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Data on catches, CPUE and biomass of shrimp (<u>Pandalus borealis</u>) from the French fishery off West Greenland in 1979

## by

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## Introduction.

The French fishery for shrimp (<u>Pandalus borealis</u>) off West Greenland was again conducted in 1979 by the freezer trawler <u>Finlande III</u> which to date has completed two trips, one from 4 July to 4 September and other from 18 September to 30 October. The fishing logbooks including information on date, position and depth at stard and end, time, duration and catches for each tow were provided for analysis at the St.Pierre Laboratory. Also were collected on board, before commercial sorting, samples of shrimp : five during the first trip and three during the second one (Table 1). These samples, kept frozen, were also examined at the Laboratory.

#### Observation on samples.

After separation and weighing of the different sexual stages in each sample, the carapace length (Lc) of each specimen was measured to the millimeter below. The length distributions of shrimp collected during the first trip are indicated in Table 2 and illustrated in Fig. 1. Those for samples collected during the second trip are indicated in Table 3 and illustrated in Fig. 2.

The proportions in number and weight of each sexual component in each sample are given in Table 4. The most notable changes are the progressive decrease in number and weight of females in the samples of trip no. 1 and, on the contrary, the greater percentages of females in the samples of trip no. 2 and particularly of berried individuals.

#### Composition of catches.

During the first trip, 221 metric tons of shrimp were caught : 115 tons from 4 to 30 July and 106 tons from 1st August to 4 September. During the second trip, the catch was 123 tons composed of 29 tons from 18 to 30 September and 94 tons from 1st to 30 October. The length distributions of male, transitional and female shrimp reported to the total catches during the two trips are illustrated in Fig. 3, indicating no significant change from one to another.

The mean carapace length ( $\overline{Lc}$  in mm) for each sexual component are as follows :

Trip	#0	Q.		ę		
No.	:		NR	HR	KR	BR
I	: 21.7	23.6	<u> </u>	26	•6	23•7
II	: 22.1	23•8	25 <b>.1</b>	26•9	28.7	25•9

The mean proportion in weight and removals of each sexual component, by month and trip, reported to the corresponding total catches are indicated in Table 5. It appears that proportionally more female were caught during the second trip due to larger catches of berried individuals.

## Fishing effort.

Efforts calculated in adding all tow durations give values of 476 hours fishing in July, 533 hours in August, 268 hours in September and 308 hours in October.

The monthly distributions of the French fishing effort (in hour) are reported in Fig. 4, 5, 6 and 7 using the rectangular units ( $15^{\circ}$  latitude x 7.5° longitude) proposed by the Danish scientists.

These figures indicate that the effort was concentrated in a rather small area of the offshore grounds (between 67°15 and 68°00 latitude N) in July-August that spread and narrowed during the September-October period.

# Catch-per-unit-effort.

Data on CPUE of shrimp (kg/hour) by month and by trip are indicated in Table 6. The resulting average figures were calculated from all reported catches including nil ones and without adjustments in relation to the fishing time (night or different periods of the day). Average CPUE were 208 kg/hour and 240 kg/hour for the first and second trip respectively.

The distribution of CPUE (kg/hour) are reported in Fig. 8 and 9 for the first and second trip respectively using again the rectangular unit areas. These figures indicate also the slight change in the area covered during each trip.

### Estimate of the minimum exploitable biomass.

Taking into account the specifications of the gear used by <u>Finlande III</u> (opening of 17.5 m between wings) and the average trawling speed (2.8 knots) the area swept by the commercial trawl in one hour of fishing is calculated to be  $0.09 \text{ km}^2$ .

# - Estimate from data of the first trip.

The average CPUE calculated for the first trip (208 kg/h) can be expressed =  $2.311 \text{ tons/km}^2$ . The area of fishing concentration during this trip (s<sub>1</sub>) consists of 40 rectangular units i.e. approximatively 6,000 km<sup>2</sup>. The value of the minimum exploitable biomass in s<sub>1</sub> is then b<sub>1</sub> = 14,000 tons.

