WG-CFSA-86/3

THE KERGUELEN DATABASE

G. Duhamel
(France)

Abstract

A database for fishery statistics and biological data for the Kerguelen EEZ has been operating in France since 1979. At the end of the 1984/85 fishing season, the data from 25445 trawls had been entered into the database. A graphical representation of these data is presented for several parameters including a distribution of the fishing effort, position of individual trawls, total catches and catch per species. Four species (Champsocephalus gunnari, Notothenia squamifrons, N. rossii and Dissostichus eleginoides) represent about 99% of the total catches. Length frequency distributions of the species are also provided for the period 1979/80-1985/86.

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LA BASE DE DONNEES DES KERGUELEN

G. Duhamel
(France)

Résumé

Une base de données pour les données biologiques et de statistiques de la pêche dans la ZEE des Iles Kerguelen est en usage en France depuis 1979. A la fin de la saison de pêche 1984/85, les données de 25.445 chaluts ont été introduites dans la base de données. Ces données sont représentées graphiquement pour plusieurs paramètres y compris une répartition de l'effort de pêche, la position des chaluts individuels, les prises totales et la prise par espèce. Quatre espèces (Champsocephalus gunnari, Notothenia squamifrons, N. rossii et Dissostichus eleginoides) représentent environ 99% des prises totales. Les répartitions des fréquences de longueurs des espèces sont également fournies pour les périodes 1979/80-1985/86.

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EL BANCO DE DATOS DE KERGUELEN

G. Duhamel
(Francia)

Resumen

Un banco de datos para estadisticas pesqueras y datos biológicos para la ZEE de las islas Kerguelén ha estado operando en Francia desde 1979. A fines de la temporada de pesca de 1984/85, los datos de 25 445 arrastres habían sido entrados en el banco de datos. Se presenta una representación gráfica de estos datos para varios parámetros, incluyendo una distribución del esfuerzo de pesca, de la posición de arrastres individuales, de capturas totales, y de capturas por especie. Cuatro especies (Champsocephalus gunnari, Notothenia squamifrons, N. rossii y Dissostichus eleginoides) representan alrededor de 99% de las capturas totales. También se proporcionan las distribuciones de frecuencia de tamaño de las especies para el periodo 1979/80 - 1985/86.

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БАЗА ДАННЫХ ЗОНЫ КЕРГЕЛЕНА

Г. Дюамель
(Франция)

Резюме

Начиная с 1979 г. во Франции функционирует база статистических данных промысла и биологических данных Экономической (прибрежной) зоны о-вов Кергелен. К концу промыслового сезона 1984/85 г. в эту базу были введены данные, полученные в результате 25445 тралений. Дается графическое представление этих данных по некоторым параметрам, включая распределение промысловых усилий, местоположение отдельных тралений, величины общего вылова и вылова по видам. Около 99% общего вылова приходится на четыре вида (Champsocephalus gunnari, Notothenia squamifrons, N. rossii и Dissostichus eleginoides). Представлены также сведения о распределении по частоте длины по видам за период с 1979/80 по 1985/86 г.

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THE KERGUELEN DATABASE

Since 1979, a data collecting system (fishery statistics and biological sampling program) has been used for the Kerguelen Islands area. The introduction of a fishing logbook for each trawler in June 1980 has generally been accepted and the data collected can be considered as reliable.

At the end of the split-year 1985/86 25445, trawlings have been registered in a database. The LFD (Length Frequency Distribution) of four abundant species are also available from 1979/80 to 1985/86. These species are Champsocephalus gunnari, Notothenia squamifrons, N. rossi and Dissostichus eleginoides and they represent about 99% of the total catches.

Some data can be presented using figures and tables. In the interpretation of the results however, one should take into account that the fisheries are controlled.

The frequency of the trawlers in the area (Figure 1) illustrates the fishing effort during the year. During spring and summer the fishing effort is greatest due to better meteorological conditions and maximal concentration of fishes.

The geographical position of the fishing effort is represented in an artificial map (see Figure 2) where the total trawl number is plotted for a certain period of time. Two such periods are shown. During the first period, the main fishing effort occurs in the Southern, South-Eastern part of the shelf (see Figure 8). The effort extends from the South to the North-East of the shelf and also to a neighbouring bank (S-W) during the second period.

The same analysis, but on a seasonal base, is given in Figures 3 to 5. The period extends from winter 1984 to summer 1986. The analysis as a whole indicates that some sectors (principally N/E, S/E, S sectors and secondarily the W and S/W bank) must be considered as the main fishing grounds of the area.

The monthly total catches, catches per species, fishing effort and CPUE (Catch Per Unit Effort) for the whole area are shown in Figures 6 and 7. Two peaks can be seen in the catches during the summers of 1982/83 and 1985/86. They are related to the high level of C. gunnari catches.

The presence of N. rossii in the total catches has decreased yearly. Conservation measures established for this species have been in force for several years. In recent years, catches of N. squamifrons have never been high (except during the summer of 1980) but have been relatively constant. The catching period was restricted to the summer. Finally, D. eleginoides constitutes an important part of the catches during the 1984/85 season as a result of the discovery of a new deep fishing ground. The species did not support the fishing effort and subsequent catches in the same sector remained low.

Annual abundance of each species in the total catches is listed in Table 1. Two measures of fishing effort are given (number of trawls and hours fished). The results for the CPUE are comparable even when the CPUE in tonnes/hour is considered as the best measure of fishing effort. The highest yield occurred during the season 1985/86 (4.69 t/h) but the 1982/83 value was also good (4.57 t/h) due to the good catches of C. gunnari. It is also clear that when this species does not occur or when it is less abundant, the total value for the CPUE is low (e.g. 1.51 t/h during 1983/84).

The database allows analysis of catches and fishing effort within geographical sectors. The Kerguelen Islands EEZ has been divided into 9 sectors. This provides the possibility to study the seasonal distribution of the species and to follow the variations in catches, fishing effort and CPUE. In addition, four depth ranges have been selected for analysing the bathymetric distribution of the species. The following results were obtained :

- The first depth range (050-149 m) is not a major fishing area.

- Three sectors of the shelf are important : 2, 3 and 4.

- One species is dominant in each sector :
  - main sector for C. gunnari : 2
    secondary sector : 8 and 1
    main depth range : 150-249 m in the sector 2
    250-349 m in the sector 8
  - main sector for N. rossii : 3
    regular in sector 8
    main depth range : 250-349 m and 250-600 m during the winter
  - main sector for N. squamifrons : 4
    secondary sector : 3
    main depth range : 250-349 m.

- Recent discovery of the D. eleginoides fishing grounds indicates :

  - main sector for D. eleginoides : 6
    secondary sector : 5
    main depth range : 350-600 m.

- Allopatry of the species in the depth ranges (except between N. rossii and N. squamifrons in the sectors 3 and 4 during the winter, due to the three month analysis).

- CPUE are representative in the studies of abundance if the main sector of distribution and the depth range are taken into account for each species. The season is also important.

The analysis would be incomplete if the LFD were not available. The LFD for N. rossii has already been presented and now we can supply the LFD for the two other important species.

The analysis of LFD for C. gunnari contains an important amount of information even in the absence of data for the period 1970/79. The cohorts (Figure 9 can be easily followed using the integration method). This is very useful as age determination with otoliths is difficult. We have obtained the following data :

- Two cohorts (1979 and 1982) are dominant during the period 1979/1986, taking into account the level of corresponding catches. These cohorts are exploited in the North/eastern part of the shelf.

- The cohorts 1978 and 1981 have been found outside the shelf and do not mix with those previously mentioned.

- In terms of abundance, it is necessary to modify the value of CPUE if the same cohort is followed.

- The length at first maturity is 25 cm. This value is important to consider when the catches are relative to only one age group.

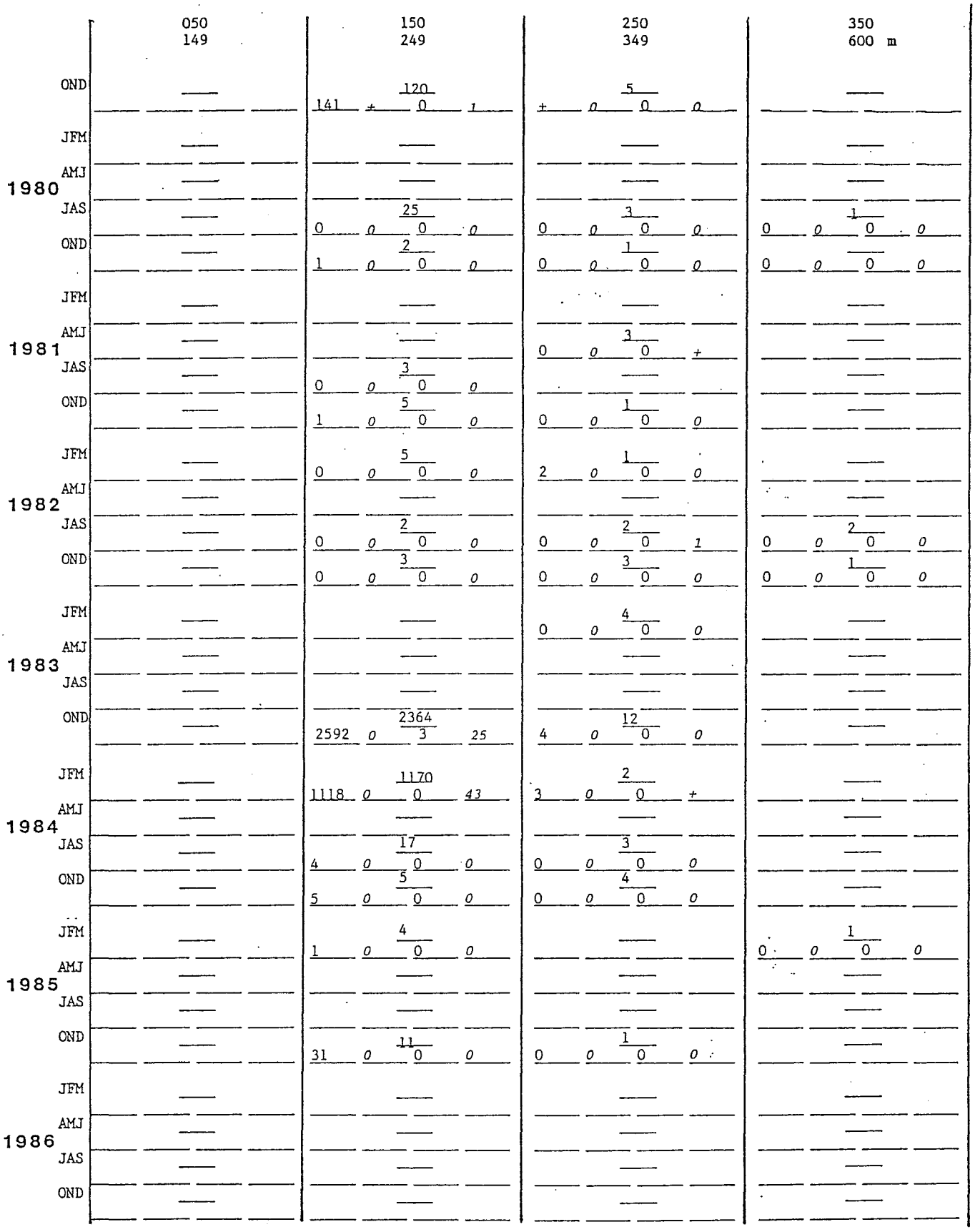
The LFD and ageing of N. squamifrons are illustrated in Figure 10. It is evident that only a part of the population is exploited because no fish under 23 cm were caught. A decrease of the mean length is obvious. The actual mean length is less than the length at first maturity. The values of CPUE do not reflect a decrease of the population which is exploited at a low level.

