SCOTIA-FUNDY SHRIMP STOCK STATUS - 1982

by

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Abstract

The 1982 shrimp fishery off Cape Breton underexploited the estimated resource. Out of a total quota of 4200 t for the three areas only 569 t or 14% were taken. Three research cruises were carried out in this area and biomass estimates were higher in the November cruise than in the spring cruises. The recommended TAC's based on these cruises are 2000 t for the Canso and Misaine holes and 3000 t for the Louisbourg hole. Observers on vessels provided detailed data for the commercial fleet and an unexpected result is the factor of four difference between commercial and research by-catch rates.

Résumé

La campagne de pêche des crevettes au large du Cap-Breton en 1982 n'a pas récolté toute la ressource estimée. Sur un contingent total de 4 200 t pour les trois zones, seulement 569 t, ou 14 %, ont été capturées. Trois croisières de recherche ont été effectuées dans cette région, le relevé de novembre donnant des estimations de biomasse plus élevées que les deux relevés de printemps. Les TPA recommandés, sur la base de ces relevés, sont de 2 000 t pour les fosses de Canso et de Misaine, et de 3 000 t pour la fosse de Louisbourg. Des observateurs placés à bord des bateaux de pêche nous ont fourni des données détaillées sur les opérations de la flottille commerciale et, résultat inattendu, les prises accidentelles des bateaux commerciaux ont différé d'un facteur quatre de celles des navires de recherche.

Introduction

The shrimp fishery off Cape Breton was pursued by 12 licensed vessels from the Gulf and a number of permits from the Scotia-Fundy Region. Although the exploitation rates were low the vessels fished in all three areas and made almost equal landings in Cape Breton and the Gulf of St. Lawrence. The Louisbourg hole supplied the largest catch (316 t) compared to 201 t for Canso and 52 t for Misaine. No catches were reported for the vessels which fished under permit.

Three research cruises were carried out in the months of February, April, and November. The November cruise encountered some of the highest catch rates ever seen for this area and influences the estimated biomasses upward especially for the Louisbourg hole. As before, biomasses are estimated by areal expansion. TAC's are estimated using the agreed-upon fraction of 35% of the estimated biomass. Length frequencies show differences particularly in the largest (oldest) grouping, with Louisbourg having more large animals than the other areas.

Methods and Results

Research Data

Research trawls were carried out for one-half hour durations at speeds of 2.5 knots using a Yankee 36 trawl with 32 mm mesh. The results of these surveys are displayed in Table 1 and graphically in Figures 1, 2, and 3. Weather conditions limited the sampling in the February survey. The channels are defined by the 100 fathom depth contour; but as is seen in Figure 1, significant catches are found in shallower adjoining waters. Stations were allocated randomly inside the single strata for Canso and Louisbourg holes. Stations for the Misaine Channel were the random stations from the previous cruise. These were re-used to save searching time for good bottom. The shrimp fraction by weight in the total catch was lower this year, about 20% of the total, than historical levels which are in the 40% to 50% range (see Table 2). The species composition of the by-catch was not unusual. The length frequency distributions (Figures 7 and 8) are based on measurements to one-tenth of a millimeter and then grouped into 13 mm groupings. The two numbers at the top of each figure are the cruise code number and the number of individuals in the total sample. The April, sample of almost 12,000 animals shows a very strong peak at 18 mm, especially for the Louisbourg hole which represents males. The maximum size varies from hole to hole with Misaine having the smallest and Louisbourg the largest. This observation corresponds to anecdotal information about Louisbourg shrimp being preferred. The larger sizes for Louisbourg are also evident in the November sample.

Commercial Data

Commercial data for this report come from the Fisheries Observer Program, the Cape Breton statistical coordinator, and log books (Table 3 and Figures 4, 5, & 6). The logs were at about 10% variance with the official statistic for this area and also at variance with the observers' data. The principle discrepancies are 10% less catch in the logs and disagreement between the observers and logs as to gear types. The average catch rates were of the order of 100 kg/hr as calculated from observer data for Western 2a for Louisbourg hole and 114 kg/hr for all gears from the logs. For Canso hole the 2a rate was 89.7 while for all gear it was 124 kg/hr. Only limited effort was expended in Misaine and the catch rate was 96.5 kg/hr for Western 2a trawls.

Biomass Estimates

Biomass for each hole was estimated by areal expansion. The horizontal opening of the research gear is assumed to be effectively 36 ft. The standard tow is one-half hour at 2.5 knots giving a length of 1.25 nautical miles and a swept area of approximately 1/135 of a square nautical mile. The areas of the three holes were measured with a polar planimeter using the 100 fathom contour yielding 276.4, 472.7, and 444.2 square nautical miles for Canso, Louisbourg, and Misaine respectively. The average catch rates from the research cruises were standardized to Western 2a catch rates by multiplying by 1.5 to account for the vertical distribution above the Yankee 36. A correction for the horizontal opening was not made. The resultant biomasses are given in the following table. The standard errors of the biomass estimates range from approximately 1000 t for Misaine to 3000 t for Louisbourg.

Biomass, standard deviation, and TAC estimates from survey data (t).

Cruise	Feb.	April	Nov.	Average*	TAC**
Canso	4153±804	4411± 519	8496±1789	5700	2000
Louisbourg	-	3944± 799	13611±3299	8800	3000
Misaine	3418	5793±1031	6153± 951	6000	2000

* Average rounded to two significant figures; Misaine - Feb. estimate dropped.
**Rounded to nearest thousand tons.

