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**Reconstruction of the 4Vsw cod catch at age
on a half-year basis (1971-1989)**

by

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Abstract

The 4Vsw cod catch at age was reconstructed from historical sampling data for the years 1971 to 1989. The new catch at age was explicitly split by half-years to allow better SPA calibration with the July research vessel survey. A consistent practice of using annual and, where possible, seasonal length/weight parameters was followed. The new catch at age, summed to full years, was compared with the previous catch at age. For the years 1979 on, the new estimate of total annual removals at age generally changed by less than 10% from the previous estimates.

Résumé

On a établi des statistiques sur les prises de morue selon l'âge dans 4VsW d'après les données d'échantillonnage historiques des années 1971 à 1989. Une séparation explicite des nouvelles prises selon l'âge a été effectuée par demi-année pour permettre une meilleure calibration de l'analyse séquentielle de population avec les données de la campagne d'évaluation de juillet. On a appliqué uniformément la méthode qui consiste à utiliser des paramètres longueur/poids annuels et, dans les cas où cela était possible, saisonniers. Après avoir additionné les données pour obtenir des résultats par année entière, on les a comparées avec les prises selon l'âge précédentes. Pour 1979 et les années subséquentes, l'écart entre la nouvelle estimation des retraits totaux selon l'âge et les estimations antérieures était généralement inférieur à 10 %.

Introduction

Since the introduction of automated non-linear regression for calibration of sequential population analysis (ADAPT) a practice of retrospective analysis has been utilized. Dropping the last 5 or more years from an ADAPT analysis and then adding them back into the analysis one at a time, while using a consistent ADAPT formulation allows a retrospective view of the population to be developed. Each ADAPT analysis estimates the population size in the final year as well as all the previous years in the time series. Comparison of estimates at age in a given year, as each subsequent year of data is included in the ADAPT analysis, forms the basis of retrospective analysis. In 4VsW cod there are very strong trends of reducing estimates of numbers in a given year as additional years are included in the ADAPT run. It is possible that errors in matching the research vessel survey population index at age to the SPA numbers were contributing to the retrospective patterns observed. Since the major research vessel (RV) survey of 4VsW cod is in July the SPA numbers have usually been adjusted to mid-year by applying half the total annual mortality to the beginning of year numbers. However, the use of a half year catch at age would make it possible to calculate the actual fishing mortality occurring in the year prior to the survey. Therefore, the CAFSAC groundfish subcommittee recommended that the catch at age be reconstructed, to the extent possible, on a half year basis.

A lack of standardization during the last 20 years, in the application of the length/weight parameters (a's and b's) became apparent upon a review of 4VsW cod assessment research documents (Figure 1). Prior to 1977 constant a's and b's were utilized to calculated the catch at age for this stock. It appeared that the length weight parameters from the July groundfish survey were employed in 1978-80, although no supporting documentation was available. Occasional variations in the use of the a's and b's were noted since 1981. Although the area of capture for the majority of the catch has often been either 4Vs or 4W (Table 1, Figure 2), the values used were most often from the total stock area of 4VsW despite the availability of divisional parameters.

Methods

In reconstructing the catch at age, a set of principles were adopted to standardize the application of length/weight parameters and the combination of available samples for age composition. The principles applied in regards to the a's and b's are as follows:

1. Only annual values, i.e. from a given year's RV survey are used because of trends in condition over years.
2. When available, seasonal values are used for appropriate keys. March survey a's and b's were used where available (1979-84, 1986-90) in the calculation of first quarter keys. Fall survey a's and b's were utilized for fourth quarter keys when available (1978-84). In all other cases (second quarter, third quarter, first half, second half and full year keys), July survey a's and b's were used.
3. When 75% or more of the catch being applied to a particular key came from only one division (i.e. Div. 4W or Subdiv. 4Vs) then a's and b's were calculated using only the RV length and weight observations in that division. Otherwise, a's and b's from the entire 4VsW area were used.

In relation to sampling for age composition the following principles applied:

1. To the degree to which sampling is available, construct keys for each gear category on half yearly, or preferably quarterly, basis. This was generally taken to mean a minimum of 200 otoliths in the key unless catches were very small.

When sampling is inadequate:

2. If possible, pool samples within a year for a gear category, i.e. full year keys. Partition full year catch at age by proportion of total caught in each half year.
3. If necessary pool across gear categories even combining fixed and mobile if need be.
4. When little or no sampling is available, but there is an existing catch at age, it is adopted and partitioned by the proportion of the total catch taken in each half of the year. This affected only the small mesh catch at age prior to 1984.

Age/length keys were generated for each category of gear type when sufficient sampling permitted. The gear categories used are as follows:

Mobile

- a) Trawls - side, stern and pair; bottom, shrimp and midwater trawls; this category was enlarged to include

danish, scottish and pair seines when sampling levels did not permit a separate key for seine fisheries;

- b) Ground seines - danish, scottish and pair seines, used when sufficient samples were collected;
- c) Small mesh fisheries - all small mesh trawl fisheries, regardless of country, which were primarily directed for silver hake, squid, argentine, mackerel and herring;

Fixed

- d) Hook and line fisheries - longlines, handlines, dory lines and automated jiggers;
- e) Gillnets;

Others

- f) Prior to 1977 keys could only be constructed by combining all gears with the exception of small mesh fisheries.

The existing catch at age for small mesh gears (Gagne et al., 1984) was adopted for small mesh fisheries prior to 1984. The yearly catch at age (Table 2) was partitioned into half years by calculating the proportion of catch taken in each portion of the year. International Observer Program length frequency data have shown no significant numbers of small 4VsW cod in the small mesh fishery for the years 1984-1990 (unpublished data).

Table 3 shows the breakdown of data used to re-calculate the catch at age for each half year. Listed by half-year and gear category, it shows the time period for which the key was run, the length/weight parameters utilized, the RV survey from which the a's and b's were derived, the number of fish measured and aged, and the total catch for the key in metric tonnes.

For the years 1971-1976 only two keys were used for each half year catch at age (Table 4), Small mesh fisheries and Others, which by their definition combined to make up 100% of the catch. Faroese catches during these years were reported without specifics on the gears used and months fished, and were included in the Others category and split in proportion to the rest of the catch. After 1976, catches which did not fall into the designated keys were used to raise the keyed catch at age to 100% of the catch (Tables 5, 6).

Results

By combining each half within a year, a new annual catch at age was derived (Table 7). Comparison with the previously presented catch at age (Table 8) shows few significant changes in recent years, with the difference in age 3+ numbers not exceeding 6% after 1978. The catch at age ratios for individual ages (new/old) generally were within 10% after 1978 (Table 9). The ratios for the years 1971-78 were more variable, up to a factor of 2 in many cases.

References

Gagne, J.A., A.F. Sinclair and C. Dale. 1984. The 1984 assessment of 4VsW cod: a completely revised procedure. CAFSAC Res. Doc. 84/78.

Table 1. Total catch of 4VsW cod by gear¹ and (Sub)Division from NAFO.

