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ANNUAL MEETING - JUNE 1979

Polish Research Report, 1978

by

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Please add the following paragraph to the section entitled "Special Research Studies" found on page 11 of the original document.

Another joint Polish-US research cruise of R/V *Wieczno* took place in the period September-November in Div. 5Z and Statistical Area 6. During the first leg, longline catches and tagging experiments on large-sized predator fish combined with feeding studies were conducted. In the next part of the cruise, phyto-, zoo-, and ichthyoplankton studies together with hydrological surveys and a special patch study experiment were carried out. A sonic tagging experiment on swordfish was conducted during the final leg of the cruise.

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The trend in Polish catches from the ICNAF Convention Area continued to decline sharply in 1978. The total catch from Subareas 2-5 and Statistical Area 6 decreased from 49,505 tons in 1977 to 17,622 tons (2.8 folds) in 1978. The catch in Subareas 2-4 dropped by 11,957 tons, while in Subarea 5 and Statistical Area 6 from 20,095 tons to zero. The allocations to Poland have been decreased in Subareas 2-4 from 42,055 tons in 1977 to 34,350 tons (1.2 folds) in 1978, and in Subarea 5 and Statistical Area 6 from 37,260 tons in 1977 to 5,230 tons (7.1 folds) in 1978.

In Subareas 2-4 the major share in the catches constituted Greenland halibut (5,215 tons), cod (4,517 tons), witch (3,490 tons), squid (*Illex*) (1,944 tons), and capelin (1,538 tons) (Table 1). In 1978, the overall decrease of total catches was greater than that of allocations due to a substantial underutilization of the capelin quota (10.6% only was taken) and cod in Div. 2GH (25.7%) (Table 2). The Polish fishery in Subarea 5 and Statistical Area 6 had to cease totally because of fishery regulation measures adopted in the US fishery conservation zone, allowing for incidental by-catches of herring, mackerel, silver hake, and other species at a level far from observed by-catches in the squid (*Illex*) fishery in these waters.

Table 1. Polish catches in ICNAF Subarea 1-5 and Statistical Area 6 in 1977 and 1978¹.

Species	1977		1978	
	Metric tons	%	Metric tons	%
Cod	9,242	18.7	4,517	25.6
Redfish	2,280	4.6	708	4.0
American plaice	34	0.1	159	0.9
Witch	3,117	6.3	3,490	19.8
Greenland halibut	6,006	12.1	5,215	29.6
Atlantic halibut	5	+	-	-
Roundnose grenadier	-	-	51	0.3

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Table 1. (Cont'd)

Species	1977		1978	
	Metric tons	%	Metric tons	%
Capelin	5,300	10.7	1,538	8.7
Squid - <i>Illex</i>	3,595	7.3	1,944	11.0
Squid - <i>Loligo</i>	232	0.5	-	-
Mackerel	17,186	34.7	-	-
Herring	119	0.2	-	-
Butterfish	280	0.6	-	-
Silver hake	33	0.1	-	-
Pollock	17	+	-	-
Sea robins	546	1.1	-	-
Wolffishes	12	+	-	-
Dogfish	70	0.1	-	-
Bluefin tuna	-	-	-	-
Other finfish in SA 2-4	406	0.8	-	-
Other finfish in SA 5-6	1,025	2.1	-	-
Total	49,505	99.9	17,622	99.9

¹ Provisional.

Table 2. Polish catch quota and catches in 1978 in ICNAF area (in metric tons).

