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Romanian Research Report 1968

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Romanian fishing cruise in the North Atlantic in 1968, took place between 40° - 43°N and 68° - 71°W (1 August - 23 October) in ICNAF Divisions 5Z and 5Y.

Generally, herring was the main species fished in the same zones, Nantucket and Georges Bank, as in 1967, using this time, both bottom and pelagic trawl, night and day.

The quantity caught was 3,463 tons with Clupeidae making up 2,385 tons (68.9%).

Table 1 shows the species composition of the Romanian catch in 1968.

Table 1. Distribution by species in the Romanian fishery in 1968 (tons and percent)

Statistics group	Species	Catch			
		metric tons		percent	
		by species	total group	by species	total group
1 Clupeidae	*Clupea harengus*	2,135)	2,385	61.6	68.9
	Pomolobus aestivalis	250)		7.3	
2 Gadidae	*Gadus morhua*	235)		6.8	
	Melanogrammus aeglefinus	11)	501	0.4	14.7
	Merluccius biliniaris	255)		7.3	
3 Scombridae	*Scomber scombrus*	284	284	8.2	8.2
4 Sharks and Rays		212	212	6.1	6.1
5 Other unindentified species		81	81	2.1	2.1
Total			3463		100.0

The average catch/day was 24.5 tons in 1968 and 23.3 tons in 1967.

This fishing increase is due to both bottom and pelagic fishing, fish shoals being attentively followed day and night. Pelagic fishing was practiced during the night with better results.

The decrease in catch of Clupeidae in comparison with the rest of species (especially blueback herring - *Pomolobus aestivalis*) is due to the fact that Romanian fishing vessels arrived late in the area and remained for a shorter period than in the previous years.

This is why the catches of *Pomolobus aestivalis* in the south Nantucket area and the catches of *Clupea harengus* from the remaining area - Georges Bank and Great South Channel were smaller than in 1967.

The total Clupeidae catch/day in 1968 averaged 16.9 m tons compared with 18.1 m tons in 1967.

Table 2 shows the quantities caught and landed for years 1965-1968.

Table 2

Year	Catch in metric tons			Tons/day
	Fished	Landed		
		Frozen for human consumption	Processed for industrial purposes	
1965	3,208	1,612	1,696	34.8
1966	3,533	1,938	1,495	32.7
1967	1,729	1,028	701	23.3
1968	3,463	2,400	1,063	24.5

Compensating for the lower Clupeidae catches was the increased catch of other species and Gadidae, *Merluccius bilinearis* and *Gadus morhua*.

Special observations

Clupeidae. In 1968, as in previous years (i.e. 1967) fishing for Clupeidae yielded better results. This fishing was on *Clupea harengus* and *Pomolobus aestivalis* concentrations, which are distinct for Div. 5Z and 5Y; our fishing vessels were present during this concentration.

Atlantic herring. (*Clupea harengus*)was more scattered on Georges Bank and between Cape Cod and the Gulf of Maine (41^{o} - $44^{o}51'$N and $65^{o}40'$ - 71^{o}W), while the *Pomolobus aestivalis* was found south of Nantucket (southern part of Div. 5Z and northern part of Subarea 6: 31^{o} - 41^{o}N and $69^{o}31'$ - 71^{o}W).

Herring was found in two dense concentrations, one northwest and east of Georges Bank, at 50 - 100m depth, between $67^{o}45'$ - 66^{o}W, north and south of latitude 42^{o}N, and the other north of Great Channel to near Cape Cod between 41^{o}-42^{o}N and $68^{o}30'$ - 61'W.

These two concentrations with different locations are two different populations of herring (*Clupea harengus*):

(a) The herring population on Georges Bank was found, during August, concentrated for feeding and fattening. The length group was between 23-31 cm (3-8 years old). The proportion of the 6-8 year olds (length 26-31 cm) increased as the spawning period, which was estimated to be between 1 September - 1 October, approached. Food was composed exclusively of Euphasiidae (*Meganyctiphanes norwegica*). After 16 August individuals with empty digestive tract and spawning pigmentation appeared.

