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**An Update of the Status of the Inshore
Cod Stock in Subdivision 4Vn (May-Dec) for 1981**

by

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¹ This series documents the scientific basis for fisheries management advice in Atlantic Canada. As such, it addresses the issues of the day in the timeframes required and the Research Documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Abstract

The cod fishery in Subdivision 4Vn (May-December) is mainly an "inshore" fishery with longliners in the 0-49.9 GT tonnage class landing the largest amount. This year, the quota for fixed gear less than 65 feet was exceeded in September. An additional allocation was exceeded in mid-October which resulted in the closure of this category of the fishery on October 17th.

Analyses of the 1981 research survey data suggests an upward trend of 4+, 5+ and 6+ cod. The 1977 and 1975 year-classes predominate in recent surveys but to date have not exhibited a marked influence in the commercial fishery.

Low return rates for logbooks and the lack of effort information from Newfoundland based vessels which fish in 4Vn, limited the interpretative value of commercial catch-per-unit-effort estimates.

Commercial samples from the longline fishery, in recent years, show an increasing trend in length-at-age for fish age 6 and older, and in weight-at-age for all ages.

Résumé

La pêche à la morue dans la sousdivision 4Vn (mai-décembre) est surtout une pêche "côtières" et la plupart des prises sont faites par les palangriers de la classe 0 à 49,9 tonnes brutes. Cette année, le quota établi pour les engins fixes de moins de 65 pieds a été dépassé en septembre. Les prises supplémentaires autorisées par la suite ont été dépassées à la mi-octobre, de sorte que la pêche dans cette catégorie a été fermée le 17 octobre.

Selon les résultats des relevés scientifique de 1981, les classes de morues de catégorie 4+, 5+, et 6+ auraient tendance à augmenter. Les classes d'âges 1977 et 1975 prédominent dans les relevés récents, mais jusqu'ici on n'en a pas observé l'influence dans les pêches commerciales.

Nous n'avons reçu que quelques journaux de bord et le manque d'information quant à l'effort des bateaux terre-neuviens pêchant dans la sousdivision 4Vn rend difficile l'interprétation des estimations des prises par unité d'effort de pêche.

Les échantillons des prises commerciales à la palangre des dernières années indiquent que le rapport taille/âge a tendance à augmenter chez les poissons de 6 ans et plus et le rapport poids/âge chez tous les poissons.

Introduction

This year saw the first quota set for all gears in the summer cod fishery in 4Vn. The initial quota set for 4Vn (May-Dec) was 7,400 mt (plus 100 mt to France) with 6,100 mt of this allocated to the fixed gear less than 65 ft. category. According to the department's quota reports this 6,100 mt limit was exceeded by the September 9th report (6,365 mt). An increase of 2,500 mt to the Canadian TAC was made official on September 30th with 2,000 mt of this increase going to the fixed gear category. This new limit of 8,100 mt was overrun in October and this segment of the fishery was restricted to a 1.5 mt per boat per trip limit for the rest of the year.

Nominal landings in 1981 for all gears exceeded 12,000 mt with longliners making up the majority of the landings (9,800 mt). Reports from the port technician and fisheries officers indicate that as in 1980 (Smith and Charlton, 1981) longliners are fishing far from shore mainly in the area along the 4Vn-4Vs boundary close to the Laurentian Channel.

Nominal catch

Nominal landings for Canada and other nations (at present only France-St. Pierre et Miquelon) are presented in Table 1 for the years 1965-1981. The landings for all countries are also presented in Table 2 broken down by gear type for the years 1971-1981. At present most of the catch is being taken by "inshore" gears (Figure 1) with longliners in the 0.-49.9 GT tonnage class (Tables 3 and 4) landing the largest amount. In Table 5 the breakdown of nominal catch by month and gear type for 1977 to 1981 is presented. In 1981 (Table 5e) catches from the longliner component of the fleet peaked in May, remained fairly constant until October and then were low until December. This behavior in the late fall was due to the closure in October mentioned above.

Vessels from Newfoundland as well as the Maritimes participate in the 4Vn fishery. Statistics from the Newfoundland region record 115 mt in total landed by Newfoundland based vessels. However, independent records kept by the department's statistical co-ordinator in Sydney show that 1,167 mt of cod were landed in Cape Breton by Newfoundland based vessels. Since the Newfoundland vessels (i.e. longliners in the 25-49.9 tonnage class) are not required to carry logbooks these landings would not show up in the Newfoundland region's records and are treated as Maritime catch here.

