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A preliminary report on the herring fishery in ICNAF Divisions 4V and 4Wa

by

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Introduction

The history of the mobile winter herring fishery on the presently defined Banquereau stock (ICNAF subdivisions 4Vn, 4Vs, and 4Wa) is quite brief, with data on catch levels, length frequencies and biological samples being unavailable prior to the 1968-69 season. Canada, however, has a long history of a relatively small fixed gear summer herring fishery in ICNAF subdivisions 4Vn and 4Wa, but prior to the intense mobile winter fishery only catch statistics were gathered.

Very little is known about the Banquereau herring stock regarding the population size, migration patterns and spawning grounds, nor are we sure of the geographical extent of this stock in Divisions 4V and 4W. The possibility that the 4Wa and 4Vn fisheries are not part of the Banquereau stock cannot be eliminated, although Hodder and Parsons (1971) have suggested that the Banquereau-Canso Bank-Chedabucto Bay herring are a single stock complex.

The present paper is a preliminary report on the status and trend of the fishery in subdivisions 4Vn, 4Vs and 4Wa with emphasis being given to length and age compositions obtained from catches of the Canadian mobile fishery. Since this fishery extends over the fall-winter season (mainly November to March) the data were combined for

the yearly intervals from April 1 to March 31 as recommended by Winters (1972). This breakdown thus includes the data from the summer fixed gear and the subsequent mobile fleet fishing seasons.

Materials and Methods

Catch information for subdivisions 4Vn and 4Vs were taken from ICNAF Statistical Bulletins for the years 1963-71 and from unpublished data on file with the ICNAF Secretariat for 1972. Foreign catch statistics for 1972 in subdivisions 4Vn and 4Vs are preliminary as are those for the 1971-72 fishing season.

The Canadian fixed gear catches in subdivision 4Wa were obtained from landing records in the associated Canadian Fisheries Districts. Canadian mobile fleet monthly and total catch statistics for 1972 and 1973 were obtained from the Canadian Fisheries Information Branch.

Biological data from the two ICNAF subdivisions 4Wa and 4Vn were collected over the period 1969-73 from mobile and fixed gear fisheries. Samples for length at age studies consisted of 100 fish selected, randomly in 1969-72 and length stratified in 1973, from landed catches and subsequently frozen prior to laboratory analysis of various parameters including length, weight, otolith age, sex, maturity, condition and meristics. Length frequencies of 100-1000 randomly selected fish were determined either on board vessels or at local processing plants and all lengths were rounded to the next lower centimeter.

Length frequencies including lengths from biological samples were weighted with respect to sample size and type of gear. Each sample was first expressed as a percentage and then combined by gear type for each fishing season to give an average percent distribution of length for each gear. The contribution of each gear type to the total samples for a season was expressed as a fraction and this fraction was then applied to the averages for each gear. The sum of these partial averages was considered the weighted length frequency distribution for the season. It was assumed that any gear selectivity or sample bias was thus minimized and that this weighted total length frequency was the best approximation to the catch length frequency.

Ages from biological samples estimated from otoliths were expressed as a year class as defined by Hunt et al (1973). The use of year class was necessitated by the duration of the fishing season which extends over the presently used January 1st artificial birthdate. Year classes from 1960 to 1971 have been recorded for each of the four fishing seasons and any earlier year classes (1959, 1958 etc.) were added to the 1960 total.

Age-length keys from biological samples were determined and then summed for each fishing season. Keys for the weighted total length frequency were calculated by applying the proportion of each year class at each length group in the biological samples to the total fish represented in the weighted sample. The mean length at age and year class composition were then calculated from this weighted age-length key. The mean length of the total sample was also calculated as was the mean age, expressed as a year class.

For subdivisions 4Vs, where Canadian data is lacking, length frequencies recorded by Federal Republic of Gernamy (1968-69) and U.S.S.R. (1969-70 and 1970-71) in ICNAF Sampling Yearbooks were used. Cursory examination suggests that the data used was representative of the catch for each year.

Results and Discussion

Catch Information

The herring fishery in subdivisions 4V and 4Wa has consisted of Canadian fixed gear effort in 4Vn and 4Wa, and an International mobile fishery, of which the non-Canadian component operates mainly in 4Vn and 4Vs. The Canadian Maritime mobile fleet has concentrated its effort on the more inshore areas (Fig. 1) although with the expansion of the fishery more effort has been directed towards areas such as Canso Bank; little or no Canadian effort has been exerted in 4Vs.

The fixed gear and mobile fisheries operate at different times of the year as shown in Figure 2 and Tables 1, 2 and 3. The fixed gear fishery is relatively small, takes place from April to October with peak catches in June and July, and takes less than 1500 tons yearly. The mobile fishery extends from October to May with peak catches occurring in December and January.

Prior to 1968 over 90% of the herring catch was taken by fixed gear (see Table 4). The small Canadian mobile fleet operated only in 4Vn and took less than 100 metric tons yearly. No foreign effort was recorded in the three subdivisions.

In the winter of 1968 a large mobile fishery developed in all three subdivisions, with an associated decrease in the fixed gear catch (Tables 1 and 3). Since the mobile fishery is a winter fishery, the catch statistics were considered in terms of the fishing season rather than yearly catch, in order to avoid distortion of the catch trend of the fishery. As shown in Figures 3 and 4 and Table 4,

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the Canadian mobile fishery in 4Vn develops more rapidly when analysed by fishing season and does not taper off in 1972 as the annual analysis would suggest. Also in both 4Vs and 4Wa peak catches differed by a year depending on which analysis was used.

In the 1968-69 fishing season herring catches of over 11,500 and 70,900 metric tons were taken by the foreign mobile fleet in 4Vn and 4Vs respectively (Table 4). In both areas the foreign catch decreased slightly the following year, then essentially collapsed in the 1970-71 fishing season. It is not known whether these decreases were due to a lack of fish or decreased effort. The Canadian mobile fishery developed more slowly in 4Vn, but has continued to expand (Fig. 3), taking almost 17,000 metric tons during the 1972-73 fishing season.

