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An assessment of the cod stock in NAFO Divisions 4R 4S and in Subdivision 3Pn

by

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ABSTRACT

Nominal catches of cod from the 4RS 3Pn stock had reached a maximum over the last 29 years in 1983 (106,878 t) and have declined to 93,164 t (preliminary statistics in 1984). Catch rates were not standardized since sources of biases and errors could be found in all catch rates series. A new catch at age matrix was reconstructed in order to distinguish different components of the fishery. Research vessel abundance estimates although variable do indicate either stable abundance or a slight increase since 1980. In this respect tuning was done in order to minimize the coefficient of variation of the exploitable biomass in the last three years, this was obtained by using a terminal fishing mortality of 0.35. If the coeficient of variation of 4+ biomass is minimized, F_t is 0.25.

RESUME

Les captures nominales de morue provenant du stock de 4RS 3Pn ont atteint un maximum pour les 29 dernières années en 1983 (106 878 t) et se situent à 93 164 t en 1984 (données préliminaires). Les taux de captures n'ont pu être standardisés à cause de biais et d'erreurs possibles dans les séries de taux de captures. Une nouvelle matrice de capture à l'âge a été produite afin de séparer la contribution des différentes composantes de la pêcherie à la capture à l'âge. Les estimés d'abondance des missions d'évaluation semblent indiquer soit une stabilité ou une légère augmentation depuis 1980. L'estimé de la mortalité par la pêche a été établie en minimisant le coefficient de variation de la biomasse exploitable, nécessitant une mortalité par la pêche de 0,35 en 1984. Si on cherche le plus faible coefficient de variation de la biomasse 4+, F_t est 0,25.

1. INTRODUCTION

The cod fishery in NAFO Divisions 4RS 3Pn has been prosecuted historically in two distinct components: a mostly offshore winter fishery in Subdivision 3Pn and southern 4R and a mostly inshore summer fishery in Divisions 4R and 4S (Table 1). The fishery has been dominated historicaly by Canada which took 53% of the reported catches between 1959 and 1976. Since 1977, the French component of the catch has been limited to 15% while the remainder was caught in a 2:1 ratio by Newfoundland and Quebec based vessels. Catches by Maritime based vessels have been small (Table 2 & 3). Preliminary catches for 1984 show a slight decrease in landings for Newfoundland and a small increase for Quebec, Maritime and St.Pierre based vessels in relation to 1983.

2. NOMINAL CATCHES

The 1984 nominal catch statistics (Table 4) for Newfoundland, Maritime and Quebec based vessels were obtained from the respective Statistical branches of the Department of Fisheries and Oceans. Data for the French fleet operating in the Gulf were obtained through the FLASH system. Revised landings for the 1983 fishery indicates an increase of 4,231 t over the 102, 647 t figure presented in Gascon (1984); the preliminary statistics for 1984 (93,164 t) indicate a drop of 13%. This is mainly due to decreases in catch by Newfoundland based otter trawlers and longliners operating in Subdivision 3Pn in the first 3 months of the year and Maritime otter trawls in May in Division 4R. However, small increases are noted for Quebec and St.Pierre based vessels.

3. CATCH AND EFFORT DATA

Historical commercial catch and effort data, with the exception of French (metropolitan and St.Pierre and Miquelon) and Québec based vessels, were obtained from the NAFO Statistical Bulletins. Data for the Québec based vessels (from 1975-1983) were obtained from the Direction de la recherche, ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec. The data for the French vessels were obtained through the various Observer programs (Programme des observateurs du Québec, Foreign Cooperative Observer programs, Scotia Fundy and Newfoundland regions). The data for 1984 were obtained with the nominal catch statistics. Preliminary catch and effort data for 1985 were obtained for Newfoundland based vessels. Preliminary catch and effort data for 1984 obtained from the Quebec and Gulf regions in May 1985 were suspect (because of unusually large or small catch per unit effort). These data were rejected and the assessment postponed until the fall. At that time, revised data were available only from the Quebec Region; these data represented only a sampling of the total fleet (vessels known to fish mostly Division 4S).

The catch rate data were analysed using the multiplicative model (Gavaris, 1980). The series was analysed in a single unit as in Gascon (1984). Values for catch less than 10 t and effort less than 10 hours were deleted from the analysis because of possible large rounding off in the statistical tables. A weighting factor, estimated from the residuals of an unweighted regression (average on 5 levels of effort values) was applied to the CPUE data. Results of the analysis are presented in Tables 5 and 6 and in Figure 1.

Standardized catch rates decreased by more than 27% between 1982 and 1984, this trend continuing at a lower rate in 1985. Preliminary analysis of catch rate, from which the observer data from the French vessels were excluded, showed an even more pronounced decline (49%) imputable only to Canadian vessels. A detailed examination of all catch rates present in the analysis was undertaken to determine the source of the decline. Canadian components on the model are as follows:

1) Quebec based OTB2's and OTB3's fishing mostly in Division 4S between May and September. This fishery occurs in the western part of the stock range and accounts for approximately 7% of nominal catches (Table 7a, b).

2) Maritime (New Brunswick, Prince Edward Island, and Nova Scotia) based OTB5's and OTB4's fishing the winter concentrations from January until June. It represents less than 1% of nominal catches (Table 7c and d).

3) Newfoundland based OTB4's and OTB5's fishing Divs 3Pn and southern 4R from January until May fishing the winter concentrations of the stock. It accounts for approximately 1% nominal catches (Table 7e and f).

Three of these catch rate series (Quebec OTB2's and 3's; Maritime OTB4's) showed a regular increase between 1978 and 1983, followed by a sharp decline in 1984 and 1985 (Fig. 2). Catch rates for Newfoundland based OTB4's and OTB5's as well as Maritime base OTB5's have increased steadily until 1981 to decline thereafter. The data for the latter four categories are based on little data in recent years.

The decline (by a factor of 2.5) in catch rates for Quebec vessels between 1983 and 1984 occurred concurrently with a change in jurisdiction. Until 1983, catch and effort statistics were collected by the Provincial Government (Ministère de l'Agriculture, des Pêcheries et de l'Alimentation). Starting in 1984, this responsibility was taken over by the Department of Fisheries and Oceans. We felt at the time that this change might lead to inconsistencies in the temporal series. This change combined with a change in aggregation practices (from a set by set to a day by day basis) might account for, at least, part of the decline. These suspicions were later confirmed (too late to modify the assessment) when a software error was discovered in the catch/effort aggregation program.

Changes in jurisdictions and aggregating practices also occurred in the four remaining series (Maritime and Newfoundland based TC4's and 5's). These catch rates are derived from minor components of the fishery (approximately 2% nominal catches) and may not provide an accurate representation of the fishery as a whole, which is mostly an inshore and small [TC2] trawler fishery. Catch rate data are available only for a small proportion of the total catch since large vessels (both Canadian and foreign) were virtually excluded from the fishery in the late 1970's (Table 6). The major trawler fishery is the one conducted on the west coast of Newfoundland by small vessels (TC2's and TC3's). There are currently no reliable catch/effort data from this fleet. Acquisition of catch/effort data from this fleet should considerably enhance the reliability of the catch rate index.

Catch rates from the winter fishery are extremely variable (Fig. 2 b, c, d - see also Fig. 4: research surveys also conducted in winter) which lead to the belief that other factors, in addition to population dynamic considerations, affect catch rates experienced during the winter months. Hence these catch rates were judged to be of dubious value and were not used further in the analysis.

4. RESEARCH SURVEY RESULTS

Stratified groundfish research surveys have been conducted in Divs. 4R, 4S, and 3Pn since 1978, with the exception of 1982, on the *Gadus Atlantica*. The surveys were always conducted in the January-February period. The stratification of the Northern Gulf of St.Lawrence is shown in Figure 3. Minimum exploitable biomass estimated from these surveys are shown in Figure 4. Because of the rather unpredictable nature of the weather at the time of the surveys, and of the varying extent of the ice cover between years, the number and the identity of the strata surveyed varied from year to year.

Thus a standardized research survey abundance index from these surveys was constructed using only the strata surveyed in all years (Figure 5: vertical hatching). Strata 833, 827, 803 and 804 (Figure 5: stippled areas) were not surveyed in 1979. Strata 823 and 824 in Division 4R as well as 829 and 830 in Division 4S were not surveyed in all years and were combined to form strata AB and CD respectively. The resulting combined strata yielded a complete temporal series. This was done because these very thin contiguous strata were in the same depth range and displayed similar catch rates. Estimates of biomass per stratum for the standardized series of strata are shown in Table 8.

The survey abundance indices cover a relatively short time interval (1978 to 1985), and the survey was not conducted in 1982. The estimates of biomass derived from the surveys are extremely variable (Figure 4) from year to year. Because of this variability, these indices are best considered at this stage as a qualitative indicator of stability in stock abundance between 1978 and 1985, with possibly a slight increase in recent years.

5. CATCH AT AGE

The historical catch at age (1974-1983) for cod in NAFO Divisions 4R, 4S, and 3Pn was recalculated using the biological sampling data of the catch provided by the Fisheries Research Branch, Newfoundland Region (period 1974-1982), and the data from the Fisheries Research Branch, Québec Region for 1983.

Individual length frequency samples were grouped into strata defined by gears, Country (or Provinces), Divisions, and months. Weighted (by the turnout weights associated with each sample) average length frequencies were computed within each stratum. No turnout weights were available for the pre-1979 samples for inshore gears, hence these average length frequencies remained unweighted. These frequencies were then averaged in a stepwise manner in order to produce quarterly average length frequencies for the inshore and trawler catches. The weighting factors used were the nominal catches for each of the stratum obtained from the NAFO Statistical Bulletins. In combining the length frequencies, the classification factors were ordered as follows: Divisions, Country, and gears. Departures from this scheme only occurred when the lack of data (eg. nominal catches for inshore gears from Québec) or samples dictated it. Age-length keys were likewise combined to produce 4 quarterly keys for the inshore gears and trawlers respectively.

The age length keys were appied to the length frequencies to produce quarterly catch-at-age vectors for the inshore gears and trawlers. These were added to form yearly catch-at-age vectors for the inshore gears, trawlers, and the whole fleet. The average weights at age were obtained by applying the following length-weight relationship to the length-at-age data (Minet, 1978).

$$\mathrm{Log}_{10}(W_g) = 2.96 \ . \ \mathrm{Log}_{10}(L_{cm}) - 1.98$$

In several years, especially the earlier ones, samples were lacking in some quarters, and the catch vectors had to be extrapolated from existing samples.

Catch-at-age and average weights-at-age matrices were then constructed for the whole catch (Table 9), the inshore gears (Table 10), the offshore catch (Table 11). The catch at age presented in this document includes all of the available data.

Catch at age for 1984

Biological sampling data for the 1984 catch were obtained from several sources: the commercial sampling sections of the Quebec and Gulf regions Fisheries Research Branches for Canadian landings, and the foreign observer program for the French fleet. The sampling data available for 1984 are summarized in Table 12.

The 1984 catch at age and its variance (Gavaris and Gavaris, 1982) was calculated as described above. The quarterly catch-at-age vectors for inshore gears and trawlers are given in Tables 13 and 14 respectively. The combined catch vectors (inshore, trawlers and total) are given in Tables 15 and 16.

6. SEQUENTIAL POPULATION ANALYSIS

Cohort analysis (Pope, 1972) was performed using the catch-at-age matrix shown in Table 9a using a constant instantaneous rate of natural mortality of 0.2. Midyear biomasses were determined using the average weights at age of Table 9b. By examination of age specific mortalities of preliminary runs of VPA (at $F_T = 0.3$), it appears that cod from NAFO Divisions 4R, 4S, and 3Pn are fully recruited to the fishery from age 7 onward.

The partial recruitments for age 4 to 6 in 1984 were estimated as the average of partial recruitments for ages 4 to 6 between 1977 and 1983 (Table 17 a). The 3 first years were excluded because it was suspected that some data were left out of the catch-at-age matrix originally used. A mesh size change occurred in the Gulf of St.Lawrence in 1981 for otter trawlers (120 mm to 130 mm) which could have affected the PR vector in recent years. However, a regulated mesh size reduction from 152 to 140 mm occurred simultaneously for the gillnets in Quebec. Following these changes, there was no apparent effects in the partial recruitment matrix, hence the average between 1977 and 1983 was used. The historical partial recruitments were estimated as the ratio of fishing mortaility at age over the fully recruited fishing mortality (Table 17b). The fully recruited fishing mortalities were estimated from the survival rate of fish aged 7 to 10 in one year and aged 8 to 11 in the next. Attempts to derive the PR vector by estimating directly fishing mortality at age in 1984 from a relationship between historical effort levels of the trawler fleet and the partial F at age for the same fleet proved unsuccessful as no valid predictive relationships could be established for the partialy recruited ages.

7. DETERMINATION OF FISHING MORTALITY IN 1984

Because the available abundance indices (catch rates and research surveys) could not be used reliably in tuning the sequential population analysis, an alternate method of determining terminal fishing mortality was used. There did not seem to be any major changes in the stock abundance and in the fishery in the recent years (1982 to 1984) and faced with lack of clear information in one way or another, the most pascimonious approach was to assume stability in stock abundance over this period. There is some anectodal evidence to support this hypothesis: there has been no apparent change of effort level in the fishery in the last few years. While some Quebec based vessels have moved into the shrimp fishery, a number of additional Newfoundland vessels have entered the cod fishery. The commercial catch rate series do not show a consistent trend since some increase and some decrease. The French series, with the exception of the 1984 point, is relatively stable, as is the research survey series.

Therefore, a terminal fishing mortality was chosen to minimize variation (as measured by the coefficient of variation [CV]) over the last 3 years (1982 to 1984) on stock abundance parameters computed from sequential population analysis. C.V. for fully recruted fishing mortality, total biomass, and exploitable biomass (obtained by applying the partial recruitment vector [Table 17b] to the total biomass) between 1982 and 1984, for a range of terminal F (0.15 to 0.5) is given in Table 18. Variation in total biomass is minimized at a F of .25, whereas variations in exploitable biomass and fishing mortality are minimized at F's in 1984 of .35 and .4-.45 respectively (Table 18).