The November survey gave markedly higher estimates for Canso and Louisbourg than the earlier cruises or indeed any earlier published estimates. One notes that the total catches for these sets were also higher. The crew felt that the gear was fishing unusually well as a result of using heavier doors.

Total Allowable Catch (TAC) Estimates

The TAC's were derived from the biomass estimates using an exploitation rate of 35% as was recommended at a November 1982 CAFSAC meeting. These are shown in the above table. The quotas for 1982 were 1000, 1400 and 1800 t respectively for Canso, Louisbourg, and Misaine. The proposed quotas for 1983 are somewhat higher as would be expected by the increased average biomass estimates caused by the good November catches.

Discussion

A good agreement was seen between the research survey catch rates (after correction for gear) and the commercial rates. This agreement is somewhat surprising considering the great difference in tow times and the fact that the research stations are placed at random although sets over unsuitable bottom were dropped. There was, however, a great difference in terms of the by-catch. The research trawls were 20% shrimp and the commercial catches were 80% shrimp. The authors have no explanation for this result and neither did the personnel from the Observer Program.

The quotas for 1983 are higher than have presented historically due to the high catch rates from the November survey. To date the exploitation of the Cape Breton stocks has been well below the 35% level and increasing the TAC in response to the higher observed biomass would be expected to have little effect on the catch. On the other hand, the Minister has just recently sanctioned the release of nine new licenses for this area so there is reason to believe that effort may well increase in 1982. Also, the market is reported to be currently strong for Pandalus. The correction for the vertical distribution in standardizing for the gear was incorporated into the biomass estimates but the correction for the effective width of the standard (W-2a) gear was not. A more serious consideration is that these holes are effectively at virgin biomass levels and it is not known how the biomass will respond to higher and sustained levels of exploitation.

A research survey was carried out off the south shore of Nova Scotia in areas which once supported a shrimp fishery in the early 1970's. Fourteen of a scheduled 21 stations were sampled and only one P. borealis was caught. However, small numbers of P. montagui were found and many of them were ovigerous.

Fishermen, observers, and research personnel from other cruises reported numbers of the deep-water shrimp, Plesiopenaeus edwardsianus, in trawls off the edge of the Shelf. Samples brought in were as large as 250 mm total length. Coordinated attempts to estimate their extent and density have not been planned.

Acknowledgements

The authors thank the staff of the E.E. Prince for their valuable assistance in carrying out research cruises, members of the Observer Program for their data, and Roland Cormier, Yves Lavergne, and Alex MacIssac for their help in compiling a description of the fishery.

Table 1. Catch information from scientific research cruises.

Date	Area	Set	Depth (fm)	Bottom Temp.	Shrimp (kg)	Total Catch (kg)
February 1982	Canso	1	81		13	
		2	97		66	
		3	109		34	
		4	135		9	
		5	104		45	
		6	102		53	
		7	80		40	
	Misaine	9	110		19	
April 1982	Canso	2	115	4.6	40	159
		3	108		64	149
		4	105	3.9	63	122
		6	107	4.0	23	60
		7	106	3.2	31	91
	Louisbourg	10	147		57	96
		11	114	3.8	35	74
		12	119		11	83
		13	110		24	160
		14	119	4.0	15	163
		15	145	4.2	26	64
		16	152		26	56
		17	132	4.2	7	91
		18	169	2.2	7	49
		19	140		7	60
		20	212		22	70
		21	126	3.6	10	156
	Misaine	22	144	1.8	38	140
		23	136		37	189
		24	120		9	1135
		25	145	0.6	37	178
		26	158		40	170
		27	130	1.7	38	170
		28	110	1.9	16	58
		29	115	2.2	66	177
		30	141	2.3	9	79
	Canso	33	112	1.5	29	132
		34	148	2.0	41	140
		35	112		34	137
		36	110	1.0	30	109
November 1982	Canso	1	106		41	262
		2	105		150	729
		3	109		102	644
		4	107		37	323
		5	108		29	364
		6	117	3.5	168	514
		7	141	3.7	94	243
		8	105	2.8	88	244
		9	166	2.5	14	121
		10	115	2.6	36	79

.../Contd.

Table 1. Contd...

Date	Area	Set	Depth (fm)	Bottom Temp.	Shrimp (kg)	Total Catch (kg)
November 1982	Louisbourg	11	97		23	169
		12	131		67	235
		13	116		136	268
		14	134		177	325
		15	144		82	130
		16	127		11	89
		17	130		28	397
		19	132		71	268
		20	147		45	154
	Misaine	21	138		58	360
		22	143		25	234
		23	157		33	195
		24	132		13	336
		25	157		18	250
		26	132		33	87
		27	118		58	189
		28	121		45	211
		29	106		11	551
		30	138		48	134

Table 2. Percentage catch composition of shrimp trawls.

