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Assessment of 4X Haddock in 1990

by

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Abstract

The nominal catch of 4X haddock in 1990 was 7,342 t, a 60% overrun of the 4,600 t TAC. CHP (cod, haddock, pollock) management was the main contributing factor to the overrun. Recent RV surveys indicate extremely low abundance and high exploitation rate. Reduction in the age range of the population is evident in both the survey and the commercial catch since the mid-1980s. While abundance of the 1987 and 1988 yearclasses appears average, the 1985 and 1986 yearclasses were among the lowest in the survey series and the 1989 yearclass may also be weak. An assessment using sequential population analysis was not attempted as the problems with the catch-at-age and/or the ADAPT formulation had not been resolved. There has been no improvement in the status of the 4X haddock stock since the last assessment. While it appears the stock has experienced two years of average recruitment one of which has already recruited to the fishery at age 3, it would be unwise to increase exploitation on the resource. It is recommended that there be no directed fishery for 4X haddock and that bycatch be kept at the lowest possible level. It should be noted that this advice is incompatible with the CHP management system and with the current management measures which allow a directed fishery.

Résumé

Les prises nominales d'aiglefin dans la division 4X se sont établies à 7 342 t en 1990, ce qui représente un dépassement de 160 % du TPA, fixé à 4 600 t. Le phénomène est imputable essentiellement à la gestion morue-aiglefin-goberge. Des campagnes d'évaluation récentes de navires scientifiques révèlent une très faible abondance et un taux d'exploitation élevé. La réduction de la fourchette d'âges de la population est manifeste, tant dans les campagnes d'évaluation que dans les captures commerciales depuis le milieu des années '80. L'abondance des classes d'âge de 1985 et 1986 se situe parmi les plus faibles de la série étudiée, tandis que celle des classes de 1987 et 1988 est moyenne et que la classe d'âge de 1989 risque d'être faible. On n'a pas procédé à une analyse séquentielle de population en raison de problèmes non résolus au sujet des données sur les prises selon l'âge et de la formule ADAPT. L'état du stock d'aiglefin de la division 4X ne s'est pas amélioré depuis la dernière évaluation. Bien que ce stock ait connu deux années de recrutement moyen et qu'une des classes d'âge de ces deux années ait déjà été recrutée à la pêche à 3 ans, il serait imprudent d'accroître l'exploitation de la ressource. Aussi recommande-t-on qu'il n'y ait pas de pêche directé de l'aiglefin dans la division 4X et que les prises accidentelles de cette espèce soient réduites au minimum. Il faut noter que cette recommandation va à l'encontre du régime de gestion morue-aiglefin-goberge, qui permet une pêche directe.

Introduction

This document contains an evaluation of the NAFO Division 4X haddock stock (Figure 1). As in the past, haddock caught in unit area 4Xs were not included in the analysis because they are believed to be part of the 5Y stock (Halliday 1974).

In the previous assessment of this stock (Frank et al. 1990), it was concluded that problems with the catch at age and/or the ADAPT formulation needed to be resolved before the results of the Sequential Population Analysis (SPA) could be used as the basis for harvest advice. These problems have not yet been resolved; thus indices and stock parameters derived from research vessel survey and commercial sampling data are examined to indicate trends in stock abundance and exploitation rates. An analysis of haddock, cod and pollock distributions from seasonal surveys is presented to address the Subcommittee recommendation that areas in NAFO Division 4X be defined for consideration of year-round closure to the fishery in order to conserve the haddock resource. In addition, some new initiatives designed to improve the estimation of haddock stock status are discussed.

The Fishery

Annual Trends in Reported Landings

The long-term (1930-83) annual catch of haddock in NAFO Division 4X has averaged about 20,000 t. This level was greatly surpassed once during the 1960s and again during the 1980s when landings peaked above 30,000 t (Figure 2). The former peak, fuelled by the strong 1963 yearclass, resulted in high exploitation rates and low spawning stock biomass and was thus instrumental in the imposition in 1970 of a quota system and a spawning area closure (Halliday 1988) under ICNAF. The 1970 TAC was set at 18,000 t, but was dropped to 9,000 t in 1972 and ICNAF recommended closure of the fishery in 1974 (Table 1). Catches and TACs subsequently increased to a peak in 1981-82. Catches were lower than TACs set during 1982-84. Total catch has been below the long-term average since 1984 with restrictive quotas in place since 1985.

Quota allocations for the stock since 1976 are given in Table 2. There has been a general tendency over time for finer and finer subdivisions of the TAC by fleet sector and season. During 1982-87, the fishery was regulated on the basis of 5 gear sectors: 1) mobile gear <65 ft; 2) mobile gear 65-100 ft; 3) mobile gear >100 ft; 4) fixed gear <65 ft; 5) fixed gear 65-100 ft. In 1988, gear sectors <65 ft were further subdivided into < and > 45 ft ie. fixed gear A1 and A2 and mobile gear C1 and C2. In 1989, mobile gear <45 ft (C1) were further subdivided into Generalists and Specialists. Since 1986, the allocation to mobile gear (C1 and C2) was further subdivided into three 4-month trimesters to extend the fishery over the year. These fine-scale allocations resulted in significant enforcement problems and resulted in the implementation of an aggregate cod/haddock/pollock (CHP) allocation in 1989

for the <65 ft mobile fleets; however the mobile and fixed gear sectors all exceeded their quotas and were shut down in June and October respectively.

The 1990 nominal catch of 4X haddock was 7,342 t. Vessels in the inshore mobile gear fleets again fished in 4X against a combined cod, haddock and pollock (CHP) quota system that had been introduced in 1989. A combination of CHP trip limits and haddock bycatch allowances kept the fleets fishing throughout most of the year (Figure 3), in contrast to 1989. The fixed gear fleet fished unrestricted in 4X until May 1 when they were placed under options of haddock trip limits or haddock bycatch allowances to the end of the year. Mobile gear <45 ft (C1) Specialists and Generalists caught 92 and 227% respectively of their allocations, mobile gear 45-65 ft (C2) caught 117% of their allocation, and fixed gear <65 ft caught 263% of their allocation. Landings by vessels 65-100 ft were insignificant. Landings by mobile gear >100 ft, which was once a major participant in the fishery, were only 3% of the total in 1990.

Discussions with industry representatives have indicated that substantial misreporting of haddock in NAFO Division 4X occurred during 1985-88 and this was corroborated by anecdotal reports which suggested that misreporting occurred anytime in the past when quotas have been restrictive. In 1989, anecdotal reports indicated that misreporting of haddock landings was generally low compared to previous years, at least until May while the fishery was relatively unrestricted. While the restrictions in place in 1990 allowed the fleets to fish throughout most of the year, they resulted in an increase in misreporting.

The Browns Bank closure (March 1-May 31) was extended to June 15 in 1990. Mobile gear vessels participating in the experimental square mesh fishery on Georges Bank continued to use the new 130 mm square mesh cod ends when they returned to fishing in 4X. Appendix 1 contains a listing of weekly highlights of the fishery.

Sampling

As exploitation by the inshore fleet expanded during the 1977-81 period, the landings per sample ratio increased relative to previous levels (Table 3). Since then, sampling has been generally good with rates of approximately one sample per 200-300 t landed.

Although sampling intensity in 1990 was good (103 t per sample) and the number of otoliths collected increased relative to last year (1549 vs. 935), the low level of landings created by trip limits and bycatch restrictions made it extremely difficult to obtain samples from the inshore mobile gear fleet fishing in 4Xmnop after the first quarter. As a result, it was not possible to follow the recommendations of O'Boyle et al. (1983) when constructing the catch at age for this fleet sector. The lack of samples from this sector necessitated using keys common to 4Xmnop and 4Xqr rather than separate keys as O'Boyle et al. (1983) recommended. The 1990 catch at age was constructed using the gear and quarter stratification shown in Table 4. A total of 23 keys were used (Table 5).

Catch Numbers and Weight at Age

The catch numbers and weight at age data for 1970-90 are shown in Table 6. In recent years, there has been a tendency for the landings to be dominated by fewer and fewer age groups. In 1982-83, five age groups (3-7) each contributed over 10% by weight to the total yield. In the following two years, four age groups dominated. Since 1985, ages 4-6 have comprised >85% of the catch by weight (Table 6). In 1990, four age groups contributed significantly to the landings, but one of those was age 3 which contributed 15% by weight. Figure 4 highlights the continuing reduction in numbers at age in the catch but the increase in age 2 and 3 fish in 1990. Since the mid-1980s, there has also been a reduction in the maximum age present in the catch at age. In 1990, the oldest fish in the catch at age was age 9.

The mean weight at age of haddock caught in NAFO Division 4X shows a trend of increasing weight at age in the past three to four years (Figure 5). Compensatory changes in weights at age associated with low population levels is one possible explanation for the observed trend; alternatively a shift in distribution to an area of higher growth rate could also produce an increasing trend. The cause of this increase will be investigated.

Abundance Indices

Commercial Catch Rates

Because of high and variable levels of misreporting in recent years, the commercial C/E is not considered to be a reliable index of haddock abundance in NAFO Division 4X.

Groundfish Bottom Trawl Survey

The July groundfish research vessel survey on the Scotian Shelf from 1970-90 was used to evaluate the status of the resource. The mean number per tow by stratum are shown in Table 7. Mean numbers at age per tow, weighted by stratum area, and the associated standard errors and coefficients of variation are shown in Table 8, while mean weight per tow and mean individual weights are shown in Table 9. In the previous assessment (Frank et al. 1989), these data were calculated using the SMS software described by O'Boyle and Wallace (1986). As a result of changes in the BIO computing systems, the research survey data presented here were calculated using the STRAP software (Smith and Somerton 1981). Due to differences in which fish were used in the age length keys and how fish that were sampled but not aged were handled, some slight differences were found between the two, however the trends were identical.

The arithmetic mean catch rates across strata from 1970-90 for ages 2-5, ages 6-9 and

all age groups combined exhibit large inter-annual variability (Figure 6). In general, total abundance was low during the early 1970s and high during the early-mid 1980s. Abundance dropped sharply since 1985 and has remained low. There has also been a reduction in recent years in the number of ages seen in the survey (oldest age=7 in 1989 and 1990), consistent with the trend seen in the commercial fishery. Trends in weight per tow paralleled catch in numbers per tow (Figure 7). Since 1986, there has been a general trend of increasing weight at age (Figure 8) and length at age (Figure 9) in the survey, consistent with the pattern observed in the commercial catch.

The catch of 2 year olds in 1989 and of both 2 and 3 year olds in 1990 is encouraging, given the magnitude and low CVs of the estimates; however these values suggest only average yearclass strength. The previous two yearclasses, 1985 and 1986, were among the lowest in the summer research vessel series, while the 1983 and 1984 were only average. Although the CV is relatively high, the age 1 value in 1990 is the lowest in the series.

Total mortality (Z) for ages 2-7, 2+ and age groups considered to be fully recruited (5-7/6-8) to the survey gear were calculated from the 1970-90 summer research vessel survey data (Table 10) using Paloheimo's method and the software of Rivard (1982). If natural mortality has been constant at 0.2, then these calculations indicate that exploitation rates (smoothed using a 3 yr running mean) varied around 0.4 during 1970-83 and since 1985 have been in excess of 1 (Figure 10). It appears that the exploitation rate has reached a peak in recent years and now it may even be declining.

Foreign Small Mesh Gear Fishery

Length frequencies of the haddock bycatch from the foreign small mesh gear fishery in 4X were examined to determine whether they could be used to indicate yearclass strength (Figure 11). The 1986 and 1987 length frequencies show little bycatch of the weak 1985 and 1986 yearclasses; however the 1988, 1989 and 1990 length frequencies show the 1987 and 1988 yearclasses at ages 1 and 2. The 1990 length frequency shows very little bycatch of the 1989 yearclass, supporting the indication from the 1990 research vessel survey that the 1989 yearclass is weak.

Estimation of stock size

As it was concluded that problems with the catch at age and/or the ADAPT formulation needed to be resolved before SPA results could be used, only indirect indicators of stock abundance derived from the commercial sampling and the research vessel surveys were considered at this time.

Assessment results

The NAFO Division 4X haddock stock has been experiencing very high exploitation rates in recent years as shown by the reduction in the age range in both the commercial catch and the research survey and by estimates of fishing mortalities in excess of 1 from the research vessel survey. Research vessel survey catch rates suggest the population is at or near a historical low, with poor yearclasses in 1985 and 1986 and possibly 1989, and only average yearclasses in 1983, 1984, 1987 and 1988. The increases in weights at age in both the commercial catch and the research vessel survey also suggest that population size is low.

Prognosis

While the estimate of exploitation rate from the research vessel survey suggests a decrease over the last year, and the average 1987 and 1988 yearclasses have resulted in a small increase in the research survey catch rate in the last year, we feel it would be premature to change the advice and recommend that a bycatch fishery for NAFO Division 4X haddock remain in effect for the remainder of the multi-year management plan.

Other Research

The 1991 fishery

In response to a request from the CAFSAC chairperson, commercial catch and sampling data were examined to address comments from the fishing industry that unavoidable bycatches of large haddock were occurring in 4X during the first quarter of 1991. We also conducted extensive interviews with fishermen throughout the area to determine what they had experienced and what they had heard from others.

The only data available for the first quarter of 1991 are the commercial samples collected by port technicians. A total of 29 samples were collected in the first quarter (Table 11).

The same breakdown used in constructing the catch at age was used to compare length frequencies in the commercial samples. The length frequencies from first quarter 4Xmnop TC1-3 otter trawl samples and from TC1-3 longline samples in the same area and quarter were compared for 1985-91 (Figure 12). The otter trawl samples for 1991 showed an increase in the size of haddock relative to the earlier years and relative to the longline samples. An examination of individual samples from 1991 indicated that the shift to larger haddock occurred in all three 1991 otter trawl samples from 4Xo and in some of the 4Xp samples, but not in the single 4Xn sample. We are unable to determine what has caused this change in mean size in the first quarter of 1991, but it may be related to the trend of

increasing size at age seen in this area in recent years, the recruiting of poor yearclasses or the change in mesh size used in 1991. We will be able to address this once the 1991 samples have been aged.

Interviews with 4X fishermen suggested that the occurrence of large haddock was not the rule in 1991 and that they were not unavoidable. At this time of year, there are relatively few otter trawlers fishing 4X and many of those interviewed said they had moved to another area whenever they encountered haddock, so as to minimize their haddock bycatch. It was generally considered that the reports that haddock were unavoidable were coming from a minority and were related to dissatisfaction with low individual boat quotas for haddock rather than the abundance of haddock.

Closed area analysis

Seasonal research vessel survey data from NAFO Division 4X were analyzed by estimating the mean catch per tow by 10' squares for the spring (1979-85), summer (1970-89) and fall (1979-84) surveys for small (≤43 cm) and large (≥44 cm) cod, haddock and pollock. Distributional maps are presented for each species and size group by highlighting those 10' squares that equalled or exceeded the grand mean catch per tow by a factor of 2.

Small haddock were abundant on Browns Bank and the other offshore banks year round (Figures 13, 14, 15). High concentrations of large haddock are most dissimilar from small haddock in the fall (Figure 15) and most similar in the summer (Figure 14). The Trinity Ledge/Lurcher Shoal area shows a mixture of large and small haddock in the summer and fall surveys (Figures 14, 15) and during the spring, small haddock were abundant in deep water to the west of this inshore region (Figure 13).

The distribution of high concentrations of small and large cod were similar year round and the Bay of Fundy can be considered a major centre of abundance (Figures 16, 17, 18). The offshore banks showed persistent high concentrations of small and large cod but the locations were spotty in comparison to the distributional pattern observed in the Bay of Fundy.

High concentrations of small and large pollock were observed in several discrete locations throughout 4X year round (Figures 19, 20, 21). The high concentrations seen in the Bay of Fundy generally overlapped with those of cod.

Collectively, the results of the graphical analysis suggest that the persistent concentrations of small haddock seen in the offshore and, secondarily, the concentrations of small haddock observed in the inshore may serve as potential closed areas that would have only limited impact on fisheries for cod, pollock and large haddock. Changes in mesh sizes used by the dragger fleet implemented in 1991 may reduce the catch of small haddock to

levels low enough that area closures would provide little additional protection for small haddock. Further objective analysis and consultation with industry are required before a conclusion can be reached regarding the location and target size of haddock that could be protected by such a management measure.

Tagging

Preliminary analysis of haddock tagging data from NAFO Division 4X (Stobo, unpublished data) suggests that small haddock are less dispersive or occupy a smaller geographic range than large haddock. If this observation is correct, it would suggest that definition of closed areas for small haddock would be most effective in terms of protection from the fishery. A detailed analysis of the historical haddock tagging data base in 4X is presently underway.

Adjustment of Landings Data

It was concluded in last year's assessment (Frank et al. 1990) that problems with the catch at age should be resolved before the results of the SPA could be used as the basis for harvest advise. These problems may have been created by the substantial misreporting of 4X haddock that occurred during the 1985-88 period. As part of our ongoing communications initiatives with the Industry, the possibility of quantifying misreporting of 4X haddock was discussed with a number of fishermen and their representatives. A number of cases were identified where personal fishing records had been maintained and might be compared to logbook records. Attempts are being made to identify groups of fishermen with common fishing/reporting practices and to determine representative cases that could be used to adjust landings data from these specific groups.

Inshore RV survey

A large portion of NAFO Division 4X is not surveyed during the July research vessel survey because of "untrawlable bottom", yet significant quantities of haddock are taken from these waters (particularly German Bank in 4Xq). During a survey in June 1990 with the Lady Hammond, a number of sets were made with a Western IIA trawl to evaluate the possibility of surveying these areas. Of 29 sets by this 58 m vessel, 31% were rejected due either to gear damage or to tows cut short because of bad bottom. Major trawl damage occurred in 5 tows, yet in most cases smaller commercial vessels were fishing successfully in the same general area. In July 1991, an experimental survey is planned with the 20 m J.L. Hart using a Gourock Rockhopper trawl which is designed to fish on rough bottom. The survey will run concurrently with the standard July survey with the Alfred Needler, but will cover the "untrawlable bottom" area. Local fishermen will be consulted to determine where in this area a small vessel may tow successfully without damaging the trawl.