Split year	C. gunnari	N. squamifrons	N. rossii	D. eleginoides	others	Fishing effort trawls (CPUE)	hours
1979	(1347)*	(4451)*	(1175)*	(159)*	(18)*	*1429*	*2435*
1980	1631	11308	1752	159	18	*(5.00)*	*(2.94)*
1980	1095	6287	7927	43	59	*4011*	*5682*
1981						*(3.84)*	*(2.71)*
1981	16048	4051	9792	124	7	*5249*	*8680*
1982						*(5.72)*	*(3.46)*
1982	25851	1815	1823	130	29	*3957*	*6485*
1983						*(7.49)*	*(4.57)*
1983	7127	3794	744	147	618	*3278*	*8231*
1984						*(3.79)*	*(1.51)*
1984	8265	7408	1704	6673	12	*4844*	*7146*
1985						*(4.97)*	*(3.37)*
1985	17054	2464	801	459	2	*2686*	*4435*
1986						*(7.74)*	*(4.69)*

** partial data corresponding to the fishing effort & used for the CPUE*

Table 1. Catches per species from split-year 1979/80 to 1985/86. Values of the total fishing effort (number of trawls and hours fished) are represented. The corresponding CPUE is in brackets. Kerguelen Islands EEZ.

Table 2. Seasonal fishing effort (trawling hours) and corresponding catches (tonnes) per species (C. gunnari, N. squamifrons, N. rossii, D. eleginoides respectively) in four depth ranges for sectors of the Kerguelen EEZ (see Figure 8).

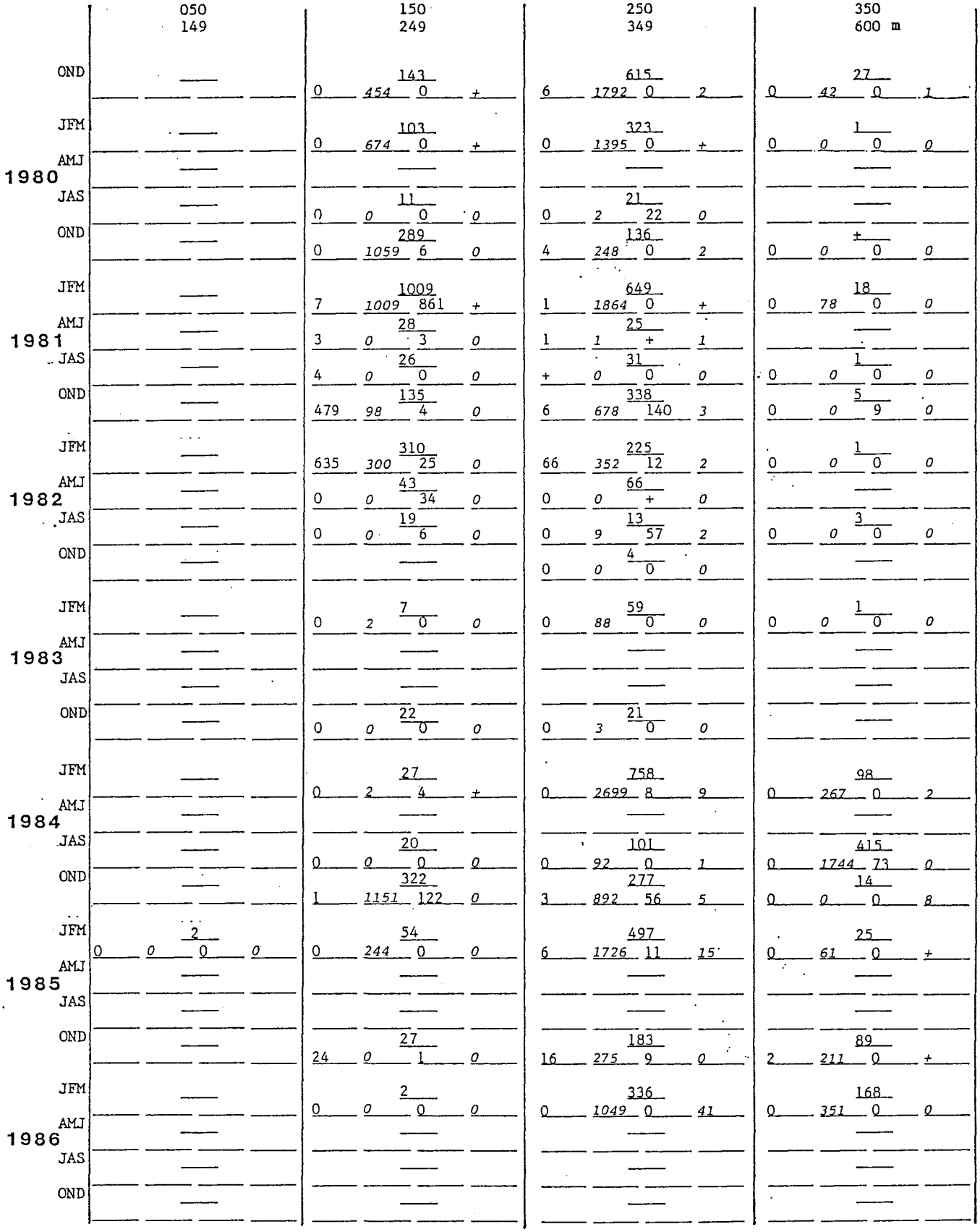


		050 149			150 249			250 349			350 600 m		
	OND	8			34			8					
		0	0	0	9	+	1	+	1	+			
	JFM	1			+			2			2		
		0	0	+	0	0	0	+	0	0	0	0	0
	AMJ	2			13			1					
1980		2	0	0	14	0	0	2	0	0	0	0	0
	JAS	13			27			8			1		
		0	0	0	0	1	0	0	0	0	0	0	0
	OND	8			58			80			3		
		2	0	0	14	0	6	55	3	0	0	0	0
	JFM				10			6					
					0	0	0	+	2	0			
	AMJ				23			2			3		
1981					7	+	+	0	0	0	0	0	0
	JAS	21			23			5					
		0	0	0	5	0	+	+	0	0			
	OND	2			48			51			4		
		58	0	0	34	1	31	11	4	22	0	0	0
	JFM	22			1435			196			43		
		69	0	0	6459	3	36	361	65	7	1	16	2
	AMJ				5								
1982					14	0	+						
	JAS	26			325			138			3		
		3	0	0	905	0	71	377	0	81	0	0	0
	OND	832			956			63			17		
		5660	8	63	8105	1	167	215	0	4	0	2	0
	JFM	64			973			345			24		
		403	0	0	6995	2	41	438	466	7	0	30	0
	AMJ	40			118			69			8		
1983		99	0	3	495	0	4	582	2	+	0	0	0
	JAS												
	OND	43			1214			106					
		19	0	0	1329	0	8	55	0	0			
	JFM	12			545			123			10		
		2	1	1	774	7	+	106	10	0	0	1	0
	AMJ	2			105			4					
1984		0	0	0	187	+	0	1	0	0			
	JAS	19			39			17			13		
		2	0	0	30	0	0	46	0	0	4	0	0
	OND	2			35			21			11		
		0	0	0	123	1	1	56	1	1	1	1	1
	JFM	8			631			223			5		
		45	+	0	4808	53	6	482	149	3	5	0	0
	AMJ	4			249			16					
1985		9	0	0	2081	1	1	104	+	0			
	JAS												
	OND	179			2429			172			38		
		865	0	2	15248	10	92	690	20	60	22	+	0
	JFM				17			7					
					114	3	0	1	23	0			
	AMJ												
1986													
	JAS												
	OND												

Sector II

		050 149			150 249			250 349			350 600 m		
1980	OND	5 0 0 0 0			9 0 0 0 0			24 0 0 0 0			— — — — —		
	JFM	— — — — —			2 0 0 0 0			10 0 57 0 0			— — — — —		
	AMJ	— — — — —			6 0 0 4 0			131 0 12 1024 0			17 0 0 126 0		
	JAS	3 0 0 0 0			44 0 0 178 0			504 0 29 3692 0			271 0 29 1326 0		
	OND	3 0 0 0 0			91 4 35 105 0			97 0 28 88 0			15 0 0 0 0		
1981	JFM	— — — — —			257 2 346 258 0			648 1 1731 0 +			21 0 30 0 0		
	AMJ	1 0 0 0 0			128 0 2 141 +			207 1 19 586 1			80 0 0 501 0		
	JAS	— — — — —			175 0 0 213 0			686 0 4 3610 2			300 0 3 1892 +		
	OND	— — — — —			1350 5284 3 161 15			1010 437 1431 1394 11			21 0 42 1 0		
1982	JFM	2 16 0 0 0			312 861 12 27 +			534 208 1091 112 4			59 0 234 0 +		
	AMJ	— — — — —			72 + 0 16 3			226 + 0 685 0			261 0 2 1263 0		
	JAS	1 0 0 0 0			61 0 0 10 0			1060 0 243 829 2			192 0 130 65 +		
	OND	40 373 0 0 0			118 818 113 17 0			31 5 0 0 2			7 0 2 0 0		
1983	JFM	2 12 0 0 0			125 319 0 18 2			323 46 609 5 8			93 0 222 4 14		
	AMJ	+ + 0 0 0			4 0 0 1 0			25 0 0 60 5			54 0 5 143 9		
	JAS	— — — — —			— — — — —			— — — — —			— — — — —		
	OND	1 0 0 0 0			175 0 153 258 1			397 1 539 237 5			14 0 9 4 1		
1984	JFM	9 0 0 2 0			31 1 22 0 0			83 31 70 3 9			11 0 10 0 3		
	AMJ	— — — — —			6 0 + 0 +			2 0 0 0 0			6 0 1 0 0		
	JAS	4 0 0 0 0			17 0 2 5 0			178 0 12 255 1			235 0 69 853 0		
	OND	— — — — —			24 + 6 0 10			271 0 638 2 15			3 0 1 0 +		
1985	JFM	1 0 0 0 0			29 127 1 0 0			404 18 504 259 21			21 0 16 33 0		
	AMJ	— — — — —			— — — — —			— — — — —			— — — — —		
	JAS	— — — — —			— — — — —			— — — — —			— — — — —		
	OND	1 0 0 0 0			15 25 2 0 0			280 3 225 625 2			27 0 25 0 2		
1986	JFM	— — — — —			2 0 0 0 0			155 16 269 0 0			6 0 2 0 0		
	AMJ	— — — — —			— — — — —			— — — — —			— — — — —		
	JAS	— — — — —			— — — — —			— — — — —			— — — — —		
	OND	— — — — —			— — — — —			— — — — —			— — — — —		