Species	Research cruises			Commercial boats		
	Feb.	April	Nov.	Aug.	Sept.	Oct.
Shrimp		19.1	21.5	80.9	76.2	77.5
Cod		25.0	21.3	8.6	11.1	11.2
Redfish		28.3	9.0	8.9	9.8	8.4
Flatfish		10.9	14.5	0.5	1.6	1.5
Hake		0.3	25.2	-	-	-
Halibut		0.3	0.2	-	-	-
Miscellaneous		16.2	8.3	1.2	1.4	1.4
Total shrimp catch (kg)	279	892	1,741	11,160	13,076	13,227

Table 3. Monthly commercial information for Canso and Louisbourg areas (1982)

	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	YEARLY
Canso									
Catch (kg)				113,552	14,136	4,310	22,121		154,119
Effort (un)				624.3	106	180	89		999.3
Effort (cor)	–	–	–	759.1	159	81	367.5	–	1,366.6
CPUE				149.6	88.9	53.2	60.2		112.8
Louisbourg									
Catch (kg)	10,654	113,029	119,884	48,527	39,980	28,804	11,907	16,188	388,973
Effort (un)	176	918.5	868	417.5	370	268	105	120	3,243
Effort (cor)	228.8	1,288	1,392.5	730.2	721.5	585	204.8	234	5,384.6
CPUE	46.6	87.8	86.9	66.5	55.4	49.2	58.2	69.2	72.2
Both areas									543,092
									4,242.3
									6,751.2
									80

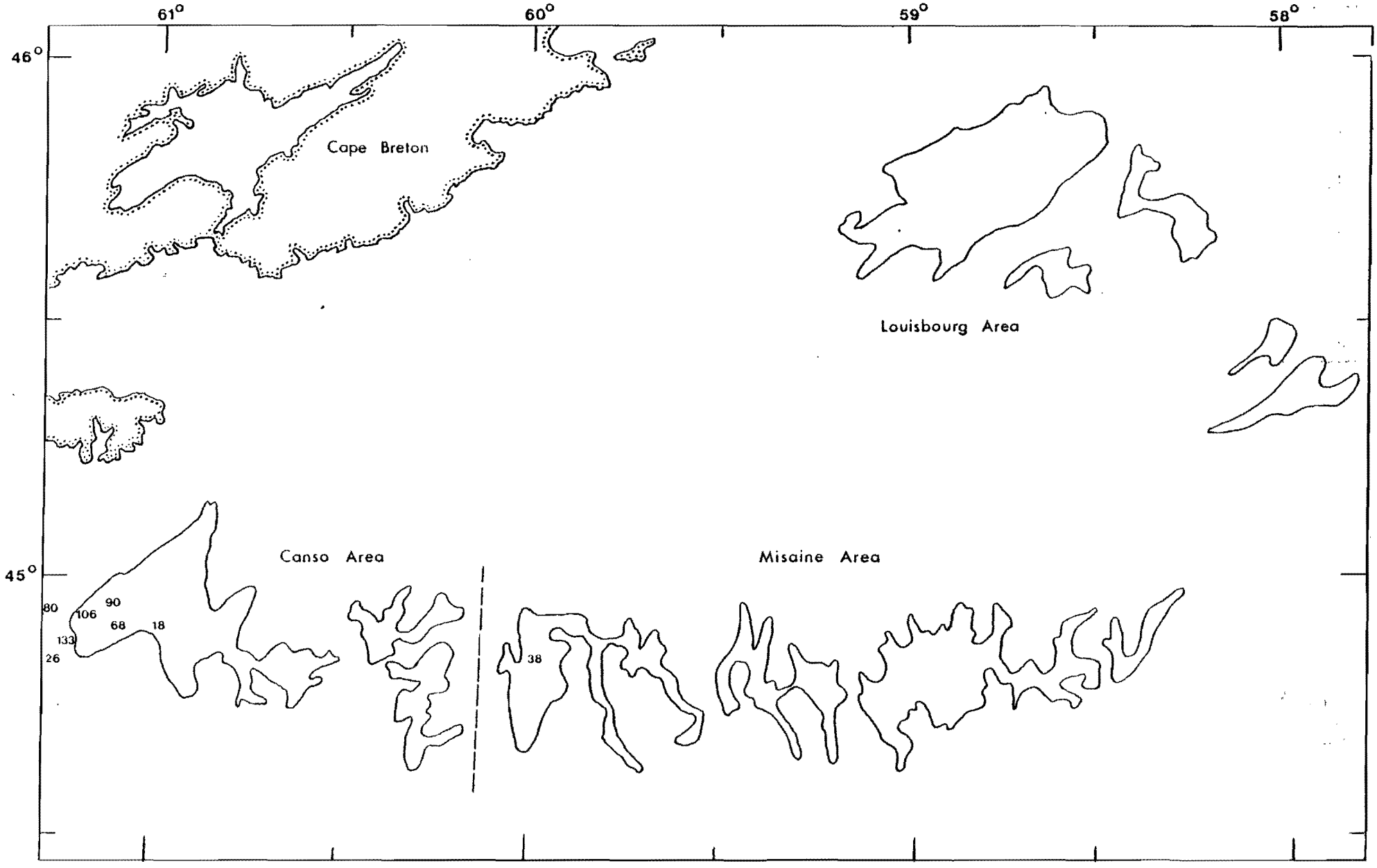

Figure 1. Catch rates (kg/h) for February 1982 research cruise.

