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# The inshore capelin fishery in NAFO Div. 3K in 1992 and a comparison of mean lengths in NAFO Div. 3 K and 3 L 

by

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## Abstract

Provisional landings of $16,351 \mathrm{t}$ in 1992 in SA2 and Div. 3K were lower than landings reported from 1988 to 1991 and slightly less than the quota of $17,915 \mathrm{t}$. The 1992 commercial catch was dominated by the 1989 year-class as three-year-olds (77\%). Reported discards were estimated as $22 \%$ of trap landings and $17 \%$ of purse seine landings. Small females in the catch accounted for $57 \%$ of the reported discarding by purse seines. For traps the reasons given were more variable with low percentage of females ( $30 \%$ ), catches mixed with herring or small cod (24\%) and closed quota (22\%) being equally important. Small females (13\%) were also important as discards for trap fishermen, constituting the highest portion in the series. Mean lengths- and weights-at-age have declined in recent years. Catch rates ( $t /$ day) estimated for traps and purse seines were third and second highest in their respective series and both were substantially higher than in 1991. In 1992 capelin arrived later than observed in the 1980's but not as late as in 1991. Many fixed gear and purse seine fishermen did not fish or fished on a limited basis in 1992 because of the late arrival of capelin and small females in the population.

## Résumé

Les chiffres préliminaires sur les débarquements en provenance de la sous-zone 2 et de la division 3 K en 1992, soit 16351 t , sont, d'une part, inférieurs à ceux de la période 19881991, d'autre part, légèrement inférieurs au quota (17 915 t). Ce sont les poissons de trois ans, soit ceux de la classe d'âge de 1989, qui ont dominé les prises commerciales, dans une proportion de 77 p. 100. Les rejets déclarés se chiffraient à 22 p. 100 dans la pêche au parc en filet et à 17 p. 100 dans la pêche à la senne coulissante. Le faible pourcentage de femelles a été la cause principale de 57 p. 100 des rejets déclarés par les pêcheurs à la senne coulissante. En ce qui concerne les pêcheurs aux parc en filet, ils ont donné diverses raisons pour expliquer leurs rejets, le faible nombre de femelles ( 30 p . 100), la présence de hareng ou de petites morues dans les prises ( 24 p .100 ) et l'épuisement du quota ( 22 p .100 ) étant les plus fréquemment invoquées. La proportion de petites femelles (13 p. 100) a aussi été une cause importante de rejets chez les pêcheurs au parc en filet. Il s'agit de la plus élevée de la série. Les longueurs et poids moyens selon l'âge sont en recul depuis quelques années. Les taux de prises estimés ( $t / j o u r$ ) dans les deux types de pêche venaient aux troisième et deuxième rang des plus élevées de leur série respective. Dans les deux cas, ils étaient considérablement plus élevés qu'en 1991. En 1992, le capelan est arrivé plus tard que dans les années 80 , mais toutefois pas aussi tardivement qu'en 1991. De nombreux pêcheurs aux engins fixes et à la senne coulissante n'ont pas pêché du tout ou ont peu pêché en raison de cette arrivée tardive du capelan et de la présence de petites femelles dans la population.

## Introduction

Provisional landings in 1992 of $16,351 t$ were slightly less than the $17,915 \mathrm{t}$ quota in NAFO SA2 and Div. 3 K and were lower than landings in the previous four years (Table 1). The proportion of landings from the purse seine component of the fishery was much higher in 1992 than in 1991. We provide herein a summary of the 1992 commercial capelin fishery, the age composition of the catch, trends in mean lengths and weights of capelin in Div. 3 K and Div. 3L, and an analysis of the data compiled in research logbooks maintained by fishermen.

## Materials and Methods

Commercial samples were collected by fishermen and at fish plants by reliable collectors at the rate of two samples per gear type per week per statistical section in Div. 3K (Fig. 1). From each sample, length, sex, and maturity stage were measured on 200 fish and a stratified sample of 2 otoliths per sex per $1 / 2 \mathrm{~cm}$ length was taken for ageing.

In 1992 research logbooks were mailed to 21 purse seine and 47 fixed gear licensed fishermen residing in Div. 3K. Of these fishermen, 10 purse seine and 28 fixed gear logbook records were returned to us in 1992, an increase in purse seine and trap logbooks from 1991 (Nakashima and Harnum 1992). Three purse seiners from Div. 3L also fished in Div. 3K in 1992. of the 47 fixed gear fishermen, 28 returned logbooks and ten did not fish in 1992. Only the records from the 21 fishermen who fished capelin traps were included in this report. Of the remaining seven fixed gear logbooks returned in 1992, four were for beach seines and three reports contained insufficient data. The number of fishermen who did not fish capelin in 1992 was high, most likely due to the late arrival of capelin, small females in some areas, and the northern cod moratorium. A telephone survey of fixed gear fishermen who had not sent in their logbooks indicated that many fishermen set their traps, got no or one poor catch (low numbers, poor quality, etc.) initially, and gave up fishing.

Fishing effort was estimated from research logbook records for both purse seines and capelin traps. Fishing days for purse seines are defined as those days when the vessel was out searching for capelin schools. Similarly fishing days for traps were defined as those days when the trap was fishing. In 1992, 19 trap fishermen fished one trap each and two fishermen fished two traps per trap crew and maintained separate records for each trap fished.

