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The Inshore Capelin Fishery in NAFO Div. 3L in 1990

by

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Abstract

Data collected during the inshore capelin fishery in 1990 in NAFO Div. 3L were presented. Provisional inshore landings of 47,073 t in 1990 were less than in 1989. Purse seiners in all areas of Div. 3L failed to land their quotas. Opening and closing dates varied among areas and gear sectors. Discarding was higher than reported in 1988 and in 1989. Low percentage of females and problems in selling the catch were the dominant reasons for discarding the catch from traps and for purse seines it was the presence of 'redfeed' in the fish. Catch rates in 1990 were comparable to the highest estimate in 1987 for capelin traps and the second highest for purse seines in their respective series. Fishing time for traps was the lowest in the series. The catch was dominated by a strong 1986 year-class as four-year-olds comprising 53% of the total catch in numbers.

Introduction

Capelin landings of 47,073 t in NAFO Div. 3L were the fourth highest reported for the inshore fishery (Table 1). In 1990 the opening dates for each area (Fig. 1) were based on a monitoring programme designed to assess the suitability of female capelin for the Japanese roe market. Accordingly the capelin fishery opened in St. Mary's Bay on June 18, in Conception and Trinity Bays on June 20, on the Southern Shore on June 21, and in Bonavista Bay on June 24. These opening dates were later than in 1989. Five days later on June 25 Trinity Bay was closed to fixed gear fishing. Conception and Bonavista Bays were closed on June 29 for fixed gears. Unlike other years the purse seine

fishery was never closed during the spawning period and the purse seine quota in each area of Div. 3L was never reached. Purse seine landings were down from 1989, especially evident in St. Mary's and Conception Bays. The fixed gear fisheries in St. Mary's Bay and the Southern Shore also remained open throughout June and July. For all areas of NAFO Div. 3L, a fishery for male production was opened on July 5. The TAC for the Div. 3L inshore fishery in 1990 was 56,100 t based on a market-related TAC for roe-bearing females.

The data presented here describe catch and effort from research logbook records collected by inshore fishermen and age composition of the catch based on biological samples from the commercial fishery.

Materials and Methods

Research logbooks were mailed to 28 purse seine and 113 fixed gear fishermen who fished in NAFO Div. 3L. Fishermen completed 18 purse seine and 76 fixed gear logbooks (Table 2). The proportion of fixed gear fishermen who did not fish capelin in 1990 increased from 1989 (Table 2). Five purse seiners from Div. 3K who fished in Div. 3L were also included in this analysis.

To improve the quality of logbook data, approximately 10% of the fishermen were visited prior to the 1990 fishery to explain how to change their record-keeping procedures. All new fishermen added to the survey were visited to explain the research logbook programme to them. In September we tried to visit each fisherman to collect his logbook and to obtain a post-mortem of the fishery. This follow-up provided us with valuable information in interpreting the results of the logbook records.

Biological samples were collected from the commercial capelin fishery on the basis of two random samples per statistical section (Fig. 1) per gear type per week. From each sample, 200 fish were measured for length, sex, and maturity stage (LSM). A stratified sample of 2 fish per sex per 1/2 cm length group was collected from each LSM sample for otoliths. The otoliths were used for age determinations by an experienced reader.

Effort data for capelin traps were examined based on the fishing strategy employed. In 1990 29 fishermen who filled out logbooks fished one trap and 47

others fished two traps. Of the 47 fishermen who fished more than one trap, 29 reported separate catch and effort data for each trap fished and 18 did not. It was not possible to determine the fishing strategy employed by these 18 fishermen. We developed an adjustment factor by combining the data for all 29 fishermen who kept separate records for each trap fished. Fishing effort for the remaining 18 fishermen was estimated by doubling the reported number of fishing hauls and multiplying by 0.78 and doubling the number of fishing days and multiplying by 0.84. In 1990 most fishermen who set two traps tended to leave one trap fishing longer than the other similar to 1989 (Nakashima and Harnum 1990).

Results

Discards

Discarding rates in 1990 was 38% for purse seines (Table 3) and 32% for traps (Table 4) which were higher than the 21% and 23% respectively in 1989 (Nakashima and Harnum 1989) and were at least twice the 14% and 17% respectively estimated in 1988 (Nakashima and Harnum 1988). Capelin caught but not landed for sale were considered as discards in this analysis with no distinction between those released alive and those dumped (dead capelin). Capelin given to other fishermen were included in the estimates of discarding (Tables 3 and 4) but were excluded in assigning proportional weight to the reasons for discarding (Tables 5 and 11).