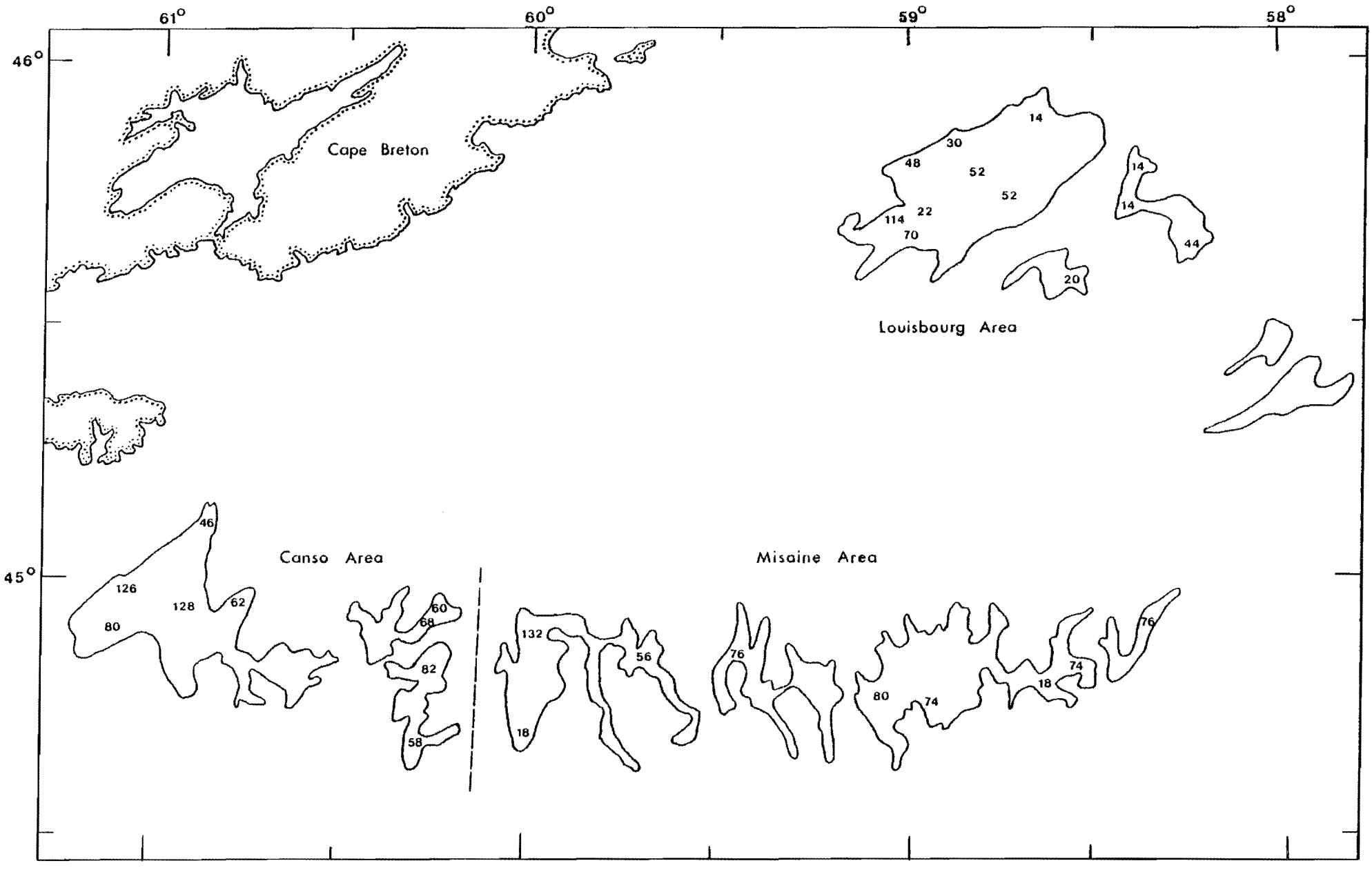

Figure 2. Catch rates (kg/h) for April 1982 research cruise.

