

Serial No. 3057
(D.a.72)

ICNAF Summ.Doc. 73/27

ANNUAL MEETING - JUNE 1973

Polish Research Report, 1972

by

E. Stanek

Sea Fisheries Institute, Gdynia, Poland

Total Polish catches in the ICNAF Area increased from 171,539 tons in 1971 to 174,282 tons in 1972. This was due to an increase of mackerel catches in subarea 5 and cod catches in Div. 3 K and to a smaller degree also due to an increase of Greenland halibut and flatfish catches. At the same time a considerable decrease of herring catches in subarea 5 and of redfish - mainly in Div. 3 K - was observed.

The Polish catches in the ICNAF Area were the best in subarea 5 /44,973 tons/, than in subarea 3 /35,693 tons/ and in subarea 2 /24,055 tons/. The catches in subarea 4 and 1 were of less meaning /402 and 262 tons/.

In the ICNAF Area and in subarea 6 in 1972 totally 31 factory trawlers operated and 8 large freezer trawlers /3100 GT/, 13 smaller freezer trawlers /1900 GT/, 14 side motor trawlers, and 35 side steam trawlers also took part in fishing operations. Factory trawlers were operating in catches mainly in subareas

2 and 3, the freezer trawlers and side trawlers in subareas 5 and 6. Side trawlers were operating together with mother-ships just as in the previous years.

The comparative data concerning the catches of major species in ICNAF Area for 1971 and 1972 are shown in Table 1.

Table 1.

Species	1972		1971	
	metric tons	%	metric tons	%
Redfish	3,691	2.1	8,444	4.9
Cod	42,158	24.2	29,365	17.1
Flatfish	7,406	4.2	6,740	3.9
Greenland halibut	7,122	4.1	5,238	3.1
Mackerel	61,731	35.1	43,604	25.4
Herring	41,252	23.7	69,086	40.3
Other species	10,922	6.3	8,982	5.3
T o t a l	174,282	100.0	171,539	100.0

The above data show that the Polish fisheries were interested mainly in mackerel, cod and herring catches.

S u b a r e a 1

A. Status of the Fisheries

Usually the Polish fishing fleet is not operating in subarea 1. However in 1972 one factory trawler operated in subarea 1 mainly in Div. 1 C during 24 days in autumn season. The catches in subarea 1 are shown in Table 2.

Table 2.

ICNAF Div.	Catch in metric tons		
	Greenland halibut	Grenadier	T o t a l
1 C	140	118	258
1 D	7	17	24
1 E	-	-	-
Total	147	135	282

B. Research Studies

As Polish fisheries was not interested in catches in subarea 1 - investigations in this subarea were not carried out in 1972.

S u b a r e a 2

A. Status of the Fisheries

In total 24 factory trawlers operated in subarea 2, mainly in Div. 2 J, and in smaller extent in Div. 24. In Div. 24 catches were performed mainly during January and August, and in Div. 2 J - during January. Already in February most of trawlers - due to appearance of drift ice - had to withdraw from these fishing grounds, and shifted towards Div. 3 K. After moving of ices in April, the trawlers operated in Div. 2 J again. In the period from May to July Polish trawlers did not

operate in subarea 2. The catches in this subarea started in August again. In subarea 2 mainly cod catches were performed by the Polish fisheries.

The composition of catches is shown in Table 3.

Table 3.

ICNAF Div.	Catch in metric tons					Total
	Redfish	Cod	Greenland halibut	Flatfish	Other species	
2 H	165	2,792	1,317	2	61	4,337
2 J	484	16,422	2,006	731	75	19,718
Total	649	19,214	3,323	733	136	24,055

The best fishing yields were obtained in January, February and in April. In Div. 2 H the fishing yields reached up to 36,4 tons per day during January. The daily yields in Div. 2 J were as follows: January - 37,3 tons, February - 27,6 tons, March - 11,7 tons, April - 27,0 tons.

During the remaining months the yields were lower, except in December when they reached 17,3 tons per day.

In general, the fishing yields in subarea 2 in 1972 were slightly higher than those of 1971.

