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Capelin in SA 2 and Div. 3K

by

J. Carscadden, B. Nakashima, R. Harnum, and G. Lilly  
Science Branch  
Department of Fisheries and Oceans  
P. O. Box 5667  
St. John's, Newfoundland A1C 5X1

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### Abstract

Preliminary estimates of catch in the inshore and offshore areas of SA2 + Div. 3K were 27,000 t and 23,000 t, respectively. During 1988 and 1989, certain areas were closed to the offshore USSR trawlers until October 31. Fishing occurred north of this area in both years but in 1988 the trawlers remained north of the area even after it was opened for fishing. However in 1989, the trawlers moved southward into the area after November 1.

As in previous years, the offshore catch rate estimates were somewhat higher than the NAFO series and the pattern in recent years has been different. The 1989 catch rate estimate from observers were slightly lower than the 1988 estimate. Beginning in 1987, the observers have observed over 80% of the reported catch.

In the inshore fishery, the 1989 purse seine catch rate was lower than 1988 whereas the trap catch rate was approximately the same as 1988. These estimates were derived from logbooks compiled by the fishermen and use total catch (including discards) rather than landings.

From logbook reports in 1989, redfeed and low percentage of females were the main reasons for discarding by purse seiners. Trap fishermen reported that low percentages of females was the main reason for discarding. Discarding from both purse seines and traps was higher in 1989 than in 1988.

The inshore catch was dominated by the 1986 (69%) and the 1985 (27%) year-classes. The offshore catch was dominated by the 1986 year-class (54%) followed by the 1987 year-class (41%).

Incidental catches of capelin during the groundfish survey conducted after the Canadian acoustic survey indicated capelin were broadly distributed. Catches were small but capelin were recorded in 49% of the sets, a higher proportion than in any previous year.

## Résumé

Les estimations préliminaires des prises des pêches côtière et hauturière dans les zones SA2 + division 3K s'établissent à 27 000 t et 23 000 t respectivement. En 1988 et 1989, certaines zones ont été fermées aux chalutiers de pêche hauturière soviétiques jusqu'au 31 octobre. Les chalutiers en question ont donc pêché au nord de ces zones durant les deux années indiquées. En 1988, ils sont même restés au nord après l'ouverture des zones en question, tandis qu'en 1989, ils sont rentrés dans ces zones après le 1<sup>er</sup> novembre.

Comme dans les années antérieures, les estimations des prises de la pêche hauturière ont été quelque peu supérieures aux chiffres enregistrés par l'OPANO; les tendances des dernières années ont été différentes. Les estimations de taux de prises établies par les observateurs en 1989 étaient légèrement plus basses que celles de 1988. Depuis 1987, les observations ont porté sur plus de 80 % des prises déclarées.

Dans la pêche côtière, les taux de prises à la senne coulissante de 1989 a été inférieur à celui de 1988, le taux de prises au parc en filet restant sensiblement le même. Ces estimations des taux de prises ont été établies d'après les journaux de bord remplis par les pêcheurs. Elles sont donc fondées sur les prises totales (y compris les rejets) plutôt que sur les débarquements.

D'après les journaux de bord de 1989, les causes principales des rejets ont été le redfeed et le faible pourcentage de femelles. Les pêcheurs au parc en filet ont indiqué que le faible pourcentage de femelles était à l'origine de la plupart de leurs rejets. En 1989, les rejets ont été supérieurs à ceux de 1988 et cela tant dans la pêche à la senne coulissante que dans la pêche au parc en filet.

Ce sont les classes d'âges de 1986 (69 %) et de 1985 (27 %) qui ont dominé les prises de la pêche côtière. Dans la pêche hauturière, la classe d'âge de 1986 (54 %) était prépondérante, suivie de la classe de 1987 (41 %).

Les prises accidentelles de capelan durant l'étude sur le poisson de fond réalisée après l'étude acoustique canadienne ont révélé que le capelan était distribué sur une vaste surface. Bien qu'en petites quantités, le capelan était présent dans 49 % des filets mis à l'eau, proportion supérieure à celle de l'année précédente.

## Introduction

The capelin fishery in NAFO Subarea 2 and Div. 3K was, until 1972, limited to inshore catches during the spawning season. In 1972, substantial catches were taken offshore by vessels from several countries, and these peaked in 1976 at 212,000 t before declining during the late 1970's to 11,000 t in 1979. Since then, 1980-89, the USSR has conducted the only directed fishery offshore. Throughout its history, the offshore fishery has generally been conducted during August-December with peak catches occurring in September-November. During 1979-82 and again in 1985 and 1988, the catches were taken in Div. 2J only, but in other areas catches have also been made in Div. 3K.

In recent years, an inshore directed roe fishery during June and July has developed, primarily in Div. 3K.

The offshore fishery first came under quota regulation in 1974 and the inshore fishery in 1982. Catches and TAC's ('000 t) since 1979 are shown below:

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>Offshore</b>											
TAC	75	5	10	10	10	17	17	17	31	17	20
Nominal catch	11	5	10	10	10	17	17	17	30*	17*	23*
<b>Inshore</b>											
TAC	-	-	-	3	11	8	8	19	9	21.5	24.1
Nominal catch	1	1	2	4	4	7	7	12	11*	26*	27*

\* preliminary statistics

This paper contains information from both the inshore and offshore fisheries for capelin in Div. 2J and 3K during 1989. For the offshore fishery data are available pertaining to distribution of the fishery, age-composition of the catches and catch rates. In the case of the inshore fishery, data on age-composition and catch-rates by gear-type are presented. Results on by-catches of capelin during autumn bottom-trawl surveys are also reported in this paper.

## Results and Discussion

## Offshore Capelin Fishery in 1989

The allocation to the USSR fleet in 1989 was 20,000 t. Preliminary catch figures indicate a total catch of 22,725 t of which 96% was taken in Div. 2J during September-November and the remainder in Div. 3K, mostly in November-December (Table 1). The occurrence of larger catches in Div. 2J

earlier in the season is similar to some earlier years in the 1980's, for example, 1983, 1984, 1986 and 1987 (Fig. 1). However, it is somewhat different from the pattern observed in 1988; in both 1988 and 1989 there were areas closed to fishing because of complaints of gear conflicts with Canadian fishermen. The areas designated A & B (Fig. 2) were closed to all USSR trawlers between August 1 and October 31, with the exception that area B would be open to four USSR trawlers between September 1 and October 31. All areas were open to USSR trawlers during November and December. These closures were first placed in effect in 1988 and in that year, fishing occurred almost exclusively north of the designated areas. The distribution of sets throughout Div. 2J in 1989 is more reminiscent of earlier years while the distribution in 1988 may have been a result of the new area closure regulations.