Sector III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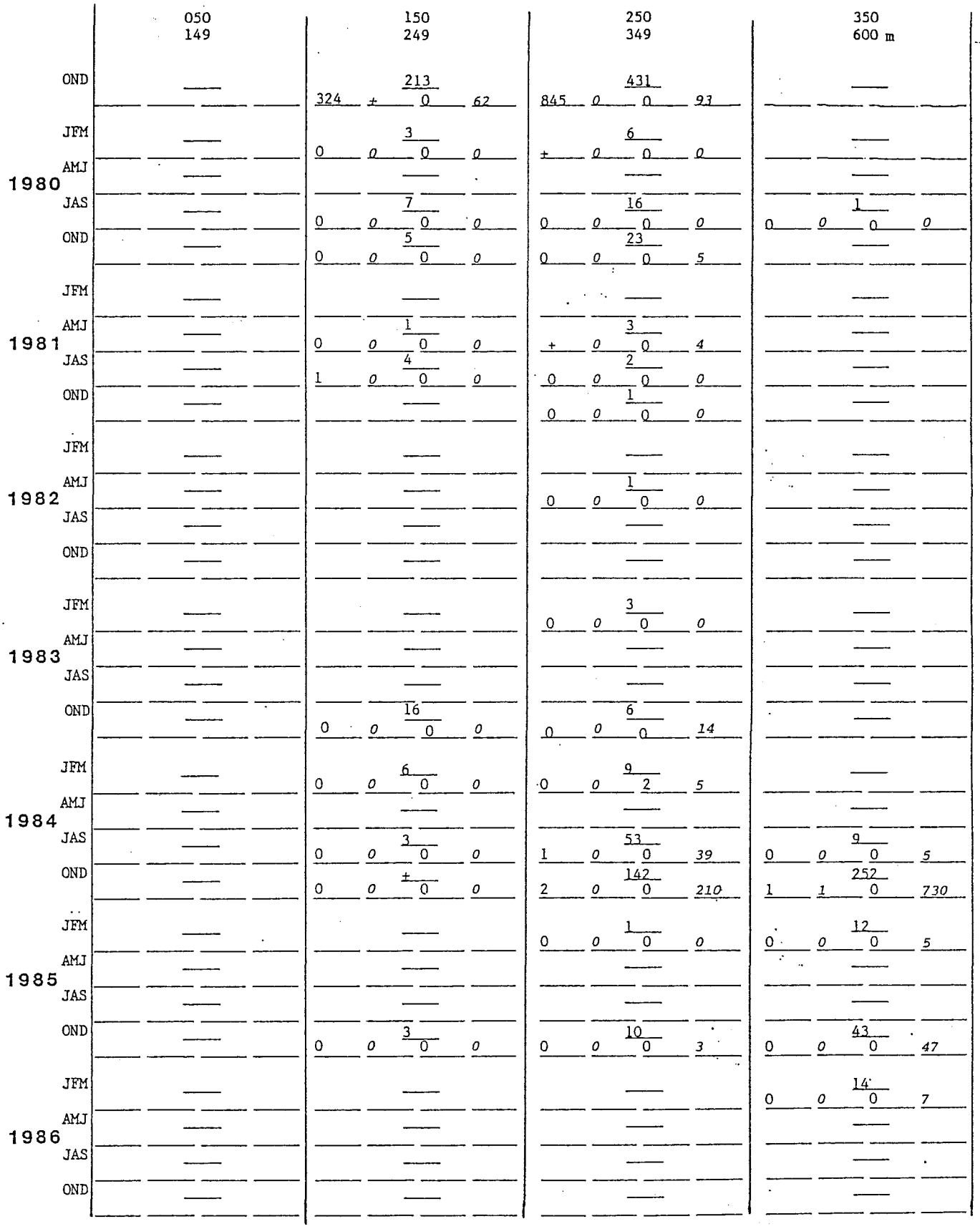
Sector IV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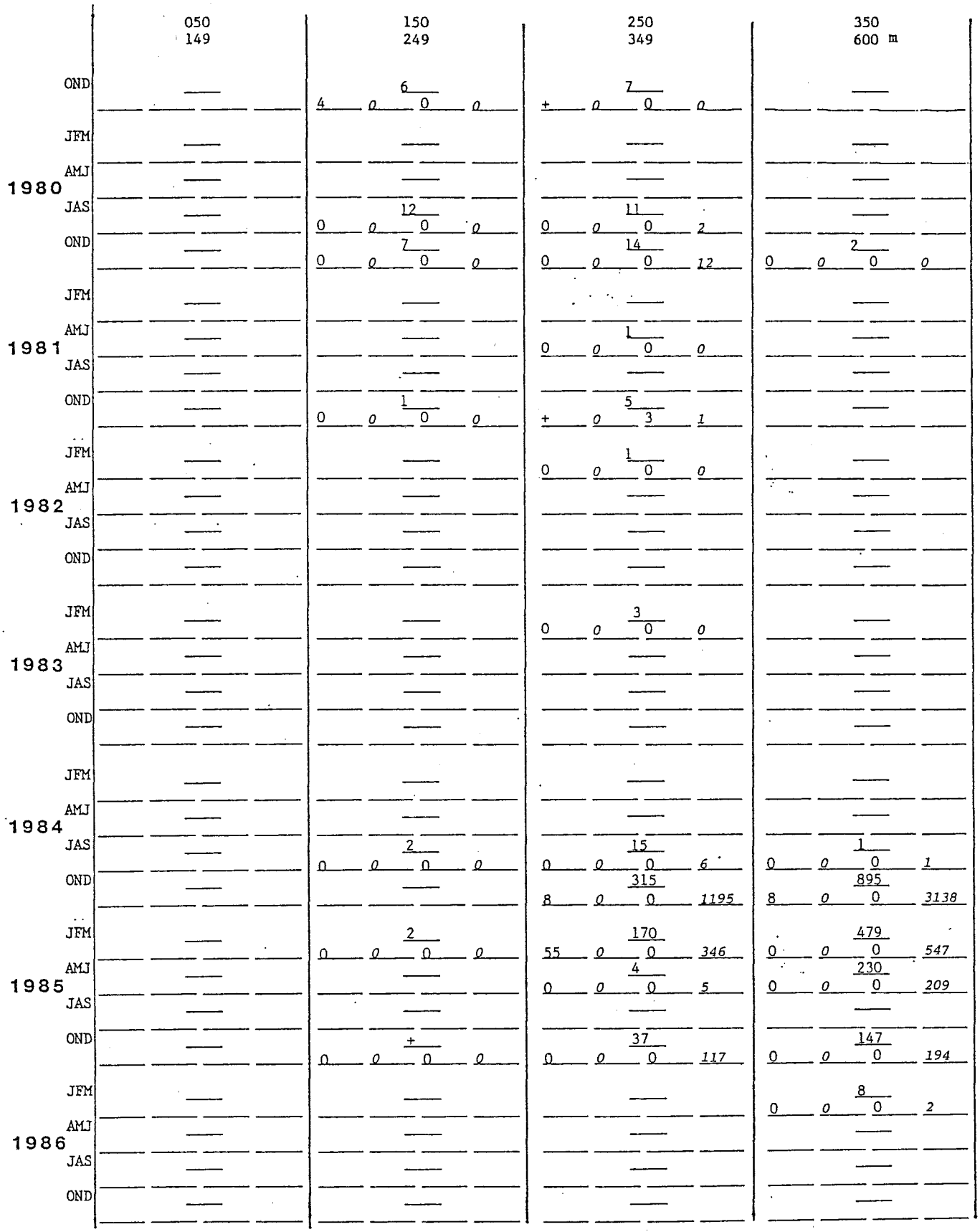
Sector V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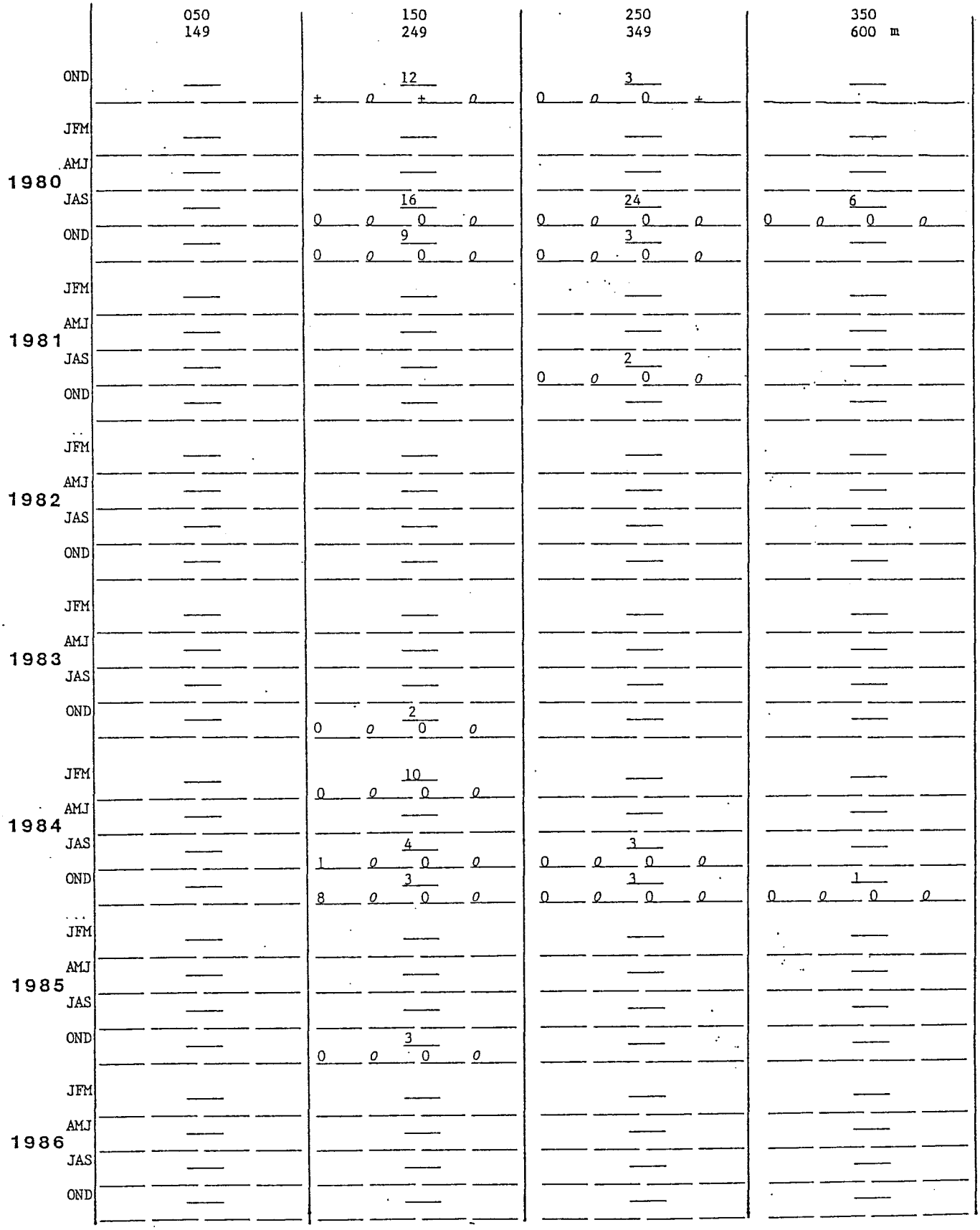
Sector VI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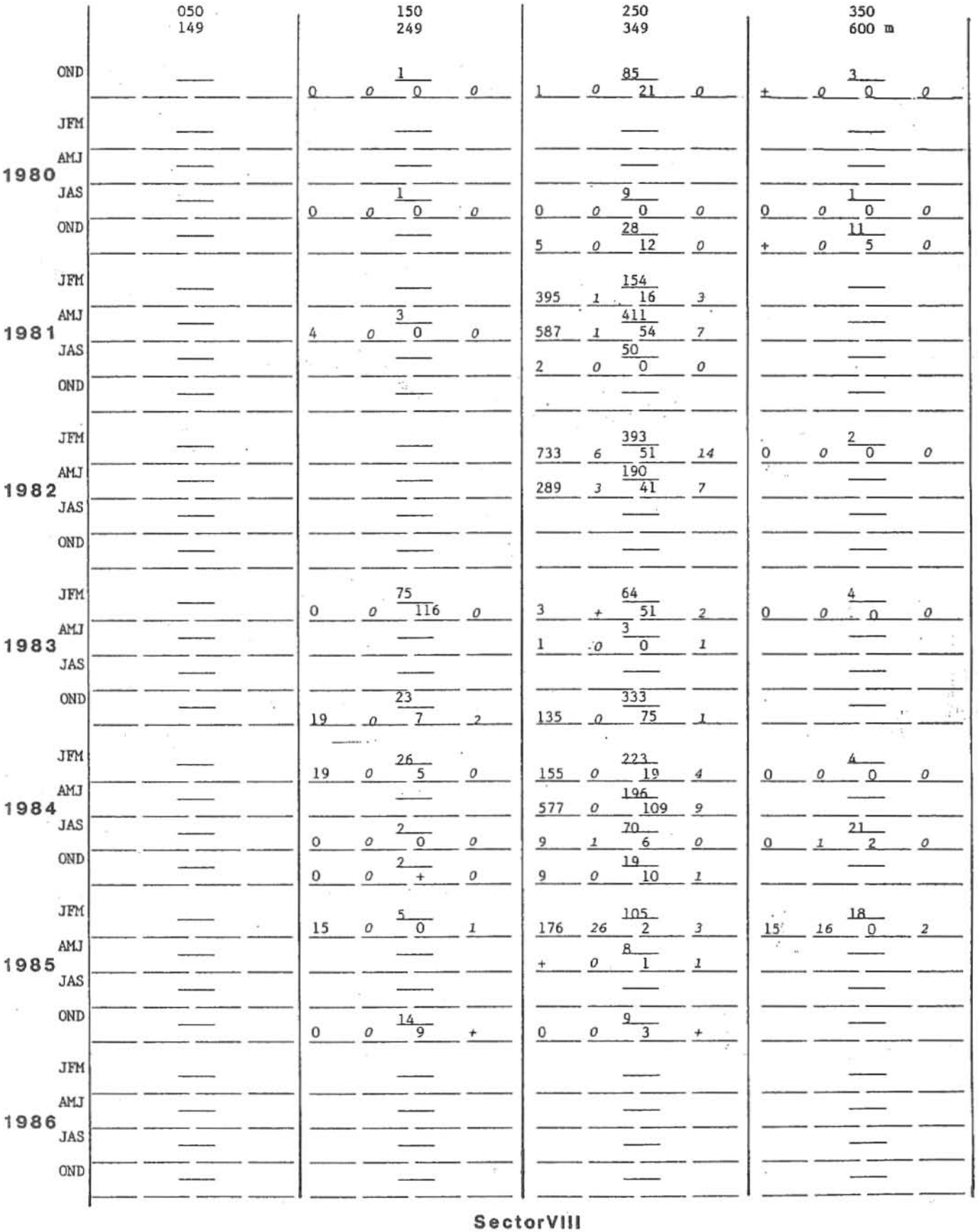
Sector VII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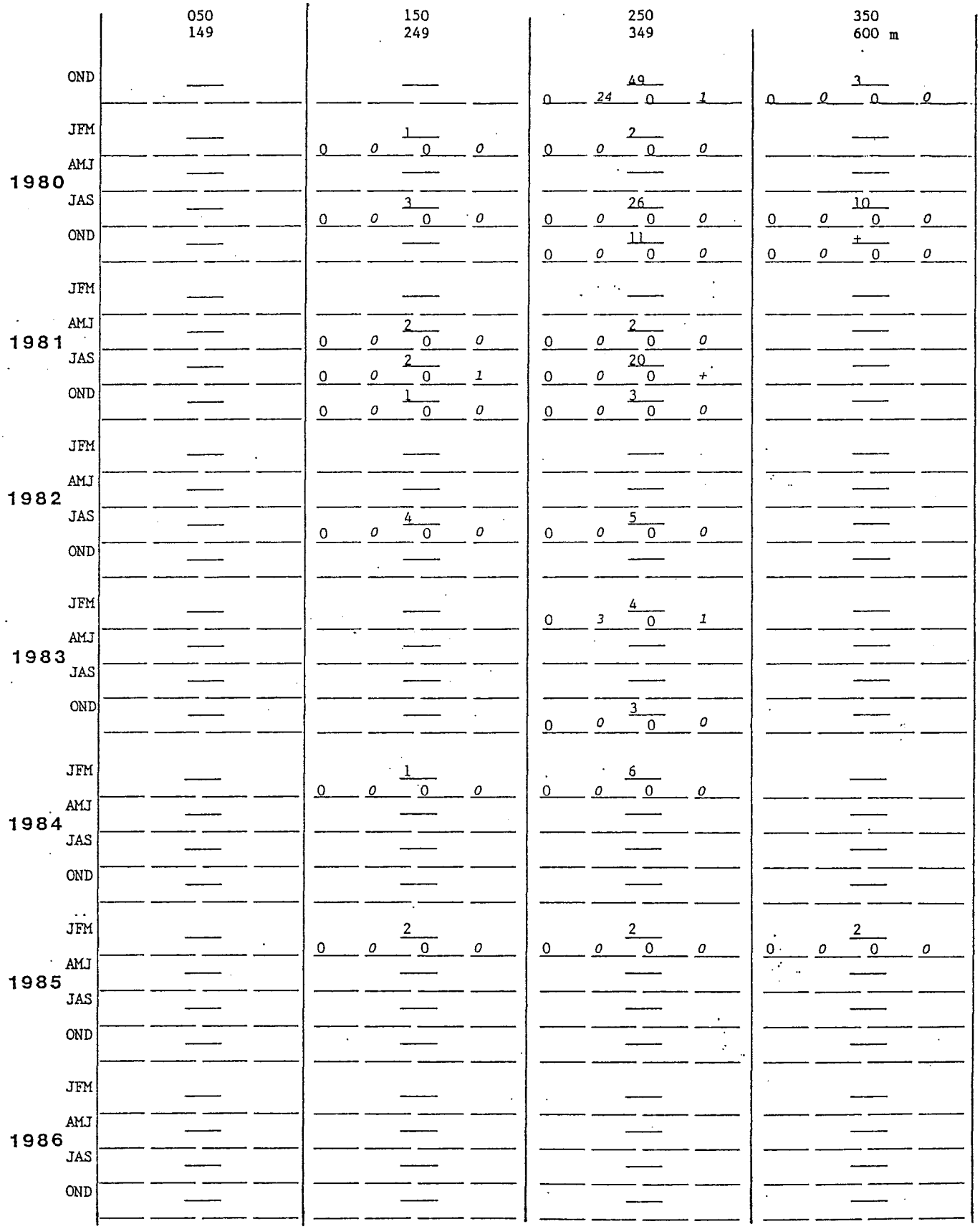
SectorVIII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Sector IX

