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Update of the Status of 4Vn Cod: 1995

by

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Abstract

The 4Vn cod fishery has been closed since September 1993. Nevertheless the stock shows no sign of recovery, largely due to lack of recruitment. About 40 tonnes of cod were taken commercially as bycatch in redfish and flatfish fisheries. The stock is monitored by annual DFO groundfish trawl surveys in July and for the last two years in September by an extension into 4Vn of the regular 4T groundfish survey. In addition, a "sentinel survey" employing commercial longliners, inaugurated in September 1994, conducted two more surveys in 1995. All of these surveys gave a similar picture of the stock status. Until there is substantial addition of biomass through recruitment, there are no prospects for a reopening in the near future.

Résumé

La pêche de la morue de 4Vn est fermée depuis septembre 1993. Il n'en demeure pas moins que le stock ne présente aucun signe de rétablissement, cela surtout à cause de l'absence de recrutement. Quarante tonnes environ de morue ont été récoltées sous forme de prises accidentelles des pêches du sébaste et des poissons plats. Le stock est contrôlé par le moyen de relevés annuels au chalut du poisson de fond effectué en juillet par le MPO et, au cours des deux dernières années, par un prolongement en 4Vn du relevé habituels du poisson de fond en 4T. Un «relevé sentinelle» par palangriers commerciaux, réalisé pour la première fois en septembre 1994, a été effectué à deux reprises en 1995. Tous ces relevés dressent une même image de l'état du stock et rien n'indique qu'il sera possible de réouvrir la pêche dans un proche avenir, à moins qu'il n'y ait un accroissement appréciable de la biomasse par recrutement.

INTRODUCTION

Cod landings in NAFO Subdivision 4Vn have declined sharply during recent years. Throughout most of the 80's, catch quotas restrained the fishery, but after 1990 the catch was substantially less than the TAC. In September 1993 the cod fishery was closed and this moratorium is still in effect. In the few years prior to the closure, vessels using mobile gear generally managed to maintain a catch close to their allocation, whereas the longline fleet fared less well. Mixing of Gulf of St. Lawrence (4T) cod with the resident stock and inability to apportion landings according to stock has complicated the assessment and management of the 4Vn stock.

4T cod overwinter along the shelf edge from Sydney Bight as far as Banquereau Bank region, leaving the Gulf in the late autumn and returning in the spring. During this period the catch of cod in 4Vn comprised both Gulf and resident cod, although the 4T cod made up the bulk, being a much larger stock. Thus, unknown quantities of 4Vn cod were being caught during the overwintering period. Furthermore, the dragger fleet which had traditionally caught most of its catch between May and October began to transfer its activities toward the latter part of the year to exploit migrant cod. The effect was to maintain the overall catch for 4Vn even as the abundance of resident fish fell. Information on the overwintering migration of Gulf of St. Lawrence (4T) cod into the Sydney Bight area was reviewed in the spring of 1994. From patterns of commercial fleet movements and results of tagging studies it was clear that many 4T cod had departed the Gulf by mid November and probably all by December. Therefore it was decided to modify the 4Vn management unit definition by shortening the assessment period from May to December to May to October, inclusive.

With the closure of the fishery, information on the status of the stock is now largely limited to two sources; the DFO July groundfish survey and a "Sentinel" survey operated by commercial longliners in June and September. Additional data are to be found from commercial bycatch port samples and a limited DFO inshore survey of the western half of Sydney Bight.

This report will provide information on landings of cod taken as bycatch during 1995 and summarise the findings of research surveys carried out by DFO and the fishing industry in that year.

COMMERCIAL CATCH

Thirty-nine tonnes of cod were taken as bycatch in 4Vn between May 1 and October 31, 1994 (Fig 1 and see also Appendix A for an historical time series of landings by gear type back to 1970). The bulk of this bycatch was caught along with redfish and flatfish (see Appendix B). Large tonnage otter trawlers and small tonnage class seiners took 32% and 33% of the cod bycatch respectively (Table 1).