YEAR	4Vs					4W					4VsW				
	TRAWLS	LL	SDN	MIS	TOTAL	TRAWLS	LL	SDN	MIS	TOTAL	TRAWLS	LL	SDN	MIS	TOTAL
1964	25452	42	2	0	25496	32855	708	88	4110	37761	58307	750	90	4110	63257
1965	36607	84	22	0	36713	28931	1416	159	3767	34273	65538	1500	181	3767	70986
1966	27006	143	14	14	27177	36460	1474	38	3376	41348	63466	1617	52	3390	68525
1967	26481	99	27	0	26607	22407	2405	71	2668	27551	48888	2504	98	2668	54158
1968	48715	48	18	0	48781	24686	2970	89	3902	31647	73401	3018	107	3902	80428
1969	22265	43	7	1	22316	21946	3567	13	2323	27849	44211	3610	20	2324	50165
1970	28617	21	1	0	28639	23655	3817	62	1261	28795	52272	3838	63	1261	57434
1971	24088	40	0	0	24128	22006	4819	26	1584	28435	46094	4859	26	1584	52563
1972	33570	595	4	2364	36533	15888	3793	7	5424	25112	49458	4388	11	7788	61645
1973	21654	82	3	1662	23401	25144	3748	20	1780	30692	46798	3830	23	3442	54093
1974	19105	337	0	169	19611	18931	2969	5	2225	24130	38036	3306	5	2394	43741
1975	10522	444	0	728	11694	16336	3185	11	1291	20823	26858	3629	11	2019	32517
1976	10068	68	0	1417	11553	8021	2913	14	1906	12854	18089	2981	14	3323	24407
1977	2819	50	4	0	2873	2305	3487	68	1657	7517	5124	3537	72	1657	10390
1978	10044	294	19	0	10357	8277	4552	839	1380	15048	18321	4846	858	1380	25405
1979	14869	438	86	0	15393	14579	5825	3245	988	24637	29448	6263	3331	988	40030
1980	28941	2116	321	0	31378	6729	6588	3440	1117	17874	35670	8704	3761	1117	49252
1981	27662	4274	171	0	32107	9813	8229	2433	1136	21611	37475	12503	2604	1136	53718
1982	32247	7069	794	0	40110	6431	6655	1943	615	15644	38678	13724	2737	615	55754
1983	28024	4475	671	0	33170	11555	5052	1936	667	19210	39579	9527	2607	667	52380
1984	37576	4123	879	0	42578	3839	3512	2144	473	9968	41415	7635	3023	473	52546
1985	39978	7449	718	44	48189	3768	3386	1229	883	9266	43746	10835	1947	927	57455
1986	35514	8277	237	0	44028	2758	3075	600	1068	7501	38272	11352	837	1068	51529
1987	33157	6276	311	11	39755	1803	2666	538	741	5748	34960	8942	849	752	45503
1988 ²	26888	6092	612	56	33648	1218	2155	383	805	4561	28106	8247	995	861	38209
1989 ²	22560	6320	402	41	29323	3503	2920	323	593	7339	26063	9240	725	634	36662

¹ Gear designations include the following:

TRAWLS - Side/stern bottom, side/stern midwater, pair trawls and shrimp trawls;

LL - Set/drift longlines, Hand lines, jigs, dory vessel lines;

SDN - Scottish, danish and pair seines;

MIS - Miscellaneous gears not included above.

² Preliminary Interzonal and International Observer Program data.

Table 2. Removals at age of 4VsW cod by the small mesh fishery (Gagne et al. CAFSAC Res. Doc. 84/78) which were partitioned proportional to the catch in each half year.

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1	2142	1225	1110	1984	2046	1218	1273	1538	513	1	29	12	31	3	5	0
2	13656	7811	7076	12649	13040	10153	7090	8571	2866	23	63	46	25	63	1	2
3	8838	5055	4579	8184	8437	5187	5877	7105	2376	222	152	106	83	302	12	43
4	1606	921	834	1487	1536	984	1004	1214	406	121	178	214	73	281	16	81
5	534	305	277	495	512	432	146	176	59	26	27	181	92	41	10	50
6	0	0	0	0	0	7	66	80	28	6	3	42	45	25	3	16
7	0	0	0	0	0	23	0	0	0	1	1	5	17	8	1	2
8	0	0	0	0	0	10	4	7	3	0	0	0	1	1	0	1
9	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
∞																
1+	26776	15317	13876	24800	25570	18017	15460	18691	6251	400	453	606	368	724	48	195
2+	24633	14092	12766	22816	23524	16799	14187	17152	5738	399	424	594	337	721	43	195
3+	10977	6281	5690	10167	10485	6646	7097	8252	2872	376	361	548	312	658	42	193
4+	2140	1226	1110	1983	2047	1458	1220	1476	495	154	209	442	229	356	30	150
5+	534	305	277	495	512	475	216	263	89	33	31	228	156	75	14	69
6+	0	0	0	0	0	43	70	87	30	7	4	47	64	34	4	19

Table 3. Data used to re-calculate 4VsW cod commercial catch at age.

Year	Half	Key	Gear ¹	Period ²	Length/weight coefficients			Lengths	Aged	Catch
					a	b	Source ³			
1971	1	1	Small Mesh	P	--	--		3573	517	3355 34902
		2	Others	FY	.0072	3.0648	July 4VsW			
1972	1	1	Small Mesh	P	--	--	--	2804	415	1621 42825
		2	Others	FY	--	--	--			
1973	1	1	Small Mesh	P	--	--		2870	457	1502 28033
		2	Others	FY	.0099	2.9933	July 4VsW			
1974	1	1	Small Mesh	P	--	--		2133	323	1918 23889
		2	Others	FY	.0053	3.1493	July 4VsW			
1975	1	1	Small Mesh	P	--	--		4185	770	1875 17570
		2	Others	FY	.0066	3.1005	July 4VsW			
1976	1	1	Small Mesh	P	--	--		1307	209	1136 11287
		2	Others	FY	.0059	3.1326	July 4VsW			
1977	1	1	Small Mesh	P	--	--		970	159	348 1216 2671
		2	OTB, PTB, SNU	H1	.0092	3.0185	July 4VsW			
	3	LL, LHP		FY	.0082	3.0455	July 4W	742	418 147	82 3523 866
		2	Small Mesh	P	--	--				
	2	OTB, PTB, SNU		H2	.0092	3.0185	July 4VsW	2230	159	1176 11896
		3	LL, LHP	FY	--	--	--			
1978	1	1	Small Mesh	P	--	--		2621	432	59 1626
		2	OTB, PTB, SNU	Q1	.0073	3.0674	July 4VsW			
		3	OTB, PTB, SNU	Q2	.0069	3.0873	July 4Vs	2453	356	4460
		4	LL, LHP	FY	.0074	3.0613	July 4W			
1979	2	1	Small Mesh	P	--	--		4080	589	189 2713 8004 3325
		2	OTB, PTB, SNU	Q3	.0073	3.0674	July 4VsW			
		3	OTB, PTB, SNU	Q4	.0079	3.0423	Fall 4VsW	2876	241	15027 2720 475
		4	LL, LHP	FY	--	--	--			
	5	1	Small Mesh	P	--	--		2424	389	634 1705 11767 3543 2852
		2	OTB, PTB	H1	.0037	3.2341	July 4VsW			
		3	LL, LHP	H1	.0037	3.2304	July 4W			
		4	SNU	FY	.0037	3.2304	July 4W			
		5	Small Mesh	P	--	--				
	2	2	OTB, PTB	Q3	.0037	3.2341	July 4VsW	1765	249	177 15027 2720 475
		3	OTB, PTB	Q4	.0044	3.1930	Fall 4Vs			
		4	LL, LHP	H2	.0037	3.2304	July 4W			
		5	SNU	FY	--	--	--			

Table 3. (Continued)