Research trawl survey information

In Table 6 we present the population abundance indices from the annual research surveys carried out in July from 1970 to 1981. The 1981 estimated

numbers of cod are up over last year's estimate and the upward trend for 4+, 5+ and 6+ noted last year has continued (Fig. 2).

In Figures 3a-3k we plotted the percentage-at-age composition for both the research surveys and samples taken from commercial catches of longliners in 4Vn. There were no commercial longliner samples taken in 1977. From these results it appears that the surveys are useful in picking up dominant year-classes when they are between 2 to 6 years of age.

Since 1978 the commercial catches have been dominated by the 1973 and 1974 year-class. The latter year-class was also strong in the surveys since 1976 (age 2).

In the 1980 and 1981 surveys the 1977 and the 1975 year-classes predominate but the 1977 year-class has yet to have a marked influence on the commercial catch.

At present, use of the estimated numbers-at-age from the surveys for predicting commercial numbers-at-age is limited by the large variances associated with the estimates obtained from survey data.

Catch-per-unit effort

The C.P.U.E. estimates for longliner tonnage class 2 vessels for the period 1970-1981 are presented in Table 10. The estimates for 1970- 1980 use data covering the whole May to December period. In 1981 only data from May to September were used for the following reasons:

1. the fishery was officially closed on October 17th and vessels were under a 1.5 mt per trip quota and,
2. one vessel contributed the majority of the catch and effort data for October and November but this vessel according to the port technician in the area had problems with its automatic baiting gear rendering this data suspect.

A major problem concerning the interpretive value of this effort data is the low return rates of logbooks in the 4Vn area. Since the largest part of the catch is taken by longliners, catch and effort data from these vessels should be the main source of catch rate information. As a condition of their licence, longliners in tonnage class 2 (25-49.9 GT) are required to fill in logbooks. However longliners in the same class from Newfoundland which fish in the area do not have to do so. This has caused many problems for the department's staff in 4Vn.

An attempt was made to fit an equilibrium general production model to the effort series above and to an effort series derived from the mean catch-per-set from the research survey data using the APL function

"Schaefer" given in Rivard (1982). For the former series the program gave negative MSY's while the latter resulted in an estimated long term sustainable yield at 2/3 FMSY of 12,500 mt. The results of such an analysis are dubious due to the limited data available (12 years) and questions regarding the applicability of research survey derived effort to commercial catch.

Catch composition

This year 6 samples from the longliner catches were obtained by the port technician in comparison to one sample last year. Results from these samples are presented in Tables 7, 8 and 9. In Table 8 where we have presented average lengths-at-age it appears that in comparing data from 1980 and 1981 to data from 1970 to 1979 there has been a definite increase in the lengths-at-age for fish age 6 and older. In fact if these cohorts are followed back through the table (take age 9, 1981 for example) the fish of these cohorts appear to be larger than fish of the same age in previous years. Fish younger than age 6 in 1981 however do not show such a trend. From the mean weight-at-age data in Table 9 the 1981 weights are generally higher than the weights for previous years.

Discussion and Conclusions

Since the data are not amiable to analytical assessment we therefore have 3 main observations to consider: 1) the survey data indices which show a continued increase in recent years, 2) the presence of relatively strong year-classes at ages 4 and 6 in the survey which have to appear as strong in the longliner fishery and, 3) C.P.U.E. indices which are still on the increase. Indications therefore, are that the stock is in good condition and may continue to be so provided the relatively strong year-classes which occur in the survey catches contribute significantly to the commercial catch in the near future.

References

- Rivard, D. 1982. APL programs for stock assessment (revised). Can. Tech. Rep. Fish. Aquat. SCI. 1091: 146 p.
- Smith, S.J. and B.A. Charlton. 1981. An update of the inshore cod stock in Subdivision 4Vn (May-Dec) for 1980. CAFSAC Res. Doc. 81/20. 28 p.