Stock area estimation

Several recent studies have shown that both pelagic and demersal species respond to changes in abundance by adjusting their regional distribution. Positive correlations between abundance and distributional area for populations of haddock and cod have been reported by Crecco and Overholtz (1990) and Rose and Leggett (1991). This approach is presently being evaluated for 4X haddock by Marshall and Frank (unpublished data). The first step involves the development of an acceptable method for the estimation of stock area from the research vessel survey. The frequency distribution of the mean catch per tow by age from each July survey was used to assess the area occupied. An interesting initial result is that the frequency of zero sets for haddock age 4-7 in any given year was at a minimum compared to the younger age groups, despite their lower numerical abundance. This result is consistent with the preliminary results of the historical tagging data which suggests the young haddock occupy a smaller geographic range relative to older haddock. If a relationship between stock area and stock abundance can be developed for 4X haddock, then a meaningful additional index of stock status will be available.

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Table 1. Reported nominal catch (t round) of haddock from NAFO Division 4X (excluding unit area 4Xs) by country. The numbers in brackets represent the number of commercial samples collected in that year.

Year	Canada (MQ)	Canada (Nfld)	USA	USSR	Spain	Other	Total	TAC
1970	15560 (26)	--	1638	2	370	12	17582	18000
1971	16067 (29)	--	654	97	347	1	17166	18000
1972	12391 (36)	--	409	10	470	1	13281	9000
1973	12535 (30)	--	265	14	134	6	12954	9000
1974	12243 (25)	--	660	35	97	--	13035	--
1975	15985 (56)	--	2111	39	7	2	18144	15000
1976	16293 (45)	--	972	--	95	5	17365	15000
1977	19555 (79)	--	1648	2	--	12	21217	15000
1978	25299 (62)	114	1135	2	--	27	26577	21500
1979	24275 (49)	268	70	3	--	15	24631	26000
1980	28209 (56)	71	257	38	--	37	28612	28000
1981	30148 (82)	117	466	--	--	15	30746	27850
1982	23201 (92)	28	854	--	--	4	24087	32000
1983	24428 (119)	44	494	17	--	7	24990	32000
1984	19402 (97)	23	206	--	--	--	19631	32000
1985	14902 (86)	--	25	--	--	1	14928	15000
1986	14986 (78)	--	38	10	--	--	15034	15000
1987	13538 (82)	--	17	--	--	--	13555	15000
1988	10921 (79)	--	2	53	--	--	10976	12400
1989	6666 (43)	--	1[1]	33[1]	--	--	6700	4600
1990	7297 (71)	--	25[1]	17[2]	--	3[2]	7342	4600

Longterm averages: 1930 - 60 = 16854 t
1961 - 83 = 25217 t
1930 - 83 = 20127 t

1 - NAFO Circular Letters
2 - I.O.P. data

Table 2. Recent Canadian fishery allocations and the respective reported catch (t) of 4X haddock. Information from Atlantic Quota Reports (AQR).

Year	Report Date	Fleet	Allocation	Reported[1] Catch	%	Closure Information
1976		All Vessels	13300	15715	118	
1977		All Vessels	13400	20220	151	
1978		All Vessels	21500	25518	119	
1979		Vessels<125'	17500	17949	103	
		Vessels>125'	8500	6471	76	
		Total	26000	24420		
1980		Vessels<125'	22500	23585	105	
		Vessels>125'	5500	5095	93	
		Total	28000	28680		
1981	31/12	Vessels<125'	22350	25102	112	24/10 - 31/12
		Vessels>125'	5500	5380	98	02/05 - 31/12
		Total	27850	30482		
1982	31/12	FG < 65'	8850	8168	92	
		MG < 65'	15000	12909	86	
		FG 65-100'	100	124	124	23/05 - 31/12
		MG 65-100'	1000	567	57	
		MG > 100'	7050	2829	40	
		Total	3200	24597		
1983	31/12	FG < 65'	9050	9179	101	
		MG < 65'	15000	12991	87	
		FG 65-100'	100	108	108	12/04 - 31/12
		MG 65-100'	800	177	22	
		MG > 100'	7050	2438	35	
		Total	32000	24893		
1984	31/12	FG < 65'	8850	6958	79	
		MG < 65'	15000	12359	82	
		FG 65-100'	100	3	3	
		MG 65-100'	1000	44	4	
		MG > 100'	7050	648	9	
		Total	32000	20012		
1985	31/12	FG < 65'	4000	4496	112	16/11 - 31/12
		MG < 65'	10000	10214	102	13/08 - 31/12
		FG 65-100'	100	1	1	
		MG 65-100'	100	61	61	
		MG > 100'	800	541	68	
		Total	15000	15313		

Table 2 (continued)

Year	Report Date	Fleet	Allocation	Reported[1] Catch	%	Closure Information
1986	31/12	FG < 65'	5000	5446	109	
		MG < 65':				
		1/1-30/4	2700			13/03
		1/5-31/8	4000			18/07
		1/9-31/12	2300	9202	102	
		FG 65-100'	100	0	0	
		MG 65-100'	100	118	118	15/02, 15/11
		MG > 100'	800	680	85	
		Total	15000	15446		
1987	31/12	FG < 65'	5000	4747	95	
		MG < 65':				
		1/1-30/4	2700	2998	111	08/04, trip limits
		1/5-31/8	4000	3481	87	28/07, 13/08, trip limits
		1/9-31/12	2300	1380	60	20/11, 08/12, trip limits
		FG 65-100'	100	49	49	
		MG 65-100'	100	121	121	24/03, revoked 31/03
		MG > 100'	800	487	61	
		Total	15000	13263	88	
1988	31/12	FG < 65'	4126	3455	84	
		FG 65-100'	75	0	0	
		MG < 45':				
		1/1-30/4	1200	1037	86	Trip limits
		1/5-31/8	1800	1540	86	Trip limits
		1/9-31/12	978	839	86	21/10
		MG 45-65':				
		1/1-31-8	2500	2708	108	Trip limits
		1/9-31/12	976	962	99	21/10
		MG 65-100'	85	15	17	
		MG > 100'	660	408	62	
		Total	12400	10964		
1989	31/12	FG <45' (A1)	1540	2884	187	11/10; 2 options of trip limits
		FG 45-65'(A2)				19/10; A1, 1500 kg/10% bycatch; A2, no permits
						03/11; A2, 0 kg/10% bycatch
						09/11; A1, 2 options of trip limits
		FG < 100'	25	0	0	
		MG < 45'(C1)				
		1/1-30/4	450	1363	303	22/2; closed
		1/5-31/8	670	799	119	23/2; revoked
		1/9-31/12	400	125	31	16/3; closed
						22/3; revoked
						28/3; 9000 kg trip limit
						11/4; 1500 kg trip limit
						13/4; 9000 kg trip limit
						14/6; closed to cod, haddock, pollock (CHP) in 4X, 5, except Generalists
						Generalists; 3300lbs CHP/trip
						19/7; 2000 lbs CHP/trip
						04/8; 3300 lbs CHP trip, 2 trips/wk or 10% CHP/trip
						27/9; 2000 lbs CHP/trip
						22/11; Generalists closed

Table 2 (continued)

Year	Report Date	Fleet	Allocation	Reported[1] Catch	%	Closure Information
		MG 45-65' (C2)				
		1/1-30/4	370	1273	344	22/2; closed
		1/5-31/8	560	357	64	23/2; revoked
		1/9-31/12	320	0	0	16/3; closed 22/3; revoked 14/6; closed to CHP in 4X, 5
		MG < 100'	25	9	36	
		MG > 100'	240	56	23	
		Total	4600	6899	149	
1990	31/12	FG<45 (A1) <45 (A3) 45-65 (A2)	1540	4050	263	01/05; A1-A3; trip limit options 3300 lbs/10% bycatch 15/06; A1-A3; trip limit options 3300 lbs/20% bycatch 21/07; A1-A3; trip limit options 3300 lbs/10% bycatch 06/10; A1-A3; trip limit options 3300 lbs/10% bycatch A2; trip limit options 0 lbs/0% bycatch 01/11; A2; trip limit options 0 lbs/ 10% bycatch
		FG 65-100	25	0	0	
		MG<45' (C1, Specialists)				
		1/1-30/4	390	753	193	01/01; Trip limit: 10,000 lbs CHP (cod,haddock,pollock) 1 trip/wk
		1/5-31/8	650	304	47	13/02; Closed
		1/9-31/12	267	151	57	19/02; Trip limit: 10,000 lbs CHP 1 trip/wk 06/03; Closed 16/04; Trip limit: 15,000 CHP total 30/04; Trip limit: 15,000 CHP total 07/05; Closed 17/05; Trip limit: 15,000 CHP total 01/05; Trip limit: 15,000 CHP total 12/06; Trip limit options: 1.Pollock 20,000 lbs Cod 10% of pollock Haddock 10% of pollock 2.Pollock 10,000 lbs Cod 5,000 Haddock 20% of cod & pollock 4 fishing trips until October 27/06; same options as above with the 4 trips until Dec. 31 23/08; Trip limit option #2 only one available 19/09;Pollock & cod: Individual trip limits Haddock: 20% of cod and pollock; above on a week-to-week basis 02/11;above only valid until Nov 30 30/11;Closed

Table 2 (continued)

Year	Report Date	Fleet	Allocation	Reported[1] Catch	%	Closure Information
		MG<45' (C1, Generalist)				
			213	483	227	01/01; Trip options: 3300 lbs C.H.P. (2 trips/week) or 10% bycatch only 19/02; Trip options: 3300 lbs C.H.P. (1 trip/week) or 10% bycatch only 26/02; Same as above 12/03; Same as above 19/03; Same as above 26/03; Same as above 30/04; Same as above 07/05; Same as above 14/05; Same as above 23/08; 10% bycatch only 19/09; 3300 lbs 2 trips/week or 10% bycatch 03/10; 10% bycatch only 02/11; 3300 lbs/2 trips/week or 10% bycatch
		MG 45-65' (C2)				
		1/1-30/4	416	927	223	01/01; 20,000 lbs CHP (1 trip/wk)
		1/5-31/8	417	406	97	19/02; Closed
		1/9-31/12	417	131	31	16/04; 20,000 lbs total CHP 30/04; 20,000 lbs total CHP 07/05; Closed 17/05; 20,000 lbs total CHP 31/05; 20,000 lbs total CHP 11/06; Pollock 15,000 Cod: 30% of pollock Haddock: 20% of pollock 4 trips only until Dec. 31 01/08; C3,C4 (Eastern N.S. vessels) Pollock 15,000 Cod: 10% of pollock Haddock: 10% of pollock 1 trip in August 19/09; C2:Pollock and cod - Individual trip limits with haddock 20% of C & P on a week-to-week basis C4, C200-C213: Closed 30/11; All closed
		MG 65-100'	20	14	68	
		MG>100'	245	188	77	
Total			**4600**	**7404**	**161**	

[1] These figures are based on hail information and thus are unofficial and not comparable to those in Table 1.

Table 3. Reported nominal catch (t round) of haddock from NAFO Division 4X (excluding unit areas 4Xs) landed in the Maritimes split by tonnage class and gear type. The numbers in brackets represent the mean weight landed per age/size sample collected.

	Tonnage Class					
	TC 1-3			TC 4+		
Year	MG (OT)	FG (LL)	Misc.[1]	MG (OT)	FG	Misc.	Total
1970	4894 (1224)	3281	767	6501 (296)	114	3	15560
1971	4289 (858)	3475 (1158)	499	7711 (367)	94	0	16068
1972	2742 (686)	4396 (440)	439	4750 (216)	63	0	12390
1973	1822 (304)	6090 (677)	324	4228 (282)	70	0	12534
1974	3949 (494)	6364 (530)	251	1622 (324)	55	0	12241
1975	6085 (320)	5193 (577)	271	4408 (157)	26	0	15983
1976	4347 (1087)	5305 (884)	445 (223)	6144 (186)	46	6	16293
1977	6178 (1030)	4328 (481)	550	8343 (130)	117	35	19551
1978	9413	6814 (568)	1084 (542)	7888 (164)	97	0	25296
1979	10171 (5086)	5127 (394)	600 (600)	8317 (252)	57	0	24272
1980	13043 (1186)	6911 (384)	1127 (376)	7045 (294)	82	0	28208
1981	14765 (328)	7846 (302)	993 (331)	6475 (809)	70	0	30149
1982	11670 (243)	7581 (345)	945 (79)	2972 (297)	32	0	23200
1983	12563 (224)	8533 (225)	754 (75)	2535 (195)	15	0	24400
1984	11828 (208)	6769 (226)	193 (193)	609 (76)	0	0	19399
1985	9834 (173)	4360 (182)	142	565 (113)	1	0	14902
1986	9201 (192)	5336 (184)	240	209 (209)	0	0	14986
1987	7952 (169)	4854 (270)	231 (21)	501 (84)	0	0	13538
1988	7074 (131)	3353 (152)	118 (118)	376 (188)	0	0	10921
1989	3656 (130)	2699 (245)	222	89 (22)	0	0	6666
1990	3183 (76)	3731 (133)	280 (280)	102	0	1	7297

1 - Gillnets (set, drift), traps, unspecified.

Table 4. Summary of commercial sampling for the 4X haddock fishery in 1990. Tons landed is followed by sampling information in parentheses. The first number represents the number of fish measured and the second the number of otoliths read. The boxes represent the aggregation used in age/length key formation.

Otter Trawls

	4Xmnop		4Xqr	
Quarter	TC 1-3	TC 4+	TC 1-3	TC 4+
1	1341 (4354-341)	42	93 (415-31)	1
2	229 (177-28)	16	723 (2372-287)	0
3	125	16	427 (1700-111)	1
4	128	25	117 (452-50)	1

Longliners

	4Xmnop		4Xqr	
Quarter	TC 1-3	TC 4+	TC 1-3	TC 4+
1	1267 (2756-302)	0	8	0
2	256	0	11	0
3	1447 (1255-158)	0	29 (407-51)	0
4	707 (1658-190)	0	6	0

Miscellaneous*

	4Xmnop		4Xqr	
Quarter	TC 1-3	TC 4+	TC 1-3	TC 4+
1	20	0	0	0
2	9 (42-0)	0	56	0
3	115	0	53	0
4	26	1	1	0

* Longline samples applied to miscellaneous landings

Table 5. Individual keys used to construct the catch at age for the 1990 4X haddock fishery by gear, area, quarter and tonnage class.

				NUMBERS AT AGE(000s)													
Gear	Area	Quarter	TC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
OT	MNOP	1	1-3	0	4	152	155	248	251	59	3	0	0	0	0	0	0
			4+	0	0	5	5	8	8	2	0	0	0	0	0	0	0
	QR		1-3	0	0	11	11	17	18	4	0	0	0	0	0	0	0
			4+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MNOP	2	1-3	0	37	102	38	21	13	2	0	0	0	0	0	0	0
			4+	0	3	7	3	1	1	0	0	0	0	0	0	0	0
	QR		1-3	0	113	314	117	64	42	7	1	0	0	0	0	0	0
			4+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MNOP	4	4+	0	3	8	4	2	1	0	0	0	0	0	0	0	0
		3	4+	0	2	5	2	1	1	0	0	0	0	0	0	0	0
	QR	3	1-3	0	43	132	63	36	21	0	0	0	0	0	0	0	0
			4+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	1-3	0	11	35	17	10	6	0	0	0	0	0	0	0	0
	MNOP	3	1-3	0	13	40	19	11	6	0	0	0	0	0	0	0	0
		4	1-3	0	13	41	19	11	6	0	0	0	0	0	0	0	0
LL	MNOP	1	1-3	0	0	52	92	234	250	72	5	1	0	0	0	0	0
	QR	1	1-3	0	0	0	1	1	2	0	0	0	0	0	0	0	0
	MNOP	2	1-3	0	0	11	18	47	50	14	1	0	0	0	0	0	0
	QR	2	1-3	0	0	0	1	2	2	1	0	0	0	0	0	0	0
	MNOP	3	1-3	0	4	112	166	332	158	12	0	0	0	0	0	0	0
	QR	3	1-3	0	0	2	3	6	3	0	0	0	0	0	0	0	0
	MNOP	4	1-3	0	6	111	118	119	61	3	1	0	0	0	0	0	0
	QR	4	1-3	0	0	1	1	1	0	0	0	0	0	0	0	0	0
GN	MNOP	1	1-3	0	0	1	1	4	4	1	0	0	0	0	0	0	0
	MNOP	2	1-3	0	0	0	1	2	2	1	0	0	0	0	0	0	0
	QR	2	1-3	0	0	2	4	10	11	3	0	0	0	0	0	0	0
	MNOP	3	1-3	0	0	9	13	26	13	1	0	0	0	0	0	0	0
	QR	3	1-3	0	0	4	6	12	6	0	0	0	0	0	0	0	0
	MNOP	4	1-3	0	0	4	4	4	2	0	0	0	0	0	0	0	0
			4+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QR	4	4+	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USA		1		0	0	0	0	1	1	0	0	0	0	0	0	0	0
		2		0	2	5	2	1	1	0	0	0	0	0	0	0	0
		3		0	1	3	2	1	1	0	0	0	0	0	0	0	0
Foreign		2		0	2	5	2	1	1	0	0	0	0	0	0	0	0
		3		0	1	3	1	1	0	0	0	0	0	0	0	0	0
			Σ	0	258	1177	889	1235	942	182	11	1	0	0	0	0	0

Table 6. Annual landings numbers (A), weight at age (B), percent by number (C), and percent by weight (D) of NAFO Division 4X haddock. Note that age 13+ represents all individuals 13 and over.

