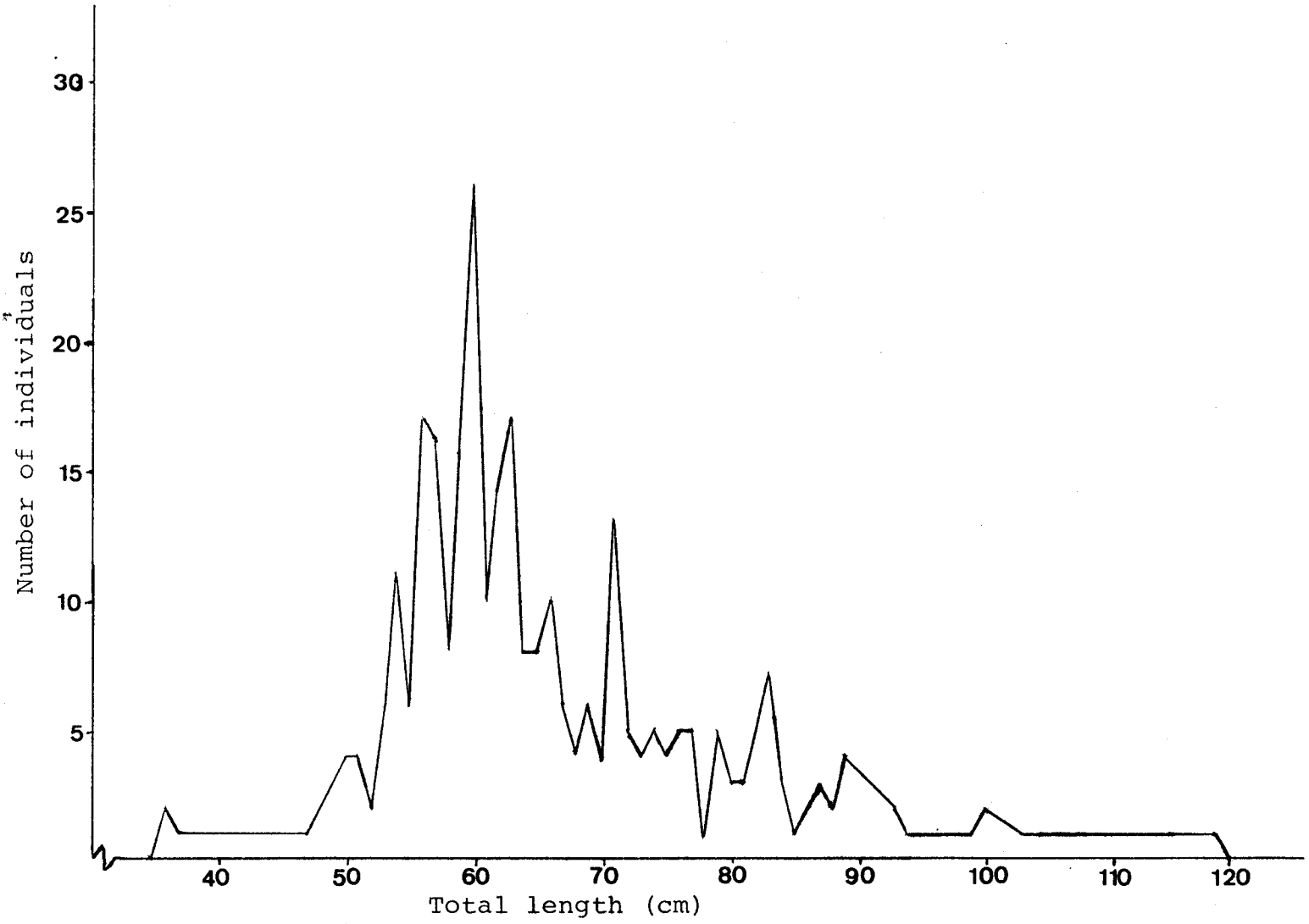

Figure 3 - Cod length frequency distribution for eastern Scotian Shelf.