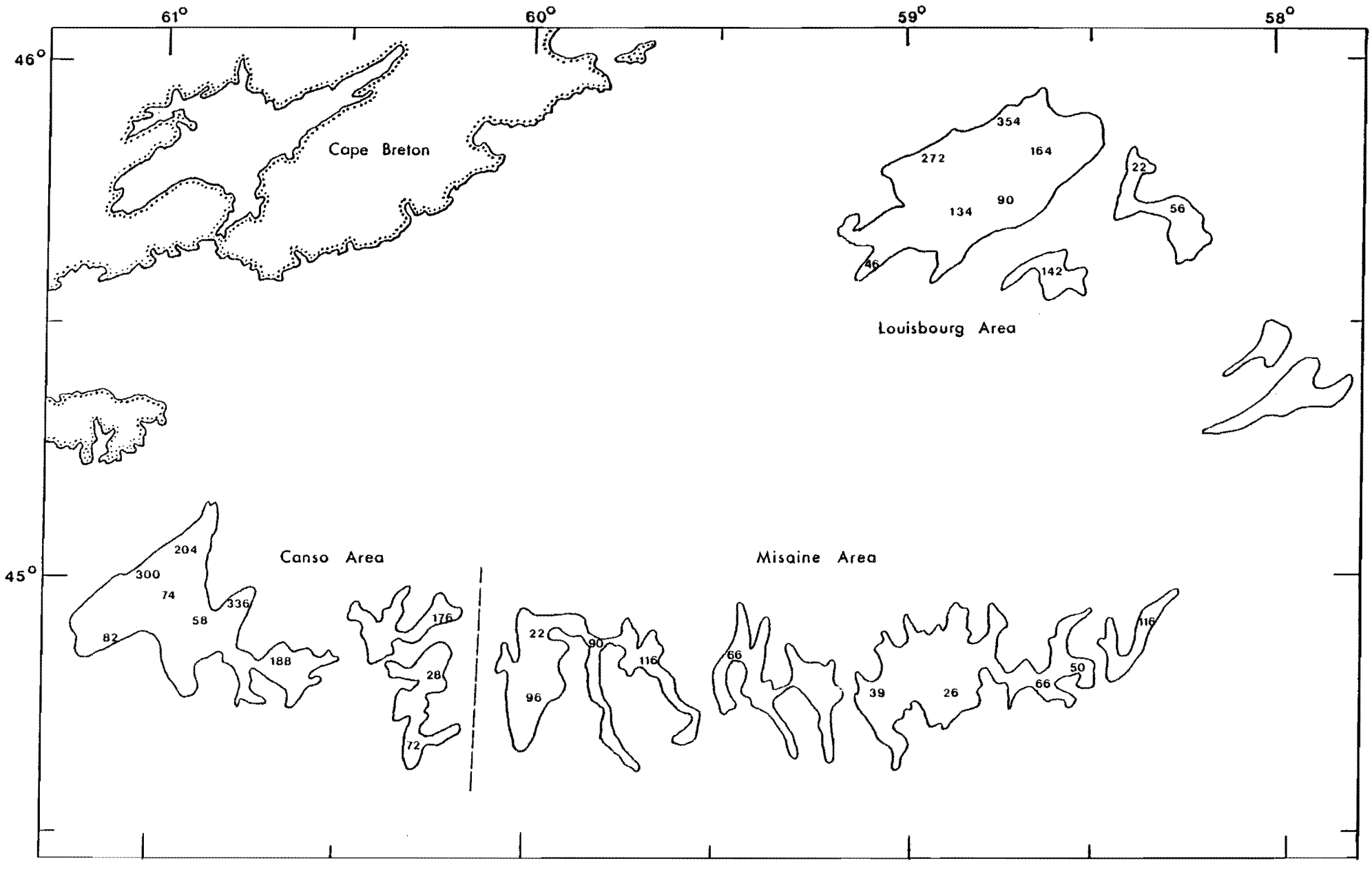

Figure 3. Catch rates (kg/h) for November 1982 research cruise.

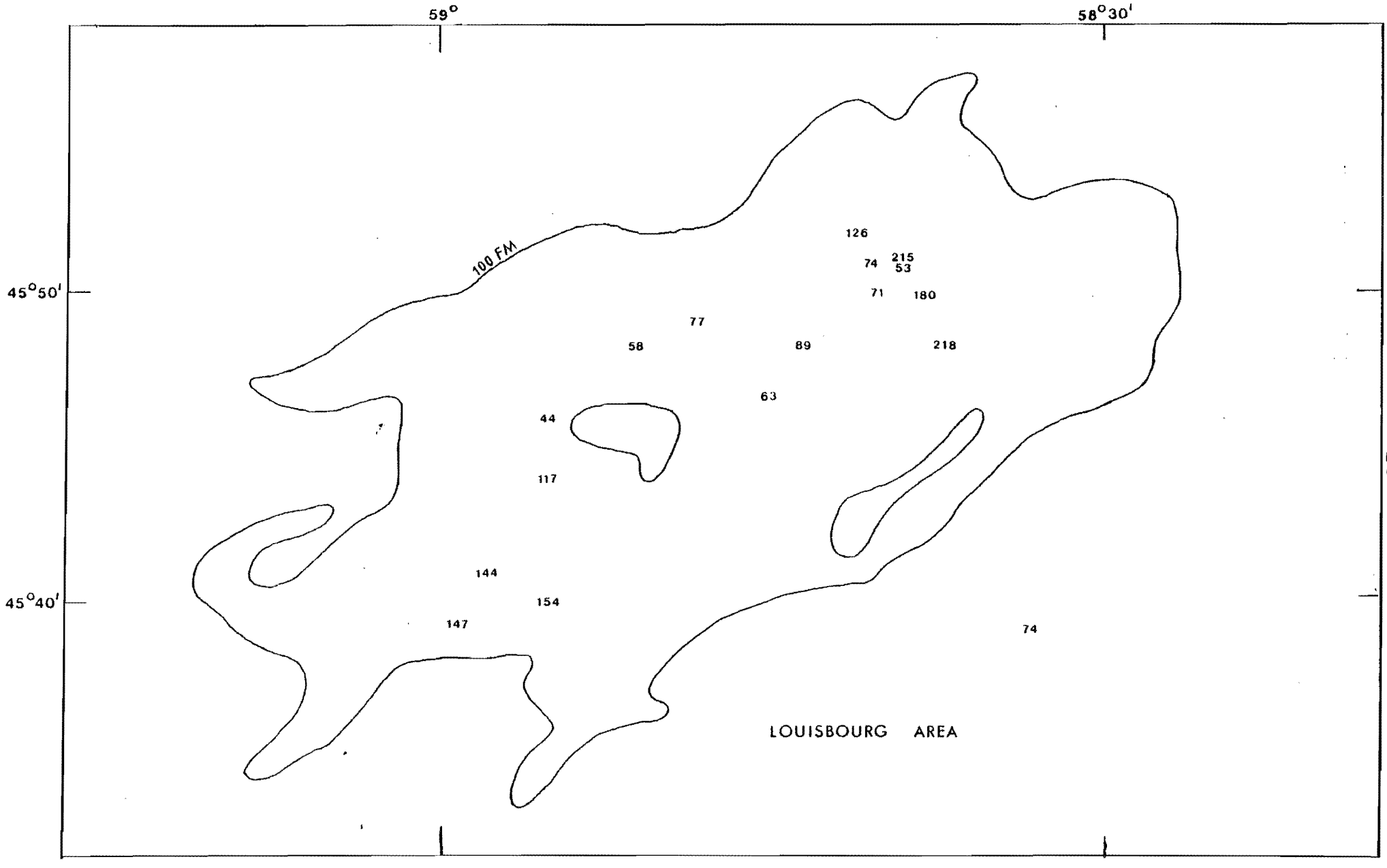

Figure 4. Catch rates (kg/h) for a commercial trawler - August 31, 1982.