TOTAL ANNUAL LANDINGS (000S) AT AGE OF HADDOCK IN 4Xmnopqr

a

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	0	0	41	150	1	37	18	2	0	0	16	1	0	0	2	0	0	0	0	0	0
2	1055	788	22	3077	694	2175	1296	1285	75	81	161	1182	491	64	708	198	290	39	28	17	258
3	724	1617	3434	113	4653	4568	1644	3126	3354	1158	2445	2215	3639	3294	1108	1956	1170	913	311	264	1177
4	1502	788	1841	2247	309	5164	4261	2019	7014	6709	3008	6219	3474	5476	4680	2261	4378	2858	1342	941	889
5	379	1422	509	1067	1779	485	3682	3193	2094	3881	5413	4199	4628	3733	3439	4516	3923	4186	2854	1644	1235
6	524	404	645	527	509	1103	434	2881	2832	1070	3499	3195	1703	2232	2396	1463	1476	1931	1935	1115	942
7	4536	69	90	600	189	247	807	360	1040	1244	527	1163	1457	940	948	464	246	252	453	285	182
8	1863	3316	57	322	269	172	154	389	137	263	623	357	840	395	340	132	116	56	76	24	11
9	133	1020	1166	259	186	62	71	107	107	57	169	323	183	187	110	53	40	2	14	4	1
10	96	163	512	614	269	32	95	72	26	68	34	97	94	119	77	16	28	2	3	1	0
11	175	181	26	55	552	165	39	23	9	11	21	14	45	69	36	6	9	5	4	0	0
12	27	146	193	13	24	229	103	8	6	1	3	23	16	25	20	1	4	0	0	0	0
13+	37	105	92	6	4	11	157	87	48	18	10	9	14	25	12	1	2	0	0	0	0

MEAN ANNUAL WEIGHT (KG) AT AGE OF HADDOCK CAUGHT IN 4Xmnopqr

b

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	.290	.290	.290	.270	.180	.230	.230	.280	.290	.290	.160	.230	.000	.000	.250	.000	.000	.000	.000	.000	.000
2	.570	.500	.450	.510	.460	.520	.520	.460	.440	.510	.522	.593	.493	.394	.527	.553	.523	.615	.491	.566	.535
3	.900	.960	.900	.750	.820	.820	.810	.710	.870	.870	.882	.887	.907	.758	.785	.787	.726	.733	.789	.877	.927
4	1.050	1.250	1.350	1.250	1.100	1.200	1.190	1.220	1.330	1.330	1.326	1.260	1.294	1.141	1.069	1.043	1.050	1.003	1.125	1.214	1.320
5	1.160	1.400	1.600	1.800	1.700	1.550	1.600	1.720	1.850	1.840	1.777	1.721	1.653	1.714	1.411	1.392	1.397	1.356	1.488	1.492	1.752
6	1.430	1.500	1.750	2.000	2.300	2.250	2.100	2.200	2.330	2.360	2.355	2.219	2.130	2.146	1.932	1.942	1.867	1.800	1.877	1.858	2.325
7	1.650	1.750	1.900	2.200	2.500	2.850	2.950	2.940	2.700	2.830	2.906	2.654	2.577	2.607	2.287	2.460	2.480	2.473	2.296	2.379	2.856
8	1.950	1.950	2.100	2.300	2.600	3.000	3.500	3.300	3.390	3.300	3.278	3.134	2.947	2.869	2.683	2.901	2.615	3.077	3.001	3.068	3.841
9	2.300	2.300	2.300	2.500	2.800	3.200	3.600	3.570	3.770	4.030	3.811	3.608	3.470	3.108	3.054	3.341	3.399	4.095	3.614	4.268	5.120
10	2.820	2.650	2.800	2.700	2.950	3.450	3.800	3.770	4.170	4.150	4.332	3.688	4.033	3.550	3.431	3.244	3.540	4.410	3.287	3.410	.000
11	2.800	3.250	3.000	3.300	3.200	3.500	4.100	3.690	4.030	4.960	4.200	4.546	3.946	3.630	3.841	4.162	3.037	3.980	4.495	.000	.000
12	2.850	3.000	3.700	3.400	3.800	3.700	4.000	3.940	3.620	6.000	4.963	4.823	4.033	3.780	4.114	4.300	3.110	.000	.000	.000	.000
13+	3.600	3.000	3.300	4.200	3.900	4.400	4.200	3.910	4.630	5.680	5.711	4.680	4.908	4.064	4.000	5.700	4.410	.000	.000	.000	.000

PERCENT LANDINGS AT AGE BY NUMBER

c

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	8	0	34	7	15	10	9	0	1	1	6	3	0	5	2	2	0	0	0	5
3	7	16	40	1	49	32	13	23	20	8	15	12	24	20	8	18	10	9	4	6	25
4	14	8	21	25	3	36	33	15	42	46	19	33	16	33	34	20	37	28	19	22	19
5	3	14	6	12	19	3	29	24	13	27	34	22	31	23	25	41	34	41	41	38	26
6	5	4	7	6	5	8	3	21	17	7	22	17	11	13	17	13	13	19	28	26	20
7	41	1	1	7	2	2	6	3	6	9	3	6	10	6	7	4	2	2	6	7	4
8	17	33	1	4	3	1	1	3	1	2	4	2	2	2	2	1	1	1	1	1	0
9	1	10	14	3	2	0	1	1	1	0	1	2	1	1	1	0	0	0	0	0	0
10	1	2	6	7	3	0	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0
11	2	2	0	1	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13+	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

PERCENT LANDINGS AT AGE BY WEIGHT

d

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	4	2	0	13	2	7	4	3	0	0	0	2	1	0	2	1	1	0	0	0	2
3	4	10	24	1	29	22	7	11	11	4	8	6	14	10	4	10	6	5	2	3	15
4	10	6	19	23	3	36	27	12	35	36	14	25	13	25	25	16	31	21	14	17	16
5	3	12	6	16	23	4	32	27	14	29	34	23	32	26	25	42	36	42	39	37	30
6	5	4	9	9	9	14	5	31	25	10	29	23	15	19	24	19	18	26	33	31	30
7	46	1	1	11	4	4	13	5	10	14	5	10	16	10	11	8	4	5	9	10	7
8	22	40	1	6	5	3	3	6	2	4	7	4	4	5	5	3	2	1	2	1	1
9	2	14	21	5	4	1	1	2	2	1	2	4	3	2	2	1	1	0	0	0	0
10	2	3	11	14	6	1	2	1	0	1	1	1	2	2	1	0	1	0	0	0	0
11	3	4	1	2	14	3	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0
12	0	3	5	0	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13+	1	2	2	0	0	0	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0

Table 7. 4X haddock mean numbers per standard tow by stratum in the 1970-90 summer RV surveys.

SUMMER SURVEY-MEAN NOS. PER TOW BY STRATA

	1970	1971	1972	1973	1974	1975	1976
70	3.938	.583	5.678	5.134	.412	4.200	.700
71	.000	.000	2.471	.000	.000	.553	.000
72	13.718	37.800	15.864	12.563	28.858	49.180	35.250
73	89.870	9.975	82.215	51.917	53.905	11.500	111.883
74	55.725	25.608	28.958	39.500	75.434	88.725	75.743
75	78.138	53.879	21.969	57.627	105.675	27.125	136.381
76	.000	80.500	12.385	.000	41.533	39.528	1.313
77	45.401	34.125	24.515	31.914	132.000	25.236	66.938
78	1.750	1.750	.700	.583	2.524	3.208	10.111
80	100.653	240.457	98.510	191.432	262.160	179.521	64.126
81	63.262	30.888	31.687	146.873	271.967	49.718	56.217
82	2.333	3.316	.000	.000	5.833	3.062	4.690
83	2.527	.000	4.083	.000	1.853	2.100	30.333
84	.000	.525	.000	.368	.350	.389	6.115
85	52.162	11.776	3.111	31.924	9.291	12.000	14.775
90	30.429	56.875	.525	70.774	323.400	48.120	109.148
91	4.156	.000	11.392	3.917	21.050	3.014	2.580
95	16.800	13.557	9.329	4.000	20.189	1.733	4.873

	1977	1978	1979	1980	1981	1982	1983
70	273.933	5.750	38.250	3.281	6.088	.000	35.790
71	.437	.457	.553	2.917	2.864	2.945	3.889
72	14.917	10.526	31.386	248.912	192.033	141.201	39.749
73	169.737	26.390	81.259	31.419	10.600	135.882	33.802
74	26.003	96.785	303.773	27.176	119.461	134.853	57.810
75	36.580	81.000	77.824	71.197	44.970	47.982	53.936
76	554.500	53.783	.000	23.100	14.841	5.499	62.337
77	31.068	45.019	44.471	35.917	53.200	94.152	86.471
78	4.678	6.153	2.522	1.750	.667	2.941	16.771
80	628.144	192.549	88.416	224.505	180.808	73.738	93.047
81	7.875	72.484	84.583	169.201	35.109	170.296	41.817
82	9.750	8.400	20.545	14.749	9.923	23.333	8.578
83	9.963	1.750	9.653	23.500	32.225	70.037	5.662
84	.412	.583	14.868	2.333	1.667	6.043	1.279
85	34.484	13.878	10.871	65.917	15.014	24.849	10.942
90	188.873	63.480	385.106	311.239	1480.214	485.647	235.261
91	21.302	11.515	5.205	15.371	15.481	30.463	32.012
95	33.919	48.000	31.461	6.750	8.683	37.552	14.843

	1984	1985	1986	1987	1988	1989	1990
70	12.578	.972	38.603	6.611	6.462	4.791	1.544
71	.461	.000	.515	2.574	.000	.000	.000
72	49.034	73.403	73.088	28.209	34.725	37.785	17.465
73	60.703	189.097	174.074	80.294	12.010	12.324	41.512
74	.000	134.501	52.610	3.153	1.544	1.797	31.111
75	254.436	100.854	159.044	14.126	13.897	22.104	54.473
76	8.750	370.256	22.390	25.032	9.096	9.206	5.023
77	150.809	92.132	120.409	43.994	59.482	42.016	24.374
78	16.728	20.417	9.479	25.392	11.324	.000	13.825
80	172.055	117.448	97.597	52.541	84.961	175.670	252.900
81	70.772	18.678	167.923	31.931	25.591	29.104	18.030
82	20.903	1.458	2.059	31.633	22.733	17.843	39.565
83	33.424	14.583	12.517	11.484	20.074	1.544	36.842
84	4.118	2.936	.686	.000	1.367	.972	.972
85	26.443	80.435	35.573	2.970	9.680	1.863	13.125
90	773.722	159.667	31.559	32.110	124.802	129.291	174.019
91	29.262	16.342	2.745	1.029	.257	.000	.667
95	3.088	5.219	.000	.000	.975	.000	18.047

Table 8. 4X haddock mean numbers at age per standard tow (A), standard error of the mean (B), and coefficients of variation by age (C) in 1970-90 summer RV surveys.

a

SUMMER SURVEY-STRATIFIED MEAN NUMBERS PER STANDARD TOW

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	.000	.000	.000	.000	.000	.000	.000	.012	.000	.388	.029	.611	.153	.354	.307	.000	.121	.000	.067	.005	.193
1	5.853	.118	5.296	6.826	11.579	6.765	5.577	6.382	6.223	1.964	22.285	37.021	13.075	6.858	4.683	6.636	3.838	.953	7.173	5.686	.089
2	4.691	11.361	.234	20.797	23.151	3.444	5.932	33.591	5.369	13.539	7.151	27.941	28.872	4.532	21.217	6.903	8.723	.897	1.863	9.187	10.115
3	1.426	4.844	3.342	.723	32.044	5.175	3.823	38.720	12.246	7.879	15.783	7.872	12.767	14.542	14.485	24.676	9.851	3.615	1.948	2.833	9.717
4	2.662	2.081	1.432	3.243	.987	7.769	4.025	11.407	3.762	9.761	8.323	8.675	4.569	5.903	17.584	19.016	16.405	6.626	4.140	2.438	3.145
5	1.123	2.916	.908	1.613	4.210	.439	7.415	11.583	1.778	4.861	12.577	3.306	6.795	3.493	5.637	11.796	9.473	5.143	5.231	3.186	3.927
6	2.640	1.395	.991	.594	.947	1.820	.566	6.803	3.250	1.893	4.261	3.613	2.532	2.400	3.237	3.092	2.539	1.769	1.888	.591	1.911
7	5.775	2.089	.646	.773	.544	.492	.697	.811	1.223	3.062	1.562	1.218	2.487	.954	1.539	.952	.564	.436	.264	.022	.339
8	.814	5.260	1.005	.543	.641	.379	.123	1.078	.000	1.113	1.257	.253	.339	.308	.572	.095	.241	.008	.075	.000	.000
9	.345	.783	1.302	.342	.378	.158	.023	.161	.000	.272	.598	.452	.206	.302	.444	.000	.069	.000	.140	.000	.000
10	.280	.093	.046	.493	.276	.105	.040	.153	.000	.067	.241	.284	.060	.209	.080	.040	.017	.000	.000	.000	.000
11	.080	.048	.006	.025	.380	.292	.009	.017	.039	.000	.038	.142	.032	.090	.033	.000	.017	.000	.000	.000	.000
12	.031	.063	.005	.000	.000	.244	.270	.071	.039	.000	.000	.000	.000	.079	.030	.030	.000	.000	.000	.000	.000
13	.000	.000	.000	.015	.000	.000	.094	.081	.018	.000	.000	.000	.000	.021	.041	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	.189	.053	.040	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	.039	.080	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

b

STRATIFIED STANDARD ERROR OF MEAN NUMBERS PER STANDARD TOW

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	.000	.000	.000	.000	.000	.000	.000	.012	.000	.253	.029	.450	.148	.235	.124	.000	.056	.000	.067	.005	.193
1	1.308	.058	2.090	2.380	6.628	2.749	1.386	1.834	2.201	.974	14.031	23.794	5.137	2.258	2.156	1.709	.476	.248	2.877	1.247	.050
2	1.328	2.876	.108	7.797	8.296	.920	1.585	12.215	1.580	1.624	2.890	12.392	8.257	1.630	9.740	1.392	2.446	.368	1.046	2.654	3.234
3	.329	1.516	.927	.248	10.158	1.502	.607	23.950	3.598	1.911	5.914	3.864	3.389	4.436	6.046	8.102	2.624	.845	.461	.614	2.442
4	.766	.704	.248	.709	.261	2.213	.672	6.800	1.012	2.546	2.521	1.488	1.047	1.038	5.995	8.774	3.818	1.152	.676	.394	.572
5	.446	1.000	.137	.289	1.084	.146	1.126	5.115	.551	1.412	3.867	.404	1.373	.558	1.428	3.969	2.032	.800	.706	.647	.768
6	1.064	.489	.134	.170	.275	.586	.077	2.580	1.009	.496	1.244	.458	.440	.352	.632	.507	.693	.301	.422	.195	.470
7	1.915	.800	.095	.205	.150	.155	.083	.234	.303	.780	.388	.220	.511	.147	.300	.194	.219	.099	.094	.022	.125
8	.290	1.792	.142	.164	.194	.120	.022	.369	.000	.280	.252	.059	.093	.056	.100	.027	.090	.008	.044	.000	.000
9	.128	.275	.190	.118	.110	.056	.017	.039	.000	.129	.128	.120	.067	.071	.093	.000	.045	.000	.133	.000	.000
10	.131	.054	.011	.146	.076	.060	.013	.053	.000	.017	.054	.123	.024	.052	.028	.019	.012	.000	.000	.000	.000
11	.027	.019	.004	.010	.079	.098	.009	.007	.013	.000	.016	.051	.013	.022	.017	.000	.012	.000	.000	.000	.000
12	.012	.029	.005	.000	.000	.076	.089	.042	.021	.000	.000	.025	.000	.030	.013	.019	.000	.000	.000	.000	.000
13	.000	.000	.000	.015	.000	.000	.023	.033	.018	.000	.000	.000	.000	.012	.014	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	.060	.000	.020	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	.013	.032	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

c

SUMMER SURVEY-COEFFICIENTS OF VARIATION

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	0	0	0	0	0	0	0	100	0	65	100	74	97	66	40	0	45	0	100	100	100
1	22	49	39	35	57	41	25	29	35	50	63	64	39	33	46	26	12	26	40	22	56
2	28	25	46	37	36	27	27	36	29	12	40	44	29	36	46	20	28	41	56	29	32
3	23	31	28	34	32	29	16	62	29	24	37	49	27	31	42	33	27	23	24	22	25
4	29	34	17	22	26	28	17	60	27	26	30	17	23	18	34	46	23	17	16	16	18
5	40	34	15	18	26	33	15	44	31	29	31	12	20	16	25	34	21	16	13	20	20
6	40	35	14	29	29	32	14	38	31	26	29	13	17	15	20	16	27	17	22	33	25
7	33	38	15	27	28	32	12	29	25	25	25	18	21	15	19	20	39	23	36	100	37
8	36	34	14	30	30	32	18	34	0	25	20	23	27	18	17	28	37	100	59	0	0
9	37	35	15	35	29	35	74	24	0	47	21	27	33	24	21	0	65	0	95	0	0
10	47	58	24	30	28	57	32	35	0	25	22	43	40	25	35	48	71	0	0	0	0
11	34	40	67	40	21	34	100	41	33	0	42	36	41	24	52	0	71	0	0	0	0
12	39	46	100	0	0	31	33	59	54	0	0	3	0	38	43	63	0	0	0	0	0
13	0	0	0	100	0	0	24	41	100	0	0	0	0	57	34	0	0	0	0	0	0
14	0	0	0	0	0	0	0	32	0	50	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	33	40	0	0	0	0	0	0	0	0	0	0	0

Table 9. 4X haddock mean biomass (kg) at age (A) per standard tow and average weight (kg) per fish by age (b) in 1970-90 summer RV surveys.

