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1980 Analyses of Inshore Cod Stock  
in Subdivision 4Vn (May-Dec.)

by

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INTRODUCTION

Assigning the catch of cod in Subdivision 4Vn has been traditionally difficult, but Halliday (1974) defined the catch from inshore stocks to be all the Canadian catch in the May-December period other than by otter trawls. Cod caught by otter trawls in this period were assumed to be from the 4VsW cod stock. A catch quota was first introduced for this stock in 1974 by ICNAF and since then, annual quotas have been set. The low point in total 4Vn cod catches was in 1975 when 4000 t were caught with a TAC of 10,000 t. However, the low point in the inshore cod catches was 1976 when 1600 t were landed, comprising about 30% of the total Canadian catch. Inshore catches have been increasing since 1977, and the catch per unit effort has approximately tripled since 1975.

### NOMINAL CATCH

The Canadian share of the total catch of 4Vn (M-D) cod has usually been above 80% since 1965, and above 95% since 1977 (Table 1). The inshore catch comes mainly from long- and hand-lines (Table 2, Figure 1). Virtually all of the catch of the inshore gears is attributable to vessels less than 50 gross registered tons (Table 3). Table 4 illustrates the gear breakdown for the Canadian nominal catch only. In 1978 and 1979, the catch of long-lines increased considerably over that of 1976 and 1977. The catch of otter trawlers decreased during this same interval. The decreasing catch by otter trawlers is due to the Ground-fish Management Plan, which in 1979 restricted otter trawlers to a bycatch-only policy for cod. Table 5 indicates the monthly breakdown of the catch for the last three years. The catch of long- and hand-lines and Danish seines was dispersed throughout the May through December period. In 1977 and 1978, otter trawl catches tended to be concentrated in May and December, but in 1979, they were dispersed throughout the period.

### CATCH PER UNIT EFFORT

Available catch per unit effort for long-lines and otter trawls is indicated in Table 6. In 1979 there was a drop in catch per unit effort for otter trawls, but the long-line catch per unit effort was similar to that of 1978. Figure 2 indicates the catch per unit effort of the long-lines, while those of otter trawlers are indicated in Figure 3. The catch per unit effort series from tonnage class 2 and 3 long-liners agree with each other, whereas those of tonnage class 3, 4 and 5 otter trawlers show little correspondence. Catch per unit effort data for the long-liners suggest that the stock has been increasing in abundance since 1975.

Estimates of numbers at age from the groundfish survey cruises are indicated in Table 7, and three-year running averages (except for 1979) of 4+, 5+, 6+ and 7+ abundance are indicated in Figure 4. There were large annual differences in numbers at age and these were smoothed by a three-year running average. The trends in population abundance indicated by the survey cruises (Figure 4) and those of long-line catch per unit efforts (Figure 2) are similar. Both indicate that the stock has been increasing in abundance since 1975.

### CATCH COMPOSITION AND SAMPLING FREQUENCY

The breakdown of the catch by gear since 1967 is illustrated in Figure 5. Long-lines were generally the dominant gear, but in 1975 accounted for about only 35% of the inshore catch. Table 8 indicates the frequency of sampling of the commercial landings. As the selectivity of the various gears are different, it was felt that there were not sufficient samples from the commercial landings to construct a reasonable removals-at-age table. Because this information is not available, no cohort analysis was conducted.

Samples from the long-line landings were examined and the annual mean weights-at-age are indicated in Table 9, while the removals-at-age are indicated in Table 10.

### RELATION WITH 4VsW COD

Halliday (MS 1974) suggested that cod from Subdiv. 4Vs migrate into Subdiv. 4Vn during the summer. Changes in catch rates in Subdiv. 4Vn and 4Vs were examined in this regard. Catch per unit efforts of Spanish TC 4 pair trawls in February-March were highly correlated with Canadian TC 2 long-lines in August-October between 1967 and 1976 ( $r = 0.95$ ,  $n = 9$ ,  $P < 0.001$ ). Spanish CPUEs were also related to Canadian TC 4 otter trawl CPUEs in August and September between 1967 and 1976 ( $r = 0.82$ ,  $n = 8$ ,  $P < 0.05$ ). Thus, improved catch rates in the cod fishery in Subdiv. 4Vn (May-December) may be a reflection of the improved status of the 4VsW cod stock.

### SUMMARY

Data from the groundfish survey cruises and from long-line catch per unit efforts indicate that the stock has been increasing in abundance since 1975. Long-lines are the main gear used in conducting the inshore fishery. Landings from this fishery have been almost entirely Canadian in the late 1970s.

### LITERATURE CITED

Halliday, R. G. MS 1974. The cod stocks of the southern Gulf of St. Lawrence and Sydney Bight (ICNAF Div. 4T-4Vn). ICNAF Res. Doc. 74/24.

Table 1: Nominal Cod Catch (t) by countries in Div. 4VN (May - Dec)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Canada	9136	9075	7292	6342	8373	8707	8469	6729	5245	4836	3363	5746	7786	5410	6304
Spain	304	45	320	666	611	1141	2161	1171	241	852	89	-	-	-	-
Portugal	465	-	-	-	-	-	-	459	189	84	360	-	-	-	-
France	1679	210	-	44	85	34	1	745	-	-	-	211	135	53	80
Norway	-	-	-	-	-	-	-	-	-	142	186	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	-	636	-	-	-
U.K.	-	-	-	-	-	-	-	-	-	-	61	-	-	-	-
F.R.G.	-	-	-	-	-	-	-	-	-	73	14	-	-	-	-
U.S.A.	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	71	7	-	-	-	-	-	-	-	-	-
Others	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
USSR	415	543	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	11999	9873	7627	7052	9140	9894	10631	9104	5748	5989	3998	6593	7921	5463	6384
% Canadian	76	92	96	90	92	88	80	74	91	81	84	87	98	99	99
TAC	-	-	-	-	-	-	-	-	-	10,000	10,000	10,000	3500	3500	3400

Table 2. Nominal catch (mt) of cod in Subdiv. 4Vn (May - December) by gear type for all countries, 1971-79.