The Canadian mobile fishery began (Table 4) a year earlier in Chedabucto Bay itself (4Wa), and reached a maximum catch of over 54,000 metric tons in the 1970-71 fishing season. The catch subsequently declined to about 5000 metric tons during the 1972-73 season. Normally a large proportion of the 4Wa catch is taken between January and March (Fig. 2). Although no analysis of effort is available, severe ice conditions which occurred in subdivision 4Wa during the latter part of the 1971-72 and 1972-73 fishing seasons restricted fishing operations considerably.

Considering the fishery on the presently designated Banquereau stock (Fig. 5), a maximum catch of over 108,000 metric tons was taken during the first concentrated effort by the mobile fishery in the 1968-69 season, of which the Canadian mobile catch was about 25,500 metric tons. Since then the foreign catch has drastically declined; the Canadian mobile catch increased to a maximum of 59,000 metric tons during the 1970-71 season and has since declined.

Biological Data

Since length frequencies from the two subdivisions appeared to be discontinuous, data from 4Wa and 4Vn have been treated separately, although no inference as to stock distribution was intended. Considering subdivision 4Wa first (Tables 5-8 and Fig. 5), it is apparent that smaller (16-24 cm) fish are well represented in both length frequencies and biological samples. Mean length of the total sample for each year ranged from 24.36 cm to 28.32 cm with a four year average of 25.16 cm, although the distribution of lengths showed considerable variation from year to year. Obvious shifts in 1970-71 to smaller fish (17 cm range), possibly due to strong 1969 and 1968 year classes (as 2 and 3 year olds), occurred and in 1971-72 to larger (22.26 cm range), possibly due to a strong 1968 year class (as 4 year olds). As an index to fish size, the percentage of lengths equal to or less than nine inches (22.9 cm) varied from 14-57% of the total.

Year class composition (Fig. 5) showed considerable fluctuation over the four year period and, with the exception of the 1966 year class, little consistent trend in year class strength is apparent. For example, the 1969 year class was well represented in the 1970-71 fishery (25.6%), relatively weak in the 1971-72 fishery (11.0%) and strong again in the 1972-73 fishery (31.9%). Inadequate sampling of the fishery may produce some of this variation but it may also be the result of concentration of effort on different size categories as availability and abundance changes. In any event it is obvious that the 4Wa fishery has been dependant on relatively small fish for a large part of the catch and consequently exerts substantial fishing mortality on year classes at an early point in their life history.

In subdivision 4Vn (Tables 9-11 and Fig. 6) biological and length frequency samples indicate a group of relatively larger and older fish. Mean length of the total sample for each season ranged from 30.92 cm to 33.67 cm with a three year average of 31.88 cm. Length distribution (Fig. 6) was not consistent for the three seasons, although in all cases more than 90% of the lengths were greater than nine inches (22.9 cm). In 1972-73 a definite shift to smaller fish (20-28 cm) was apparent with at least 10% of the total less than 9 inches as opposed to less than 3% for the other two years.

Year class composition (Fig. 6) appeared to be fairly consistent in terms of year class trends although the degree of error in ageing older fish should be considered. The influx of the 1970, 1969 and 1968 year classes to the fishery in 1972-73 may indicate a change in the nature of catches although the contribution of large fish continues to be significant.

Generally speaking, it would seem apparent that the two subdivisions (4Vn and 4Wa) differ in year class composition and fish size. Comparison of length frequencies of the Canadian fishery in 4Vn and 4Wa with those of foreign countries (Fig. 7) suggests a more obvious relationship between 4Vs and 4Vn rather than between 4Wa and 4V, although Hodder and Parsons (1971), suggest that herring move from Chedabucto Bay to Banquereau as they increase in size. However, the relation of catches from the three areas in terms of stock identity cannot at present be resolved and awaits a more detailed study of biological and effort data. Such a study, using this report as a basis for further research, will be carried out in the near future.

References

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Hodder, V.M. and L.S. Parsons. 1971. Some biological features of southwest Newfoundland and northern Scotian Shelf herring stocks. Int. Comm. Northwest Atl. Fish. Res. Bull. 8:67-74.

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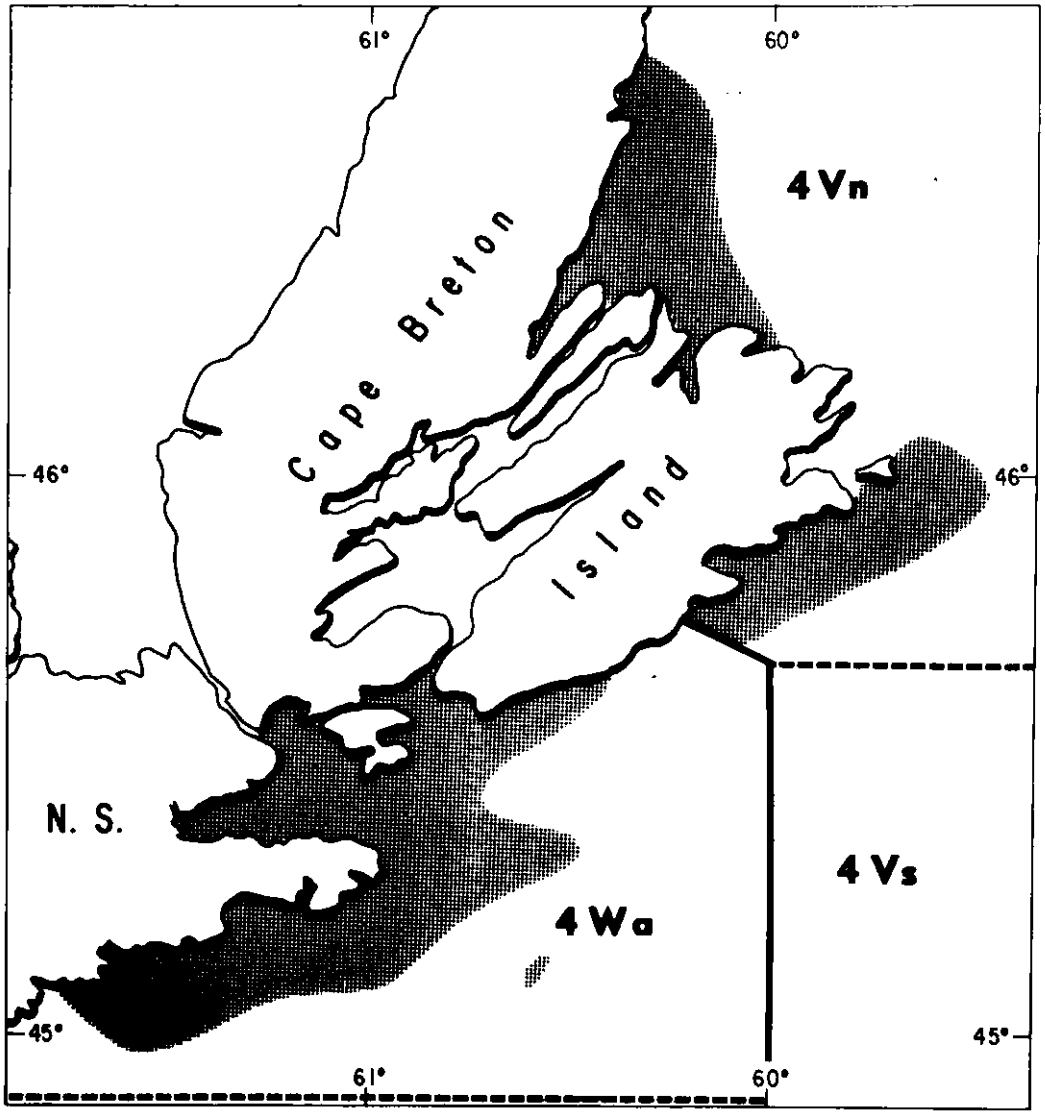