Mean lengths and weights for Div. 3K and 3L were estimated from the commercial samples for each gear type and combined by weighting by landings.

## Results and Discussion

## The Inshore Fishery

The inshore fishery in Div. 3K was prosecuted by purse seines, capelin traps, and beach seines and has been regulated by quota management since 1982. Quotas by area and gear type are presented in Appendix A. Similar to 1991 the 1992 quota of $17,915 \mathrm{t}$ was subdivided between mobile and fixed gears and among areas. Opening and closing dates varied considerably in 1992. Purse seine and fixed gear fisheries in Notre Dame Bay and the fixed gear fishery in Labrador opened on June 5. Capelin in White Bay and north White Bay was monitored prior to opening the fishery on June 23. The fixed gear fishery between Cape St. John and North Head in Notre Dame Bay was closed on June 23 to allow a monitoring programme. Similarly the area between North Head and Dog Bay Point in Notre Dame Bay was closed for fixed gears on June 25 for monitoring. On July 8, Labrador and the remainder of Notre Dame Bay for fixed gear and purse seining in Notre Dame Bay were closed. On July 14 the purse seine and fixed gear fisheries were closed in White Bay. Purse seining in Notre Dame Bay was reopened on July 19 and closed two days later on July 21. The fixed gear fishery from Cape St. John to North Head in Notre Dame Bay reopened on July 20 and closed on July 23 and North Head to Dog Bay Point area reopened on July 22 and closed on July 27. The fixed gear fishery north of White Bay in the area north of Fischot Island closed on July 30. All remaining areas were closed to fishing on August 5. All purse seine and fixed gear fishermen who completed logbooks fished in July in Div. 3K.

## Age Composition of the Commercial Catch

In 1992, 50 biological samples were collected and processed from commercial catches throughout Div. 3K. The samples were from 14 purse seine, 11 beach seine, and 25 trap catches (Table 2). The average numbers of otolith pairs per sample were approximately four less than in 1991 for purse seines and beach seines and the same number for traps between the two years (Nakashima and Harnum 1992).

In 1992, the catch in numbers was strongly dominated by the 1989 year-class as three-year-olds (76.9\%) (Table 3). The 1988 year-class as four-year-olds (13.3\%) was very weakly represented in the catch. The 1990 year-class as two-year-olds (8.6\%) was surprisingly high and especially so for females (12.0\%). We had some difficulty in differentiating seasonal growth patterns on otoliths possibly due to the influence of colder spring temperatures on delayed maturation and spawning which was observed in 1991 (Carscadden et al. 1992).

The age compositions reported in Nakashima and Harnum (1992) have been revised in Table 3 using more recent landing statistics for 1991.

## Mean Lengths and Weights in Div. 3K and Div. 3L

The mean lengths-at-age in Div. 3L during 1981 were small (Fig. 2). For age 2, the 1982-90 mean lengths did not vary much or exhibit any trends but declined during 1991 and 1992. For ages 3 and 4, mean lengths showed only small variations between 1982 and 1988 but have shown a gradual decline since then. For all ages combined, the decline seems more severe during 1991 and 1992 and this is largely because of the increased importance of the two-year-olds in the overall sample.

In Div. 3K (Fig. 3) there seems to be no trend in mean length at age 2. For ages 3, 4, and all ages combined, there has been a general decline in mean length with 1991 and 1992 mean lengths being the smallest in the series.

For males, age 2 fish usually comprise only a small proportion of the stock, so sample sizes are small. However, for age 3 males, differences between Div. 3L and 3 K were small until 1992, when Div. 3L males at age were much smaller. At age 4, Div. 3L and 3 K males were approximately the same length, even in 1992.

Age 2 females contribute more to the spawning stock than age 2 males. In most years, Div. 3L two-year-old females were smaller than Div. 3K females. This was true in 1991 and 1992 when age 2 fish made a significant contribution to the spawning stock and therefore contributed to the decline in overall mean size (all ages combined) of females in the population. Females in Div. 3L at age 3 was only slightly smaller than females at the same age in Div. 3K until 1992 when the difference became larger. At ages 4 and 5, females in Div. 3L and 3K were approximately the same length.

The sample mean weights from the inshore fishery and mean weights used in the projections performed by NAFO are given in Table 4.

Similar data are shown for Div. 3 K in Table 5. In this table, sample mean weights-at-age are given only for 1984-92. In some years prior to 1984, sample sizes were small although the mean weights for all available data were used in the projections.

## Research Logbook Survey

The reasons reported by fishermen for discarding capelin in 1992 were variable but small females and low percentage of females were two reasons often given (Table 6). For traps in White Bay, capelin mixed with herring or cod (39\%), low percentage of females ( $24 \%$ ), and small females (24\%) were important reasons given for discarding capelin (Table 6). Discarding from traps in Notre Dame Bay was attributed to fishery closures (46\%) and low percentage of females (38\%) in the catch (Table 6). Almost all the discarding in White Bay by purse seiners was due to small females (99\%) compared to Notre Dame Bay where catches were let go because of spent females (52\%) and low percentage of females (48\%) (Table 6). For Div. 3K in general purse seiners reported small females (57\%), spent females (22\%), and low percentage of females (21\%) as the main reasons for discarding (Table 7). Small females and spent females in 1992 represent the highest levels ever reported by purse seiners. Also noteworthy, was the absence of redfeed problems in the 1992 purse seine fishery. Trap fishermen in Div. 3 K experienced problems with low percentages of females ( $30 \%$ ), mixed catches of capelin and herring or small cod (24\%), inability to sell catches because the quota was taken (22\%), and small females (13\%) (Table 8). Similar to purse seines, the presence of small females in trap catches was much higher than in previous years and redfeed was unimportant in 1992 (Table 8).