Year	Half	Key	Gear ¹	Period ²	Length/weight coefficients			Lengths	Aged	Catch
					a	b	Source ³			
1980	1	1	Small Mesh	P	--	--	--	--	--	214
		2	OTB, PTB, SNU	Q1	.0124	2.9151	March 4Vs	5779	648	9033
		3	OTB, PTB, SNU	Q2	.0130	2.9102	July 4Vs	2079	373	9761
		4	LL, LHP	FY	.0136	2.9017	July 4VsW	1129	222	4012
	2	1	Small Mesh	P	--	--	--	--	--	217
		2	OTB, PTB, SNU	Q3	.0130	2.9102	July 4Vs	2477	401	6548
		3	OTB, PTB, SNU	Q4	.0081	3.0462	Fall 4Vs	7215	1188	13655
		4	LL, LHP	FY						4692
1981	1	1	Small Mesh	P	--	--	--	--	--	367
		2	OTB, PTB, SNU	Q1	.0040	3.2080	March 4VsW	3928	634	7357
		3	OTB, PTB, SNU	Q2	.0124	2.9284	July 4VsW	3228	576	9765
		4	LL, LHP	FY	.0124	2.9284	July 4VsW	4284	714	5754
	2	1	Small Mesh	P	--	--	--	--	--	298
		2	OTB, PTB, SNU	Q3	.0133	2.9057	July 4Vs	4913	713	5484
		3	OTB, PTB, SNU	Q4	.0119	2.9340	Fall 4Vs	6717	1131	16808
		4	LL, LHP	FY						6749
1982	1	1	Small Mesh	P	--	--	--	--	--	48
		2	OTB, PTB	Q1	.0046	3.1708	March 4Vs	7386	1110	13128
		3	OTB, PTB	Q2	.0092	2.9931	July 4Vs	6787	1117	13205
		4	LL, LHP	H1	.0108	2.9569	July 4VsW	5678	1294	6115
		5	SNU	H1	.0108	2.9569	July 4VsW	1495	187	1090
	2	1	Small Mesh	P	--	--	--	--	--	31
		2	OTB, PTB	Q3	.0108	2.9569	July 4VsW	2720	337	3187
		3	OTB, PTB	Q4	.0061	3.1017	Fall 4Vs	5441	778	8860
		4	LL, LHP	H2	.0108	2.9569	July 4VsW	1484	317	7609
		5	SNU	H2	.0108	2.9569	July 4VsW	2033	238	1642
1983	1	1	Small Mesh	P	--	--	--	--	--	265
		2	OTB, PTB	Q1	.0057	3.1060	March 4VsW	10793	1577	8172
		3	OTB, PTB	Q2	.0106	2.9647	July 4VsW	9206	558	14892
		4	LL, LHP	H1	.0106	2.9647	July 4VsW	4174	408	4245
		5	SNU	H1	.0107	2.9648	July 4W	1948	178	1115
	2	1	Small Mesh	P	--	--	--	--	--	10
		2	OTB, PTB	Q3	.0094	2.9924	July 4Vs	3449	226	5891
		3	OTB, PTB	Q4	.0085	3.0099	Fall 4Vs	11017	209	9852
		4	LL, LHP	H2	.0106	2.9647	July 4VsW	6973	583	5282
		5	SNU	H2	.0106	2.9647	July 4VsW	2797	155	1492
1984	1	1	OTB, PTB	Q1	.0059	3.0902	March 4Vs	4266	575	7756
		2	OTB, PTB	Q2	.0122	2.9233	July 4Vs	11034	670	14366
		3	LL, LHP	H1	.0101	2.9737	July 4VsW	4774	570	2602
		4	SNU	H1	.0101	2.9737	July 4VsW	2870	201	1357
	2	1	OTB, PTB	Q3	.0122	2.9233	July 4Vs	2008	279	5225
		2	OTB, PTB	Q4	.0061	3.0864	Fall 4Vs	14604	453	13908
		3	LL, LHP	H2	.0101	2.9737	July 4VsW	5563	908	5033
		4	SNU	H2	.0064	3.0935	July 4W	2229	174	1666
	3	1	OTB, PTB, SNU	Q1	.0105	2.9613	July 4Vs	7284	775	11585
		2	OTB, PTB, SNU	Q2	.0105	2.9613	July 4Vs	11171	463	17030
		3	LL, LHP	H1	.0088	3.0063	July 4VsW	3319	380	3600
1985	2	1	OTB, PTB, SNU	Q3	.0105	2.9613	July 4Vs	3049	301	5964
		2	OTB, PTB, SNU	Q4	.0105	2.9613	July 4Vs	5973	358	9806
		3	LL, LHP	H2	.0088	3.0063	July 4VsW	2244	372	7235

Table 3. (Continued)

Year	Half	Key	Gear ¹	Period ²	Length/weight coefficients			Lengths	Aged	Catch
					a	b	Source ³			
1986	1	1	OTB, PTB, SNU	Q1	.0073	3.0288	March 4Vs	5745	536	9126
		2	OTB, PTB, SNU	Q2	.0084	3.0110	July 4Vs	8965	370	11760
		3	LL, LHP	H1	.0084	3.0110	July 4Vs	3438	460	4468
	2	1	OTB, PTB, SNU	H2	.0084	3.0110	July 4Vs	5520	453	16930
		2	LL, LHP	H2	.0072	3.0513	July 4VsW	3980	533	6884
	1987	1	OTB, PTB, SNU	Q1	.0099	2.9589	March 4Vs	7276	576	10781
		2	OTB, PTB, SNU	Q2	.0138	2.8909	July 4Vs	5163	349	7131
		3	LL, LHP	FY	.0091	2.9992	July 4VsW	3369	547	3351
		2	OTB, PTB, SNU	Q3	.0138	2.8909	July 4Vs	5733	330	9894
		2	OTB, PTB, SNU	Q4	.0138	2.8909	July 4Vs	2458	356	7930
		3	LL, LHP	FY						5591
1988	1	1	OTB, PTB, SNU	Q1	.0049	3.1313	March 4Vs	4463	335	8613
		2	OTB, PTB, SNU	Q2	.0140	2.8945	July 4Vs	4227	261	6367
		3	LL, LHP	H1	.0140	2.8945	July 4Vs	4221	809	2936
		4	GN	FY	.0066	3.0874	July 4W	844	70	180
	2	1	OTB, PTB, SNU	Q3	.0140	2.8945	July 4Vs	2718	253	4081
		2	OTB, PTB, SNU	Q4	.0140	2.8945	July 4Vs	6502	446	9927
		3	LL, LHP	Q3	.0100	2.9790	July 4VsW	4068	640	4579
		4	LL, LHP	Q4	.0100	2.9790	July 4VsW	906	154	735
		5	GN	FY						656
	1989	1	OTB, PTB, SNU	Q1	.0068	3.0601	March 4Vs	3375	413	7741
		2	OTB, PTB, SNU	Q2	.0096	2.9867	July 4Vs	5165	435	5939
		3	LL, LHP	H1	.0060	3.1075	July 4VsW	4531	747	3630
	2	1	OTB, PTB, SNU	Q3	.0060	3.1075	July 4VsW	2833	189	3314
		2	OTB, PTB, SNU	Q4	.0096	2.9867	July 4Vs	6370	517	9576
		3	LL, LHP	H2	.0060	3.1075	July 4VsW	3609	542	5611

¹ Small Mesh includes all fisheries directed for silver hake, squid, mackerel and trawling for herring. Others include all catches not deemed to be small mesh fisheries. Keys include all available domestic commercial samples.

² Period designations are as follows: P - Catch at age for small mesh fisheries (Gagne, Sinclair and Dale CAFSAC WP 84/78) were partitioned to each half year based on the half year catch ratio; FY - Full year keys were regenerated and partitioned according to the catch ratio per half year; Q1 - First quarter key; Q2 - Second quarter key; Q3 - Third quarter key; Q4 - Fourth quarter key; H1 - First half key; H2 - Second half key.

³ The source for length weight coefficients from RV surveys were the March and Fall surveys respectively for first and fourth quarter keys when available. The basis for the divisional assignment of a's and b's was if greater than 75% of the catch for the gear/time was taken in one division the appropriate coefficients were used.

Table 4. 4VsW cod catch at age by key for each half year 1971-90.

1971 - First half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	1472	0	1472	1	710	0	710
2	9387	127	9514	2	4528	2123	6651
3	6073	1060	7133	3	2930	2528	5458
4	1103	2643	3746	4	533	7857	8390
5	367	4444	4811	5	178	5165	5343
6	0	3725	3725	6	0	4906	4906
7	0	2484	2484	7	0	2486	2486
8	0	1426	1426	8	0	1413	1413
9	0	511	511	9	0	261	261
10	0	267	267	10	0	350	350
11	0	116	116	11	0	51	51
12	0	126	126	12	0	6	6
13	0	113	113	13	0	27	27
14	0	58	58	14	0	0	0
15	0	29	29	15	0	2	2
16	0	38	38	16	0	5	5
<u>Total</u>	<u>18402</u>	<u>17167</u>	<u>35569</u>	<u>Total</u>	<u>8879</u>	<u>27180</u>	<u>36059</u>

1971 - Second half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	512	0	512	1	1336	0	1336
2	3262	48	3310	2	8512	702	9214
3	2111	399	2510	3	5507	836	6343
4	384	995	1379	4	1003	2596	3599
5	128	1673	1801	5	334	1707	2041
6	0	1403	1403	6	0	1621	1621
7	0	935	935	7	0	822	822
8	0	537	537	8	0	467	467
9	0	193	193	9	0	86	86
10	0	100	100	10	0	116	116
11	0	43	43	11	0	17	17
12	0	47	47	12	0	2	2
13	0	43	43	13	0	9	9
14	0	22	22	14	0	0	0
15	0	11	11	15	0	1	1
16	0	14	14	16	0	2	2
<u>Total</u>	<u>6397</u>	<u>6463</u>	<u>12860</u>	<u>Total</u>	<u>16692</u>	<u>8984</u>	<u>25576</u>

Table 4. (Continued)