SUMMER SURVEY-STRATIFIED MEAN WEIGHT(KG) PER STANDARD TOW 91/05/02

a

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.004	.000	.001	.002	.000	.000	.000	.000	.000	.001
1	.532	.014	.455	1.106	1.300	.790	.540	.832	.443	.200	1.848	4.139	1.160	.465	.455	.586	.369	.083	.693	.520	.012
2	2.042	3.343	.040	7.312	7.761	1.441	2.101	15.732	2.699	5.401	3.766	15.377	8.756	1.302	7.880	2.421	2.584	.212	.828	2.988	9.025
3	1.137	3.701	2.349	.370	24.254	4.350	3.011	35.051	13.027	7.141	14.612	8.326	9.848	10.929	8.571	15.099	5.415	1.937	1.689	2.087	8.674
4	2.848	2.583	1.746	4.198	.982	9.840	5.017	15.468	5.669	14.641	12.149	10.723	5.707	6.492	18.563	15.341	14.611	6.112	5.017	3.101	4.063
5	1.521	4.176	1.489	2.871	8.362	.750	11.952	23.784	3.727	8.818	23.760	6.449	11.653	5.588	7.903	16.390	13.022	7.070	8.352	5.096	7.778
6	4.253	2.549	1.936	1.405	2.121	4.467	1.025	15.416	7.379	4.382	9.464	8.414	5.422	4.826	5.657	6.501	4.106	3.069	3.530	1.177	4.330
7	12.120	3.963	1.299	1.816	1.333	1.503	1.806	2.213	3.206	7.840	3.990	3.221	5.887	2.211	2.954	2.350	1.399	.863	.588	.075	1.034
8	1.864	11.060	2.319	1.395	1.671	1.165	.294	2.786	.000	3.096	3.383	.736	.954	.751	1.210	.252	.698	.028	.246	.000	.000
9	.863	1.912	3.391	.914	.992	.514	.066	.570	.000	.983	1.898	1.462	.669	.799	1.118	.000	.237	.000	.506	.000	.000
10	.887	.360	.156	1.309	.755	.314	.124	.459	.000	.253	.812	.990	.299	.514	.264	.119	.076	.000	.000	.000	.000
11	.291	.165	.022	.082	1.244	.979	.035	.057	.110	.000	.143	.577	.111	.199	.120	.000	.076	.000	.000	.000	.000
12	.079	.185	.026	.000	.000	.799	.893	.239	.147	.000	.000	.000	.000	.268	.119	.107	.000	.000	.000	.000	.000
13	.000	.000	.000	.055	.000	.000	.335	.325	.081	.000	.000	.000	.000	.077	.125	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	.602	.247	.168	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	.143	.302	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

SUMMER SURVEY-AVERAGE WEIGHT(kg) of a INDIVIDUAL

b

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	.000	.000	.000	.000	.000	.000	.000	.006	.000	.006	.003	.006	.002	.004	.005	.000	.002	.000	.002	.010	.007
1	.091	.120	.086	.162	.112	.117	.097	.130	.071	.102	.083	.112	.089	.068	.097	.088	.096	.087	.097	.091	.132
2	.435	.294	.169	.352	.335	.418	.354	.468	.503	.399	.527	.550	.303	.287	.371	.351	.296	.237	.445	.325	.892
3	.797	.764	.703	.512	.757	.841	.788	.905	1.064	.906	.926	1.058	.771	.752	.592	.612	.550	.536	.867	.737	.893
4	1.070	1.241	1.219	1.295	.995	1.267	1.246	1.356	1.507	1.500	1.460	1.236	1.249	1.100	1.056	.807	.891	.922	1.212	1.272	1.292
5	1.355	1.432	1.640	1.780	1.986	1.709	1.612	2.053	2.096	1.814	1.889	1.951	1.715	1.600	1.402	1.389	1.375	1.375	1.597	1.599	1.981
6	1.611	1.827	1.954	2.366	2.240	2.454	1.811	2.266	2.271	2.315	2.221	2.329	2.141	2.011	1.748	2.102	1.617	1.735	1.870	1.992	2.266
7	2.099	1.897	2.011	2.349	2.450	3.056	2.591	2.729	2.621	2.561	2.554	2.645	2.367	2.318	1.919	2.469	2.480	1.988	2.227	3.387	3.051
8	2.290	2.103	2.307	2.569	2.607	3.074	2.391	2.584	3.433	2.782	2.691	2.908	2.814	2.438	2.116	2.649	2.895	3.556	3.275	.000	.000
9	2.501	2.442	2.604	2.673	2.624	3.255	2.853	3.542	.000	3.614	3.173	3.235	3.246	2.645	2.518	.000	3.432	.000	3.615	.000	.000
10	3.166	3.870	3.382	2.656	2.736	2.991	3.111	3.003	.000	3.770	3.369	3.486	4.976	2.458	3.299	2.975	4.469	.000	.000	.000	.000
11	3.636	3.437	3.703	3.295	3.274	3.352	3.862	3.329	2.810	.000	3.762	4.065	3.471	2.206	3.647	.000	4.469	.000	.000	.000	.000
12	2.559	2.929	5.242	.000	.000	3.275	3.306	3.370	3.758	.000	.000	4.646	.000	3.397	3.976	3.551	.000	.000	.000	.000	.000
13	.000	.000	.000	3.699	.000	.000	3.563	4.014	4.506	.000	.000	.000	.000	3.684	3.045	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	3.184	4.660	4.208	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	3.660	3.776	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Table 10. Total mortality estimates (Z) for ages 2 to 7, 2+ and fully recruited ages (5-7/6-8) from 1970-90 summer RV survey.

ESTIMATES OF TOTAL MORTALITIES (Z)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
2	-.032	1.224	-1.128	-.432	1.498	-.104	-1.876	1.009	-.384	-.153
3	-.378	1.219	.030	-.311	1.417	.251	-1.093	2.331	.227	-.055
4	-.091	.829	-.119	-.261	.810	.047	-1.057	1.859	-.256	-.253
5	-.217	1.079	.424	.533	.839	-.254	.086	1.271	-.063	.132
6	.234	.770	.248	.088	.655	.960	-.360	1.716	.060	.192
7	.093	.732	.174	.187	.361	1.386	-.436	.000	.094	.890
2+	-.065	.975	-.062	-.033	.930	.381	-.789	1.637	-.054	.125
5-7/6-8	.087	.885	.287	.335	.750	.686	-.002	1.457	.030	.327

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
2	-.096	.783	.686	-1.162	-.151	-.356	.881	-.776	-.419	-.056
3	.598	.544	.771	-.190	-.272	.408	.397	-.136	-.224	-.104
4	.923	.244	.269	.046	.399	.697	1.160	.236	.262	-.477
5	1.247	.267	1.041	.076	.601	1.536	1.678	1.002	2.181	.511
6	1.252	.373	.976	.444	1.224	1.702	1.766	1.902	4.452	.556
7	1.820	1.279	2.089	.512	2.785	1.374	4.256	1.756	.000	.000
2+	.958	.582	.972	-.046	.764	.893	1.690	.664	1.250	.086
5-7/6-8	1.286	.418	1.171	.247	.923	1.555	1.738	1.194	2.488	.524

Table 11. Commercial samples collected for haddock in NAFO Division 4X in the first quarter of 1991.

Otter Trawl TC1-3

	m	n	o	p
Jan	-	-	3	4
Feb	-	1	-	1
Mar	-	-	-	1

Otter Trawl TC4

	m	n	o	p
Jan	-	-	-	1
Feb	-	-	-	-
Mar	-	-	-	-

Otter Trawl TC1-3

	q	r
Jan	1	-
Feb	-	-
Mar	2	-

Longline TC1-3

	m	n	o	p
Jan	-	6	1	3
Feb	-	5	-	-
Mar	-	-	-	-

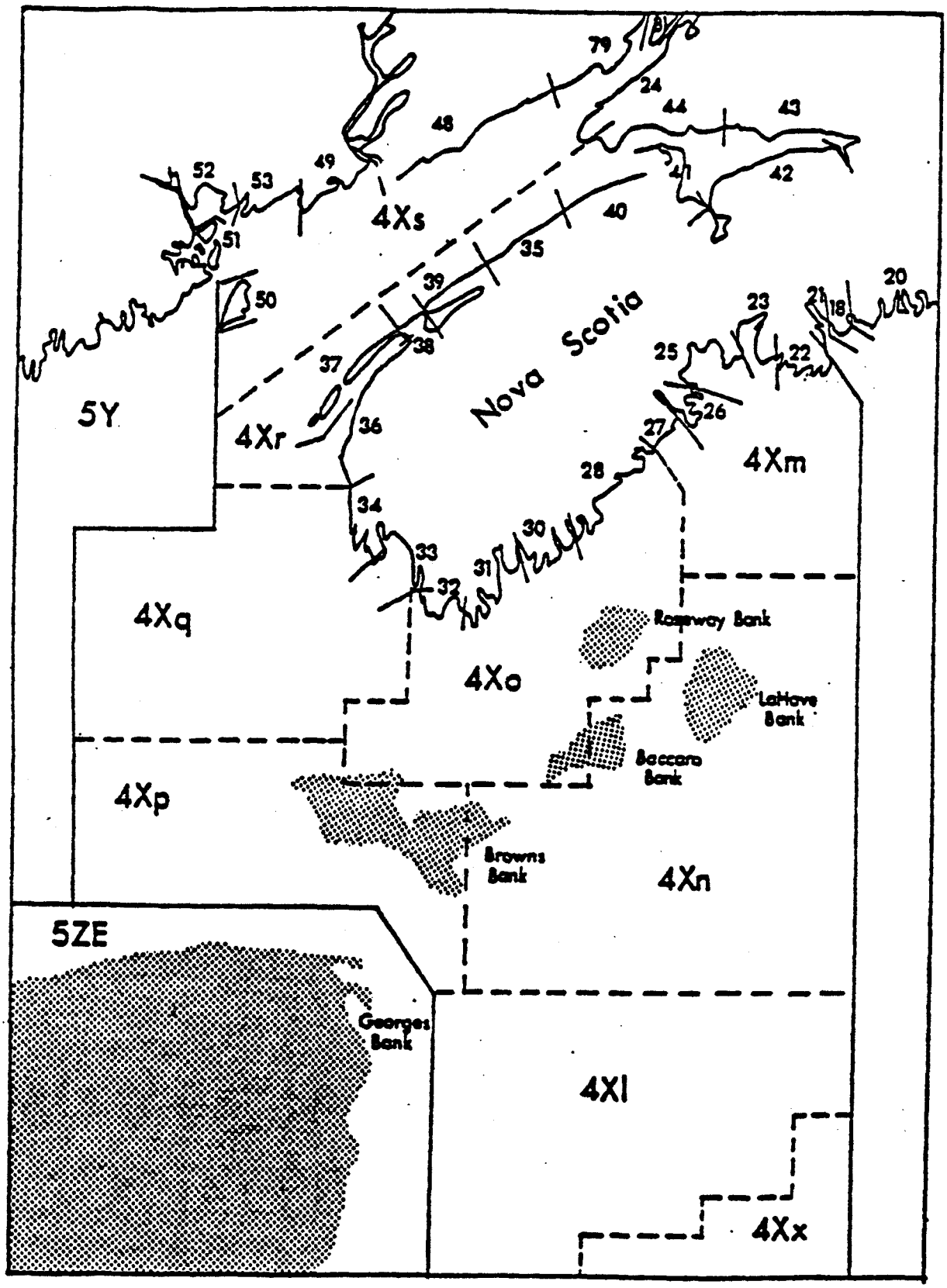

Figure 1. Canadian fisheries statistical unit areas in NAFO Division 4X

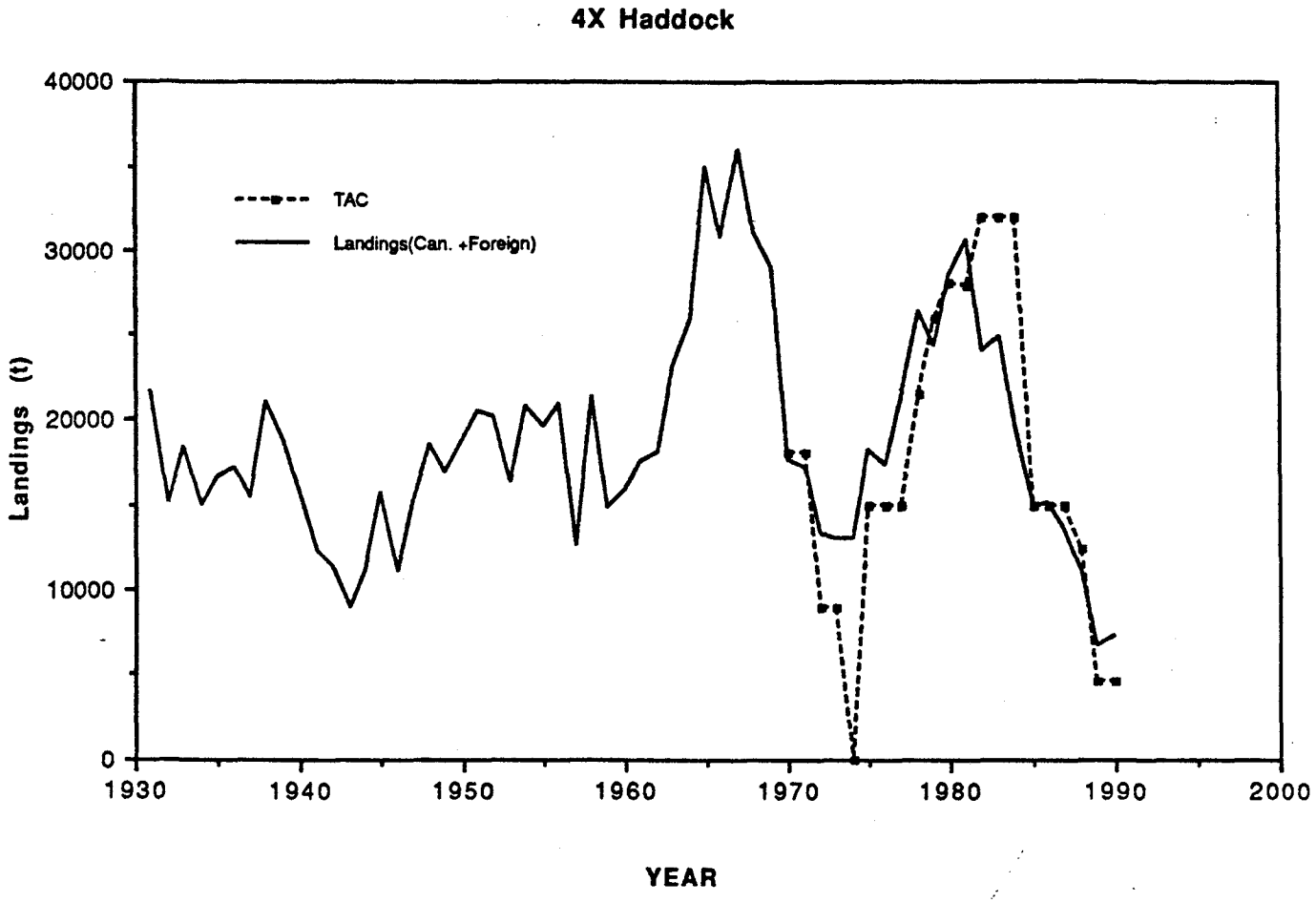

Figure 2. Long-term trends in 4X haddock landings, along with TACs since 1970.

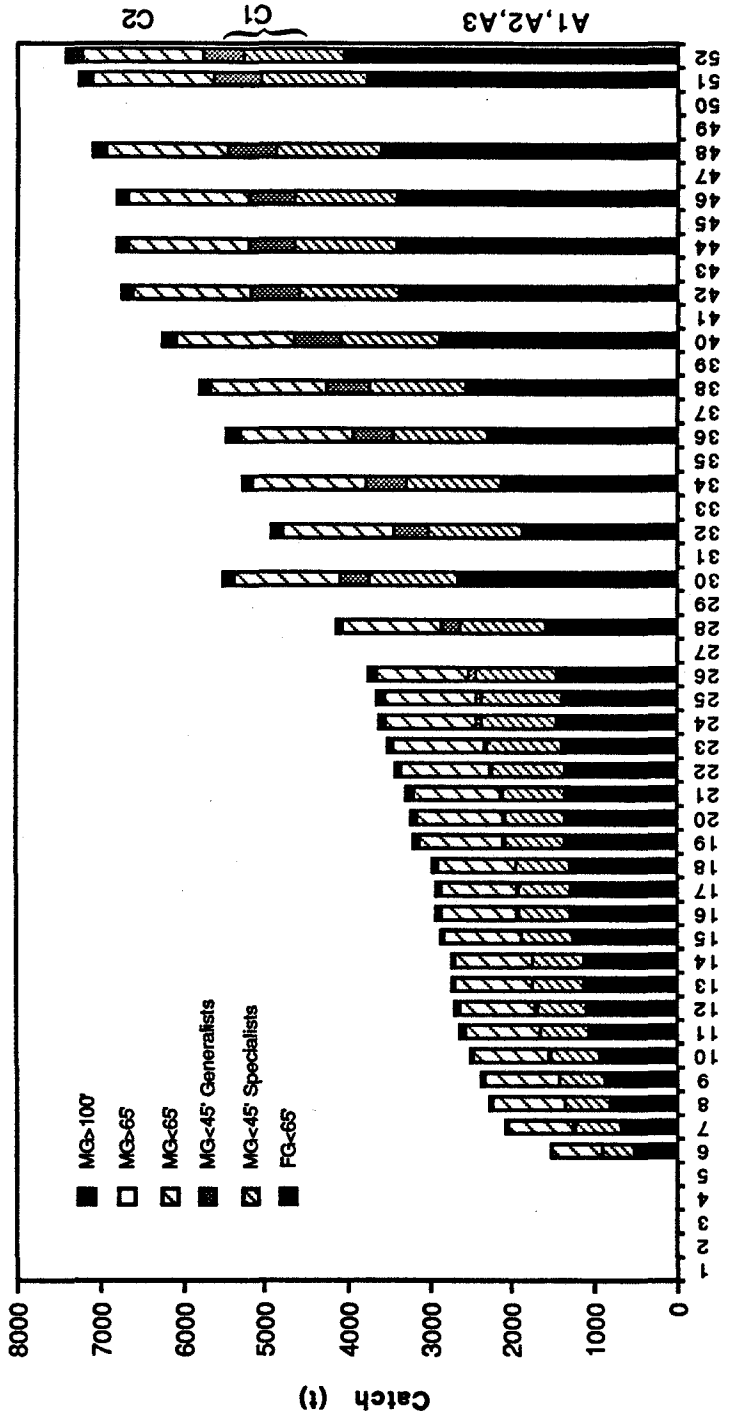

Figure 3. Weekly cumulative catch by gear sector of the 4X haddock stock. (from quota reports)

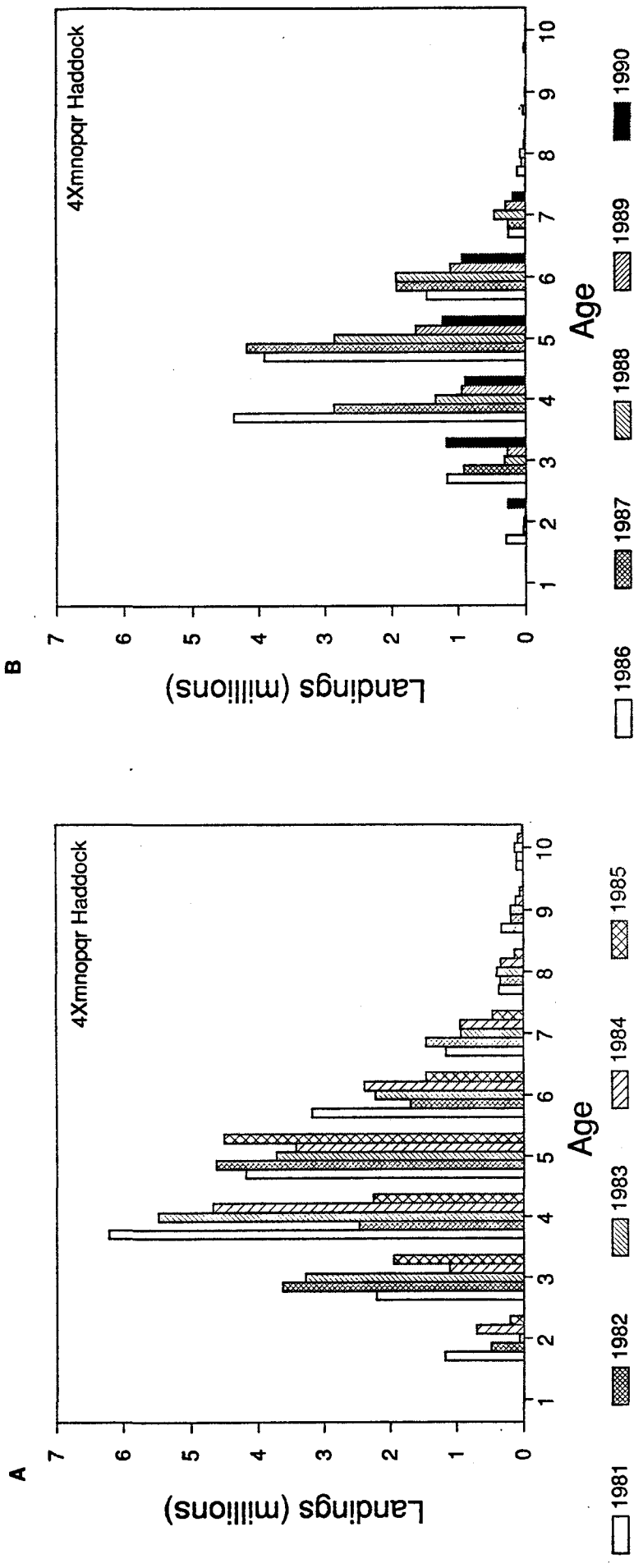

Figure 4. Landings at age from the 4X haddock fishery during 1981-1985 (A) and 1986-1990 (B).