Figure 1 Distribution of the fishing effort in the Kerguelen Island EEZ during the period 1979-80/1985/86.

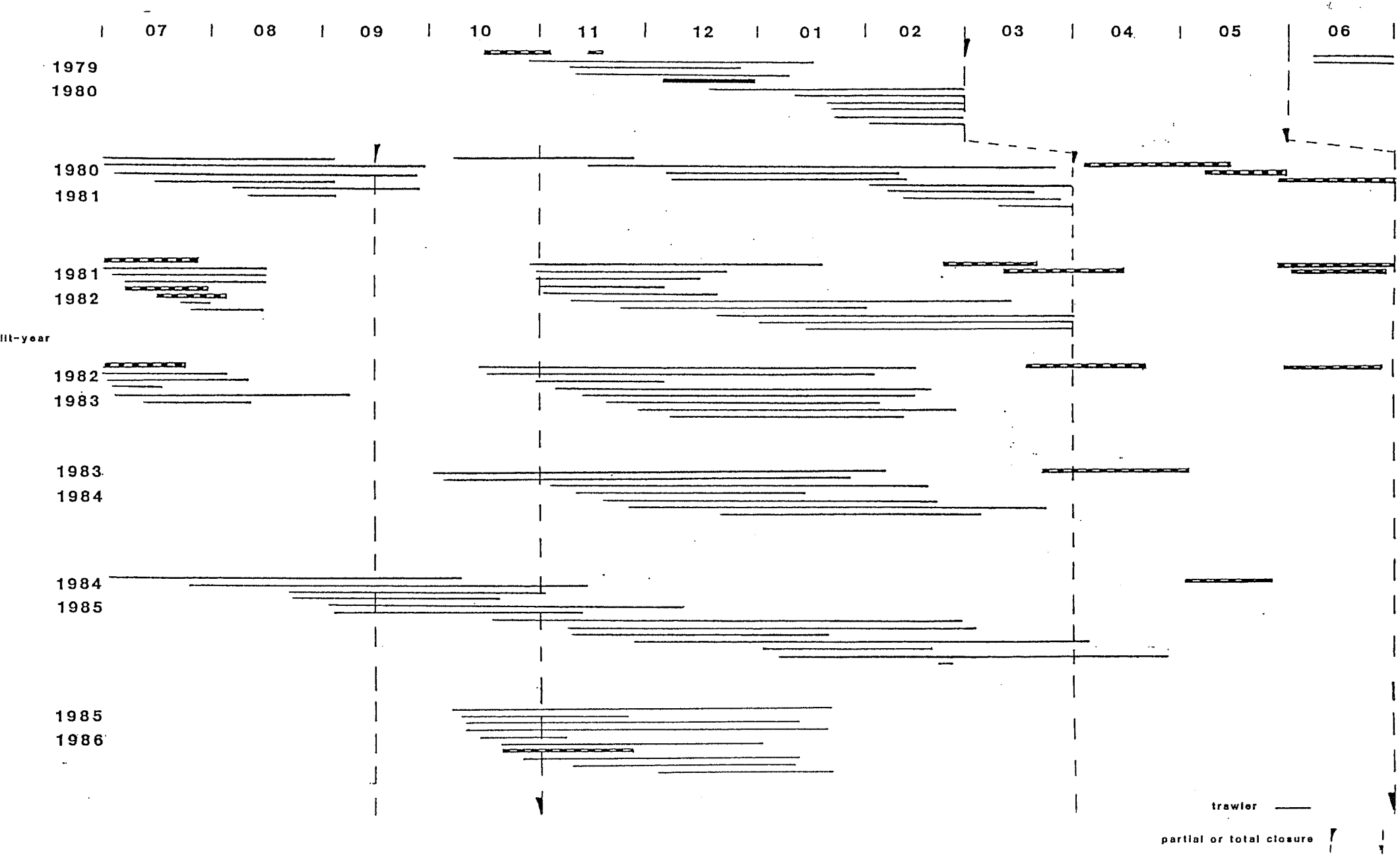
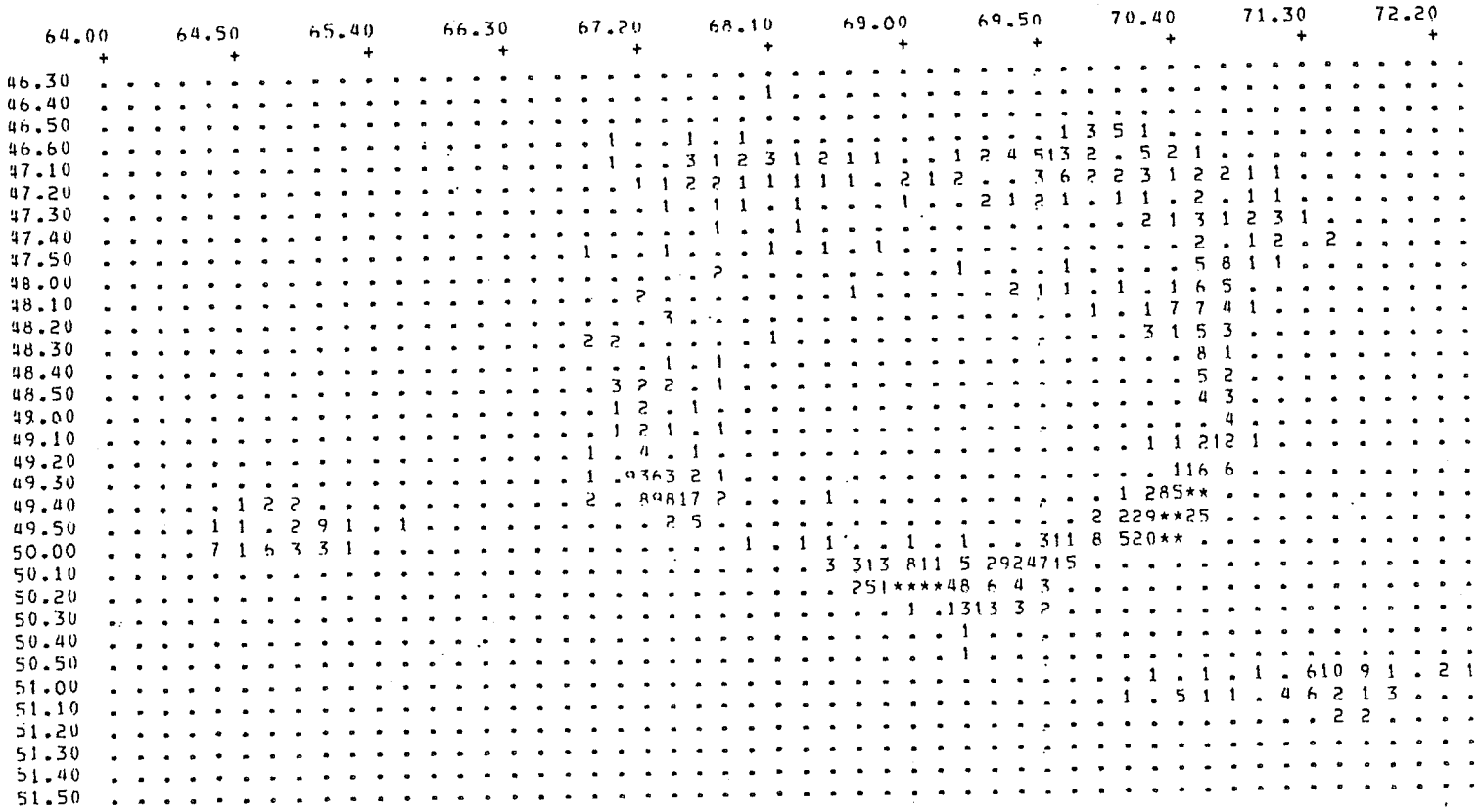