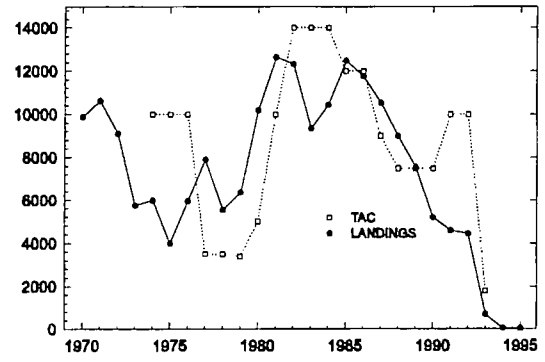

Fig. 1. Annual landings and corresponding TAC's for 4Vn cod.

Table 1. Nominal catch of cod in 4Vn (May to October, 1995) by tonnage class and gear type.

TONNAGE	OTTER TRAWL	SEINE	LONGLINE	HANDLINE	OTHER	TOTAL
0-24.9	0.05	7.75	4.51	0.17	0.49	12.97
25-49.9	0.08	5.37	3.93			9.38
50-149.9	2.07	0.62				2.69
150-499.9	0.02					0.02
500-999.9	12.74					12.74
1000+						
Uknown	0.12	1.84			0.14	2.10
TOTAL	15.08	15.58	8.44	0.17	0.63	39.90

The distribution of the catch over time is found in Table 2. The highest amounts of cod were landed in July and none in October. However, it should be noted that about 3 tonnes of cod were taken by the Sentinel survey (see later section) in July and a further 15 tonnes in September.

Table 2. Nominal catch (1994) of 4Vn cod landed by month and gear.

GEAR	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	TOTAL
Longline	2.51	1.63	1.97	1.29	1.04	0	8.44
Handline	0.10	0.05	0.01	0.01	0	0	0.17
Otter trawl	1.73	0.02	8.72	3.68	0.90	0	15.08
Seine	7.96	1.85	4.09	0.65	0.25	0	15.58
Other	0.26	0	0.30	0.05	0.02	0	0.63
TOTAL	12.56	3.55	15.09	5.68	2.21	0	39.90

Normally the commercial catch is analysed and characterised according to a number of biological indices such as mean length, weight and age; however, this was not done due to the small size of catch and also due to the difficulty of comparing indices derived from cod bycatch to the longer time series derived from directed cod catch.

JULY GROUNDFISH SURVEY

The July survey is notoriously variable due to low numbers of sets and also no doubt due to high natural variability. Although the greatest mixing of stocks in 4Vn occurs in the winter, there appears to be mixing of cod stocks in this area during all months of the year. Nevertheless, the survey tracks cohorts well, and the survey index trends accurately reflect true abundance.

Although the index was slightly higher in 1995 than in 1994, it is still at a very low level (Fig 2). No cod were taken in the deepest stratum (>183 m); about 100 per tow in the mid-depth

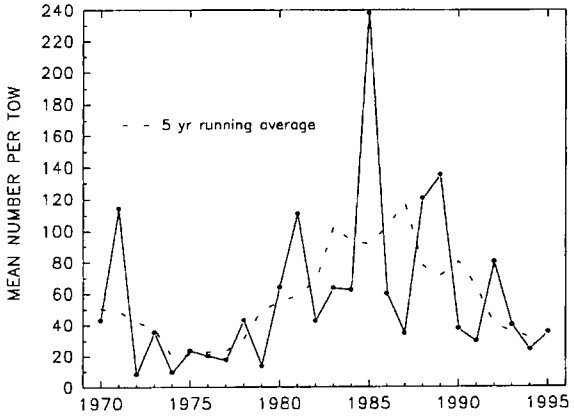

Fig 2. Abundance of 4Vn cod - July groundfish research survey.

stratum (91 to 183 m) and about 9 per tow in the shallow stratum (<91 m). Most of the catch was taken in two sets, 278 and 165 fish, respectively. The 1990, 1991 and 1992 year classes made up the bulk of the catch with 5 yr-olds being slightly more abundant than adjacent year-classes (Fig 3).