Discarding as a percentage of landings was the lowest ratio since 1981 for purse seines (Table 9) and the lowest in the series for traps (Table 10). Purse seine discards constituted 13\% of landings in 1992 compared to $100 \%$ in 1991 (Table 9). Discarding from traps continued to decline from 56\% of landings in 1990 to $22 \%$ in 1992 (Table 10). The reported discards for purse seines include 55.4 t and for traps 23.6 t which were given away to other fishermen. According to research logbook reports fishermen reported that $71 \%$ of trap and $51 \%$ of purse seine discards were released alive at sea. In the analyses presented in Tables 6-11 discards are defined as all capelin caught but not landed by the fisherman who caught them and includes both live and dead fish.

Catch/effort (CPUE) data were available since 1981 for purse seine vessels and since 1983 for capelin traps. The CPUE estimate in 1992 for purse seines was higher than the average CPUE from 1981 to 1990 of 15.8 t/day and higher than the 1991 estimate when only one purse seine logbook was available for analysis (Table 9). The 1992 purse seine CPUE of 18.7 t/day was the second highest in the series. For traps, the 1992 CPUE of 6.3 t /day was higher than the 1991 estimate of $4.6 \mathrm{t} / \mathrm{day}$ and was similar to the average CPUE from 1983 to 1991 of 6.0 t/day (Table 10).

The average fishing effort by 13 purse seiners in Div. 3K was 3.6 searching days and 6.6 sets per vessel in 1992 (Table 9) resulting in a noticeable reduction in searching days compared to previous years. For capelin traps in Div. 3K in 199223 traps averaged 9.0 fishing days and were hauled 13.4 times (Table 10). Similar to 1991 (Nakashima and Harnum 1992) the effort in White Bay was twice the effort in Notre Dame Bay. In White Bay, 17 traps were fished 10.9 days and had 15.3 hauls each compared to 3.7 days and 7.8 hauls for 6 traps in Notre Dame Bay (Table 11). The majority of the fishery took place in White Bay and the western part of Notre Dame Bay similar to 1991 (Nakashima and Harnum 1992).

If we accept CPUE's as an index of inshore abundance of mature capelin and assume that total catch (i.e. landings + discards) as reported in these research logbooks is more realistic than landings alone, then both purse seine and trap CPUE's indicate that inshore biomass and abundance was higher in 1992 than in 1991 (Fig. 4,5).

The number of fishermen who fished for capelin in 1992 was again low. Fishermen did not fish because of the late arrival of capelin in several areas especially in Notre Dame Bay, the small size of females and the low percentage of females.

## Relative Year-class strength

Relative year-class strength was estimated for catches by purse seines and traps by estimating total effort (days fished) from landings (Table 1) and catch rates (Tables 9, 10). The total effort (Table 12) and catch-at-age numbers (Table 13) were used to derive catch rates-at-age given in Table 14. To visualize trends in year-class strengths in the 1980's the catch rates-at-age were summed for ages 3 and 4 for year-classes 1979 to 1988 (Table 15) and compared (Fig. 6,7). The standardized values in Figure 7 suggest that the same strong (eg. 1983, 1986) and weak (eg. 1981, 1984) year-classes were prosecuted by both inshore gears. Interestingly enough the 1988 year-class appears weak in the purse seine series and average in the trap series despite its strong appearance as two-year-olds in acoustic surveys in 1990 (Anon. 1991).

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Table 1. Inshore capelin landings ( $t$ ) by gear, 1980-92.

| Year | NAFO Div. | Purse seine | Ring net | Beach seine | Trap | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1980 | 2 J | - | - | - | - | - |
|  | 3K | - | 560 | 655 | 139 | 1354 |
|  | 2+3K | - | 560 | 655 | 139 | 1354 |
| 1981 | 2 J | - | - | $\stackrel{-}{ }$ | - | - |
|  | 3 K | - | 1000 | 520 | 283 | 1803 |
|  | 2+3K | - | 1000 | 520 | 283 | 1803 |
| 1982 | 2 J | - | 4 | 4 | - | 8 |
|  | 3K | - | 1935 | 1544 | 381 | 3760 |
|  | 2+3K | - | 1939 | 1548 | 381 | 3768 |
| 1983 | 2 J | - | - | 4 | - | 4 |
|  | 3k | 2359 | - | 1062 | 344 | 3765 |
|  | 2+3K | 2359 | - | 1066 | 344 | 3769 |
| 1984 | 2 J | - | - | 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 | 2 J | - | - | 3 | - | 3 |
|  | 3K | 4222 | - | 2534 | 5143 | 11889 |
|  | 2+3K | 4222 | - | 2537 | 5143 | 11892 |
| 1987* | 2 J | - | - | 4 | - | 4 |
|  | 3K | 3038 | - | 2141 | 5625 | 10804 |
|  | 2+3K | 3038 | - | 2145 | 5625 | 10808 |
| 1988* | 2 J | ${ }^{-}$ | - | 2 | - | 2 |
|  | 3 K | 9767 | - | 3725 | 13353 | 26845 |
|  | 2+3K | 9767 | - | 3725 | 13353 | 26847 |
| 1989* | 2 J | - | - | 3 | 304 | 307 |
|  | 3K | 6608 | - | 3436 | 17451 | 27495 |
|  | 2+3K | 6608 | - | 3439 | 17755 | 27802 |
| 1990* | 2 J | - | - | 1 | - | 1 |
|  | 3K | 10304 | - | 3721 | 21114 | 35139 |
|  | 2+3K | 10304 | - | 3721 | 21114 | 35140 |
| 1991* | 2 J | - | - | 1 | - | 1 |
|  | 3K | 665 | - | 2936 | 16336 | 19937 |
|  | 2+3K | 665 | - | 2937 | 16336 | 19938 |
| 1992* | 2 J | - | - | - | - | - |
|  | 3k | 5814 | - | 1240 | 9297 | 16351 |
|  | 2+3K | 5814 | - | 1240 | 9297 | 16351 |