Figure 2 Position of the trawl on the Kerguelen Shelf and surrounding banks for two periods.

Period

01/10/1979-30/09/1980

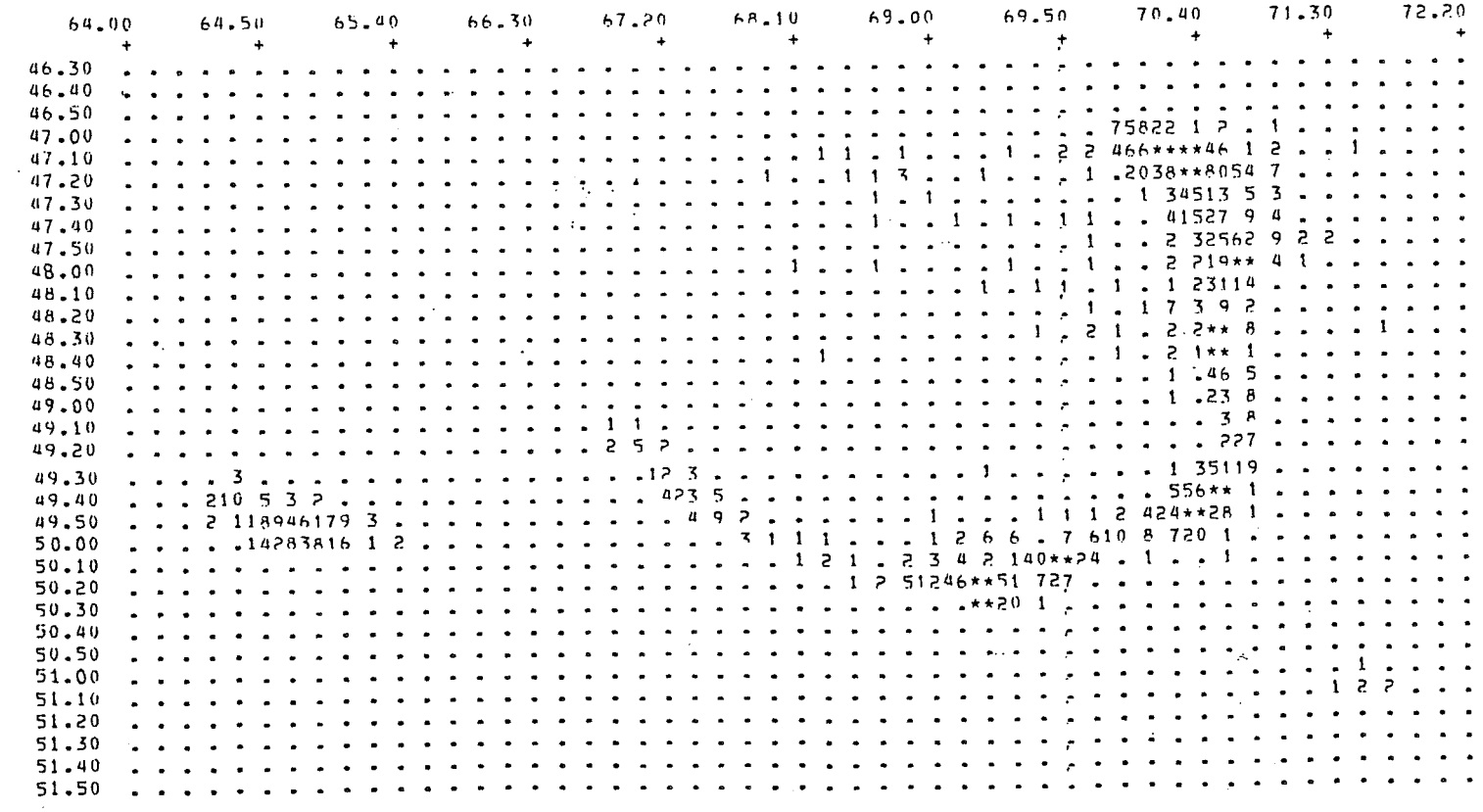
2663 trawls



Period

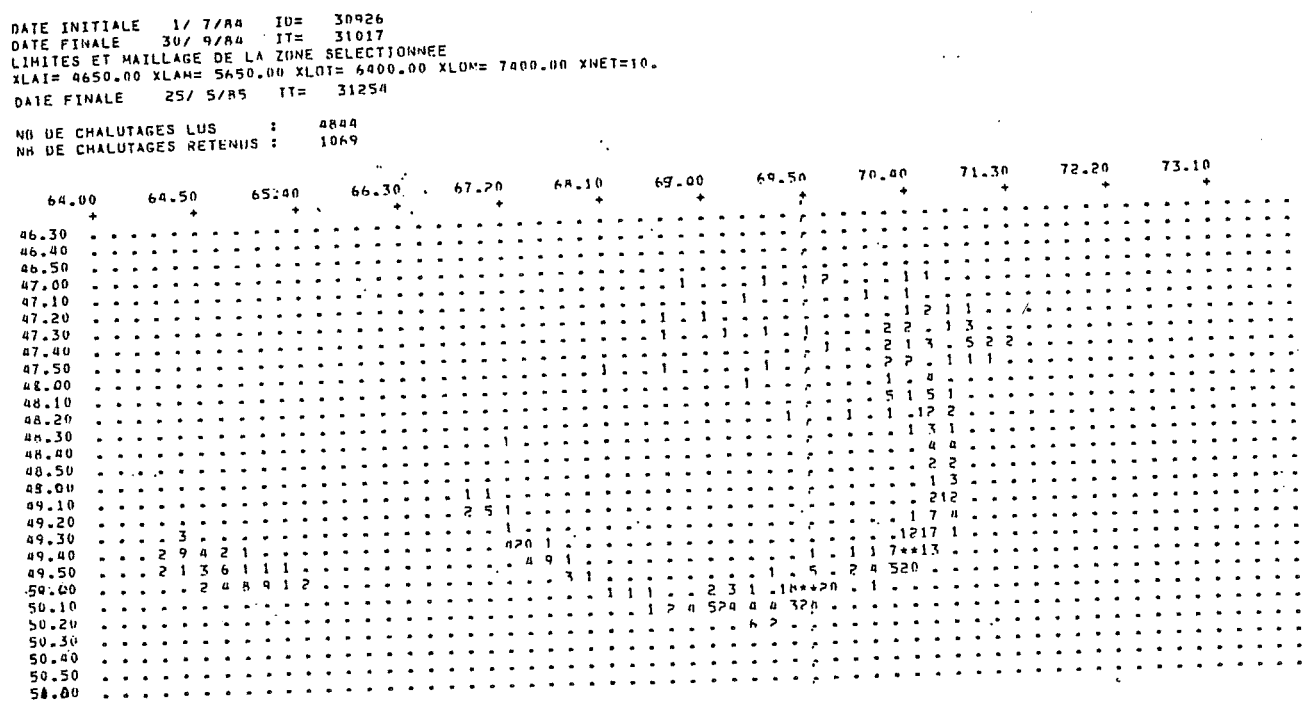
01/10/1983-30/09/1984

4347 trawls



Figures 3, 4 and 5 — Seasonal position of the trawl on the Kerguelen shelf and surrounding banks from winter 1984 to summer 1986.

Fig. 3



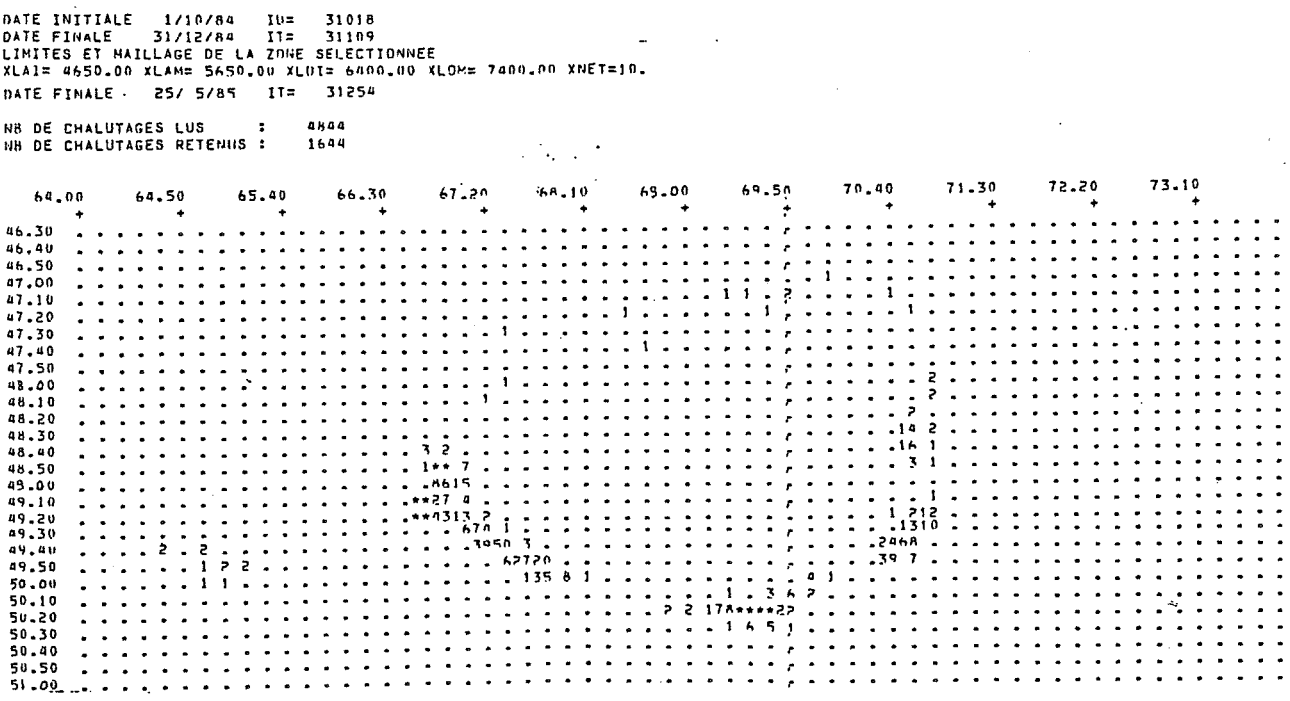


Fig. 4

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DATE FINALE    31/ 3/85   IT=   31199
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XLAI= 4650.00 XLAM= 5650.00 XLOI= 6400.00 XLOM= 7400.00 XNET=10.
DATE FINALE    25/ 5/85   IT=   31254