#### Offshore Catch Rates

As in past years, catch rates are available from two sources, NAFO statistics and a combination of USSR/observers. The NAFO data (Table 2) are available only up to 1988. The second series (Table 2) is a combination of USSR estimates (Seliverstov and Serebrov 1979) for 1971-78 and observers (Foreign Cooperative Research Section, D. Kulka, pers. comm.) Monthly catch rate estimates from observers are given in Table 3.

With the addition of the 1988 NAFO data, the discrepancy between the catch rate series continues (Fig. 3). In theory, there should be no difference in the trends between the FCR series and the NAFO series since the FCR series is essentially a subset of the NAFO series. The observers have usually observed a significant portion of the catch, especially in recent years when efforts have been made to place an observer on each vessel (Table 4).

#### Age-compositions from the Offshore Fishery

Age-compositions from the offshore fishery are given in Table 5. A relatively high contribution of three-year-olds is usually indicative of a strong year-class (compare to the years 1976 and 1986 for 1973 and 1983 year-classes respectively). Thus, the pattern in 1989 indicates that the 1986 year-class is probably stronger than average while the 1987 may be weaker than the 1986 year-class.

#### Canadian Bottom-trawl Surveys

By-catches of capelin during autumn bottom-trawl surveys in NAFO Div. 2J3K have been compared with geographic coverage by Canadian acoustic surveys for capelin to help determine whether coverage by the acoustic surveys has been adequate (Carscadden et al. 1989). Such comparisons must be treated with caution because in each year the bottom-trawl survey requires about 6 weeks and does not start until the acoustic survey is completed. Thus, for any point in space, the duration between coverage by the two surveys could range from one week to two months. It is possible that the capelin move during this period, with the most likely movement being toward the south and east (Carscadden et al. 1988).

The Canadian bottom-trawl survey in 1989 was conducted from November 2 to December 19, with a median date of fishing of November 26. The completion date was 6 days later than in any previous year. For the first time in this survey

series, a 2-phase survey design was adopted. In the first phase, sets were allocated on a stratified-random basis as in previous years. In the second phase, additional sets were allocated to strata where variation in cod catch was high during the first phase. These additional sets were added on eastern Hamilton Bank and northwestern Belle Isle Bank in Div. 2J (N = 20) and on northern Funk Island Bank in Div. 3K (N = 28).

Capelin were recorded from 49% of the sets, a higher proportion than in any previous year (Table 6). Catches tended to be small (95th percentile = 2 kg; maximum = 32 kg) (Table 6). The capelin were broadly distributed (Fig. 4). Some were caught in those areas where high density was recorded during the acoustic survey (northwestern Hamilton Bank and west of Hawke Saddle), but the catches in these areas were not unusually large. Small catches were taken outside the blocks of the acoustic survey, notably in Hawke Saddle and in the extreme northwest and southeast of the survey area.

#### Inshore Capelin Fishery in 1989

Provisional landings of capelin during the inshore fishery in 1989 were 26,976 t, one of the highest in the series (Table 7). The fishery is prosecuted by purse seines, capelin traps, and beach seines.

The inshore commercial fishery has been regulated by quota management since 1982. Quota allocations by area and gear type are provided in Appendix A. In 1989 the quota for the SA2+3K stock was subdivided into four areas: Notre Dame Bay, White Bay, N. White Bay, and Labrador (Fig. 5).

The inshore fishery opened on June 7. The purse seine fisheries closed on June 26 in Notre Dame Bay and on June 28 in White Bay. The fixed gear fisheries closed later on July 1 in Notre Dame Bay and on July 2 in White Bay.

#### Age Composition of the Inshore Catch

Commercial samples were collected by fishermen and at fish plants by reliable collectors at a rate of two random samples of 200 fish per gear type per week per statistical section in Div. 3K (Fig. 5).

In 1989, 78 samples were collected from the commercial catch. From each sample, length, sex, and maturity stage were measured for 200 fish and a stratified sample of 2 otolith pairs per sex per 1/2 cm length was taken for ageing. Seventeen purse seine, 21 beach seine, and 40 capelin trap samples were collected and 3074 otolith pairs were aged from the fishery (Table 8).

The largest proportion of the 1989 inshore catch in numbers of fish was the 1986 year-class as three-year-olds at 69.4% (Table 9). The 1985 year-class as four-year-olds made up 27.3% of the catch. The remaining year classes in the catch were relatively weak accounting for 3.3% of the total. The strong 1983 year-class was evident as six-year-old females.

Age compositions in Table 9 have been revised using the most recent catch statistics available as of February 1990 for all years since 1982.

### Mean Lengths-at-Age of the Inshore Catch

The mean total lengths-at-age for male and female capelin in the commercial inshore catch are given in Table 10.

### Research Logbook Survey

In 1989 redfeed levels (51%) and low percentage of females (38%) were the major reasons for catches being discarded by purse seiners (Table 11). Miscellaneous reasons included a mixed set with herring, mechanical problems, and excess catch reported in purse seine logbooks. Clearly, the dominant reason reported by trap fishermen for discarding fish was a low percentage of females in the catch (66%) (Table 12). Inability to sell the catch primarily due to boat quotas (18%) and sorting males from the catch (12%) were less important. Discarding because of redfeed problems (3%) was not significant for traps in 1989.

Discarding from purse seines and traps was higher in 1989 than in 1988. If we express reported discards as a percentage of logbook landings, then discarding was 28% of purse seine landings (Table 13) and 76% of trap landings (Table 14). The discard totals incorporate 5t for traps and 38t for purse seines which were given to other fishermen. They are not used to estimate the percentages in Tables 11 and 12. Based on research logbook data when fishermen reported the condition of their discards, 84% of trap and 93% of purse seine discards were released live at sea. For the analyses provided in Tables 11, 12, 13, and 14 discards are defined as all capelin not landed by the fisherman who caught them which includes both live and dead capelin.

Fishing effort was estimated from research logbook records collected from purse seine and trap fishermen. Fishing days for purse seines were defined as those days when the vessel was searching for capelin schools. Similarly fishing days for traps included all days when the trap was fishing. In 1989 we received logbooks from 21 trap fishermen who fished one trap and 7 fishermen who fished two traps per crew. Of these 7, 6 fishermen maintained separate records for each trap fished and one combined the effort data for his traps. To estimate his effort we used an effort adjustment factor derived from the records of the 6 fishermen who fished two traps in 1989. To estimate fishing days, the reported fishing days were doubled and multiplied by 0.78 and to estimate the number of hauls, the reported hauls were doubled and multiplied by 0.76. This assumes that all 7 fishermen who fished two traps and completed logbooks fished in a similar manner in 1989.