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When referring to the results of R/V <u>Thalassa</u> in September-October 1979 (DUPOUY <u>et al</u>., 1979) the area s<sub>1</sub> corresponds approximatively to :

		1/2	area	of	stratum	No.	05	i.e.	320	km <sup>-</sup>
	plus	2/3	area	of	stratum	No.	06	i.e.	2400	km <sup>2</sup>
	plus		area	of	stratum	No •	09	i.e.	1600	km <sup>2</sup>
and	plus	1/2	area	of	stratum	No.	04	i.e.	1500	km <sup>2</sup>

i.e. a total of 5820  $\rm km^2$  in which the mean adjusted catch is 2.416 tons/km^2 and the biomass estimate 13,500 t.

For the remainder of the area surveyed by R/V <u>Thalassa</u> (strata No. 02, 03, 10, 11, 12, 13, 15 i.e.  $20.000 \text{ km}^2$ ), the mean adjusted catch is  $1.022 \text{ kg/km}^2$ . This indicates that outside the concentration area s<sub>1</sub>, the CPUE must be considered as about the half of the value found inside.

Considering the total area of shrimp distribution on the offshore grounds of West Greenland S = 34,000 km<sup>2</sup> (HORSTED, 1978), the area outside  $s_1$  is  $s'_1 = 28,000 \text{ km}^2$  and the value of the minimum exploitable biomass in  $s'_1$  is then  $b'_1 = 32,000$  tons.

The first estimate of the minimum exploitable biomass  $(B_1)$  for the area S as a whole is therefore 46,000 tons.

- Estimate from data of the second trip.

CPUE = 240 kg/h = 2.667 tons/km<sup>2</sup>  $s_2 = 32$  units  $\simeq 5000 \text{ km}^2$   $b_2 = 13,000 \text{ tons}$   $s'_2 = 29,000 \text{ km}^2$  with a CPUE of 1.334 tons/km<sup>2</sup>  $b'_2 = 39,000 \text{ tons}$  $B_2 = 52,000 \text{ tons}$ 

From these results, the minimum exploitable biomass of shrimp off West Greenland in 1979 is therefore ranging between 46,000 t and 52,000 t. However, taking into account that the totality of shrimp on and off bottom is not caught by the trawl and that the CPUE values were not adjusted to diurnal variations in availability of the species, these estimates must be considered as very minimum.

#### References

DUPOUY, H., J. FRECHETTE, and C. LEROY. 1979. Biomass estimate of the northern deepwater shrimp, <u>Pandalus borealis</u>, in NAFO Divisions 1B and 0B - R/V <u>Thalassa</u> survey, September-October 1979. NAFO/SCR Doc. 79/XI/6, Serial No. N017.

HORSTED, Sv. Aa. 1978. A trawl survey of the offshore shrimp grounds in ICNAF Division 1B and an estimate of the shrimp biomass. ICNAF Sel. Papers No. 4, 23-30.

Trip	Sample	<b>.</b> .	Average	Position	Depth	Duration	Shrimp
No.	No.	Date	Lat.N	Long.W	(m)	of haul (local time)	catch (kg)
	î	July 10	67°35'	57°55'	245 <b>-27</b> 0	21.00-23.45	1000
	2	July 22	67 <b>°</b> 47 <b>'</b>	58°00'	275-305	20.00-23.20	350
I	3	July 28	67°51'	56° 50 !	205-225	18.00-20.30	800
	4	Aug. 11	67 <b>°</b> 49 <b>'</b>	56°51'	200-220	11.00-13.30	750
	5	Aug. 29	67°52'	58°15'	305-320	12.00-15.25	1000
	6	Sept.21	67°51'	·58°55'	290-320	19.00-21.00	300
II	. 7	0ct. 1	68°00'	58°49'	260-280	08.35-11.50	800
	8	Oct. 2	67°57'	58°22'	375-400	12.00-14.40	800

Table 1. Information on shrimp sampling on board Finlande III at West Greenland in 1979.

Table 2. Length distribution of male (M), transitional (T) and female (F) shrimp in samples collected during the first trip of <u>Finlande III</u> at West Greenland (4 July-4 September 1979).