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

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Canada	9136	9075	7292	6342	8373	8707	8469	6729	5245	4836	3363	5746	7780	5496	6301	9957	12474
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	73	102	101
Norway	-	-	-	-	-	-	-	-	-	142	186	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.K.	-	-	-	-	-	-	-	-	-	61	-	-	-	-	-	-	-
F.R.G.	-	-	-	-	-	-	-	-	73	14	-	-	-	-	-	-	-
U.S.A.	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	71	7	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USSR	415	543	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
TOTALS	11999	9873	7627	7052	9140	9894	10631	9104	5748	5989	3998	5957	7915	5549	6374	10059	12575
% Canadian	76	92	96	90	92	88	80	74	91	81	84	95	98	99	99	99	99
TAC	-	-	-	-	-	-	-	-	-	10000	10000	10000	3500	3500	3400	5000	-

Table 2. Nominal catch (mt) of cod in Subdiv. 4Vn (May - December) by gear type for all countries, 1971-81.
 (Note: numbers in brackets are percentages).

YEAR	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
1971	5304(50)	106(1)	41(0)	4421(42)	759(7)	10631
1972	4418(49)	121(1)	248(3)	3471(38)	846(9)	9104
1973	2099(37)	143(2)	649(11)	2386(42)	471(8)	5748
1974	2842(47)	139(2)	751(13)	2042(34)	215(4)	5989
1975	1851(46)	100(3)	604(15)	1235(31)	208(5)	3998
1976	4375(74)	83(1)	314(5)	930(16)	255(4)	5957
1977	4613(58)	554(7)	199(3)	2400(30)	155(2)	7921
1978	1600(29)	327(6)	7(0)	3501(63)	114(2)	5549
1979	624(10)	278(4)	5(0)	5123(80)	344(6)	6374
1980	950(9)	560(6)	7(0)	8242(82)	300(3)	10059
1981	1380(11)	559(4)	2(0)	10541(84)	93(1)	12575

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(11)		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)	387(46)	3947
50- 149.9	138(3)	120(99)	83(33)	77(2)		418
150- 499.9	1548(35)					1548
500- 999.9	1521(34)				459(54)	1980
1000-1999.9	1211(28)					1211
TOTAL	4418	121	248	3471	846	9104

...continued

Table 3 (continued). page 2 of 5.

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)	282(60)	2975
50- 149.9	83(4)	133(93)	313(48)	41(2)		570
150- 499.9	1389(66)					1389
500- 999.9	552(26)				68(14)	620
1000-1999.9					121(26)	121
>2000	73(4)					73
TOTAL	2099	143	649	2386	471	5748
<u>1974</u>						
0- 49.9	41(1)	24(17)	469(62)	1795(88)	131(61)	2460
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(39)	1254
1000-1999.9	61(2)					61
>2000	14(1)					14
TOTAL	2842	139	751	2042	215	5989

...continued

Table 3 (continued). page 3 of 5.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1975</u>						
0- 49.9	20(1)	29(20)	463(77)	1026(83)	208(100)	1746
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	208	3998
<u>1976</u>						
0- 49.9	41(1)	33(40)	314(100)	930(100)	255(100)	1573
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	255	5957
<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

Table 3 (continued). page 4 of 5.

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)	114(100)	3763
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	114	5549
<u>1979</u>						
0- 49.9	102(17)	176(63)	5(100)	5068(99)	344(100)	5695
50- 149.9	64(10)	102(37)				166
150- 499.9	301(48)			55(1)		356
500- 999.9	157(25)					157
TOTAL	624	278	5	5123	344	6374
<u>1980 (Canada)</u>						
0- 49.9	160(19)	527(94)	7(100)	8024(97)	212(71)	8930
50- 149.9	138(16)	33(6)		144(2)	88(29)	403
150- 499.9	502(59)			74(1)		576
500- 999.9	48(6)					48
TOTAL	848	560	7	8242	300	9957

Table 3 (continued). page 5 of 5.