YEAR	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
1971	5304(50)	106(1)	41(0)	4421(42)	759(7)	10631
1972	4485(39)	121(1)	248(2)	3471(30)	3288(28)	11613
1973	2099(31)	143(2)	649(10)	2386(35)	1498(22)	6775
1974	2842(38)	139(2)	751(10)	2042(27)	1706(23)	7480
1975	1851(35)	100(2)	604(11)	1235(24)	1448(28)	5238
1976	4375(66)	83(1)	314(5)	930(14)	891(14)	6593
1977	4613(58)	554(7)	199(3)	2400(30)	155(2)	7921
1978	1600(29)	327(6)	7(0)	3501(64)	28(1)	5463
1979	604(10)	279(4)	5(0)	5122(80)	374(6)	6384

Table 3. Nominal catch (mt) by all countries of cod in Subdiv. 4Vn (May - December) by vessel size by gear.  
 Percentage of gear total catch for each size class is in parentheses.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1971</u>						
0- 49.9		20(19)	41(100)	4256(96)	759	5076
50- 149.9	613(11)	86(81)		165(4)		864
150- 499.9	1543(29)					1543
500- 999.9	1154(22)					1154
1000-1999.9	1994(38)					1994
TOTAL	5304	106	41	4421	759	10631
<u>1972</u>						
0- 49.9		1(1)	165(67)	3394(98)	2829(86)	6389
50- 149.9	138(3)	120(99)	83(33)	77(2)		418
150- 499.9	1548(35)					1548
500- 999.9	1521(34)				459(14)	1980
1000-1999.9	1214(27)					1214
>2000	64(1)					64
TOTAL	4485	121	248	3471	3288	11613

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Table 3 (continued) page 2 of 4.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1973</u>						
0- 49.9	2(0)	10(7)	336(52)	2345(98)	1309(87)	4002
50- 149.9	83(4)	133(93)	313(48)	41(2)		570
150- 499.9	1389(66)					1389
500- 999.9	552(26)				68(5)	620
1000-1999.9					121(8)	121
>2000	73(4)					73
TOTAL	2099	143	649	2386	1498	6775
<u>1974</u>						
0- 49.9	41(1)	24(17)	469(62)	1795(88)	1622(95)	3951
50- 149.9	121(4)	115(83)	282(38)	183(9)		701
150- 499.9	1435(51)			64(3)		1499
500- 999.9	1170(41)				84(5)	1254
1000-1999.9	61(2)					61
>2000	14(1)					14
TOTAL	2842	139	751	2042	1706	7480

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Table 3 (continued) page 3 of 4.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1975</u>						
0- 49.9	20(1)	29(29)	463(77)	1026(83)	1448(100)	2986
50- 149.9	104(6)	71(71)	141(23)	23(2)		339
150- 499.9	598(32)			186(15)		784
500- 999.9	769(42)					769
1000-1999.9	168(9)					168
>2000	192(10)					192
TOTAL	1851	100	604	1235	1448	5238
<u>1976</u>						
0- 49.9	41(1)	33(40)	314(100)	930(100)	891(100)	2209
50- 149.9	87(2)	50(60)				137
150- 499.9	2323(53)					2323
500- 999.9	1924(44)					1924
TOTAL	4375	83	314	930	891	6593
<u>1977</u>						
0- 49.9	73(2)	259(47)	154(77)	2318(97)	155(100)	2959
50- 149.9	291(6)	295(53)	45(23)	82(3)		713
150- 499.9	1539(33)					1539
500- 999.9	2710(59)					2710
TOTAL	4613	554	199	2400	155	7921

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Table 3 (continued) page 4 of 4.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1978</u>						
0- 49.9	110(7)	112(34)	7(100)	3420(98)	28(100)	3677
50- 149.9	104(6)	215(66)		81(2)		400
150- 499.9	778(49)					778
500- 999.9	608(38)					608
TOTAL	1600	327	7	3501	28	5463
<u>1979<sup>a</sup></u>						
0- 49.9	101(22)	177(63)	5(100)	4797(99)	372(100)	
50- 149.9	38(8)	102(37)				
150- 499.9	254(55)			55(1)		
500- 999.9	70(15)					
TOTAL	463	279	5	4852		5599

<sup>a</sup> Maritime data only.

Table 4. 4Vn (May-Dec) Cod: Canadian Nominal Catch by Gear

Gear	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Longlines	1730	1313	2190	2733	2393	3798	3895	2124	2455	3300	3229	3725	3185	1982	1332	689	620	1805	3035	4482
Handlines	617	912	960	945	-	-	-	1398	960	848	495	696	286	404	568	360	310	595	466	640
Seines	78	229	108	88	910	154	134	207	184	107	83	106	121	143	269	100	83	554	327	279
Fixed nets & traps	385	41	29	388	-	1229	2030	44	163	6	99	2	4	-	-	-	-	-	9	2
Gill nets	-	199	373	110	-	209	130	139	110	115	75	41	248	649	751	604	314	199	7	3
Other	-	127	688	-	1135	-	-	1537	554	634	1054	770	390	282	1	208	255	155	19	374
TOTAL "INSHORE" (May - Dec.)	2810	2821	4348	4264	4438	5390	6189	5449	4426	5010	5035	5340	4234	3460	2921	1961	1582	3308	3863	5780
Otter Trawls (May - Dec.)	1403	1096	3439	2981	4982	3737	2886	1843	1916	3363	3672	3129	2495	1785	1915	1402	4164	4478	1547	524
TOTAL (May - Dec.)	4213	3917	7787	7245	9420	9127	9075	7292	6342	8373	8707	8469	6729	5245	4836	3363	5746	7786	5410	6304