Previous assessment of this stock (Gascon 1983, 1984) have found that the relation between effort and fishing mortality were usually weak. Therefore, fishing mortalities were not considered further in this analysis. Research survey biomass estimates should correlate more closely with total biomass estimates from SPA, hence minimizing C.V. on total biomass implies minimum variations in the survey abundance index. Similarly, minimizing C.V. in exploitable biomass implies minimim variations in catch rates.

Because no reliable catch rate data were available, the implied stability in catch rates by the above analysis is purely speculative. The implied stability in survey index is based on firmer grounds, as the data, albeit extremely variable, tend to show stability (section 4). However, total biomass obtained from SPA are more affected by estimates of the partial recruitment vector and weights at age, for partially recruited age groups than is exploitable biomass, whereas the effects of the P.R. vector cancel out in exploitable biomass.

Because of large uncertainties in parameters used in these relationships cohort analysis for both hypothesis (F_t = .25 and F_t = .35) are presented in Tables 19 and 20.

8. CATCH PROJECTIONS FOR 1985 AND 1986

Catch projections were made using population numbers in 1984 from cohort analysis at both F_t = 0.25 and .35 (Table 21, 22). Recruitment at age 4 for 1985 and 1986 was estimated using the geometric mean of age 4 population numbers between 1974 and 1984 (110 x 10^6 fish). The average of 1982 to 1984 weights at age was used for the projections. Partial recruitment vector is the same as used in 1984 (Table 17b).

The parameters used in the projection of the $F_{0.1}$ reference level in 1986 were as follows:

Age	Population Numbers 1984 ('000) (F_t = 0.35)	Population Numbers 1984 ('000) (F_t = 0.25)	Catch Numbers 1984 ('000)	Average Weights (Kg)	Partial Recruitment
4	101 302	141 280	2,526	0.83	0.080
5	69 264	95 423	7,032	1.11	0.339
6	60 560	82 097	11,835	1.48	0.691
7	65 576	87 692	17,654	1.80	1.000
8	24 467	32 718	6,587	2.10	1.000
9	19 049	25 474	5,128	2.47	1.000
10	7 218	9 653	1,943	3.07	1.000
11	3 050	4 079	821	3.96	1.000
12	1 496	2 001	403	4.53	1.000
13	558	746	150	5.79	1.000
14	125	167	34	6.63	1.000
15	103	138	28	6.68	1.000
16	146	195	39	6.64	1.000

Under hypothesis 1 (minimum variations in exploitable biomass; F_t = 0.35), if the 1985 TAC of 100,000 t is taken (resulting in a F of 0.38 in 1985) the $F_{0.1}$ catch in 1986 would be 54,000 t. Under hypothesis 2 (minimum variations in total biomass; F_t = 0.25) if the 1985 TAC of 100,000 t is taken (resulting in a F of 0.249 in 1985), the $F_{0.1}$ catch in 1986 would be 83,000 t. This latter hypothesis was retained as the basis of advice in Advisory Document 85/19.

9. REFERENCES

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Table 1: Historical monthly catch statistics for the 4RS 3Pn cod stock for the period 1961-1984. The pre-1961 data for 3Pn are too incomplete to allow monthly estimate for the stock as a whole.

MONTHS / YEARS	J	F	M	A	M	J	J	A	S	O	N	D	NK	TOTAL
1961*	364	12,375	44,543	8,745	1,473	5,761	14,341	6,752	2,490	1,408	1,305	453		100,010
1962*	316	12,903	24,720	4,656	1,565	6,951	16,717	11,738	3,513	1,535	1,016	291		85,921
1963*	649	7,661	13,336	2,478	1,623	17,419	14,870	10,698	3,104	1,916	692	300		74,746
1964	1,104	24,423	15,761	6,058	3,106	10,350	12,527	5,853	2,153	1,385	863	651		84,234
1965	792	12,506	21,171	3,698	2,216	5,267	10,422	5,945	3,636	1,359	927	990		68,929
1966	1,965	22,817	8,929	2,516	1,638	8,371	7,482	4,744	2,490	1,146	1,779	1,208		65,085
1967	7,872	7,028	14,792	8,447	2,017	7,525	12,664	5,232	7,154	3,315	1,356	1,909	1	79,312
1968	725	7,980	22,799	9,061	3,087	10,717	17,216	9,400	4,914	1,781	1,172	819		89,671
1969	875	4,654	9,675	4,220	5,192	10,958	12,103	8,639	7,866	3,557	2,035	1,366		71,140
1970	1,637	25,487	18,115	27,995	4,803	6,020	8,974	3,897	2,130	3,170	1,936	1,301		105,465
1971	845	44,590	7,580	5,250	2,338	5,839	8,420	3,039	2,374	1,616	1,004	915		83,810
1972	1,494	14,961	5,337	7,400	7,334	4,594	6,818	3,296	2,365	1,406	994	212	2,026	58,237
1973	16,472	10,556	7,586	4,826	3,235	5,860	5,125	4,145	2,365	1,459	1,016	567	2,593	65,805
1974	12,995	10,753	5,959	5,665	6,231	5,021	6,235	5,396	2,214	1,331	1,009	479	3,148	66,436
1975	8,232	19,486	2,702	2,616	5,316	5,122	5,042	4,488	2,767	1,267	819	704	1,672	60,233
1976	15,637	15,204	3,610	3,437	7,071	6,930	6,978	4,310	3,348	2,286	1,537	578	6,055	76,981
1977	11,143	8,603	3,790	11,312	10,057	7,368	8,133	5,780	3,361	1,751	1,814	454		73,566
1978	20,754	6,307	5,161	3,156	6,717	9,796	13,255	7,000	2,836	1,979	1,309	236		78,506
1979	15,543	4,273	6,475	6,647	8,517	12,890	12,085	8,660	2,971	2,449	1,816	451		82,777
1980	5,280	8,965	9,925	8,087	7,147	14,096	23,158	10,719	5,687	2,773	1,311	431		97,579
1981	9,156	15,368	3,170	3,763	12,835	17,257	16,344	10,343	5,676	2,550	1,172	277		97,911
1982	2,289	11,671	10,122	5,544	12,723	16,826	22,492	9,136	8,412	4,463	1,229	32		104,939
1983	3,982	10,586	11,187	6,903	21,049	18,352	16,251	8,139	5,790	3,932	552	155		106,878
1984+	5,435	10,375	8,986	3,567	12,742	12,918	17,313	11,116	4,286	4,430	944	1,048	4	93,164

* Incomplete data. Some statistics reported for div. 3P only.

+ Preliminary Statistics.

Table 2: Historical catch statistics for the 4RS 3Pn cod stock by division for the major participants involved in the fishery during the period 1954-1984.

3Pn

COUNTRIES / YEARS	CAN-N	CAN-M	CAN-Q	FR-M	FR-SPM	SPAIN	PORT.	OTHERS	TOTAL
1954									NK
1955									NK
1956									NK
1957									NK
1958									NK
1959*	4,901			651		59	1,162		6,773
1960*	5,181		2	3,694		1,428	976		11,281
1961*	5,728		42	8,515		15,551	8,282	100	38,218
1962*	8,022		3	3,807		9,310	3,506		24,648
1963*	8,076		65	2,148		5,764	4,139	12	20,204
1964	8,502			2,015		1,663	2,116	836	15,132
1965	8,344		2	5,206	277	1,466	1,009	431	16,735
1966	6,876		2	3,470	450	1,675	559	592	13,624
1967	4,546			6,622		2,512	1,273	5,475	20,428
1968	5,640			3,207	13	2,223	680	146	11,909
1969	4,763			47	5	102			4,917
1970	4,930			90	1	184			5,205
1971	6,661				26	167	990		7,844
1972	6,521			2,687	3	269	877		10,357
1973	5,885			1,008		515	3,841	51	11,300
1974	2,941		8	3,913	557	1,507	4,149	938	14,013
1975	2,758		18	2,612	295		538	12	6,233
1976	6,041		56	1,452	280			636	8,465
1977	7,109		247	167	42				7,565
1978	6,271		34	497					6,802
1979	10,208	151		557					10,916
1980	8,150	174		271	204				8,799
1981	11,191	60	3	2,869	1,006				15,130
1982	14,703	152	-	341	289	-	-	-	15,485
1983	12,053	104	-	(4,211)		-	-	-	16,368
1984+	5,128	178	-			-	-	-	(5,306)

* Incomplete data. Some statistics reported from div. 3P only.

\+ Preliminary Statistics. Without the French statistics.

Note: Subdivision 3Pn was created in 1959.

Table 2: continued

4R

COUNTRIES / YEARS	CAN-N	CAN-M	CAN-Q	FR-M	FR-SPM	SPAIN	PORT.	OTHERS	TOTAL
1954		16,571		14,050			1,598	7	32,226
1955	15,631	252		20,642		46	9,628	35	46,234
1956	15,635	4,076		10,568		14	8,737	32	39,062
1957	25,133	1,974		13,512			7,252	1	47,872
1958	18,832	7,139		30,037		314	15,334		71,656
1959	26,099	7,174		7,099		392	166		40,930
1960	17,302	5,937		21,970	4	7,331	13,418	604	66,566
1961	15,737	2,904		18,706		2,374	7,626		47,347
1962	21,984	3,482		7,043		5,451	10,142		48,102
1963	26,799	2,984		1,628		3,019	7,936		42,366
1964	20,162	3,197		16,264	38	6,806	12,492	1	58,960
1965	20,037	1,715		10,084	70	219	11,714		43,839
1966	21,202	1,813		9,735		1,097	10,361		44,208
1967	22,398	3,511		10,460	1	3,806	6,180	3,585	49,941
1968	32,810	4,415		22,963	169	2,779	6,905		70,041
1969	27,342	8,784		16,318	165	2,693	1,330		56,632
1970	23,337	11,337		30,303	120	8,053	17,993	3	91,146
1971	17,095	2,237		24,363	68	5,451	17,144	4	66,362
1972	11,664	3,348		10,608	3	1,357	8,144	2,459	37,583
1973	13,222	1,086		16,525	109	502	11,232	418	43,094
1974	16,348	5,538		11,679	395		5,302	184	39,446
1975	14,897	2,727		13,206	625		9,879	235	41,569
1976	20,004	6,648		15,392	918		9,034	4,034	56,030
1977	9,907	25,568		15,815	2,097				53,387
1978	35,376	6,290		13,252	2,022				56,940
1979	37,096	4,423	1,038	11,040	2,171				55,768
1980	52,358	2,822	582	8,275	646				64,683
1981	49,479	2,291	775	7,466	1,167				61,178
1982	51,248	2,024	882	9,875	1,458	-	-	-	65,487
1983	55,842	3,271	2	(7,180)		-	-	-	66,295
1984+	51,522	589	95			-	-	-	(52,206)

+ Preliminary Statistics. Without the French statistics.

Table 2: continued

4S

COUNTRIES / YEARS	CAN-N	CAN-M	CAN-Q	FR-M	FR-SPM	SPAIN	PORT.	OTHERS	TOTAL
1954		2,928							2,928
1955	1	4,487		30			717		5,235
1956	11	2,318		319					2,648
1957	23	5,417		254			119		5,813
1958	157	7,597		38			20		7,812
1959	7	10,224				126			10,357
1960		16,057		18		428			16,503
1961	1	13,814		495		74	61		14,445
1962		13,171							13,171
1963	22	11,794					360		12,176
1964	45	10,077		18			2		10,142
1965	108	7,241					1,006		8,355
1966	88	6,777		57			331		7,253
1967	50	6,859		22			1,092	920	8,943
1968	146	7,558			17				7,721
1969	307	9,241			1	42			9,591
1970	443	8,175				198	298		9,114
1971	182	9,161			1	259		1	9,604
1972	189	9,130		27		338	613		10,297
1973	434	7,942					911	2,124	11,411
1974	366	8,976		86	4		1,474	2,077	12,983
1975	381	7,808		401	16		2,400	1,425	12,431
1976	726	9,231		22	23		1,099	1,385	12,486
1977	171	12,426		10	7				12,614
1978	229	14,535							14,764
1979	47	851	15,194		1				16,093
1980	1,437	1,417	21,243						24,097
1981	336	229	21,038						21,063
1982	141	1,386	22,390	50	-	-	-	-	23,967
1983	505	1,328	22,382	-	-	-	-	-	24,215
1984+	227	436	21,763	-	-	-	-	-	22,426

+ Preliminary Statistics.

Table 2: continued

TOTAL

COUNTRIES / YEARS	CAN-N	CAN-M	CAN-Q	FR-M	FR-SPM	SPAIN	PORT.	OTHERS	TOTAL
1954									NK
1955									NK
1956									NK
1957									NK
1958									NK
1959*	31,007	17,398		7,750		577	1,328		58,060
1960*	22,483	21,996		25,682	4	9,187	14,394	604	94,350
1961*	21,466	16,760		27,716		17,999	15,969	100	100,010
1962*	30,006	16,656		10,850		14,761	13,648		85,921
1963*	34,897	14,843		3,776		8,783	12,435	12	74,746
1964	28,709	13,274		18,297	38	8,469	14,610	837	84,234
1965	28,489	8,958		15,290	347	1,685	13,729	431	68,929
1966	28,166	8,592		13,262	450	2,772	11,251	592	65,085
1967	26,994	10,370		17,104	1	6,318	8,545	9,980	79,312
1968	38,596	11,973		26,170	199	5,002	7,585	146	89,671
1969	32,412	18,025		16,365	171	2,837	1,330		71,140
1970	28,710	19,512		30,393	121	8,435	18,291	3	105,465
1971	23,938	11,398		24,363	95	5,877	18,134	5	83,810
1972	18,374	12,478		13,322	6	1,964	9,634	2,459	58,237
1973	19,541	9,028		17,533	109	1,017	15,984	2,593	65,805
1974	19,655	14,516		15,678	956	1,507	10,925	3,199	66,436
1975	18,036	10,553		16,219	936		12,817	1,672	60,233
1976	26,771	15,935		16,866	1,221		10,133	6,055	76,981
1977	17,187	38,241		15,992	2,146				73,566
1978	41,876	20,859		13,749	2,022				78,506
1979	47,351	5,425	16,232	11,597	2,172				82,777
1980	61,945	4,413	21,825	8,546	850				97,579
1981	61,006	2,580	21,816	10,335	2,173				97,911
1982	66,092	3,562	23,272	10,266	1,747	-	-	-	104,939
1983	68,400	4,703	22,384	(11,391)		-	-	-	106,878
1984+	56,877	1,203	21,858	(13,226)		-	-	-	93,164

* Incomplete data. Some statistics reported for div. 3P only.