The spawning period for this population, in 1968, began approximately on 1 September on the northern part of Georges Bank between $41^{o}58'$ - $42^{o}09'$N and $66^{o}58'$ - $67^{o}20'$W, and lasted about 24-26 days, at temperatures of 13^{o} - 15^{o}C. The sex ratio was 45% male and 55% female. The 6-7 year olds (27-30 cm in length) were 92.5%, while the younger, 3-5 year olds (under 26 cm in length) were only 7.5%.

(b) The herring population located north of Great South Channel, represented a herring concentration composed of a smaller percentage (66.8%) of the 6-8 year olds (27-32 cm in length) than the population on Georges Bank. But the percentages of younger, 3-5 year olds (21-26 cm in length) fish was greater - 33.2%. Therefore the average age of the herring population north of the Great South Channel is less than that of the population located on Georges Bank. The herring shoals found here could be considered as younger, although 6-8 year olds are dominant in the population. The spawning period begins earlier, on 28-30 August, when individuals with spawning pigmentation and empty digestive tracts appear. Individuals capable of spawning appear earlier in September. After 15 September this herring population moves for spawning purposes probably to the Gulf of Maine coast areas.

After 25 August our fishing vessels move to the northwest of Georges Bank because of herring concentrations there.

For the entire population the ratio between sexes is 50% male and 50% female. There is a slight increase in the number of males in the catches before the spawning period (end of August).

Blueback herring (*Pomolobus aestivalis*) was fished in 1968 as in previous years south of Nantucket, at an average surface temperature, varying between 16° - 20°C. The temperatures lower than 16°C resulted in the shoals scattering. The biggest catches were made at higher temperatures from 1 August to the beginning of September. (Fig. 1)

With the colder September waters the *Pomolobus* concentrations broke up and moved to the fresh-water spawning area. At this time the stage (3) of maturation of the gonads and the food in the stomachs show that *Pomolobus* comes into the area to fatten before moving off to spawn.

Fish 4-6 years of age (19-24 cm in length) were dominant, making up 80%.

Scomber scombrus. The most important *Scomber* concentrations were found during August and September, northwest of Georges Bank, and in September - October on the northern part of Great South Channel.

Scomber catches were higher in 1968 than in 1967. The biggest catch was made on Georges Bank on 1 October. Fish 25-32.5 cm in length were dominant. Sex ratio was 53.1% male and 46.9% female; gonads were in stage three of maturation.

Gadidae. Cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) were located on the northern and western part of Georges Bank. Length-class varied between 35-75 cm for *Gadus morhua* and 30-60 cm for *Melanogrammus aeglefinus*.

Food of both species was *Ammodytes americanus*.

Silver hake (*Merluccius bilinearis*) appeared in catches in the Nantucket area catching, in more important quantities. Length-class varied between 27-35 cm. Sex ratio was 79.6% female and 20.4% male.

Generally speaking, Gadidae kept their growth rate, as in previous years; for *Gadus morhua* length-class was 50-75 cm; for *Melanogrammus aeglefinus*, 40-60 cm and for *Merluccius bilinearis*, 30-35 cm.

Other fish caught were Pleuronectidae, Sharks and Rays, with benthonic ones and *Lamna nasus* too. And also *Etrumius sadina* as pelagic species.

Environmental conditions

Meteorogical observations. Air temperatures varied daily between 16,3° - 19.2°C in August on Georges Bank and Great South Channel, and between 16.8° - 22.3°C on Nantucket.

In September, temperatures varied from 15.5° - 13.7° up to 20°C on Georges Bank and Great South Channel.

Due to the cold layer of air and the Labrador current, Georges Bank, strongly influenced by the meteorological conditions, presented a cooler climate, with more frequent foggy days and winds, than in southern zones (Nantucket) and the western part of Great South Channel.

Meteorogical conditions also influenced the temperature of the surface water layers in these areas. Water was colder, with greater temperature variations, especially in the northern and northwestern part of Georges Bank.

