Northwest Atlantic Fisheries Organization

Serial No. N055

NAFO SCR Doc. 80/II/23
(Corrigendum)

SPECIAL MEETING OF SCIENTIFIC COUNCIL - FEBRUARY 1980

Assessment of the Squid (*Illex illecebrosus*) Stock in Division 4W by the area-density method

by

M. Lipinski
Sea Fisheries Institute
Gdynia, Poland

In NAFO SCR Doc. 80/II/23, the area covered by Polish commercial fishing operations in Div. 4W in 1979 was estimated by splitting the division into small rectangles (0.5° × 0.5°), and assuming the area of each rectangle to be 30 Nm × 30 Nm = 900 Nm^2 = 3100 km^2. Due to the effect of the Mercator projection, the area of each rectangle should be 30 Nm × 21 Nm = 630 Nm^2 = 2161 km^2.

This recalculation results in corrected estimates of the area investigated and the squid biomass in 1979 as follows:

Total area = 11,885.5 km

Total biomass = 107,000 tons

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Introduction

The area-density method was previously used by the author /Lipiński, 1978; 1979/ for the assessment of Illex stocks in Div. 4W. The use of this method as a routine procedure in relation to the same Division in the consecutive years could probably improve our understanding of variations of squid abundance, and would serve for current management decisions as well.

Polish Fleet fishing operations in Div. 4W

The Polish Fleet fishing for squid in the Div. 4W consisted of five stern trawlers working with use of standard Polish mid-water trawl /MWT/. The stern trawlers operated also in Div. 3 O.

Fishing on squid started on 4 July and finished on 30 October. The details of the Polish squid fishery in Div. 4W are shown in Fig. 1 and Table 1. These data were taken from logbooks of the vessels and therefore seem to be the best source available for further analysis.

The total Polish catch for Div. 4W amounted to 10,399 tons /pelagic trawls only/.

The area of Polish squid fishery in 1979 was generally similar to that previously described, but slightly smaller /17,050 km^2 instead of 18,600 km^2 in 1978/. The area was equally fished and sampled in the different periods of the season and it was assumed that there was no need to split it into sub-areas A and B. The depth of fishing operations was 140-180 m and 180-240 m. The mean duration of each haul was slightly below 3 hours, mean number of hauls per day equaled 4, trawl towing speed - 4.5 knots. The spread between the net wings was 35 m and an area covered during a single haul - 0.87 km^2.

As it was shown in the previous paper /Lipiński, 1979/ the assessment of males and females stocks separately in different periods of the season probably does not influence seriously the

final result. Therefore mean length of 21,5 cm and mean weight of 190 g was assumed as appriopriate for the whole analysis. The data on length and weight obtained in the field at the end of July, corresponded well with data of Lange and Johnson /1979/ and Lipiński /1978/.
It was found that Polish Fleet equally sampled the whole area with time, therefore migration could not influence seriously the results of the assessment.

The mean catch per day was 31.3 t and remained relatively constant during the whole fishing period. This was equal to 1.647×10^5 individuals.
The mean density of squids per 1 km^2, extracted by net was 0.473×10^5 individuals, and the total number of squids in the area analysed was 8.065×10^8 individuals.

Biomass of Squids in the Area Investigated

The total Polish catch in Div. 4W totalled 10,399 tons, i.e. 0.547×10^8 individuals. The ratio of this catch to the total number of squids in the area investigated equalled:

$$P = \frac{0.547 \times 10^8}{8.065 \times 10^8} = 0.068$$

Therefore the biomass was estimated at:

$$\frac{10,399}{0.068} = 152,900 \text{ t.}$$

This is a slight increase of the biomass as compared with the 1978 estimate.

Discussion

The biomass of squid stocks in Div. 4W was relatively stable during 1977-1979 fishing seasons. It seems therefore that the directed squid fishery did not affect seriously these stocks. Some biomass fluctuations /if any/ could be rather explained by influence of natural factors, as it was in 1979 paper /Lipiński, op.cit./ discussed.

Conclusion

A catch yield of 61,000 tons of Illex in Div. 4W does not seem to be excessive for the existing stock.

Literature Cited

- L a n g e , A.M.T. and K a r e n L. J o h n s o n , 1979
Dorsal Mantle Length - Total Weight Relationships of Squid /Loligo pealei and Illex illecebrosus/ from the Northwest Atlantic, off the Coast of the United States. ICNAF Res.Doc. 79/II/4:37 pp.