Fig. 1. The areas of operation of the Canadian Maritime mobile fleet are represented by the shaded portions of ICNAF subdivisions 4Vn and 4Wa.

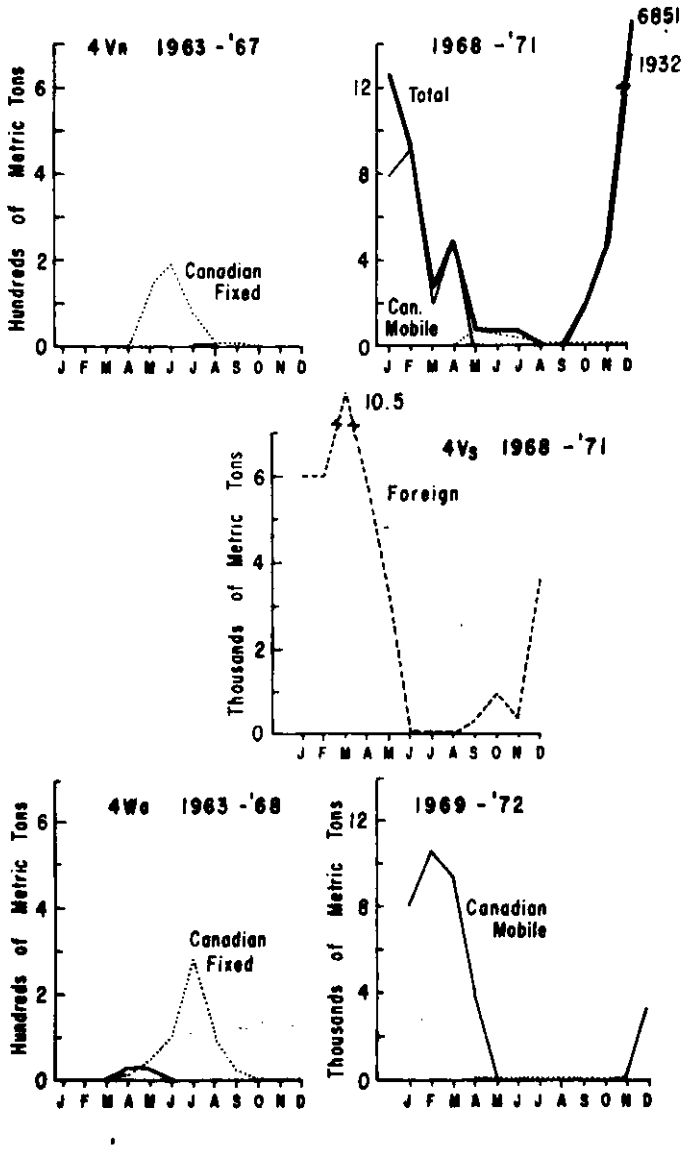

Fig. 2. The average monthly herring catch from 1963-71 are presented for ICNAF subdivisions 4Vn and 4Vs and from 1963-72 for 4Wa. The data in subdivisions 4Vn and 4Wa are divided into two discrete intervals since in 1968 and 1969 respectively the fishery changed from a predominately fixed gear to a mobile fishery. The fishery in 4Vs is strictly mobile and commenced in 1968.