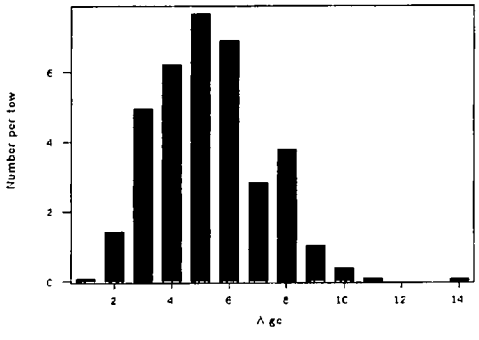

Fig 3. Age frequency of 4Vn cod - July 1995 groundfish research cruise.

This stock continues to suffer from low levels of recruitment; the last good year-class was 1987. The historical time series of catch per set by age can be found in Appendix C. The dominant length mode in survey catches was 40 cm. Very few fish over 60 cm were taken (Fig 4), which has been the case since the late eighties.

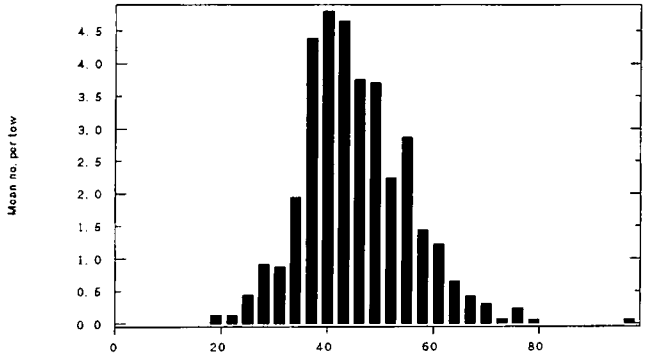

Fig 4. Length frequency of 4Vn cod - July 1995 groundfish research cruise

INSHORE SURVEY

A two-part inshore survey was begun in Sydney Bight in 1991; an ichthyoplankton component was abandoned early in 1992 due to reduction of funding but a bottom trawl program has continued at a reduced level until present. The trawl survey has consistently found 0-group and 1 year-old cod in the Bird Island area. These fish are present in the area from at least May to October after which time they disappear and presumably move to deeper water to overwinter. The 4Vn inshore survey is an important adjunct to the July groundfish survey since it can provide additional information. The latter does not provide good evidence of the presence of young cod

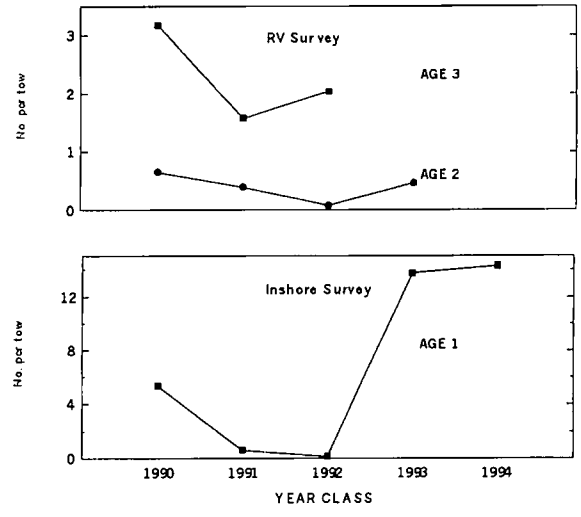

Fig 5. Relative year-class strength of 4Vn cod.

because it does not sample the shallow water area favoured by these juveniles. In the past two years, the numbers of one year-old cod (average length 12 cm) were at least twice the level of the previous three years. The relative abundance of year-classes as seen by the inshore survey agrees reasonably well with their subsequent relative abundance as seen in the July RV survey as 2 and 3 yr-olds (Fig 5). However, the time series is still too short to say whether the results of the inshore survey can provide a good index of recruitment.