Rainfall was rare and of short duration. Winds blew from the northwest, south and southwest, and sometimes from the north and the east, not over 5 Bf, usually 1-3.

There were no hurricanes in August and September.

Oceanographical observations

Water temperatures were influenced not only by the atmospheric conditions but also by the cold currents from Labrador, alternating with the warm ones from the coast and from the south converging at the northern parts of the area.

During the period, 1-8 August, one observed on Georges Bank that warm currents penetrated into the eastern parts of the shelf giving temperatures varying from 16.6° to 19°C. During 7-23 September, the surface layer was under the influence of the cold currents resulting in temperatures on the shelf lowering to 13° and 14.8°C. Towards the end of September warm water layers again invaded the shelf, and temperatures rose in the central and eastern parts, to 16°C and even 17°C (average value).

Beginning in October cold water was present anew, but average temperature values were 0.2° - 3°C greater than in 1967 in the same period, for some northern and eastern areas of the shelf where the average temperature was between 14.2° - 16°C.

In the Nantucket area, generally characterized by warm waters, the penetration of cold northern water beginning 22 August (Table 3) made average temperatures lower (from 18° and 20°C to under 16°C); the consequence was the dispersion of the *Pomolobus aestivalis* concentration. This change has also been noticed in the area between Cape Cod and Georges Bank, Western Great South Channel, where temperatures dropped to 13.8° and 15.2°C. After a short time the warm water returned and temperatures varied again around 18°C near the surface.

The beginning of October brought for the entire area, cold waters which lowered the temperatures to 16°C and 18°C (2-8 October) and 15° - 12° (to the end of the month).

Table 3 shows the temperatures (°C) the salinity (°/oo) at different depths and layers.

Table 3

Depth (m)	August													
	day	7		13		17		23		25		26		30	
	zone	41°48'N 68°12'W		41°37'N 66°56'W		41°13'N 67°58'W		40°22'N 70°21'W		41°25'N 69°24'W		41°25'N 69°24'W		41°22'N 67°12'W	
		°C	°/oo	°C	°/oo	°C	°/oo	°C	°/oo	°C	°/oo	°C	°/oo	°C	°/oo
0		14.4	-	13.0	32.1	16.0	-	16.0	-	13.4	-	11.4	-	13.2	32.0
10		13.0	32.0	12.6	31.8	14.0	-	16.0	-	11.0	30.0	7.2	-	12.0	-
20		13.0	-	12.2	31.8	13.0	-	11.0	-	11.0	-	6.8	31.0	11.3	-
30		12,0	-	12.0	-	13.0	32.0	9.0	32.0	9.0	-	6.8	-	11.3	31.8
40		10.0	-	12.0	-	13.0	-	8.6	-	7.8	-	6.8	-	10.9	-
50		9.0	-	12.0	-	12.6	-	8.5	-	6.0	-	6.4	-	9.9	-
60		7.0	-	12.0	-	10.3	-	8.5	-	-	-	-	-	8.4	-
70		7.0	-	18.0	-	10.3	-	8.4	-	-	-	-	-	8.0	-

Depth (m)	September			
	day	4		15
	zone	41°22'N 69°22'W		40°04'N 67°12'W
		°C	°/oo	°C	°/oo
0		17.7	30.0	14.4	-
10		16.7	-	14.2	-
20		8.5	-	8.4	32.0
30		8.5	-	8.4	-
40		8.3	-	8.4	-
50		6.4	-	6.5	-
60		6.2	-	-	-
70		-	-	-	-

Analysing the temperatures and salinities one finds an isotherm zone with greater salinities and variable depths, located between 20-60 m; 20-40 m; 40-60 m; 10-20 m and 20-30 m.

These depths indicate the level of the cold water penetration, the mixture of waters with different temperatures and the thermocline positions in several situations.

Temperature differences between the thermocline and upper layers in points of contact, had, in 1968, values between 2.4° - 8.2°C. The thermocline was situated sometimes on the upper part of the isothermal layer.

