

Distribution, Relative Abundance and Size Composition of Three Species of Eelpouts in the Labrador and Newfoundland Areas

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Abstract

Data from bottom-trawl surveys in the Labrador-Newfoundland area during 1978-80 were used to describe the distribution and abundance and the size composition of Arctic eelpout *Lycodes reticulatus*, Esmark's eelpout *L. esmarki*, and Vahl's eelpout *L. vahlii*. The Arctic eelpout was the most abundant of the three species, occurring mainly in depths of 300 m at temperatures from -0.9° to 3.5°C . Esmark's eelpout occurred over wide ranges of depth and temperature but seemed to prefer depths of 251-300 m at temperatures from 2.6° to 3.5°C . Vahl's eelpout was prevalent in depths of 201-600 m at temperatures from 2.1° to 4.5°C . All three species were more prevalent off southern Labrador and eastern Newfoundland than on the Grand Bank. Length frequencies of samples from different parts of the area indicated increasing size from north to south for Arctic eelpout but no significant differences in average length for Esmark's and Vahl's eelpouts.

Introduction

Several species of eelpouts are found in the Northwest Atlantic (Leim and Scott, 1966). However, the available literature contains only scattered data on the ecology and biology of eelpouts in the North Atlantic (Lütken, 1898; Jensen, 1904, 1952; Knipovich, 1926; Andriyashev, 1954), and even less is known about their distribution and abundance off Labrador and Newfoundland.

Except for the ocean pout, *Macrozoarces americanus*, off northeastern United States, eelpouts are not commercially exploited in the Northwest Atlantic, but they occur frequently in bottom-trawl catches over broad ranges of depth and temperature. This paper presents data from trawl surveys on distribution and abundance and on size composition of the three most numerous eelpouts found off Newfoundland from southern Labrador to the Grand Bank, namely the Arctic eelpout *Lycodes reticulatus*, Esmark's eelpout *L. esmarkii*, and Vahl's eelpout *L. vahlii*.

Materials and Methods

Data on length compositions of the three species of eelpouts were collected during bottom-trawl surveys in the summers (usually May-August) of 1978, 1979 and 1980 by the research vessels *Persey III*, *Suloy* and *N. Kononov* respectively. Since information on the catches of eelpouts was more complete for the *Persey III* survey in 1978 than for the others, only the data from that survey were used to illustrate the distribution and abundance by depth and temperature. The surveys involved trawling at fixed stations throughout the area

from southern Labrador (NAFO Division 2J) southward off Newfoundland (Div. 3K and 3L) to the southern Grand Bank (Div. 3N and 3O). The duration of each trawl set was 1 hr. The trawl codend was lined with small-mesh (8 mm) kapron netting.

At each trawling station, bottom depth and near-bottom temperature were recorded, together with the quantities of different species caught. Biological data collected, as time permitted, for selected species included length measurements (total length, cm), sex, maturity, structures for age determination, etc. A detailed description of the methods used in conducting these annual trawl surveys was reported by Konstantinov (MS 1981). The summarized data on occurrence and mean catch per set by depth and temperature for the three species of eelpouts are based on 279 sets during the summer survey of 1978. The length compositions are based on measurement of 1,133 Arctic eelpouts, 543 Esmark's eelpouts and 489 Vahl's eelpouts caught during the 1978-80 surveys.

Results and Discussion

Depth and temperature distribution

The three species of eelpouts occurred over wide ranges of depth and temperature but certain differences are evident (Table 1, Fig. 1). The Arctic eelpout was more prevalent in the catches than either of the other species, as indicated by their occurrence in 50% or more of the trawl catches at different depth and temperature ranges (22 instances for Arctic eelpout in contrast to 9 for Esmark's eelpout and 11 for Vahl's eelpout) (Table 1).

TABLE 1. Number of sets and percent occurrence of three species of eelpouts by depth and temperature in the Labrador-Newfoundland area. May-August 1978. (* indicates percentages based on single sets.)