SENTINEL SURVEY

The sentinel survey forms an adjunct to DFO groundfish surveys that have been carried out in this area during the past two decades. The 4Vn sentinel survey is conducted during the summer and again in the autumn by commercial longliners following a random design, stratified by depth, similar to that used by the July groundfish survey. Three surveys have now been completed; September 1994, and July and September 1995. The area surveyed by the sentinel survey was the same as the DFO survey with the exception of there being no sets over 100 fathoms and the stratification schemes being slightly different. The July survey uses three strata: <50 fath., 50 - 100 fath., and >100 fath. The sentinel survey also employs three strata; however, the deep stratum was dropped, the mid-depth was retained and the shallow stratum was divided in two. Hence the sentinel strata are; <30 fath., 30 to 50 fath. and 51 to 100 fath. The geographic distribution of cod caught in all three surveys was similar, with the exception of relatively high

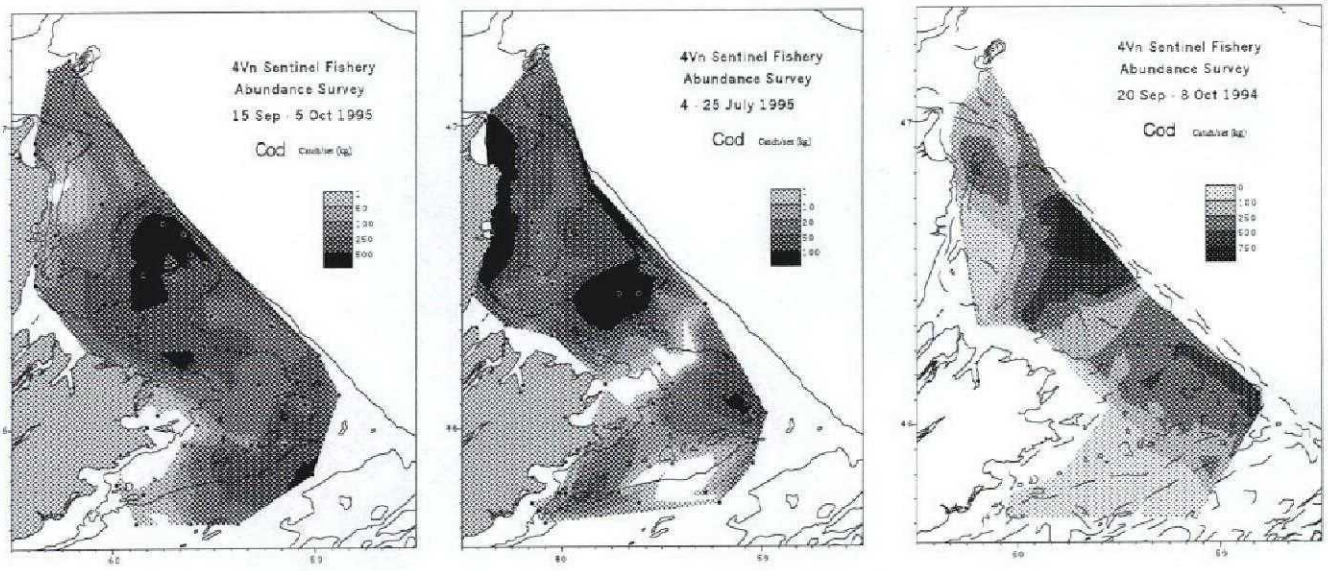

Fig 6. Sentinel Survey 4Vn Cod Distribution.

concentrations of fish along the north-east Cape Breton shore in the western part of Sydney Bight during July in 1995 (Fig 6, note different abundance scales). However, although the catch rates in September of 1994 and 1995 were virtually identical (110.1 and 108.3 kg/1000 hks, respectively), the catch rate during July 1995 (22.8 kg/1000 hks) was much lower (Fig 7). This appears to be a

seasonal effect; longline fishermen have found that July catch rates historically have been lower than in other times of the year.