In 1990 the principle reason for discarding capelin varied among areas (Table 5). A low percentage of females in the catch was the main reason for discarding from traps in Conception Bay and the Southern Shore. Problems related to trip limits (22,727 kg/trip), inability to sell the catch, and filled quotas were especially problematic in Conception Bay and Bonavista Bay. Similar to 1988 and 1989 (Nakashima and Harnum 1989, 1990), most of the discards from traps in Trinity Bay were males picked from the catch to increase the percentage of females in the landed catch. For purse seiners in St. Mary's Bay discarding was related to small females in the catch and low percentages of females, whereas in Conception Bay 'redfeed' content was important. Discards from purse seine sets in Bonavista Bay and Trinity Bay were predominantly due to 'redfeed'

content followed by small females in the catch. Discarding based on market-related problems were especially important for purse seiners in Conception Bay. Most of these were due to the purse seine boat quota of 22,727 kg per trip imposed by DFO in 1991.

Catch/effort

Detailed records from logbooks collected from 23 purse seiners (Tables 3 and 7) and from 119 capelin traps (Tables 4 and 8) were analyzed to calculate catch/effort indices. Fishing effort in 1990 was lower than estimated in 1989. The average number of days fished and average number of hauls per trap in 1990 were the lowest in the series for all areas except Conception Bay (Table 6). Purse seiners in Div. 3L fished 9.3 days per vessel and averaged 17.7 sets (Table 7). These results suggest that the fishing effort in 1990 was reduced considerably from previous years.

Catch rates for purse seiners and capelin trap fishermen varied among areas (Tables 7 and 8). The lowest purse seine catch/day (C/D) occurred in Trinity Bay followed by St. Mary's Bay then Conception Bay and with extremely high rates estimated for Bonavista Bay (Table 7). The low rate for Trinity Bay and the very high C/D in Bonavista Bay were similar to the pattern observed in 1989 (Nakashima and Harnum 1990). While landings/day (L/D) and C/D were highest in Bonavista Bay, the highest landings/set (L/S) and catch/set (C/S) were from St. Mary's Bay. The average C/D for a purse seine vessel in NAFO Div. 3L in 1990 was 21.4 t. The C/S in the four areas ranged from 10.0 t to 16.4 t and averaged 11.2 t per set.

All four catch rates for traps in 1990 were higher than reported in 1989. The C/D of 6.9 t in Conception Bay was the lowest one in 1990. The second lowest was from the Southern Shore followed by Bonavita Bay. The two highest catch rates were 11.0 t/D in Trinity Bay and 11.2 t/D in St. Mary's Bay. Unlike 1988 and 1989 (Nakashima and Harnum 1989, 1990) the pattern of catch/haul (C/H) in 1990 was not similar to the C/D. For all areas C/H varied between 4.8 to 5.6 t/H except for St. Mary's Bay where it was 7.1 t/H. In 1990 the average C/D for capelin traps was 8.6 t and the average C/H was 5.0 t.

By-catch

The total reported by-catch of cod was 97.5 t for 119 traps fished in 1990 which represented 2.1% of reported logbook landings of capelin (Table 4). There was a significant increase from 1989, especially in Conception Bay, where the bulk of the bycatch was reported. Herring by-catch in traps was negligible (Table 4).

Age Composition

The age composition of the commercial catch was estimated from 74 samples based on 31 purse seine, 41 capelin trap, and 2 beach seine samples (Table 9). The mean number of otolith pairs read per sample in 1990 varied from 28.5 for beach seines to 34.2 for traps (Table 9).

Age compositions of the inshore catch from 1979 to 1990 are given in Table 10. In 1990, the dominant 1986 year-class as four-year-olds represented 53% of the total catch in numbers (Table 10). The 1990 fishery was projected to be dominated by a strong 1987 year-class comprising 83% of the mature biomass (Anon. 1989). With respect to age composition of the total catch, the 1987 year-class as three-year-olds at 43% was also strong. The 1985 year-class as five-year-olds was relatively weak. The weak 1984 year-class was practically absent from the 1990 catch.