\+ Preliminary Statistics.

Note: Subdivision 3Pn was created in 1959. The total catch for this stock is unknown before then.

Table 3: Historical catch statistics for the 4RS 3Pn cod stock broken down into gear categories for the period 1954-1984. (DV, dory vessels; T, traps, GN, gillnets; HL, hand lines; LL long lines, IN misc, inshore, miscellaneous; DS, danish seines; PT, pair trawls; ST, shrimp trawls; OT, otter trawls.)

3Pn

GEARS / YEARS	DV	T	GN	HL	LL	IN. MISC.	DS	PT	ST	OT	TOTAL
1954											NK
1955											NK
1956											NK
1957											NK
1958											NK
1959*				1,016		3,885				1,872	6,773
1960*				1,246		3,934				6,101	11,281
1961*					2,083	3,645		15		32,475	38,218
1962*					2,988	5,005		29		16,626	24,648
1963*	53				3,062	4,922				12,167	20,204
1964	558				3,416	4,875		178		6,105	15,132
1965	113				2,702	4,815		142		8,963	16,735
1966	16				2,499	2,854		559		7,696	13,624
1967					657	3,463	27	33		16,248	20,428
1968	33				85	5,031	12	306		6,442	11,909
1969			444	270	3,630	39	10	24		500	4,917
1970		46	643	675	3,378		5	62		396	5,205
1971			364	217	5,574	134		52		1,503	7,844
1972	17	10	181	98	5,593	20	545	176		3,717	10,357
1973	1,405		175	110	5,431	97	174	356		3,552	11,300
1974	128		297	52	2,460	915	58	1,507		8,596	14,013
1975			61	152	2,418	12	6			3,584	6,233
1976		9	163	225	4,467	636	163			2,802	8,465
1977		37	73	163	5,679		119			1,494	7,565
1978		7	34	103	5,323		17			1,318	6,802
1979		25	40	116	7,338		181			3,216	10,916
1980			13	83	6,443		18			2,242	8,799
1981		4	3	72	7,560		28			7,463	15,130
1982		1	8	87	7,670		12			7,707	15,485
1983		1	46	97	6,789		20	8		9,407	16,368
1984+		46	212	123	1,934		202		11	(2,778)	(5,306)

* Incomplete data. Some statistics reported for div. 3P only.

+ Preliminary Statistics. Without the French statistics.

Note: Subdivision 3 Pn was created in 1959.

Table 3: continued

4R

GEARS / YEARS	DV	T	GN	HL	LL	IN. / MISC.	DS	PT	ST	OT	TOTAL
1954						16,413				15,813	32,226
1955	55					15,620				30,559	46,234
1956	3,057					15,316				20,689	39,062
1957	581			196		25,034				22,061	47,872
1958	2,619			2,261		18,075				48,701	71,656
1959	2,183			575		25,809				12,363	40,930
1960				108		17,135				49,323	66,566
1961					113	15,640	71			31,523	47,347
1962					104	21,486	105			26,407	48,102
1963					55	26,620	181			15,510	42,366
1964					123	18,789	185			39,863	58,960
1965					152	16,766	145		26,776		43,839
1966					201	15,532	53	38	28,384		44,208
1967					207	21,015	47		28,672		49,941
1968			289		1,138	26,130	60	508	41,916		70,041
1969		3,943	10,905	1,622	4,405	2,646	198	5	32,908		56,632
1970	184	2,340	4,319	1,673	5,489	1,962	239	225	5	74,710	91,146
1971		3,786	3,718	1,295	3,076	436	247		224	53,580	66,362
1972		1,606	2,835	1,107	1,115	2,851	16	24	168	27,861	37,583
1973		2,007	3,154	1,007	2,564	3,050	120	84	545	30,563	43,094
1974		1,789	5,182	1,714	1,358	666	223		28,514		39,446
1975		2,032	6,462	1,413	978	490	221		29,973		41,569
1976		1,572	7,671	1,445	527	4,238	155		40,422		56,030
1977		2,414	7,866	1,591	1,429	147	147		39,793		53,387
1978		4,103	13,235	1,749	2,462		233		35,158		56,940
1979		3,071	11,479	3,138	5,031		311		32,738		55,768
1980		8,354	11,607	2,380	7,768		467		34,107		64,683
1981		5,408	5,796	2,096	8,936	327	384		38,231		61,178
1982		7,473	9,465	2,126	7,208		337		38,878		65,487
1983		3,415	11,849	5,047	6,614		473		2,906	35,991	66,295
1984+		3,167	6,508	3,025	8,077		233		1,038	(30,158)	(52,206)

+ Preliminary Statistics. Without the French statistics.

Table 3: continued

4S

GEARS / YEARS	DV	T	GN	HL	LL	IN. MISC.	DS	PT	ST	OT	TOTAL
1954						2,892				36	2,928
1955						4,423				812	5,235
1956						2,197				451	2,648
1957						5,217				596	5,813
1958				107		7,114				591	7,812
1959				434		9,368				555	10,357
1960				5,159		2,037				9,307	16,503
1961		1,133			2,229	3,830	5			7,248	14,445
1962		2,777	80	3,974	2,057		24			4,259	13,171
1963		3,197		3,570	432		15			4,962	12,176
1964					486	6,166				3,490	10,142
1965		3,950	24		320		1		4,060		8,355
1966		1,656	973		441	798			3,385		7,253
1967		2,470	1,618	710	305				3,840		8,943
1968		3,070	1,127	623	333				2,568		7,721
1969		2,312	1,960	607	262				4,450		9,591
1970	21	1,789	846	771	251				215	5,221	9,114
1971		2,410	963	503	565			1	309	4,853	9,604
1972		2,040	1,418	511	511				242	5,575	10,297
1973		885	1,774	470	402	2,248			477	5,155	11,411
1974		200	2,326	402	976	2,064			7,009		12,977
1975		579	2,072	2,337	136	1,425			5,882		12,431
1976		992	2,900	353	46	1,385			6,810		12,486
1977		861	4,089	303	36		2		7,323		12,614
1978		2,178	3,626	194	28		2		8,736		14,764
1979		1,043	6,578	467	148				7,857		16,093
1980			1,376		1,796	11,658			9,267		24,097
1981		3	364		2,678	12,554		51	5,953		21,603
1982		13	27	-	3,688	11,629	3	340	8,267		23,967
1983			622	2	3,890	11,242	174		2,353	5,932	24,215
1984+		677	8,901	940	4,299				2,159	5,450	22,426

+ Preliminary Statistics.

Table 3: continued

TOTAL

GEARS / YEARS	DV	T	GN	HL	LL	IN. MISC.	DS	PT	ST	OT	GRAND TOTAL
1954											NK
1955											NK
1956											NK
1957											NK
1958											NK
1959*											NK
1960*				6,513		23,106				64,731	94,350
1961*		1,133			4,425	23,115	76	15		71,246	100,010
1962*		2,777	80	3,974	5,149	26,491	129	29		47,292	85,921
1963*	53	3,197		3,570	3,549	31,542	196			32,639	74,746
1964	558				4,025	29,830	185	178		49,458	84,234
1965	113	3,950	24		3,174	21,581	146	142	39,799		68,929
1966	16	1,656	973		3,141	19,184	53	597	39,465		65,085
1967		2,470	1,618	710	1,169	24,478	74	33	48,760		79,312
1968	33	3,070	1,416	623	1,556	31,161	72	814	50,926		89,671
1969		6,255	13,309	2,499	8,297	2,685	208	29	37,858		71,140
1970	205	4,175	5,808	3,119	9,118	1,962	244	287	220	80,327	105,465
1971		6,196	5,045	2,015	9,215	570	247	53	533	59,936	83,810
1972	17	3,656	4,434	1,716	7,219	2,871	561	200	410	37,153	58,237
1973	1,405	2,892	5,103	1,587	8,397	5,395	294	440	1,022	39,270	65,805
1974	128	1,989	7,805	2,168	4,794	3,645	281	1,507	44,119		66,436
1975		2,611	8,595	3,902	3,532	1,927	227		39,439		60,233
1976		2,573	10,734	2,023	5,040	6,259	318		50,034		76,981
1977		3,312	12,028	2,057	7,144	147	268		48,610		73,566
1978		6,288	16,895	2,046	7,813		252		45,212		78,506
1979		4,139	18,097	3,721	12,517		492		43,811		82,777
1980		8,354	12,996	2,463	16,007	11,658	485		45,616		97,579
1981		5,415	6,163	2,168	19,174	12,881	463		51,647		97,911
1982		7,487	9,500	2,213	18,566	11,629	352	340	54,852		104,939
1983		3,416	12,517	5,146	17,293	11,242	667	8	5,259	51,330	106,878
1984+		3,890	15,621	4,088	14,310		435		3,208	51,612	93,164

+ Preliminary Statistics. All the French catch has been added to the OT total.

Note: Subdivision 3Pn was created in 1959. The total for the stock is unknown before then.

TABLE 4. Preliminary catch statistics for cod in NAFO Division 3Pn in 1984.

Preliminary catch statistics for cod in NAFO Division 3Pn in 1984

Canada-Newfoundland

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Traps						3	37	6						46
Fixed gillnets				1	35	17	65	23	22					163
Handlines			1	1	1	24	26	14	42	2	1	11		123
Lines trawls	472	254	125	48	179	352	443	21	23	3	2	11		1933
Danish seines			1			51	5	43	35	5	7	1		148
Otter trawls	67	277	381	12	111	87	217	245	640	354	188	136		2715
Total	539	531	508	62	326	534	793	352	762	364	198	159		5128

Canada-Maritime

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Fixed gillnets						49								49
Lines trawls						1								1
Danish seines						54								54
Otter trawls		6	9				4					55		74
Total		6	9			104	4					55		178

Division total	539	537	517	62	326	638	797	352	762	364	198	214		5306

TABLE 4. Continued. Preliminary catch statistics for cod in NAFO Division 4R in 1984.

Preliminary catch statistics for cod in NAFO Division 4R in 1984

Canada-Newfoundland

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Traps				1	36	1744	841	534	10				1	3167
Fixed gillnets	13	2		307	472	1133	2847	1127	281	101	71	133	1	6488
Handlines	2			4	34	300	390	1370	633	218	42	32		3025
Lines trawls	231	1332	784	862	1500	1238	862	610	329	205	26	92	2	8073
Danish seines			4	59	51	34	18		7	35	20	5		233
Otter trawls	13	1537	6004	1925	7721	2256	5304	3829	615	603	283	446		30536
Total	259	2871	6792	3158	9814	6705	10262	7470	1875	1162	442	708	4	51522

Canada-Maritime

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Fixed gillnets								1						1
Lines trawls								1	1					2
Otter trawls	57			202	200	3	8					116		586
Total	57			202	200	3	8	2	1			116		589

Canada-Québec

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Fixed gillnets							19							19
Lines trawls								2						2
Otter trawls							41	33						74
Total							60	35						95

Division total	316	2871	6792	3360	10014	6708	10330	7507	1876	1162	442	824	4	52206

Table 4 continued. Preliminary catch statistics for cod in NAFO Division 4S in 1984

Canada-Newfoundland

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Fixed gillnets							144	2						146
Handlines								1	3	11	1			16
Otter trawls				20	45									65
Total				20	45		144	3	3	11	1			227

Canada-Maritime

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Otter trawls	14				356	54	12							436
Total	14				356	54	12							436

Canada-Québec

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Traps					3	410	247	9		8				677
Fixed gillnets				17	517	2745	3602	941	392	533	4	4		8755
Handlines					3	73	230	369	74	159	16			924
Lines trawls					510	759	575	1022	585	787	61			4299
Otter trawls				92	968	1531	1376	913	594	1406	222	6		7108
Total				109	2001	5518	6030	3254	1645	2893	303	10		21763

Division total	14			129	2402	5572	6186	3257	1648	2904	304	10		22426

TABLE 4. Continued. Preliminary catch for cod in NAFO Divisions 3Pn, 4RS in 1984.

Preliminary catch statistics for cod in NAFO Divisions 3Pn, 4RS in 1984

Canada-Newfoundland

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Traps				1	36	1747	878	540	10				1	3213
Fixed gillnets	13	2		308	507	1150	3056	1152	303	101	71	133	1	6797
Handlines	2		1	5	35	324	416	1385	678	231	44	43		3164
Lines trawls	703	1586	909	910	1679	1590	1305	631	352	208	28	103	2	10006
Danish seines			5	59	51	85	23	43	42	40	27	6		381
Otter trawls	80	1814	6385	1957	7877	2343	5521	4074	1255	957	471	582		33316
Total	798	3402	7300	3240	10185	7239	11199	7825	2640	1537	641	867	4	56877

Canada-Maritime

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Fixed gillnets						49		1						50
Lines trawls						1		1	1					3
Danish seines						54								54
Otter trawls	71	6	9	202	556	57	24					171		1096
Total	71	6	9	202	556	161	24	2	1			171		1203

Canada-Québec

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Traps					3	410	247	9		8				677
Fixed gillnets				17	517	2745	3621	941	392	533	4	4		8774
Handlines					3	73	230	369	74	159	16			924
Lines trawls					510	759	575	1024	585	787	61			4301
Otter trawls				92	968	1531	1417	946	594	1406	222	6		7182
Total				109	2001	5518	6090	3289	1645	2893	303	10		21858

FRANCE (M + SP)

Gear type	J	F	M	A	M	J	J	A	S	O	N	D	UK	TOTAL
Otter trawls	4566	6967	1677	16										13226
Total	4566	6967	1677	16										13226

Division total	5435	10375	8986	3567	12742	12918	17313	11116	4286	4430	944	1048	4	93164

TABLE 5. Results of the ANOVA from the regression of in catch rates against dummy categorical variables in NAFO Divisions 4RS, 3Pn.