Pelagic species, *Clupea harengus* and especially *Pomolobus aestivalis* and *Scomber scombrus* remain around the thermocline, some species (herring) in the cooler stratum while others (*Pomolobus* and *Scomber*) are in the warmer ones and move in connection with the thermocline variations. This is why we consider as important the scientific research concerning the study of the variations and their consequences, i.e. fish concentrations,in order to determine a pelagic or a bottom fishery.

Concerning water transparency, one established during August and September, a variation in values between 16 - 14 m. Influencing this matter in 1968 was not only the feeble organism presence, but also the pronounced and frequent haziness as well as the reduced visibility.

Biological observations

Preliminary analysis of samples showed a concentration of planktonic biomass at the limit of Georges Bank shelf, and especially the eastern, western and southern regions of Nantucket, and therefore the herring has concentrated, during August, in these regions.

Dominant groups were cryophile organism. Euphasiidae and *Meganyctiphanes norwegica* formed the herring food; *Calanus finmarchicus* and *Centropages typicus* (Copepodae) formed the principal food for *Scomber scombrus*. Secondly, *Discopliura* sp.and *Salpa* (Urocordatae) also formed herring food and influenced its concentration. *Pandalus*, a decapod crustacean formed 24 - 66% of the food of the Gadidae (*Merluccius bilinearis* and *Urophycis chuss*) food.

Benthic food consisted especially of molluscs.

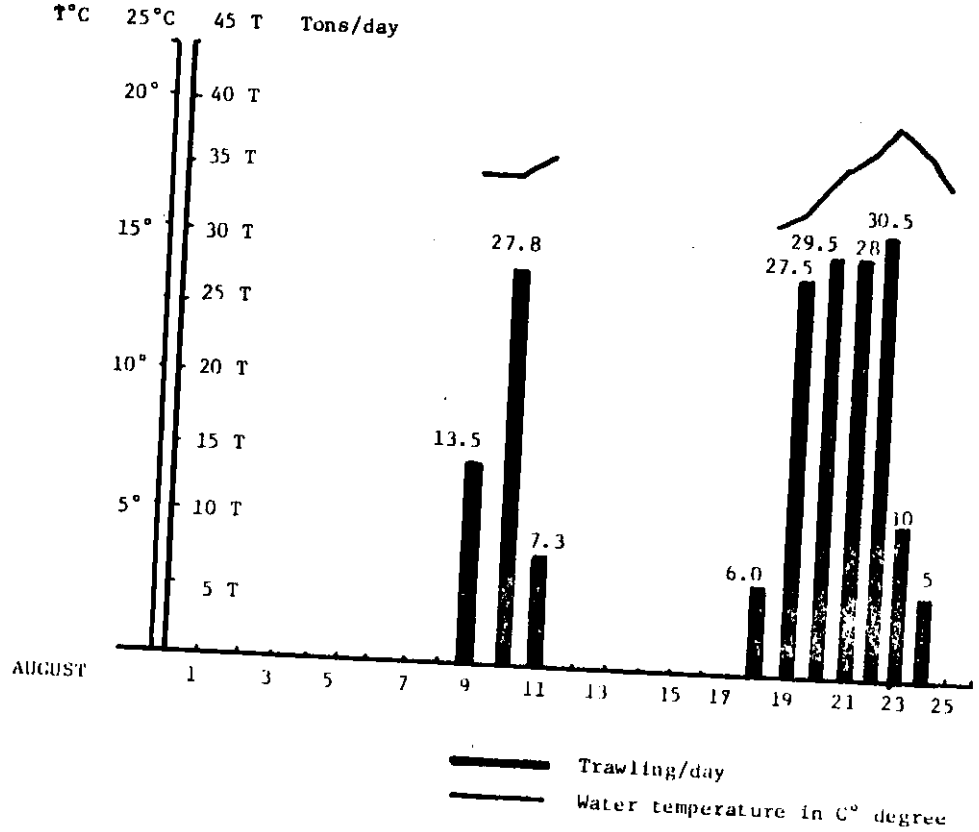

Fig. 1. Variations in catch of *Pomolobus aestivalis* with temperature between 9-11 and 18-24 August 1968 in south Nantucket area.