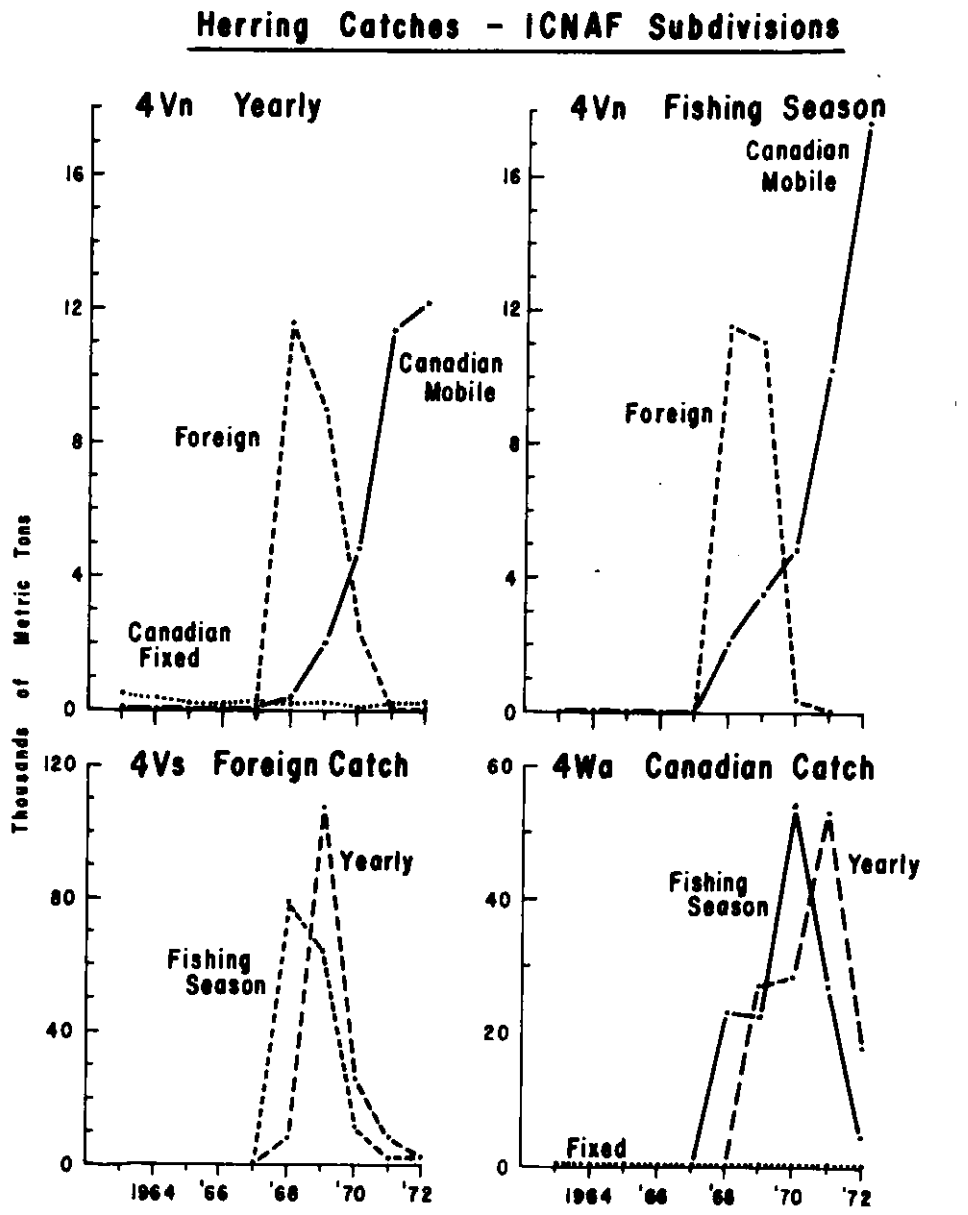

Fig. 3. Herring catches are presented for ICNAF subdivisions 4Vn, 4Vs and 4Wa, for the calendar year and the fishing season. The fixed gear catch was taken between April and October, thus the same values apply for either method.

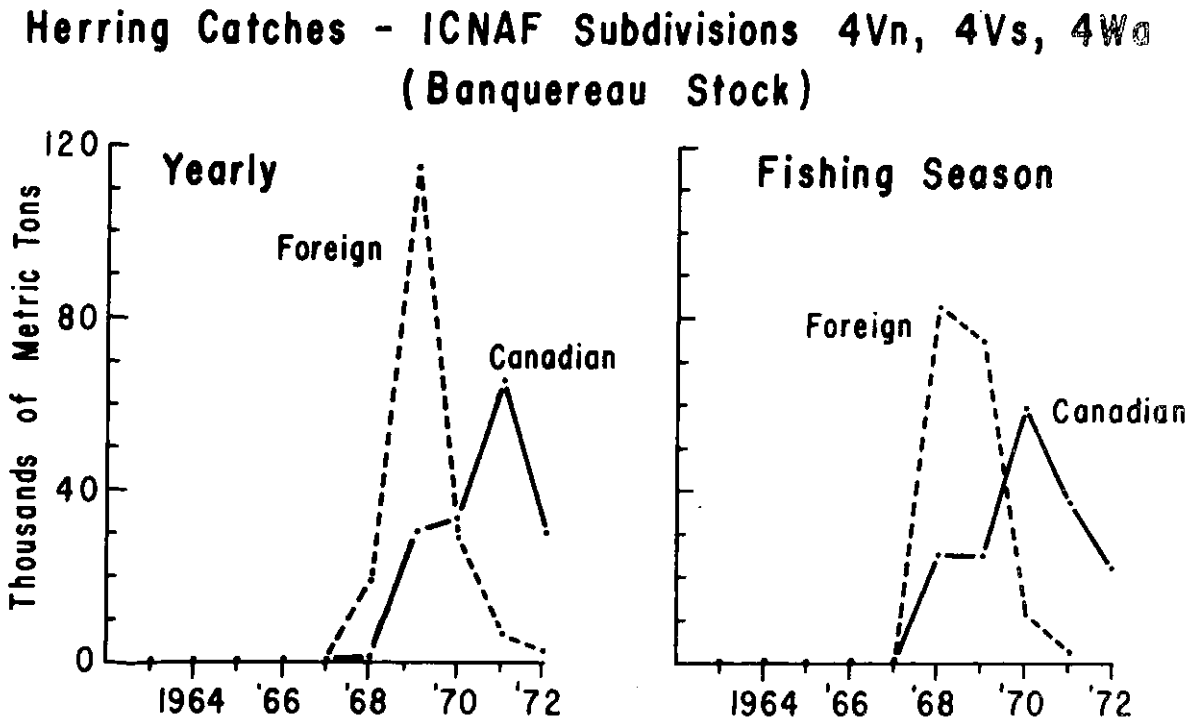

Fig. 4. Herring catches by year and fishing season are presented for the foreign and Canadian mobile fishery during the period 1963-72 for the Banquereau stock.