Catch/effort (CUPE) data were available since 1981 for purse seines and since 1983 for capelin traps. CUPE estimates from the purse seine fishery were lower than in 1988 (Table 14). Using catch per day (C/D) the 1989 value of 16.7 t was less than 18.5 and 18.0 CUPE's observed in 1988 and 1986, respectively. The catch per set (C/S) of 9.9 t in 1989 was the same as the series mean of 9.7 t (n=9). For traps, the CUPE estimates in 1989 were lower than in 1988 using landings but were the same in both years using total catch (Table 14).

Effort in the purse seiner fleet was lower in 1989 than in 1988 but was similar in the trap fishery. Each purse seine vessel averaged 5.0 fishing days and made 8.5 sets (Table 13), however a considerable number of purse seiners

fished in both the Div. 3L and Div. 3K. Consequently the effort reported here represents only the time spent in Div. 3K. Capelin traps averaged 11.7 days and were hauled 20.9 times in 1989 (Table 14) which were comparable to the values reported during the 1988 inshore fishery (Nakashima and Harnum 1989: 12.9 days, 21.2 hauls).

If we consider CPUE as an index of inshore abundance and assume that total catch is more acceptable than landings then the purse seine CUPE's suggest that abundance was lower in 1989 than in 1988, whereas trap CUPE's indicate that abundance was similar in both years.

#### Conclusions

There is nothing in the data in this paper to signal either a dramatic decrease or increase in the population of capelin in Div. 2J3K. The assumption that trends in offshore catch rates are indicative of stock status has been questioned in the past (Carscadden et al. 1985) but to date, this question has not been resolved. Nevertheless, offshore catch rates remain relatively high especially when compared to catch rates experienced during the late 1970's and early 1980's. Inshore catch rates in 1989 remained the same (trap nets) as in 1988 or declined slightly (purse seines). Results of bycatches of capelin taken during the groundfish survey indicated capelin were widely distributed throughout the survey area.

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Table 1. Preliminary capelin catches in Div. 2+3K for USSR (1989) by division, by month.

Month	Div. 2J	Div. 3K
	Catch (t)	Catch (t)
September	6,452.7	6.7
October	13,342.3	
November	2,019.8	562.5
December		341.2
TOTAL	21,814.8	910.4

Table 2. Commercial catch rate series for Div. 2J3K capelin, 1972-98.

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
USSR/FCR (t/hr)	2.81	3.29	4.56	6.47	5.27	4.14	2.29	1.34	4.57	3.68	3.19	5.31	4.24	6.96	6.05	7.70	5.97	6.12
TC7 (t/hr)	2.65	2.75	3.62	4.51	3.62	4.00	2.34	1.35	4.92	3.72	3.36	4.51	3.86	4.16	4.38	4.71	4.47	

Table 3. Monthly catch rates (t/hr) of tonnage class 7, USSR trawlers from observer data.

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<u>Div. 2J</u>											
Aug.				2.42					8.46		
Sept.	0.98	5.26	2.26	3.26	3.34	6.73	5.09	4.83	8.04	4.81	4.51
Oct.	1.58	4.25	4.20	2.81	7.41	7.43	7.50	6.72	7.67	6.43	8.02
Nov.	0.96		4.38	12.16	6.16	3.22	6.67	9.02	9.38	6.28	5.95
Dec.	1.20				7.96						
<u>Div. 3K</u>											
Aug.											
Sept.											
Oct.								7.43			
Nov.	0.26					3.14		6.08	7.56		6.96
Dec.						2.96		5.90	2.92		1.91

Table 4. Number of samples by month, proportion of catch observed by FRC personnel, and monthly catch for commercial USSR fishery in Div. 2J3K.

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<u>Div. 2J</u>											
Aug.	0/0/645			4/25/1286	0/0/253	0/0/481	0/0/333	12/49/3352	4/208/236		
Sept.	14/12/1616	12/100/1547	9/50/1947	16/55/4435	11/56/2326	10/49/3948	2/17/2763	18/46/6885	17/83/10908	10/102/361	22/90/6453
Oct.	37/38/5676	17/92/3248	29/67/6793	7/21/3357	11/48/3898	6/22/7366	12/42/8129		32/70/14117	32/81/11982	27/85/13342
Nov.	10/67/1155		3/43/1117	3/50/599	6/47/1731	17/66/3385	10/29/5341		5/79/3246	11/82/1665	10/91/2020
Dec.	1/49/265		0/0/292		2/23/1561		0/0/272				
<u>Div. 3K</u>											
Aug.	0/0/56								0/0/41		
Sept.	0/0/43										0/0/7
Oct.	0/0/85				0/0/55			4/42/1027	0/0/11		
Nov.	0/100/5					3/100/0*		12/43/4764	2/81/1851		0/94/563
Dec.					0/0/573	9/53/2186		1/21/729	0/70/721		4/83/341

\* no catch in NAFO stats but 570.5 t observed

Table 5. Commercial age compositions for Div. 2J3K, 1972-89.

Age	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.1	0.0	0.5	0.1	3.8	2.5	1.0	8.6	1.8	3.6	9.6	0.1	0.3	0.6	0.8	0.3
2	11.8	25.1	20.2	61.8	8.8	3.0	16.6	78.3	45.1	67.4	77.3	40.5	61.9	66.7	21.1	44.1	72.0	40.5
3	64.0	30.0	48.9	27.7	82.9	29.9	31.1	10.6	40.4	16.1	19.1	48.2	18.2	28.7	69.3	19.5	18.7	54.2
4	21.0	40.0	17.6	8.2	6.8	60.0	42.3	2.4	10.8	4.0	1.5	7.3	9.1	2.8	8.3	32.2	2.3	4.3
5	2.8	5.0	12.2	1.8	0.9	6.2	5.9	3.2	1.6	3.6	0.4	0.5	1.2	1.5	0.7	3.5	5.6	0.3
6	0.4	0.3	1.0	0.5	0.2	0.9	0.3	3.0	1.1	0.2	0.1	0.1	0.0	0.1	0.3	0.1	0.5	0.4

Table 6. Statistics for by-catches of capelin during bottom-trawl surveys in NAFO Div. 2J3K during the autumns of 1978 to 1989.