B. Research Studies

I. Cod

D 5

Cod investigations were carried out on factory trawlers. In January and February 12,526 cod specimens were measured

in Div. 2 J, and 1250 cod otoliths were taken for age determination. The length of cod ranged between 24 cm to 89 cm, and their age between 3 to 19 years. Their mean length was 46,5 cm and their mean age 5,9 years. Most frequent in the catches were fishes with a length from 36 cm to 56 cm /78.5 %/ and age from 5 to 7 years /year classes 1967, 1966 and 1965/ with a predominance of 5 year old fishes /39.0 %/. In Div. 2 J the mean catch in number during January and February 1972 amounted up to 2,854 fish per one hour. In the previous years the number of cod captured during the same months was as follows: in 1969 - 2 299 fish per hour, in 1970 - 1 626 fish per hour, in 1971 - 1 445 fish per hour.

The catch in number of the most important year classes occurring in the catches of 1972 was as follows:
1967 - 1 112 fish/hour, 1966 - 600 fish/hour, 1965 - 582 fish/hour.

The occurrence of cod born in 1968 was relatively numerous.

II. Redfish

In Div. 2 J 1300 fish /type Mentella/ were measured and 200 otoliths read for age-during March. The length of the fish ranged from 20 cm to 52 cm, and their age from 5 to 33 years. In the catches the most numerous were redfish with a length from 35 to 48 cm and age from 15 to 28 years. The mean length of redfish was 41,3 cm and their mean age was 20,5 years.

S u b a r e a 3

A. Status of the Fisheries.

In subarea 3 in the period from February to April and from June to October 26 factory trawlers operated, having the best catch results in January, February and June. The fishing grounds in Div. 3 L provided considerably less results where fish were captured mainly in March and August. The fishing grounds of Div. 3 M, 3 N and 3 O were of relatively less importance for fisheries, where catches were performed in March and April only.

Cod was the most often fish occurring in the catches of subarea 3. The Greenland halibut and redfish were of considerably less importance. The catches are shown in Table 4.

Table 4.

ICNAF Div.	Catch in metric tons					TOTAL
	Redfish	Cod	Greenland halibut	Flatfish	Other species	
3 K	1,488	21,809	3,481	3,989	20	30,787
3 L	94	897	182	1,617	1	2,791
3 M	960	35	-	8	-	1,003
3 N	-	19	1	1,054	-	1,074
3 O	26	10	-	2	-	38
3 P _s	-	-	-	-	-	-
Total	2,568	22,770	3,664	6,670	21	35,693

The above data show that Polish trawlers were operating mainly in Div. 3 K. The mean yields obtained per one day of fishing were as follows: February - 35,0 tons, March - 19,5 tons, April - - tons, May - 18,2 tons, June - 33,0 tons, July - 19,5 tons, August - 20,5 tons, September - 14,9 tons, October - 11,5 tons.

The fishing yields obtained in 1972 were in general higher, especially in January and in June, in comparison with those obtained in 1971.

B. Research Studies

I. Cod

13 197 fish were measured in Div. 3 K and 1359 otoliths read for age. The length of these fish ranged from 27 cm to 89 cm, and their age from 4 to 20 years. The main component in the catches were cod with a length from 33 to 62 cm /84.9%/ and age from 5 to 7 years /year classes 1967, 1966 and 1965/, of which the most numerous were fish with a length from 39 to 56 cm, and age 5 and 6 years. The mean length of cod was 50,2 cm, and their mean age 6,7 years. The total number of cod captured in one hour in February averaged of 2 152 fishes. In previous years the catches in the same months were as follows: in 1970 - 1264 fish/hour, in 1971 - 226 fish/hour. The catch in number of the most important year-classes occurring in the catches of 1972 was as follows: 1966 - 608 fish/hour, 1967 - 657 fish/hour, 1965 - 446 fish/hour.

In Div. 3 L only 1746 fish were measured, and 200 otoliths read for age. The length of these fish ranged from 21 to 83 cm and their age from 2 to 16 years. The most numerous were cod with a length from 33 to 44 cm, of which predominated those with a length from 36 to 41 cm and age 5 and 4 years /year classes 1967 and 1968/. The mean length of these cod was 40,8 cm and their mean age 4,8 years.

In the period from 7 to 21 September young cod were fished in Div. 3 K - in order to estimate their abundance. In these catches only single young cod were observed and no conclusions could be drawn as regards estimation on abundance of the particular year classes. The period of these catches seems to be too late for obtaining proper investigation results.