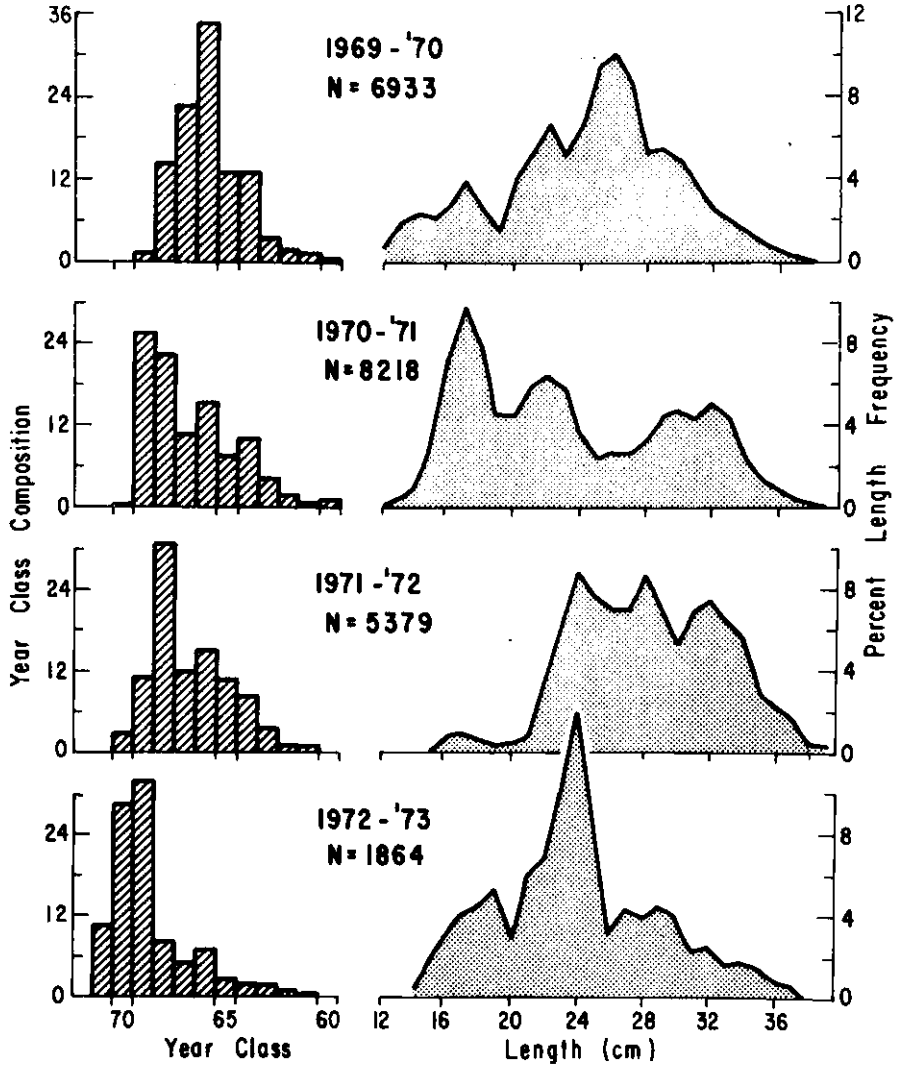

Fig. 5. Year class composition and length frequencies for 1969-73 in subdivision 4Wa.

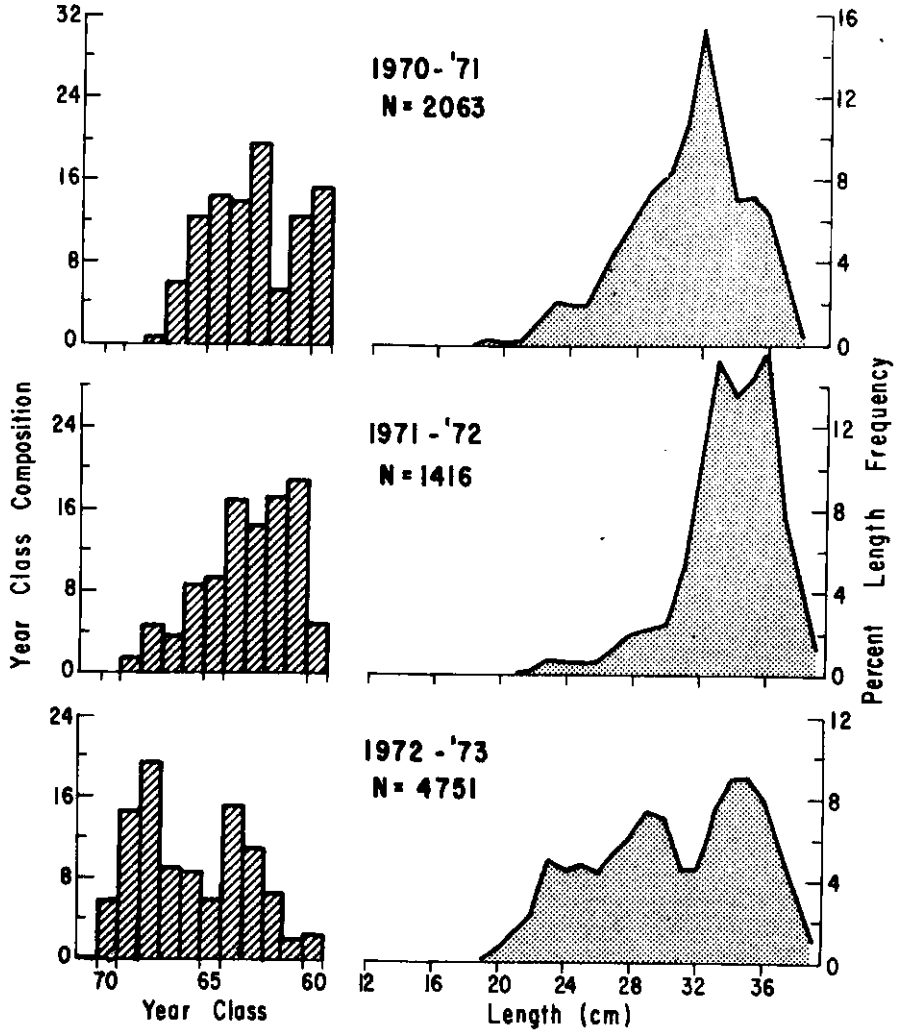

Fig. 6. Year class composition and length frequencies for 1970-73 in subdivision 4Vn.