Table 5a: Nominal catches (t) for Cod fishery in 4VN (May - Dec) by month-gear 1977

Catch	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Traps	-	-	-	-	-	-	-	-	-
Drift Nets	-	-	-	-	-	-	-	-	-
Fixed Gill Nets	-	21	33	118	25	2	-	-	199
Handlines	-	4	90	172	80	64	185	-	595
Misc	1	13	16	33	19	17	31	22	155
Unspec.	-	-	-	-	-	-	-	-	-
Shrimp Tr	-	-	-	-	-	-	-	-	-
Side OT	261	26	17	23	16	31	389	694	1457
Stern OT	198	16	-	257	4	23	290	2124	2912
Longlines	141	76	140	170	364	429	325	160	1805
Purse Seine	-	-	-	-	-	-	-	-	-
Danish Seine	166	54	21	5	1	1	54	157	459
Scottish Seine	-	29	35	31	-	-	-	-	95
Midwater	-	-	-	-	1	4	-	101	106
Pair Seine	-	-	-	-	-	-	-	-	-
OTB	-	1	-	1	1	-	-	-	3
TOTAL CAN	770	240	352	810	511	571	1274	3258	7786
<u>FOREIGN FISHERY</u>									
FRANCE	2	-	-	-	-	-	-	133	135
TOTAL	772	240	352	810	511	571	1274	3391	7921

Table 5 b. Nominal catch (t) for Canadian cod fishery in Subdivision 4VN (May-Dec.) by month and gear (1978).

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
Gillnets	3	1	-	1	2	-	-	-	7
Hand	2	13	82	98	81	83	92	15	466
Long	373	243	310	375	401	473	534	326	3035
Traps			5	3	1	-	-	-	9
Miscellaneous			6	10	3	-	-	-	19
OT spec.	3	9	6	1	2	3	-	-	24
Side OT	664	23	9	12	15	7	4	10	744
Stern OT	451	38	4	-	57	5	9	54	618
Midwater Trawl	161	-	-	-	-	-	-	-	161
Purse seine	-	-	-	-	-	1	-	-	1
Danish seine	148	77	19	4	3	18	11	19	299
Scottish seine	27	-	-	-	-	-	-	-	27
TOTAL	1832	404	441	504	565	590	650	424	5410

FOREIGN FISHERY

<u>FRANCE</u>							53	53	
(stern OT)									
TOTAL	1832	404	441	504	565	590	650	477	5463

Table 5c. Nominal catch ((t) for Canadian (Maritimes & Newfoundland) fishery in Div. 4Vn (May-Dec.) by month and gear (1979).

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
Fixed gillnets	-	2	-	-	-	-	-	-	2
Drift gillnets	2	-	1	-	-	-	-	-	3
Handlines	-	2	84	119	119	140	121	55	640
Longlines	918	743	378	372	464	600	619	388	4482
Miscellaneous	3	1	11	14	25	30	266	24	374
Otter trawls (side)	35	45	13	54	54	20	30	20	271
Otter trawls (stern)	59	39	12	24	17	2	65	35	253
Danish seine	78	70	16	4	11	22	73	5	279
TOTAL	1095	902	515	587	690	814	1174	527	6304
FOREIGN FISHERY									
FRANCE (stern OT)	80	-	-	-	-	-	-	-	80
OVERALL TOTALS	1175	902	515	587	690	814	1174	527	6384

Table 6: 4Vn (M-D) Cod: Catch per unit effort for Canadian (M &amp; Q) Otter trawls (t/hr) and longlines (t/line).

YEAR	OTTER TRAWL				LONGLINE		
	OTB3 May + Dec	OTB4 May + Dec	OTB4 Aug. + Sept.	OTB5 May + Dec.	LL2 Nov. + Dec.	LL2 Aug+Sept+Oct.	LL3 Nov. + Dec.
1967	0.3205	0.4581	0.8847	0.6833	0.6233	0.5978	0.6602
1968	0.2915	0.6054	-	0.4787	-	-	-
1969	0.2063	0.5720	0.7333	0.6296	0.7432	0.5586	-
1970	0.8602	0.4356	0.4400	0.4790	0.6245	0.5649	-
1971	0.2974	0.368	0.3906	0.4874	0.6146	0.4242	-
1972	0.2110	0.5364	0.7679	0.9533	0.5419	0.3266	-
1973	0.2026	0.4121	0.5000	0.3587	0.3802	0.2918	0.3832
1974	0.2286	0.3477	0.1600	0.4564	0.1414	0.3197	0.2513
1975	0.3242	0.2821	-	0.5118	0.1938	0.2128	0.2167
1976	0.2065	0.5079	0.1500	0.6734	0.3786	0.2683	-
1977	0.4506	0.7538	0.1739	1.0111	-	-	-
1978	0.5932	0.9081	-	0.7897	0.6770	0.3815	0.7759
1979	0.1212	0.5167	0.1364	-	0.6170	0.3901	-

Table 7. Div. 4Vn (M-D) Cod: Research vessel survey estimates of population numbers at age x 10<sup>-3</sup> (Strata 40-42)