Species	Stock division	Catch quotas	Catches	Catch Quota (%)
Cod	2GH	4,000	1,028	25.7
	2J+3KL	2,890	2,874	99.4
	3M	1,460	615	42.1
Redfish	2+3K	710	625	88.0
Witch	2J+3KL	3,500	3,490	99.7
Greenland halibut	2+3KL	5,290	5,215	98.6
Capelin	2+3K	10,000	1,036	10.4
	3L	500	495	99.0
	3NO	4,000	7	0.2
Squid- <i>Illex</i>	3+4	2,000	1,944	97.2
	5+6	3,275	-	-
Squid- <i>Loligo</i>	5+6	320	-	-
Herring	5+6	16	-	-
Mackerel	5+6	38	-	-
Silver hake	5+6	20	-	-
Red hake	5+6	20	-	-
Butterfish	5+6	67	-	-
Other finfish	5+6	1,474	-	-

Subarea 2

Status of the Fisheries

The overall catch taken by Polish fishing vessels from Subarea 2 dropped from 15,729 tons in 1977 to 4,744 tons in 1978.

The fishery was confined mainly to Div. 2J where 3,595 tons were taken. The major portion of catches in Subarea 2 comprised of cod (3,631 tons). The catches of other species, i.e., Greenland halibut, redfish, capelin, and American plaice, were small (Table 3).

The cod and Greenland halibut fisheries were conducted mainly from January to March in Div. 2J and, to a much smaller extent, from July to October in Div. 2H. Other species were taken as by-catch.

Minor concentrations of capelin allowed a mere catch of 42 tons of this species with pelagic trawls.

Table 3. Polish catches in SA 2, 1978 (in metric tons).

Species	Subarea 2			Total
	2G	2H	2J	
Cod	-	1,028	2,603	3,631
Redfish	-	8	111	119
American plaice	-	1	10	11
Witch flounder	-	5	231	236
Greenland halibut	3	104	598	705
Capelin	-	-	42	42
Total	3	1,146	3,595	4,744

Cod

A substantial drop in Polish cod catches from Subarea 2 occurred in 1978 due to reduction of the quota for the Div. 2J+3KL cod stock. The quota was lowered from 7,430 tons in 1977 to 2,874 tons in 1978. The catches in Subarea 2 decreased from 7,169 tons to 3,631 tons.

The catches decreased mainly in Div. 2J from 6,199 tons in 1977 to 2,608 tons in 1978. The amount caught in Div. 2H remained at the same level as in 1977 - about 1,000 tons (Table 3). The larger amounts from that Division were taken in January, August, September, and October (Table 4). In Div. 2J almost the entire catch was taken in January and February.

Table 4. Polish cod catches in SA 2 and 3, 1978 (in metric tons).

Div.	Months												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2H	300	-	-	-	-	-	22	192	282	173	-	59	1028
2J	1977	620	1	5	-	-	-	-	-	-	-	-	2603
3K	-	142	38	88	3	-	-	-	-	-	-	-	271
3M	-	-	-	-	-	36	381	152	-	-	-	46	615
TOTAL	2277	762	39	93	3	36	403	344	282	173	-	105	4517

In Div. 2J, 2,297 fish were measured (Table 5) in January (mean length = 42.4 cm). In Div. 2J and 3K, 789 specimens were examined for age. Age-group 5 predominated in catches in Div. 2J constituting 56.0%, then age-group 4 - 24.5%, and age-group 6 - 11.9% (Table 6).

Table 5. Cod length frequencies per mille (Div. 2J, 3K).

Length (cm)	2J January	3K February	3K March
24	2	-	-
27	10	-	5
30	57	2	-
33	61	2	3
36	95	18	-
39	176	49	11
42	167	98	66
45	152	125	48
48	143	136	111
51	63	193	85
54	48	106	114
57	18	93	130
60	6	43	106
63	-	38	114
66	-	33	64
69	+	21	61
72	-	13	48
75	+	16	11
78	1	-	11
81	1	-	5
84	-	2	3
87	-	2	-
90	-	2	2
93	-	2	2
103	-	2	-
107	-	2	-
110	-	2	-
TOTAL	1,000	1,000	1,000
Number measured	2,297	610	377
Average length(cm)	42.4	51.9	57.0

Table 6. Age composition of cod commercial catches in January (Div. 2J).