REGRESSION OF MULTIPLICATIVE MODEL

MULTIPLE R..... .885
MULTIPLE R SQUARED..... .784

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARES	F-VALUE
INTERCEPT	1	9.753E0001	9.753E0001	
REGRESSION	41	9.589E0002	2.339E0001	98.887
TYPE 1	10	2.067E0002	2.067E0001	87.371
TYPE 2	4	4.013E0001	1.003E0001	42.419
TYPE 3	1	7.580E0000	7.580E0000	32.049
TYPE 4	26	7.358E0001	2.830E0000	11.966
RESIDUALS	1120	2.649E0002	2.365E-001	
TOTAL	1162	1.321E0003		

REGRESSION COEFFICIENTS

CATEGORY	CODE	VARIABLE	COEFFICIENT	STD. ERROR	NO. OBS.
1	24	INTERCEPT	-0.161	0.183	1162
2	1,2				
3	36,42				
4	1959				
GEAR *1	25	1	0.401	0.066	107
	34	2	-0.191	0.059	201
	35	3	0.167	0.072	95
	41	4	-2.342	0.268	3
	42	5	-1.240	0.083	61
	43	6	-0.890	0.078	101
	44	7	0.844	0.140	22
	85,86,87,94 to 97	8	0.523	0.079	111
	154, 216	9	0.641	0.064	270
	217	10	0.941	0.095	41
MONTHS 2	3	11	-0.218	0.049	166
	4	12	-0.327	0.049	184
	5	13	-0.438	0.054	140
	6	14	-0.655	0.051	333
DIVISIONS 3 **	41	15	0.204	0.036	636

*Codes for gear categories. Last digit refers to tonnage class and the first two digits refer to countries/provinces given below:

2:	Maritimes	3:	Newfoundland	4:	Quebec
21:	Portugal	15:	Spain	8:	France (Metro)
				9:	France (St. Pierre)

**Codes for Divisions are 36 = 3Pn, 41 = 4R, 42 = 4S.

TABLE 6. Mean catch rates indices for cod in NAFO divisions 4RS and 3Pn. The proportion of catch that was used to compute the catch rates is also indicated.

PREDICTED CATCH RATE

STANDARDS USED VARIABLE NUMBERS: 24 1 36

YEAR	TOTAL CATCH	PROP.	CATCH RATE MEAN	S.E.	EFFORT
1959	58060	0.034	0.942	0.171	61623
1960	94350	0.251	1.050	0.139	89833
1961	100010	0.363	1.369	0.157	73034
1962	85921	0.335	1.355	0.168	63395
1963	74746	0.283	1.624	0.214	46012
1964	84234	0.282	1.468	0.190	57390
1965	68929	0.276	1.254	0.137	54974
1966	65085	0.312	1.156	0.122	56324
1967	79312	0.237	1.004	0.094	78967
1968	89671	0.235	1.185	0.110	75682
1969	71140	0.203	1.052	0.099	67607
1970	105465	0.398	0.969	0.083	108834
1971	83810	0.353	0.680	0.068	123338
1972	58237	0.301	0.789	0.078	73780
1973	65805	0.262	0.672	0.071	97919
1974	66436	0.303	0.969	0.089	68556
1975	60233	0.267	0.762	0.075	79061
1976	76981	0.142	0.743	0.064	103642
1977	73566	0.273	0.766	0.063	96002
1978	78506	0.220	0.788	0.069	99659
1979	82777	0.210	0.800	0.074	103429
1980	97579	0.200	0.838	0.068	116483
1981	97911	0.281	1.613	0.156	60689
1982	104939	0.192	1.625	0.145	64598
1983	106878	0.166	1.402	0.139	76243
1984	93164	0.190	1.183	0.119	78749
1985	56000	0.213	1.140	0.124	49109

AVERAGE C.V. FOR THE MEAN: .104

Table 7. Monthly breakdown catch rates by fishing fleet component for the 4RS, 3Pn cod stock.

QUEBEC TC2 (7a)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974												
1975								0.076	0.085			
1976					0.152	0.081	0.089	0.117	0.108	0.069		
1977					0.144	0.102	0.109	0.135	0.143	0.136	0.168	
1978					0.119	0.163	0.132	0.088	0.083	0.090	0.194	
1979					0.117	0.133	0.134	0.101	0.088	0.128		
1980				0.075	0.167	0.154	0.135	0.110	0.172	0.381		
1981					0.208	0.190	0.161					
1982					0.378	0.188	0.161	0.262	0.204	0.252		
1983					0.301	0.216	0.281	0.273		0.239		
1984					0.229	0.135	0.100	0.068	0.086	0.101	0.088	
1985					0.121	0.090						

QUEBEC TC3 (7b)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974												
1975						0.084	0.175	0.124	0.120	0.129		
1976				0.185	0.145	0.131	0.147	0.166	0.147	0.138	0.159	
1977					0.179	0.134	0.220	0.184	0.206	0.170	0.173	
1978				0.318	0.169	0.245	0.132	0.129	0.104	0.095	0.121	
1979				0.299	0.146	0.193	0.199	0.142	0.103	0.143		
1980		0.632	2.000		0.192	0.190	0.190	0.157	0.400	0.458		
1981				0.282	0.302	0.317	0.287	0.265	0.357	0.728	0.692	
1982				0.387	0.446	0.376	0.289	2.139	0.300	0.405		
1983					0.404	0.558	0.381				0.135	
1984					0.266	0.195	0.288	0.122	0.113	0.121	0.084	
1985					0.186	0.170	0.157	0.070				

MARITIMES TC5 (7c)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974	0.875	1.754		1.412	0.864	1.712					0.417	0.683
1975	0.266	1.155			0.653							1.200
1976	0.993	1.714	0.302	0.711	0.815		0.656		0.968	0.335	0.770	0.632
1977	1.485	1.263	0.529	1.210	1.115							
1978	1.622	1.140	1.027	2.985	2.841							
1979	1.833	1.623	1.776									
1980	0.997	1.090	1.350	1.344								0.696
1981	3.622	1.816										
1982		1.748	4.083	2.547	2.548							
1983		1.159		2.286	2.262							
1984												
1985												

Table 7 continued. Monthly breakdown catch rates by fishing fleet component for the 4RS, 3Pn cod stock.

MARITIMES TC4 (7d)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974					0.565	0.848			0.644		0.368	
1975					0.314							
1976				0.492	0.548	0.626			0.520	0.290	0.569	
1977	0.662	0.717	1.696	0.539	0.548						0.750	
1978		1.279		1.160	0.975							
1979	1.000	0.444			0.538						0.454	
1980	0.929	0.519		0.395	0.831							
1981	1.559	1.658				0.781				0.354		
1982	1.385	1.518	2.280	15.235	1.692							
1983	1.235			1.903	2.053							
1984												
1985												

NEWFOUNDLAND TC4 (7e)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974	0.676	0.957	0.447	0.487	0.760	0.675					0.697	
1975	0.355	1.294	0.618	0.646	0.411						0.624	
1976	0.527	0.377	1.013	0.333	0.434	0.780			0.775	0.304	0.593	0.410
1977	0.688	0.513	0.367	0.539	0.304							
1978	0.823	0.300										
1979	1.143		0.687		0.361							
1980		0.579	0.652	0.638								
1981	1.294	0.983	6.410								0.160	
1982		1.328	0.373	1.153	0.208							
1983				0.629		0.788						
1984		1.383	1.361		0.694							
1985				0.904								

NEWFOUNDLAND TC5 (7f)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974	0.739	0.758	1.640	0.901	0.855	0.993						1.231
1975				0.524	0.554							
1976	0.689	0.311	0.378	0.862	0.877						1.052	
1977	0.821	0.907	0.281	0.463	0.674							
1978	1.141	0.668										
1979	1.509	1.212										
1980		0.670	0.604	1.107								
1981	2.139											
1982		1.812	1.780	4.178	2.207							
1983	0.985	1.376	0.950	1.281	2.547							
1984				0.571	1.039	0.500	0.763					
1985		3.136	2.976	2.009	1.249							

Table 7 continued. Monthly breakdown catch rates by fishing fleet component for the 4RS, 3Pn cod stock.

FRANCE TC6+7 (7g)

YEAR	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1974												
1975												
1976												
1977												
1978	3.564	0.795										
1979	0.726	0.591	1.851	0.939	0.756							
1980	1.811	0.909	1.185	0.774	0.472							
1981	2.849	9.399										
1982	2.083	2.745	0.927	2.797								
1983	1.575	2.865	1.743	1.650								
1984	9.967	22.747	13.213									
1985	2.583	3.706	2.343	3.103								

Table 8. 4RS, 3Pn minimum exploitable biomass estimates in Gadus Atlantica winter groundfish surveys.

Division & Strata	Gadus 4 1978		Gadus 16 1979		Gadus 31 1980		Gadus 46 1981		Gadus 73 1983		Gadus 89 1984		Gadus 104 1985	
	No.	Total Weight	No.	Total Weight	No.	Total Weight	No.	Total Weight	No.	Total Weight	No.	Total Weight	No.	Total Weight
3Pn														
302	3	8872	3	1073	3	3036	3	5063	4	3449	5	2656	3	169
303	3	2457	3	96	3	2786	4	1536	6	6459	8	2220	4	912
304	3	126	3	108	3	645	3	355	5	1867	5	53	3	416
305	3	271	3	170	2	508	5	5518	8	338	9	27	6	777
4R														
801	3	127	3	1299	2	126	2	66	3	2207	2	2737	3	2241
802	3	1861	2	646	3	10523	2	2112	7	308	5	395	3	27
809	3	3509	3	4524	3	1924	2	4156	6	1786	5	2421	8	3081
810	3	1810	3	583	4	8888	2	3515	5	1361	4	1084	3	72
811	5	8188	5	3686	4	20412	2	31536	7	6920	7	76743	7	2293
812	5	16032	5	7435	3	882	7	1068	10	8266	9	35882	14	24411
813	3	7452	4	541	4	1576	6	267	7	25176	10	21197	10	13574
820	4	5157	4	4021	4	103644	2	45384	7	3172	5	3668	5	2482
821	4	59447	4	2943	4	5082	2	6329	7	4251	5	12866	5	3902
822	4	59823	4	37986	5	224	5	312	10	16541	13	35161	10	24737
AB	2	8348	5	170	5	18	2	0	4	2689	7	6067	6	2320
4S														
803	6	1592		0	7	18568	4	6871	11	1162	17	2443	15	1893
804	3	515		0	2	1035	3	2034	5	508	5	817	3	282
807	3	855	2	277	3	180	2	227	5	4390	6	320	6	960
808	3	5167	3	4557	3	8844	3	9779	8	8194	6	24154	6	1643
814	3	535	3	61	3	95	2	92	3	23966	3	10811	5	4797
815	3	1006	4	1275	3	1109	6	495	7	30451	8	77504	10	18890
816	5	1158	3	5899	3	1195	7	101	10	10499	4	798	4	6387
819	2	312	2	2655	3	79	2	24	3	11949	4	9639	7	22981
827	4	176		0	2	9	5	35	4	11319	5	273	5	109
833	3	114		0	2	0	2	0	2	843	3	2371	3	301
CD	5	503	2	24653	6	88	6	116	9	19822	8	82	6	14510

Table 9. 4RS, 3Pn cod, catch at age ('000) and mean weights at age (kg).

A. 4RS 3PN COD: CATCH AT AGE 10/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	0	0	0	0	0	0	0	0	0	0	0
2	0	12	3	0	0	0	1	2	12	207	0
3	741	35	217	14	60	71	605	316	229	687	31
4	4069	4313	5210	2672	2644	3387	3569	6689	3231	3489	2526
5	9607	7707	12535	10124	10656	13962	17515	8999	18782	10596	7032
6	13498	5091	6323	12756	17391	12806	20196	20054	12747	21386	11835
7	5303	7185	4244	7943	9174	12632	11624	13971	13768	10953	17654
8	6658	2930	5750	2628	2135	4846	7063	4730	8673	7363	6587
9	2794	2757	1991	3274	1050	1438	1531	2154	3372	3686	5128
10	1509	1719	2561	1098	1245	722	482	939	2109	1421	1943
11	413	740	993	894	531	537	289	294	618	916	821
12	173	316	395	394	435	300	323	172	145	248	403
13	82	135	147	291	232	140	78	163	74	245	150
14	31	89	69	84	126	88	79	74	42	37	34
15	23	28	45	20	27	29	31	71	24	23	28
16	32	16	6	22	11	20	18	44	13	16	39
17	3	5	0	16	5	5	9	25	14	29	17
18	6	5	3	7	6	0	2	9	7	2	2
19	0	0	0	2	0	2	3	0	1	0	2
20	0	5	0	2	0	2	1	0	1	1	1
21	0	0	0	5	0	1	0	0	0	0	0
22	0	0	0	0	1	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	1
24	0	0	0	0	0	0	1	0	0	0	0

B. 4RS 3PN COD: MEAN WEIGHTS AT AGE 10/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.06	0.20	0.00	0.00	0.00	0.00	0.32	0.12	0.93	0.00
3	0.46	0.40	0.44	0.46	0.57	0.35	0.49	0.57	0.45	0.31	0.42
4	0.64	0.72	0.76	0.65	0.75	0.64	0.61	0.79	0.85	0.85	0.81
5	0.99	1.00	1.13	1.02	0.96	0.93	0.92	0.98	1.11	1.22	1.02
6	1.31	1.52	1.68	1.48	1.44	1.42	1.33	1.32	1.44	1.55	1.44
7	1.67	1.89	2.15	2.02	1.98	1.86	1.90	1.85	1.76	1.84	1.79
8	1.98	2.34	2.60	2.52	2.63	2.58	2.39	2.49	2.12	2.10	2.08
9	2.51	2.61	2.90	2.77	3.22	3.40	3.36	3.34	2.66	2.39	2.36
10	2.89	3.08	3.12	3.17	3.32	3.83	4.13	4.55	3.13	3.31	2.78
11	4.46	4.16	3.91	3.35	3.22	3.97	4.41	6.04	3.88	4.53	3.47
12	5.59	4.50	4.83	4.23	3.86	5.23	3.84	7.43	5.70	4.18	3.71
13	5.57	4.30	6.90	4.13	5.12	5.38	5.54	5.93	6.02	6.61	4.75
14	6.61	6.57	5.26	4.48	5.90	5.35	4.16	7.96	6.41	5.99	7.48
15	8.64	6.53	7.40	8.08	7.34	6.28	7.54	5.34	6.04	6.54	7.45
16	7.81	5.02	9.86	9.57	6.48	7.37	5.39	8.94	7.32	5.99	6.61
17	0.01	3.43	0.00	13.14	6.67	7.34	6.11	12.42	7.46	5.61	4.64
18	12.22	9.51	8.71	7.51	5.69	0.00	15.31	9.48	11.00	7.88	14.17
19	0.00	0.00	0.00	5.97	0.00	3.87	8.90	7.96	15.31	24.59	13.55
20	0.00	9.51	0.00	4.84	0.00	11.60	17.67	8.07	13.87	13.76	10.88
21	0.00	0.00	0.00	10.35	0.00	16.46	0.00	0.00	0.00	0.00	20.02
22	0.00	0.00	0.00	0.00	15.31	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	16.46	0.00	0.00	0.00	0.00	24.93
24	0.00	0.00	0.00	0.00	0.00	0.00	18.94	0.00	0.00	18.94	0.00

Table 10. 4RS 3Pn cod, catch at age ('000) for inshore gears and mean weights at age (kg).