[^0]Table 2. Summary of the conmercial samples collected and aged from the 1992 inshore capel in fishery in Div. 3K.

|  | No. of <br> LSM/strat <br> samples | No. otoliths <br> aged $(N)$ | Mean no. <br> otoliths $\pm$ SD <br> per sample |
| :--- | :---: | :---: | :---: |
| Gear type | 14 | 474 | $33.9 \pm 3.9$ |
| Purse seine | 11 | 353 | $32.1 \pm 6.4$ |
| Beach seine | 25 | 903 | $36.1 \pm 4.1$ |
| Capelin trap | 50 | 1730 |  |
| TOTAL |  |  |  |

Table 3. Age-compositions (\%) of capelin from the inshore commercial capelin fishery, Div. 3K, 1982-92.


Table 4. Mean weights (gm) of commercial samples in Div. 3L, sexes combined, for 1981-92.

|  | Age |  |  |  |  |  |  |
| :--- | ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | 2 | 3 | 4 | 5 | 6 | All |  |
| 1981 | 7.8 | 22.3 | 29.8 | 32.3 | 36.4 | 28.1 |  |
| 1982 | 13.6 | 32.5 | 37 | 37.2 | 39.9 | 33 |  |
| 1983 | 13.9 | 27.7 | 33.8 | 34 | 37.6 | 29.1 |  |
| 1984 | 12 | 27.6 | 34.7 | 30.5 | 33.6 | 31.3 |  |
| 1985 | 18 | 25.4 | 35.9 | 32.6 | 33.1 | 26.7 |  |
| 1986 | 14.2 | 26.2 | 34.2 | 33.7 | 36.8 | 29.1 |  |
| 1987 | 14.3 | 29.9 | 36.3 | 33.5 | 38.1 | 33.1 |  |
| 1988 | 29.3 | 36.6 | 36.4 | 38.8 | 30.7 |  |  |
| 1989 | 16 | 25.4 | 32.7 | 36.6 | 37.9 | 30.8 |  |
| 1990 | 12.6 | 21.2 | 29.2 | 27.8 | 37.1 | 29.2 |  |
| 1991 | 18 | 24.6 | 22.3 | 35.7 | 22.6 |  |  |
| 1992 |  | 28.3 | 36.0 | 34.3 |  | 16.6 |  |
| Projections |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Table 5. Mean weights (gm) for commercial samples in Div. 3K, sexes combined, for 1984-92.

| Year | Age |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 2 | 3 | 4 | 5 | 6 | All |
| 1984 | 14.7 | 30.5 | 37 | 34.5 | 32.3 | 35 |
| 1985 | 15.3 | 26.3 | 34.1 | 31.7 | 33.6 | 29.2 |
| 1986 | 11.3 | 27.4 | 34.4 | 32.9 | 35.3 | 30.1 |
| 1987 | 17 | 30.7 | 37.9 | 34.8 | 35.8 | 36.8 |
| 1988 | 17.2 | 31.2 | 42.6 | 36.4 | 38.9 | 34.1 |
| 1989 | 14.5 | 31.3 | 38.2 | 36.9 | 38.8 | 33.2 |
| 1990 | 16.4 | 26.1 | 32.6 | 31.3 |  | 30.2 |
| 1991 | 18.9 | 23.1 | 27.2 | 26.4 | 31.7 | 24.8 |
| 1992 | 15.2 | 24.7 | 26.7 | 24.9 | 34.3 | 24.2 |
| Projections |  | 29.9 | 37.3 | 35.1 | 36.7 |  |
| $\begin{aligned} & \text { (Mean wt. } \\ & \text { 1979, 1982-89) } \end{aligned}$ |  |  |  |  |  |  |
|  |  |  |  |  | $\cdots$ |  |

Table 6. Percent contribution by weight of reasons for discarding capelin in 1992. (This excludes capel in given to other fishermen.)