Age	3	4	5	6	7	8	9	10	11	12	12+
Per mille	47	245	560	119	18	9	1	1	-	-	-

Greenland halibut

A substantial shift in the distribution of Greenland halibut between Subarea 2 and Subarea 3 was noted. In 1977 about 87% of the catches were taken in Subarea 2 (5,229 tons), while in 1978 about 13.5% only (705 tons) originated from that Subarea. In Div. 2J, 598 tons were caught, in Div. 2H - 104 tons, and 3 tons only in Div. 2G (Table 3).

The largest amount in Div. 2J was caught in February and March. From July to October, small by-catches of Greenland halibut occurred in the cod fishery in Div. 2H (Table 7).

In Div. 2J, length measurements comprised of 245 males and 319 females taken in January. The average length of males was 48.6 cm and that of females, 51.6 cm (Table 8).

Table 7. Polish Greenland halibut catches in SA 2 and 3, 1978 (in metric tons)

Div.	Months												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2G	-	-	-	-	-	-	3	-	-	-	-	-	3
2H	8	-	-	-	-	-	44	33	13	6	-	-	104
2J	12	320	253	13	-	-	-	-	-	-	-	-	598
3K	-	2087	968	530	925	-	-	-	-	-	-	-	4510
TOTAL	20	2407	1221	543	925	-	47	33	13	6	-	-	5215

Table 8. Greenland halibut length frequencies per mille (Div. 2J, 3K).

Length group /2 cm/	January 2J		February 3K		March 3K	
	♂	♀	♂	♀	♂	♀
32	-	3	-	1	5	1
34	4	3	-	1	-	1
36	-	12	3	4	14	7
38	4	22	12	11	41	34
40	20	41	28	18	49	19
42	90	56	70	45	65	27
44	143	119	113	76	128	51
46	212	150	138	97	101	58
48	163	94	138	131	125	66
50	147	100	127	71	65	55
52	82	107	102	84	134	82
54	41	91	84	65	93	67
56	24	19	63	50	33	73
58	16	50	53	40	49	63
60	24	31	21	35	30	63
62	16	56	25	33	19	79
64	12	6	14	38	33	29
66	-	6	5	29	11	41
68	-	3	1	45	3	34
70	-	9	2	20	-	33
72	-	9	-	18	-	42
74	-	-	-	20	3	35
76	-	3	-	15	-	6
78	-	-	-	12	-	11
80	-	-	-	8	-	-
82	-	6	-	16	-	1
84	-	-	-	6	-	-
86	-	-	-	4	-	5
88	-	-	-	2	-	7
90	-	-	-	1	-	5
92	-	-	-	1	-	1
94	-	-	-	-	-	1
Total	998	996	1000	997	1000	997
Number measured	245	319	923	1467	367	822
Average length	48,6	51,6	49,5	55,1	49,7	56,2
Average weight	-	-	1133,4	1445,3	-	-

Witch

As in the Greenland halibut fishery, a similar shift in the proportion of catches taken from Subarea 2 versus Subarea 3 took place in the witch flounder fishery. The share of catches in Subarea 2 declined from 63% (1,959 tons) in 1977 to 7% (236 tons) in 1978. Most of the catches (231 tons) were taken in Div. 2J from February to April (Table 9).

No biological samples were collected from Subarea 2.

Table 9. Polish witch catches in SA 2 and 3, 1978 (in metric tons).

Div.	Months												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2H	5	-	-	-	-	-	-	-	-	-	-	-	5
2J	-	69	113	49	-	-	-	-	-	-	-	-	231
3K	-	986	1517	666	85	-	-	-	-	-	-	-	3254
TOTAL	5	1055	1630	715	85	-	-	-	-	-	-	-	3490

Redfish

The total redfish catch from Subarea 2 in 1978 amounted to 119 tons only (Table 3). The observed decrease, compared to the 1977 fishery when 996 tons were caught, was due to the reduction of the national allocation by about 80% (from 2,275 tons to 710 tons). There was no directed fishery for redfish in Subarea 2. Small by-catches were taken in the cod fishery in Div. 2J from January to April (Table 10).