4RS 3PN COD: INSHORE CATCH AT AGE 10/ 2/86

	I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	I	0	0	0	0	0	0	0	0	0	0	0
2	I	0	0	0	0	0	0	1	2	0	0	0
3	I	688	0	0	1	48	31	567	283	10	106	27
4	I	2829	19	8	364	1223	1692	2775	2767	1566	2582	1440
5	I	4990	53	245	2175	3555	5804	10028	2250	6217	5848	3712
6	I	3968	626	931	3392	4372	4211	9412	4851	5398	7244	4190
7	I	1216	1332	1555	2700	3442	4352	5379	5909	5362	4332	5709
8	I	1175	1300	2339	1021	1167	2411	3443	1944	4042	2575	2532
9	I	716	1064	1193	1189	635	813	953	1330	1967	1454	2141
10	I	326	763	1469	284	594	513	261	664	1574	872	1027
11	I	212	545	573	265	178	290	170	261	536	671	473
12	I	41	185	224	141	216	191	160	142	86	198	193
13	I	17	65	98	92	154	96	37	151	64	223	83
14	I	15	67	54	27	52	54	24	69	33	31	25
15	I	6	10	35	19	11	22	17	54	13	19	13
16	I	0	0	4	5	5	16	13	40	13	9	21
17	I	3	0	0	5	1	3	4	23	10	29	17
18	I	6	5	3	1	1	0	2	9	5	2	1
19	I	0	0	0	0	0	0	3	0	1	0	2
20	I	0	5	0	0	0	1	0	0	0	1	1
21	I	0	0	0	0	0	1	0	0	0	0	0
22	I	0	0	0	0	1	0	0	0	0	0	0
23	I	0	0	0	0	0	0	0	0	0	0	1
24	I	0	0	0	0	0	0	1	0	0	0	0

4RS 3PN COD: INSHORE MEAN WEIGHTS AT AGE 10/ 2/86

	I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00
3	I	0.47	0.00	0.00	0.46	0.65	0.43	0.49	0.59	0.43	0.51	0.40
4	I	0.63	0.91	0.58	0.66	0.81	0.70	0.60	0.81	0.95	0.85	0.75
5	I	0.97	1.11	1.71	0.98	1.08	0.96	0.89	1.09	1.15	1.19	0.95
6	I	1.34	2.22	2.22	1.60	1.73	1.62	1.28	1.53	1.58	1.65	1.37
7	I	1.77	2.53	2.52	2.31	2.28	2.16	1.99	2.19	1.84	2.03	1.85
8	I	2.39	2.81	2.95	2.90	2.81	3.00	2.60	3.21	2.21	2.50	2.18
9	I	2.92	3.21	3.16	3.14	3.49	3.88	3.50	3.94	2.76	2.88	2.52
10	I	4.04	3.87	3.32	3.44	3.83	4.09	4.53	5.18	3.03	3.82	3.00
11	I	4.49	4.36	4.43	3.84	4.20	4.79	4.98	6.26	3.79	5.08	3.72
12	I	6.32	5.55	5.46	4.59	4.33	6.28	4.19	8.02	6.09	4.04	4.07
13	I	7.64	5.21	7.39	4.07	5.68	5.94	6.50	5.92	6.12	6.49	5.68
14	I	6.96	7.22	5.51	4.64	8.81	6.29	5.22	8.11	7.02	5.79	7.20
15	I	8.78	7.96	8.35	8.05	6.81	6.65	8.64	5.76	6.01	6.39	6.47
16	I	0.00	0.00	7.96	11.03	7.03	8.12	5.39	9.37	7.32	6.43	8.39
17	I	5.97	0.00	0.00	6.46	7.63	8.40	5.29	12.98	8.09	5.49	4.64
18	I	12.22	9.51	8.71	9.16	7.96	0.00	15.31	9.48	13.11	6.26	14.59
19	I	0.00	0.00	0.00	0.00	0.00	0.00	8.90	7.96	15.31	24.59	13.55
20	I	0.00	9.51	0.00	0.00	0.00	11.24	0.00	7.33	6.59	14.13	10.88
21	I	0.00	0.00	0.00	0.00	0.00	16.46	0.00	0.00	0.00	0.00	20.02
22	I	0.00	0.00	0.00	0.00	15.31	0.00	0.00	0.00	0.00	0.00	0.00
23	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.93
24	I	0.00	0.00	0.00	0.00	0.00	0.00	18.94	0.00	0.00	18.94	0.00

Table 11. 4RS 3Pn cod, catch at age ('000) for trawlers and mean weights at age (kg).

4RS 3PN COD: OFFSHORE CATCH AT AGE 10/ 2/86

	I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	I	0	0	0	0	0	0	0	0	0	0	0
2	I	0	12	3	0	0	0	0	0	12	207	0
3	I	53	35	217	13	12	40	38	32	219	581	4
4	I	1240	4294	5202	2309	1421	1695	794	3922	1665	906	1086
5	I	4618	7653	12290	7949	7101	8157	7487	6749	12565	4748	3320
6	I	9531	4466	5392	9364	13019	8595	10784	15204	7350	14141	7644
7	I	4087	5853	2689	5243	5732	8280	6245	8063	8406	6621	11945
8	I	5482	1629	3411	1608	968	2435	3620	2785	4631	4788	4055
9	I	2078	1692	798	2085	415	624	578	824	1405	2232	2988
10	I	1183	956	1092	814	651	209	221	275	535	549	916
11	I	201	195	420	628	353	248	119	34	82	245	348
12	I	132	131	171	253	219	109	163	31	59	50	209
13	I	64	69	49	199	78	44	41	12	11	22	67
14	I	16	22	15	57	74	33	55	5	8	5	9
15	I	17	18	9	1	15	7	14	17	11	4	15
16	I	32	16	2	17	6	4	5	4	0	7	19
17	I	0	5	0	11	3	3	5	2	4	0	0
18	I	0	0	0	7	6	0	0	0	2	0	1
19	I	0	0	0	2	0	2	0	0	0	0	0
20	I	0	0	0	2	0	0	1	0	1	0	0
21	I	0	0	0	5	0	0	0	0	0	0	0
22	I	0	0	0	0	0	0	0	0	0	0	0
23	I	0	0	0	0	0	0	0	0	0	0	0
24	I	0	0	0	0	0	0	0	0	0	0	0

4RS 3PN COD: OFFSHORE MEAN WEIGHTS AT AGE 10/ 2/86

	I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	I	0.00	0.06	0.20	0.00	0.00	0.00	0.00	0.00	0.12	0.93	0.00
3	I	0.36	0.40	0.44	0.46	0.26	0.29	0.43	0.38	0.45	0.27	0.52
4	I	0.66	0.72	0.76	0.65	0.70	0.59	0.65	0.77	0.74	0.85	0.89
5	I	1.01	1.00	1.12	1.03	0.91	0.92	0.95	0.94	1.09	1.26	1.10
6	I	1.30	1.42	1.58	1.43	1.34	1.33	1.37	1.26	1.34	1.50	1.48
7	I	1.65	1.75	1.94	1.87	1.80	1.71	1.82	1.60	1.71	1.72	1.76
8	I	1.90	1.96	2.36	2.28	2.41	2.16	2.19	1.99	2.05	1.89	2.01
9	I	2.37	2.23	2.51	2.56	2.80	2.77	3.13	2.37	2.52	2.07	2.25
10	I	2.57	2.45	2.84	3.08	2.86	3.19	3.64	3.02	3.43	2.51	2.53
11	I	4.43	3.60	3.21	3.14	2.72	3.01	3.60	4.31	4.46	3.03	3.13
12	I	5.36	3.01	4.00	4.03	3.40	3.38	3.50	4.68	5.13	4.73	3.38
13	I	5.02	3.44	5.93	4.16	4.01	4.13	4.68	6.02	5.42	7.86	3.60
14	I	6.29	4.56	4.37	4.41	3.85	3.82	3.70	5.90	3.98	7.20	8.30
15	I	8.59	5.71	3.73	8.80	7.71	5.10	6.20	4.01	6.08	7.15	8.33
16	I	7.81	5.02	13.16	9.13	6.06	4.16	5.36	5.02	0.00	5.46	4.65
17	I	0.00	3.43	0.00	15.86	6.29	6.21	6.76	5.47	5.97	18.94	0.00
18	I	0.00	0.00	0.00	7.33	5.39	0.00	0.00	0.00	6.92	18.94	13.87
19	I	0.00	0.00	0.00	5.97	0.00	3.87	10.35	0.00	0.00	0.00	0.00
20	I	0.00	0.00	0.00	4.84	0.00	14.22	17.67	12.18	16.46	13.17	0.00
21	I	0.00	0.00	0.00	10.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	I	0.00	0.00	0.00	0.00	0.00	16.46	0.00	0.00	0.00	0.00	0.00
24	I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 12. 4RS 3Pn cod commercial sampling in 1984.

GEAR	QUARTER	COUNTRY	DIVISION	LENGTH MEASUREMENTS	OTOLITHS
OTB	1	CAN(N)	4R	8689	386
		CAN(M)	4R	137	0
		FRA(SPM)	3Pn	612	0
			4R	8783	354
	2	CAN(N)	4R	7279	336
		CAN(M)	4R	619	65
		CAN(Q)	4S	1583	270
	3	CAN(N)	4R	9615	350
		CAN(M)	4R	56	0
			4S	725	188
		CAN(Q)	4S	6518	425
	4	CAN(N)	4R	3377	236
		CAN(M)	4R	219	0
			4S	1205	174
		CAN(Q)	4S	3139	309
SN	3	CAN(N)	4R	2031	256
	4	CAN(M)	4S	290	37
LL	1	CAN(N)	3Pn	3165	354
	2	CAN(N)	3Pn	511	99
			4R	9657	531
		CAN(Q)	4S	1028	375
	3	CAN(N)	3Pn	2065	269
			4R	6634	564
		CAN(Q)	4S	817	282
	4	CAN(N)	4R	2220	289
		CAN(Q)	4S	554	235
GN	2	CAN(N)	4R	5031	365
		CAN(Q)	4S	1439	207
	3	CAN(N)	4R	5995	430
		CAN(Q)	4S	2945	385
	4	CAN(N)	4R	1680	191
FIX	2	CAN(N)	4R	2285	220
LMP	2	CAN(N)	4R	612	91
	3	CAN(N)	4R	1030	115
		CAN(Q)	4S	111	20
FPN	3	CAN(N)	4R	1078	89
TOTAL				103734	8497

AGE1IN

Quarter 1

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.357	34.000	3	3.33	1.05
4	0.668	41.166	118	21.80	0.19
5	0.814	44.502	257	34.66	0.13
6	1.206	50.857	339	48.00	0.14
7	1.579	55.639	746	61.22	0.08
8	1.912	59.093	236	40.69	0.17
9	2.184	61.616	146	31.51	0.22
10	2.717	65.723	131	26.17	0.20
11	3.000	68.491	50	14.29	0.28
12	2.703	65.942	26	12.17	0.47
13	4.479	79.566	5	2.59	0.54
14	6.025	87.890	2	1.89	0.87
15	7.252	94.000	1	1.21	1.07
16					
17	12.181	112.000			0.01
18	9.506	103.000		0.01	0.01

TOTAL CATCH: 3221

AGE2IN

Quarter 2

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.399	35.239	14	7.13	0.52
4	0.756	43.560	360	51.28	0.14
5	0.928	46.615	1134	83.02	0.07
6	1.356	52.786	1662	101.75	0.06
7	1.789	57.907	2049	97.46	0.05
8	2.149	61.236	976	69.13	0.07
9	2.456	63.768	796	59.08	0.07
10	3.312	70.240	339	33.25	0.10
11	4.334	77.005	134	17.53	0.13
12	4.225	76.368	64	12.27	0.19
13	7.423	92.656	29	5.59	0.19
14	8.026	94.658	8	3.19	0.38
15	6.894	90.464	6	2.56	0.41
16	8.833	98.306	9	3.27	0.38
17	3.590	70.725	14	8.22	0.60
18	15.312	121.000			
19	7.959	97.000	1	0.89	1.01
20	9.506	103.000	1	0.98	1.02

TOTAL CATCH: 13628

AGE3IN

Quarter 3

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.424	35.962	8	2.37	0.28
4	0.771	43.907	859	69.75	0.08
5	0.967	47.340	2200	102.09	0.05
6	1.394	53.256	2041	104.53	0.05
7	1.933	59.440	2547	100.03	0.04
8	2.233	62.175	1116	70.21	0.06
9	2.604	64.969	1026	64.16	0.06
10	2.952	67.773	435	41.27	0.09
11	3.637	72.684	249	28.08	0.11
12	4.429	77.440	91	14.66	0.16
13	4.867	78.463	44	11.53	0.26
14	7.042	90.607	13	3.89	0.29
15	6.623	89.821	4	1.69	0.44
16	8.069	92.980	12	3.92	0.34
17	11.075	107.914	2	0.73	0.45
18	20.481	133.429		0.38	1.01
19	17.108	124.617	1	1.13	0.82
20	14.216	118.000		0.43	1.08
21	20.018	132.400		0.30	1.14
22					
23	24.930	142.600	1	0.31	0.58

TOTAL CATCH: 18884

AGE4IN

Quarter 4

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.450	36.729	1	0.83	0.64
4	0.707	42.589	103	8.65	0.08
5	1.012	48.123	120	11.20	0.09
6	1.640	56.588	148	16.02	0.11
7	2.111	61.475	366	23.50	0.06
8	2.317	63.311	203	19.19	0.09
9	2.577	65.392	172	17.55	0.10
10	2.608	65.582	121	15.26	0.13
11	3.043	69.477	40	8.38	0.21
12	3.414	71.832	12	4.39	0.36
13	4.159	76.066	5	2.58	0.48
14	4.851	81.750	1	0.78	0.81
15	4.461	77.152	2	1.65	0.81
16	8.422	97.018		0.29	0.81
17	5.761	85.807	1	0.84	0.64

TOTAL CATCH: 2723

TABLE 13. Quaterly catch-at-age vector of inshore gears for Divisions 4RS, 3Pn Cod.