Year	GADUS ATLANTICA trip number	Number <sup>a</sup> of sets	Sets with capelin		Percentiles of capelin catches (kg) <sup>b</sup>			
			No.	%	50	75	95	Max.
1978	15	125	2	2	0.03			<<1
1979	29	124	42	34	0.09	0.3	9	185
1980	44	134	25	19	0.50	1.8	149	172
1981	58,59	214	53	25	0.30	1.0	24	345
1982	71,72	291	97	33	0.20	0.5	3	18
1983	86-88	248	58	23	0.10	0.3	2	24
1984	101-103	251	67	27	0.15	0.4	2	3
1985	116-118	297	127	43	0.12	0.4	3	10
1986	131-133	210	50	24	0.18	0.8	12	24
1987	145-147	276	94	34	0.20	1.0	18	117
1988	159-161	233 <sup>d</sup>	84	36 <sup>c</sup>	0.15	0.8	3	39
1989	174-176	273 <sup>d</sup>	134	49	0.12	0.3	2	32

<sup>a</sup> Sets in depths >750 m are not included. Sets in strata 618 and 619 on the coastal shelf off northern Newfoundland are included. These strata were not fished prior to 1984.

<sup>b</sup> Percentiles are calculated for those sets in which capelin were recorded in the catch.

<sup>c</sup> A frequency of occurrence of 50% reported for 1988 by Carscadden et al. (1989) was in error.

<sup>d</sup> Only sets from first-stage sampling are included.

Table 7. Inshore capelin landings (t) by gear, 1977-89.

Year	NAFO Div.	Purse seine	Ring net	Beach seine	Trap	Total
1977	2J	-	-	-	-	-
	3K	-	-	1891	24	1915
	2+3K	-	-	1891	24	1915
1978	2J	-	-	-	-	-
	3K	-	25	1948	447	2420
	2+3K	-	25	1948	447	2420
1979	2J	-	-	-	-	-
	3K	-	168	461	42	671
	2+3K	-	168	461	42	671
1980	2J	-	-	-	-	-
	3K	-	560	655	139	1354
	2+3K	-	560	655	139	1354
1981	2J	-	-	-	-	-
	3K	-	1000	520	283	1803
	2+3K	-	1000	520	283	1803
1982	2J	-	4	4	-	8
	3K	-	1935	1544	381	3760
	2+3K	-	1939	1548	381	3768
1983	2J	-	-	4	-	4
	3K	2359	-	1062	344	3765
	2+3K	2359	-	1066	344	3769
1984	2J	-	-	1	-	1
	3K	3661	-	2338	1119	7118
	2+3K	3661	-	2339	1119	7119
1985	2J	-	-	1	-	1
	3K	3948	-	835	2584	7367
	2+3K	3948	-	836	2584	7368
1986	2J	-	-	3	-	3
	3K	4222	-	2534	5143	11889
	2+3K	4222	-	2537	5143	11892
1987*	2J	-	-	4	-	4
	3K	3038	-	2141	5625	10804
	2+3K	3038	-	2145	5625	10808
1988*	2J	-	-	2	-	2
	3K	9767	-	3725	13353	26845
	2+3K	9767	-	3725	13353	26847
1989*	2J	-	-	3	100	103
	3K	6059	-	3281	17513	26853
	2+3K	6059	-	3284	17613	26956

\* provisional

Table 8. Summary of the commercial samples collected and aged from the 1989 inshore capelin fishery in Div. 3K.

Gear type	No. of LSM/strat samples	No. otoliths aged (N)	Mean no. otoliths $\pm$ SD per sample
Purse seine	17	677	39.8 $\pm$ 2.4
Beach seine	21	803	38.2 $\pm$ 6.6
Capelin trap	40	1594	39.9 $\pm$ 5.0
TOTAL	78	3074	



Table 9. Age-compositions (%) of capelin from the inshore commercial capelin fishery, Div. 3K, 1982-89.

	Age				
	2	3	4	5	6
<b>Males</b>					
1982	1.2	92.3	6.3	0.1	0.1
1983	0	47.5	52.5	0	0
1984	0	30.7	68.2	1.1	0
1985	0.6	61.7	34.7	3.0	0
1986	0	59.1	40.4	0.5	0
1987	0	8.7	89.9	1.4	0
1988	0.6	65.8	29.9	3.7	0
1989	+	72.2	27.5	0.3	+
<b>Females</b>					
1982	0.2	80.0	9.9	7.8	2.1
1983	0	38.0	58.8	3.2	0
1984	1.5	38.0	54.1	6.2	0.3
1985	0.8	55.5	27.1	16.0	0.5
1986	0	62.6	32.1	3.9	1.3
1987	0.2	12.5	76.3	10.4	0.6
1988	3.4	54.3	13.6	27.0	1.7
1989	0.7	66.6	27.1	2.4	3.2
<b>Sexes combined</b>					
1982	1.0	85.0	8.3	4.5	1.3
1983	0	43.3	55.0	1.4	0
1984	0.6	33.4	62.6	3.1	0.1
1985	1.5	57.2	29.5	11.5	0.4
1986	0	61.0	35.8	2.4	0.7
1987	0.1	10.8	82.5	6.3	0.3
1988	1.9	59.5	20.8	16.9	1.0
1989	0.4	69.4	27.3	1.3	1.6

Table 10. Mean total lengths-at-age (mm) of capelin from the inshore commercial fishery, Div. 3K, 1982-89.

	Age				
	2	3	4	5	6
<b><u>Males</u></b>					
1982	117	189	195	210	203
1983	-	185	195	-	-
1984	153	183	190	200	-
1985	164	181	193	194	-
1986	143	182	190	192	-
1987	163	188	195	197	-
1988	166	187	199	201	-
1989	147	186	196	191	203
<b><u>Females</u></b>					
1982	134	166	181	188	194
1983	-	170	178	190	-
1984	145	162	173	178	189
1985	144	162	176	183	191
1986	133	161	173	184	190
1987	148	169	178	185	192
1988	148	166	182	188	195
1989	142	161	179	192	195

Table 11. Reasons (expressed as % by weight) reported in logbooks for discarding capelin in purse seines in Div. 3K, 1981-89. This analysis excludes capelin given away to other fishermen.

Year	Low % females	Redfeed	Not mature enough	Small females	Females spawned out	No market	Over ripe	Misc.	Unknown
1981	90	6	4	0	0	0	0	0	0
1982	32	52	0	10	6	0	0	0	0
1983	5	48	0	4	0	42	0	0	1
1984	81	4	0	2	8	3	2	0	0
1985	6	52	0	0	5	2	0	33	3
1986	31	36	0	0	4	3	0	26	0
1987	6	78	0	0	0	0	0	10	6
1988	20	39	0	7	0	9	0	20	5
1989	38	51	0	4	0	0	0	6	1

Table 12. Reasons (expressed as % by weight) reported in logbooks for discarding capelin from capelin traps in Div. 3K in 1983-89. This analysis excludes capelin given away to other fishermen.