1973 - First half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	623	0	623	1	787	0	787
2	5194	37	5231	2	4382	136	4518
3	2654	1542	4196	3	3633	4378	8011
4	503	2641	3144	4	621	6285	6906
5	221	5043	5264	5	90	3943	4033
6	4	1818	1822	6	41	1282	1323
7	12	1834	1846	7	0	393	393
8	5	2588	2593	8	2	590	592
9	2	921	923	9	0	115	115
10	0	213	213	10	0	90	90
11	0	302	302	11	0	8	8
12	0	4	4	12	0	1	1
13	0	12	12	13	0	0	0
14	0	12	12	14	0	0	0
15	0	10	10	15	0	0	0
16	0	26	26	16	0	0	0
<u>Total</u>	9218	17003	26221	<u>Total</u>	9556	17221	26777

1974 - First half

13

1973 - Second half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	595	0	595	1	486	0	486
2	4959	31	4990	2	2708	95	2803
3	2533	1272	3805	3	2244	3069	5313
4	481	2178	2659	4	383	4406	4789
5	211	4159	4370	5	56	2765	2821
6	3	1499	1502	6	25	899	924
7	11	1513	1524	7	0	276	276
8	5	2134	2139	8	2	414	416
9	1	760	761	9	0	81	81
10	0	176	176	10	0	63	63
11	0	249	249	11	0	5	5
12	0	4	4	12	0	1	1
13	0	9	9	13	0	0	0
14	0	9	9	14	0	0	0
15	0	8	8	15	0	0	0
16	0	21	21	16	0	0	0
<u>Total</u>	8799	14022	22821	<u>Total</u>	5904	12074	17978

Table 4. (Continued)

1975 - First half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	945	0	945	1	363	0	363
2	5267	0	5267	2	2029	0	2029
3	4366	177	4543	3	1682	240	1922
4	746	1162	1908	4	287	2129	2416
5	108	2750	2858	5	42	1901	1943
6	49	1918	1967	6	20	1018	1038
7	0	1755	1755	7	0	637	637
8	4	367	371	8	2	220	222
9	0	296	296	9	0	67	67
10	0	409	409	10	0	26	26
11	0	103	103	11	0	6	6
12	0	73	73	12	0	23	23
13	0	24	24	13	0	0	0
14	0	4	4	14	0	2	2
15	0	4	4	15	0	0	0
16	0	11	11	16	0	1	1
<u>Total</u>	<u>11485</u>	<u>9053</u>	<u>20538</u>	<u>Total</u>	<u>4425</u>	<u>6270</u>	<u>10695</u>

1975 - Second half

<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>	<u>Age</u>	<u>Small Mesh</u>	<u>Others</u>	<u>Total</u>
1	593	0	593	1	150	0	150
2	3304	0	3304	2	837	0	837
3	2739	120	2859	3	694	244	938
4	468	787	1255	4	119	2172	2291
5	68	1862	1930	5	17	1940	1957
6	31	1299	1330	6	8	1039	1047
7	0	1188	1188	7	0	650	650
8	3	249	252	8	1	224	225
9	0	201	201	9	0	69	69
10	0	277	277	10	0	27	27
11	0	69	69	11	0	6	6
12	0	50	50	12	0	24	24
13	0	17	17	13	0	0	0
14	0	2	2	14	0	2	2
15	0	2	2	15	0	0	0
16	0	8	8	16	0	1	1
<u>Total</u>	<u>7206</u>	<u>6131</u>	<u>13337</u>	<u>Total</u>	<u>1826</u>	<u>6938</u>	<u>8224</u>

Table 4. (Continued)

1977 - First half

Age	Small Mesh	OTB, PTB, SNU		Total	LL, LHP		OTB, PTB, SNU		Total	LL, LHP	
		H1	FY		1	2	3	4		FY	Total
1	0	0	0	0	2	15	0	0	0	0	7
2	4	0	0	4	3	36	9	20	3	18	85
3	42	14	29	85	4	42	80	556	62	740	
4	23	83	117	223	5	6	123	1081	97	1307	
5	5	344	132	481	6	1	129	589	178	897	
6	1	375	75	451	7	0	84	190	56	330	
7	0	240	37	277	8	0	28	49	36	113	
8	0	116	11	127	9	0	37	8	14	59	
9	0	103	1	104	10	0	22	5	10	37	
10	0	26	1	27	11	0	8	4	4	16	
11	0	36	0	36	12	0	6	1	5	12	
12	0	38	0	38	13	0	6	2	5	13	
13	0	10	0	10	14	0	2	1	1	4	
14	0	3	0	3	15	0	1	0	0	1	
15	0	2	0	2	16	0	1	1	0	2	
16	0	6	0	6							
<u>Total</u>		<u>75</u>		<u>1396</u>		<u>403</u>		<u>1874</u>		<u>107</u>	
<u>Total</u>		<u>75</u>		<u>1396</u>		<u>403</u>		<u>1874</u>		<u>107</u>	

1978 - First half

Age	Small Mesh	OTB, PTB, SNU		Total	LL, LHP		OTB, PTB, SNU		Total	LL, LHP	
		Q1	Q2		1	2	3	4		FY	Total
1	0	0	0	0	2	15	0	0	0	0	7
2	0	0	0	0	3	0	0	0	3	18	85
3	36	9	20	55	62	740	20	62	740		
4	42	80	556	608	97	1307	556	97	1307		
5	6	123	1081	1187	97	1307	1081	97	1307		
6	1	129	589	609	178	897	589	178	897		
7	0	84	190	190	56	330	190	56	330		
8	0	28	49	49	36	113	49	36	113		
9	0	37	8	37	14	59	8	14	59		
10	0	22	5	22	10	37	5	10	37		
11	0	8	4	8	4	16	4	4	16		
12	0	6	1	6	2	12	1	2	12		
13	0	6	2	6	2	13	2	2	13		
14	0	2	1	2	1	4	1	1	4		
15	0	1	0	1	0	1	0	0	1		
16	0	1	1	1	1	1	0	0	1		
<u>Total</u>		<u>107</u>		<u>536</u>		<u>2507</u>		<u>491</u>		<u>3641</u>	
<u>Total</u>		<u>107</u>		<u>536</u>		<u>2507</u>		<u>491</u>		<u>3641</u>	

1977 - Second half

Age	Small Mesh	OTB, PTB, SNU		Total	LL, LHP		OTB, PTB, SNU		Total	LL, LHP	
		H2	FY		1	2	3	4		FY	Total
1	1	0	0	1	22	0	0	0	0	0	22
2	19	0	0	19	48	2	8	5	63		
3	180	65	89	334	116	146	605	43	910		
4	98	291	360	749	136	563	1918	137	2754		
5	21	386	406	813	21	712	1894	212	2839		
6	5	37	232	274	2	245	699	388	1334		
7	1	30	115	146	1	52	160	122	335		
8	0	13	35	48	0	10	14	78	102		
9	0	0	5	5	0	1	3	31	35		
10	0	0	3	3	0	2	4	22	28		
11	0	0	2	2	0	0	3	8	11		
12	0	0	2	2	0	0	0	11	11		
13	0	0	0	0	0	0	0	11	11		
14	0	0	0	0	0	1	0	3	4		
15	0	0	0	0	0	0	0	0	0		
16	0	0	0	0	0	0	0	0	0		
<u>Total</u>		<u>325</u>		<u>822</u>		<u>1249</u>		<u>2396</u>		<u>346</u>	
<u>Total</u>		<u>325</u>		<u>822</u>		<u>1249</u>		<u>2396</u>		<u>346</u>	

Table 4. (Continued)

1979 - First half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU		Total
		H1	H1	H1	FY	Total	Total	
1	3	0	0	0	0	3		
2	10	0	0	0	0	10		
3	23	461	33	15	532			
4	47	3216	170	66	3499			
5	39	4520	367	145	5071			
6	9	2011	343	42	2405			
7	1	433	152	11	597			
8	0	101	48	0	149			
9	0	11	18	0	29			
10	0	4	0	0	4			
11	0	1	0	0	1			
12	0	0	1	0	1			
13	0	0	1	0	1			
14	0	0	0	0	0			
15	0	0	0	0	0			
16	0	0	0	0	0			
<u>Total</u>		132	10758	1133	279	12302		