The age composition of the Div. 3L catch in 1990 was comparable to that of the Div. 3K catch (Nakashima and Harnum 1991) except that the 1986 year-class in Div. 3K was relatively stronger than observed in Div. 3L.

Discussion

Discarding was higher in 1990 than observed in 1988 and 1989 for both traps and purse seines. When discarding was reported for traps in 1990, the major reasons were low percentage of females in the catch and problems in selling the catch or the quota being taken (Table 11). The various proportions of reasons for discarding were comparable between 1989 and 1990 for traps. The presence of

'redfeed' in females and a low percentage of females in the catch were given as the major reasons for discarding fish by purse seiners (Table 11). Market problems especially related to boat load quotas and small females in the catch were also frequently reported in 1990. The presence of small females in the catch was significant in 1990 for purse seiners.

Four catch rate indices were estimated for capelin traps and for purse seines based on logbook data (Tables 12 and 13). Catch/day (C/D) is the preferred index because it combines both landings and discards to estimate catch. If the discards were in the same proportion to landings in all years then landings could be utilized in place of the catch. However, the level of discarding varies among years. We assumed that C/S and C/H more likely reflect school size and may not necessarily indicate changes in mature biomass. The average C/D for capelin traps in 1990 was 8.6 t which was similar to the highest estimate in the entire series reported in 1987 (Table 12). The average C/D per purse seiner was 21.4 t in 1990 which was the second highest rate in the purse seine series next to the 1989 estimate (Table 14). Both indices indicated that capelin spawning biomass in Div. 3L in 1990 was one of the highest observed since 1981 and that the mature biomass has been increasing since 1981 (Fig. 2).

Two management initiatives in place during the 1990 fishery were a sampling programme to determine opening dates and a trip limit of 22,727 kg for purse seine vessels. Both had an influence on the fishery. The sampling programme resulted in later opening dates than in 1989 and may have contributed to the shorter fishing times, especially for trap fishermen (Table 6). The trip limit contributed to the increase in discarding by purse seiners (Table 3) as evidenced by the increase in the proportional amount of capelin let go due to market/quota reasons (Tables 5 and 11).

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Table 1. Inshore capelin landings (t) by fishing gear (vessels <21 m in length) by area (Bonavista Bay = BB, Trinity Bay = TB, Conception Bay = CB, Southern Shore = SS, St. Mary's and Trepassey Bays = SMB) in Div. 3L. The mobile fleet was issued ringnet licences until 1982 and purse seine licences from 1983 to the present.

Year	Area	Ringnet and purse seine (<21 m)	Beach seine	Capelin trap	Total
1979	BB	45	680	45	770
	TB	1144	991	1163	3298
	CB	2087	1727	4250	8064
	SS	15	70	93	178
	SMB	4	2	-	6
	3L	3295	3470	5551	12316
1980	BB	1388	205	124	1717
	TB	2541	603	1612	4756
	CB	3226	457	3591	7274
	SS	-	80	239	319
	SMB	284	-	95	379
	3L	7439	1345	5661	14445
1981	BB	3714	89	62	3865
	TB	6006	1006	2267	9279
	CB	4670	202	5537	10409
	SS	-	14	51	65
	SMB	820	3	-	823
	3L	15210	1314	7917	24441
1982	BB	3429	169	133	3731
	TB	7687	463	2445	10595
	CB	5511	174	5944	11629
	SS	9	33	314	356
	SMB	1056	58	9	1123
	3L	17692	897	8845	27434

Table 1. Continued.