No biological samples were collected.

Table 10. Polish redfish catches in SA 2 and 3, 1978 (in metric tons).

Div.	Months												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2H	8	-	-	-	-	-	-	-	-	-	-	-	8
2J	41	15	24	31	-	-	-	-	-	-	-	-	111
3K	-	31	98	142	225	-	-	-	-	-	-	10	506
3M	-	-	-	-	-	2	67	14	-	-	-	-	83
TOTAL	49	46	122	173	225	2	67	14	-	-	-	10	708

Subarea 3

Status of the Fisheries

The overall catch in Subarea 3 totalled 11,116 tons, approximately the same level as in 1977 when 10,687 tons were taken. The bulk of the catches (87.4%) originated, as in preceding years, from Div. 3K (Table 11).

Opposite to the 1977 catch composition, the predominant species in the 1978 fishery were Greenland halibut totalling 4,510 tons and witch amounting to 3,254 tons (Table 11). Capelin catches were considerably smaller and declined from 5,300 tons in 1977 to 1,496 tons in 1978.

A considerable decrease in cod (from 2,073 tons to 886 tons) and redfish (from 1,284 tons to 589 tons) catches took place in 1978 in comparison with the 1977 fishery; in the former case, it was due to a shift of the fishery into Div. 2J and, in the latter, to lower amounts allocated to Poland (Table 11). Squid (*Illex*) catches, mainly in Div. 30, amounted to 182 tons.

Table 11. Polish catches in SA 3, 1978 (in metric tons).

Species	Subarea 3					Total
	3K	3L	3M	3N	30	
Cod	271	-	615	-	-	886
Redfish	506	-	83	-	-	589
American plaice	127	-	21	-	-	148
Witch flounder	3,254	-	-	-	-	3,254
Greenland halibut	4,510	-	-	-	-	4,510
Roundnose grenadier	51	-	-	-	-	51
Capelin	994	495	-	7	-	1,496
Squid- <i>Illex</i>	-	-	-	3	175	182
TOTAL	9,713	495	723	10	175	11,116

Greenland halibut

In spite of the fact that the Polish quota for this species was decreased from 6,000 tons in 1977 to 5,290 tons in 1978, the total catches in Subarea 3 (4,510 tons) in 1978 were much greater than in 1977 when 777 tons only were taken (Table 11). The most intensive fishing operations were carried out in Div. 3K from February to April. The greater amount was taken in February (2,087 tons) (Table 7).

Length measurements were conducted on 923 males (average length = 49.5 cm) and 1,467 females (average length = 55.1 cm) in February, and on 367 males (average length = 49.7 cm) and 822 females (average length = 56.2 cm) in March (Table 8).

The weight-length relationship calculated by sex was as follows:

for males $W = 0.0633 L^{3.0661}$; $r^2 = 0.99$

for females $W = 0.0139 L^{2.8916}$; $r^2 = 0.86$

Six samples (833 specimens) were collected in Div. 3K for detailed biological studies, but age determinations have not yet been completed.

Witch

The Polish witch flounder fishery in Subarea 3 was confined in 1978 to Div. 3K where 3,254 tons were taken (Table 11). This was a substantial increase compared to the 1977 fishery when 1,158 tons were taken. The national allocation for this species was the same for 1977 and 1978 - 3,500 tons. The bulk of catches was taken from February to April (Table 9).

Length measurements were conducted on 842 males (average length = 42.2 cm) and 1,073 females (average length = 45.7 cm) in February, on 304 males (average length = 43.3 cm) and 1,247 females (average length = 50.7 cm) in March, and on 225 males (average length = 43.7 cm) and 740 females (average length = 50.1 cm) in April (Table 12).

The weight-length relationship calculated for males and females separately was as follows:

for males $W = 0.0081 L^{2.9531}$; $r^2 = 0.97$

for females $W = 0.0006 L^{3.6352}$; $r^2 = 0.99$

Seven samples (845 specimens) were collected for age determination and detailed biological analyses. Age readings have not yet been completed.