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	-	-	-	-	-	-	-	-	-	-
2	2120	391	174	-	-	204	2164	43	222	435
3	591	14,146	95	970	203	2142	751	2377	3048	262
4	1595	3,368	784	1529	455	2863	494	1400	6442	1717
5	3637	8,846	100	7073	931	1550	643	968	1850	837
6	3490	5,390	538	870	1071	271	517	685	1462	197
7	1502	3,554	491	995	133	334	243	279	509	572
8	864	1,198	130	1028	168	192	597	64	392	186
9	280	657	89	154	87	71	549	93	147	98
10	-	180	85	49	74	109	469	48	145	49
11	96	-	62	-	36	-	81	64	-	-
12	46	-	-	-	-	38	78	85	-	55
13+	43	187	125	-	-	-	156	73	37	149
UK	70	135	125	72	-	55	-	23	42	-
TOTAL	14,334	38,052	2,798	12,740	3,159	7,829	6,742	6,202	14,296	4557
4+	11,553	23,380	2,404	11,698	2,955	5,428	3,827	3,759	10,984	3860
5+	9,958	20,012	1,620	10,169	2,500	2,565	3,333	2,359	4,542	2143
6+	6,321	11,166	1,520	3,096	1,569	1,015	2,690	1,391	2,692	1306
7+	2,831	5,776	982	2,226	498	744	2,173	706	1,230	1109
4+ Three year running average	12,446	12,494	5,686	6,694	4,070	4,338	6,190	6,201	7422 <sup>a</sup>	
5+ running average	10,530	10,600	4,763	5,078	2,799	2,752	3,411	3,015	3342 <sup>a</sup>	
6+ average	6,336	5,261	2,062	1,893	1,758	1,699	2,258	1,796	1999 <sup>a</sup>	
7+	3,196	2,994	1,235	1,156	1,138	1,208	1,573	1,015	1170 <sup>a</sup>	
Z4+/5+	.16	.96	.11	.87	.39	.24	.72	.62		
Z5+/6+	.69	1.64	.92	1.06	.50	.20	.64	.41		
Z6+/7+	.75	1.45	.58	.51	.38	.22	.90	.43		

a

2-year average

Table 8. 4Vn (May-Dec.) cod inshore:  
Available age length keys

YEAR	LONGLINE	GILLNET	SEINE
1967	X		
1968	X		
1969	X		
1970	X		
1971	X		
1972	X		
1973	X		
1974	X		
1975	X		
1976	X	X	
1977			X
1978	X		
1979	X		

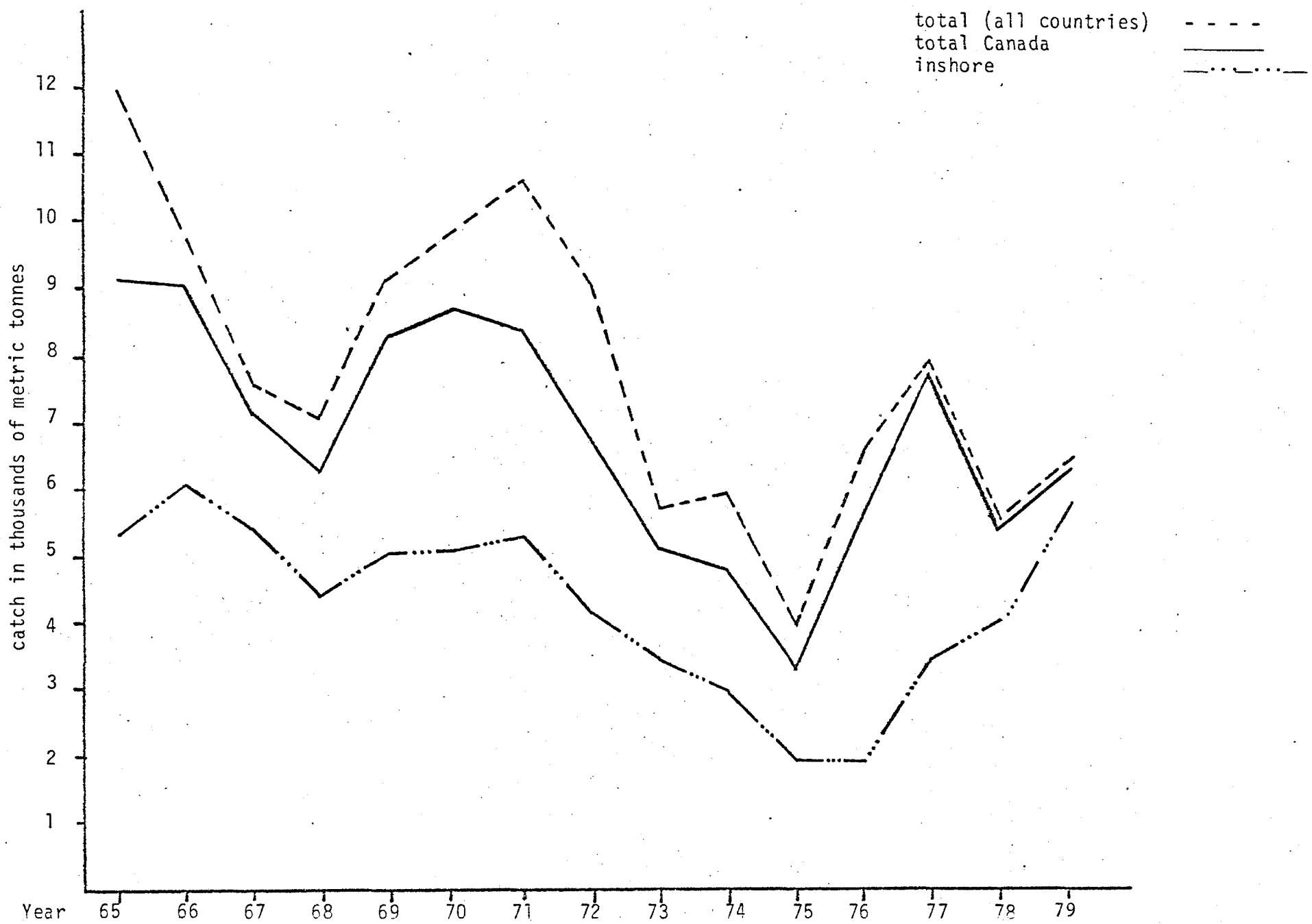
Table 9. 4Vn (May-Dec.) inshore cod:  
Mean weight-at-age for longline catch (kg)