1980 - First half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU		Total
		Q1	Q2	FY	Total	Q1	Q2	
1	15	0	0	0	0	12	0	
2	2	0	0	0	0	0	0	
3	3	41	36	36	331	120	44	131
4	4	46	36	36	326	331	466	1159
5	5	46	46	46	1546	983	579	3154
6	6	22	22	22	1779	1417	397	3615
7	7	8	8	8	819	695	145	1667
8	8	0	0	0	282	422	33	737
9	9	0	0	0	88	93	9	190
10	10	0	0	0	20	26	3	49
11	11	0	0	0	14	14	2	30
12	12	0	0	0	6	17	0	23
13	13	0	0	0	2	0	0	2
14	14	0	0	0	0	0	0	0
15	15	0	0	0	0	1	0	1
16	16	0	0	0	1	6	0	7
<u>Total</u>					180	5008	4044	1768
								11000

1979 - Second half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU		Total
		Q3	Q4	H2	FY	Total		
1	9	0	0	0	0	9		
2	36	5	22	15	2	80		
3	83	37	705	264	89	1178		
4	167	219	1521	573	398	2878		
5	142	389	2087	703	868	4189		
6	31	199	1650	376	252	2508		
7	4	47	330	133	65	579		
8	0	2	169	44	2	217		
9	0	4	32	9	0	45		
10	0	0	16	2	0	18		
11	0	2	7	0	0	9		
12	0	2	1	0	0	3		
13	0	2	0	0	0	2		
14	0	0	0	0	0	0		
15	0	0	0	0	0	0		
16	0	0	0	0	0	0		
<u>Total</u>		472	908	6540	2119	1676	11715	

1980 - Second half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU		Total
		Q3	Q4	FY	Total	Q3	Q4	
1	16	0	0	0	0	16	0	
2	2	13	45	42	13	408	778	
3	3	42	42	42	42	969	2036	
4	4	37	37	37	37	1098	1803	
5	5	46	46	46	46	638	1307	
6	6	23	23	23	23	414	725	
7	7	9	9	9	9	87	236	
8	8	1	1	1	1	21	83	
9	9	1	1	1	1	8	29	
10	10	0	0	0	0	8	8	
11	11	0	0	0	0	0	0	
12	12	0	0	0	0	0	3	
13	13	0	0	0	0	1	1	
14	14	0	0	0	0	0	0	
15	15	0	0	0	0	0	0	
16	16	0	0	0	0	0	0	
<u>Total</u>					188	3665	7054	2068
								12975

Table 4. (Continued)

1981 - First half

Age	Small Mesh	OTB, PTB, SNU		LL, LHP		Total
		Q1	Q2	FY	Total	
1	2	0	0	0	2	
2	36	0	2	2	40	
3	171	75	462	162	870	
4	159	1688	1707	626	4180	
5	23	1311	1323	702	3359	
6	14	1090	823	535	2462	
7	4	613	553	342	1512	
8	1	124	368	203	696	
9	0	38	99	73	210	
10	0	11	19	24	54	
11	0	9	11	17	37	
12	0	1	3	9	13	
13	0	2	1	5	8	
14	0	0	1	0	1	
15	0	0	1	1	2	
16	0	0	2	0	2	
Total		410	4962	5375	2701	13448

1982 - First half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU Total
		Q1	Q2	H1	H2	
1	3	0	0	0	0	3
2	1	0	0	0	0	1
3	7	143	530	12	6	698
4	10	1203	2137	78	119	3547
5	6	3418	2816	237	602	7079
6	2	1317	1143	171	73	2706
7	1	1051	581	254	69	1956
8	0	349	193	303	30	875
9	0	104	102	202	25	433
10	0	31	41	84	0	156
11	0	14	12	67	0	93
12	0	5	7	25	0	37
13	0	3	9	18	0	30
14	0	2	1	6	0	9
15	0	1	2	10	0	13
16	0	0	0	3	0	3
Total		30	7641	7574	1470	924
						17639

1981 - Second half

Age	Small Mesh	OTB, PTB, SNU		LL, LHP		Total
		Q3	Q4	FY	Total	
1	1	0	0	0	1	
2	27	38	143	3	211	
3	131	682	1251	191	2255	
4	122	1219	2688	735	4764	
5	18	835	2093	823	3769	
6	11	293	1164	628	2096	
7	4	196	783	402	1385	
8	0	79	378	239	696	
9	0	24	69	86	179	
10	0	16	34	28	78	
11	0	2	9	19	30	
12	0	1	7	10	18	
13	0	8	1	5	14	
14	0	0	1	0	1	
15	0	1	0	2	3	
16	0	0	0	0	0	
Total		314	3394	8621	3171	15500

1982 - Second half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU Total
		Q3	Q4	H2	H2	
1	0	0	0	0	0	0
2	2	2	79	20	31	134
3	5	600	689	76	357	1727
4	6	1165	1753	350	715	3989
5	4	664	1358	606	271	2903
6	1	113	478	296	38	926
7	0	45	206	321	6	578
8	0	13	154	254	0	421
9	0	2	50	184	0	236
10	0	2	34	119	1	156
11	0	0	14	44	0	58
12	0	0	7	20	0	27
13	0	0	2	21	0	23
14	0	0	0	45	0	45
15	0	0	0	6	0	6
16	0	0	0	16	0	16
Total		18	2606	4824	2378	1419
						11245

Table 4. (Continued)

1983 - First half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU	
		Q1	Q2	H1	H1	Total	Total
1	0	0	0	0	0	0	0
2	2	0	0	0	0	2	2
3	41	232	1594	2	10	1879	1879
4	78	1283	3320	58	218	4957	4957
5	48	1269	2605	1641	191	4277	4277
6	15	1436	1983	519	215	4168	4168
7	2	430	395	214	45	1086	1086
8	1	302	83	233	28	647	647
9	0	151	48	157	2	358	358
10	0	21	8	53	0	82	82
11	0	12	8	33	0	53	53
12	0	4	7	11	0	22	22
13	0	2	2	6	0	10	10
14	0	1	0	10	0	11	11
15	0	1	0	3	0	4	4
16	0	0	1	1	0	2	2
<u>Total</u>		187	5144	10054	1464	709	17558

1984 - First half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU	
		Q1	Q2	H1	H1	Total	Total
1	0	0	0	0	0	0	0
2	2	0	0	0	0	0	0
3	41	433	1917	2	67	0	70
4	78	920	2552	5	49	96	2495
5	48	1198	1695	6	177	288	3926
6	15	892	1159	7	182	215	3285
7	2	313	257	8	97	233	2466
8	1	153	93	9	64	22	689
9	0	47	27	10	35	0	109
10	0	6	8	11	25	1	40
11	0	3	4	12	10	0	17
12	0	1	4	13	8	0	13
13	0	2	1	14	3	0	6
14	0	0	0	15	1	0	1
15	0	0	0	16	0	0	6
16	0	0	0				
<u>Total</u>		3970	7784	823	858	13435	18

1983 - Second half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU	
		Q3	Q4	H2	H2	Total	Total
1	0	0	0	0	0	0	0
2	0	0	0	0	4	4	4
3	2	189	843	17	498	1549	1549
4	3	1013	1777	206	535	3534	3534
5	2	1034	1300	442	267	3045	3045
6	1	571	950	439	29	1990	1990
7	0	212	352	212	2	778	778
8	0	94	75	177	0	346	346
9	0	52	95	104	2	253	253
10	0	15	51	70	0	136	136
11	0	7	27	57	0	91	91
12	0	1	5	23	0	29	29
13	0	0	0	13	0	13	13
14	0	0	0	4	0	4	4
15	0	0	0	2	0	2	2
16	0	0	0	9	0	9	9
<u>Total</u>		8	3188	5475	1775	1337	11783

1984 - Second half

Age	Small Mesh	OTB, PTB		LL, LHP		SNU	
		Q3	Q4	H2	H2	Total	Total
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	1
3	2	38	285	4	28	355	355
4	3	678	2098	91	345	3212	3212
5	2	1402	3081	237	343	5063	5063
6	1	582	1212	294	234	2322	2322
7	0	174	683	358	100	1315	1315
8	0	88	252	181	24	545	545
9	0	31	84	106	4	225	225
10	0	19	75	84	0	178	178
11	0	7	47	57	0	111	111
12	0	4	11	30	0	45	45
13	0	1	0	20	0	21	21
14	0	1	0	10	0	11	11
15	0	0	0	1	0	1	1
16	0	0	0	5	0	5	5
<u>Total</u>		3025	7828	1478	1079	3410	18

Table 4. (Continued)