| Area | Redfeed | Low \% females | Small <br> females | Males picked out | Females spawned out | No market/ quota filled | Misc. | Not given |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Iraps |  |  |  |  |  |  |  |  |
| White Bay Notre Dame Bay | $\begin{aligned} & 5 \\ & 0 \end{aligned}$ | $\begin{aligned} & 24 \\ & 38 \end{aligned}$ | $24$ | $\begin{array}{r} 2 \\ 12 \end{array}$ | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\begin{array}{r} 5 \\ 46 \end{array}$ | $\begin{array}{r} 39 \\ 4 \end{array}$ | 1 0 |
| Purse Seine |  |  |  |  |  |  |  |  |
| White Bay Notre Dame Bay | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\begin{array}{r} 0 \\ 48 \end{array}$ | $\begin{array}{r} 99 \\ 0 \end{array}$ | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\begin{array}{r} 0 \\ 52 \end{array}$ | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & 1 \\ & 0 \end{aligned}$ | 0 0 |

Table 7. Reasons (expressed as $\chi$ by weight) reported in logbooks for discarding capelin in purse seines in Div. 3K, 1981-92. This analysis excludes capelin given away to other fishermen.

| Year | Low \% <br> females | Redfeed | Not <br> mature <br> enough | Small <br> females | Females <br> spawned <br> out | No <br> market | Over <br> ripe | Misc. | Not <br> given |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 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 |
| 1990 | 31 | 45 | 0 | 3 | 2 | 13 | 0 | 3 | 3 |
| 1991 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 56 |
| 1992 | 21 | 0 | 0 | 57 | 22 | 0 | 0 | + | 0 |

Table 8. Reasons (expressed as $\boldsymbol{X}$ by weight) reported in logbooks for discarding capel in from capelin traps in Div. 3 K in 1983-92. This analysis excludes capelin given away to other fishermen.

| Year | Redfeed | Small females | Females over ripe | No market | Low $x$ females | Males picked out | Females spauned out | Misc. | Not given |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1983 | 81 | 0 | 0 | 0 | 4 | 1 | 15 | 0 | 0 |
| 1984 | 1 | 0 | 0 | 17 | 51 | 19 | 4 | 8 | 0 |
| 1985 | 19 | 0 | 0 | 27 | 28 | 19 | + | 2 | 4 |
| 1986 | 10 | 0 | 16 | 27 | 30 | 7 | 3 | 6 | 0 |
| 1987 | 27 | 0 | 0 | 37 | 11 | 5 | 0 | 14 | 6 |
| 1988 | 19 | 0 | 0 | 50 | 14 | 14 | 0 | 2 | 1 |
| 1989 | 3 | 0 | 0 | 18 | 66 | 12 | 0 | 1 | 0 |
| 1990 | 26 | 0 | + | 29 | 30 | 5 | 0 | 5 | 5 |
| 1991 | 28 | 3 | 0 | 9 | 38 | 20 | 1 | + | 1 |
| 1992 | 3 | 13 | 0 | 22 | 30 | 7 | 0 | 24 | 1 |

Table 9. Capel in landings ( $t$ ), discards ( $t$ ), and catch/effort from research logbook records for purse seines in Div. 3K, 1981-92.

| Year | No. fishermen | Landings | Discards logbook | No. days <br> fished (D) | No. sets made (S) | L = Landings |  | $\begin{gathered} \text { discards } \\ \text { Landings }+ \\ \hline \end{gathered}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | L/D | L/S | C/D | C/S |
| 1981 | 10 | 725.0 | 92.9 | 89 | 118 | 8.2 | 6.1 | 9.2 | 6.9 |
| 1982 | 8 | 849.9 | 188.0 | 67 | 109 | 12.7 | 7.8 | 15.5 | 9.5 |
| 1983 | 14 | 1097.0 | 253.2 | 113 | 161 | 9.7 | 6.8 | 12.0 | 8.4 |
| 1984 | 10 | 928.0 | 297.1 | 87 | 127 | 10.7 | 7.3 | 14.1 | 9.7 |
| 1985 | 9 | 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 |
| 1990 | 20 | 1784.1 | 1075.8 | 131 | 224 | 13.6 | 8.0 | 21.8 | 12.8 |
| 1991 | 1 | 0 | 43.1 | 8 | 5 | 0 | 0 | 5.4 | 8.6 |
| 1992 | 13 | 778.3 | 102.1 | 47 | 86 | 16.6 | 9.1 | 18.7 | 10.2 |

Table 10. Capelin landings ( $t$ ), discards ( $t$ ), bycatch ( $t$ ), and catch/effort from research logbook records for capelin traps in Div. 3K, 1983-92.

| Year | No. fishermen | No. traps | Landings | Discards logbook | Bycatch |  | No. days fished (D) | No. times hauled (H) | L = Landings |  | $\mathrm{C}=\underset{\text { discards }}{\text { Landings }}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | $\overline{\mathrm{Cod}}$ | Herring |  |  | L/D | L/H | C/D | C/H |
| 1983 | 3 | 3 | 85.8 | 51.3 | 6.0 | 24.9 | 41 | 48 | 2.1 | 1.8 | 3.3 | 2.9 |
| 1984 | 6 | 6 | 217.0 | 111.3 | 2.6 | 0.1 | 80 | 101 | 2.7 | 2.1 | 4.1 | 3.3 |
| 1985 | 9 | 9 | 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 |
| 1990 | 34 | 48 | 1893.7 | 1447.9 | 2.9 | 0.1 | 312 | 575 | 6.1 | 3.3 | 10.7 | 5.8 |
| 1991 | 23 | 28 | 1288.5 | 722.5 | 1.4 | 1.4 | 439 | 583 | 2.9 | 2.2 | 4.6 | 3.4 |
| 1992 | 21 | 23 | 1072.1 | 231.8 | 1.5 | 5.7 | 208 | 308 | 5.2 | 3.5 | 6.3 | 4.2 |