AGES	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	0.28	-	-	-	-
3	0.44	0.54	0.46	0.60	0.48	-	0.40	0.49	0.53	-	-	0.56	-
4	0.96	0.87	0.94	0.79	0.77	0.82	0.72	0.81	0.84	-	-	0.99	.53
5	1.49	1.38	1.26	1.09	1.04	0.91	1.17	1.28	1.29	1.82	-	1.40	.90
6	2.03	2.00	1.86	1.67	1.45	1.72	1.75	1.72	1.79	2.46	-	2.14	1.37
7	2.45	2.87	2.38	2.14	2.01	1.66	1.78	2.65	2.29	3.08	-	3.27	2.00
8	2.93	2.38	3.14	3.11	4.33	2.10	2.14	2.40	2.00	4.18	-	4.14	2.07
9	4.51	3.29	4.44	4.38	3.60	9.29	2.79	2.50	3.18	4.23	-	4.97	2.62
10	4.07	4.97	4.19	4.39	5.24	6.91	5.33	3.14	3.50	6.19	-	5.27	3.59
11	4.10	6.70	4.67	5.15	6.29	3.46	5.98	7.72	4.41	6.07	-	6.27	4.00
12	5.13	5.97	4.63	8.07	8.55	9.29	5.68	4.15	7.72	7.50	-	6.45	4.98
13	7.44	4.58	6.96	8.79	4.84	15.23	7.24	11.06	11.06	-	-	7.98	5.43
14	7.04	7.55	8.01	9.49	13.45	-	10.15	10.26	8.79	-	-	8.93	3.56
15	13.42	11.06	9.39	12.02	12.03	11.06	13.03	11.37	-	-	-	9.16	-
16	8.55	-	9.37	-	10.71	15.23	7.01	6.08	8.48	9.39	-	14.09	-

Table 10. 4Vn (May-Dec.) Inshore cod:  
Catch-at-age by longlines (thousands of fish)

AGES	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	1	-	-	-	-
3	5	5	2	3	10	-	7	15	44	-	-	35	-
4	122	96	42	62	43	676	133	179	177	-	-	277	31
5	336	393	240	322	236	39	437	181	127	5	-	265	388
6	266	382	346	314	492	604	87	184	73	10	-	197	898
7	67	102	370	181	600	444	193	54	36	25	-	120	572
8	112	122	184	208	63	209	230	66	17	27	-	76	346
9	24	68	41	56	152	2	51	82	13	17	-	49	170
10	23	10	55	40	48	21	17	26	11	15	-	54	32
11	33	12	24	82	14	50	9	-	4	10	-	20	75
12	11	10	24	21	7	2	5	4	-	10	-	18	15
13	4	10	17	17	28	1	6	1	-	-	-	13	8
14	3	2	8	11	1	-	1	1	1	-	-	3	7
15	1	1	2	1	7	1	-	1	-	-	-	8	-
16	2	-	1	-	5	1	2	1	-	10	-	4	-