TONNAGE CLASS (TONS)	OTTER TRAWLS	SEINES	GILLNETS	LONGLINES & HANDLINES	MISCELLANEOUS	TOTAL
<u>1981 (Canada only)</u>						
0- 49.9	316 (25)	487 (87)	2 (100)	10307 (98)	56 (60)	11168
50- 149.9	395 (31)	72 (13)		210 (2)	37 (40)	714
150- 499.9	422 (33)			24 (0)		446
500- 999.9	146 (11)					146
TOTAL	1279	559	2	10541	93	12474

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	1980	1981
Longlines	1730	1313	2190	2733	2393	3798	3895	2124	2455	3300	3229	3725	3185	1982	1332	689	620	1805	3035	4483	6422	9800
Handlines	617	912	960	945	-	-	-	1398	960	848	495	696	286	404	568	360	310	595	466	640	1820	741
Seines	78	229	108	88	910	154	134	207	184	107	83	106	121	143	269	100	83	554	327	278	560	559
Fixed nets & traps	385	41	29	388	-	1229	2030	44	163	6	99	2	4	-	-	-	-	-	9	4	8	13
Gill nets	-	199	373	110	-	209	130	139	110	115	75	41	248	649	751	604	314	199	7	5	7	2
Other	-	127	688	-	1135	-	-	1537	554	634	1054	770	390	282	1	208	255	155	105	340	292	80
TOTAL "INSHORE"																						
(May-Dec)	2810	2821	4348	4264	4438	5390	6189	5449	4426	5010	5035	5340	4234	3460	2921	1961	1582	3308	3949	5750	9109	11195
Otter Trawls																						
(May-Dec)	1403	1096	3439	2981	4982	3737	2886	1843	1916	3363	3672	3129	2495	1785	1915	1402	4164	4478	1547	551	848	1279
TOTAL																						
(May - Dec)	4213	3917	7787	7245	9420	9127	9075	7292	6342	8373	8707	8469	6729	5245	4836	3363	5746	7786	5496	6301	9957	12474

Table 5a: Nominal catches (mt) 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 Gillnet	-	21	33	118	25	2	-	-	199
Handlines	-	4	90	172	80	64	185	-	595
Misc	4	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 5b. Nominal catch (mt) 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
Handlines	2	13	82	98	81	83	92	15	466
Longlines	373	243	310	375	401	473	534	326	3035
Traps			5	3	1	-	-	-	9
Miscellaneous	-	10	26	40	18	10	1	-	105
OT Unspec.	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	414	461	534	580	600	651	424	5496

FOREIGN FISHERY

<u>FRANCE</u>							53	53	
(stern OT)									
TOTAL	1832	414	461	534	580	600	651	477	5549

Table 5c. Nominal catch (mt) for Canadian fishery in Division 4Vn (May-Dec) by month and gear (1979).

	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Set gillnets	2	-	3	-	-	-	-	-	5
Handlines	-	2	84	119	119	140	121	55	640
Longlines	920	743	378	372	463	600	620	387	4483
Miscellaneous	3	-	7	11	4	28	263	24	340
Otter trawls (side)	46	45	14	55	57	20	32	20	289
Otter trawls (stern)	48	39	11	23	17	2	65	34	239
Danish seine	78	69	16	4	11	22	73	5	278
Traps	-	1	2	-	-	-	1	-	4
Otter trawls (unspec.)	-	-	2	3	16	2	-	-	23
Total	1097	899	517	587	687	814	1175	525	6301
<u>Foreign Fishery</u>									
France (stern OT)	73	-	-	-	-	-	-	-	73
Overall totals	1170	899	517	587	687	814	1175	525	6374

Table 5d. nominal catch (mt) for Canadian fishery in Division 4Vn (May-Dec) by month and gear (1980).

	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Fixed gillnets		2	5						7
Handlines	1	28	64	180	246	462	487	352	1820
Longlines	1331	1080	536	652	594	845	589	795	6422
Miscellaneous	5		25	122					152
Otter trawls (side)	32	63	9	126	87	36	69	39	461
Otter trawls (stern)	115	55	43	15	18	24	17	100	387
Danish seine	250	86	27	18	12	38	55	62	548
Scottish seine	12								12
Traps	1	6		1					8
Scallop						1			1
Not known	1		5	17		2		26	51
Shrimp trawl	8	34	15	15	3	13			88
Total	1756	1354	729	1146	960	1421	1243	1348	19957
<u>Foreign Fishery</u>									
France	102								102
Overall totals	1858	1354	729	1146	960	1421	1243	1348	10059