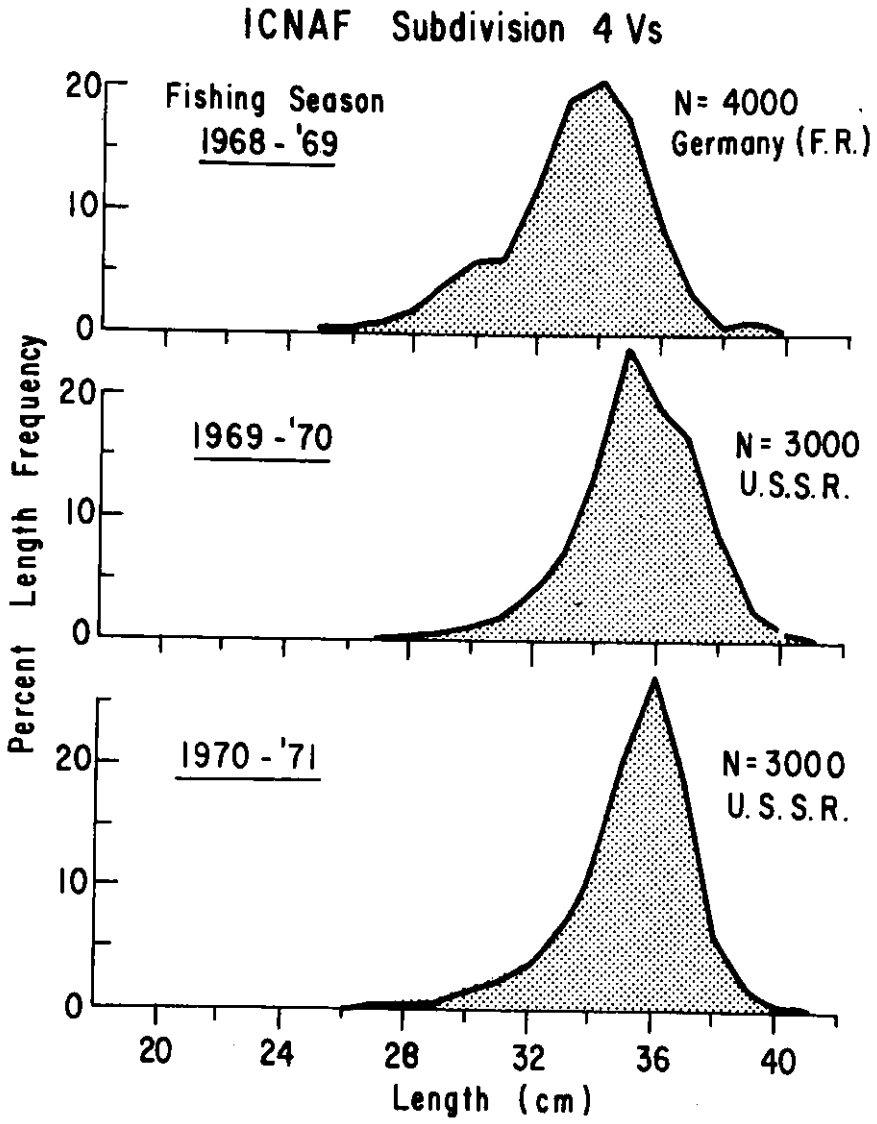

Fig. 7. Representative length frequencies of the foreign catch in subdivision 4Vs are presented for the period 1968-71.

TABLE 1. Monthly herring catch (metric tons) in ICNAF subdivisions 4Vn for the years 1963-72. Total catch (T) and Canadian mobile (M) and fixed gear (F) catches are shown separately. The 1972 total catch values are provisionary.

	1963			1964			1965			1966			1967		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	8	-	8	-	-	-
5	237	-	237	109	-	109	81	-	81	21	-	21	29	-	29
6	146	-	146	250	-	250	66	-	66	45	-	45	113	-	113
7	88	-	88	33	1	32	120	29	91	47	30	17	170	-	153
8	12	-	12	17	3	14	30	-	12	10	10	-	-	-	-
9	42	35	7	2	1	1	2	-	2	-	-	-	1	-	1
10	-	-	-	-	-	-	-	-	-	12	9	3	-	-	-
11	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	526	35	491	411	5	406	299	29	262	143	49	94	313	-	296

	1968			1969			1970			1971			1972		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
1	-	-	-	136	136	-	3296	1431	-	1607	1569	-	1897	1897	-
2	-	-	-	687	687	-	1624	1624	-	1348	1348	-	-	-	-
3	-	-	-	848	848	-	189	-	-	-	-	-	-	-	-
4	20	-	20	25	-	25	1834	1827	7	16	-	16	288	288	-
5	107	-	107	100	-	100	11	-	11	56	-	56	141	125	16
6	54	2	52	51	-	51	43	-	43	44	-	44	102	-	102
7	181	-	56	42	-	42	13	-	13	5	-	5	29	-	29
8	-	-	-	7	-	7	-	-	-	4	-	4	10	-	10
9	-	-	-	-	-	-	10	10	-	8	-	8	3	-	3
10	271	271	-	443	443	-	6	-	-	21	17	4	-	-	-
11	87	-	-	696	-	-	135	-	8	847	847	-	4287	4283	4
12	11480	102	-	8300	-	-	174	-	1	7450	7450	-	5632	5631	1
	12200	375	235	11335	2114	225	7335	4892	83	11406	11231	137	12389	12224	165

TABLE 2. Monthly herring catch (metric tons) in ICNAF subdivision 4Vs for the years 1968-72. No catches were reported prior to 1968. The 1972 data are provisionary.