- L i p i ń s k i , M.,1978
Stock assessment of Illex illecebrosus /Lesueur, 1821/ in ICNAF Div. 4W determined by area-density method. ICNAF Res. Doc. 78/II/10:7 pp.

- L i p i ń s k i , M., 1978
Length-weight relationship of the Illex illecebrosus /Lesueur, 1821/ from Div. 4W. ICNAF W.P. 78/II/7:2 pp.

- L i p i ń s k i , M., 1979
Assessment of Illex illecebrosus /Lesueur, 1821/ Stocks in ICNAF Div. 4W determined by area-densit method. ICNAF Res.Doc. 79/II/37.

Table 1. Catches and fishing effort in the Polish squid fishery in Div. 4W, July-October 1979, by individual vessels

Vessel type and name	Capacity /GRT/	Fishing gear	Weeks	No. of tows	Hours fished	Days fished	Total catch	Squid catch	Squid catch per day	By - catches		
										Silver hake	Sword-fish	Others
M/T "SEJWAL" B-18	2480	MWT	15-21 Jul.	15	59.8	6	174.5	174.0	29.0	-	0.5	-
			22-28 Jul.	21	81.5	7	278.7	278.0	39.7	0.5	0.2	-
			29 Jul.- - 4 Aug.	38	96.4	7	236.7	236.5	33.8	-	0.2	-
			5-11 Aug.	19	59.4	5	114.7	114.0	22.8	-	0.7	-
			12-18 Aug.	-	-	-	-	-	-	-	-	-
			19-25 Aug.	-	-	-	-	-	-	-	-	-
			26 Aug.- - 1 Sept.	32	62.3	6	119.0	119.0	19.8	-	-	-
			2-8 Sept.	29	82.3	7	107.7	107.7	15.4	-	-	-
			9-15 Sept.	-	-	-	-	-	-	-	-	-
			16-22 Sept.	21	70.2	6	142.0	142.0	23.7	-	-	-
			23-29 Sept.	29	83.6	7	241.5	241.0	34.4	-	0.3	0.2
			30 Sept.- - 6 Oct.	17	54.5	5	58.3	58.2	11.6	-	0.1	-
			7-13 Oct.	20	73.3	6	164.2	164.2	27.4	-	-	-
			14-20 Oct.	12	32.4	5	107.1	107.1	21.4	-	-	-
			Totals	253	755.7	67	1744.7	1741.7	26.0	0.5	2.0	0.2

Table 1. /continued/

Vessel type and name	Capacity /GRT/	Fishing gear	Weeks	No.of tows	Hours fished	Days fished	Total catch	Squid catch	Squid catch per day	By - catches		
										Silver hake	Sword-fish	Others
M/T "ORKA" B-18	2495	MWT	1- 7 Jul.	4	19.0	2	63.0	63.0	31.5	-	-	-
			8-14 Jul.	20	88.3	7	189.3	189.0	27.0	-	0.3	-
			15-21 Jul.	18	82.4	7	223.6	222.0	31.7	0.5	0.9	0.2
			22-28 Jul.	20	60.7	7	232.5	232.0	33.1	-	0.5	-
			29-Jul.- 4 Aug.	10	20.8	2	53.0	53.0	26.5	-	-	-
			5-11 Aug.	-	-	-	-	-	-	-	-	-
			12-18 Aug.	-	-	-	-	-	-	-	-	-
			19-25 Aug.	29	63.6	7	191.7	191.0	27.3	0.5	0.2	-
			26 Aug.- - 1 Sept.	29	73.2	7	217.0	217.0	31.0	-	-	-
			2-8 Sept.	11	34.0	3	77.0	77.0	25.7	-	-	-
			9-15 Sept.	5	16.1	2	23.0	23.0	11.5	-	-	-
			16-22 Sept.	30	79.8	7	169.8	169.0	24.1	-	0.8	-
			23-29 Sept.	26	76.9	7	175.6	175.5	25.1	-	-	0.1
			30 Sept.- - 6 Oct.	13	38.9	5	141.1	141.0	28.2	-	0.1	-
			7-13 Oct.	17	50.2	7	160.0	160.0	22.9	-	-	-
			14-20 Oct.	1	1.9	1	5.0	5.0	5.0	-	-	-
			Totals	233	705.8	71	1921.6	1917.5	27.0	1.0	2.8	0.3