Year	Area	Ringnet and purse seine (<21 m)	Beach seine	Capelin trap	Total
1983	BB	2580	96	527	3203
	TB	3801	603	4445	8849
	CB	6349	166	5500	12015
	SS	-	3	3	6
	SMB	983	6	12	1001
	3L	13713	874	10487	25074
1984	BB	3805	49	2037	5891
	TB	4928	799	5531	11258
	CB	6628	89	6806	13523
	SS	-	17	672	689
	SMB	1714	28	159	1901
	3L	17075	982	15205	33262
1985	BB	2286	115	1593	3994
	TB	1624	545	6816	8985
	CB	3649	211	6804	10664
	SS	33	9	348	390
	SMB	1284	12	121	1417
	3L	8876	892	15682	25450
1986*	BB	3323	199	3197	6719
	TB	4005	648	12142	16795
	CB	7454	133	9589	17176
	SS	37	52	1362	1451
	SMB	5685	34	337	6056
	3L	20504	1066	26627	48197
1987*	BB	2140	76	2139	4355
	TB	1644	193	6780	8617
	CB	1317	120	3084	4521
	SS	106	32	633	771
	SMB	712	0	0	712
	3L	5919	421	12536	18976
1988*	BB	3664	157	3960	7781
	TB	4275	164	15417	19856
	CB	7064	210	10586	17860
	SS	220	33	3194	3447
	SMB	3636	228	605	4469
	3L	18859	792	33762	53413
1989*	BB	2704	111	4426	7241
	TB	4822	172	14845	19839
	CB	8662	75	8579	17316
	SS	207	11	3048	3266
	SMB	3327	1	643	3971
	3L	19722	370	31541	51633
1990*	BB	2914	102	5607	8623
	TB	4261	108	11655	16024
	CB	6631	60	11292	17983
	SS	0	45	2861	2906
	SMB	521	0	1016	1537
	3L	14327	315	32431	47073

* provisional

Table 2. Responses from a logbook survey conducted in Div. 3L, 1981-90.

Year	No. contacted	No. logbooks returned	Did not fish capelin	Logbooks not returned
<u>Purse seine</u>				
1981	70 (7)*	37 (44)	11	22
1982	91 (7)*	54 (61)	10	27
1983	75 (9)*	37 (46)	7	31
1984	63 (3)*	39 (42)	3	21
1985	45 (3)*	30 (33)	2	13
1986	36 (7)*	27 (34)	0	9
1987	37	23	4	10
1988	34 (7)*	26 (33)	3	5
1989	34 (9)*	27 (36)	2	5
1990	28 (5)*	18 (23)	1	9
<u>Fixed gear</u>				
1981	119	74	13	32
1982	136	81	36	19
1983	131	66	38	27
1984	142	91	20	31
1985	93	61	8	24
1986	87	56	5	26
1987	93	62	14	17
1988	95	70	8	17
1989	96	82	2	12
1990	113	76	11	26

* fishermen who reside in Div. 3K but fished in Div. 3L. These are added to the 'No. logbooks returned' column in parentheses.

Table 3. Total purse seine landings (t) compiled from logbooks in 1990.

Area	Landings by logbook	Discards by logbook*	No. of fishermen
Bonavista Bay	460.5	300.1	6
Trinity Bay	1009.0	158.1	9
Conception Bay	1717.0	707.2	15
St. Mary's Bay	110.8	86.2	5
Div. 3L	3297.3	1251.6	23

* includes capelin given to other fishermen

Table 4. Total capelin trap landings (t) compiled from logbooks in 1990.

Area	Landings by logbook	Discards by logbook*	By-catch		No. of fishermen	No. of traps
			Cod	Herring		
Bonavista Bay	935.2	343.0	2.3	0	15	26
Trinity Bay	1453.3	407.6	1.4	+	24	35
Conception Bay	1922.4	640.0	93.8	0	25	45
Southern Shore	206.0	148.1	0	0.6	6	10
St. Mary's Bay	227.5	0	0	0	2	3
Div. 3L	4744.4	1538.7	97.5	0.6+	72	119

* includes capelin given to other fishermen

Table 5. Percent contribution by weight of reasons for discarding capelin in 1990. (This excludes capelin given to other fishermen.)

Area	Redfeed	Low % females	Small females	Females picked out	Females spawned out	No market/ quota filled	Misc.	Not given
<u>Traps</u>								
Bonavista Bay	11	9	-	7	3	63	7	-
Trinity Bay	6	25	-	38	4	3	23	1
Conception Bay	16	41	2	1	7	26	7	+
Southern Shore	19	54	6	16	5	-	-	-
<u>Purse Seine</u>								
Bonavista Bay	44	18	26	-	2	9	-	1
Trinity Bay	56	4	33	-	1	4	2	-
Conception Bay	42	22	3	-	2	23	7	1
St. Mary's Bay	-	32	58	-	-	-	10	-

Table 6. Average fishing days (D) and average number of trap hauls (H) per capelin trap per area in Div. 3L from 1981-90. (Number of traps given in parentheses.)