Table 5e. Nominal catch (mt) for Canadian cod fishery in Subdivision 4Vn (May-Dec) by month and gear 1981

Gear	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Gillnets	-	1	-	1	-	-	-	-	2
Handlines	21	96	225	208	93	92	5	1	741
Longlines	2286	1224	1072	1291	1324	1426	746	431	9800
Traps	2	4	7	-	-	-	-	-	13
Miscellaneous	2	-	-	10	11	11	-	-	34
UNKNOWN	-	-	4	-	-	1	-	4	9
Side OT	100	54	49	88	50	41	27	132	541
Stern OT	160	34	85	39	17	19	7	377	738
Pair	7	1	-	-	-	-	-	-	8
Purse	-	-	2	-	-	-	-	-	2
Danish	159	49	45	16	15	13	155	81	533
Scottish	16	-	-	-	-	-	-	-	16
Shrimp trawl	9	6	12	6	1	-	3	-	37
TOTAL	2762	1469	1501	1659	1511	1603	943	1026	12474
FRANCE	82	19	-	-	-	-	-	-	101
TOTAL	2844	1488	1501	1659	1511	1603	943	1026	12575

Table 6. Div. 4Vn (M-D) cod: Research vessel population abundance indices (numbers at age $\times 10^{-3}$) (strata 40-42).

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	-	-	-	-	-	-	-	-	-	-	-	111
2	2120	391	174	-	-	204	2164	43	222	435	627	1455
3	591	14146	95	970	203	2142	751	2377	3048	262	3509	5642
4	1595	3368	784	1529	455	2863	494	1400	6442	1717	1325	12170
5	3637	8846	100	7073	931	1550	643	968	1850	837	7866	4010
6	3490	5390	538	870	1071	271	517	685	1462	197	5471	8492
7	1502	3554	491	995	133	334	243	279	509	572	1719	3835
8	864	1198	130	1028	168	192	597	64	392	186	387	421
9	280	657	89	154	87	71	549	93	147	98	149	309
10	-	180	85	49	74	109	469	48	145	49	123	286
11	96	-	62	-	36	-	81	64	-	-	123	81
12	46	-	-	-	-	38	78	85	-	55	-	52
13+	43	187	125	-	-	-	156	73	37	149	-	105
UK	70	135	125	72	-	55	-	23	42	-	-	58
TOTAL	14334	38052	2798	12740	3158	7829	6742	6202	14296	4557	21299	37027
4+	11553	23380	2404	11698	2955	5428	3827	3759	10984	3860	17163	29819
4+ (smoothed)	11553	11553	11553	5428	3827	3827	3827	3827	3860	10984	17163	28329
5+	9958	20012	1620	10169	2500	2565	3333	2359	4542	2143	15838	17649
5+ (smoothed)	9958	9958	9958	2565	2565	2565	2565	2565	3333	4542	15838	17649
6+	6321	11166	1520	3096	1569	1015	2690	1391	2692	1306	7972	13639
6+ (smoothed)	6321	6321	3096	1569	1569	1569	1569	1569	2690	2692	7972	13639
7+	2831	5776	982	2226	498	744	2173	706	1230	1109	2501	5147
7+ (smoothed)	2831	2831	2226	982	744	744	744	1109	1230	1230	2501	2501

Table 7. 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	1980	1981
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
3	5	5	2	3	10	-	7	15	44	-	-	35	-	-	63
4	122	96	42	62	43	676	133	179	177	-	-	277	17	8	166
5	336	393	240	322	236	39	437	181	127	5	-	265	208	105	234
6	266	382	346	314	492	604	87	184	73	10	-	197	480	532	308
7	67	102	370	181	600	444	193	54	36	25	-	120	305	747	505
8	112	122	184	208	63	209	230	66	17	27	-	76	185	386	397
9	24	68	41	56	152	2	51	82	13	17	-	49	91	219	200
10	23	10	55	40	48	21	17	26	11	15	-	54	17	127	113
11	33	12	24	82	14	50	9	-	4	10	-	20	39	32	42
12	11	10	24	21	7	2	5	4	-	10	-	18	8	8	39
13	4	10	17	17	28	1	6	1	-	-	-	13	4	8	39
14	3	2	8	11	1	-	1	1	1	-	-	3	4	-	4
15	1	1	2	1	7	1	-	1	-	-	-	8	-	-	7
16	2	-	1	-	5	1	2	1	-	10	-	4	-	-	13

Table 8. 4Vn (May-Dec) Inshore Cod : Average Length-at-age from Longline Samples (cm).