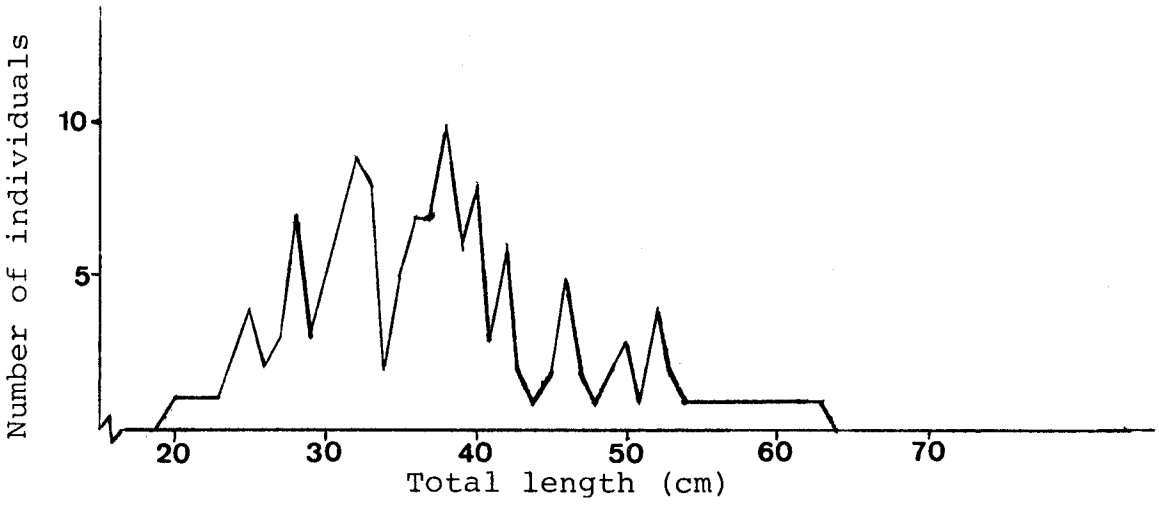

Figure 4 - Plaice length frequency distribution for eastern Scotian Shelf.