Year	Measure of effort	Areas in Div. 3L				
		Bonavista	Trinity	Conception	Southern Shore	St. Mary's
1981	D	-	10.4 (15)	16.8 (21)	13.6 (5)	-
	H	-	12.1	21.1	11.8	-
1982	D	-	14.6 (23)	24.2 (48)	13.0 (10)	-
	H	-	18.0	30.3	12.5	-
1983	D	14.0 (1)	17.2 (25)	19.8 (40)	-	-
	H	12.0	21.9	21.3	-	-
1984	D	13.7 (7)	19.5 (36)	18.2 (31)	19.0 (8)	19.0 (1)
	H	26.0	30.9	26.4	22.4	47.0
1985	D	11.4 (16)	13.3 (23)	16.8 (24)	10.5 (8)	-
	H	19.8	18.4	23.8	9.4	-
1986	D	11.8 (14)	15.3 (33)	24.9 (22)	17.7 (6)	6.3 (2)
	H	17.7	24.4	28.8	20.8	2.5
1987	D	6.3 (15)	7.7 (31)	7.3 (25)	5.0 (7)	-
	H	13.9	14.3	11.2	6.9	-
1988	D	9.0 (16)	11.6 (44)	12.6 (34)	8.8 (10)	11.1 (1)
	H	16.4	22.5	17.0	14.7	17.0
1989	D	8.2 (24)	8.1 (40)	7.0 (43)	7.6 (10)	2.7 (2)
	H	17.3	16.2	12.2	9.7	8.0
1990	D	4.8 (26)	4.8 (35)	8.3 (45)	4.1 (10)	6.8 (3)
	H	8.8	11.1	11.9	6.6	10.7

Table 7. Catch/effort data for purse seiners from the 1990 logbook survey.

Area	No. days fished	No. sets made	Landings per logbook (t)	Landings and discards per logbook (t)	No. of purse seiners
Bonavista Bay	26	69	17.7/day 6.7/set	29.3/day 11.0/set	6
Trinity Bay	74	117	13.6/day 8.6/set	15.8/day 10.0/set	9
Conception Bay	104	208	16.5/day 8.3/set	23.3/day 11.7/set	15
St. Mary's Bay	9	12	12.3/day 9.2/set	21.9/day 16.4/set	5
Div. 3L	213	406	15.5/day 8.1/set	21.4/day 11.2/set	23

Table 8. Catch/effort data for capelin traps from the 1990 logbook survey.

Area	No. days fished	No. hauls made	Landings per logbook (t)	Landings and discards per logbook (t)	No. of traps
Bonavista Bay	125.0	228	7.5/day 4.1/haul	10.2/day 5.6/haul	26
Trinity Bay	169.7	389	8.6/day 3.7/haul	11.0/day 4.9/haul	35
Conception Bay	372.6	535	5.2/day 3.6/haul	6.9/day 4.8/haul	45
Southern Shore	40.8	66	5.0/day 3.1/haul	8.7/day 5.4/haul	10
St. Mary's Bay	20.4	32	11.2/day 7.1/haul	11.2/day 7.1/haul	3
Div. 3L	728.5	1250	6.5/day 3.8/haul	8.6/day 5.0/haul	119

Table 9. Summary of the commercial samples collected from the inshore capelin fishery in 1990 in Div. 3L.

Gear type	No. of LSM/stratified samples	No. of otoliths aged	Mean number of otoliths aged per sample \pm SD
Purse seine	31	1030	33.2 \pm 3.7
Capelin trap	41	1404	34.2 \pm 2.9
Beach seine	2	57	28.5 \pm 0.7
TOTAL	74	2491	

Table 10. Age compositions (%) from the inshore commercial capelin fishery in Div. 3L, 1979-90.