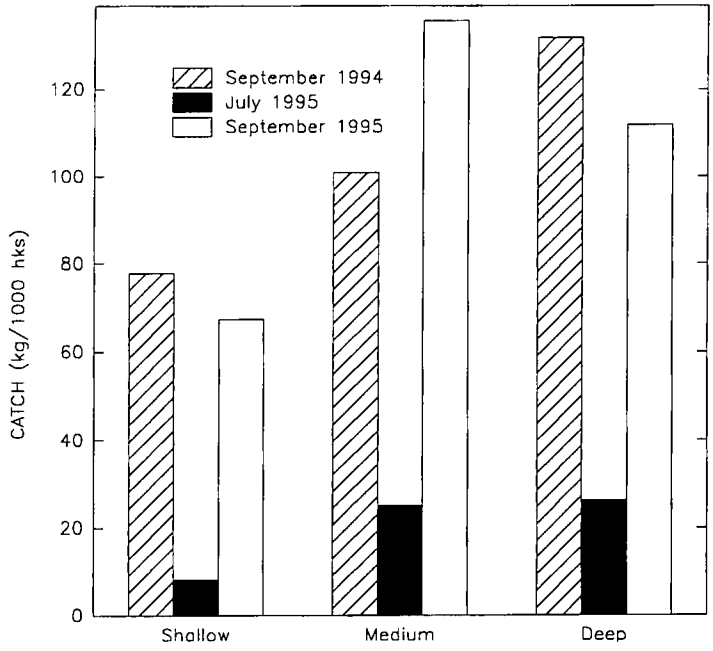

Fig 7. Mean catch rate of 4Vn cod by stratum.

A comparison of the July 1995 sentinel survey and the July RV trawl survey demonstrated that cod were caught in the same areas, but none of the areas identified as being of low abundance by the sentinel survey were sampled by the Needler. Therefore, the degree of correspondence between the sentinel and summer RV survey could not be properly assessed. Length frequencies in the July sentinel survey (Fig 8) were significantly larger than those in the July RV; this is probably due to gear selectivity. The research trawl is fitted with a small mesh liner so is capable

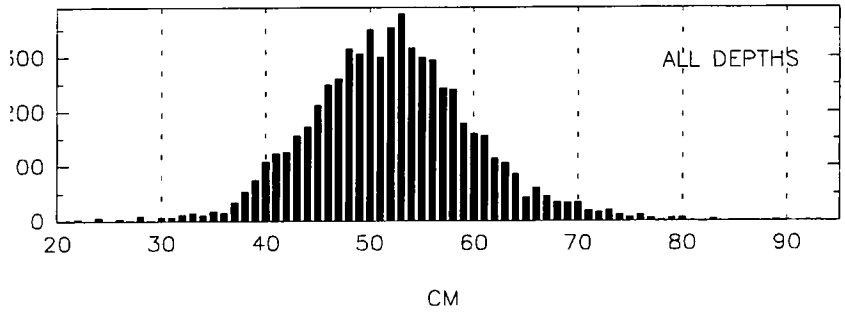

Fig 8. Length frequency of 4Vn cod (all strata) taken by sentinel survey.

of capturing very small cod; whereas, the size of hook used in the commercial longline fishery take few small fish. Fishermen indicate that cod <35 cm (14 in) are rarely taken with #12 hooks which are used for the survey.

The catch of other species besides cod are given in Tables 3 and 4 for July and Sepember surveys, respectively. Dogfish, plaice and skate are dominant species in both months. Dogfish were particularly prevalent at mid-depth in July.

Table 3. Catch by species and depth stratum in the July 1995 Sentinel Survey.

SPECIES\STRATUM	<30 F	30-50 F	>50 F	TOTAL
Spiny Dogfish	398	12,626	8,143	21,167
Cod	166	1,057	1,586	2,809
Plaice	138	414	903	1,455
Striped Atlantic Wolffish	108	908	-	1,016
Thorny Skate	27	300	483	810
Twohorn Sculpin	506	2	-	508
Blue Shark	-	243	38	281
White Hake	1		115	116
Turbot	-	-	25	25
Northern Wolffish	-	-	18	18
Fourhorn Sculpin	10	6	-	16
Conger eel	9	4	-	13
Pollock	1	-	11	12
Haddock	-	-	11	11
Misc. Invertebrates	14	10	-	24
TOTAL	1,378	15,570	11,333	28,281

Table 4. Catch by species and depth stratum in the September 1995 Sentinel Survey.