Figure 1: 4Vn (May-Dec) Cod Nominal Catch



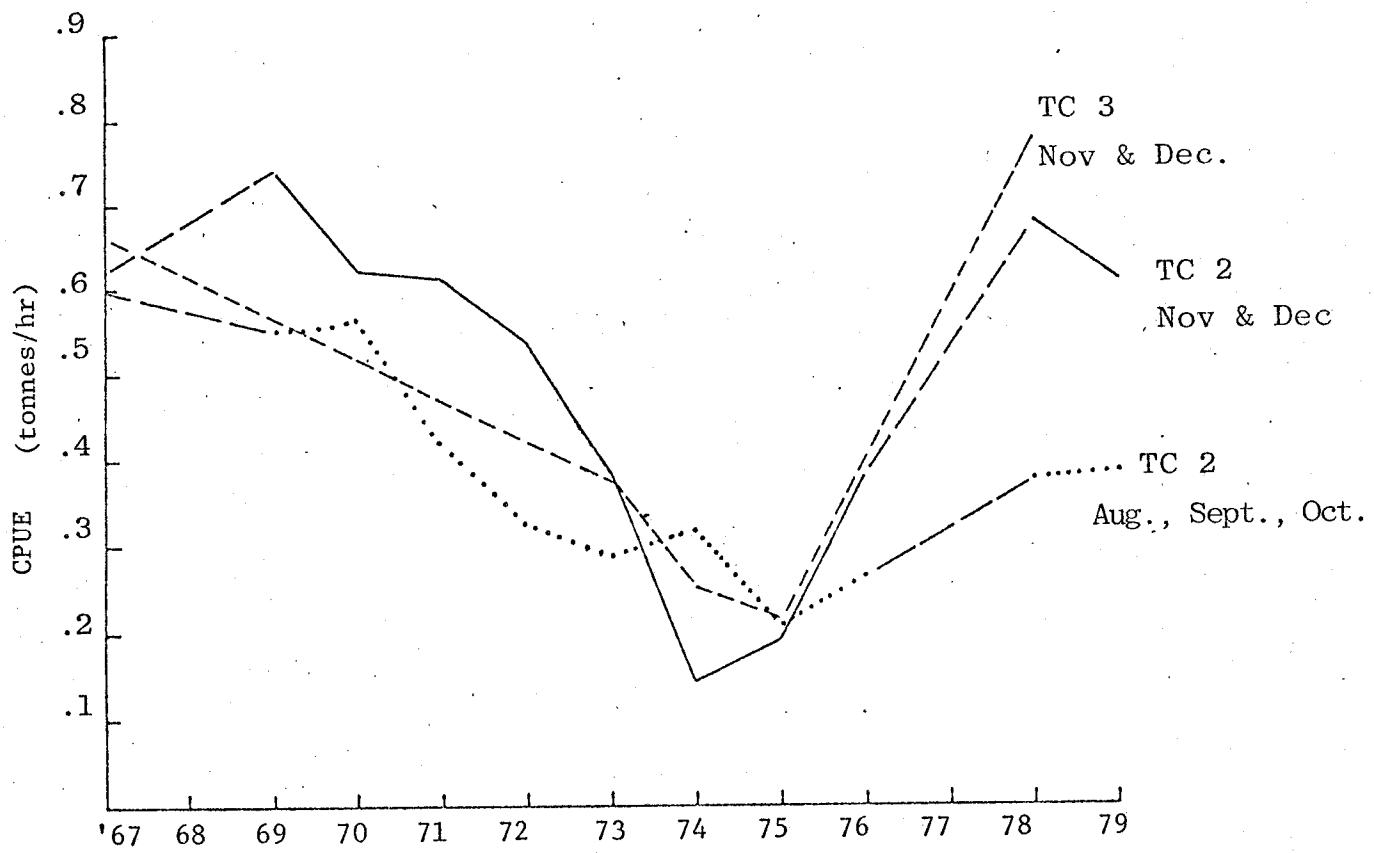


Figure 2. 4Vn (May - Dec) cod CPUE to longlines.

Figure 3a: 4Vn (May-Dec) Cod CPUE to OTB

TC3 (May + Dec) \_\_\_\_\_

TC5 (May + Dec) ..... .