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	31.00	-	-	-	-	-	28.00
3	40.00	37.00	-	34.72	37.31	38.25	-	-	38.90	-	43.00	37.67
4	43.43	43.25	43.97	42.26	44.01	44.55	-	-	46.94	46.68	51.43	45.90
5	48.55	47.82	46.00	49.74	51.10	51.24	58.00	-	52.76	55.58	60.85	52.78
6	55.80	53.17	56.41	56.94	56.26	57.26	64.00	-	60.77	63.90	65.23	61.81
7	60.33	58.91	55.44	57.22	65.40	62.04	68.20	-	69.57	72.75	70.37	68.20
8	67.79	77.04	59.38	60.44	62.58	59.23	76.00	-	75.53	72.94	80.66	78.42
9	76.31	71.65	100.00	65.83	63.50	68.66	76.86	-	80.25	78.37	89.69	83.95
10	74.53	81.59	89.03	81.97	67.17	71.79	87.00	-	81.81	88.13	94.00	89.29
11	79.49	87.47	70.67	84.64	94.00	75.74	86.50	-	86.82	90.77	97.00	95.16
12	94.99	96.47	100.00	80.53	75.18	92.23	92.50	-	86.31	97.38	100.00	102.27
13	97.24	78.98	118.00	90.09	106.00	106.00	-	-	94.06	100.92	-	100.55
14	100.44	113.17	-	103.00	103.23	97.97	-	-	98.56	88.00	-	100.00
15	109.00	108.56	106.00	112.00	106.70	-	-	-	97.91	-	-	103.54
16	-	104.42	118.00	91.00	84.47	97.00	100.00	-	114.86	-	-	110.65

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	1980	1981
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	0.28	-	-	-	-	-	0.26
3	0.44	0.54	0.46	0.60	0.48	-	0.40	0.49	0.53	-	-	0.56	-	-	0.64
4	0.96	0.87	0.94	0.79	0.77	0.82	0.72	0.81	0.84	-	-	0.99	0.93	0.73	1.16
5	1.49	1.38	1.26	1.09	1.04	0.91	1.17	1.28	1.29	1.82	-	1.40	1.63	1.22	1.75
6	2.03	2.00	1.86	1.67	1.45	1.72	1.75	1.72	1.79	2.46	-	2.14	2.54	2.03	2.81
7	2.45	2.87	2.38	2.14	2.01	1.66	1.78	2.65	2.29	3.08	-	3.27	3.78	2.49	3.88
8	2.93	2.38	3.14	3.11	4.33	2.10	2.14	2.40	2.00	4.18	-	4.14	3.92	3.14	5.68
9	4.51	3.29	4.44	4.38	3.60	9.29	2.79	2.50	3.18	4.23	-	4.97	4.99	4.55	6.94
10	4.07	4.97	4.19	4.39	5.24	6.91	5.33	3.14	3.50	6.19	-	5.27	6.95	6.21	8.35
11	4.10	6.70	4.67	5.15	6.29	3.46	5.98	7.72	4.41	6.07	-	6.27	7.78	6.99	10.43
12	5.13	5.97	4.63	8.07	8.55	9.29	5.68	4.15	7.72	7.50	-	6.45	9.78	7.65	12.55
13	7.44	4.58	6.96	8.79	4.84	15.23	7.24	11.06	11.06	-	-	7.98	10.72	8.36	11.87
14	7.04	7.55	8.01	9.49	13.45	-	10.15	10.26	8.79	-	-	8.93	6.88	-	11.50
15	13.42	11.06	9.39	12.02	12.03	11.06	13.03	11.37	-	-	-	9.16	-	-	12.76
16	8.55	-	9.37	-	10.71	15.23	7.01	6.08	8.48	9.39	-	14.09	-	-	15.73

Table 10. Longliner catch of cod and associated catch-per-unit effort 1970-1981, 4Vn (May-December).