Year	Redfeed	Females over ripe	No market	Low % females	Males picked out	Females spawned out	Misc.	Unknown
1983	81	0	0	4	1	15	0	0
1984	1	0	17	51	19	4	8	0
1985	19	0	27	28	19	+	2	4
1986	10	16	27	30	7	3	6	0
1987	27	0	37	11	5	0	14	6
1988	19	0	50	14	14	0	2	1
1989	3	0	18	66	12	0	1	0

Table 13. Capelin landings (t), discards (t), and catch/effort for purse seines in Div. 3K, 1981-89.

Year	No. fishermen	Landings		Discards logbook	No. days fished (D)	No. sets made (S)	L = Landings		C = Landings + discards	
		Statistics	Logbook				L/D	L/S	C/D	C/S
1981	10	533.9	725.0	92.9	89	118	8.2	6.1	9.2	6.9
1982	8	713.1	849.9	188.0	67	109	12.7	7.8	15.5	9.5
1983	14	808.2	1097.0	253.2	113	161	9.7	6.8	12.0	8.4
1984	10	854.1	928.0	297.1	87	127	10.7	7.3	14.1	9.7
1985	9	766.1	1067.2	551.5	98	129	10.9	8.3	16.5	12.6
1986	8		1053.9	310.0	76	110	13.9	9.6	18.0	12.4
1987	6		253.2	219.7	31	61	8.2	4.2	15.3	7.8
1988	16		2300.3	407.8	146	257	15.8	9.0	18.5	10.5
1989	28		1840.4	510.3	141	238	13.1	7.7	16.7	9.9

Table 14. Capelin landings (t), discards (t), and catch/effort for capelin traps in Div. 3K, 1983-89.

Year	No. fishermen	No. traps	Landings		Discards logbook	Bycatch		No. days fished (D)	No. times hauled (H)	L = Landings		C = Landings + discards	
			Statistics	Logbook		Cod	Herring			L/D	L/H	C/D	C/H
1983	3	3	87.3	85.8	51.3	6.0	24.9	41	48	2.1	1.8	3.3	2.9
1984	6	6	156.0	217.0	111.3	2.6	0.1	80	101	2.7	2.1	4.1	3.3
1985	9	9	172.6	212.0	209.9	2.8	0	132	123	1.6	1.7	3.2	3.4
1986	14	14		757.6	575.9	3.4	+	229	278	3.3	2.7	5.8	4.8
1987	13	15		355.8	378.4	0.1	0	70	125	5.1	2.8	10.5	5.9
1988	18	20		992.0	532.5	1.5	0	258	423	3.8	2.3	5.9	3.6
1989	28	35		1360.7	1038.1	4.9	0	411	732	3.3	1.9	5.8	3.3

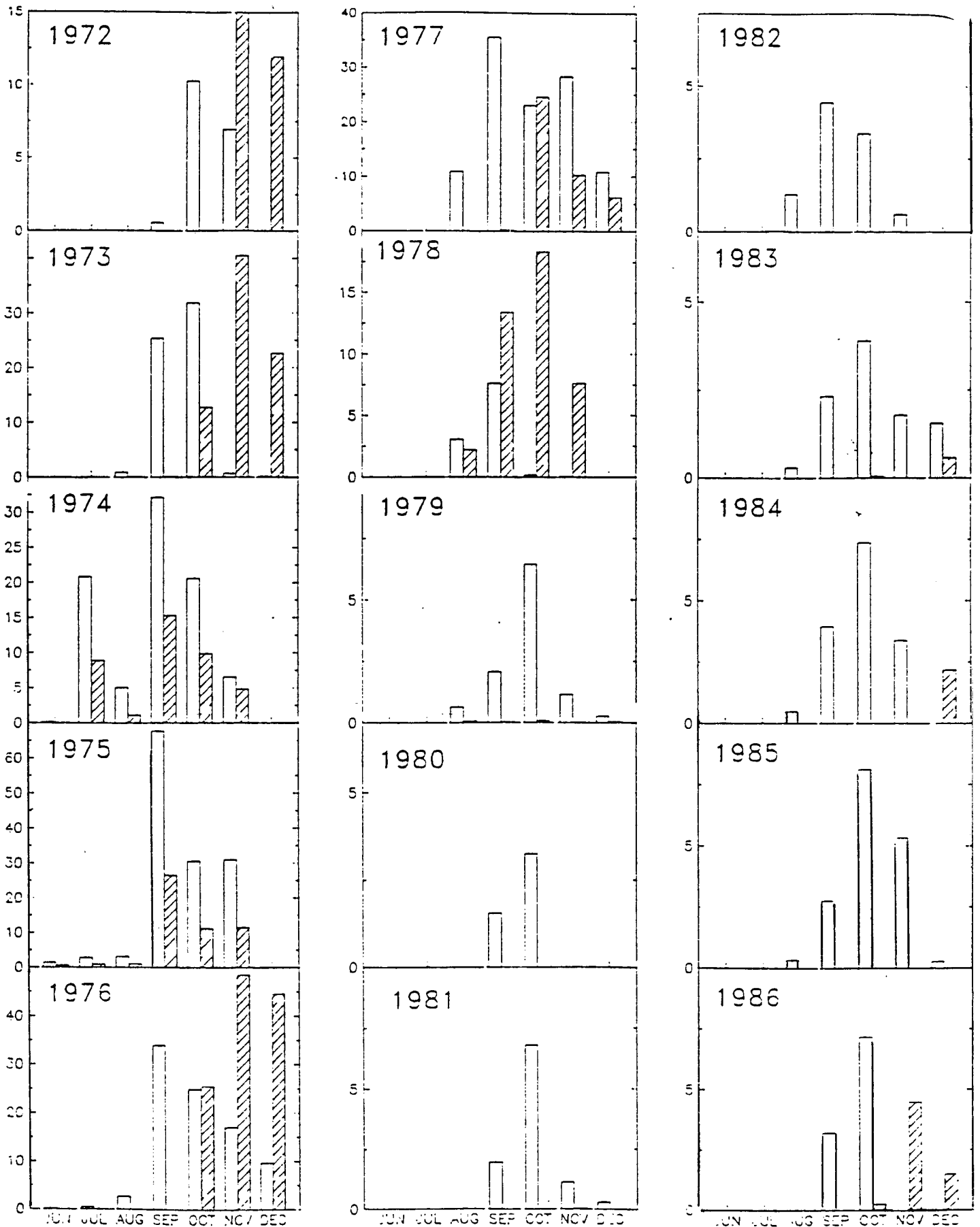


Figure 1a. Commercial fishery catches (1000's of tons)