Depth interval (m)	Bottom temperature range (°C)														
	-1.4	-0.9	-0.4	0.1	0.6	1.1	1.6	2.1	2.6	3.1	3.6	4.1	4.6	5.1	
	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	10.5	
Number of 1-hr bottom-trawl sets															
51-100	—	1	4	8	4	6	13	2	1	3	—	—	—	1	
101-150	—	2	4	3	2	2	—	1	—	—	2	—	—	3	
151-200	1	1	3	5	6	4	1	2	1	—	3	—	—	7	
201-250	—	—	1	3	2	4	5	5	10	4	3	1	—	6	
251-300	—	—	—	—	—	2	2	6	13	7	8	4	—	2	
301-350	—	—	—	—	—	1	1	2	12	17	6	1	—	3	
351-400	—	—	—	—	—	—	—	—	3	5	2	1	—	2	
401-450	—	—	—	—	—	—	—	—	—	5	1	2	1	—	
451-500	—	—	—	—	1	—	—	—	1	7	1	1	—	—	
501-550	—	—	—	—	—	—	—	—	—	2	3	—	1	—	
551-600	—	—	—	—	—	—	—	—	—	3	3	—	—	—	
601-650	—	—	—	—	—	—	—	—	1	1	1	—	—	—	
651-700	—	—	—	—	—	—	—	—	—	1	—	—	—	—	
701-750	—	—	—	—	—	—	—	—	1	2	—	—	—	—	
Totals	1	4	12	19	15	19	22	18	43	57	33	10	2	24	
Percent occurrence of Arctic eelpout															
51-100	—	0*	0	0	50	0	0	0	0*	0	—	—	—	0*	
101-150	—	50	75	67	0	0	—	0*	—	—	0	—	—	0	
151-200	100*	100*	67	80	83	100	0*	50	0*	—	0	—	—	0	
201-250	—	—	100*	100	50	100	100	100	40	100	0	0*	—	0	
251-300	—	—	—	—	—	0	50	67	54	57	0	0	—	0	
301-350	—	—	—	—	—	0*	100*	0	33	65	0	0*	—	0	
351-400	—	—	—	—	—	—	—	—	0	40	0	0*	—	0	
401-450	—	—	—	—	—	—	—	—	—	20	0*	0	0*	—	
451-500	—	—	—	—	0*	—	—	—	0*	14	0*	0*	—	—	
501-550	—	—	—	—	—	—	—	—	—	50	0	—	0*	—	
551-600	—	—	—	—	—	—	—	—	—	0	0	—	—	—	
601-650	—	—	—	—	—	—	—	—	0*	0*	0*	—	—	—	
651-700	—	—	—	—	—	—	—	—	—	0*	—	—	—	—	
701-750	—	—	—	—	—	—	—	—	0*	50	—	—	—	—	
Percent occurrence of Esmark's eelpout															
51-100	—	0*	0	13	0	0	0	0	0*	0	—	—	—	0*	
101-150	—	0	0	33	0	0	—	0*	—	—	0	—	—	0	
151-200	0*	0*	33	0	17	50	100*	0	0*	—	0	—	—	0	
201-250	—	—	0*	20	0	25	0	20	20	50	0	1*	—	0	
251-300	—	—	—	—	—	0	0	67	62	43	13	0	—	0	
301-350	—	—	—	—	—	0*	0*	0	42	41	0	0*	—	0	
351-400	—	—	—	—	—	—	—	—	0	60	0	0*	—	0	
401-450	—	—	—	—	—	—	—	—	—	0	100*	50	100*	—	
451-500	—	—	—	—	100*	—	—	—	0*	20	0*	0*	—	—	
501-550	—	—	—	—	—	—	—	—	—	0	0	—	0*	—	
551-600	—	—	—	—	—	—	—	—	—	0	100	—	—	—	
601-650	—	—	—	—	—	—	—	—	0*	0*	0*	—	—	—	
651-700	—	—	—	—	—	—	—	—	—	0*	—	—	—	—	
701-750	—	—	—	—	—	—	—	—	0*	100	—	—	—	—	
Percent occurrence of Vahl's eelpout															
51-100	—	0*	0	0	0	0	0	0	0*	0	—	—	—	0*	
101-150	—	0	0	0	0	0	—	0*	—	—	0	—	—	0	
151-200	0*	0*	0	0	0	25	0*	0	0*	—	0	—	—	0	
201-250	—	—	0*	0	50	0	0	20	30	50	0	0*	—	0	
251-300	—	—	—	—	—	0	0	50	15	35	38	100	—	0	
301-350	—	—	—	—	—	0*	0*	100	42	47	100	0*	—	0	
351-400	—	—	—	—	—	—	—	—	0	20	50	100*	—	0	
401-450	—	—	—	—	—	—	—	—	—	40	0*	50	0*	—	
451-500	—	—	—	—	0*	—	—	—	0*	0	100*	0*	—	—	
501-550	—	—	—	—	—	—	—	—	—	0	0	—	0*	—	
551-600	—	—	—	—	—	—	—	—	—	100	100	—	—	—	
601-650	—	—	—	—	—	—	—	—	0*	0*	100*	—	—	—	
651-700	—	—	—	—	—	—	—	—	—	0*	—	—	—	—	
701-750	—	—	—	—	—	—	—	—	0*	0	—	—	—	—	