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NB DE CHALUTAGES RETENUS  :    1865
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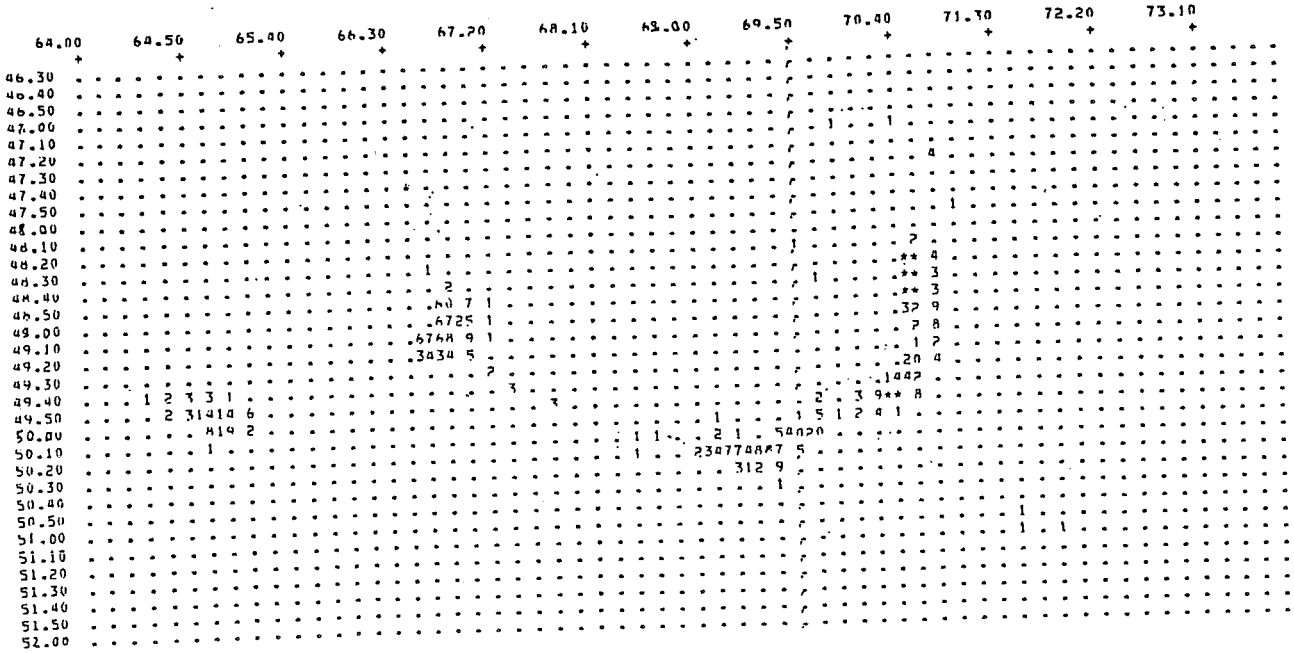


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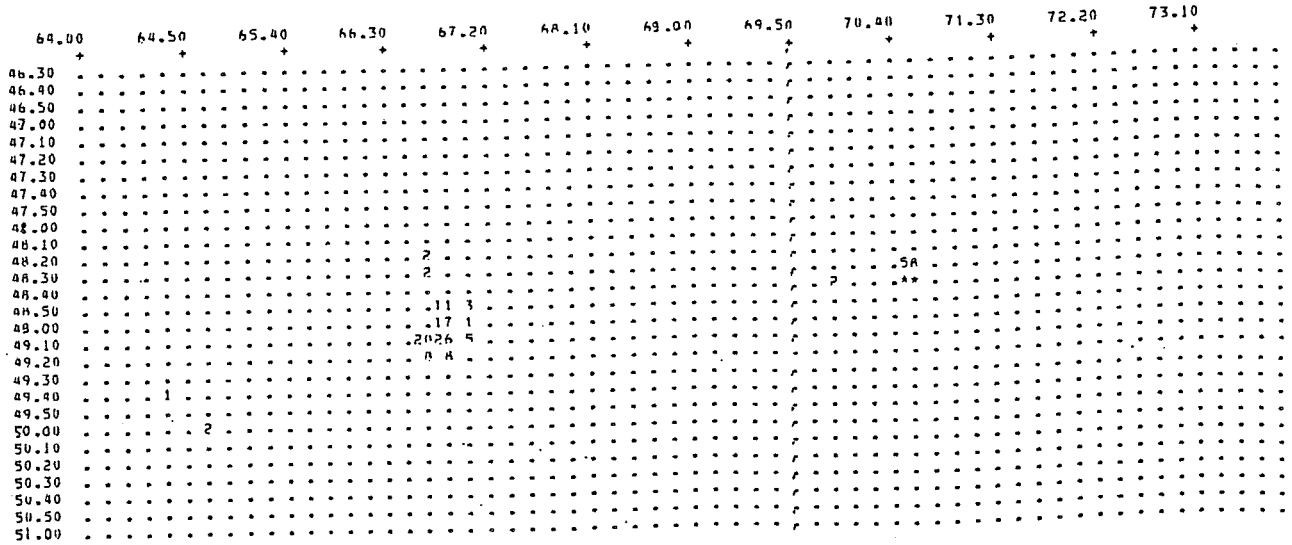
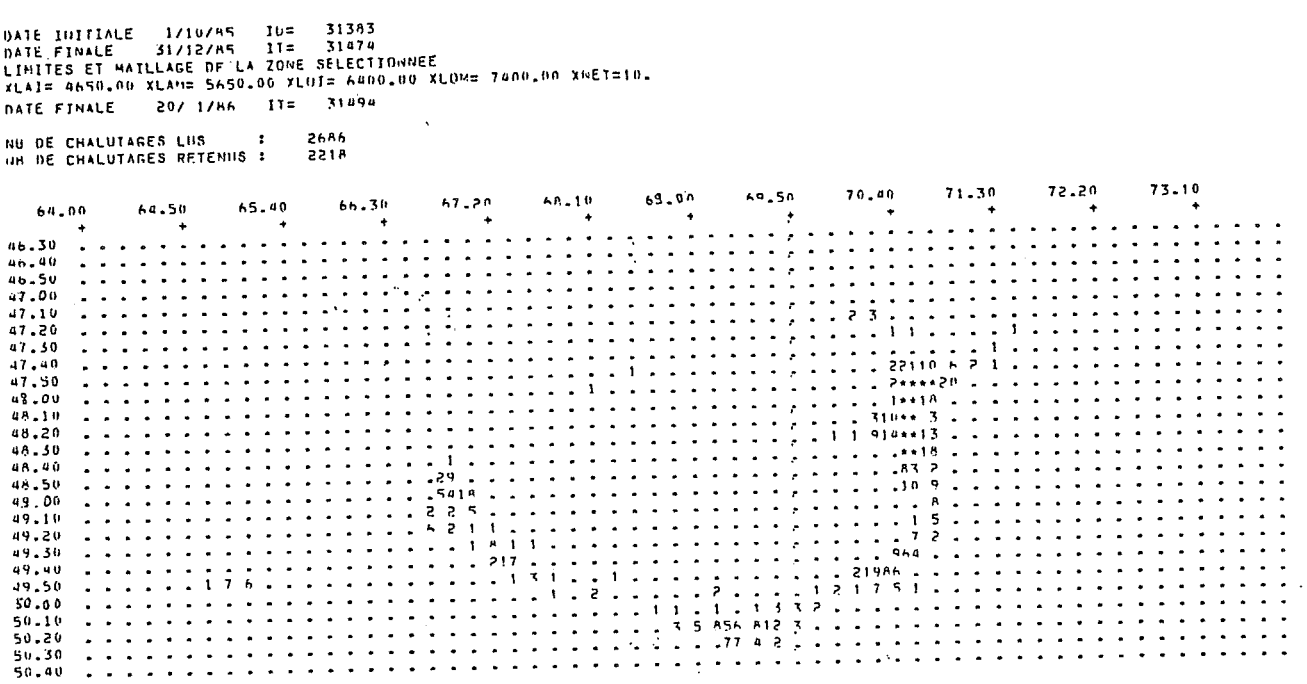


Fig. 5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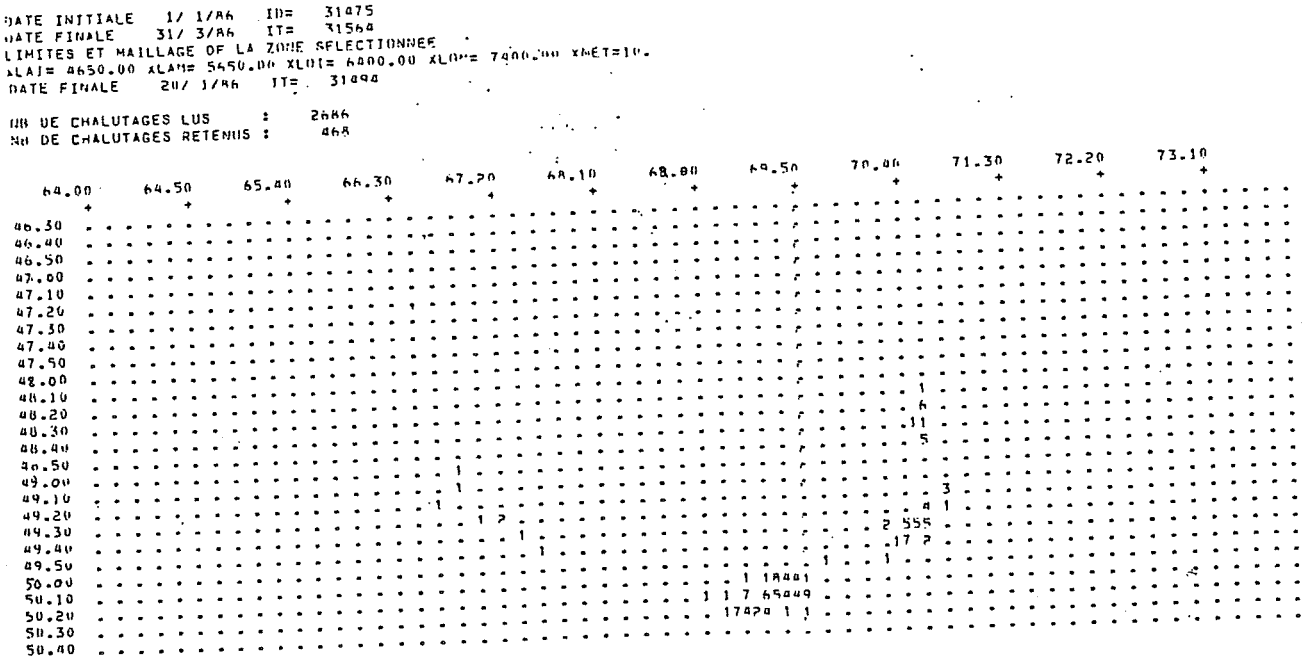
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Figure 6 Total catches, fishing effort and CPUE in the Kerguelen Islands EEZ from 1979 to 1986.