(Open bars - Division 2J, Hatched bars - Division 3K)

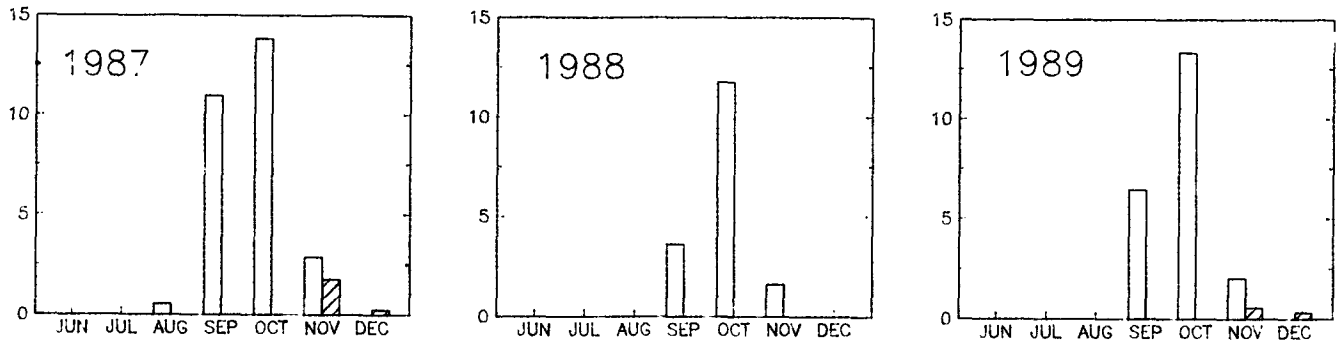


Figure 1b. Commercial fishery catches (1000's of tons)  
(Open bars - Division 2J, closed bars - Division 3K)



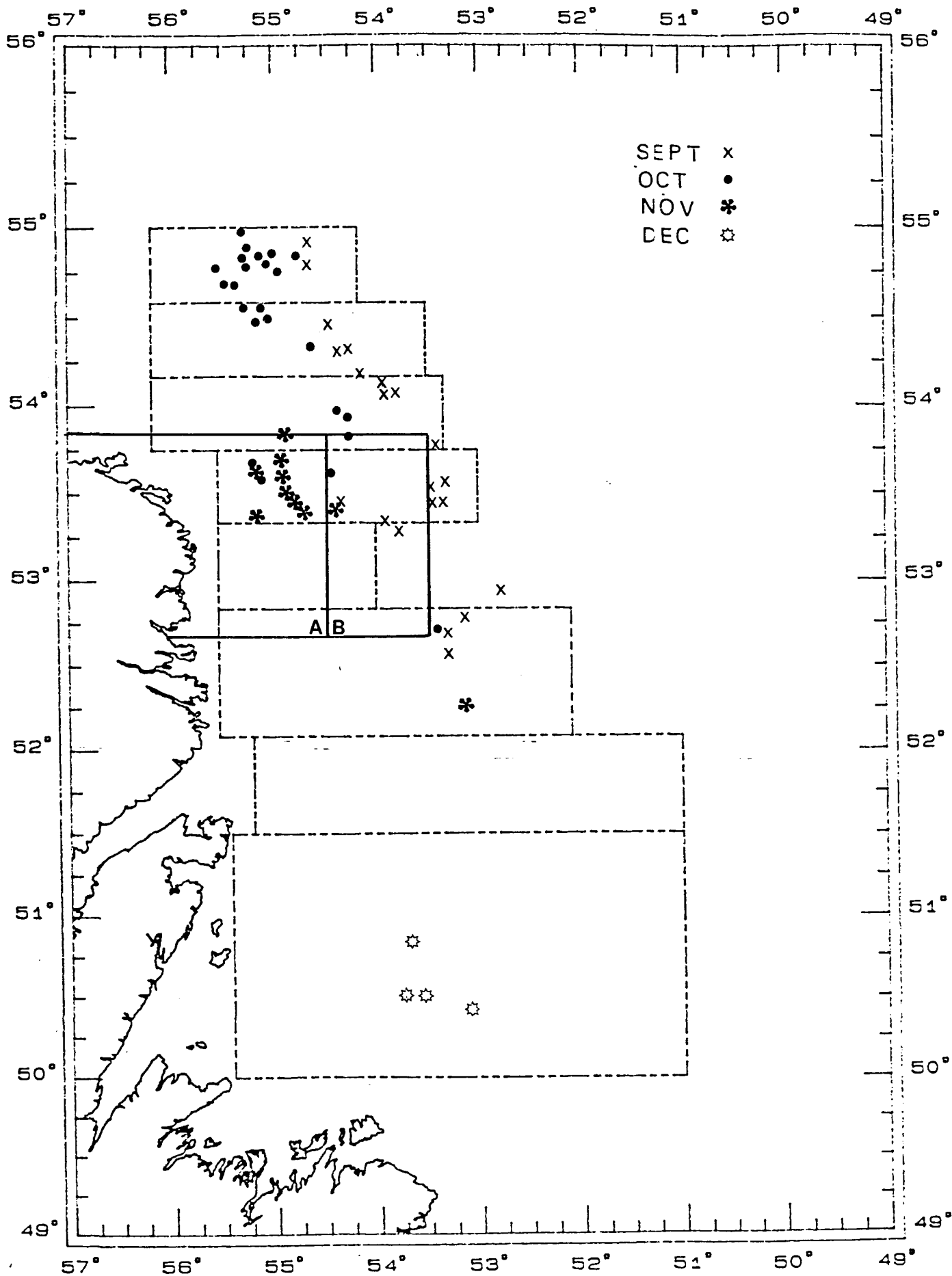


Fig. 2. Distribution of monthly samples from USSR capelin fishery 1989. Dotted lines are limits of Canadian acoustic survey and solid lines are limits of closed areas A and B.