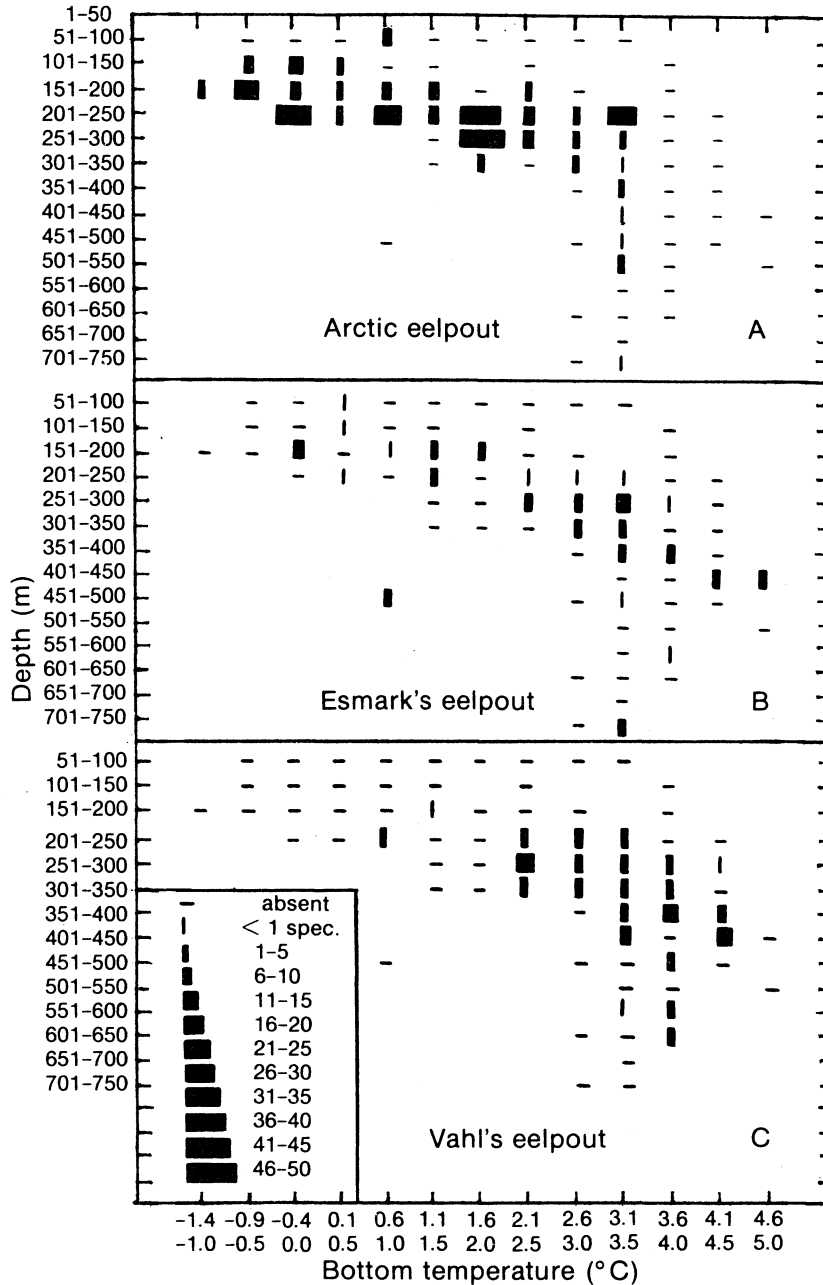


Fig. 1. Distribution in terms of mean catch (numbers) per hour trawling of (A) Arctic eelpout, (B) Esmark's eelpout and (C) Vahl's eelpout by depth and temperature in the Labrador-Newfoundland area, 1978.

The Arctic eelpout was the most abundant of the three species (Fig. 1A). Mean catches in excess of 20 specimens per set occurred at depths of 151–300 m where the bottom temperature ranged from -0.9° to 3.5°C . Few specimens were taken in sets deeper than 300 m and none where the bottom temperature exceeded 3.5°C .

Esmark's eelpout was, on the average, much less abundant than the Arctic eelpout, with mean catches

up to 15 specimens per set being prevalent in 151–500 m over a temperature range from -0.4° to 5°C (Fig. 1B). However, depths of 251–350 m and temperatures from 2.6° to 3.5°C appear to be optimal for this species.

Vahl's eelpout prefers warmer and deeper water than the other two species (Fig. 1C), being prevalent in 201–600 m at temperatures from 2.1° to 4.5°C . This eelpout was seldom caught shallower than 200 m at temperatures lower than 2°C .