	1968	1969	1970	1971	1972
1	-	22472	1403	-	-
2	-	14830	6816	2482	-
3	-	25844	12149	2626	-
4	286	21154	1688	76	-
5	28	8593	4211	397	-
6	-	-	40	60	-
7	5	3	-	15	-
8	139	8	9	-	-
9	-	1149	129	-	-
10	82	3756	75	2	-
11	-	1531	20	-	-
12	7239	7004	-	-	-
Unknown	-	-	-	1371	2099
TOTAL	7779	106344	26540	7029	2099

TABLE 3. Canadian monthly herring catch (metric tons) in ICNAF subdivisions 4Wa for the years 1963-72. Catches by mobile (M) and fixed gear (F) are shown separately.

Month	1963		1964		1965		1966		1967		1968		1969		1970		1971		1972	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	-	-	-	-	-	-	-	-	-	-	-	-	3729	-	5504	-	14676	-	9976	-
2	-	-	-	-	-	-	-	-	-	-	-	-	10920	-	6773	-	13965	-	3135	-
3	-	-	-	-	-	-	-	-	-	-	-	-	8169	-	6667	-	13535	-	3614	-
4	-	-	-	1	-	3	-	34	-	1	195	50	1920	96	5906	13	6538	33	343	1
5	-	56	-	91	-	49	-	17	-	39	176	31	-	26	-	11	-	40	11	65
6	-	128	-	110	-	83	-	81	-	80	-	105	-	63	-	42	-	34	-	59
7	-	441	-	442	4	272	-	200	-	182	-	126	-	96	-	59	-	28	-	167
8	-	121	-	132	-	68	-	87	-	120	-	60	-	62	-	19	-	28	-	27
9	-	73	-	19	-	32	-	16	-	7	-	2	-	-	-	1	-	2	-	1
10	-	12	-	2	-	3	-	1	2	2	-	1	-	-	-	6	14	1	10	8
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118	1	17	2
12	-	-	-	-	-	8	-	-	-	-	-	-	2033	-	3629	-	3937	2	424	-
Total	-	831	-	797	4	518	-	436	2	431	371	375	26771	343	28479	151	52783	169	17530	330

TABLE 4. Total herring catch (metric tons) in ICNAF subdivisions 4Vn, 4Vs and 4Wa and for the area of the Banquereau stock (4V + 4Wa) for the years 1963-72. Yearly catch totals and fishing season totals (April 1 - March 31) are presented. The 1971-72 and 1972-73 fishing season values for foreign catch are provisionary since a complete breakdown was not available.

		4Vn			4Vs	4Wa		Total (4V + 4Wa)	
		Foreign	Canada		Foreign	Canada		Foreign	Canada
			Mobile	Fixed Gear		Mobile	Fixed Gear		Mobile
1963	Yearly	-	35	491	-	-	829	-	35
1963-64	Fishing Season	-	35		-	-		-	35
1964	Yearly	-	5	406	-	-	619	-	5
1964-65	Fishing Season	-	5		-	-		-	5
1965	Yearly	18	29	262	-	-	517	18	33
1965-66	Fishing Season	18	29		-	-		18	33
1966	Yearly	-	49	94	-	-	434	-	49
1966-67	Fishing Season	-	49		-	-		-	49
1967	Yearly	17	-	296	-	-	431	17	2
1967-68	Fishing Season	17	-		-	-		17	2
1968	Yearly	11590	375	235	7779	370	375	19369	745
1968-69	Fishing Season	11590	2046		70925	23543		82515	25589
1969	Yearly	8996	2114	225	106344	27160	342	115340	29274
1969-70	Fishing Season	11050	3498		63566	22399		74616	25897
1970	Yearly	2360	4892	83	26540	28547	150	28900	33439
1970-71	Fishing Season	344	4754		11280	54288		11624	59042
1971	Yearly	38	11231	137	5656	53041	167	7067	64272
1971-72	Fishing Season	38	10211		2649	27353		2687	37564
1972	Yearly	1	12224	165	2099	17530	331	3000	29754
1972-73	Fishing Season	1	16951		2099	5094		3000	22045

TABLE 5. Age-length distribution of 1969-70 samples from area 4Wa.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10													
11			8										8
12			53										53
13			25	101									126
14			10	144									154
15				135	4								139
16				184	7								191
17				263	9								272
18				134	37								171
19				22	79								101
20				4	276	4							284
21				4	361	5							370
22					428	41							469
23					233	114							347
24					108	338	5						451
25					17	629	8	4					658
26					18	610	62	13					703
27						431	148	6					585
28						198	148	13					359
29						44	175	146	9				374
30						18	95	199	27				339
31							36	190	26				252
32							4	93	64	12			173
33							3	25	78	25	4		135
34								7	38	53	–		98
35										31	32		63
36											37		37
37											11	5	16
38												4	4
39												1	1
40													
Total			96	991	1577	2432	684	696	242	121	84	10	6933
Per Cent Composition			1.38	14.29	22.75	35.08	9.87	10.04	3.49	1.75	1.21	0.14	100.0
Mean Length At Age			12.39	15.91	21.47	25.66	28.28	30.31	32.19	33.85	35.60	37.60	

MEAN LENGTH .... 24.36 cm

MEAN AGE .... 66.01 Year class

TABLE 6. Age-length distribution of 1970-71 samples from area 4Wa.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10		3											3
11		3											3
12		3											3
13		16											16
14		6	70										76
15			273										273
16			603										603
17			815										815
18			255	382									637
19			84	295									379
20				303	60								363
21				405	87								492
22				314	199	12							525
23				120	324	36							480
24					151	152							303
25					20	181	4						205
26					11	205	5						221
27						212	12						224
28						227	45	3					275
29						179	147	42					368
30						44	231	111	7				393
31						6	94	241	11	2			354
32							84	274	58	–			416
33							14	155	155	22	4		350
34								4	134	54	8		200
35									6	53	32	21	112
36										17	35	18	70
37												36	36
38												16	16
39												6	6
40												1	1
Total	–	31	2100	1819	852	1254	636	830	371	148	79	98	8218
Per Cent Composition	–	0.38	25.55	22.13	10.37	15.26	7.74	10.10	4.52	1.80	.96	1.19	100.0
Mean Length At Age	–	12.61	16.55	20.18	22.61	26.61	29.99	31.47	33.12	34.40	35.24	36.70	