Length	:		1.		:		2		:		3		:		4		•		5		To	tal a	all sa	mples
(mm)	: M	Т	F	Sum	: M :	Т	F	Sum	: M	Т	F	Sum	: M :	Т	F	Sum	: M	í T	F	Sum	: м	Т	F.	Sum
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	: : : : : 1 - 1 : : : : : : : : : : : : : : : : : : :	1 3 2 6 10 9 2	3 13 40 63 37 20 7	1 - 1 3 6 7 8 18 27 36 46 64 37 20 7	: : : : : : : : : : : : : : : : : : :	2 3 7 3 8 2 5 1 2	1 - 4 17 59 40 43 10 3 2	1 - 1 7 13 18 20 35 23 42 65 42 43 10 3 2	: 1 : 4 : 3 : 7 : 6 : 4 : 13 : 26 : 25 : 28 : 15 : 15 : 1 : : : : : :	1 4 7 7 8 4 1 6 1	1 2 3 17 37 45 37 21 8 2	1 4 3 7 6 5 17 33 33 8 22 43 46 37 21 8 2	: 1 : 1 : 20 : 17 : 12 : 3 : 12 : 3 : : : : : :	3 6 3 8 3 1 3 1	8 16 34 35 28 18 5 1	1 - 3 1 4 1 2 0 17 20 17 26 22 45 38 29 21 6 1	::::::::::::::::::::::::::::::::::::::	2 6 8 5 11 1 5 4	4 - 4 7 16 35 27 12 4 4	1 2 7 16 22 35 23 41 31 12 4 4	: 1 : 4 : 5 : 9 : 8 : 10 : 45 : 45 : 45 : 66 : 70 : 9 : 45 : 66 : 70 : 9 : 45 : 58 : 18 : 58 : 18 : 2 : :	3 8 19 18 33 27 29 18 11 5 3 1	6 22 70 186 218 172 81 27 9	1 - 4 5 9 8 10 22 53 85 94 129 127 157 222 231 177 84 28 9
TOTAL	:	• •		281	:			325	:			348	:			274	: : :			227	: : :			1455

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: Length:				6		:	-	7	,		:			8		:	Tota	l all	. sam	ples
(mm) :		М	Т	F	Sum	:	М	Т	F	Sum	:	М	Т	F	Sum	:	М	Т	F	Sum
:						:					:					:				
11 :		1			1	:					:					:	1			1
12 :		-			- 1	:					:					:	<b></b> .			-
13 :		1			1	:	1			1	:					:	2			2
14 :		-			-	:	4			4	:					:	4			4
15 :		1			1	:	-			-	:					:	1			1
16 :		-			-	:	-			-	:					:	-			-
17 :	:	1			1	:	3			3	:					:	4			4
18 :	:	4			4	:	5			5	:					:	9			9
19 :	:	5			5	:	14			14	:					:	19			19
20 :	:	9			9	:	26	2		28	:	2			2	:	37	2		39
21 :	:	7	2		9	:	33	5		38	:	3	. 1		4	:	43	8		51
22 :	;	10	2		12	:	39	5	1	45	:	2			2	\$	51	7	1	59
23 :	: :	20	3	4	27	:	45	16	5	66	:	7	5	3	15	:	72	24	12	108
24 :	:	18	3	14	35	:	22	12	23	57	:	4	2	15	21	:	44	17	52	113
25 :	;	7	5	31	43	:	2	7	66	75	:	2		34	36	:	11	12	131	154
26 :	:	1	1	59	6 <b>1</b>	:		2	45	47	:			44	44	:	1	3	148	152
27 :	:			49	49	:		1	45	46	:			39	39	:		1	133	134
28 :	:			37	37	:			22	22	:			18	18	:			77	77
29 :	:			7	7	:			2	2	:			4	4	:			13	13
30 :				2	2	:			1	1	:			2	2	:			5	5
31 :	:					:					:			1	1	:			1	1
:	:					:					:					:				
:	:					:					:					:				
TOTAL :	:				304	:				454	:				188	:				946

Table 3. Length distribution of male (M), transitional (T) and female (F) shrimp in samples collected during the second trip of <u>Finlande III</u> at West Greenland (18 September-30 October 1979).

Table 4. Composition in number and weight of each sample of shrimp, in percentages according to the sexual stage. For females: NR = no roe; HR = head roe; BR = berried; and KR = lost or newly hatched roe.