II. Redfish

In Div. 3 K 6040 redfish /type Mentalla/ were measured in February and March, and 850 otoliths read for age. In the catches the length of the fish ranged from 20 to 56 cm and their age from 6 to 35 years. The mean length of redfish was 38,2 cm and their mean age 17,6 years.

III. Greenland Halibut

In March 971 fish were measured in Div. 3 K. Their length ranged from 37 to 91 cm. The most numerous were fish with a length from 37 to 57 cm. Their mean length was 49,4 cm.

IV. Witch

In March and April 2,446 witch were measured in Div. 3 K and 200 otoliths read for age. The length of these fish ranged from 21 to 67 cm. The most numerous were fish with a length from 43 to 48 cm. The mean length of the fish was 46,6 cm.

V. American plaice

In April 670 fish were measured in Div. 3 K and 170 otoliths read for age. The observations showed that the length of these species ranged from 20 to 56 cm and their age from 4 to 18 years, of which the most numerous were fish with a length from 30 to 38 cm, and age from 6 to 9 years. The mean length of the fish was 33,3 cm.

In Div. 3 L 1,500 American plaice were measured and 100 otoliths read for age. The length of these fish ranged from 20 to 65 cm and their age from 6 to 20 years and over.

However the most numerous were fish with a length from 38 to 53 cm and age from 13 to 15 years. The mean length of these fishes was 41,2 cm.

VI. Shrimp

Measurements of shrimps *Pandalus borealis* occurring in young fish catches in the period from 7 to 21 September were performed in Div. 3 K. In total 6,442 shrimps were

measured. Carapace length ranged from 7 to 30 mm. More detailed particulars on this subject are included in S. Grimm's paper.

C. Hydrography

Hydrographic observations were carried out in Div. 3 K and 3 L during the period from 2 to 21 September. They included the measurements of temperature, salinity, and studies on oxygen and phosphate-phosphorus content. It was observed that the temperature of surface water amounted from 5 to 14°C. With the salinity of 31,5 ‰, the water temperature was higher at the south and usually lower by 5°C at the north /51° 30' N/. The lowest salinity /below 31,0 ‰/ was noted on the border line of Div. 3 K and 3 L. The content of oxygen in the surface layer was 7 ml/l at a depth of 20 m to 50 m - 12 ml/l /by temperature $\pm$ 0°C/, and in the bottom layer - from 7 to 9,5 ml/l. The highest concentration of phosphate-phosphorus /2,5 - 3,0 μ g atom P/L/ was observed in the northern part of Div. 3 K.

S u b a r e a 4

A. Status of the Fisheries

In subarea 4 only 8 trawlers were operating, consisting of: 4 factory trawlers, 2 smaller freezing trawlers and 2 side steam trawlers. In Div. 4 Vn and 4 Vs mainly redfish were captured, whereas in Div. 4 W more often mackerel was fished.

The catches are shown in table 5

Table 5.

ICNAF Div.	<u>Catch in metric tons</u>				
	Redfish	Herring	Mackerel	Other species	Total
<u>Factory trawlers</u>					
4 V _n	20	-	-	4	24
4 V _s	45	-	-	-	45
<u>Freezer trawlers /1900 GT/</u>					
4 W	-	-	243	60	303
<u>Steam side trawlers</u>					
4 W	-	28	2	-	30
Total	65	28	245	64	402
=====					

The fishing operations of redfish were performed in March and in October in Div. 4 V_s. The fishing yields obtained were as follows: March - 1,733 kos/hour, October - 1,250 kos/hour, November - 359 kos/hour.

In subarea 4 the mackerel was fished nearly exclusively in January.

B. Research Studies

In subarea 4 no research studies were carried out.

C. Hydrography

In subarea 4 hydrographic observations were carried out in Div. 4 X during the period from 21 to 24 September. The observations included the measurements of temperature, salinity studies, investigations on oxygen and phosphate-phosphorus content. These studies showed lack of any hydrographic contrasts. It was noted that the temperatures of the water layers from the surface to the bottom were below 10° C. The salinity of the surface ranged from 32,5 ‰ in the western part to 32 ‰ and below on Browns Bank. In the bottom layer the salinity values were usually lower than 33 ‰. The oxygen content in the surface waters of the coastal region was 7 ml/l. Towards the open Ocean an increase of the oxygen content above 7 ml/l was noted. The concentrations of phosphate-phosphorus amounted from 1 to 1,25 µg atom P/L. Only in the eastern part these values were slightly higher.