Table 12. Witch length frequencies per mille (Div. 3K).

Length group /2 cm/	February		March		April	
	Male	Female	Male	Female	Male	Female
26	8	10				
28	27	31				
30	23	24				
32	23	34			4	
34	14	11			-	1
36	27	16	3		18	-
38	114	55	112	7	107	4
40	217	104	250	24	316	51
42	203	164	217	85	231	100
44	103	90	148	132	111	174
46	59	82	95	113	49	103
48	81	65	89	107	44	70
50	57	36	46	99	44	58
52	30	53	20	93	49	86
54	10	60	16	83	18	84
56	2	34	-	95	4	73
58	1	47	3	74	4	78
60		39		46		69
62		29		27		35
64		10		10		4
66		5		2		7
68				1		1
Total	1000	1000	999	998	999	998
Number measured	842	1073	304	1247	225	740
Average length	42,2	45,7	43,3	50,7	43,7	50,1
Average weight	503,1	642,8	-	-	667,6	986,1

Capelin

Capelin catches in Subarea 3 declined from 5,300 tons in 1977 to 1,496 tons in 1978. As the catch quota was about the same for both years and the amounts taken in Subarea 2 negligible, the observed decrease can be attributed to a substantial reduction of the stock biomass and, to a smaller extent, to the changes in stock distribution and availability.

About 67% of the Polish capelin catches (994 tons) in Subarea 3 were made from the Subarea 2+Div. 3K capelin stock and the remaining amount (502 tons) from the Div. 3LNO stock.

In Div. 3L, more than 75% of the total catch was taken in April and the remainder in May and June (Table 13). In Div. 3K, the fishing season extended from September to November, with about 60% of catches taken in October.

Table 13. Polish capelin catches in SA 2 and 3, 1978 (in metric tons).

Div.	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2J	-	-	-	-	-	-	-	-	42	-	-	-	42
3K	-	-	-	-	15	-	-	-	93	586	300	-	994
3L	-	-	-	378	108	9	-	-	-	-	-	-	495
3N	-	-	-	-	-	7	-	-	-	-	-	-	7
TOTAL	-	-	-	378	123	16	-	-	135	586	300	-	1538

The scarcity of capelin in 1978 prevented the collection of a sufficient number of biological samples from that fishery. Some samples were taken from not easily available landings of frozen fish. Two samples (749 specimens) were collected for length measurements from incidental (or scouting) catches taken in January and a single sample (360 specimens) from small catches (9 tons) in June, all from Div. 3L. The length distribution of these samples, average length and weight by sex is shown in Table 14.

In January, 588 specimens were collected for detailed biological analysis. More than 60% of the catch consisted of age-group 5 (Table 15). In June, age-group 4 predominated (Table 16).

Cod

The total cod catches from Subarea 3 in 1978 amounted to 886 tons and were considerably lower than those in 1977 (by 1,187 tons) (Table 11). In Div. 3K, only 271 tons were caught, compared to 1,127 tons in 1977. In spite of the increased quota in Div. 3M (from 850 tons in 1977 to 1,460 tons in 1978), a slight decline in cod catches from that Division occurred, from 843 tons to 615 tons. This drop can be explained by practical reasons, rather than a change in the stock abundance or availability. The fishery in Div. 3K was carried out from February to April and in Div. 3M, from June to August and in December (Table 4).

Length measurements comprised 610 specimens (average length = 51.9 cm) from the Div. 3K fishery in February, and 377 specimens (average length = 57.0 cm) in March (Table 5). Age-group 5 prevailed in the catches (28.6%), followed by age-group 6 (19.4%), age 4 (14.2%), and age 7 (13.4%) (Table 17). For age determination, otoliths from 789 specimens were collected from both Subareas 2 and 3.

Table 14. Capelin length frequencies from Polish catches in 1978 (per mille).