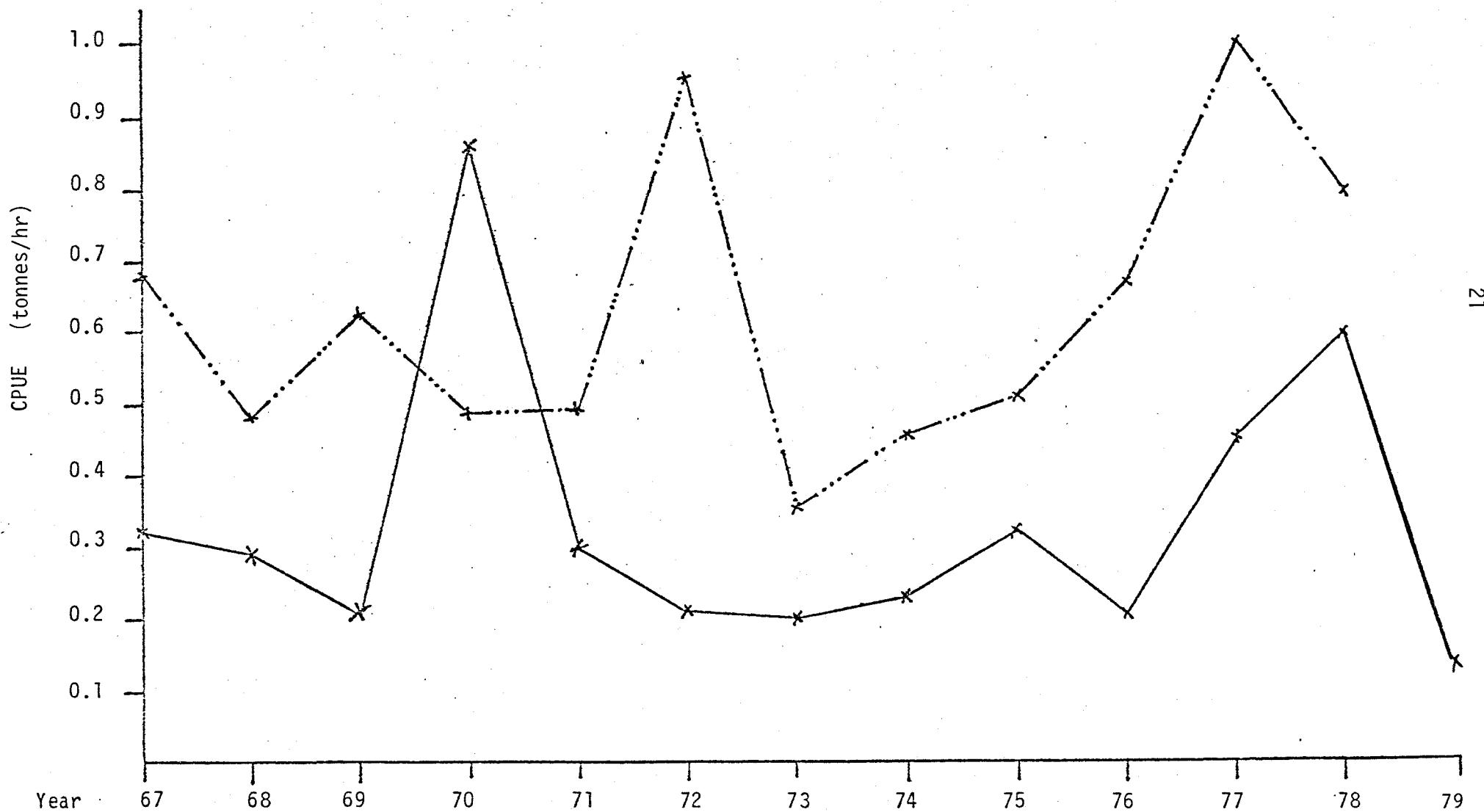


Figure 3b: 4Vn (May-Dec) Cod CPUE to OTB

TC4 (May + Dec) - - - - -

TC5 (Aug + Sept) - - - - -

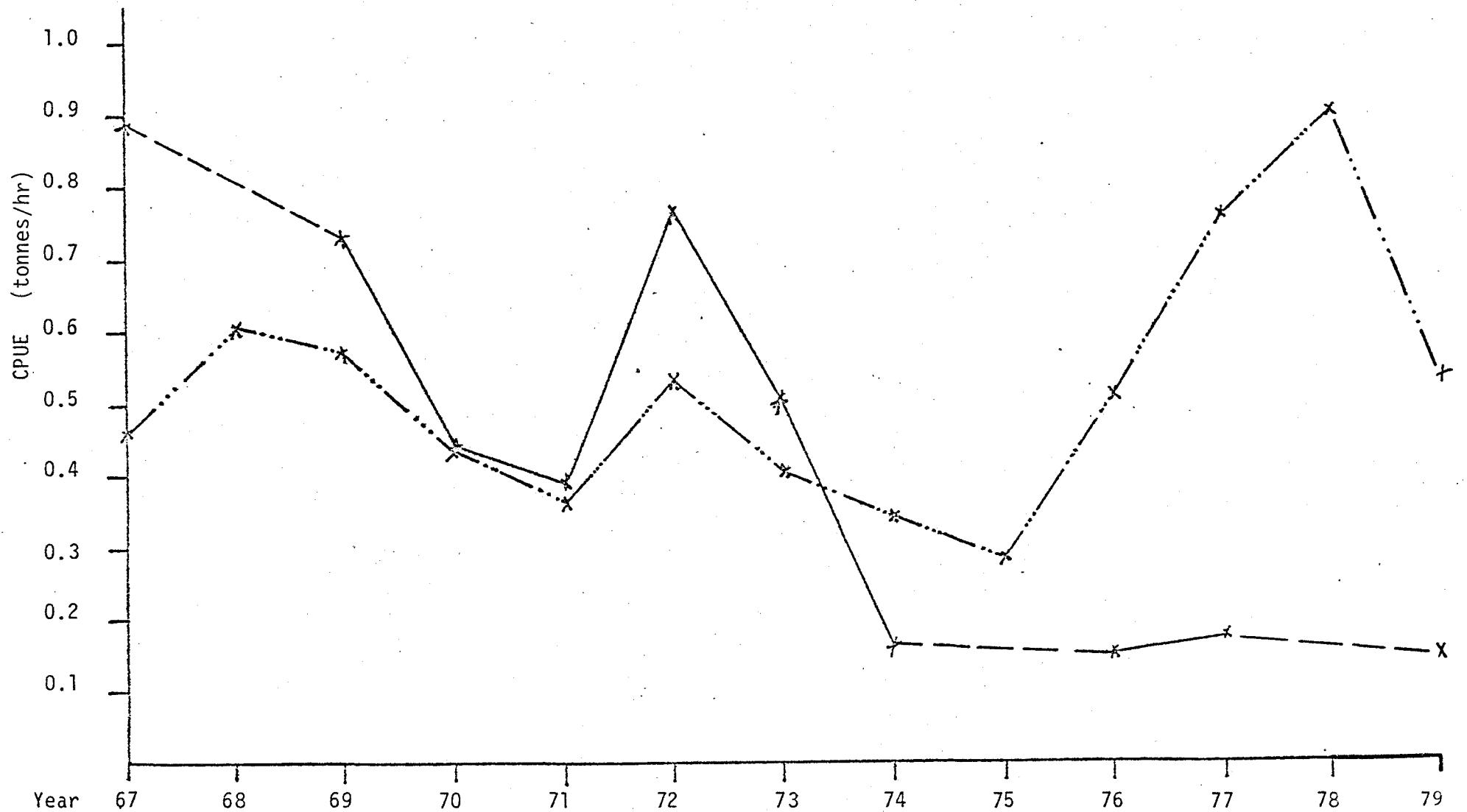
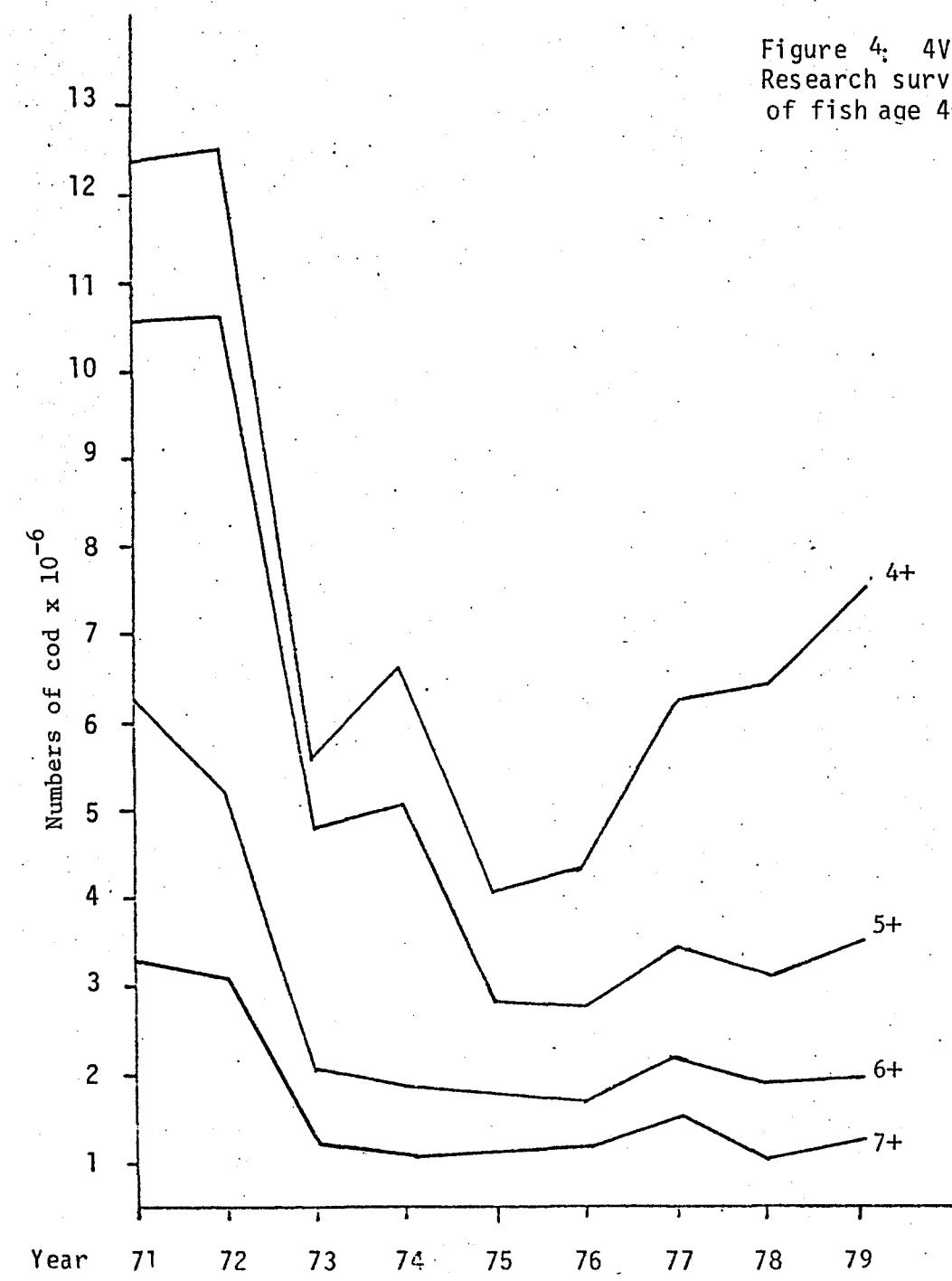