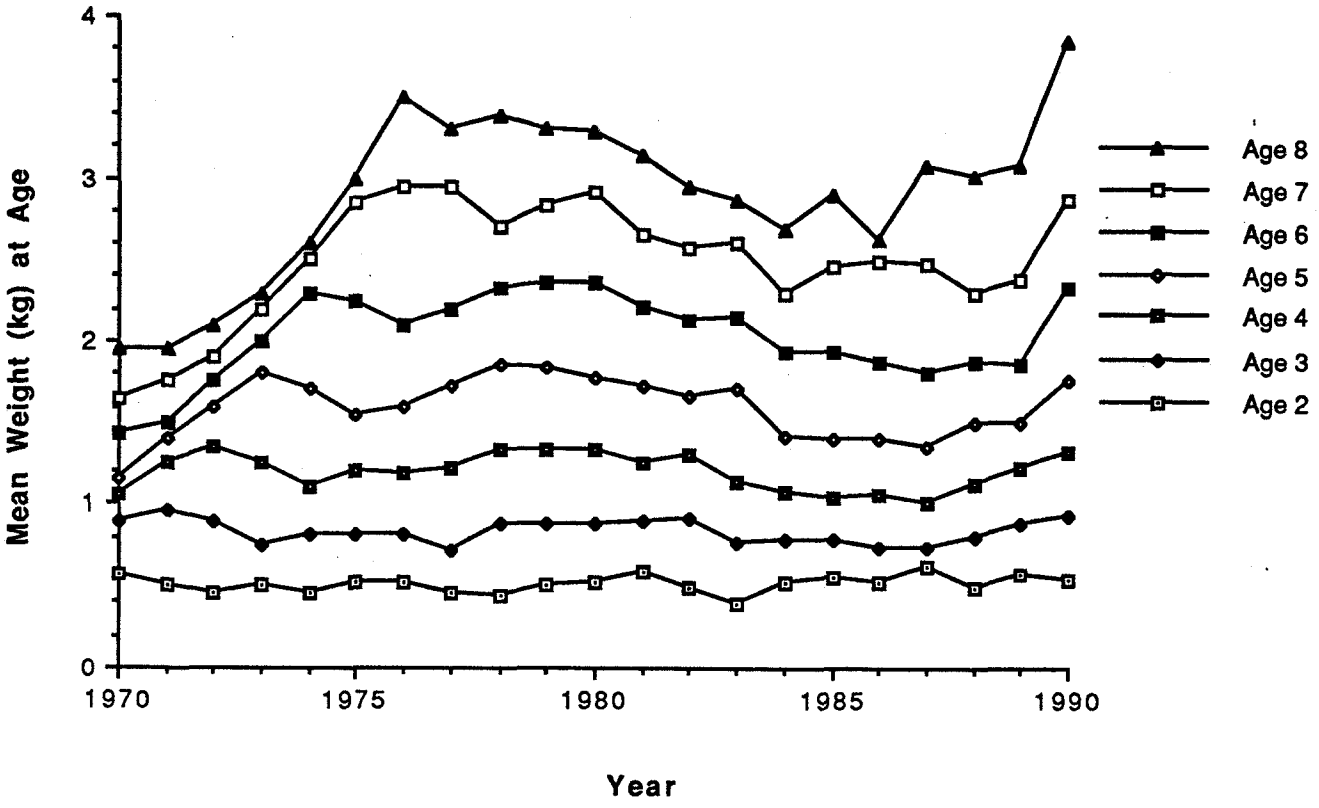

Figure 5. Mean weight at age of haddock in the commercial catch from NAFO Division 4X.

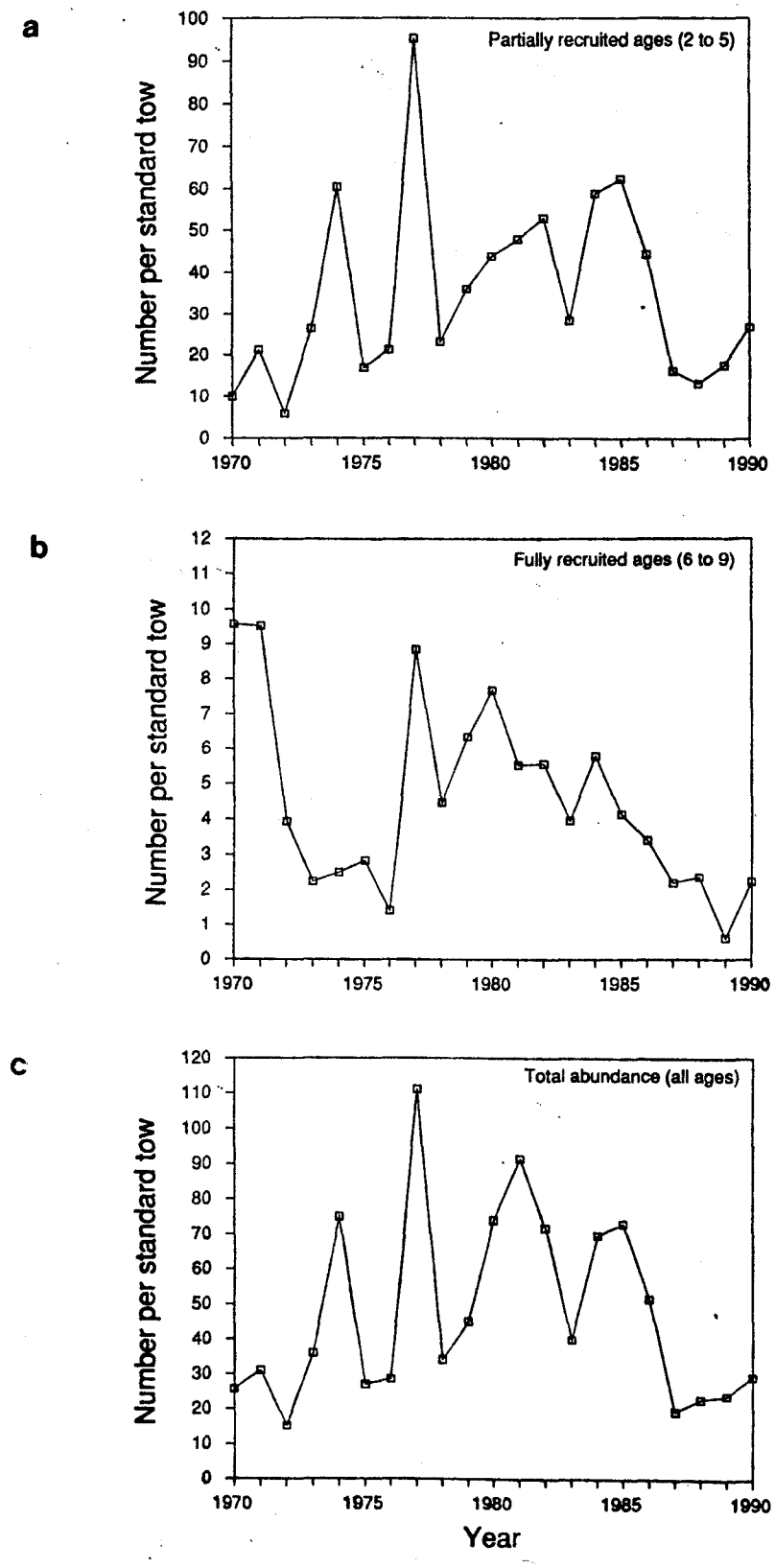

Figure 6. Survey arithmetric mean catch rate (nos./tow) of haddock from 4X during 1970-1990 for ages (a) 2-5, (b) 6-9, and (c) all age groups combined.

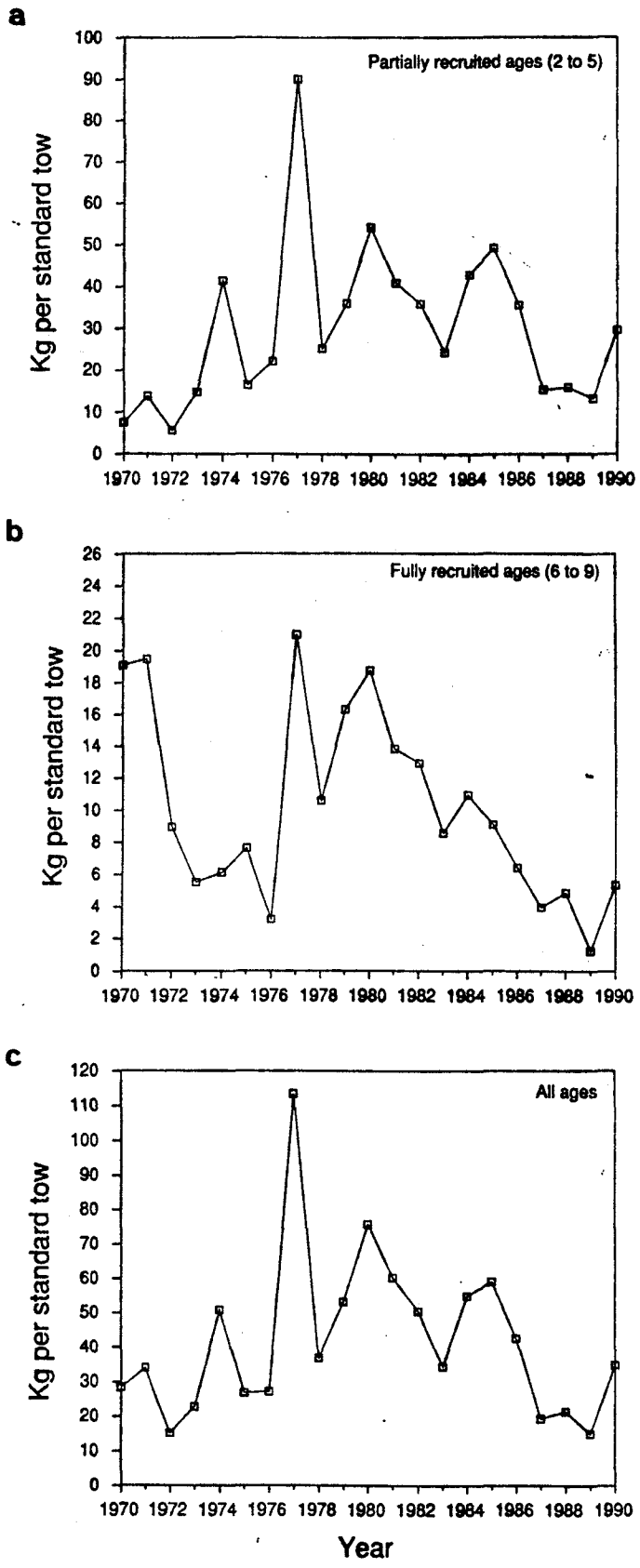

Figure 7. Survey arithemtic mean catch rate (biomass/tow) of haddock from 4X during 1970-90 for ages (a) 2-5, (b) 6-9, and (c) all age groups combined.

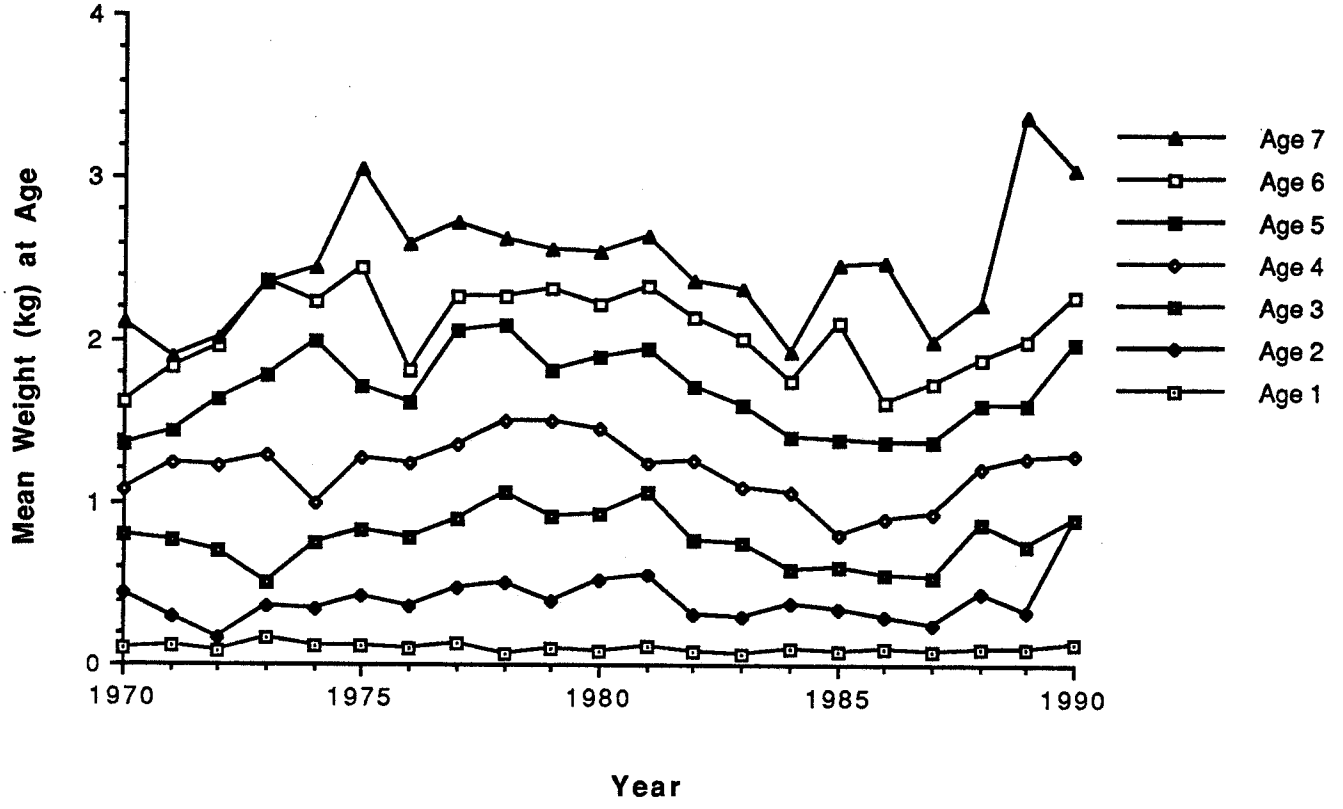

Figure 8. Mean weight at age of haddock from the groundfish research survey in NAFO Division 4X.