SPECIES\STRATUM	<30 F	30-50 F	>50 F	TOTAL
Cod	2,157	6,624	5,887	14,668
Thorny Skate	86	659	909	1,654
Plaice	30	444	756	1,230
Spiny Dogfish	751	64	226	1,041
Blue Shark	83	148	301	532
Fourhorn Sculpin	315	26	2	343
Striped Atl. Wolffish	163	35	59	257
White Hake	49	24	107	180
Crabs (unspecified)	2	146	--	148
Tomcod	120	14	1	135
Spotted Wolffish	81	4	28	113
Halibut	--	--	112	112
Red Hake	6	2	55	63
Shortfin Mako	--	--	30	30
Conger eel		19	5	24
Twohorn Sculpin	10	10		20
Pollock	--	--	13	13
Redfish (unspecified)	--	--	7	7
Northern Wolffish		5		5
Turbot	--	--	5	5
Starfish	1	2	--	3
TOTAL	3,854	8,226	8,503	20,583

SEPTEMBER GROUNDFISH SURVEY

The DFO Gulf region has extended its 4T survey into 4Vn during September in the past two years (Fig 8). The distribution of cod seen by these surveys largely mirrors that as seen by other surveys mentioned previously. However, the catch rate of cod in 1995 was only about 1/3

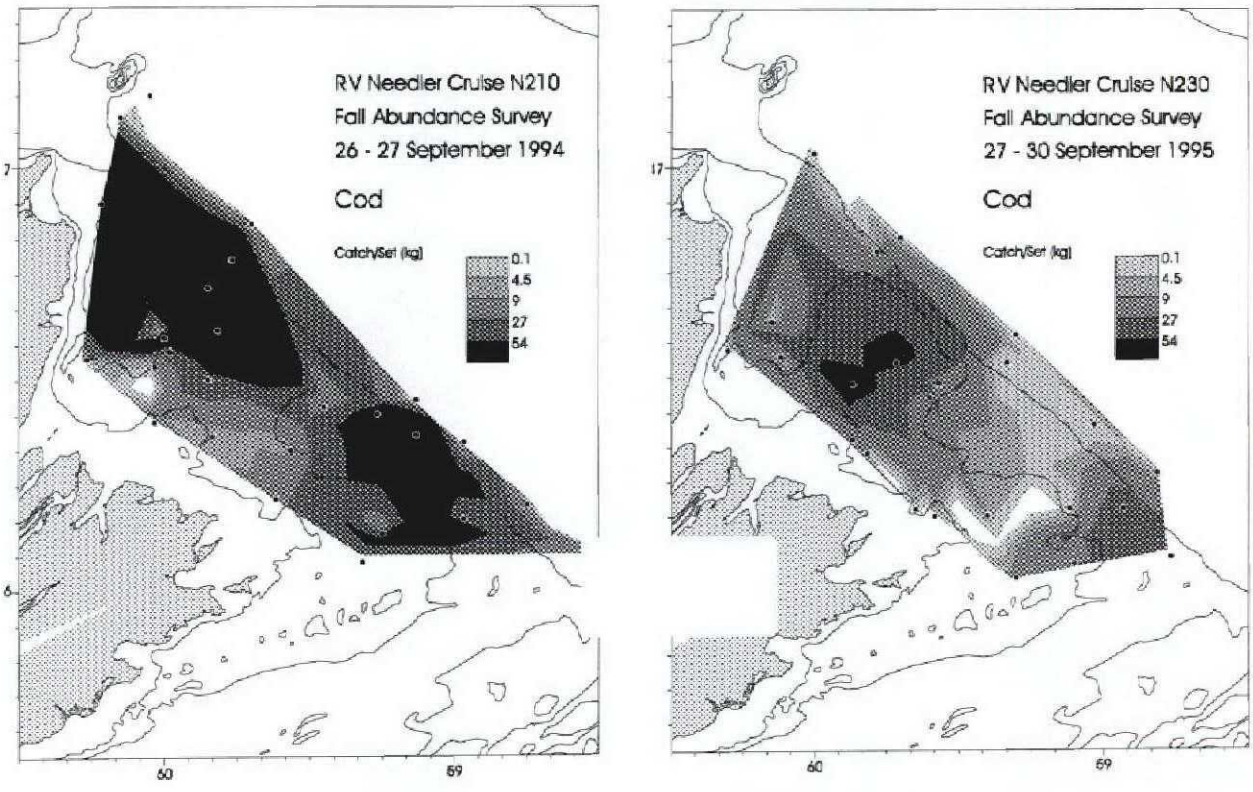

Fig 9. Distribution of 4Vn cod - September groundfish research survey.