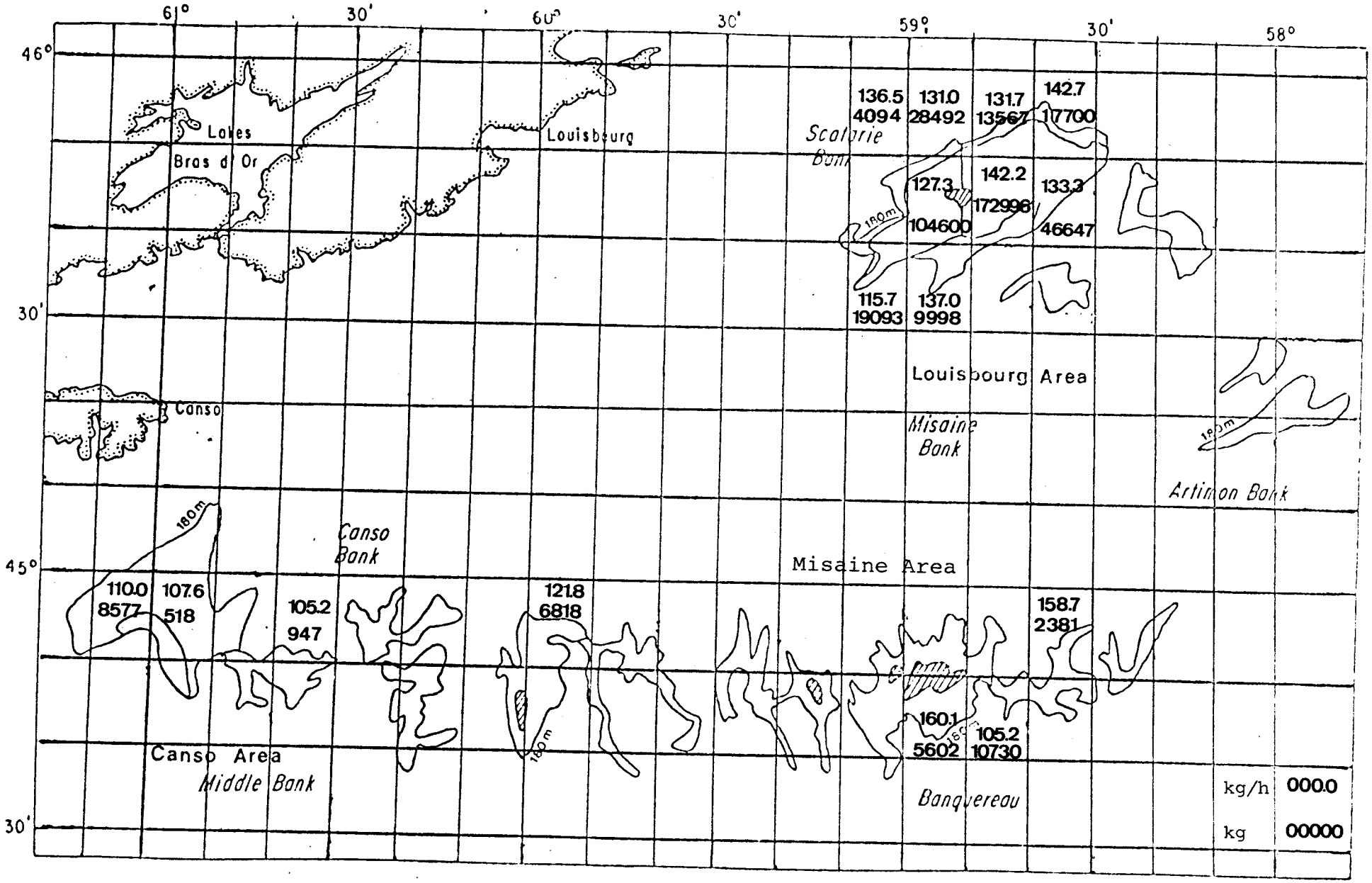

Figure 5 - Distribution of CPUE (Kg/h) and landings (Kg) per ten minutes squares, in the eastern Scotian Shelf for 1981.