AGE1OTB

Quarter 1

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.441	36.427	1	1.23	0.92
4	0.728	42.972	285	41.82	0.15
5	0.993	47.713	1171	128.70	0.11
6	1.454	54.339	3395	278.75	0.08
7	1.798	58.215	4501	307.32	0.07
8	2.086	60.998	1556	200.11	0.13
9	2.294	62.781	1172	171.93	0.15
10	2.598	65.779	390	91.88	0.24
11	3.490	71.894	116	41.07	0.36
12	3.055	69.275	124	39.74	0.32
13	2.732	66.010	47	37.33	0.80
14	6.389	89.000	5	3.42	0.66
15	9.506	103.000	7	0.02	
16	3.216	70.510	15	12.50	0.81
17					
18	14.216	118.000	1	0.79	0.89

TOTAL CATCH: 21575

AGE2OTB

Quarter 2

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
4	0.959	47.158	169	45.60	0.27
5	1.031	48.529	762	86.81	0.11
6	1.482	54.650	2367	222.67	0.09
7	1.709	57.298	3899	248.11	0.06
8	2.009	60.356	1226	164.76	0.13
9	2.349	63.479	684	108.55	0.16
10	2.798	66.811	223	58.12	0.26
11	2.858	66.428	166	54.58	0.33
12	4.008	73.827	63	25.75	0.41
13	5.452	82.760	15	6.81	0.45
14	11.071	108.267	3	2.51	0.78
15	10.002	102.642	5	2.65	0.52
16	11.240	109.000	3	3.60	1.07
17					
18	13.172	115.000		0.59	1.32

TOTAL CATCH: 15599

AGE3OTB

Quarter 3

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.569	39.777	2	1.17	0.47
4	0.950	47.002	459	53.83	0.12
5	1.229	51.361	1106	119.25	0.11
6	1.489	54.810	1555	152.11	0.10
7	1.734	57.567	2883	175.65	0.06
8	1.928	59.437	1024	118.73	0.12
9	2.136	61.484	945	107.66	0.11
10	2.209	61.580	236	55.06	0.23
11	3.285	70.670	51	18.09	0.35
12	3.369	71.448	17	8.47	0.50
13	7.756	95.421	3	0.70	0.22
14	14.216	118.000			
15	1.810	52.838	3	2.06	0.80

TOTAL CATCH: 13831

AGE4OTB

Quarter 4

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.531	38.711		0.13	0.73
4	0.900	46.299	173	14.51	0.08
5	1.214	51.176	280	27.49	0.10
6	1.600	56.146	328	34.25	0.10
7	1.860	58.936	663	40.55	0.06
8	1.894	59.092	249	29.46	0.12
9	2.171	62.017	186	24.39	0.13
10	2.322	63.244	67	15.20	0.23
11	2.847	67.708	15	5.86	0.40
12	3.571	73.524	6	2.14	0.38
13	3.006	69.577	2	1.56	0.77

TOTAL CATCH: 3699

TABLE 14. Quaterly catch-at-age vector for offshore gears for 4RS, 3Pn cod.

AGE△OTB△TOT

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.525	38.604	4	1.70	0.43
4	0.885	45.858	1086	83.29	0.08
5	1.099	49.408	3320	197.67	0.06
6	1.476	54.608	7644	389.36	0.05
7	1.757	57.799	11945	434.17	0.04
8	2.011	60.293	4055	286.62	0.07
9	2.249	62.483	2988	231.37	0.08
10	2.526	64.761	916	122.81	0.13
11	3.130	68.923	348	70.90	0.20
12	3.379	70.927	209	48.15	0.23
13	3.596	71.312	67	37.99	0.57
14	8.299	96.799	9	4.25	0.49
15	8.331	94.106	15	3.35	0.23
16	4.651	77.394	19	13.01	0.69
17					
18	13.868	117.001	1	0.99	0.74

TOTAL CATCH: 54704

AGE△IN△TOT

AGE	AVERAGE WEIGHT	AVERAGE LENGTH	CATCH MEAN	CATCH STD. ERR.	CATCH C. V.
3	0.405	35.394	27	8.26	0.31
4	0.754	43.502	1440	89.71	0.06
5	0.946	46.947	3712	136.55	0.04
6	1.372	52.993	4190	154.42	0.04
7	1.847	58.523	5709	154.30	0.03
8	2.177	61.617	2532	108.33	0.04
9	2.519	64.328	2141	94.39	0.04
10	3.000	68.067	1027	61.05	0.06
11	3.716	73.189	473	37.02	0.08
12	4.067	75.193	193	23.08	0.12
13	5.683	83.282	83	13.33	0.16
14	7.203	91.404	25	5.43	0.22
15	6.471	88.525	13	3.69	0.28
16	8.392	95.259	21	5.11	0.25
17	4.642	76.260	17	8.30	0.49
18	14.590	117.389	1	0.38	0.39
19	13.551	113.880	2	1.44	0.63
20	10.878	107.371	1	1.07	0.79
21	20.018	132.400		0.30	1.14
22					
23	24.930	142.600	1	0.31	0.58

TOTAL CATCH: 38460

TABLE 15. Catch-at-age vector, average weights and variance of catch for inshore (IN) and offshore (OTB) years in Divisions 4RS, 3Pn.

TABLE 16. Catch-at-age vector, average weights and variance of catch for cod in NAFO Divisions 4RS, 3Pn.

AGE△TOT△1984

	AVERAGE		CATCH		
AGE	WEIGHT	LENGTH	MEAN	STD. ERR.	C. V.
3	0.420	35.812	31	8.43	0.28
4	0.811	44.515	2526	122.41	0.05
5	1.018	48.109	7032	240.25	0.03
6	1.439	54.036	11835	418.86	0.04
7	1.786	58.033	17654	460.77	0.03
8	2.075	60.802	6587	306.41	0.05
9	2.362	63.253	5128	249.88	0.05
10	2.777	66.509	1943	137.15	0.07
11	3.468	71.383	821	79.98	0.10
12	3.709	72.975	403	53.40	0.13
13	4.750	77.932	150	40.26	0.27
14	7.484	92.787	34	6.89	0.21
15	7.449	91.459	28	4.98	0.18
16	6.606	86.728	39	13.97	0.36
17	4.642	76.260	17	8.30	0.49
18	14.172	117.164	2	1.06	0.46
19	13.551	113.880	2	1.44	0.63
20	10.878	107.371	1	1.07	0.79
21	20.018	132.400		0.30	1.14
22					
23	24.930	142.600	1	0.31	0.58

TOTAL CATCH: 93164

Table 17. Ratios table F/F (7-11) and partial recruitment for cod in Divisions 4RS 3Pn.

4RS 3PN COD: F-RATIOS 12/ 2/86

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4	.214	.196	.028	.048	.044	.048	.073	.103	.082	.130	.080
5	.822	.724	.176	.214	.330	.300	.351	.305	.380	.435	.339
6	.860	.870	.400	.613	.733	.588	.714	.765	.614	.775	.691
7	.927	.931	.774	1.129	1.078	.945	1.001	1.077	.845	1.024	1.000
8	1.099	1.044	1.059	.824	.836	1.154	1.111	.929	1.217	.901	1.000
9	.915	1.002	.918	.967	.815	1.049	.751	.772	1.161	1.146	1.000
10	1.054	1.286	1.500	.826	.993	1.035	.696	1.002	1.322	1.060	1.000
11	.797	1.301	1.173	.936	1.040	.782	.843	.896	1.175	1.334	1.000
12	.883	1.530	1.054	.660	1.300	1.185	.909	1.145	.712	1.018	1.000
13	.612	1.830	1.145	1.150	.934	.836	.623	1.043	.857	3.165	1.000
14	.910	1.760	1.401	.928	1.640	.611	.929	1.318	.421	.833	1.000
15	.701	2.074	1.162	.731	.737	.808	.356	2.364	.740	.397	1.000
16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

4RS 3PN PARTIAL RECRUITMENTS (F-RATIOS) 12/ 2/86

AGES	4	5	6	7	8	9	10	11	12	13	14	15	16
	.080	.339	.691	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Terminal F	F (7+)	Mean Biomass	Exploitable Biomass
.15	23.89	7.90	17.17
. 2	19.22	4.65	13.08
.25	14.81	2.87	9.48
. 3	11.23	4.20	6.57
.35	8.14	4.75	3.96
. 4	6.23	9.44	5.31
.45	6.19	12.05	7.11
. 5	7.67	14.53	9.39

Table 18: Coefficients of variation of fully recruited fishing mortality (F 7+), mean biomass, and exploitable biomass for the years 1982 to 1984 obtained from cohort analyses using different levels of terminal fishing mortality.

Table 19. Results of cohort analysis at F_t= 0.35.

4RS 3Pn Cod: Population Numbers 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	55192	78915	112662	101205	139571	158065	113617	187492	108218	88455	101302
5 I	38036	41506	60717	90776	80441	111879	126349	89792	147453	85678	69264
6 I	51214	22448	27034	44894	65161	56218	78966	87597	65372	103730	60560
7 I	19000	29772	13953	17566	25214	37613	34440	46377	53573	41988	65576
8 I	20809	10757	18148	7295	7195	12343	19365	17679	25329	31404	24467
9 I	10118	11013	6330	8038	3595	3958	5721	9464	10195	12890	19049
10 I	4874	5756	6573	3045	3618	1993	1940	3299	5799	5295	7218
11 I	1682	2625	3136	2263	1500	1836	978	1152	1851	2840	3050
12 I	646	1003	1425	1300	1044	747	1017	540	677	956	1496
13 I	420	373	507	635	708	461	341	540	286	423	558
14 I	113	269	171	214	257	370	251	208	295	167	125
15 I	104	54	126	62	99	96	224	134	103	204	103
16 I	107	65	27	53	33	57	53	155	45	63	146
4+I	202315	204566	250810	277346	328435	385635	383259	444429	419197	374093	352915
5+I	147123	125651	138148	176141	188864	227570	269643	256937	310979	285638	251612
6+I	109088	84145	77431	85365	108422	115691	143294	167145	163526	199960	182348
7+I	57873	61697	50397	40471	43262	59474	64329	79548	98153	96230	121789

4RS 3Pn Cod: Mean Biomass 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	30736	49704	82479	58739	94252	91331	61843	131111	81713	66368	73432
5 I	29205	33889	68026	79015	65166	88297	97160	75417	137789	88106	60412
6 I	51901	26727	41396	50342	71997	63199	81155	91672	76095	128910	70451
7 I	24256	44311	23491	23429	35623	51241	47698	64383	73247	59816	90081
8 I	30513	20054	33245	13177	14234	22234	33049	33878	39106	52006	39051
9 I	19394	23219	12897	15352	8732	9611	14773	25001	19906	23363	34603
10 I	10496	13957	12575	6916	8719	5466	6240	11390	12991	13483	15417
11 I	5857	8444	7965	5279	3474	5503	3252	5398	5255	9502	8136
12 I	2776	3243	4592	4120	2754	2706	2897	2966	3079	3087	4269
13 I	1890	1168	2334	1727	2667	1856	1490	2401	1330	1616	2039
14 I	570	1133	551	668	966	1557	775	1191	1579	795	718
15 I	717	283	567	370	558	455	1412	436	493	1132	593
16 I	629	254	218	346	153	303	208	1055	250	293	741
4+I	208940	226385	290335	259481	309296	343759	351953	446299	452831	448476	399943
5+I	178204	176681	207856	200742	215044	252428	290111	315187	371118	382108	326510
6+I	148999	142792	139831	121727	149878	164131	192950	239770	233329	294002	266099
7+I	97098	116065	98435	71385	77880	100932	111795	148099	157234	165092	195647

4RS 3Pn Cod: Fishing Mortality 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	.085	.062	.016	.030	.021	.024	.035	.040	.034	.045	.028
5 I	.327	.229	.102	.132	.158	.148	.166	.117	.152	.147	.119
6 I	.342	.275	.231	.377	.350	.290	.332	.292	.243	.259	.242
7 I	.369	.295	.448	.693	.514	.464	.467	.405	.334	.340	.350
8 I	.436	.330	.614	.508	.398	.569	.516	.351	.476	.300	.350
9 I	.364	.316	.532	.598	.390	.513	.351	.290	.455	.380	.350
10 I	.419	.407	.866	.508	.479	.511	.321	.378	.514	.352	.350
11 I	.317	.411	.681	.574	.497	.391	.395	.332	.461	.441	.350
12 I	.351	.483	.609	.408	.618	.586	.432	.435	.270	.338	.350
13 I	.243	.578	.662	.705	.449	.409	.292	.405	.339	1.022	.350
14 I	.362	.556	.811	.570	.781	.303	.428	.500	.170	.277	.350
15 I	.279	.656	.672	.450	.351	.398	.166	.885	.292	.133	.350
16 I	.397	.316	.579	.615	.477	.491	.466	.376	.393	.332	.350

Table 20. Results of cohort analysis at F_t= 0.25.