	Age					
	1	2	3	4	5	6
Males						
1979	-	-	47.6	36.3	15.1	0.9
1980	-	0.2	53.4	43.4	2.9	0.1
1981	9.0	1.9	29.7	37.7	20.6	1.2
1982	0.1	0.5	88.8	10.0	0.6	-
1983	-	2.3	62.9	34.0	0.9	-
1984	-	0.4	37.5	61.5	0.7	-
1985	-	5.8	66.3	26.4	1.5	0.1
1986	-	0.3	56.0	43.1	0.5	-
1987	-	0.3	12.7	85.4	1.6	-
1988	-	5.3	72.4	19.6	2.7	+
1989	-	0.4	79.3	20.3	-	-
1990	-	0.6	37.1	61.9	0.4	-
Females						
1979	-	0.8	59.1	25.4	11.3	3.4
1980	0.1	3.3	64.6	31.1	0.4	0.6
1981	5.8	5.6	54.0	20.1	14.0	0.6
1982	0.2	2.4	76.4	13.0	6.4	1.6
1983	-	6.4	59.1	32.1	2.3	0.2
1984	-	2.8	41.5	47.1	8.3	0.3
1985	-	16.7	58.0	16.0	8.7	0.6
1986	-	0.2	66.1	28.9	3.7	1.1
1987	-	6.6	21.7	63.6	7.7	0.3
1988	-	14.2	50.8	11.5	21.4	1.4
1989	-	1.5	72.5	21.8	1.9	2.3
1990	-	2.2	47.5	47.4	2.8	0.1
Sexes combined						
1979	-	0.2	50.3	33.8	14.2	1.5
1980	-	1.7	58.9	37.3	1.7	0.4
1981	7.4	3.2	42.7	28.7	17.2	0.9
1982	0.1	1.4	83.1	11.4	3.2	0.7
1983	-	4.6	60.7	32.9	1.7	0.1
1984	-	1.7	39.6	53.7	4.8	0.2
1985	-	12.4	61.3	20.2	5.8	0.4
1986	-	0.3	62.3	34.2	2.5	0.7
1987	-	4.0	18.0	72.5	5.2	0.2
1988	-	11.3	59.0	14.6	14.3	0.8
1989	-	1.0	75.4	21.2	1.1	1.3
1990	-	1.6	43.2	53.3	1.8	+

Table 11. Percent contribution to weight of reasons for discarding capelin in Div. 3L, 1981-90. (This analysis excludes capelin given to other fishermen.)

Area	Redfeed	Low % females	Small females	Females picked out	Females spawned out	No market/ quota filled	Misc.	Not given
<u>Traps</u>								
1981	13	43	1	10	+	22	3	8
1982	4	57	+	19	1	4	13	2
1983	17	37	+	3	+	18	13	12
1984	1	31	-	35	6	15	11	1
1985	30	26	4	5	3	22	4	5
1986	45	28	+	10	+	5	10	2
1987	59	22	1	+	2	9	7	+
1988	4	27	6	28	6	8	17	5
1989	12	36	2	12	1	30	7	+
1990	13	31	1	13	5	27	10	+
<u>Purse seine</u>								
1981	32	35	14	8*	+	8	+	3
1982	45	41	3	-	+	+	10	1
1983	70	17	1	-	+	5	3	4
1984	18	78	+	-	+	3	2	-
1985	61	15	9	1	3	4	5	2
1986	52	35	1	+	1	3	8	1
1987	73	4	2	-	1	2	11	7
1988	58	21	5	-	8	5	3	-
1989	43	37	+	-	-	6	10	4
1990	41	20	16	-	2	16	5	+

* use of separators at sea

Table 12. Catch/effort of capelin traps in Div. 3L utilizing research logbook data.

Year	L = Logbook landings (t)		C = Logbook landings and discards (t)	
	L/day	L/haul	C/day	C/haul
1981	2.2	1.9	2.9	2.5
1982	2.7	2.2	3.1	2.5
1983	2.4	2.1	3.4	3.0
1984	2.6	1.7	2.9	1.9
1985	2.9	2.0	4.6	3.2
1986	3.2	2.4	4.6	3.4
1987	5.1	2.9	8.8	5.0
1988	5.3	2.9	6.2	3.4
1989	5.4	2.9	6.7	3.6
1990	6.5	3.8	8.6	5.0

Table 13. Catch/effort of purse seines in Div. 3L utilizing research logbook data.