Table 1. /continued/

Vessel type and name	Capacity /GRT/	Fishing gear	Weeks	No. of tows	Hours fished	Days fished	Total catch	Squid catch	Squid catch per day	By - catches		
										Silver hake	Sword-fish	Others
M/T "BONITO" B-418	2440	MWT	15-21 Jul.	12	33.4	3	103.3	103.3	34.4	-	-	-
			22-28 Jul.	20	49.5	6	252.5	252.5	42.1	-	-	-
			29 Jul.- - 4 Aug	13	34.6	2	68.0	68.0	34.0	-	-	-
			5-11 Aug.	38	86.0	7	286.0	286.0	40.9	-	-	-
			12-18 Aug.	2	3.7	1	30.0	30.0	30.0	-	-	-
			19-25 Aug.	-	-	-	-	-	-	-	-	-
			26 Aug.- - 1 Sept.	21	47.0	4	142.0	142.0	35.5	-	-	-
			2- 8 Sept.	32	96.2	7	211.5	211.5	30.2	-	-	-
			9-15 Sept.	25	71.2	6	143.0	143.0	23.8	-	-	-
			16-22 Sept.	16	43.4	4	190.0	190.0	47.5	-	-	-
			23-29 Sept.	24	70.0	5	118.0	118.0	23.6	-	-	-
			30 Sept.- - 6 Oct.	11	30.0	3	76.0	76.0	25.3	-	-	-
			7-13 Oct.	19	60.7	5	81.0	81.0	16.2	-	-	-
			14-20 Oct.	34	108.9	7	375.0	375.0	53.6	-	-	-
			21-27 Oct.	2	6.4	1	53.0	53.0	53.0	-	-	-
			Total	269	741.0	61	2129.3	2129.3	34.9	-	-	-

Table 1. /continued/

Vessel type and name	Capacity /GRT/	Fishing gear	Weeks	No.of tows	Hours fished	Days fished	Total catch	Squid catch	Squid catch per day	By - catches		
										Silver hake	Sword-fish	Others
M/T "AMAREL" B-418	2440	MWT	1- 7 Jul.	16	41.2	4	86.5	86.5	21.6	-	-	-
			8-14 Jul.	32	98.2	7	300.5	300.5	42.9	-	-	-
			15-21 Jul.	29	97.0	7	375.4	375.4	53.6	-	-	-
			22-28 Jul.	11	32.2	5	176.0	176.0	35.2	-	-	-
			29 Jul.- - 4 Aug.	-	-	-	-	-	-	-	-	-
			5-11 Aug.	-	-	-	-	-	-	-	-	-
			12-18 Aug.	8	13.2	2	54.2	54.2	27.1	-	-	-
			19-25 Aug. x/	6	9.8	1 x/	42.9	42.9	42.9	-	-	-
			Totals	102	291.6	26	1035.5	1035.5	39.8	-	-	-

x/ - no data after 19 August.

Table 1. /continued/

Vessel type and name	Capacity /GRT/	Fishing gear	Weeks	No.of tows	Hours fished	Days fished	Total catch	Squid catch	Squid catch per day	By - catches		
										Silver hake	Sword-fish	Other
M/T "RYBAK MORSKI" B-89	2599	MWT	12-18 Aug.	34	62.1	6	120.0	120.0	20.0	-	-	-
			19-25 Aug.	45	68.5	7	225.0	225.0	32.1	-	-	-
			26 Aug.- - 1 Sept.	50	96.5	7	285.0	285.0	40.7	-	-	-
			2- 8 Sept.	15	30.6	3	115.4	115.4	38.5	-	-	-
			9-15 Sept.	-	-	-	-	-	-	-	-	-
			16-22 Sept.	30	73.8	6	270.0	270.0	45.0	-	-	-
			23-29 Sept.	17	53.0	5	225.0	225.0	45.0	-	-	-
			30 Sept.- - 6 Oct.	6	19.3	2	48.0	48.0	24.0	-	-	-
			7-13 Oct.	18	50.3	5	165.2	165.2	33.0	-	-	-
			14-20 Oct.	6	14.8	2	34.0	34.0	17.0	-	-	-
			21-27 Oct.	22	78.4	7	258.5	258.5	36.9	-	-	-
			28 Oct.- - 3 Nov.	8	20.3	3	134.8	134.8	44.9	-	-	-
			Totals	251	567.6	53	1880.9	1880.9	35.5	-	-	-