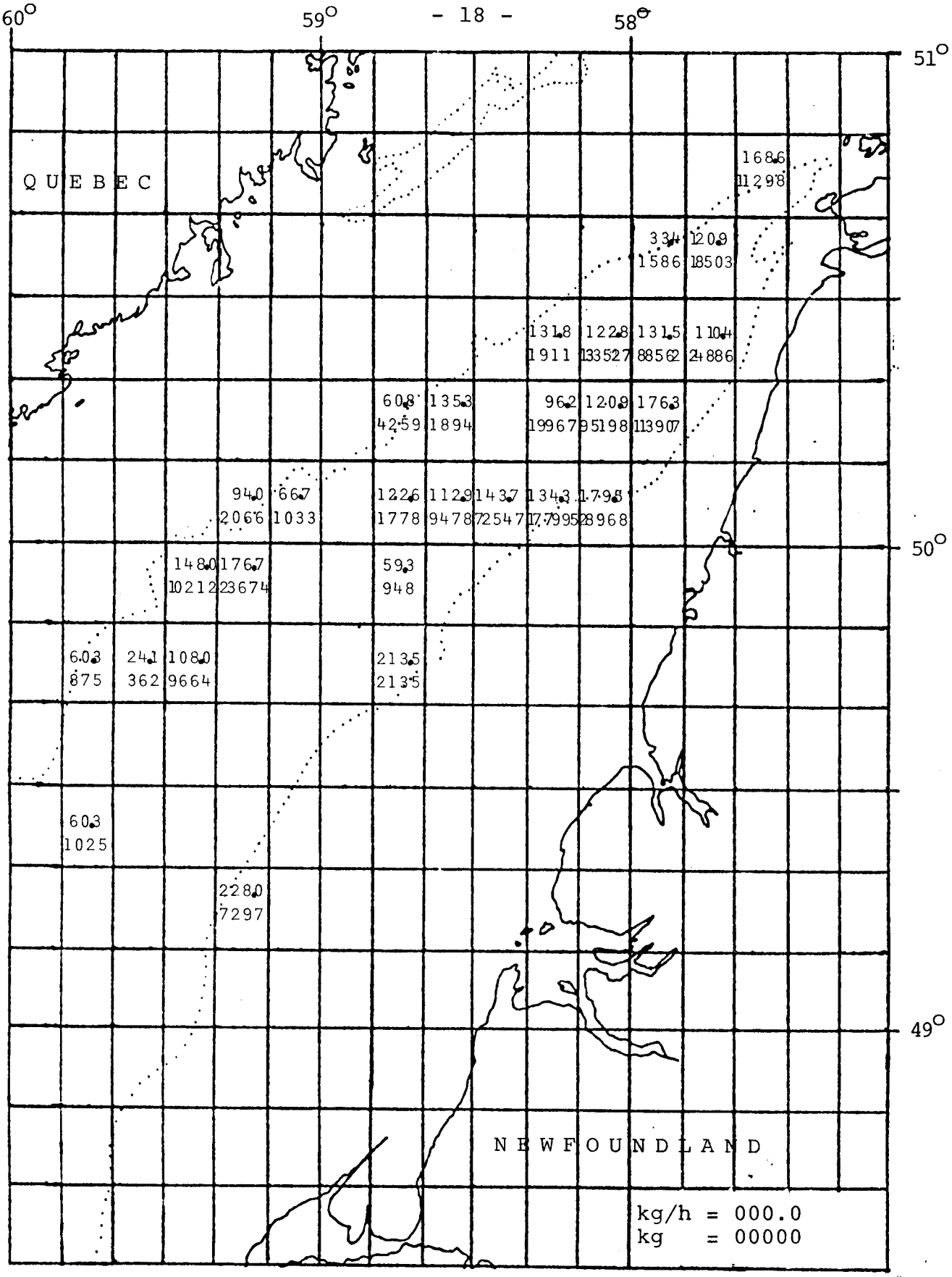

Figure 6 - Distribution of CPUE (Kg/h) and landings (Kg) per ten minutes squares, in the Esquiman Channel for 1981.

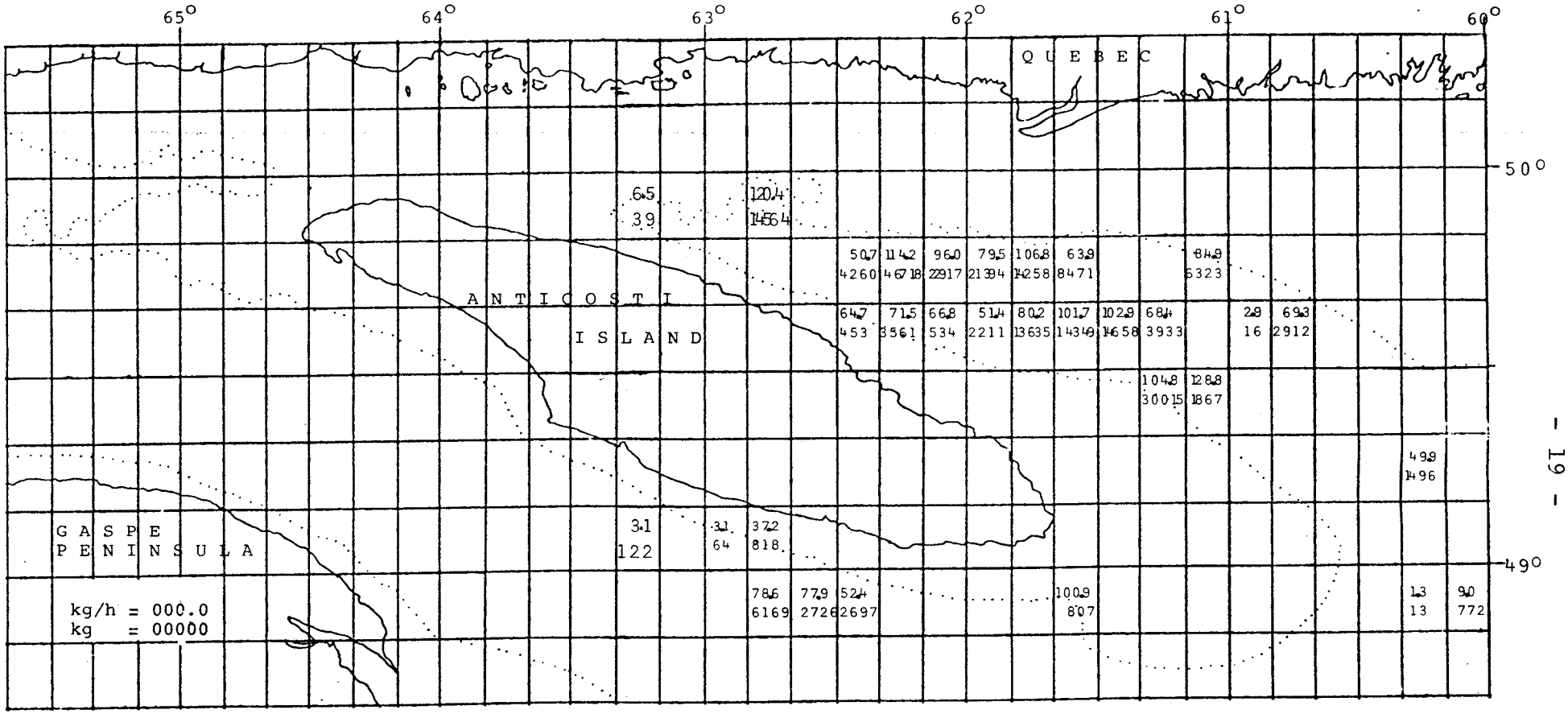

Figure 7 - Distribution of CPUE (Kg/h) and landings (Kg) per ten minutes squares, in the Anticosti Channel for 1981.