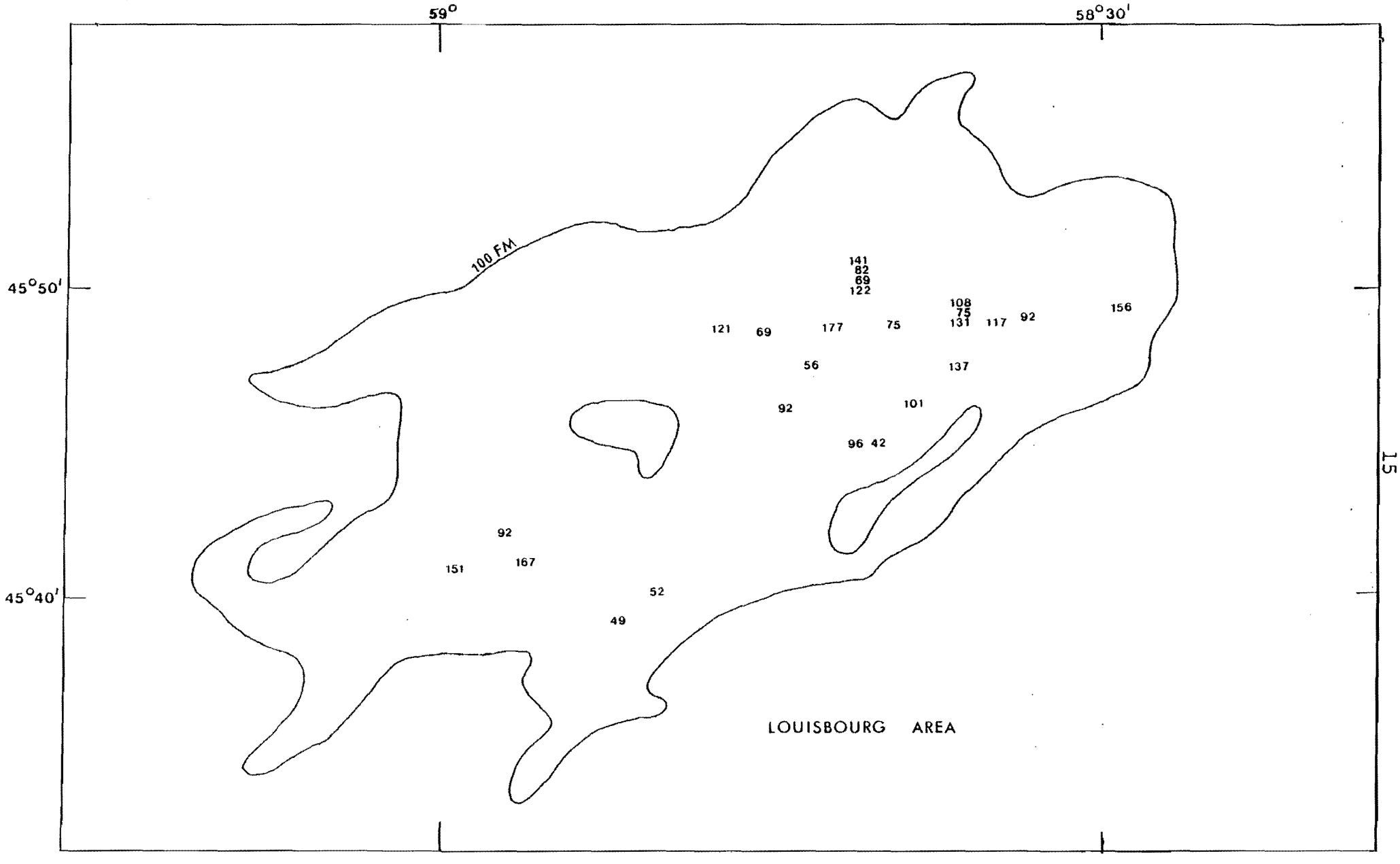

Figure 5. Catch rates (kg/h) for a commercial trawler - September 17, 1982.