Figure 4: 4Vn (May-Dec) Cod  
Research survey population estimates (3 year running average)  
of fish age 4+, 5+, 6+, and 7+.



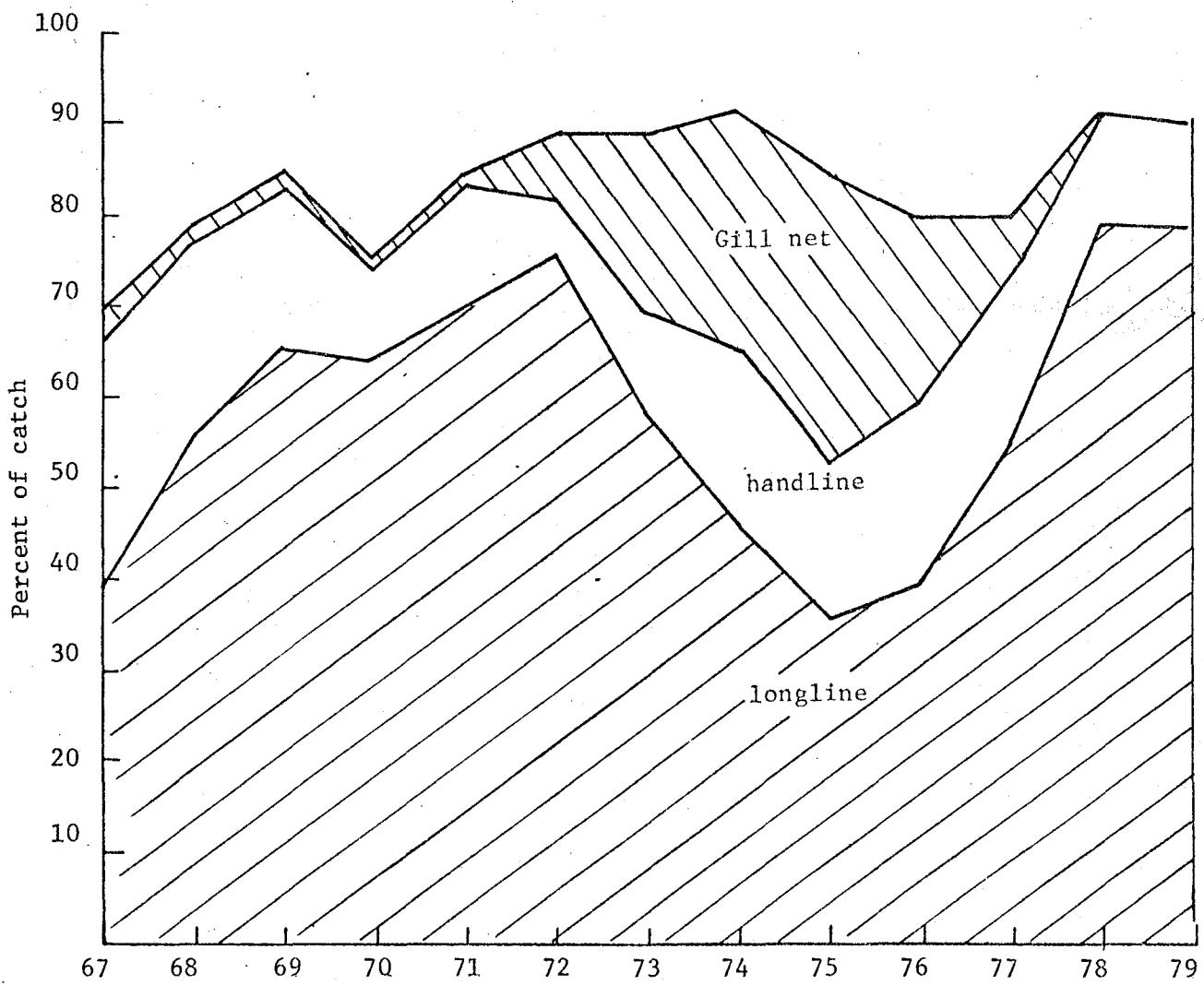


Figure 5. 4Vn (May-Dec.) Inshore Cod  
Proportion of catch taken by longlines, handlines and gill nets.