Table 11. Capelin landings ( $t$ ), discards ( $t$ ), bycatch ( $t$ ), and catch/effort from research logbook records for capel in traps in Div. 3K in 1992.

| Area | No. fishermen |  | No. traps | Landings | Discards logbook* | Bycatch |  | No. days fished (D) | No. times hauled ( H ) | $\mathrm{L}=$ Landings |  | $\mathrm{C}=\underset{\text { discards }}{\text { Landings }}+$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\overline{\text { cod }}$ |  |  | Herring | L/D |  |  | L/H | $c / 0$ | C/H |
| White Bay |  | 15 |  | 17 | 1012.0 | 124.8 | + | 5.3 | 186.1 | 261 | 5.4 | 3.9 | 6.1 | 4.4 |
| Notre Dame | Bay | 6 | 6 | 60.1 | 107.0 | 1.5 | 0.5 | 22.3 | 47 | 2.7 | 1.3 | 7.5 | 3.6 |

[^1]Table 12. Capel in landings ( $t$ ), catch rates ( $t /$ day, and effort (days fished) for purse seines (PS) and capelin traps ( $T$ ) in NAFO Div. 3K, 1982-92.

| Year | Gear | Landings | Catch rate | Effort |
| :---: | :---: | :---: | :---: | :---: |
| 1982 | PS | 1939 | 15.5 | 125 |
| 1983 | $\begin{aligned} & \text { PS } \\ & \text { T } \end{aligned}$ | $\begin{array}{r} 2359 \\ 344 \end{array}$ | $\begin{array}{r} 12.0 \\ 3.3 \end{array}$ | $\begin{aligned} & 197 \\ & 104 \end{aligned}$ |
| 1984 | $\begin{aligned} & \text { PS } \\ & T \end{aligned}$ | $\begin{aligned} & 3661 \\ & 1119 \end{aligned}$ | $\begin{array}{r} 14.1 \\ 4.1 \end{array}$ | $\begin{aligned} & 260 \\ & 273 \end{aligned}$ |
| 1985 | $\begin{aligned} & \text { PS } \\ & T \end{aligned}$ | $\begin{aligned} & 3948 \\ & 2584 \end{aligned}$ | $\begin{array}{r} 16.5 \\ 3.2 \end{array}$ | $\begin{aligned} & 239 \\ & 808 \end{aligned}$ |
| 1986 | $\begin{aligned} & \text { PS } \\ & \text { T } \end{aligned}$ | $\begin{aligned} & 4222 \\ & 5143 \end{aligned}$ | $\begin{array}{r} 18.0 \\ 5.8 \end{array}$ | $\begin{aligned} & 235 \\ & 887 \end{aligned}$ |
| 1987 | $\begin{aligned} & \text { PS } \\ & { }_{T} \end{aligned}$ | $\begin{aligned} & 3038 \\ & 5625 \end{aligned}$ | $\begin{aligned} & 15.3 \\ & 10.5 \end{aligned}$ | $\begin{aligned} & 199 \\ & 536 \end{aligned}$ |
| 1988 | $\begin{aligned} & \text { PS } \\ & { }_{T} \end{aligned}$ | $\begin{array}{r} 9767 \\ 13353 \end{array}$ | $\begin{array}{r} 18.5 \\ 5.9 \end{array}$ | $\begin{array}{r} 528 \\ 2263 \end{array}$ |
| 1989 | $\begin{aligned} & \text { PS } \\ & \text { T } \end{aligned}$ | $\begin{array}{r} 6608 \\ 17755 \end{array}$ | $\begin{array}{r} 16.7 \\ 5.8 \end{array}$ | $\begin{array}{r} 396 \\ 3061 \end{array}$ |
| 1990 | $\begin{aligned} & \text { PS } \\ & \mathrm{T} \end{aligned}$ | $\begin{aligned} & 10304 \\ & 21114 \end{aligned}$ | $\begin{aligned} & 21.8 \\ & 10.7 \end{aligned}$ | $\begin{array}{r} 473 \\ 1973 \end{array}$ |
| 1991 | $\begin{aligned} & \text { PS } \\ & T \end{aligned}$ | $\begin{array}{r} 665 \\ 16336 \end{array}$ | $\begin{aligned} & 5.4 \\ & 4.6 \end{aligned}$ | $\begin{array}{r} 123 \\ 3551 \end{array}$ |
| 1992 | $\begin{aligned} & \text { PS } \\ & \text { T } \end{aligned}$ | $\begin{aligned} & 5814 \\ & 9297 \end{aligned}$ | $\begin{array}{r} 18.7 \\ 6.3 \end{array}$ | $\begin{array}{r} 311 \\ 1476 \end{array}$ |

Table 13. Catch-at-age (numbers $\times 10^{-3}$ ) for mature capel in by purse seines and traps in NAFO Div. 3K, 1982-92.