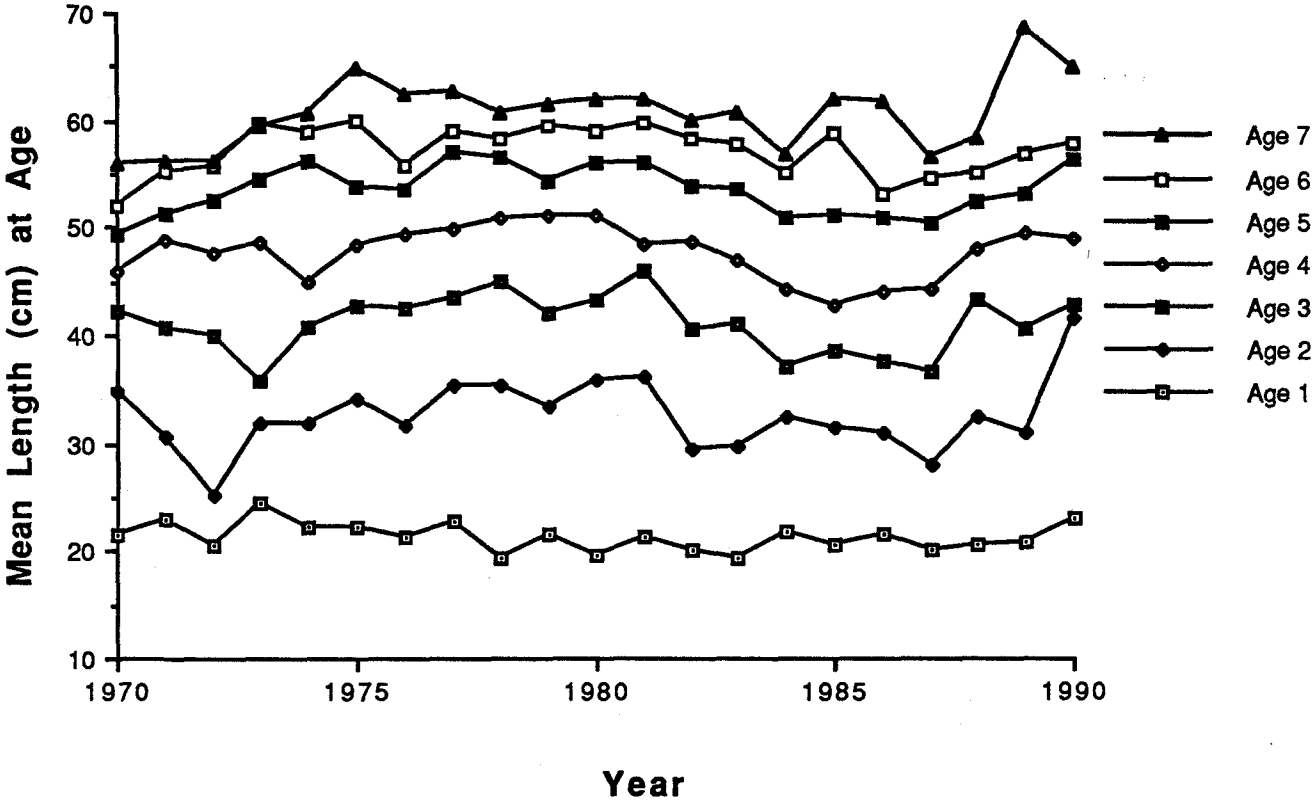

Figure 9. Mean length at age of haddock from the groundfish research survey in NAFO Division 4X.

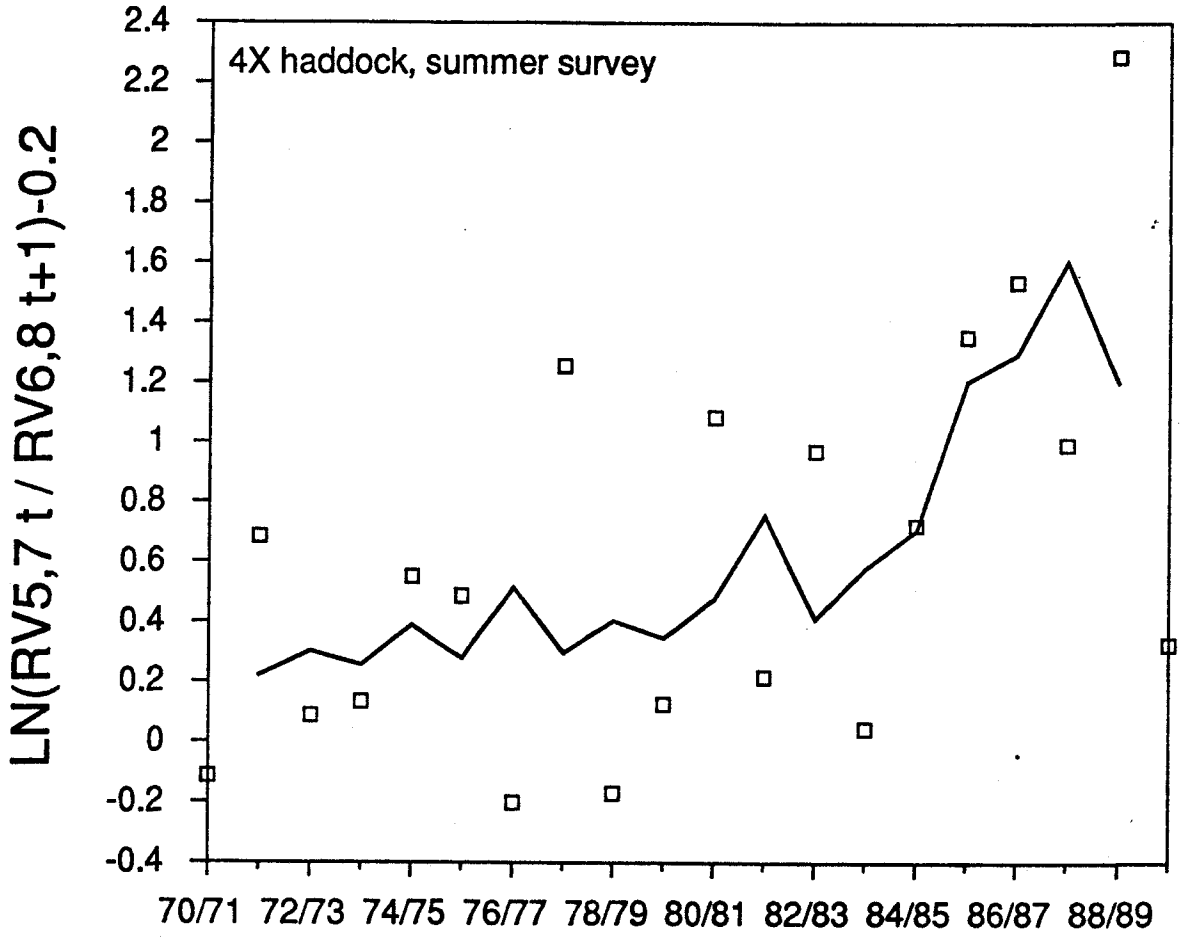

Figure 10. Mortality (F) estimated for fully recruited ages (5-7/6-8) from the RV survey data, 1970-1990. Natural mortality assumed equal to 0.2. Squares are annual estimate and line shows 3-yr running mean.

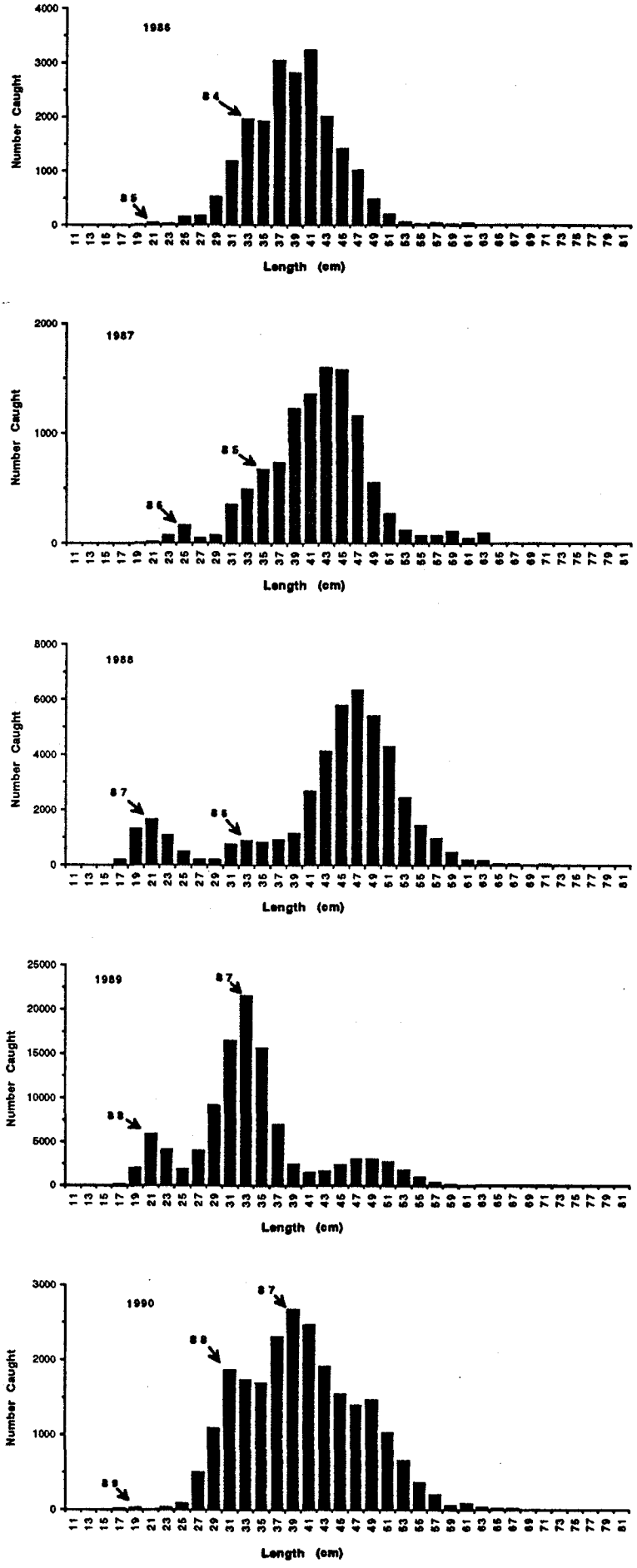

Figure 11. Length Frequency of haddock bycatch in foreign small mesh gear fishery, 1986-90. Modal length of yearclasses are labelled.

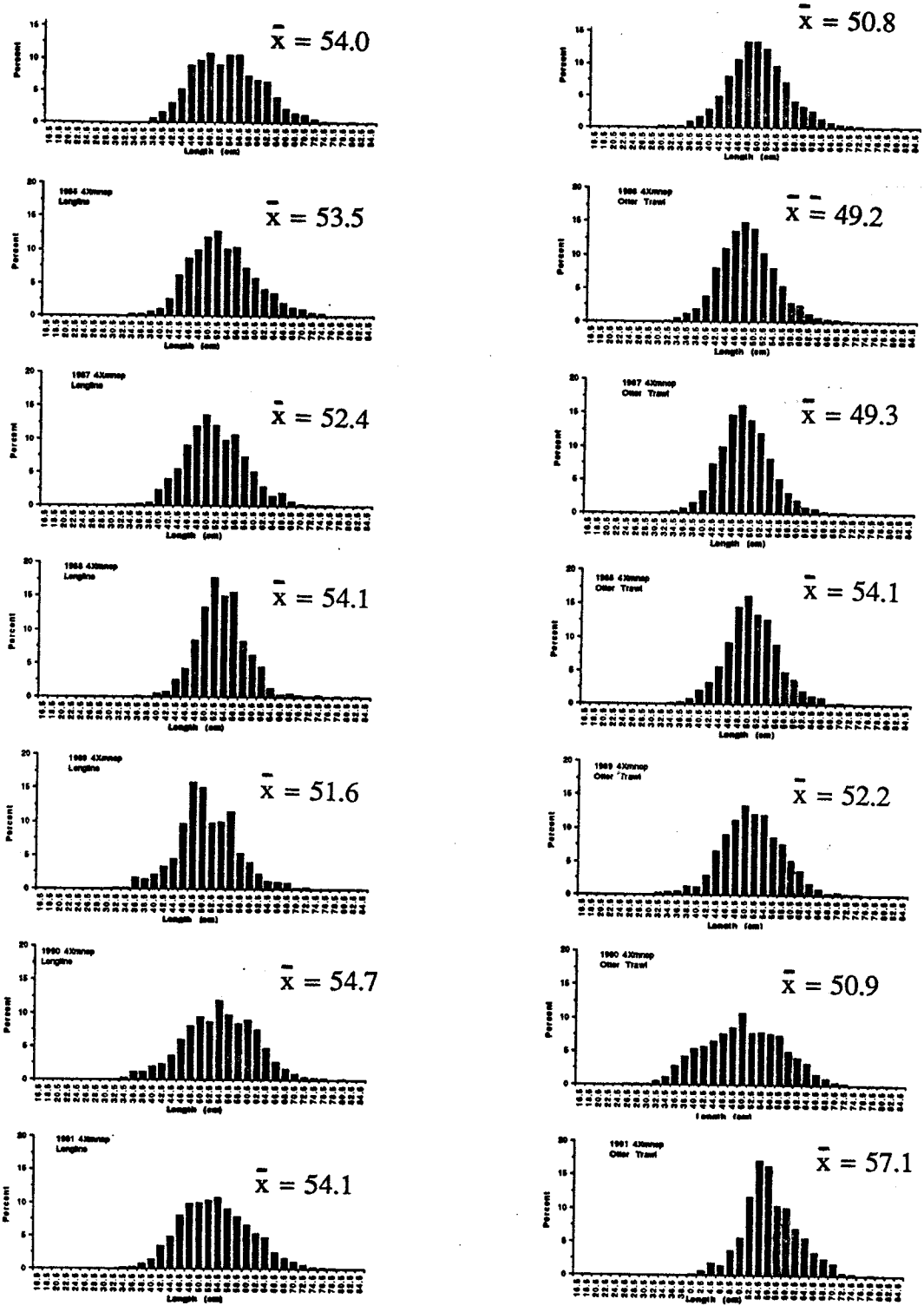

Figure 12. Haddock length frequencies for longline and otter trawl catches in NAFO subareas 4Xmnop, 1985-91.

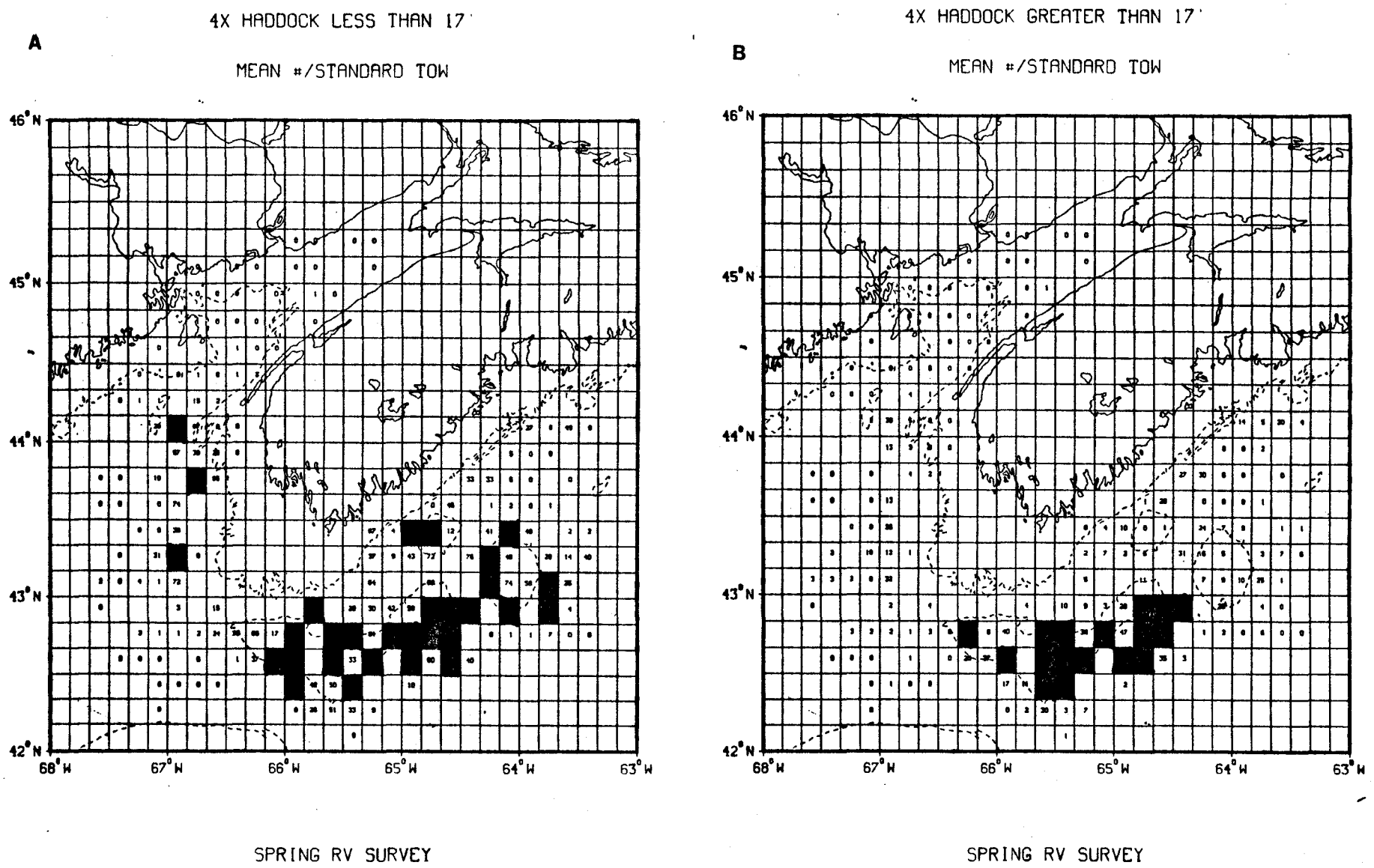

Figure 13 . Mean numbers per tow per 10' square for the spring RV survey (1979-1985) for haddock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