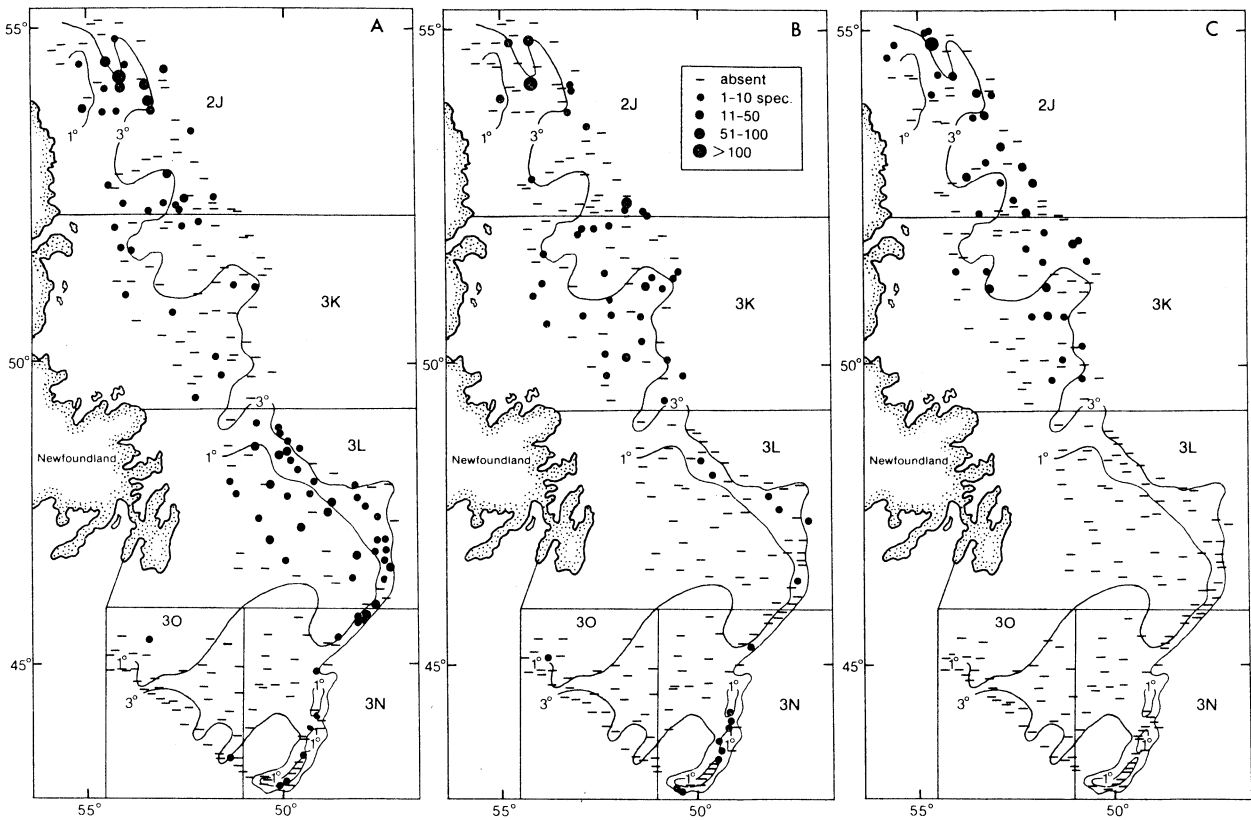


Fig. 2. Geographic distribution of (A) Arctic eelpout, (B) Esmark's eelpout and (C) Vahl's eelpout in relation to 1° and 3°C isotherms in the Labrador-Newfoundland area, 1978.

Geographic distribution

The distributions of the three species of eelpouts in relation to selected thermal features (1° and 3° isotherms) of the survey area in the summer of 1978 are shown in Fig. 2. Although observed in many trawl sets from the southern tip of Grand Bank northward to Hamilton Bank, the Arctic eelpout (Fig. 2A) occurred more frequently on the northeastern Grand Bank (Div. 3L) at temperatures from about 0° to 3°C and on the eastern slope of Hamilton Bank (Div. 2J) at temperatures from 1° to 3°C. Esmark's eelpout occurred