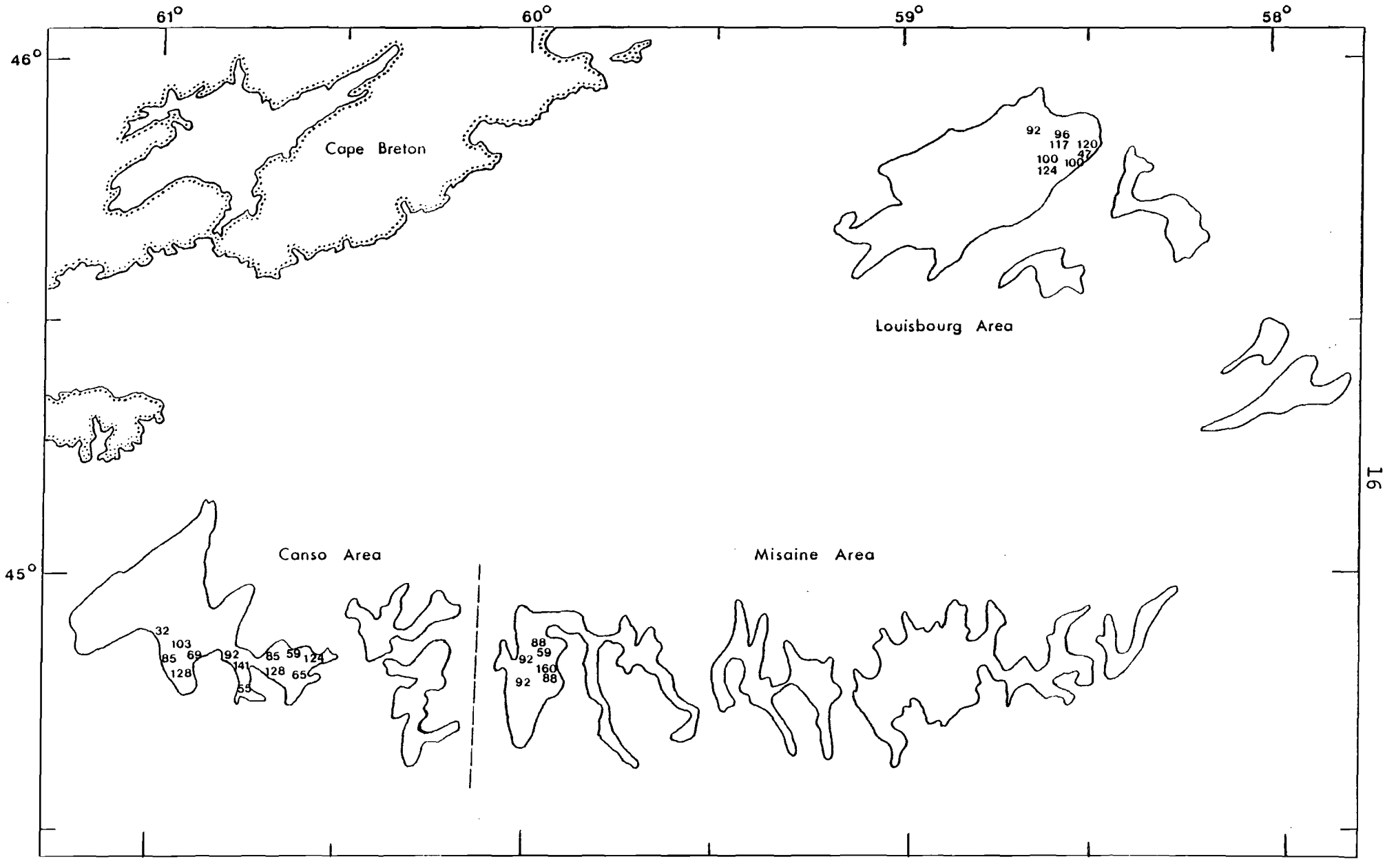

Figure 6. Catch rates (kg/h) for a commercial trawler - September 29, 1982.