4RS 3Pn Cod: Population Numbers 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	55503	80053	115161	105376	147654	175529	131981	227790	140348	120405	141280
5 I	38293	41760	61649	92822	83857	118496	140647	104827	180447	111983	95423
6 I	51578	22659	27242	45657	66836	59014	84384	99304	77682	130743	82097
7 I	19093	30069	14126	17736	25839	38984	36729	50813	63157	52067	87692
8 I	20846	10834	18392	7437	7334	12854	20488	19554	28961	39251	32718
9 I	10180	11043	6392	8237	3710	4073	6140	10383	11729	15863	25474
10 I	4885	5807	6597	3096	3781	2088	2034	3641	6552	6552	9653
11 I	1688	2634	3178	2283	1542	1969	1056	1229	2132	3456	4079
12 I	648	1008	1433	1334	1061	781	1126	603	740	1186	2001
13 I	421	374	510	641	736	475	369	630	338	475	746
14 I	113	271	172	217	262	393	262	231	368	209	167
15 I	105	65	127	63	102	100	243	143	122	264	138
16 I	107	65	28	54	33	59	56	171	53	79	195
4+I	203462	206643	255010	284955	342747	414816	425513	519319	512628	482532	481663
5+I	147959	126590	139848	179579	195093	239287	293532	291529	372281	362127	340383
6+I	109666	84829	78199	86757	111236	120791	152885	186701	191834	250144	244960
7+I	58088	62170	50957	41100	44401	61777	68502	87398	114152	119401	162863

4RS 3Pn Cod: Mean Biomass 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	30916	50443	84323	61195	99767	101539	72011	159846	106371	90863	102805
5 I	29438	34122	69123	80915	68156	93913	109086	88788	170985	117162	84577
6 I	52338	27015	41754	51374	74200	66827	87719	105814	92233	167007	98632
7 I	24399	44824	23855	23754	36767	53599	51702	71913	88695	76784	126114
8 I	30581	20221	33855	13507	14571	23462	35532	38149	46208	67059	54671
9 I	19538	23293	13063	15868	9073	9970	16060	27803	23661	29861	48444
10 I	10526	14109	12649	7066	9219	5802	6593	12818	15170	17286	21583
11 I	5881	8481	8116	5342	3599	5990	3567	5821	6257	12065	11390
12 I	2786	3263	4626	4253	2814	2873	3284	3400	3405	3963	5976
13 I	1897	1175	2359	1751	2799	1923	1632	2889	1616	1947	2854
14 I	573	1140	557	682	995	1670	818	1360	2006	1027	1005
15 I	722	285	574	378	576	479	1541	482	597	1488	830
16 I	632	256	222	353	158	318	225	1181	299	377	1038
4+I	210226	228626	295075	266439	322693	368364	389770	520264	557503	586890	559920
5+I	179310	178183	210752	205244	222927	266824	317758	360418	451132	496027	457115
6+I	149871	144061	141629	124329	154771	172912	208672	271630	280147	378865	372538
7+I	97534	117047	99875	72955	80571	106085	120953	165816	187914	211858	273906

4RS 3Pn Cod: Fishing Mortality 17/ 2/86

I	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
4 I	.084	.061	.016	.028	.020	.022	.030	.033	.026	.033	.020
5 I	.325	.227	.100	.128	.151	.140	.148	.100	.122	.110	.085
6 I	.340	.273	.229	.369	.339	.274	.307	.253	.200	.199	.173
7 I	.367	.292	.442	.683	.498	.443	.430	.362	.276	.265	.250
8 I	.435	.328	.603	.495	.388	.539	.480	.311	.402	.232	.250
9 I	.361	.315	.525	.579	.375	.494	.322	.260	.382	.297	.250
10 I	.418	.403	.861	.497	.452	.481	.304	.335	.440	.274	.250
11 I	.315	.409	.668	.567	.480	.359	.360	.307	.387	.347	.250
12 I	.350	.481	.604	.395	.604	.551	.381	.379	.244	.263	.250
13 I	.242	.575	.655	.695	.427	.395	.266	.337	.279	.846	.250
14 I	.360	.553	.801	.559	.759	.283	.406	.438	.134	.214	.250
15 I	.277	.651	.665	.440	.341	.378	.152	.799	.241	.101	.250
16 I	.396	.313	.571	.602	.462	.469	.431	.336	.328	.258	.250

Table 21. Projections of population abundance and biomass and catch biomass assuming a catch of 100,000 T (the TAC) in 1985 and $F_{0.1}$ = 0.2 in 1986 using a terminal fishing mortality of 0.35 in 1984.

POPULATION NUMBERS

	1984	1985	1986
4	101302	110000	110000
5	69264	80658	87382
6	60560	50369	58083
7	65576	38934	31742
8	24467	37834	21822
9	19049	14116	21206
10	7218	10990	7912
11	3050	4165	6160
12	1496	1760	2334
13	558	863	986
14	125	322	484
15	103	72	180
16	146	60	40
4+	352915	350144	348333
5+	251612	240144	238333
6+	182348	159485	150951
7+	121789	109116	92868

POPULATION BIOMASS (AVERAGE)

	1984	1985	1986
4	75583.63	81982.20	82546.85
5	66116.07	76636.01	85450.06
6	72274.36	59560.06	72759.94
7	90697.18	53147.68	47042.25
8	39539.26	60345.61	37788.85
9	36198.14	26474.25	43178.56
10	17070.59	25652.59	20049.16
11	9289.68	12519.14	20104.11
12	5210.87	6049.20	8711.63
13	2486.52	3796.40	4709.64
14	636.02	1619.88	2642.96
15	531.06	364.75	992.72
16	745.14	300.75	220.74
4+	416378.52	408448.53	426197.47
5+	340794.89	326466.33	343650.61
6+	274678.82	249830.32	258200.55
7+	202404.46	190270.26	185440.61

CATCH BIOMASS

	1984	1985	1986
4	2108	2475	1315
5	7838	9836	5788
6	17472	15589	10051
7	31744	20139	9408
8	13839	22867	7558
9	12669	10032	8636
10	5975	9721	4010
11	3251	4744	4021
12	1824	2292	1742
13	870	1439	942
14	223	614	529
15	186	138	199
16	261	114	44
4+	98260	100000	54243
5+	96152	97525	52928
6+	88314	87689	47139
7+	70842	72100	37088

FISHING MORTALITY

	1984	1985	1986
4	.028	.030	.016
5	.119	.128	.068
6	.242	.262	.138
7	.350	.379	.200
8	.350	.379	.200
9	.350	.379	.200
10	.350	.379	.200
11	.350	.379	.200
12	.350	.379	.200
13	.350	.379	.200
14	.350	.379	.200
15	.350	.379	.200
16	.350	.379	.200
4+	.194	.195	.098

Table 22. Projections of population abundance and biomass and catch biomass assuming a catch of 100,000 T (the TAC) in 1985 and $F_{0.1}$ = 0.2 in 1986 using a terminal fishing mortality of 0.25 in 1984.

POPULATION NUMBERS

	1984	1985	1986
4	141280	110000	110000
5	95423	113389	88293
6	82097	71783	85334
7	87692	56555	49492
8	32718	55915	36106
9	25474	20862	35697
10	9653	16243	13319
11	4079	6155	10370
12	2001	2601	3929
13	746	1276	1660
14	167	476	814
15	138	106	304
16	195	88	68
4+	481663	455449	435385
5+	340383	345449	325385
6+	244960	232059	237092
7+	162863	160277	151759

POPULATION BIOMASS (AVERAGE)

	1984	1985	1986
4	105817.08	82392.44	82546.85
5	92562.49	110012.27	86340.94
6	101184.10	88507.11	106896.10
7	126976.04	81937.27	73347.72
8	55354.97	94655.46	62522.44
9	50677.39	41526.33	72684.74
10	23898.82	40237.52	33749.80
11	13005.55	19636.97	33842.29
12	7295.22	9488.51	14664.74
13	3481.13	5954.87	7927.98
14	890.43	2540.87	4449.03
15	743.48	572.13	1671.11
16	1043.20	471.74	371.58
4+	582929.92	577933.49	581015.33
5+	477112.84	495541.06	498468.47
6+	384550.34	385528.79	412127.53
7+	283366.24	297021.68	305231.44

CATCH BIOMASS

	1984	1985	1986
4	2108	1633	1315
5	7838	9269	5849
6	17472	15208	14767
7	31744	20383	14670
8	13839	23547	12504
9	12669	10330	14537
10	5975	10010	6750
11	3251	4885	6768
12	1824	2360	2933
13	870	1481	1586
14	223	632	890
15	186	142	334
16	261	117	74
4+	98260	100000	82978
5+	96152	98367	81662
6+	88314	89097	75813
7+	70842	73889	61046

FISHING MORTALITY

	1984	1985	1986
4	.020	.020	.016
5	.085	.084	.068
6	.173	.172	.138
7	.250	.249	.200
8	.250	.249	.200
9	.250	.249	.200
10	.250	.249	.200
11	.250	.249	.200
12	.250	.249	.200
13	.250	.249	.200
14	.250	.249	.200
15	.250	.249	.200
16	.250	.249	.200
4+	.137	.140	.115

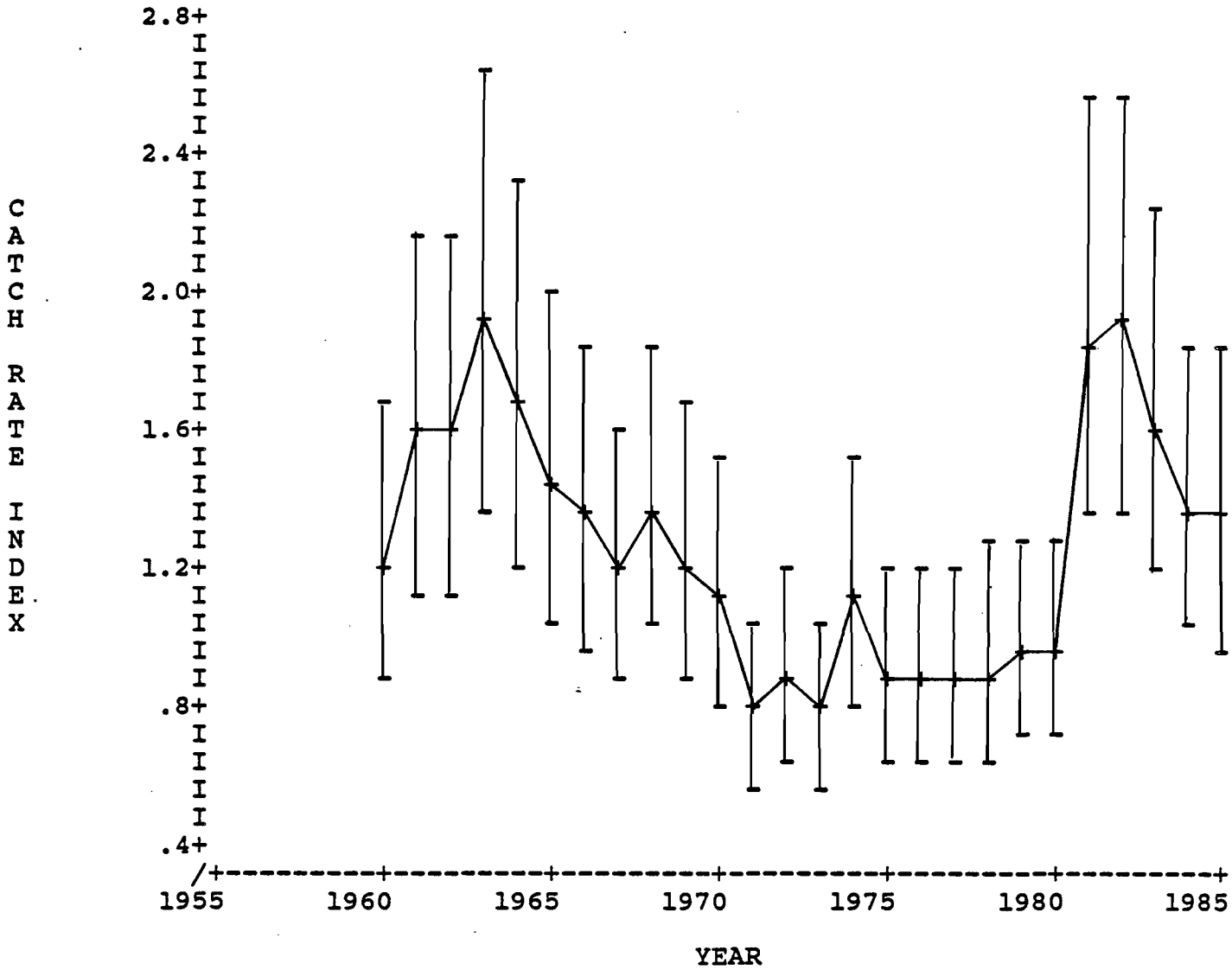

FIGURE 1. Standardized catch rates (in tonnes/hours) for cod in NAFO Divisions 4RS, 3Pn between 1959 and 1985 with 90% confidence limits.