Within the international programme of ICNAF researches - observations on the distribution of herring larvae were carried out. The samples were taken by the means of 61 cm Bongo net. The larvae captured in Div. 4 X were of length 26 mm. It shows that the spawning-season of herring started in this region at the early summer.

Moreover the bulk of biomass plankton was measured, it amounted 107 cm³/m³. The main components of zooplankton were Copepoda, Euphausiidae, ^{and} Amphipoda Chaetognatha.

S u b a r e a 5

A. Status of the Fisheries

The catches in the Subarea 5 are given i Table 6

Table 6.

ICNAF Div.	Catch in metric tons				
	Cod	Herring	Mackerel	Other species	T o t a l
<u>Factory trawlers</u>					
5 Ze	4	11,703	14,621	269	26,597
5 Zw	-	437	8,192	167	8,796
5 Y	-	48	129	-	177
<u>Freezer trawlers /3,100 GT/</u>					
5 Ze	51	10,079	8,846	4,708	23,684
5 Zw	-	360	6,984	793	8,137
<u>Freezer trawlers /1,900 GT/</u>					
5 Ze	8	13,805	18,244	3,635	35,692
<u>Side motor trawlers</u>					
5 Ze	51	481	875	584	1,991
<u>Side steam trawlers</u>					
5 Ze	45	3,732	2,112	612	6,501
5 Zw	15	527	1,474	197	2,213
5 Y	-	52	9	1	62
TOTAL	174	41,224	61,486	10,966	113,850

Fishing operations on herring and mackerel were performed in Div. 5 Y nearly during the whole of the year, with an exception in February. The best fishing results in herring were obtained during the period from August to December, particularly in September and October, while mackerel were fished with best results in November and December. The yield per unit of fishing effort of particular types of vessels in the consecutive months of the year is shown in Table 7.

Table 7.

M o n t h s	Yield per hour /in kgs/				
	Factory trawlers	Freezer trawlers /3100 GT/	Freezer trawlers /1900GT/	Motor Side trawlers	Steam side trawlers
January	8,796	-	8,461	-	693
February	-	-	-	-	-
March	3,887	-	4,334	-	-
April	3,486	-	2,354	-	-
May	-	-	2,214	-	992
June	-	4,640	2,107	2,428	1,282
July	-	2,443	1,374	3,500	1,421
August	-	3,016	1,466	1,053	1,105
September	1,951	4,326	2,647	1,189	947
October	2,165	4,540	3,102	1,195	1,039
November	3,401	6,329	3,055	1,387	998
December	5,859	7,290	4,414	1,154	-
Mean	3,723	3,972	2,931	1,781	1,071

The presented data indicate, that factory trawlers as well as freezers by using the pelagic trawls gained better fishing results in comparison to those obtained by side trawlers, where the bottom trawls are being used.

B. Research Studies

I. Herring

Samples for biological studies were collected during the period from March till May. 23,379 herring were measured and 2,510 otoliths read for age. Length of these fishes varied considerably depending on fishing grounds. In the western part of Div. 5 Y near Cap Cod, herring ranged from 20 to 38 cm in August and September, with a predominance of younger specimens with body length ranged from 20 to 24 cm. In September herring captured in the fishing grounds between $40^{\circ}30'$ - $40^{\circ}20'N$ and $68^{\circ}45'$ - $69^{\circ}30'W$ ranged from 36 to 37 cm with a predominance of individuals with body length ranged from 30 to 33 cm.

Catches consisted of year-classes 1967, 1966, and 1965. However, the proportion of herring born in 1969 and 1968 occurring in the catches was rather poor. Also, the age of herring differed considerably depending on fishing grounds. On the Cap Cod fishing grounds the proportion of 2 years old herring /1970 year-class/ made up 89%. In the Northern part of Georges Bank the spawning population consisted of older

fish /6 and 5 years of age/ in comparison with that observed in the southern part /4,5 and 6 years of age/. The data given in Table 8 show the importance of particular year-classes for the herring stock occurring in Div. 5 and 6.