1985 - First half

Age	OTB, PTB, SNU		LL, LHP		Total	Age	OTB, PTB, SNU		LL, LHP		Total
	Q1	Q2	H1	H2			Q1	Q2	H1	H2	
1	0	0	0	0	0	1	0	0	0	0	0
2	0	0	0	0	0	2	0	0	0	0	0
3	62	4	0	0	66	3	0	68	3	71	
4	357	585	1	943		4	687	880	33	1600	
5	1327	2449	119	3895		5	1504	1506	109	3119	
6	1569	2701	111	4381		6	2548	2319	295	5162	
7	1152	1603	174	2929		7	934	1027	218	2179	
8	706	779	164	1649		8	418	382	134	934	
9	404	248	123	775		9	247	230	210	687	
10	143	62	66	271		10	113	48	103	264	
11	67	37	74	178		11	42	73	55	170	
12	51	29	40	120		12	18	2	28	48	
13	3	3	19	25		13	3	6	27	36	
14	2	1	9	12		14	3	0	4	7	
15	1	0	5	6		15	0	1	11	12	
16	1	2	10	13		16	1	0	11	12	
Total	5845	8503	915	15263		Total	6518	6542	1241	14301	

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1985 - Second half

Age	OTB, PTB, SNU		LL, LHP		Total	Age	OTB, PTB, SNU		LL, LHP		Total
	Q3	Q4	H2	H2			Q3	Q4	H2	H2	
1	0	0	0	0	0	1	0	0	0	0	0
2	0	1	3	4		2	3	0	0	3	
3	12	57	14	83		3	47	1	48		
4	393	708	110	1211		4	2346	71	2417		
5	1602	1932	382	3916		5	3943	227	4170		
6	884	1439	531	2854		6	3161	477	3638		
7	386	441	378	1205		7	871	376	1247		
8	107	238	351	696		8	319	246	565		
9	28	108	117	253		9	89	296	385		
10	10	58	96	164		10	30	133	163		
11	5	24	66	95		11	2	100	102		
12	1	5	41	47		12	2	50	52		
13	0	0	40	40		13	1	26	27		
14	0	0	8	8		14	0	4	4		
15	0	0	10	10		15	0	6	6		
16	0	0	2	2		16	0	5	5		
Total	3428	5011	2149	10588		Total	10814	2018	12832		

Table 4. (Continued)

1987 - First half

Age	OTB, PTB, SNU		LL, LHP FY	Total
	Q1	Q2		
1	0	0	0	0
2	0	0	0	0
3	31	3	0	34
4	281	124	2	407
5	1887	879	69	2835
6	1660	759	130	2549
7	2187	929	230	3346
8	859	468	172	1499
9	307	136	130	573
10	157	57	102	316
11	32	8	61	101
12	27	1	25	53
13	11	2	17	30
14	3	0	1	4
15	0	4	4	8
16	1	2	3	6
Total	7443	3372	946	11761

1988 - First half

Age	OTB, PTB, SNU		LL, LHP FY	GN Total
	Q1	Q2		
1	0	0	0	0
2	0	0	0	0
3	3	19	0	22
4	76	146	12	01
5	494	298	41	234
6	1140	597	129	8
7	1282	1027	170	15
8	1215	488	179	8
9	698	345	111	1
10	237	60	85	0
11	85	52	54	0
12	9	36	40	0
13	25	8	14	0
14	0	0	7	0
15	0	3	5	0
16	0	0	6	0
Total	5264	3079	853	47
				9243

1987 - Second half

Age	OTB, PTB, SNU		LL, LHP FY	Total
	Q3	Q4		
1	0	0	0	0
2	0	0	0	0
3	2	2	0	4
4	250	201	3	454
5	1684	961	114	2759
6	1729	1280	218	3227
7	1353	865	384	2602
8	461	439	288	1188
9	181	115	217	513
10	22	87	169	278
11	3	22	103	128
12	29	5	41	75
13	0	1	29	30
14	0	5	2	7
15	0	0	6	6
16	0	0	6	6
Total	5714	3983	1580	11277

1988 - Second half

Age	OTB, PTB, SNU		LL, LHP FY	GN Total
	Q3	Q4		
1	0	0	0	0
2	5	3	0	8
3	102	61	0	163
4	382	865	23	1277
5	404	1026	110	3
6	804	1403	344	50
7	494	826	198	30
8	197	706	378	56
9	32	304	189	28
10	31	87	107	4
11	3	9	47	2
12	0	40	19	69
13	0	2	14	1
14	0	0	2	0
15	0	0	2	0
16	0	0	4	0
Total	2454	5332	1437	219
				9616

Table 4. (Continued)

1989 - First half

<u>Age</u>	<u>OTB, PTB, SNU</u>		<u>LL, LHP</u>		<u>Total</u>
	<u>Q1</u>	<u>Q2</u>	<u>H1</u>		
1	0	0	0		0
2	0	7	0		7
3	1	115	3		119
4	90	369	24		483
5	343	986	96		1425
6	711	596	173		1480
7	1308	774	298		2380
8	564	285	135		984
9	769	321	186		1276
10	204	80	84		368
11	76	22	39		137
12	67	12	24		103
13	2	4	10		126
14	2	0	4		6
15	27	0	4		31
16	0	1	1		2
<u>Total</u>	4164	3572	1081		8817

1989 - Second half

<u>Age</u>	<u>OTB, PTB, SNU</u>		<u>LL, LHP</u>		<u>Total</u>
	<u>Q3</u>	<u>Q4</u>	<u>H2</u>		
1	0	0	0		0
2	0	0	0		0
3	152	380	6		538
4	667	1276	63		2006
5	747	1603	257		2607
6	311	1232	251		1794
7	182	721	331		1234
8	42	551	189		782
9	40	433	238		711
10	10	114	89		213
11	0	47	63		110
12	0	14	37		51
13	0	0	13		13
14	0	1	8		9
15	0	0	26		26
16	0	7	25		32
<u>Total</u>	2151	6379	1596		10126

Table 5. Adjustments made to compensate for unkeyed catch.

<u>Year</u>	<u>Half</u>	<u>Keyed Catch</u>	<u>Total Catch</u>	<u>Adjustment</u>
1971	1	38257	38257	1.00
	2	14306	14306	1.00
1972	1	44446	44446	1.00
	2	17199	17199	1.00
1973	1	29535	29535	1.00
	2	24558	24558	1.00
1974	1	25807	25807	1.00
	2	17934	17934	1.00
1975	1	19445	19445	1.00
	2	13072	13072	1.00
1976	1	12423	12423	1.00
	2	11984	11984	1.00
1977	1	4471	4792	1.07
	2	4235	5598	1.32
1978	1	7666	8636	1.13
	2	14231	16769	1.18
1979	1	18399	18861	1.03
	2	20501	21169	1.03
1980	1	23020	23356	1.02
	2	25112	25896	1.03
1981	1	23243	23560	1.01
	2	29339	30158	1.03
1982	1	33586	33912	1.01
	2	21329	21842	1.02
1983	1	28689	28979	1.01
	2	22527	23401	1.04
1984	1	26081	26416	1.01
	2	25832	26130	1.01
1985	1	32215	33044	1.03
	2	23005	24411	1.06
1986	1	25354	26551	1.05
	2	23814	24978	1.05
1987	1	21263	21483	1.01
	2	23415	24020	1.03
1988	1	18097	18209	1.01
	2	19978	20000	1.00
1989	1	17310	17697	1.02
	2	18501	18965	1.03

TABLE 6. 4VsW COD COMMERCIAL REMOVALS AT AGE ('000) CALCULATED IN HALF YEAR INTERVALS.