more frequently in the northern part of the region (Div. 3K and 2J) than on the Grand Bank (Fig. 2B), being equally prevalent at temperatures less than and greater than 3°C although found in greater quantities at the higher temperatures. Vahl's eelpout, on the other hand, occurred only in the northern part of the surveyed area (Div. 2J and 3K) mainly at temperatures higher than 3°C (Fig. 2C). According to Andriyashev (1954) and Elizarov (1963), Vahl's eelpout is not found in cold polar water but prefers to dwell in warmer, more saline water.

These eelpouts are not abundant enough in the

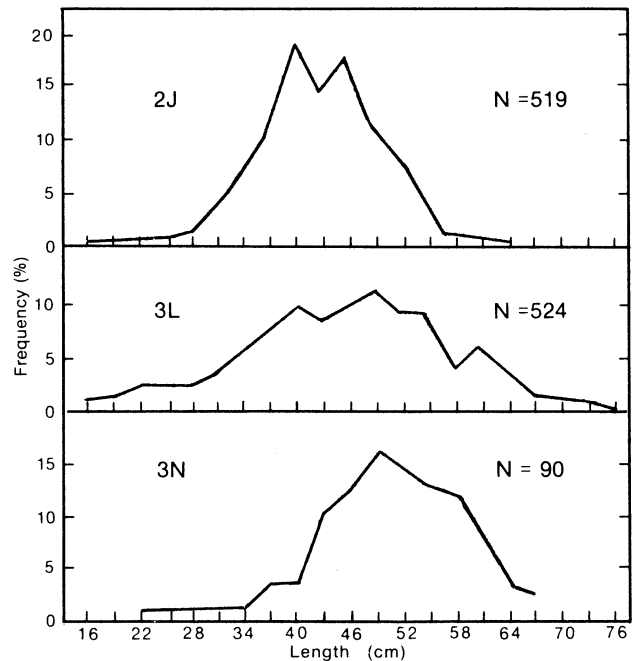


Fig. 3. Length compositions of Arctic eelpout from bottom trawl surveys of the Labrador-Newfoundland area, 1978-80.