that of the year previous. It is possible this lower catch rate in 1995 was a result of not surveying some areas where the sentinel survey had indicated higher concentrations of cod on Scaterie Bank to the south-east and to a lesser extent on White Point Bank to the north-west (compare with Fig 6).

CONCLUSIONS

There was a close correspondence of distributions of cod as seen by both DFO and industry sentinel surveys. July RV surveys and September sentinel surveys both indicate no change in the abundance of cod in 4Vn. The low abundance as seen by the September RV survey is probably not representative, since it appears concentrations of cod may not have been sampled. The July RV survey index remains low and the absence of good incoming year-classes is the major concern. Until there is substantial recruitment there can be no thought of reopening the fishery.

ACKNOWLEDGEMENTS

We would like to thank the 4Vn Sentinel Fishery Association and its participant fishermen for their cooperation in achieving the goals of the Sentinel Survey project. Thanks are also due to Ghislain Chouinard and Gloria Nielsen for supplying the data from the 4Vn leg of the 4T groundfish research survey.

AppendixA. Nominal catch (tonnes) of 4Vn cod (May to December) by gear type.

YEAR	OTTER TRAWL	SEINE	LONGLINE	HANDLINE	MISC.	TOTAL
1970	4,859	83	3,229	495	1,222	9,888
1971	5,308	109	3,728	696	790	10,631
1972	4,418	121	3,185	286	1,094	9,104
1973	2,099	143	1,982	404	1,120	5,748
1974	2,842	138	1,469	568	967	5,984
1975	1,851	100	875	360	812	3,998
1976	4,375	83	620	310	569	5,957
1977	4,613	554	1,805	595	354	7,921
1978	1,600	326	3,035	466	122	5,549
1979	624	278	4,483	640	349	6,374
1980	1,150	561	6,440	1,820	219	10,190
1981	1,488	557	9,801	741	61	12,648
1982	2,785	724	7,287	1,360	177	12,333
1983	2,448	863	5,101	924	26	9,362
1984	3,344	1,112	4,831	1,112	45	10,444
1985	5,081	1,162	4,823	1,408	20	12,494
1986	3,552	1,258	5,764	1,182	15	11,771
1987	2,034	1,285	6,369	848	16	10,552
1988	1,377	1,109	5,858	626	31	9,001
1989	2,129	851	3,610	718	157	7,465
1990	2,029	593	1,889	591	8	5,110
1991	2,213	694	1,249	389	49	4,602
1992	2,629	468	1,043	232	88	4,461
1993	p 138	60	406	77	21	702
1994*	p 26	16	4	8	<1	54
1995*	p15	16	8	<1	<1	40

* Redefinition of assessment period: Summed over six months (May to October)

p Preliminary statistics.

Appendix B. Detailed summary of cod bycatch (tonnes) by dominant species occurring in catch.

MAIN SPECIES	OTTER TRAWL	SEINE	LONGLINE	OTHER	TOTAL
Cod	2.54		5.71	0.23	8.48
Cusk			0.49		0.49
Redfish	1.34	0.76			2.10
Halibut			1.13		1.13
Plaice		7.84	0.67		8.51
Witch Fl.		1.90			1.90
Unknown Fl	0.06	5.10			5.16
Pollock	11.12				11.12
White Hake			0.10		0.10
Dogfish			0.02		0.02
Blue Shark			0.01		0.01
TOTAL	15.06	15.6	8.13	0.23	39.02

Appendix C. Research vessel abundance indices (mean number per tow and mean weight per tow) by age group for 4Vn cod.