|  | Year | Ages |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\overline{2}$ | 3 | 4 | 5 | 6 |
| Purse seine | 1982 | 721 | 50424 | 5853 | 2684 | 866 |
|  | 1983 | 0 | 23701 | 41243 | 1120 | 0 |
|  | 1984 | 869 | 43719 | 63597 | 2532 | 68 |
|  | 1985 | 2317 | 88525 | 39908 | 17304 | 528 |
|  | 1986 | 0 | 92407 | 49080 | 3328 | 962 |
|  | 1987 | 292 | 25579 | 196175 | 14998 | 808 |
|  | 1988 | 3232 | 165420 | 58995 | 49118 | 2423 |
|  | 1989 | 302 | 152365 | 48062 | 2798 | 3299 |
|  | 1990 | 610 | 119653 | 218226 | 3285 | 0 |
|  | 1991 | 1064 | 13517 | 10821 | 2181 | 23 |
|  | 1992 | 13185 | 197654 | 28333 | 1110 | 101 |
| Trap | 1984 | 211 | 9784 | 21590 | 1177 | 23 |
|  | 1985 | 1320 | 45400 | 27798 | 9263 | 287 |
|  | 1986 | 53 | 100409 | 62607 | 4415 | 1565 |
|  | 1987 | 108 | 15454 | 100172 | 9027 | 687 |
|  | 1988 | 7822 | 226722 | 85210 | 69096 | 3791 |
|  | 1989 | 2667 | 355777 | 152256 | 6677 | 8028 |
|  | 1990 | 1489 | 231748 | 457297 | 7935 | 0 |
|  | 1991 | 31255 | 315508 | 252968 | 44405 | 259 |
|  | 1992 | 41173 | 287815 | 52828 | 6827 | 0 |

Table 14. Catch rates-at-age and total catch rate (mumbers $\times 10^{-3} /$ day) for mature capel in from purse seines and traps in NAFO Div. 3K, 1982-92.

|  | Ages |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Year | 2 | 3 | 4 | 5 | 6 | Total |
| Purse seine | 1982 | 5.8 | 403.4 | 46.8 | 21.5 | 6.9 | 484.4 |
|  | 1983 | 0 | 120.3 | 209.4 | 5.7 | 0 | 335.4 |
|  | 1984 | 3.3 | 168.2 | 244.6 | 9.7 | 0.3 | 426.1 |
|  | 1985 | 9.7 | 370.4 | 167.0 | 72.4 | 2.2 | 621.7 |
|  | 1986 | 0 | 393.2 | 208.9 | 14.2 | 4.1 | 620.4 |
|  | 1987 | 1.5 | 128.5 | 985.8 | 75.4 | 4.1 | 1195.3 |
|  | 1988 | 6.1 | 313.3 | 111.7 | 93.0 | 4.6 | 528.7 |
|  | 1989 | 0.8 | 384.8 | 121.4 | 7.1 | 8.3 | 522.4 |
|  | 1990 | 1.3 | 253.0 | 461.4 | 6.9 | 0 | 722.6 |
|  | 1991 | 8.7 | 109.9 | 88.0 | 17.7 | 0.2 | 224.5 |
|  | 1992 | 42.4 | 635.5 | 91.1 | 3.6 | 0.3 | 772.9 |
| Traps | 1984 | 0.8 | 35.8 | 79.1 | 4.3 | 0.1 | 120.1 |
|  | 1985 | 1.6 | 56.2 | 34.4 | 11.5 | 0.4 | 104.1 |
|  | 1986 | 0.1 | 113.2 | 70.6 | 5.0 | 1.8 | 190.7 |
|  | 1987 | 0.2 | 28.8 | 186.9 | 16.8 | 1.3 | 234.0 |
|  | 1988 | 3.5 | 100.2 | 37.7 | 30.5 | 1.7 | 173.6 |
|  | 1989 | 0.9 | 116.2 | 49.7 | 2.2 | 2.6 | 171.6 |
|  | 1990 | 0.8 | 117.5 | 231.8 | 4.0 | 0 | 354.1 |
|  | 1991 | 8.8 | 88.9 | 71.2 | 12.5 | 0.7 | 182.1 |
|  | 1992 | 27.9 | 195.0 | 35.8 | 4.6 | 0 | 263.3 |

Table 15. Catch rate-at-age ( $t /$ day) for ages 3 and 4 mature capelin combined for NAFO Div. 3K year-classes, 1979-88.

| Year-class | Purse seine (C/D) | Trap (C/D) |
| :---: | :---: | :---: |
| 1979 | 612.8 |  |
| 1980 | 364.9 | 70.2 |
| 1981 | 335.2 | 126.8 |
| 1982 | 579.3 | 300.1 |
| 1983 | 1379.0 | 66.5 |
| 1984 | 240.2 | 149.9 |
| 1985 | 434.7 | 188.0 .7 |
| 1986 | 846.2 | 124.7 |
| 1987 | 341.0 |  |
| 1988 | 201.0 |  |






Fig. 2. Mean lengths-at-age for male and female capelin and gexes combined, Div. 3L, 1981-92.




Fig. 3. Mean lengths-at-age for male and female capelin and sexes combined, Div. 3K, 1984-92.


Fig. 4. Catch rates ( $t / d a y$ ) for purse seine and trap fisheries in NAFO Div. 3K.


Fig. 5. Catch rates (nos. $x 10^{-3} /$ day) for purse seines and traps in NAFO Div. 3 K .


Fig. 6. Catch rates at ages 3 and 4 combined for purse seines and traps in NAFO Div. 3 K .


Fig. 7. Standardized catch rates at ages 3 and 4 combined for purse seines and traps in NAFO Div. 3 K .