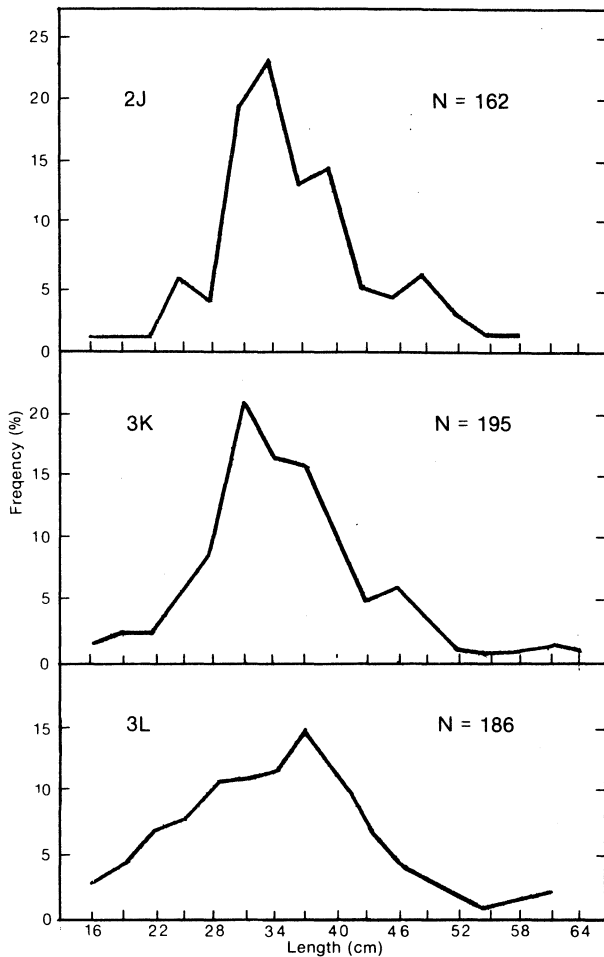


Fig. 4. Length compositions of Esmark's eelpout from bottom trawl surveys of the Labrador-Newfoundland area, 1978-80.

Labrador-Newfoundland area to be exploited commercially, but they occur frequently as by-catch in fisheries for other species. The mean catch per hour trawling of the most numerous Arctic eelpout was 4.5 kg in Div. 2J and 3.4 kg in Div. 3L. The largest individual catch was 85 kg (>100 specimens) in Div. 2J. The largest individual catches of Esmark's and Vahl's eelpouts were 129 and 79 specimens respectively, both in Div. 2J. It is possible that these eelpouts play a limited role as food for cod and other demersal predators. Popova (1962) listed the Arctic eelpout, *L. reticulatus*, as one of the food items of Atlantic cod, *Gadus morhua*, from the northeastern Grand Bank.

Size composition

The length compositions of samples of the three species of eelpouts collected during the surveys in 1978-80 were insufficient to demonstrate interannual or interseasonal variations. The Arctic eelpout apparently grows to a larger maximum size than either Esmark's or Vahl's eelpout, the largest specimens in the samples being 75 cm (Fig. 3). The average lengths