MEAN LENGTH .... 23.54 cm

MEAN AGE .... 66.72 Year class

TABLE 7. Age-length distribution of 1971-72 samples from area 4Wa.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10													
11													
12													
13													
14													
15		3											3
16		44											44
17		53											53
18		31											31
19		10	9										19
20			22	2									24
21			24	21									45
22			112	58									170
23			205	147									352
24			147	330									477
25			66	342									408
26			9	323	41	10							379
27				288	56	34							378
28				207	217	50							474
29				90	190	85	5						370
30				3	111	131	29	7					281
31					15	304	33	24					376
32					4	169	131	101					405
33						15	157	149	20				341
34						23	176	95	9				303
35							40	53	59	6			158
36							7	35	77	7			126
37									28	54	4		86
38										10	12		22
39											22		22
40											31		31
Total		141	590	1811	634	821	578	464	193	77	69		5378
Per Cent Composition		2.62	10.97	33.67	11.79	15.27	10.75	8.63	3.59	1.43	1.28		100.0
Mean Length At Age		17.01	23.05	25.55	28.53	30.55	32.95	33.29	35.44	36.88	39.16		

MEAN LENGTH .... 28.32 cm

MEAN AGE .... 66.72 Year class

TABLE 8. Age-length distribution of 1972-73 samples from area 4Wa.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10													
11													
12													
13	2												2
14	5												5
15	35												35
16	58												58
17	68	7											75
18	32	50											82
19		100											100
20		51											51
21		103	5										108
22		104	26										130
23		92	96										188
24		19	243										262
25		4	152										156
26			51	5									56
27			19	27									46
28			3	68	12								83
29				39	32	2							73
30				12	49	23							84
31					2	66	5						73
32						28	12	3					43
33						12	26	8					46
34						1	9	18	2				30
35							1	8	19	4	1		33
36								2	13	8	4	1	28
37									3	5	5		13
38										5			5
39													
40													
Total	200	530	595	151	95	132	53	39	37	22	10	1	1865
Per Cent Composition	10.72	28.42	31.90	8.10	5.09	7.08	2.84	2.09	1.98	1.18	0.54	.06	100.0
Mean Length At Age	16.41	20.87	24.27	28.17	29.43	31.21	32.79	33.95	35.46	36.50	36.40	36.00	

MEAN LENGTH .... 24.41 cm

MEAN AGE .... 68.64 Year class

TABLE 9. Age-length distribution of 1970-71 samples from area 4Vn.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10													
11													
12													
13													
14							MEAN LENGTH .... 31.05 cm						
15													
16							MEAN AGE .... 63.31 Year class						
17													
18													
19				6									6
20				2									2
21				-	4								4
22				6	12								18
23					42								42
24					29	12							41
25					15	25							40
26					18	56							74
27						77	25						102
28						42	84	4					130
29						26	108	26					160
30						15	52	86	23				176
31							23	81	109	8			221
32							5	63	175	68	5	5	321
33							7	23	77	14	77	23	221
34								3	12	7	66	57	145
35									6	10	33	102	151
36										5	36	91	132
37											39	25	64
38												11	11
39												2	2
40													
Total				14	120	253	304	286	402	112	256	316	2063
Per Cent Composition				0.68	5.82	12.26	14.74	13.86	19.49	5.43	12.41	15.32	100.0
Mean Length At Age				20.00	23.78	26.99	29.02	30.89	31.91	32.63	34.53	35.20	

TABLE 10. Age-length distribution of 1971-72 samples from area 4Vn.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Fish
10													
11													
12													
13													
14							MEAN LENGTH .... 33.67 cm						
15													
16							MEAN AGE .... 63.38 Year class						
17													
18													
19													
20													
21			1										1
22			4										4
23			11										11
24			5	5									10
25				8									8
26				9	2								11
27				21	1								22
28				19	11								30
29				4	20	6							30
30					10	22	3	1					36
31					6	45	19	4	1				75
32						38	61	47	5				151
33						10	48	122	30	4			214
34							2	59	86	38	6		191
35								5	60	97	41		203
36								3	21	83	116		223
37										22	81	10	113
38											21	40	61
39												18	18
40												4	4
Total			21	66	50	121	133	241	203	244	265	72	1416
Per Cent Composition			1.48	4.66	3.53	8.55	9.39	17.02	14.34	17.23	18.72	5.08	100.0
Mean Length At Age			22.95	26.80	29.06	31.20	32.20	33.08	34.29	35.33	36.26	38.22	

TABLE 11. Age-length distribution of 1972-73 samples from area 4Vn.

Length Group \ Year-class	71	70	69	68	67	66	65	64	63	62	61	60	Total Ages Read
10													
11													
12													
13													
14	1												1
15	-												-
16	1												1
17	1												1
18													-
19		2											2
20		22	11										33
21		74	9										83
22		67	50										117
23		103	141										244
24		8	206	7									221
25			128	35									163
26			78	20									98
27			23	98									121
28			27	244	26								297
29			7	295	61								363
30				177	136	27							340
31				24	131	60							215
32					54	144	24						222
33					14	160	109	80					363
34						9	106	292	61				468
35							31	230	115	42	11	11	440
36								101	202	72	-	15	390
37									104	155	17	-	276
38									32	33	66	33	164
39												55	55
40												5	5
Total	3	276	680	900	422	400	270	703	514	302	94	119	4683
Per Cent Composition	0.06	5.89	14.52	19.23	9.01	8.54	5.77	15.01	10.98	6.45	2.01	2.53	100.0
Mean Length At Age	15.67	21.98	24.27	28.50	30.40	32.16	33.53	34.50	35.87	36.59	37.47	38.02	

MEAN LENGTH .... 30.92 cm

MEAN AGE .... 65.95 Year class