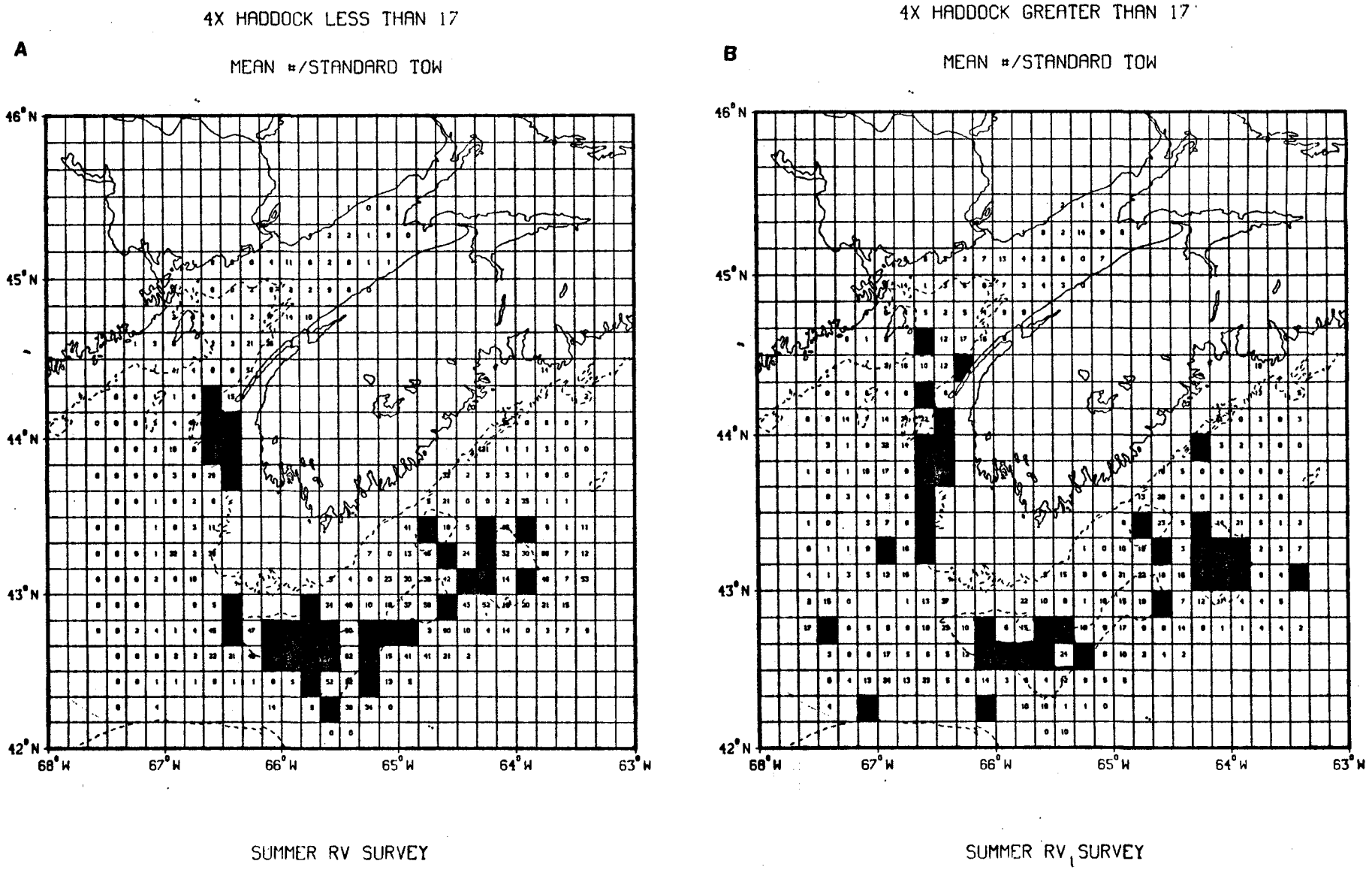

Figure 14 . Mean numbers per tow per 10' square for the summer RV suvey (1970-1989) for haddock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

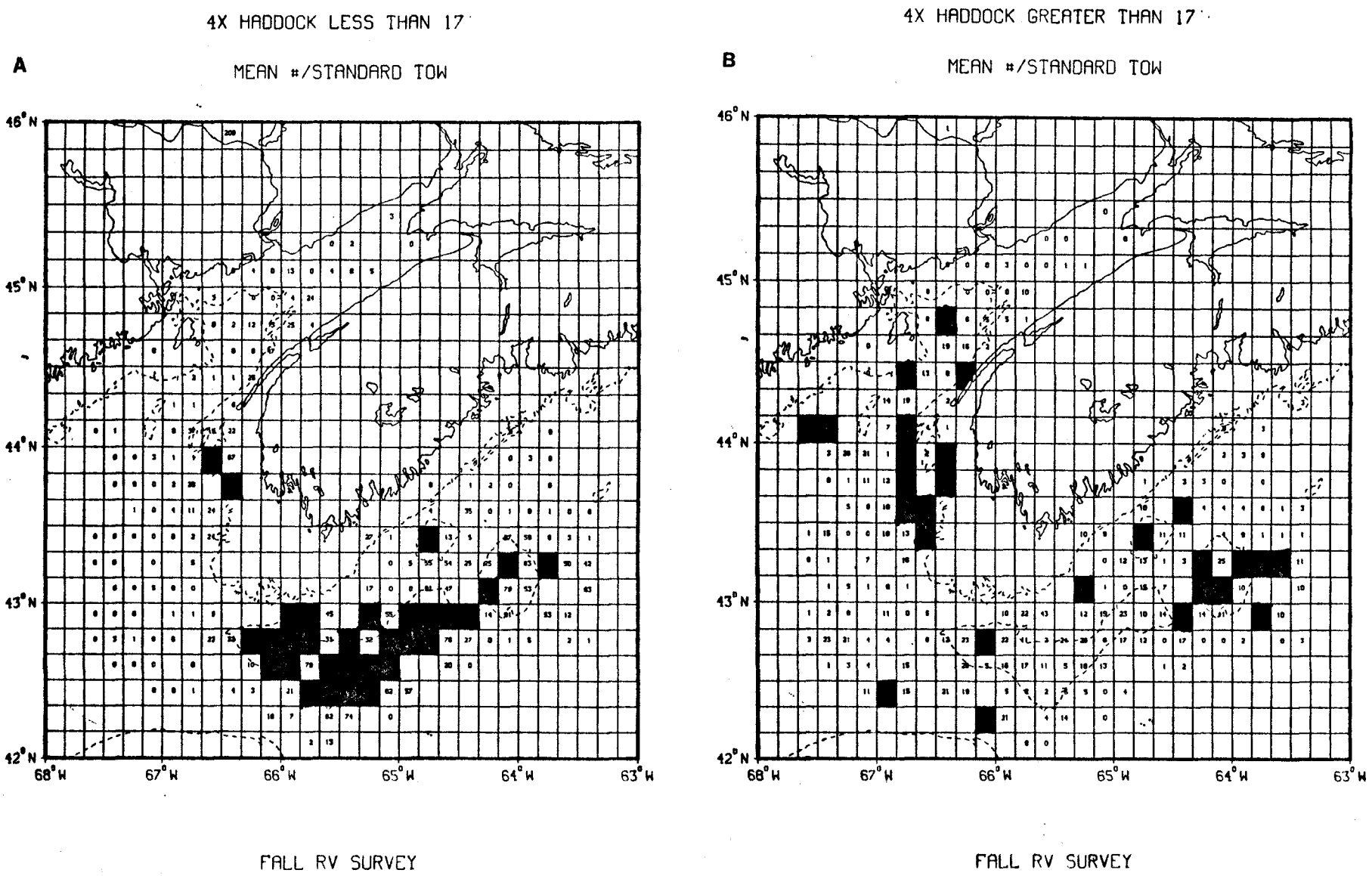

Figure 15 . Mean numbers per tow per 10' square for the fall RV survey (1970-1984) for haddock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

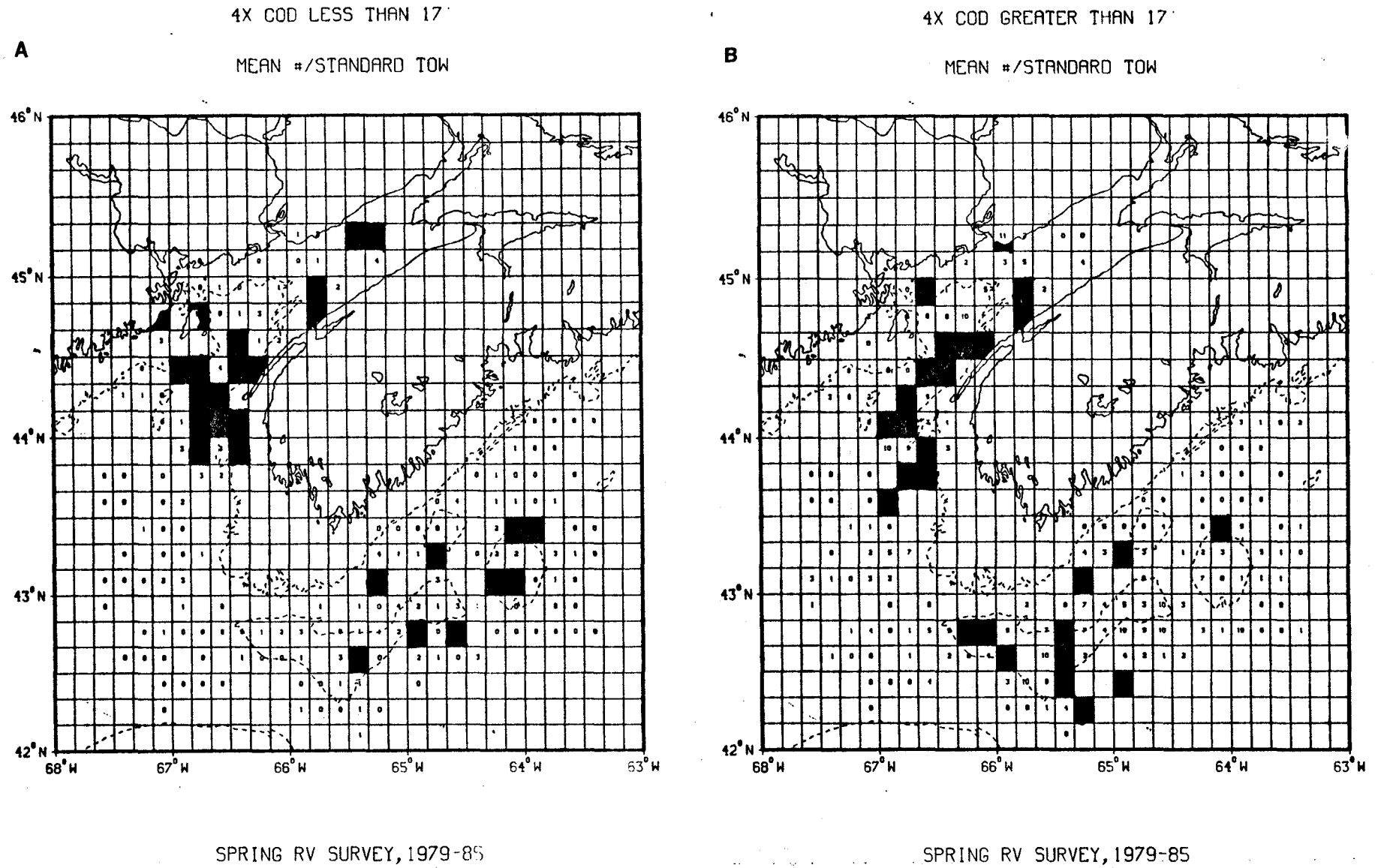

Figure 16 . Mean numbers per tow per 10' square for the spring RV survey (1979-1985) for cod ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

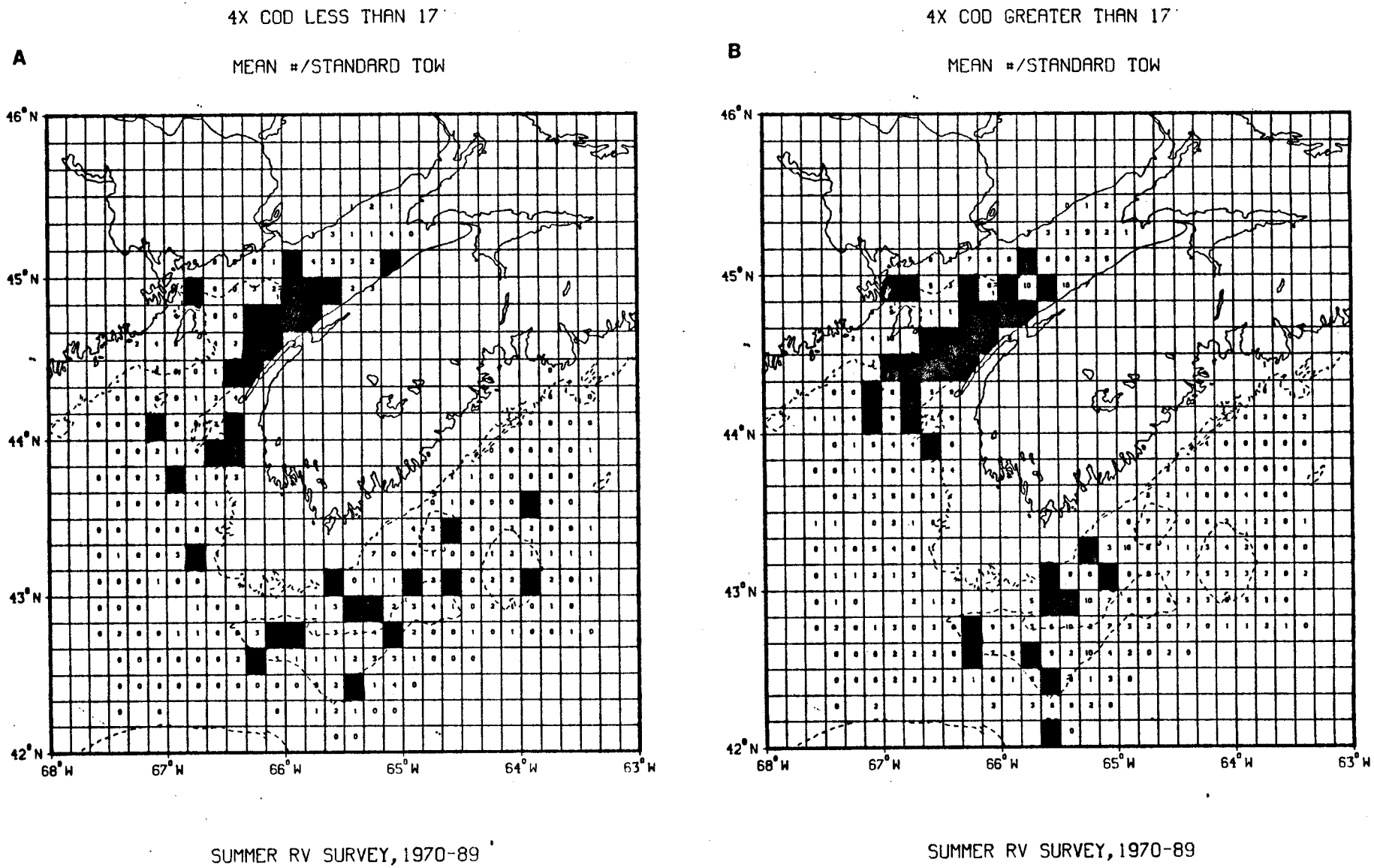

Figure 17. Mean numbers per tow per 10' square for the summer RV survey (1970-1989) for cod ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

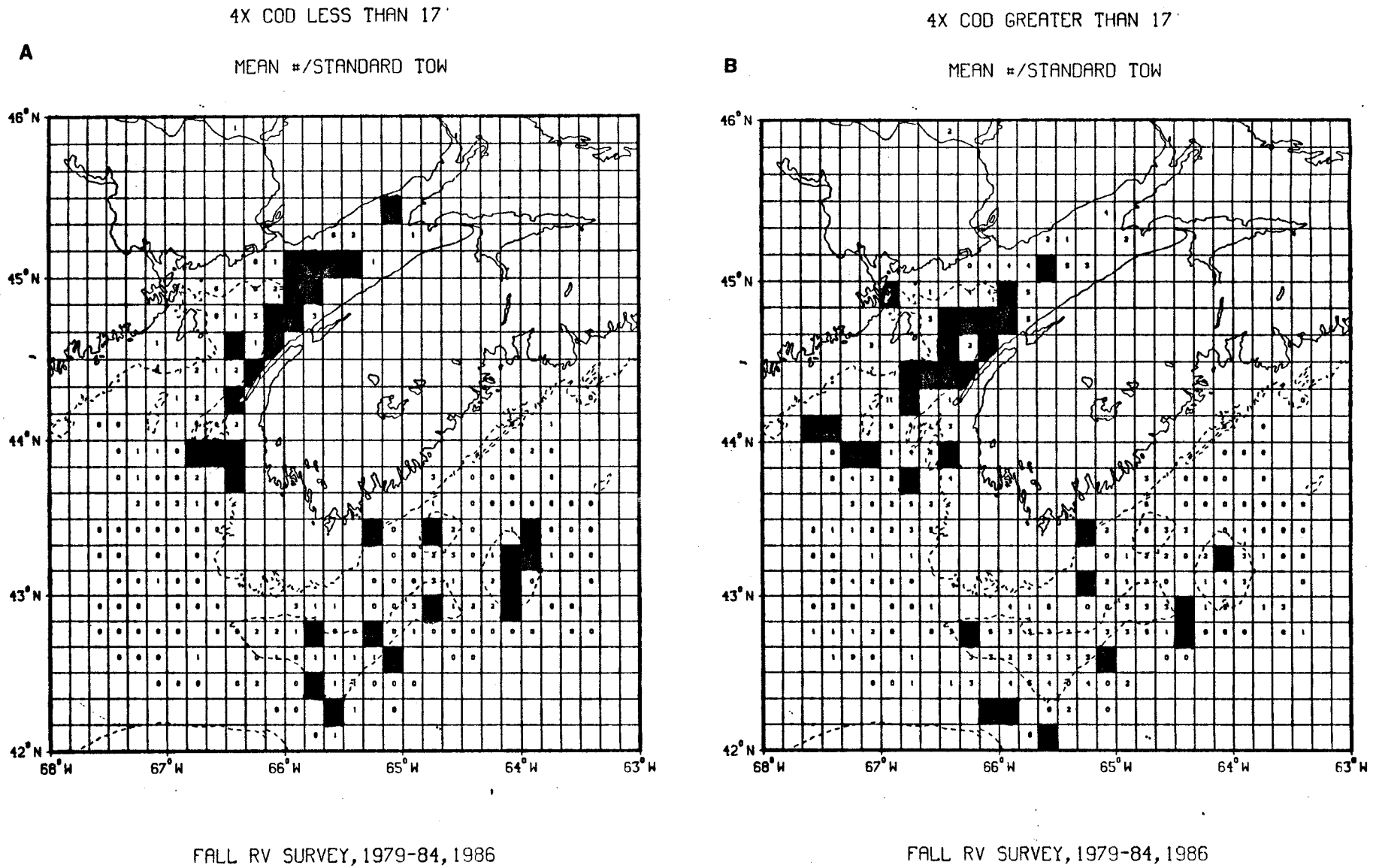

Figure 18. Mean numbers per tow per 10' square for the fall RV survey (1979-84, 86) for cod ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