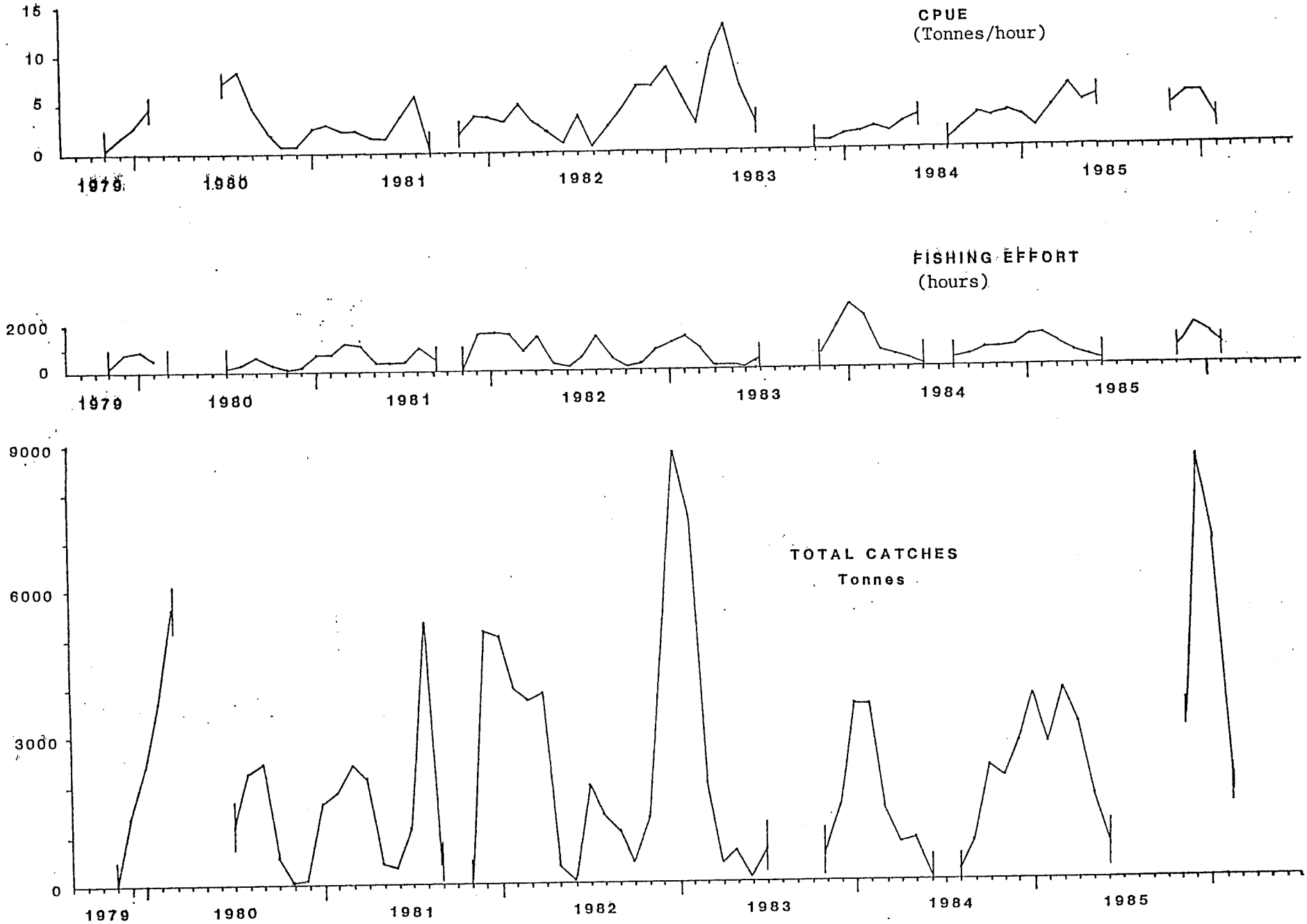
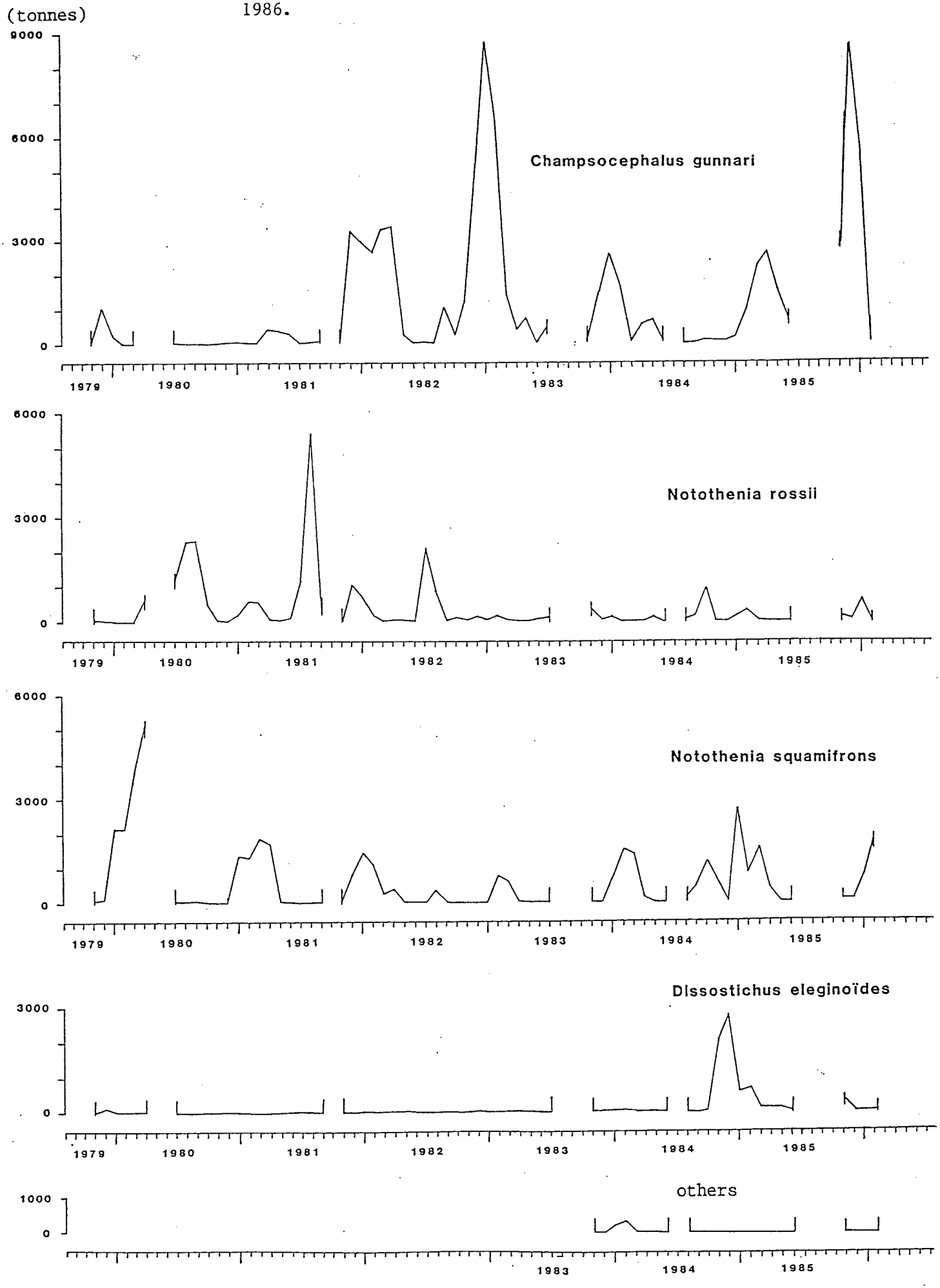


Figure 7 Catches per species in the Kerguelen Islands EEZ from 1979 to 1986.



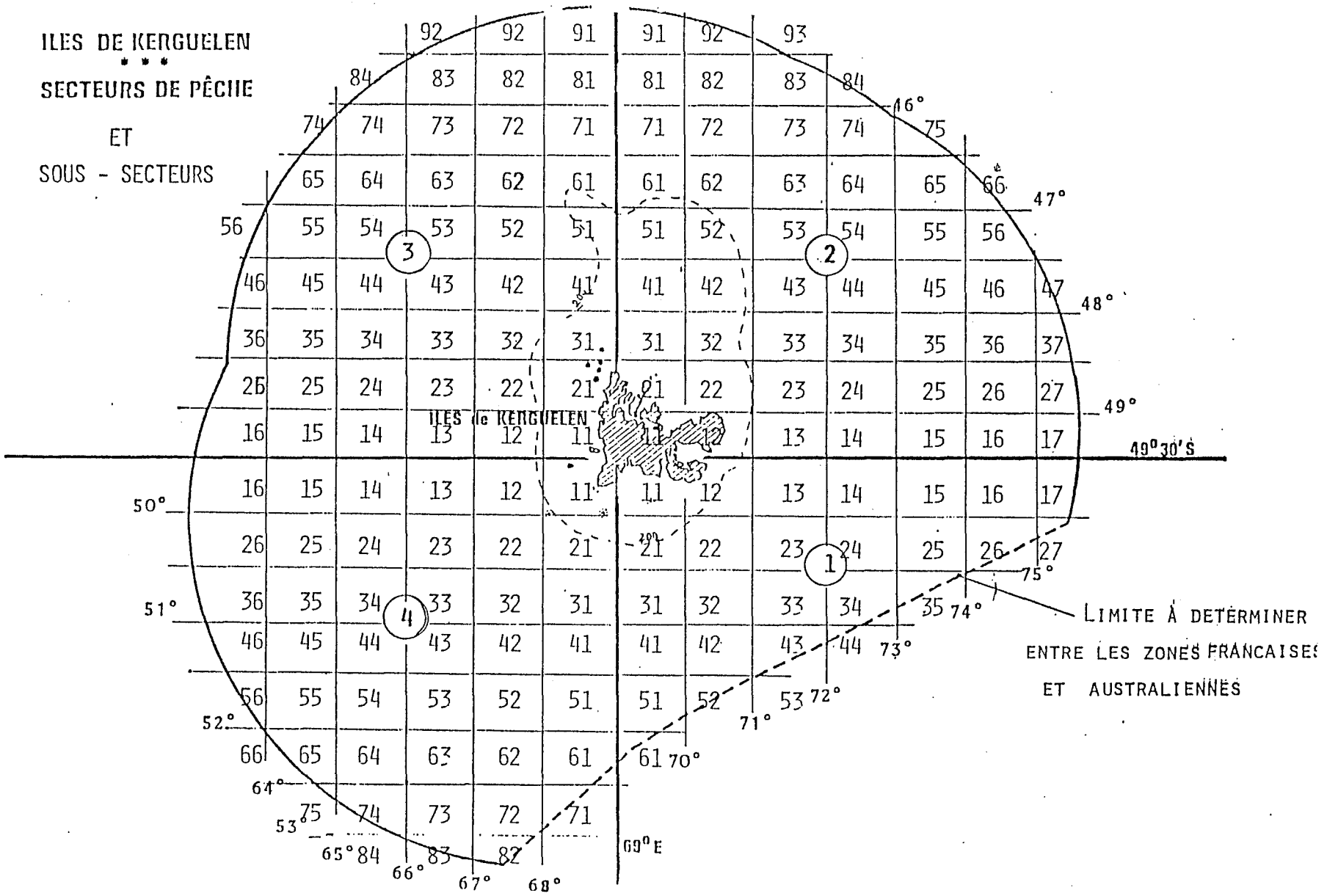


Figure 8. Fishing sectors of the Kerguelen Islands EEZ. Territorial waters and the limits between French and Australian zones are represented.