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	NK	NO TOW	KG TOW
1970	0	6.35	1.77	4.78	10.9	10.46	4.5	2.59	0.84	0	0.29	0.14	0.13	0.21	42.96	57.47
1971	0	1.17	42.4	10.09	26.51	16.16	10.65	3.59	1.97	0.54	0	0	0.56	0.4	114.05	128.2
1972	0	0.52	0.28	2.35	0.3	1.61	1.47	0.39	0.27	0.25	0.19	0	0.37	0.37	8.39	22.12
1973	0	0	2.62	4.48	18.59	0.73	3.06	2.91	0.46	0.22	0	0	0	0.22	35.28	52.58
1974	0	0	0.61	1.36	2.79	3.21	0.4	0.5	0.26	0.22	0.11	0	0	0	9.47	14.44
1975	0	0.61	6.42	8.58	4.65	0.81	1	0.58	0.21	0.33	0	0.11	0	0.16	23.47	22.12
1976	0	6.49	2.25	1.48	1.93	1.55	0.73	1.79	1.65	1.41	0.24	0.23	0.47	0	20.21	43.41
1977	0	0.25	6.26	4.01	2.74	1.9	0.72	0.21	0.24	0.14	0.21	0.24	0.15	0.09	17.16	24.58
1978	0	0.66	9.13	19.31	5.54	4.38	1.53	1.17	0.44	0.43	0	0	0.11	0.12	42.84	67.55
1979	0	1.3	0.79	5.15	2.51	0.59	1.72	0.56	0.29	0.15	0	0.17	0.45	0	13.66	27.58
1980	0	1.88	10.52	3.97	23.58	16.4	5.15	1.16	0.45	0.37	0.37	0	0	0	63.84	85.55
1981	0.33	4.36	16.91	36.48	12.02	25.45	11.5	1.26	0.93	0.86	0.24	0.16	0.31	0.17	110.98	161.81
1982	0	2.53	1.74	5.77	10.22	7.61	9.25	3.41	1.32	0.45	0.1	0.23	0	0.1	42.73	74.82
1983	0	4.37	22.11	7.9	10.64	10.04	1.7	3.41	1.52	0.66	0.25	0	0.43	0.27	63.3	78.6
1984	2.83	7.25	10.02	10.48	13.51	8.75	3.58	1.81	1.58	0.85	0.32	0.41	0.46	0.28	62.14	102.3
1985	0	0.48	3.75	19.1	125.9	52.13	22.38	7.26	1.44	0.77	0.67	0	0.37	3.63	237.94	295.97
1986	0	1.33	6.36	11.13	8.11	17.55	6.38	4.92	2.17	1.02	0.55	0.1	0.22	0.09	59.93	83.83
1987	0	0.21	3.7	4.14	5.13	8.89	6.63	2.8	1.18	0.62	0.97	0.31	0	0.08	34.66	49.21
1988	0.61	0.55	2.49	17.05	13.18	31.89	26.45	18.93	6.24	1.7	0.5	0.24	0.32	0.23	120.39	171.24
1989	0	4.6	4.39	11.6	29.76	17.64	32.08	25.53	8.25	1.3	0.33	0	0	0	135.47	177.77
1990	0	0.24	15.07	9.03	3.29	3.87	2.05	2.29	0.73	0.81	0.13	0.09	0.05	0.05	37.68	35.11
1991	0.27	1	0.5	11.1	5.34	3.21	0.74	0.7	0.14	0.3	0.3	0	0.06	0	23.66	25.23
1992	0	0.66	3.44	5.13	44.36	15.15	4.88	3.66	1.31	0.82	0.23	0.4	0.3	0	80.34	105.59
1993	0	0.4	3.18	6.18	5.7	14.67	7.36	1.74	0.5	0.05	0.06	0.07	0	0	39.96	47.67
1994	0	0.08	1.57	3.87	7.22	1.66	7.28	1.88	0.08	0.34	0	0	0	0.05	24.04	25.09
1995	0.07	1.41	4.92	6.21	7.68	6.91	2.83	3.77	1.00	0.37	0.07	0	0	0	35.31	34.08