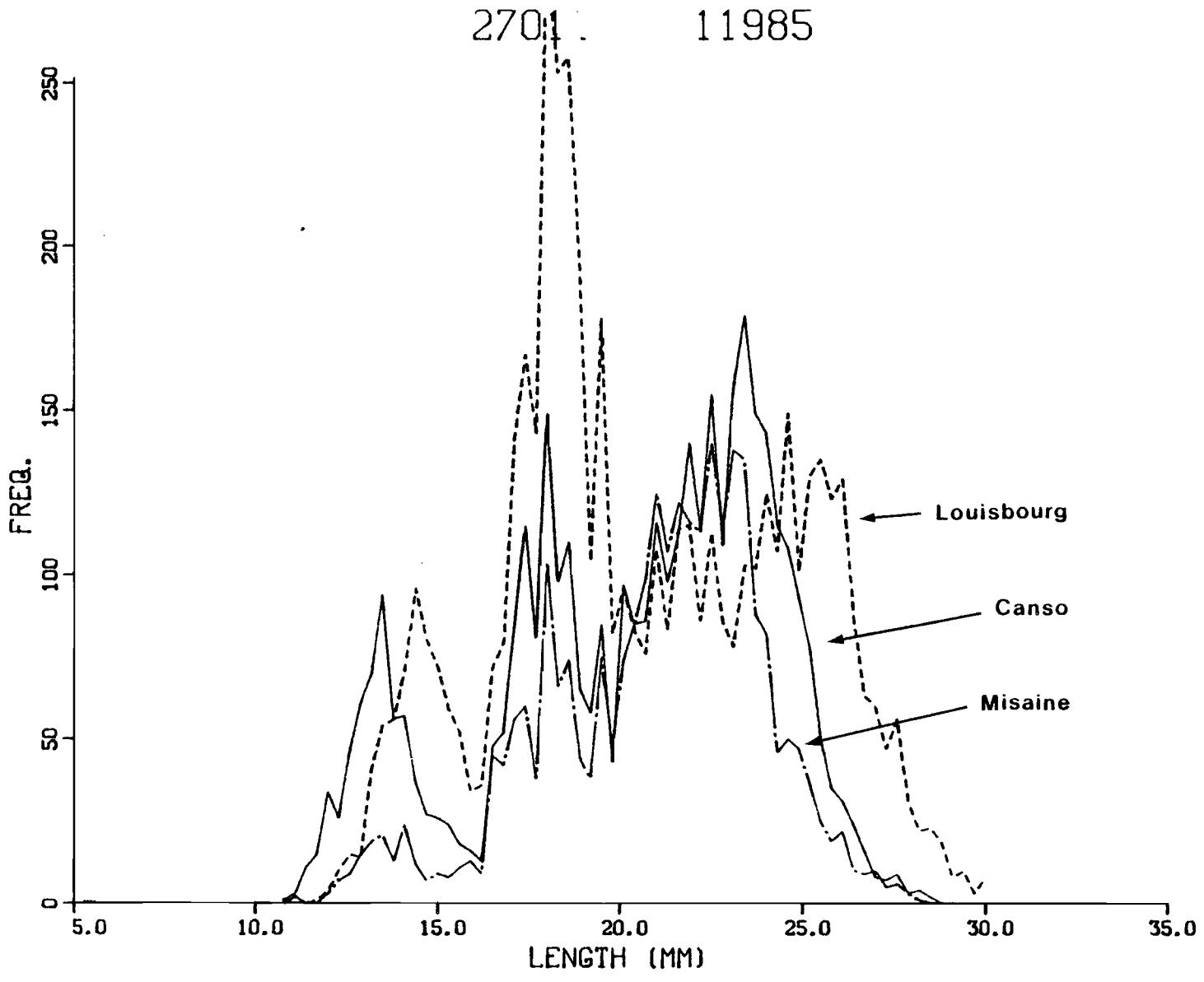

Figure 7. Shrimp length frequencies - April 1982 research cruise.

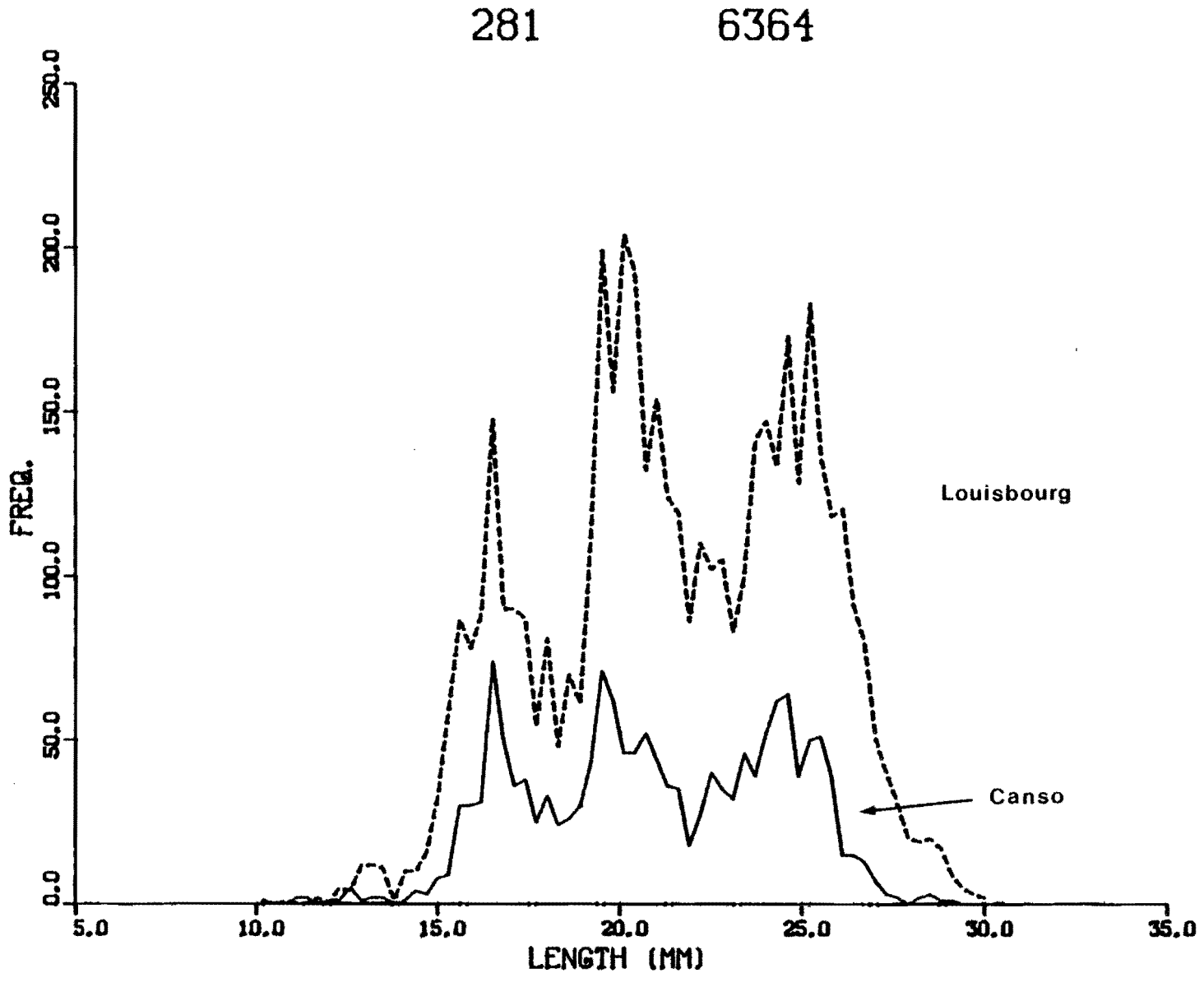

Figure 8. Shrimp length frequencies - November 1982 research cruise.