Year	L = Logbook landings (t)		C = Logbook landings and discards (t)	
	L/day	L/set	C/day	C/set
1981	6.9	3.4	9.4	5.3
1982	13.5	6.7	16.4	8.1
1983	10.4	5.4	18.8	9.7
1984	12.3	6.2	14.3	7.2
1985	10.5	5.5	16.4	8.6
1986	14.4	8.6	19.0	11.4
1987	13.4	9.0	18.1	12.1
1988	18.1	8.9	20.7	10.2
1989	20.1	9.0	24.3	10.9
1990	15.5	8.1	21.4	11.2

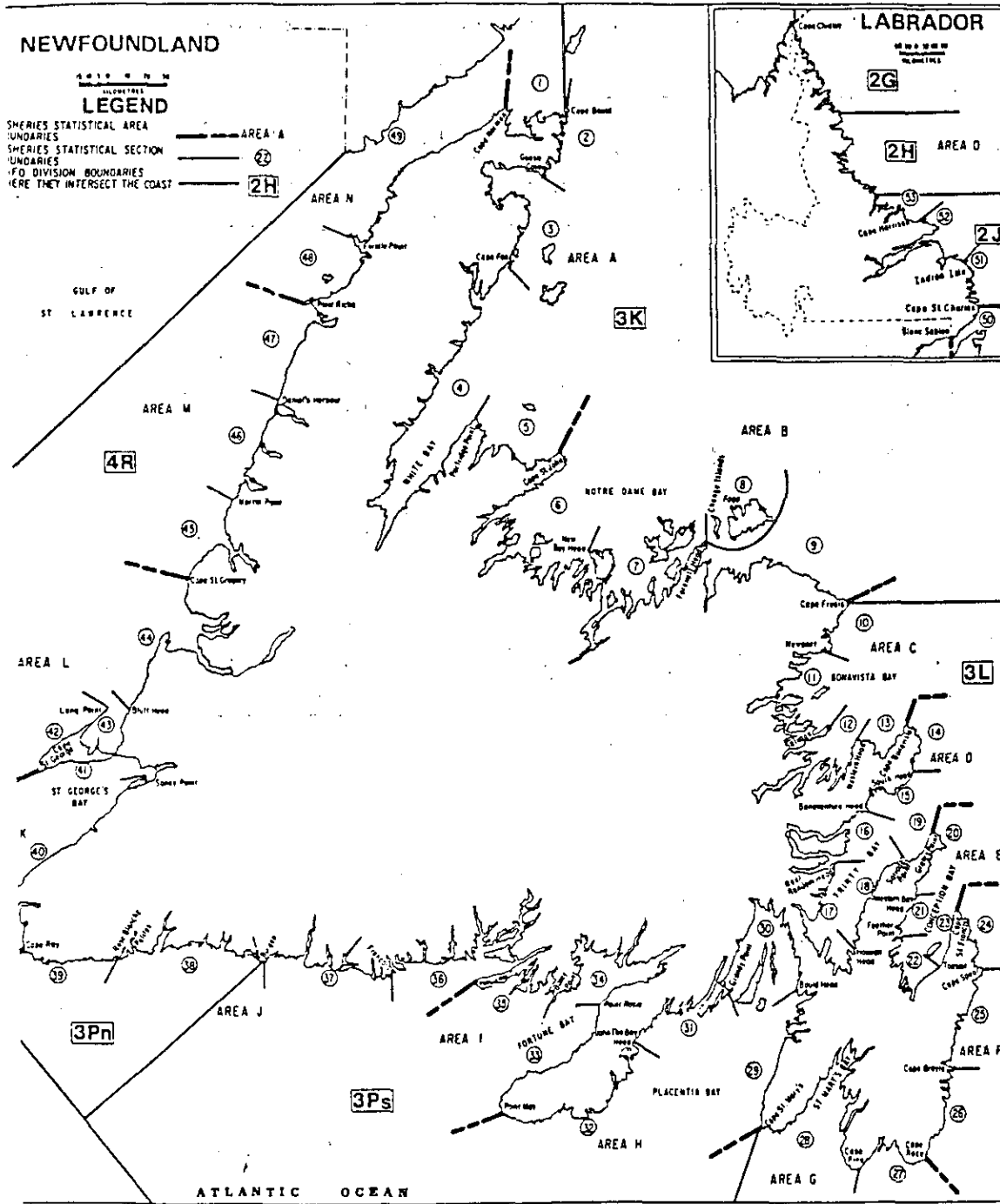


Fig. 1. Statistical areas (C = Bonavista Bay; D = Trinity Bay; E = Conception Bay; F = Southern Shore; G = Trepassey and St. Mary's Bay) and sections (numeric) in NAFO Div. 3L along the coast of Newfoundland.