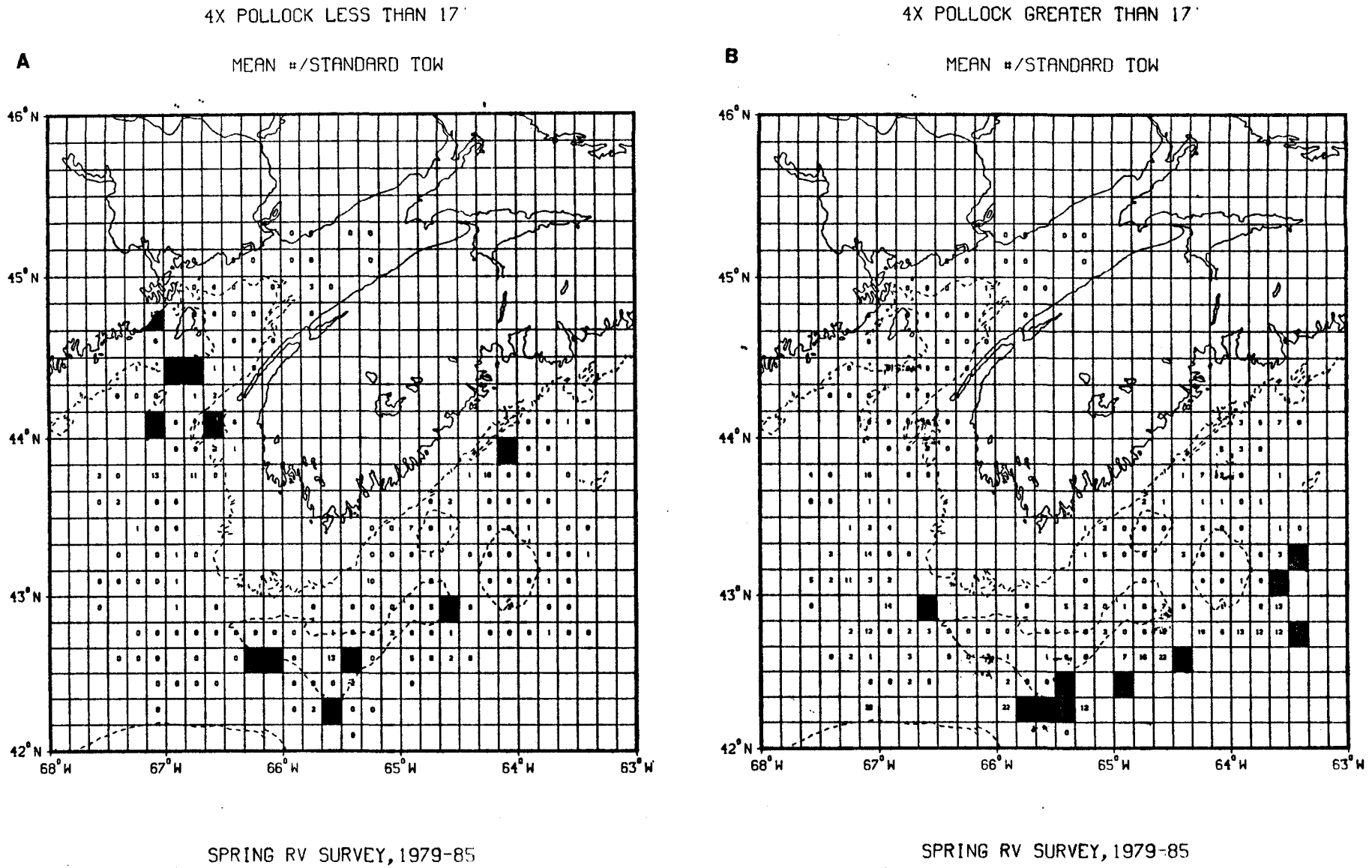

Figure 19. Mean numbers per tow per 10' square for the spring RV survey (1979-1985) for pollock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

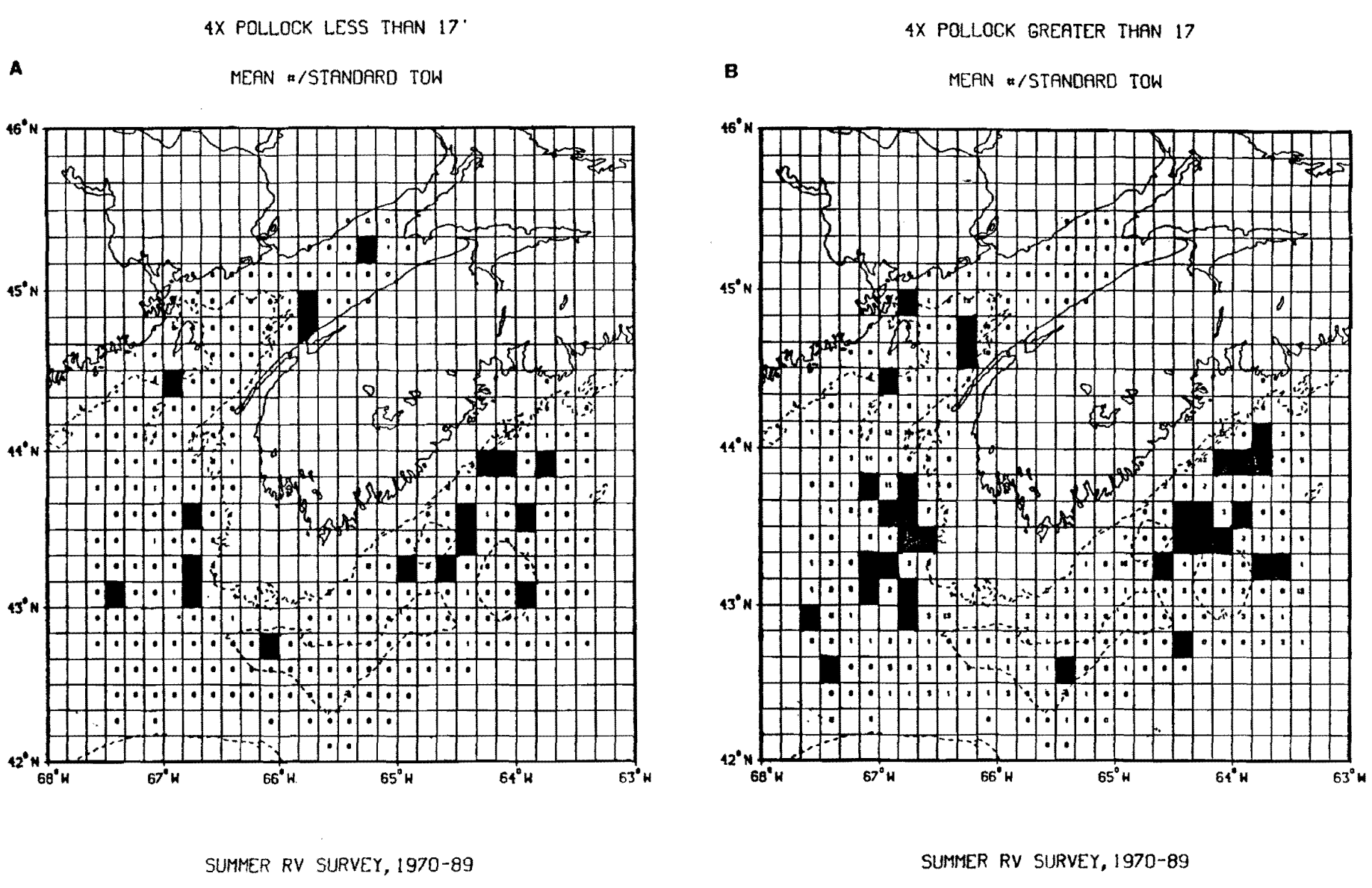

Figure 20. Mean numbers per tow per 10' square for the summer RV survey (1970-1989) for pollock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

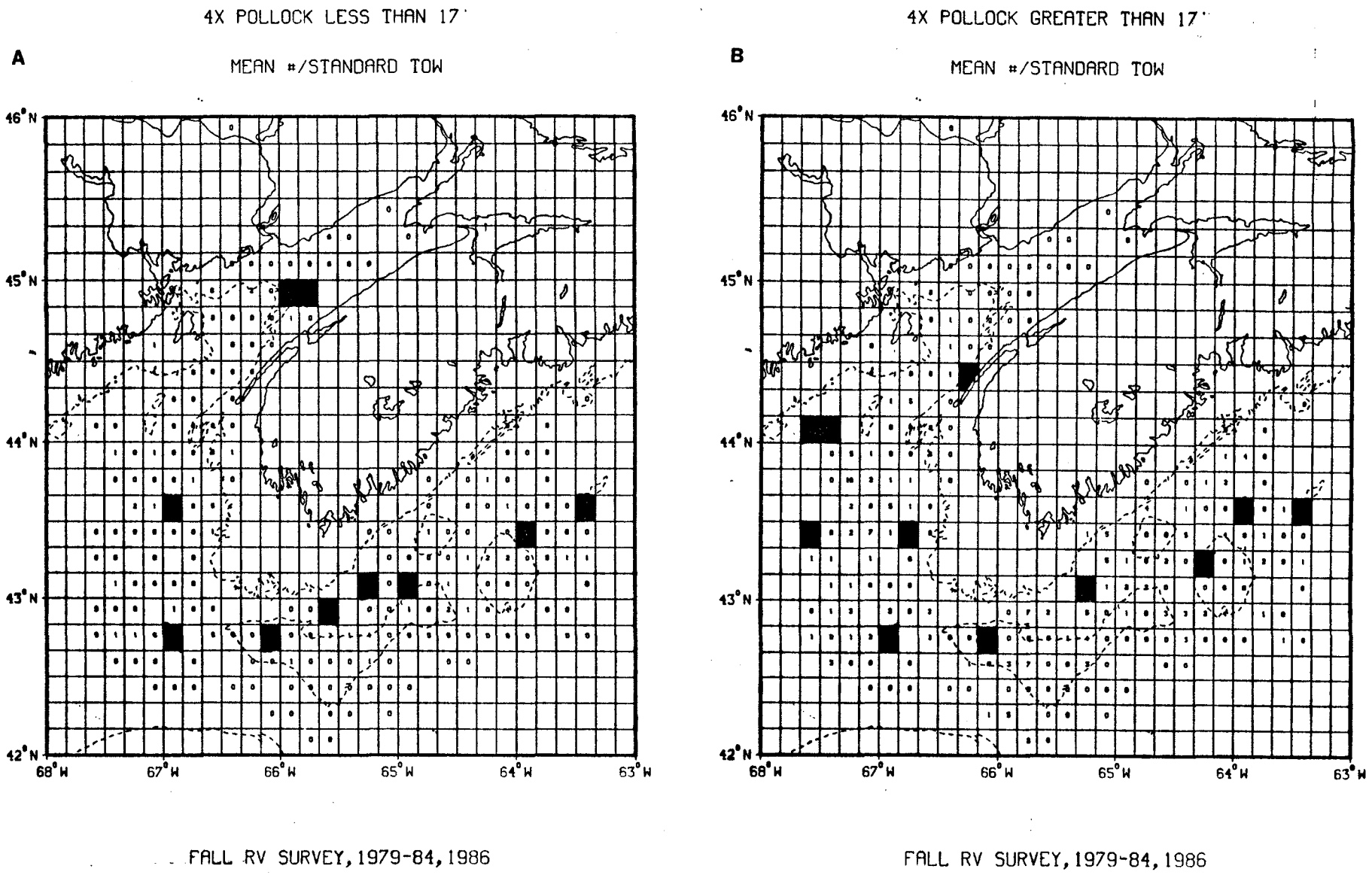

Figure 21. Mean numbers per tow per 10' square for the fall RV survey (1979-84, 86) for pollock ≤ 43 cm (A) and ≥ 44 cm (B). Blackened squares denote means greater than or equal to twice the grand mean.

Appendix I. Weekly summary of fishing activity and anecdotal information in 4X, 5Z for 1990, 1991.

	Week		Comments
1990	Jan	1 -7	Vessels getting trip limits of large haddock and small cod in Western Hole and Roseway Basin.
		8 - 14	Winter flounder fishing in 4Xo.
		15 - 21	Lots of small cod everywhere but only a few large haddock. Large haddock above German Bank. Highgrading of haddock occurring.
		22 - 28	Scrod cod in 4Xqr. Some misreporting of cod and pollock.
		29 - Feb 4	Good tows of market cod on Browns. Many vessels transhipping at sea.
	Feb	5 - 11	Forty five footers getting trip limits of market cod.
		12 - 18	All fish landed by C1's this week misreported from 4X to 4VW.
		19 - 25	C2's finished fishing until May 1, quota.
		26 - Mar 4	Banks closed Wednesday. C1's given quota extension. 2 lobstermen drown in Jordan Bay.
	Mar	5 - 11	--
		12 - 18	No quotas for C1, C2's. Reports of lots of cod and pollock everywhere.
		19 - 25	Poor weather.
	Apr	26 - April 1	Poor weather. A few lobsterboats out for up to 400 lbs/day. A few LL on Georges.
		2 - 8	Wind and full tides keep boats in.
		9 - 15	Shelburne County GN fishery opened - April 15.
		16 - 22	Quotas reopen. Most boats out for flounder in 4Xoq. GN in Roseway Basin for pollock. Good sized haddock around LaHave, but cod are small.
		23 - 29	Dirty water (slime) results in GN lifting nets. Small haddock being dumped at the Fence (4Xn). Dogfish in 4Xn.
		30 - May 6	Up to 20,000 lbs cod for 2 hr tow off Long Island. A lot of fish being dumped.
	May	7 - 13	Lobster boats getting highest catches ever. GN getting ½ cod, pollock: last year 85% pollock. Dogfish on Georges.
		14 - 20	Dogfish gone from Georges. Seiners getting mackeral on Browns.
		21 - 27	Good catches of mackeral.
		28 - June 3	Lots of small haddock off Trinity Ledge. Georges Bank opens June 1 with 130 mm square mesh.
	June	4 - 10	No small fish (i.e.<42 cm) being landed from Georges, possibly a result of square mesh.
		11 - 17	Browns open June 15. Pollock being caught in mackeral traps.
		18 - 24	--
		25 - July 1	--
	July	2 - 8	No dogfish on Browns. Catch rates poor on Georges.
		9 - 15	Cod scarce on Georges. GN report a lot of "jelly" in the water.
		16 - 22	Several boats longlining and harpooning swordfish.
		23 - 29	Some misreporting of haddock occuring. Good pollock catches in 4Xno.
		30 - Aug 5	Hurricane Bertha. Salps very abundant on Georges. Few swordfish around, water very warm.
	Aug	6 - 12	Catch rates on Browns and Georges poor. A lot of feed in water (squid, silver hake, sand lance).
		13 - 19	Draggers on Georges for cod and haddock but catches are spotty.
		20 - 26	No swordfish on Browns or Georges, water very warm. More pollock and cod in 4Xqr.
		27 - Sept 2	Tuna season opens, up to 9 fish/boat. Bay of Fundy considered "wide open" to groundfish fishery because of enforcement of tuna fishery.
	Sept	3 - 9	Good catches of haddock on German Bank. Much of this is reported from 5Z. No spawn herring on Trinity.
		10 - 16	Cod and haddock go un-reported from 4X. Swordfishing improves.

Appendix I. Weekly summary of fishing activity and anecdotal information in 4X, 5Z for 1990, 1991.

	Week		Comments
		17 - 23	Weather deteriorates. Island Princess IV fishing out of Yarmouth.
		24 - 30	Draggers report large and small haddock in 4Xnop. Many vessels on German Bank. Large cod off Long Island.
	Oct	1 - 7	LL getting good sized haddock in 4Xopq.
		8 - 14	Dogfish around Port Mouton. Herring fishery slowing down. Misreporting of 4X (German Bank) cod and haddock to 5Z.
		15 - 21	Up to 60,000 lbs/hour cod and haddock from German Bank un-reported.
		22 - 28	Massive die-off of tropical species at Woods Hbr. due to low H_2O temp. Herring finished. German Bank fishery slows.
		29 - Nov 4	Windy, little fishing.
	Nov	5 - 11	--
		12 - 18	A few boats in 4X for pollock. LL getting dogfish in 4Xno2.
		19 - 25	4Xo cod small, haddock large; 4Xn cod large, haddock small.
		26 - Dec 2	Lobster season begins with good catches.
	Dec	3 - 9	Gales. Some small cod and haddock in 4Xn.
		10 - 16	Large haddock on Lurcher. 13-16 cm haddock caught in square mesh.
		17 - 23	Some misreporting of pollock in 4Xp.
1991	Jan	1 -7	Good sign of haddock around Browns. Fishermen upset re. I.Q.s
		8 - 14	Boats out flounder fishing but getting good signs of large cod in 4Xo and market haddock in 4Xnop. Rumors of dumping fish.
		15 - 21	Good sign of haddock (all sizes) on German. Large haddock on back of Browns but not many.
		22 - 28	No haddock on German. Good catches of haddock on back of Browns. Large cod in 4Xo and large catches of pollock in 4Xp. Other boats finding few but large haddock.
		29 -Feb 4	Excellent catches of steak cod on Georges. 45' fishing witch but getting big cod in Roseway Basin. Many boats switching to pollock gear to avoid dumping.
	Feb	5 - 11	Draggers finding it difficult to avoid cod and haddock. IQ limits making life difficult. Cape Sable LL finding fishing poor around Browns.
		12 - 18	Boats fishing west of German for witch. Reports of haddock dumping due to low IQ's. Storm Feb. 14.
		19 - 25	Gales.
		26 - Mar 4	C1s fishing for witch and pollock. Steak cod on Browns. Large cod and haddock on Georges.
	Mar	5 - 11	Banks closed, gales. Some fishing for mostly cod off Rip. Some haddock on German Bank.
		12 - 18	Cape North - 4Xnop for pollock - windy weather kept many boats in.
		19 - 25	Very few haddock being landed. Excellent catches of small pollock outside of the Fence but no haddock. Lots of cod and pollock in Western Hole. Most cod ever in 4Xo.
		26 - Apr 1	Small trips of cod/witch. Again very few haddock being landed.
	Apr	2 - 8	Most draggers fishing outside German Bank to USA line for witch, pollock, redfish and cod. Reports of very small haddock and small cod in 4Xo.