Figure 9 LFD of C. gunnari in the Kerguelen EEZ from 1979 to 1986. The growth of the cohorts is represented using lines. The shaded distributions are scientific samples.

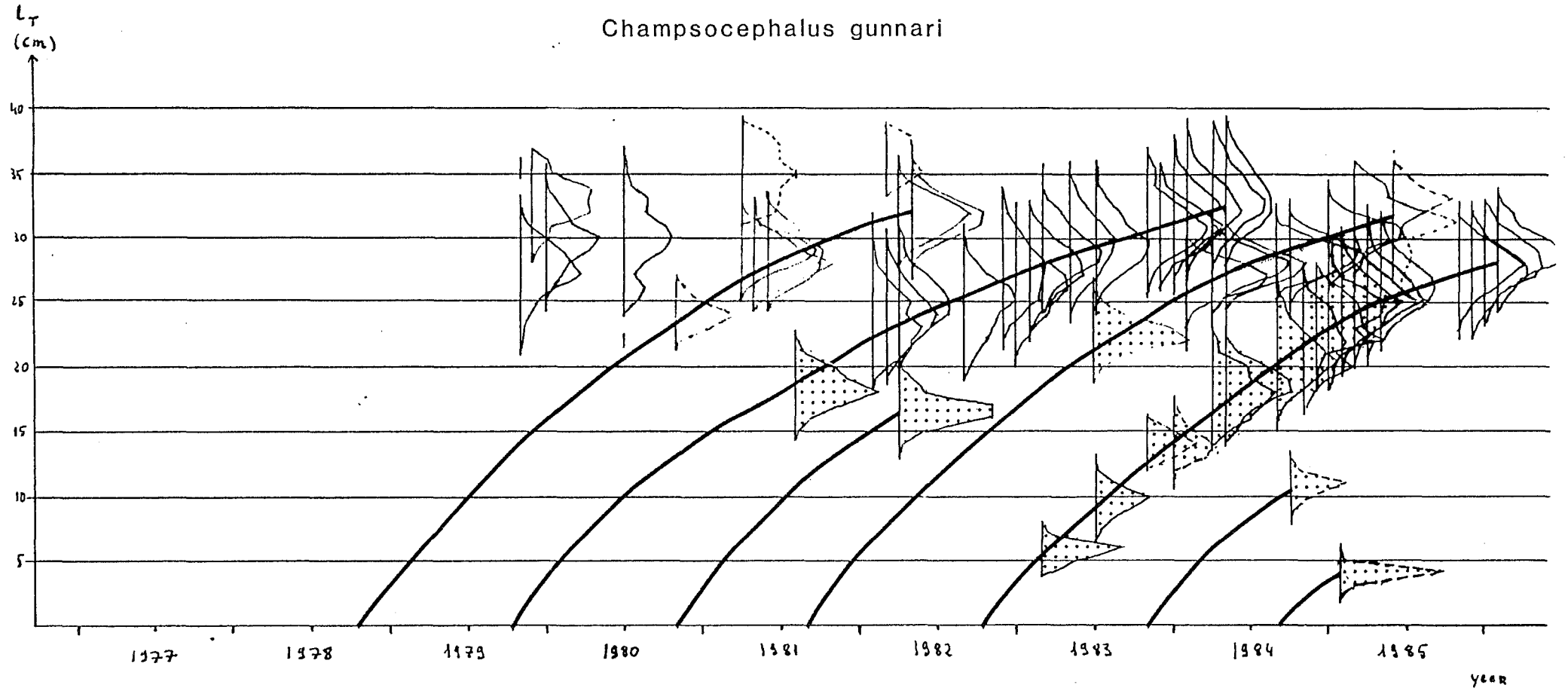
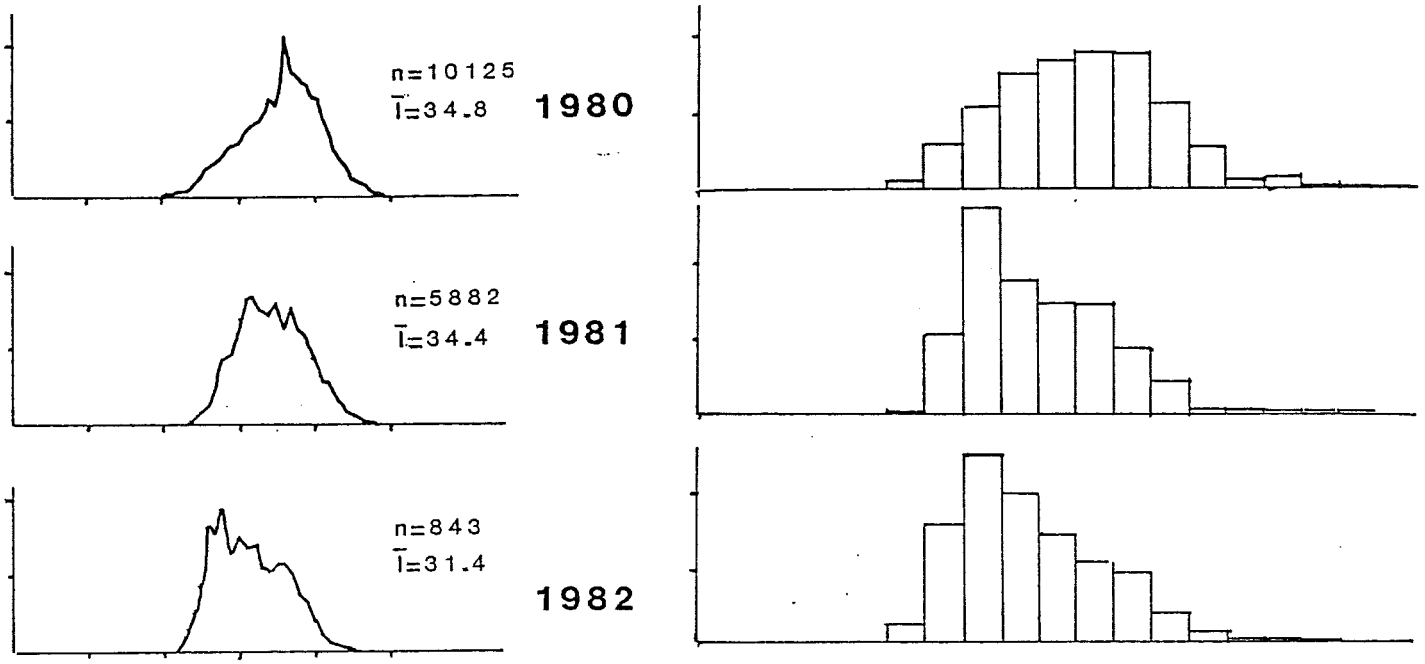


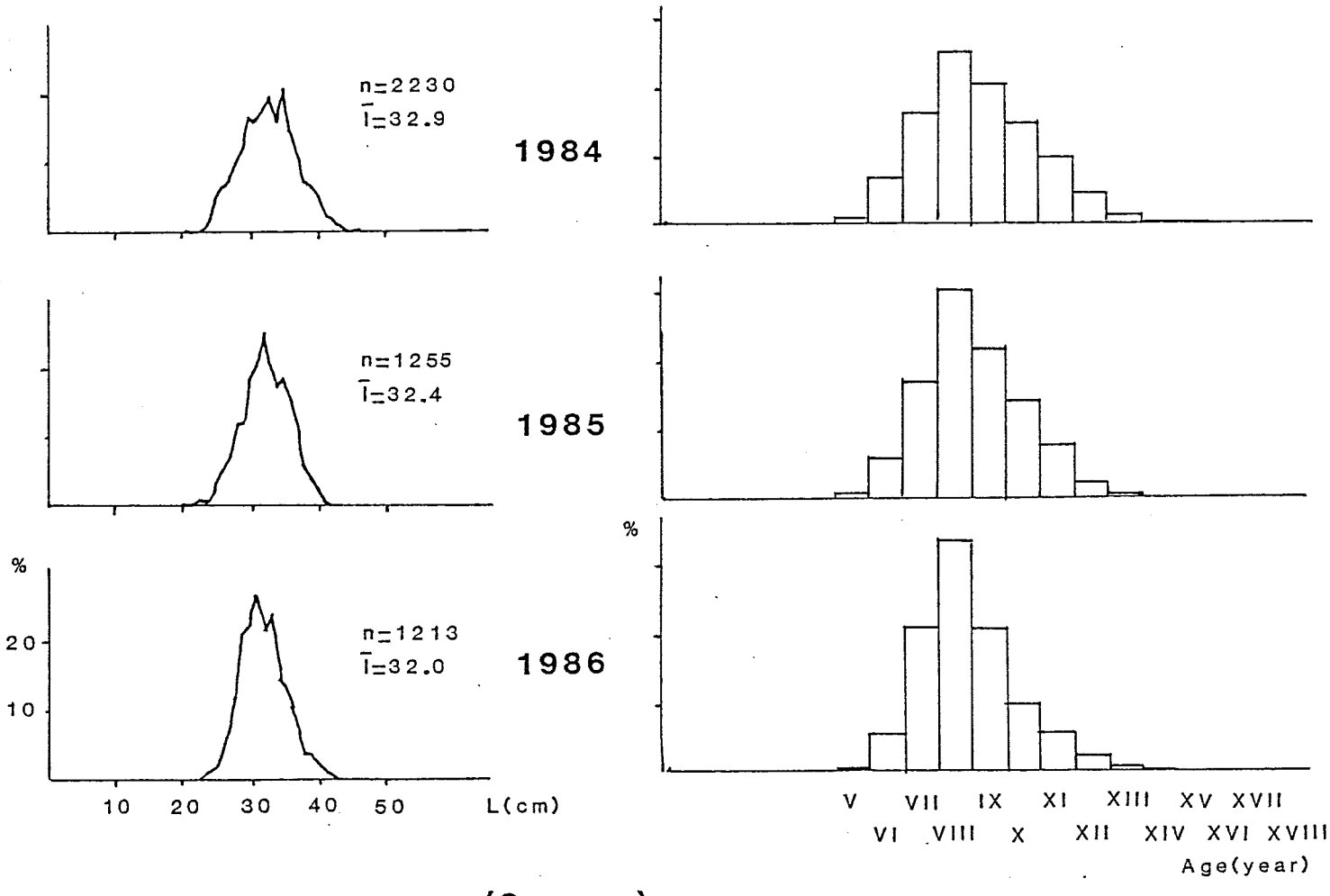
Figure 10 LFD and ageing of N. squamifrons from the southern part of the Kerguelen Shelf (summer distributions) for the period 1980-86.



Notothenia squamifrons

Kerguelen shelf

(sector VI)



(Summer)

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