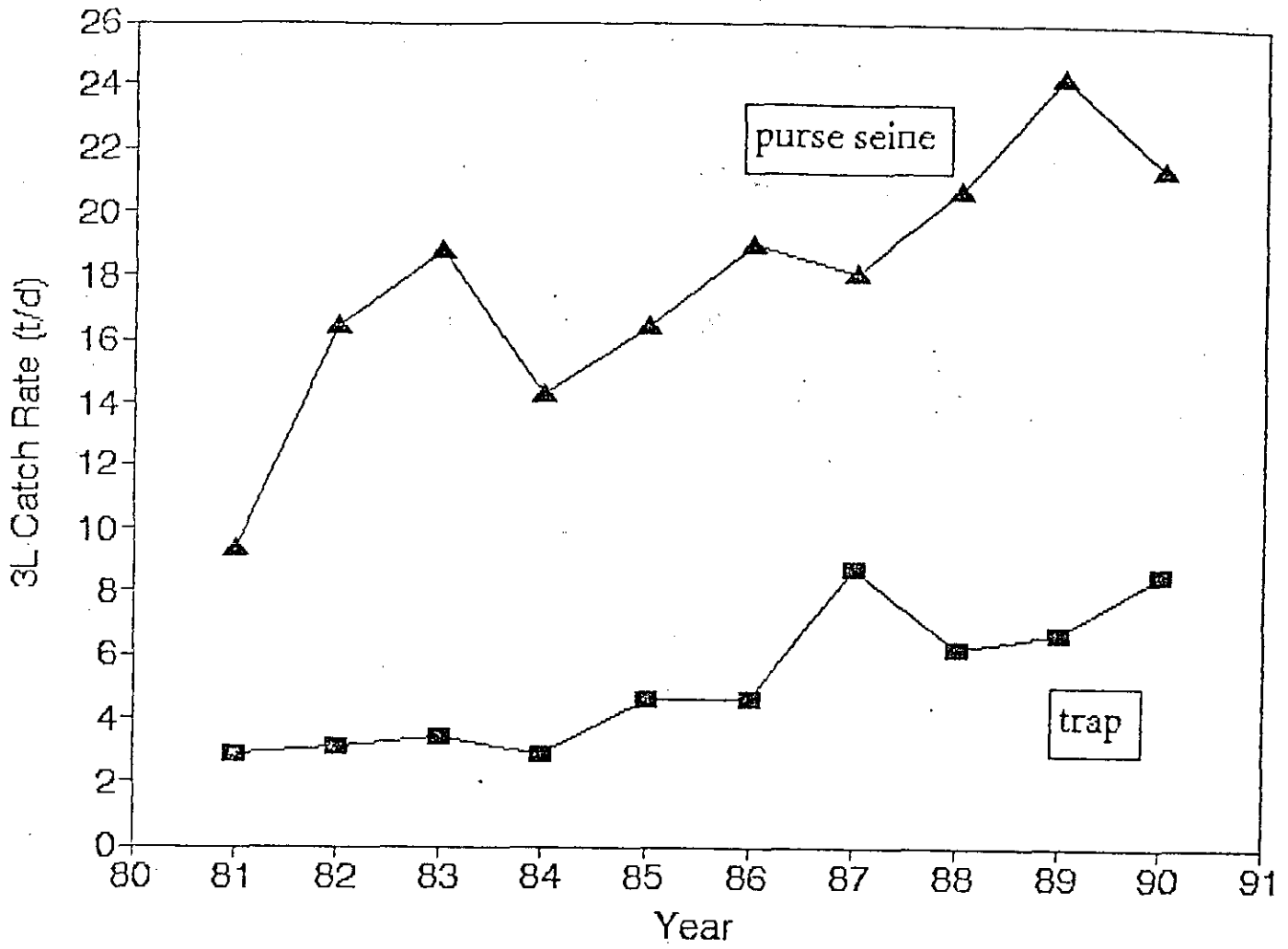


Fig. 2. Catch rates (t/d) for purse seines and capelin traps in NAFO Div. 3L from 1981 to 1990.