Table 8.

	Y e a r c l a s s e s									Total
	1970	1969	1968	1967	1966	1965	1964	1963	1962	
Mill. of fish	19	13	24	58	42	32	15	12	6	221
%	8.6	5.9	10.8	26.1	18.9	14.4	6.8	5.8	2.7	

II. Mackerel

In subarea 5 6,143 specimens were measured and 1,591 otoliths taken for age readings. The length of mackerel ranged from 28 to 49 cm, the age was determined to be 2 to over 10 years. The mean length was 35,2 cm. Mackerel with body length of 34 to 39 cm predominated in the catches, the age of which was determined to be 5 and 6 years /1967 and 1966 year classes/. The age composition of mackerel captured in subarea 5 is given in table 9.

Table 9.

Year classes	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961
%	76	29	118	50	406	190	83	10	14	24

An increase of mean length of mackerel body was observed in the period from 1970 to 1972. This was due to the quite abundant and very rich year classes of 1967 and 1966, which as a specimens of length range 32 to 34 cm and 5 to 6 years of age occurred most often in the catches 1972.

The Polish data containing the estimates on mackerel stock are presented in a separate paper worked out by A. Paciorkowski, M. Liwoch, R. Grzebielec, W. Borowski and S. Uciński.

C. Hydrography

Hydrographic observations were carried out in subarea 5 during the period from 2 to 28 October. The investigations included measurements of temperature, salinity, content of oxygen and phosphate-phosphorus. The observations were conducted in the region of Georges Bank, near Nantucket and in the Gulf of Maine. The results of hydrographical investigations worked out by A. Furtak are presented in Research Document No. 73/21.

In the region of Georges Bank the surface temperature of water was $14 - 15^{\circ}$ C. Only in the eastern part, the isotherms of $12 - 13^{\circ}$ C were observed. At the greater depths /200 - 500 m/ the temperature of water was $6^{\circ} - 9^{\circ}$ C. The salinity, both in the surface and bottom layers amounted to 32,5 ‰. The oxygen content was 6,5 ml/l. The distribution of phosphate-phosphorus differed from 0 to 2 μ g atom P/L.

In the region Nantucket, the surface temperature was from 15° to 22° C, in the bottom layer from 15° C at the costal region up to 8° C at the greater depths /280 m/ of slopes. The salinity amounted 32 ‰ advancing from the costal zone up to 35,5 ‰ towards the open Ocean. Oxygen content in the costal zone varied from 6,5 to 7,5 ml/l, while at the greater depths of water and at the bottom layer it amounted from 6,5 to 4,0 ml/l. The phosphate-phosphorus concentrations were occurring within the range of 1 to 1,5 μg atom P/l.

In the Gulf of Maine the surface temperatures of water were within the range of 10° to 14° C. At a depth of 100 to 150 m the recorded temperature was 5° to 6° C, while in the lower parts it was $1,5^{\circ}$ C to 2° C. Isohaline of 32,5 ‰ showed a nearly parallely course. The salinity was higher northwards of the Isohaline, and it was lower towards south. In the bottom layer salinity ranged from 33,0 to 34,5 ‰. Oxygen content in the surface layers was 7,5 ml/l. Concentrations of phosphate-phosphorus ranged from 1 to 1,5 μg atom P/l.

Within the frame of ICNAF international survey programme, investigations on herring larvae distribution were carried out. The observations were conducted during the period from 2 to 28 October in Div. 5 Y and 5 Z at the standard stations /Fig.1/ by the means of 61 cm Bongo net. Length composition of herring larvae is shown in table 10.

Table 10.

Region	10 mm %	10 - 15 mm %	15 %	Total number herring larvae
Nantucket Shoals	67.0	30.6	2.4	5,121
Gulf of Maine	10.6	44.3	45.1	99
Georges Bank	25.7	58.6	15.7	4,353

The data concerning the investigation results are presented in Res.Doc.73/16 by S. Grimm.