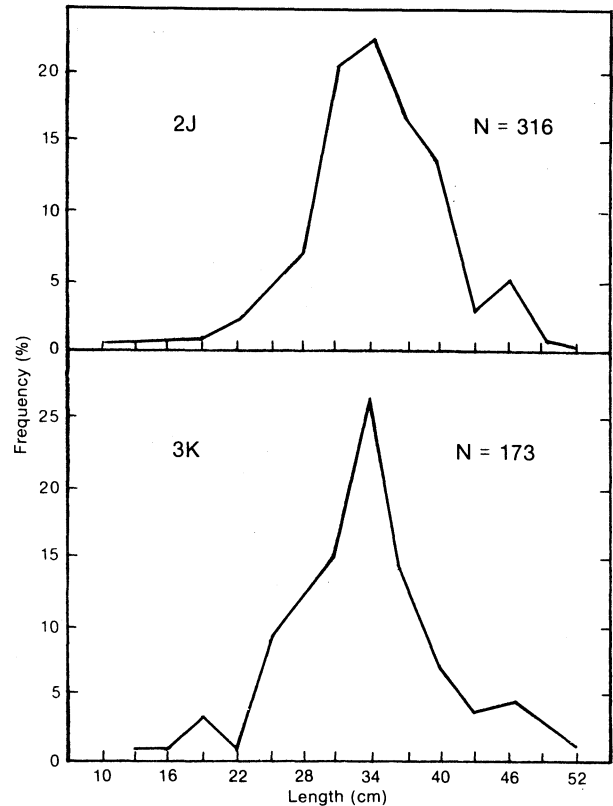


Fig. 5. Length compositions of Vahl's eelpout from bottom trawl surveys of the Labrador-Newfoundland area, 1978-80.

of specimens in collections from Div. 2J, 3L and 3N were 43.0, 45.8 and 50.8 cm respectively, thus exhibiting a definite increase from north to south.

The longest Esmark's eelpout recorded during the surveys was 63 cm, which corresponds to the maximum size (25 inches) noted by Leim and Scott (1966). The average lengths of specimens in samples from Div. 2J, 3K and 3L (35.8, 34.8 and 34.2 cm respectively) did not change significantly by area (Fig. 4).

The longest Vahl's eelpout recorded during the surveys was 51 cm, which is considerably larger than the maximum size (13 inches) noted by Leim and Scott (1966) for specimens from the Gulf of St. Lawrence. However, Jensen (1952) noted that this species may reach a length of 52 cm in Greenland waters. There was little variation in size composition of samples from Div. 2J and 3K (Fig. 5), the average lengths being 34.3 and 33.4 cm respectively.

References

- ANDRIYASHEV, A. P. 1954. Fishes of the northern seas of the USSR. *Tr. Zool. Inst.*, 53: 266-307. (In Russian.)
ELIZAROV, A. A. 1963. On oceanologic conditions determining pro-

- ductivity of main commercial fish in the northwestern part of North Atlantic. *Okeanologiya*, **3**(6). (In Russian.)
- JENSEN, A. S. 1904. The north European and Greenland Lycodinae. *Dan. Ingolf-Exped.*, **2**(4), 99 p.
1952. Recent finds of Lycodinae in Greenland waters. *Medd. Grønland*, **142**(7), 28 p.
- KNIPOVICH, N. M. 1926. Guide for determination of the fishes of the Barents, White and Kara Seas. *Trudy Nauchno-issledovatel'skogo instituta po izycheniyu Severa, Moscow*, No. 27, p. 101-112.
- KONSTANTINOV, K. G. MS 1981. Methods and results of the total trawl survey of bottom fish in Subarea 3 in 1971-1980. *NAFO SCR Doc.*, No. 73, Serial No. N358.
- LEIM, A. H., and W. B. SCOTT. 1966. Fishes of the Atlantic coast of Canada. *Bull. Fish. Res. Bd. Canada*, **155**, 485 p.
- LÜTKEN, Ch. 1898. Det ichthyologiske udbytte. *Dan. Ingolf-Exped.*, **1**: 19-22.
- POPOVA, O. A. 1962. Some data on the feeding of cod in the Newfoundland area of the Northwest Atlantic. In *Soviet Fisheries Investigations in the Northwest Atlantic*, Yu. Yu. Marti (ed.), Rybnoe Khozyaistvo, Moskva, 378 p. (In Russian.)
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