Length group /0,5 cm/	January, 3L		January, 3L		June, 3L	
	Male	Female	Male	Female	Male	Female
13,0	5	6				17
13,5	-	6				41
14,0	15	17			17	87
14,5	28	6			17	166
15,0	77	40	10	22	58	220
15,5	61	-			185	104
16,0	143	51	28	103	193	158
16,5	122	108			67	83
17,0	179	154	170	357	185	58
17,5	133	177			109	45
18,0	102	166	443	338	67	17
18,5	66	108			34	4
19,0	38	114	245	158	50	
19,5	10	46			9	
20,0	-	-	104	22		
20,5	5	6				
Total	1000	1000	1000	1000	1000	1000
Number measured	196	175	106	272	119	241
Average length /cm/	16,7	16,5	18,2	17,6	23,4	15,3
Average weight /gms/	25,9	33,9	35,0	27,5	29,6	19,5

Table 15. Age composition of Polish capelin catches in Div. 3L in January 1978 (per mille).

Sex	Age groups						Total
	3	4	5	6	7	8	
♂	19	302	603	76	-	-	1000
♀	28	130	657	157	19	9	1000

Table 16. Age composition of Polish capelin catches in Div. 3L in June 1978.

Sex	Age groups						Total
	3	4	5	6	7	8	
♂	143	464	286	107	-	-	1000
♀	41	571	367	21	-	-	1000

Table 17. Age composition of cod commercial catches in February and March (Div. 3K).

Age	3	4	5	6	7	8	9	10	11	12	12
Per mille	2	142	286	194	134	112	73	38	10	3	6

Subarea 4

Status of the Fisheries

As in 1977, the only directed Polish fishery in Subarea 4 was for squid (*Illex*). The national allocation was lowered from 3,000 tons in 1977 to 2,000 tons in 1978. The catches in 1978 were at the quota level and amounted to 1,944 tons (Table 2). The bulk of the squid (*Illex*) catch (1,762 tons) was taken in Subarea 4.

Squid (*Illex*)

The Polish squid fishery in Subarea 4 was confined to Div. 4W. The fishery started on 13 July and ended on 2 September (Table 18) with only three stern trawlers participating. The mean catch per day was 20.4 tons and remained relatively constant through the fishing period. The area-density method (M. Lipinski, Res. Doc. 79/II/37) indicated a considerable decline of the squid biomass within the area surveyed, from 205,000 tons in 1977 to 138,000 tons in 1978. It was not possible to resolve whether this was due to the real decrease of the stock biomass or changes in availability and/or different migration routes. The observed increase in the average temperature before the spawning period in 1977 and below normal temperatures in the first half of 1978 could have caused the above-mentioned changes.

One sample, consisting of 275 males and 281 females, was collected from the Div. 3N fishery. Nine samples, comprising 2,437 males and 1,811 females, were collected from Div. 4W (Table 19). Further attempts for improved age determination from statoliths were continued.

Table 18. Polish squid catches in SA 3 and 4, 1978 (in metric tons).

Div.	Months												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
3M	-	-	-	-	-	-	4	-	-	-	-	-	4
3N	-	-	-	-	-	-	3	-	-	-	-	-	3
300	-	-	-	-	-	-	175	-	-	-	-	-	175
4W	-	-	-	-	-	-	865	720	177	-	-	-	1762
TOTAL	-	-	-	-	-	-	1047	720	177	-	-	-	1944

Special Research Studies

The Polish research vessel *Wieczno* conducted one survey cruise in the ICNAF Area in the winter/spring season of 1978. In the first leg of the cruise, the random-stratified groundfish survey was carried out in Subarea 5 and Statistical Area 6 in March, in cooperation with the Northeast Fisheries Center, Woods Hole. In April, a two-week plankton-hydrographic cruise was conducted on Flemish Cap. During this leg of the cruise, oceanographic data were transmitted successfully by radio into the IGOSS system. The last part of the cruise was devoted to shark sonic tagging, again in cooperation with Northeast Fisheries Center scientists.