In the region of Georges Bank the largest quantities of herring larvae were detected at stations 83 and 90. Near Nantucket a significant number of herring larvae detected near station 26, indicate that spawning of these species is concentrated around that station, 5 larvae per 1 m^3 . Most of specimens were of length range from 6 to 10 mm, giving evidence to a relatively late spawning season of herring. In the Gulf of Maine occurrence of larvae in the costal zone was observed and in the central part of Gulf the absence of larvae was noted.

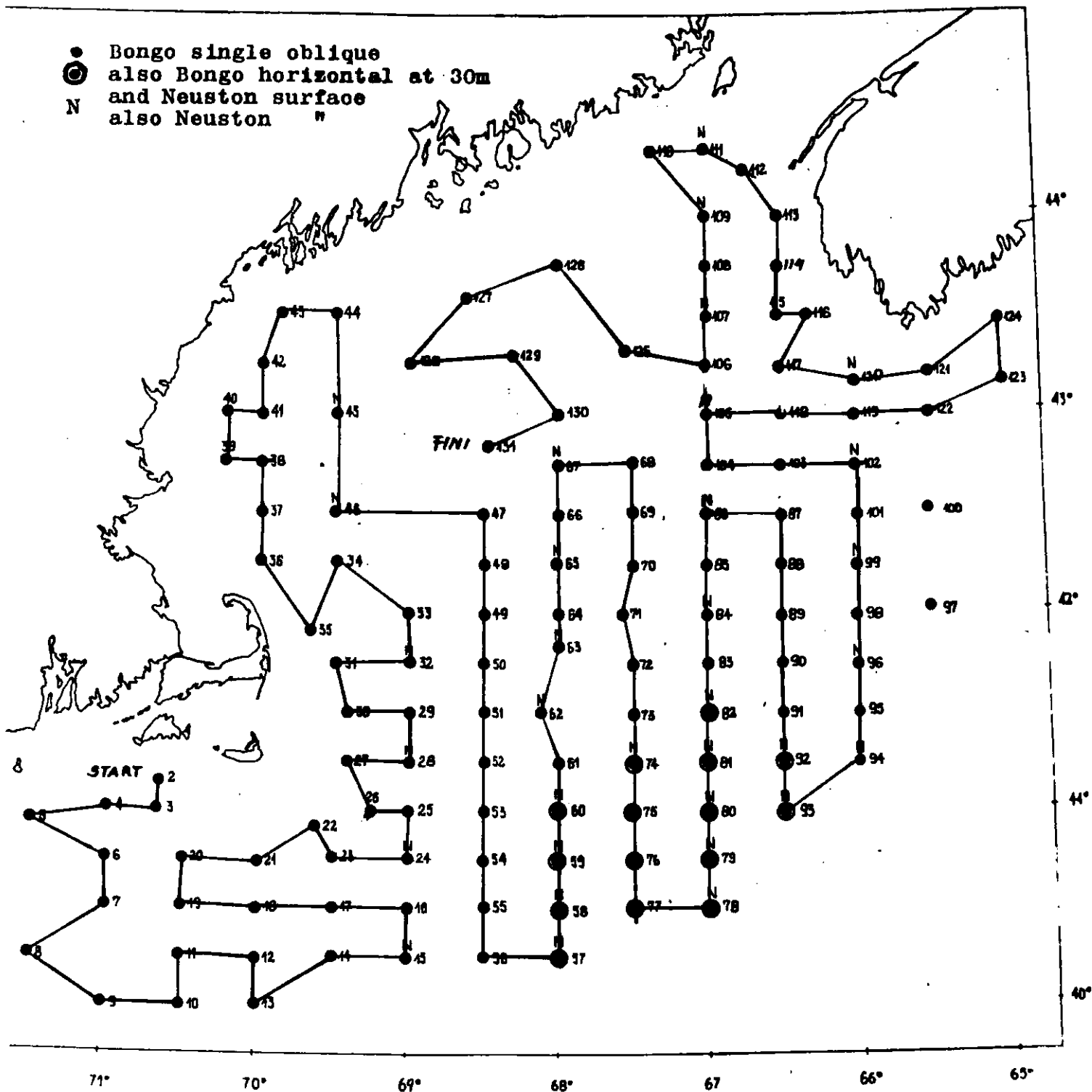


Fig. 1 Cruise tract and ichthyoplankton station ICNAF Cooperative larval herring survey, 2-28 October 1972