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

| 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 White Bay 2J3K | $\begin{aligned} & 1500 \\ & 1500 \\ & 1000 \end{aligned}$ | $\begin{aligned} & 1500 \\ & 1500 \\ & 1000 \end{aligned}$ |  | $\begin{aligned} & 3000 \\ & 3000 \\ & 2000 \end{aligned}$ | Frozen females Frozen females Roe extraction | June 15 <br> June 15 <br> June 15 |
| 1984 | Notre Dame Bay White Bay \& Labrador | $\begin{aligned} & 2500 \\ & 1500 \end{aligned}$ | $\begin{aligned} & 2500 \\ & 1500 \end{aligned}$ |  | $\begin{aligned} & 5000 \\ & 3000 \end{aligned}$ | Frozen females Frozen females | June 15 June 15 |
| 1985 | Notre Dame Bay White Bay \& Labrador | $\begin{aligned} & 2500 \\ & 1500 \end{aligned}$ | $\begin{aligned} & 2500 \\ & 1500 \end{aligned}$ |  | $\begin{aligned} & 5000 \\ & 3000 \end{aligned}$ | Frozen females Frozen females | June 28 June 28 |
| 1986 | Notre Dame Bay White Bay \& Labrador | $\begin{aligned} & 5500 \\ & 4000 \end{aligned}$ | $\begin{aligned} & 5500 \\ & 4000 \end{aligned}$ |  | $\begin{array}{r} 11000 \\ 8000 \end{array}$ | Frozen females Frozen females | June 1 June 1 |
| 1987 | Notre Dame Bay White Bay \& Labrador | $\begin{aligned} & 3300 \\ & 2600 \end{aligned}$ | $\begin{aligned} & 1700 \\ & 1000 \end{aligned}$ |  | $\begin{aligned} & 5000 \\ & 3600 \end{aligned}$ | Frozen females Frozen females | June 1* June 1* |
| 1988 | Notre Dame Bay White Bay \& Labrador | $\begin{aligned} & 8200 \\ & 5300 \end{aligned}$ | $\begin{aligned} & 3250 \\ & 3250 \end{aligned}$ | 1500 | $\begin{aligned} & 11450 \\ & 10050 \end{aligned}$ | Frozen females Frozen females | June 1 June 1 |
| 1989 | Notre Dame Bay White Bay <br> N. White Bay Labrador | $\begin{array}{r} 8500 \\ 7000 \\ 1500 \\ 300 \end{array}$ | $\begin{aligned} & 3500 \\ & 3300 \end{aligned}$ |  | $\begin{array}{r} 12000 \\ 10300 \\ 1500 \\ 300 \end{array}$ | Frozen females Frozen females Frozen females Frozen females | June 7 <br> June 7 <br> June 7 <br> June 7 |
| 1990 | Notre Dame Bay White Bay <br> N. White Bay Labrador | $\begin{array}{r} 10500 \\ 8500 \\ 2000 \\ 400 \end{array}$ | $\begin{aligned} & 4000 \\ & 4000 \end{aligned}$ |  | $\begin{array}{r} 14500 \\ 12500 \\ 2000 \\ 400 \end{array}$ | Frozen females Frozen females Frozen females Frozen females |  |
| 1991 | Notre Dame Bay <br> - Cape John to North Hd. <br> - North Hd. to Dog Bay Pt. <br> - Dog Bay Pt. to Cape Freels White Bay | $\begin{aligned} & 2950 \\ & 6150 \\ & 1400 \\ & 8500 \end{aligned}$ | $\begin{aligned} & 4000 \\ & 4000 \end{aligned}$ |  | $\begin{aligned} & 4000 \\ & 2950 \\ & 6150 \\ & 1400 \\ & 4000 \\ & 8500 \end{aligned}$ | Frozen females <br> Frozen females <br> Frozen females <br> Frozen females <br> Frozen females <br> Frozen females | June 5 <br> July 23 <br> July 23 <br> June 5 <br> June 5 <br> July 17 |
|  | North White Bay <br> - North of Fischot Is. <br> - South of Fischot Is. <br> Labrador | $\begin{array}{r} 1500 \\ 500 \\ 400 \end{array}$ |  |  | $\begin{array}{r} 1500 \\ 500 \\ 400 \end{array}$ | Frozen females Frozen females Frozen females | Aug. 1 <br> July 31 <br> June 5 |
| 1992 | Notre Dame Bay <br> - Cape John to North Hd. <br> - North Hd. to Dog Bay Pt. <br> - Dog Bay Pt. to Cape Freels White Bay <br> North White Bay | $\begin{array}{r} 1715 \\ 3570 \\ 810 \\ 4940 \end{array}$ | 2325 $2325$ |  | $\begin{array}{r} 2325 \\ 1715 \\ 3570 \\ 810 \\ 7265 \end{array}$ | Frozen females <br> Frozen females <br> Frozen females <br> Frozen females <br> Frozen females | July 19 <br> July 20 <br> July 22 <br> June 5 <br> June 23 |
|  | - North of Fischot Is. <br> - South of Fischot Is. | 1500 500 |  |  | 1500 500 | Frozen females Frozen females | June 23 June 23 |
|  | Labrador | 230 |  |  | 230 | Frozen females | June 5 |

[^2]
[^0]:    * provisional

[^1]:    * includes capelin given to other fishermen

[^2]:    * fishery began June 19 after agreement on price structure and quotas