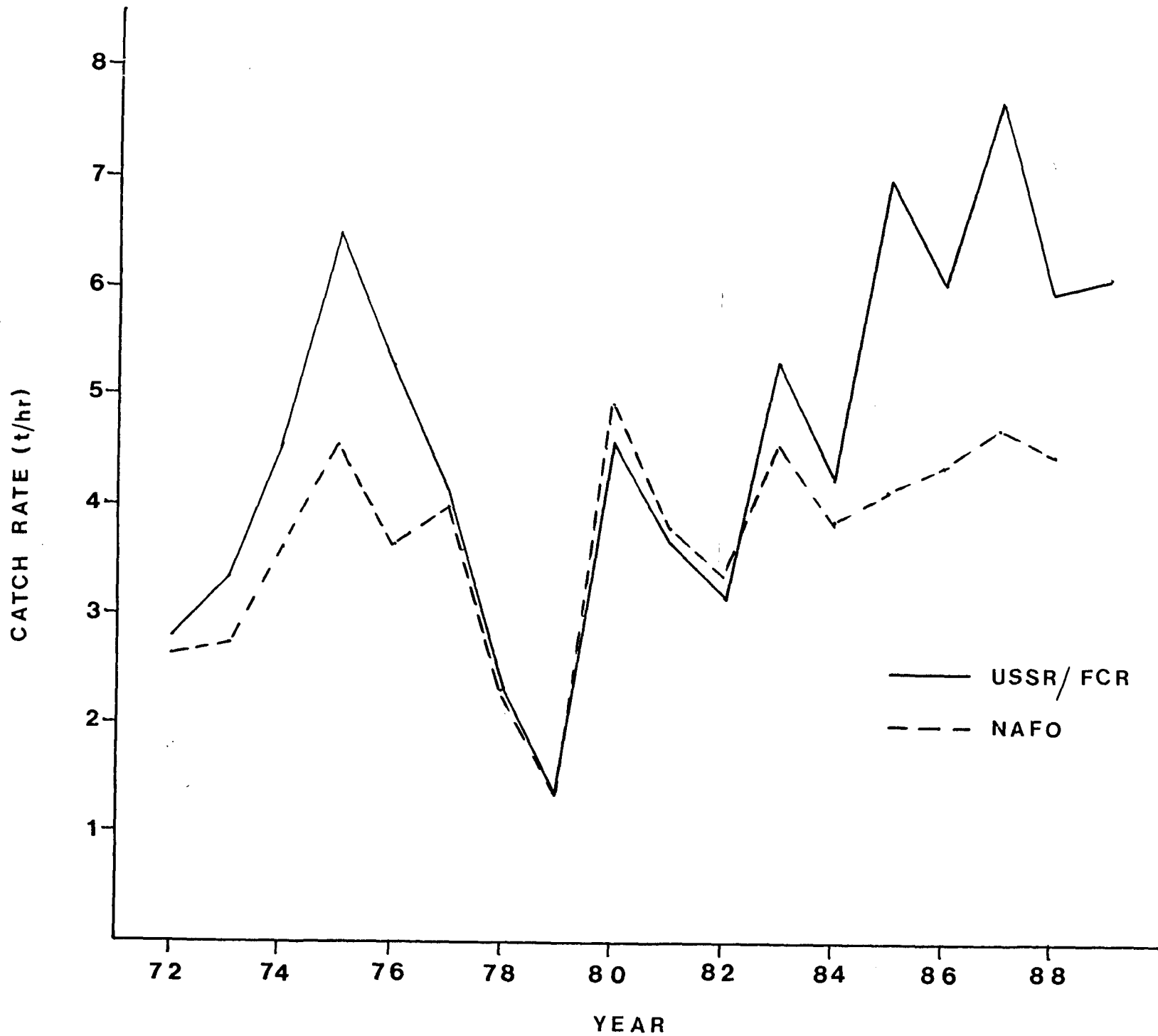


Fig. 3. Capelin catch rates by midwater trawlers, NAFO Div. 2J3K.