20/2/91

	71.0	71.5	72.0	72.5	73.0	73.5	74.0	74.5	75.0	75.5	76.0	76.5	77.0	77.5	78.0	78.5	79.0	79.5	80.0
1+	1472	512	710	1336	623	595	787	486	945	593	363	150	0	1	8	26	3	9	15
2+	9514	3310	6651	9214	5231	4990	4518	2803	5267	3304	2029	837	4	19	20	74	10	83	15
3+	7133	2510	5458	6343	4196	3805	8011	5313	4543	2859	1922	938	91	441	96	1072	545	1217	341
4+	3746	1379	8390	3599	3144	2659	6906	4789	1908	1255	2416	2291	239	990	834	3244	3586	2973	1176
5+	4811	1801	5343	2041	5264	4370	4033	2821	2858	1930	1943	1957	516	1075	1473	3344	5198	4327	3201
6+	3725	1403	4906	1621	1822	1502	1323	924	1967	1330	1038	1047	483	362	1011	1571	2465	2591	3669
7+	2484	935	2486	822	1846	1524	393	276	1755	1188	637	650	297	193	372	395	612	598	1692
8+	1426	537	1413	467	2593	2139	592	416	371	252	222	225	136	63	127	120	153	224	748
9+	511	193	261	86	923	761	115	81	296	201	67	69	111	7	66	41	30	46	193
10+	267	100	350	116	213	176	90	63	409	277	26	27	29	4	42	33	4	19	50
11+	116	43	51	17	302	249	8	5	103	69	6	6	39	3	18	13	1	9	30
12+	126	47	6	2	4	4	1	1	73	50	23	24	41	3	14	13	1	3	23
13+	113	43	27	9	12	9	0	0	24	17	0	0	11	0	15	13	1	2	2
14+	58	22	0	0	12	9	0	0	4	2	2	2	3	0	5	5	0	0	0
15+	29	11	2	1	10	8	0	0	4	2	0	0	2	0	1	0	0	0	1
16+	38	14	5	2	26	21	0	0	11	8	1	1	6	0	2	0	0	0	7
1+1	35569	12860	36059	25676	26221	22821	26777	17978	20538	13337	10695	8224	2008	3161	4104	9964	12609	12101	11163
2+1	34097	12348	35349	24340	25598	22226	25990	17492	19593	12744	10332	8074	2008	3160	4096	9938	12606	12092	11148
3+1	24583	9038	28698	15126	20367	17236	21472	14689	14326	9440	8303	7237	2004	3141	4076	9864	12596	12009	11133
4+1	17450	6528	23240	8783	16171	13431	13461	9376	9783	6581	6381	6299	1913	2700	3980	8792	12051	10792	10792
5+1	13704	5149	14850	5184	13027	10772	6555	4587	7875	5326	3965	4008	1674	1710	3146	5548	8465	7819	9616
	80.5	81.0	81.5	82.0	82.5	83.0	83.5	84.0	84.5	85.0	85.5	86.0	86.5	87.0	87.5	88.0	88.5	89.0	89.5
1+	16	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2+	77	41	217	1	137	2	4	0	1	0	4	0	3	0	0	0	8	7	0
3+	1424	882	2318	705	1768	1898	1609	71	359	68	88	74	50	34	4	22	163	120	551
4+	3697	4239	4897	3582	4085	5007	3672	2527	3251	968	1285	1675	2535	411	466	234	1278	488	2056
5+	3736	3406	3875	7150	2973	4320	3164	3977	5124	3996	4155	3266	4374	2863	2831	834	1565	1439	2672
6+	2508	2496	2155	2733	948	4210	2068	3328	2350	4495	3028	5405	3816	2574	3311	1880	2651	1495	1839
7+	1358	1533	1424	1976	592	1097	808	2498	1331	3005	1279	2281	1308	3379	2670	2487	1588	2404	1265
8+	373	706	715	884	431	653	359	698	552	1692	738	978	593	1514	1219	1897	1398	994	802
9+	120	213	184	437	242	362	263	316	228	795	268	719	404	579	526	1162	569	1289	729
10+	42	55	80	158	160	83	141	110	180	278	174	276	171	319	285	383	243	372	218
11+	20	38	31	94	59	54	95	41	112	183	101	178	107	102	131	191	69	138	113
12+	3	13	19	37	28	22	30	17	46	123	50	50	55	54	77	85	68	104	52
13+	2	8	14	30	24	10	14	13	21	26	42	38	28	30	31	47	17	16	13
14+	0	1	1	9	46	11	4	6	11	12	8	7	4	4	7	7	2	6	9
15+	0	2	3	13	6	4	2	7	1	6	11	13	6	8	6	8	2	31	27
16+	0	2	0	3	16	2	9	0	5	13	2	13	5	6	6	6	5	2	33
1+1	13376	13637	15934	17815	11515	17735	12242	13609	13572	15660	11233	14973	13459	11877	11570	9243	9626	8905	10379
2+1	13360	13635	15933	17812	11515	17735	12242	13609	13572	15660	11233	14973	13459	11877	11570	9243	9626	8905	10379
3+1	13283	13594	15716	17811	11378	17733	12238	13609	13571	15660	11229	14973	13456	11877	11570	9243	9618	8998	10379
4+1	11859	12712	13398	17106	9610	15835	10629	13538	13212	15592	11141	14899	13406	11843	11566	9221	9455	8778	9829
5+1	8162	8473	8501	13524	5525	10828	6957	11011	9961	14624	9856	13224	10871	11432	11100	8987	8177	8290	7772

TABLE 7. 4VSN COD RECALCULATED ANNUAL COMMERCIAL REMOVALS AT AGE ('000). 20/2/91

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	1984	2046	1218	1273	1538	513	1	34	12	31	3
2	12824	15865	10221	7321	8571	2866	23	94	93	92	258
3	9643	11801	8001	13324	7402	2860	532	1168	1762	1765	3200
4	5125	11989	5803	11695	3163	4707	1229	4078	6559	4873	9136
5	6612	7384	9634	6854	4788	3900	1591	4817	9525	6937	7281
6	5128	6527	3324	2247	3297	2085	845	2582	5056	6177	4651
7	3419	3308	3370	669	2943	1287	490	767	1210	3050	2957
8	1963	1880	4732	1008	623	447	199	247	377	1121	1421
9	704	347	1684	196	497	136	118	107	76	313	397
10	367	466	389	153	686	53	33	75	23	92	135
11	159	68	551	13	172	12	42	31	10	50	69
12	173	8	8	2	123	47	44	27	4	26	32
13	156	36	21	0	41	0	11	28	3	4	22
14	80	0	21	0	6	4	3	10	0	0	2
15	40	3	18	0	6	0	2	1	0	1	5
16	52	7	47	0	19	2	6	2	0	7	2
1+1	48429	61735	49042	44755	33875	18919	5169	14068	24710	24539	29571
2+1	46445	59689	47824	43482	32337	18406	5168	14034	24698	24508	29568
3+1	33621	43824	37603	36161	23766	15540	5145	13940	24605	24416	29310
4+1	23978	32023	29602	22837	16364	12680	4613	12772	22843	22651	26110
5+1	18853	20034	23799	11142	13201	7973	3384	8694	16284	17778	16974
	1982	1983	1984	1985	1986	1987	1988	1989			
1	3	0	0	0	0	0	0	0			
2	138	6	1	4	3	0	8	7			
3	2473	3507	430	156	124	38	185	671			
4	7667	8679	5778	2253	4210	877	1512	2544			
5	10123	7484	9101	8151	7640	5694	2399	4111			
6	3681	6278	5678	7523	9221	5885	4531	3334			
7	2568	1905	3829	4284	3589	6049	4075	3669			
8	1315	1012	1250	2430	1571	2733	3295	1796			
9	679	625	544	1063	1123	1105	1731	2018			
10	318	224	290	452	447	604	626	590			
11	153	149	153	284	285	233	260	251			
12	65	52	63	173	105	131	153	156			
13	54	24	34	68	66	61	64	29			
14	55	15	17	20	11	11	9	15			
15	19	6	8	17	19	14	10	58			
16	19	11	5	15	18	12	11	35			
1+1	29330	29977	27181	26893	28432	23447	18869	19284			
2+1	29327	29977	27181	26893	28432	23447	18869	19284			
3+1	29189	29971	27180	26889	28429	23447	18861	19277			
4+1	26716	26464	26750	26733	28305	23409	18676	18606			
5+1	19049	17785	20972	24480	24095	22532	17164	16062			