Trip	Sample	Total	Sampled	%	Males	% Trans	itionals	1	NP.	HR	% F	emales	KR	\$	BR
NO	:	N	W (g)	N	W	N	W	N	W	N	W	N	W	N	W
	: : 1	: 281	2,488	23.2	18.1	: : 11.7	10.1	:	6	5.1		71.8		: : 0	0
	2	325	2,846	34.7	26.4	10.2	7.6		55	5.1		66 <b>.</b> 0		0	0
т	: 3	• 348	2,856	38.9	26•4	: 11.3	8.8		49	9.8		64.8		: 0	0
-	4	274	2,168	37.0	22.1	10.2	12.0		51	1.3		64.6		1.5	1.3
	: 5	: 227	1,892	31.6	25•4	: 18.5	16.4	•	48	3.9		57.6		: 1.0	0.6
	: :TOTAL :	: 1,455 :	12,250		· · ·	:	-				·			:	
	: : 6	: : 304	3,141	27.8	18,2	: : 5.3	3•8	1.0	0.8	61.6	70.4	: : 0	0	: : 4.3	6.8
	7	454	4,322	42.8	29.2	10.8	8•4	1.4	1.3	22.9	26.3	0.3	0.3	21.8	34.5
II	: 8	: 188	2,548	10.6	5•4	<b>:</b> 4•3	2.3	3.2	5.3	65.4	69 <b>.</b> 7	: 1.0	0.9	:15.5	16.4
	: TOTAL	946	10,011			:		: :				•		•	

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Table 5. Mean percentages in weight and removals of each sexual stage of shrimp, by month and trip, reported to the catches of Finlande III at West Greenland in 1979.

		· .										1		
		: Mal	ss	Transi	tionals	4	IR	H.	R Fei	nales	Ei		ĸ	: Preliminary : Total Catch
	DOLIDI BULUSTI	₹ ₹	Catch (MT)	× >	Catch (MT)	% M	Catch (MT)	× M :	Catch (MT)	% M	Catch (MT)	% M	Catch (MT)	: (MT)
av 66 e	4-31 July	: 23.5	27	8.7	6		ٯ	7.8		78	•• ••	O	0	115
н Н	1 Aug4 Sept.	23.6	55	14.2	15		9	<b>1.</b> 3		65		<b>0</b> •9	÷-	106
• •• ••	TOTAL	: 23•5	25	11.3	25		Ó	4•7		143	•••••	0•5	~	221
•• •• •	18-30 Sept.	: 17.2	ŝ	3.4	-	(0)	(0)	: 72.4	5	0	0	6•9	2	29
· · · ·	1-30 Oct.	20•2	- <del>-</del> -	6.4	9	3•2	m	42.6	64	(o)	(o)	27.7	56	94
• •• ••	TOTAL	: 19•5	24	5.7	2	2•4	ო	49.6	6	(o)	(0)	22.8	5 8 5	123

Table 6. Catch and effort data by month and trip for Finlande III at West Greenland in 1979.

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1.1	ı					•		
an an	(kg/h)	241	178	195	208	143	(305)	(240)
Effort	(4)	476	533	58	1067	210	(308)	(518)
Catch	(kg)	115,010	95,270	11,330	221,610	30,170	(94,000)	(124,170)
Fishing	Periods	4-31 July	1-31 Aug.	1-4 Sept.	TOTAL	18-30 Sept.	1-30 Oct.	TOTAL
Trip	No		н				II	1 A .



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Fig. 1 - Length distribution of male, transitional and female shrimp in samples collected during the first trip of <u>Finlande III</u> at West Greenland (4 July-4 September 1979).

- For symbols, see Fig. 2.



Fig. 2 - Length distribution of male, transitional and female shrimp in samples collected during the second trip of <u>Finlande III</u> at West Greenland (18 September-30 October 1979).

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Fig. 4 - Distribution of the fishing effort (hours) of <u>Finlande III</u> at West Greenland, in July 1979.

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Fig. 5 - Distribution of the fishing effort (hours) of <u>Finlande III</u> at West Greenland, in August 1979.

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Fig. 6 - Distribution of the fishing effort (hours) of <u>Finlande III</u> at West Greenland, in September 1979.



Fig. 7 - Distribution of the fishing effort (hours) of <u>Finlande III</u> at West Greenland, during a part (1-16) of October 1979.

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Fig. 8 - Distribution of the CPUE (kg/hour) of <u>Finlande III</u> during the first trip at West Greenland (4 July-4 September 1979).

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Fig. 9 - Distribution of the CPUE (kg/hour) of <u>Finlande III</u> during a part of the second trip (18 September-16 October 1979).

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