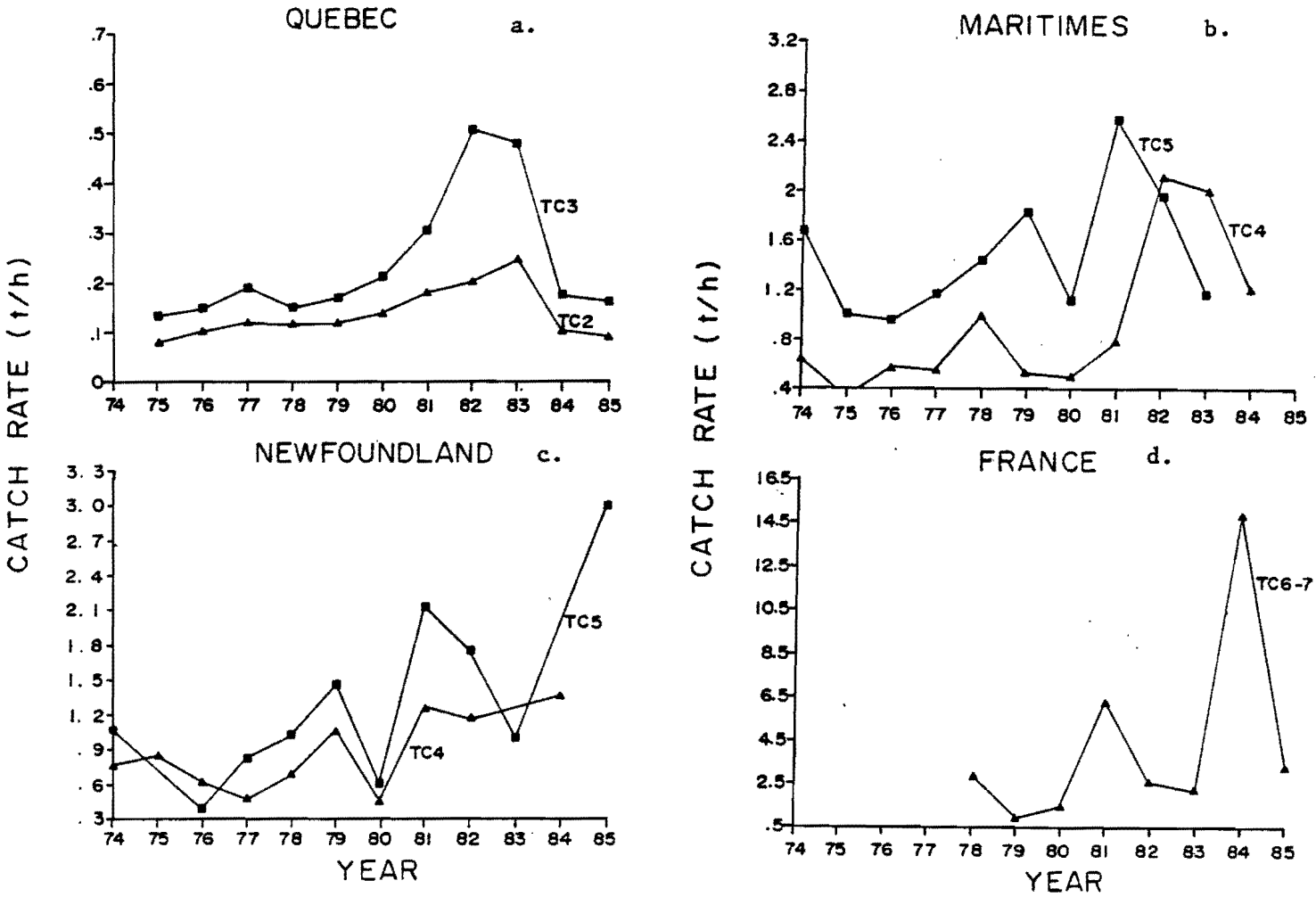

Figure 2. Average catch rates (t/h) of cod in Divisions 4RS 3Pn by the main fleet components.

Period included:	Quebec	- June	to September
	Maritimes	- January	to March
	Newfoundland	- January	to March
and	France	- January	to March

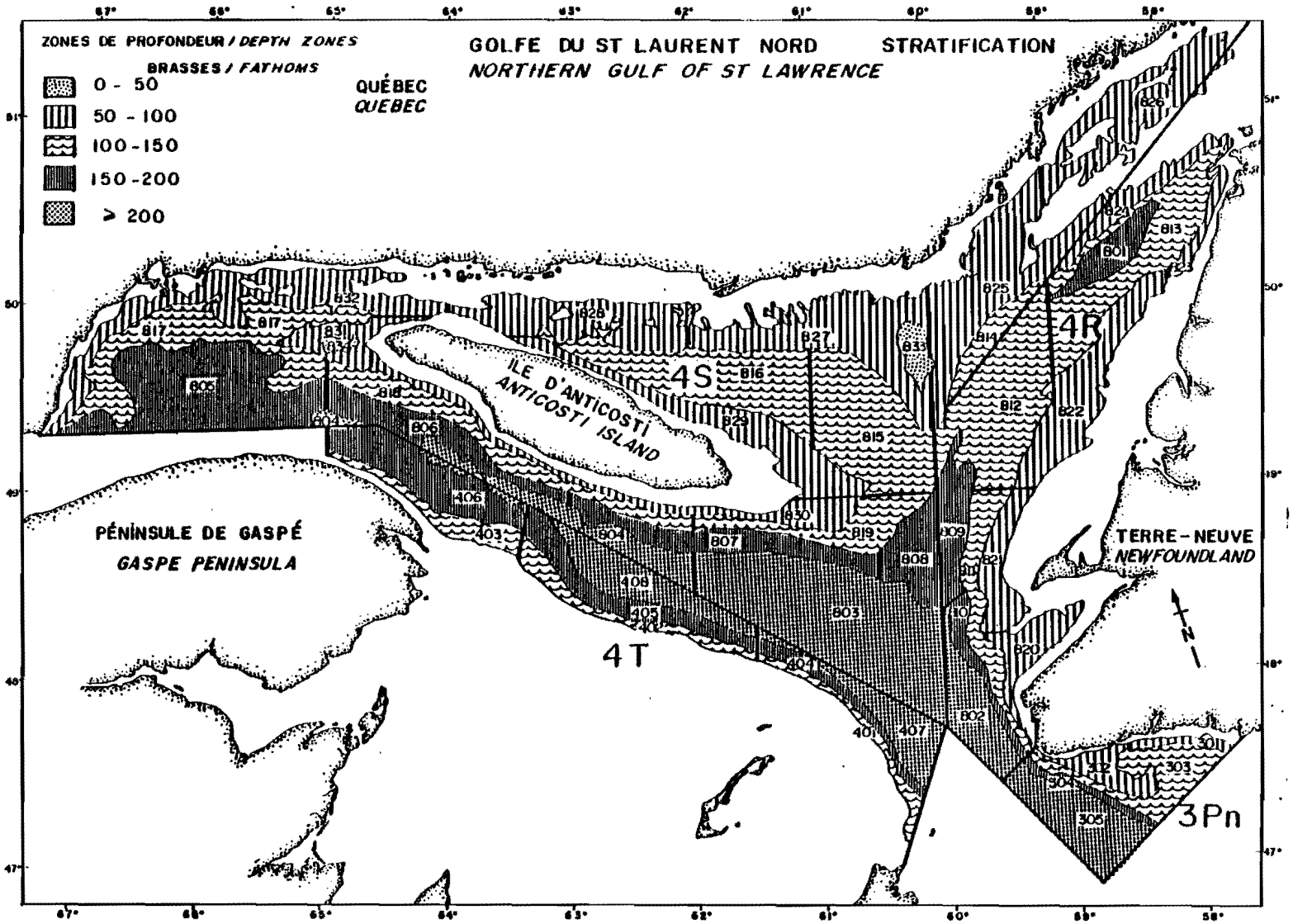

FIGURE 3: Stratification of the northern Gulf of St.Lawrence.

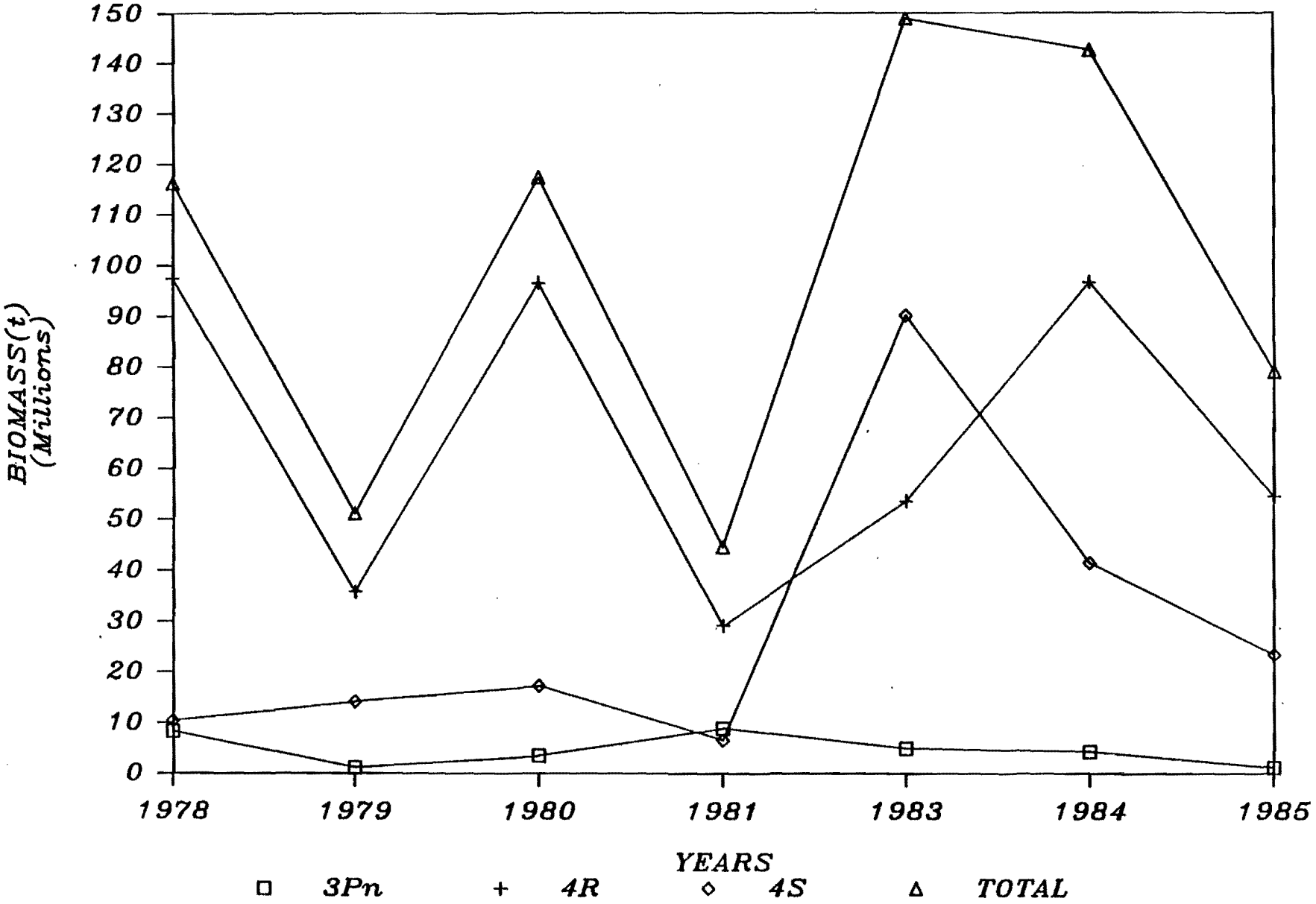

FIGURE 4. Mean trawlable biomass (per divisions and total) of cod in NAFO Divisions 4RS, 3Pn as estimated by random stratified surveys conducted on the *Gadus atlantica*

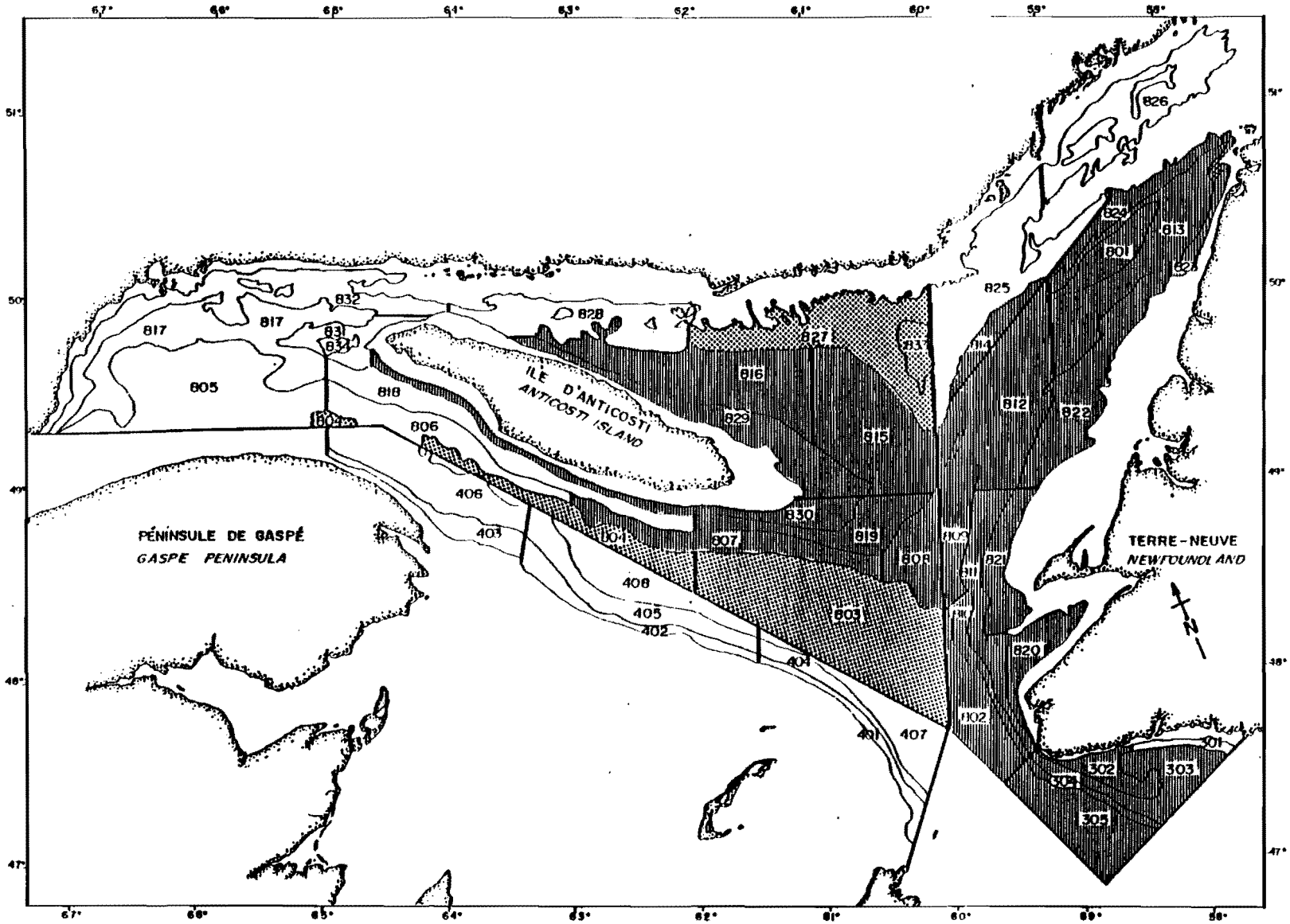

FIGURE 5. Strata used on the standardized survey numbers (vertical hatching). Stippled strata were surveyed on all years except 1979. They were not included in the standard index.