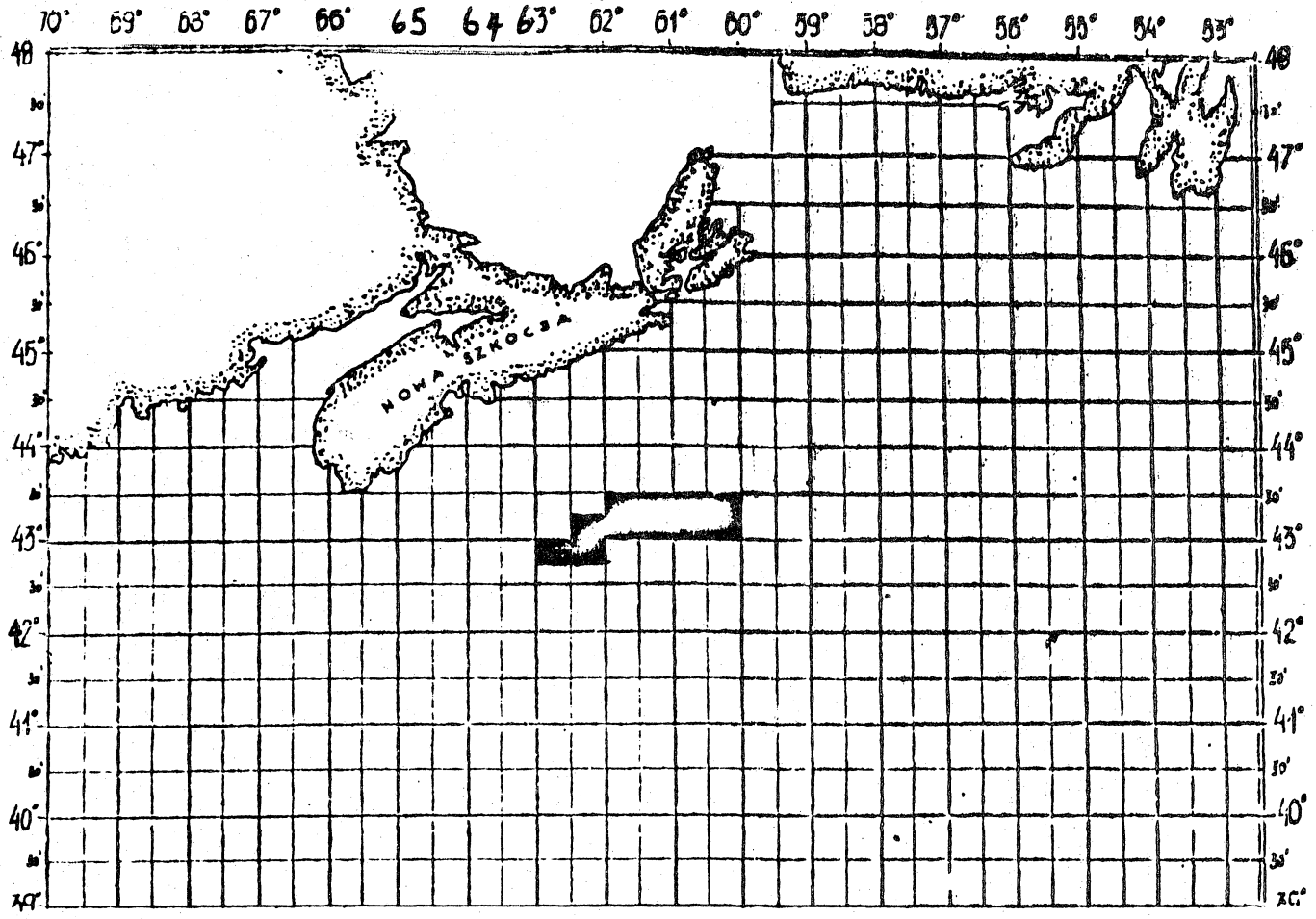

Fig. 1. Fishing grounds operated by Polish trawlers during summer 1979
Details concerning catch and effort are shown in Table 1.

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This recalculation results in corrected estimates of the area investigated and the squid biomass in 1979 as follows:

Total area = 11,885.5 km

Total biomass = 107,000 tons