TABLE 8. 4VsW COD COMMERCIAL REMOVALS AT AGE PREVIOUSLY PRESENTED ('000). 20/ 2/91

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	2311	2383	1418	1482	1792	728	2	177	12	31	3
2	15218	17738	12142	8451	9979	4061	24	153	81	152	348
3	12582	14227	14881	12885	9485	3587	386	1004	1629	2034	3742
4	9146	13361	7507	9947	4341	3713	1073	3650	6164	5119	9724
5	8809	9661	9755	7130	4549	4818	1559	4621	9145	7112	7276
6	10262	8780	3823	2766	2594	2412	871	2441	4871	6147	4852
7	5160	3432	2996	944	2627	1426	501	768	1162	2929	2991
8	1849	1919	3724	1323	612	611	220	213	371	1066	1455
9	496	358	1166	413	497	184	128	112	76	319	393
10	114	393	273	369	660	49	35	80	23	88	126
11	131	79	299	15	153	22	44	26	10	47	62
12	72	2	3	5	126	107	55	28	5	26	32
13	98	37	7	0	36	1	11	26	4	4	21
14	12	0	5	0	9	4	3	9	1	1	2
15	51	1	5	0	9	1	2	4	0	4	6
1+1	66311	72371	58004	45730	37469	21724	4914	13312	23554	25079	31033
2+1	64000	69988	56586	44248	35677	20996	4912	13135	23542	25048	31030
3+1	48782	52250	44444	35797	25698	16935	4888	12982	23461	24896	30682
4+1	36200	38023	29563	22912	16213	13348	4502	11978	21832	22862	26940
5+1	27054	24662	22056	12965	11872	9635	3429	8328	15668	17743	17216
	1982	1983	1984	1985	1986	1987	1988	1989			
1	5	0	0	0	0	0	0	0			
2	149	0	1	4	2	0	8	7			
3	2500	3048	409	154	121	36	186	673			
4	7664	8251	5604	2323	4121	832	1516	2548			
5	9953	7368	8889	8353	7506	5388	2405	4128			
6	3449	5967	5566	7782	9026	5584	4544	3352			
7	2408	1938	3761	3922	3527	5718	4087	3700			
8	1273	999	1227	2224	1518	2585	3306	1808			
9	674	576	537	978	1105	1055	1736	2034			
10	304	229	287	427	437	581	628	595			
11	156	140	152	274	282	228	261	253			
12	67	50	64	168	106	129	154	158			
13	57	22	34	65	65	60	64	30			
14	51	16	17	19	11	10	9	15			
15	19	6	2	16	19	15	10	58			
1+1	28729	28610	26550	26709	27846	22221	18914	19359			
2+1	28724	28610	26550	26709	27846	22221	18914	19359			
3+1	28575	28610	26549	26705	27844	22221	18906	19352			
4+1	26075	25562	26140	26551	27723	22185	18720	18679			
5+1	18411	17311	20536	24228	23602	21353	17204	16131			

TABLE 9. CORRECTION RATIOS FOR 4VSW COD CATCH AT AGE (NEW/OLD). 20/ 2/91

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	.859	.859	.859	.859	.858	.705	.500	.192	1.000	1.000
2	.843	.894	.842	.866	.859	.706	.958	.614	1.148	.605
3	.766	.829	.538	1.034	.780	.797	1.378	1.163	1.082	.868
4	.560	.897	.773	1.176	.729	1.268	1.145	1.117	1.064	.952
5	.751	.764	.988	.961	1.053	.809	1.021	1.042	1.042	.975
6	.500	.743	.869	.812	1.271	.864	.970	1.058	1.038	1.005
7	.663	.964	1.125	.709	1.120	.903	.978	.999	1.041	1.041
8	1.062	.980	1.271	.762	1.018	.732	.905	1.160	1.016	1.052
9	1.419	.969	1.444	.475	1.000	.739	.922	.955	1.000	.981
10	3.219	1.186	1.425	.415	1.039	1.082	.943	.938	1.000	1.045
11	1.214	.861	1.843	.867	1.124	.545	.955	1.192	1.000	1.064
12	2.403	4.000	2.667	.400	.976	.439	.800	.964	.800	1.000
13	1.592	.973	3.000		1.139	.000	1.000	1.077	.750	1.000
14	6.667		4.200		.667	1.000	1.000	1.111	.000	.000
15	.784	3.000	3.600		.667	.000	1.000	.250		.250
	1981	1982	1983	1984	1985	1986	1987	1988	1989	
1	1.000	.600								
2	.741	.926		1.000	1.000	1.500		1.000	1.000	
3	.855	.989	1.151	1.051	1.013	1.025	1.056	.995	.997	
4	.940	1.000	1.052	1.031	.970	1.022	1.054	.997	.998	
5	1.001	1.017	1.016	1.024	.976	1.018	1.057	.998	.996	
6	.959	1.067	1.052	1.020	.967	1.022	1.054	.997	.995	
7	.989	1.066	.983	1.018	1.092	1.018	1.058	.997	.992	
8	.977	1.033	1.013	1.019	1.093	1.035	1.057	.997	.993	
9	1.010	1.007	1.085	1.013	1.087	1.016	1.047	.997	.992	
10	1.071	1.046	.978	1.010	1.059	1.023	1.040	.997	.992	
11	1.113	.981	1.064	1.007	1.036	1.011	1.022	.996	.992	
12	1.000	.970	1.040	.984	1.030	.991	1.016	.994	.987	
13	1.048	.947	1.091	1.000	1.046	1.015	1.017	1.000	.967	
14	1.000	1.078	.938	1.000	1.053	1.000	1.100	1.000	1.000	
15	.923	1.000	1.000	4.000	1.063	1.000	.933	1.000	1.000	

Figure 1. Predicted weights of 60 cm 4VsW cod from July surveys and previously presented age/length keys.

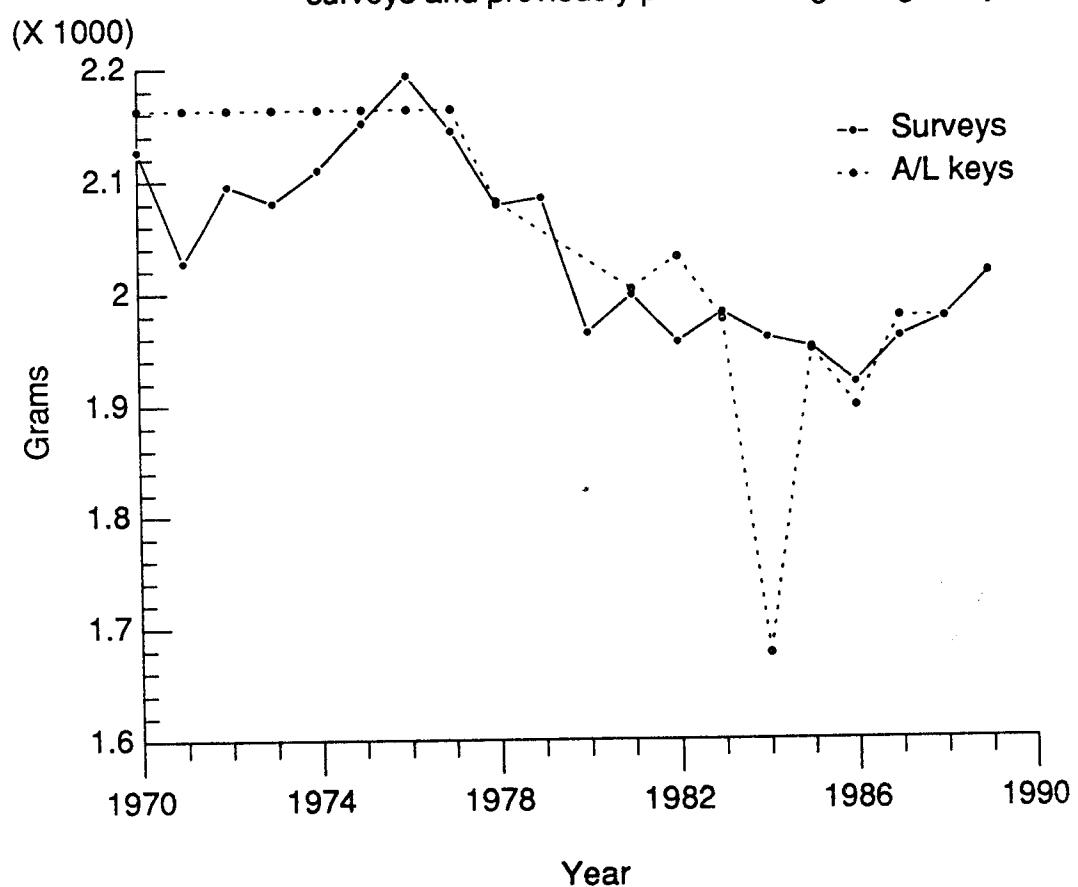


Figure 2. Comparison of cod catches in Sub-division 4Vs and Division 4W.