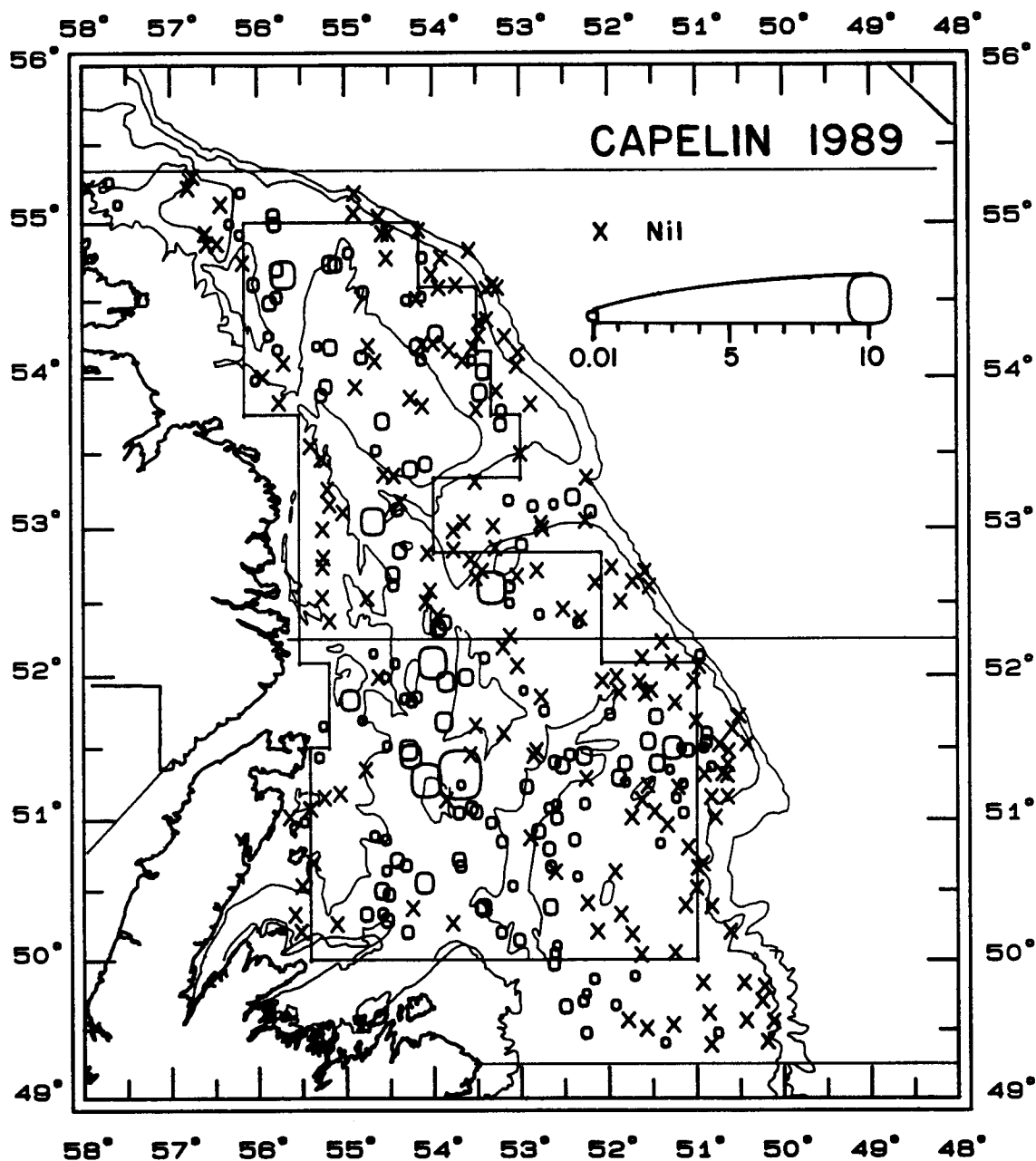


Fig. 4. Distribution of capelin catches (kg/30 min tow) during a random depth-stratified bottom-trawl survey in Division 2J3K, November 2 to December 19, 1989 (GADUS ATLANTICA trips 174-176). Catches from both phase 1 and phase 2 of the survey are shown. Symbol area is proportional to catch. Catches were set to a maximum of 10 kg before plotting. Also shown is the boundary of the Canadian acoustic survey (GADUS ATLANTICA trip 171).

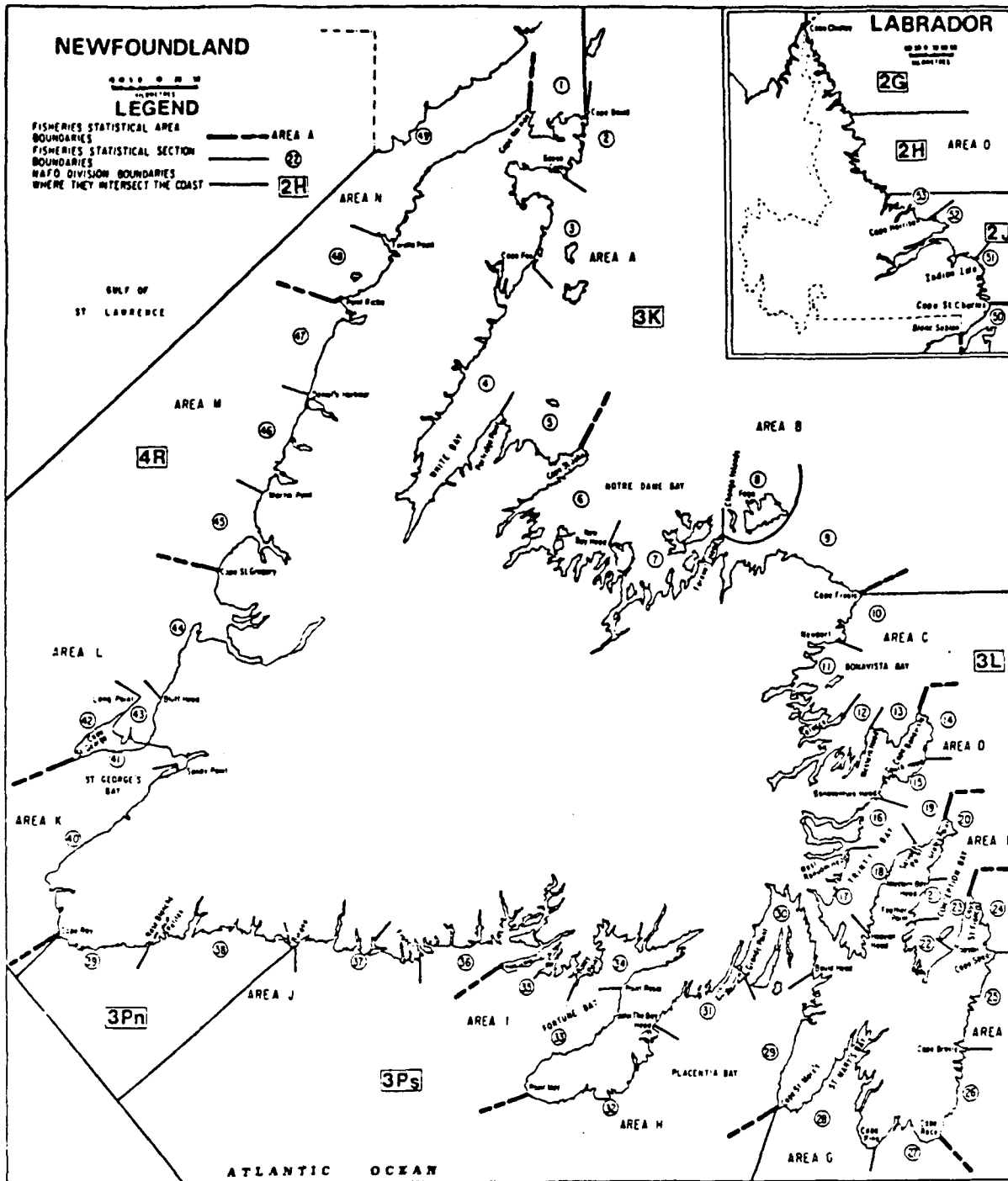


Fig. 5. Statistical area (alphabetic) and sections (numeric) in the Newfoundland Region.

## APPENDIX A

Allocation of quotas (t) and opening dates for the inshore commercial fishery in SA2 + Div. 3K.

Year	Area	Fixed gear	Purse seine	Reserve	Total	Product use	Opening date
1982	2J3K	1000	1000	1000	3000	Frozen females	June 1
1983	Notre Dame Bay	1500	1500		3000	Frozen females	June 15
	White Bay	1500	1500		3000	Frozen females	June 15
	2J3K	1000	1000		2000	Roe extraction	June 15
1984	Notre Dame Bay	2500	2500		5000	Frozen females	June 15
	White Bay & Labrador	1500	1500		3000	Frozen females	June 15
1985	Notre Dame Bay	2500	2500		5000	Frozen females	June 28
	White Bay & Labrador	1500	1500		3000	Frozen females	June 28
1986	Notre Dame Bay	5500	5500		11000	Frozen females	June 1
	White Bay & Labrador	4000	4000		8000	Frozen females	June 1
1987	Notre Dame Bay	3300	1700		5000	Frozen females	June 1*
	White Bay & Labrador	2600	1000		3600	Frozen females	June 1*
1988	Notre Dame Bay	8200	3250		11450	Frozen females	June 1
	White Bay & Labrador	5300	3250	1500	10050	Frozen females	June 1
1989	Notre Dame Bay	8500	3500		12000	Frozen females	June 7
	White Bay	7000	3300		10300	Frozen females	June 7
	N. White Bay	1500			1500	Frozen females	June 7
	Labrador	300			300	Frozen females	June 7

\* fishery began June 19 after agreement on price structure and quotas