Year	Longliner catch (mt)	C/E (t/1000 Hooks)
1970	3229	0.584
1971	3725	0.434
1972	3185	0.423
1973	1982	0.377
1974	1332	0.237
1975	689	0.238
1976	620	0.166
1977	1805	0.507
1978	3035	0.451
1979	4483	0.547
1980	6422	0.536
1981	9800	0.625

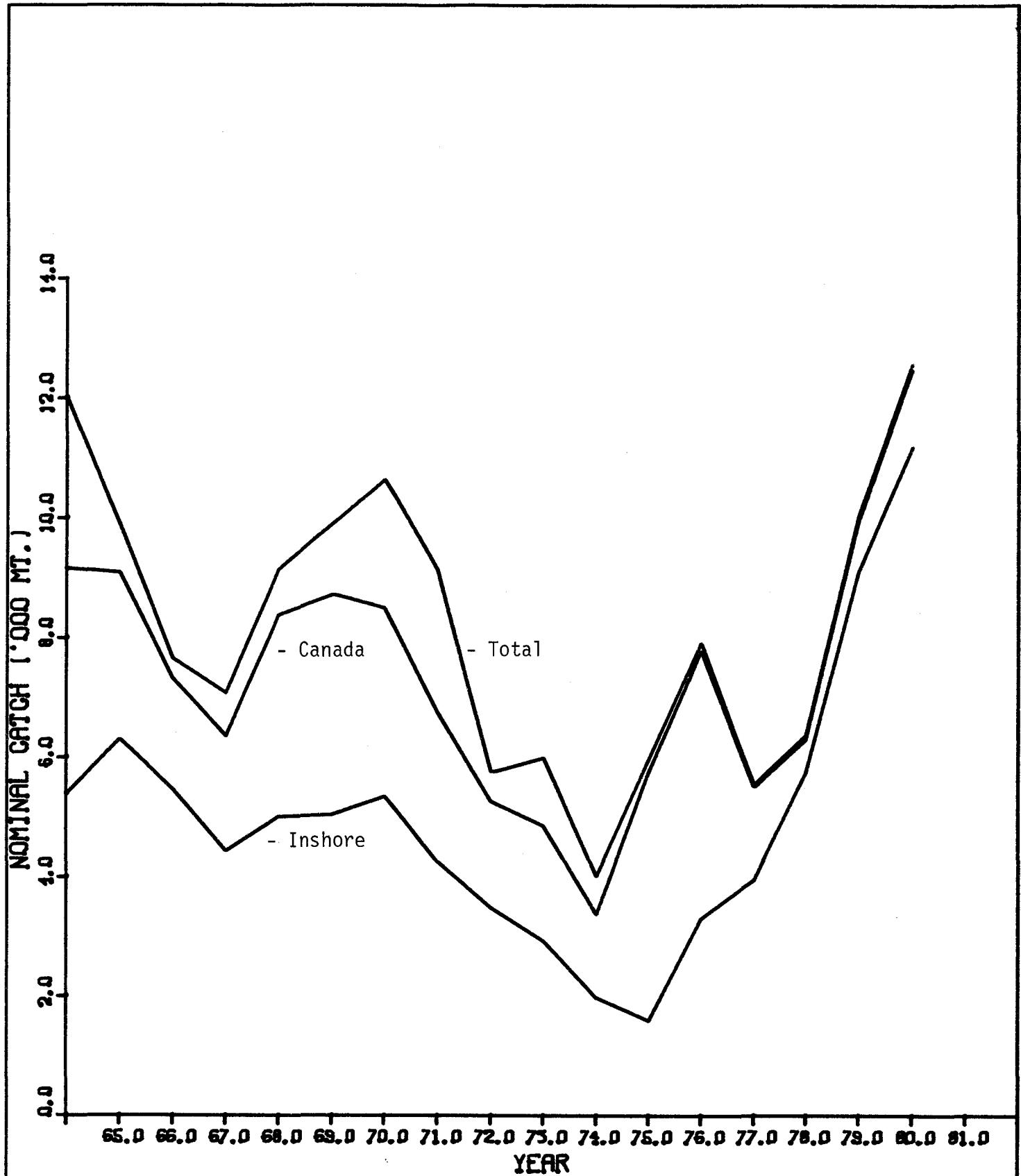


Figure 1. 4Vn (May-Dec) Cod: Nominal Catch.

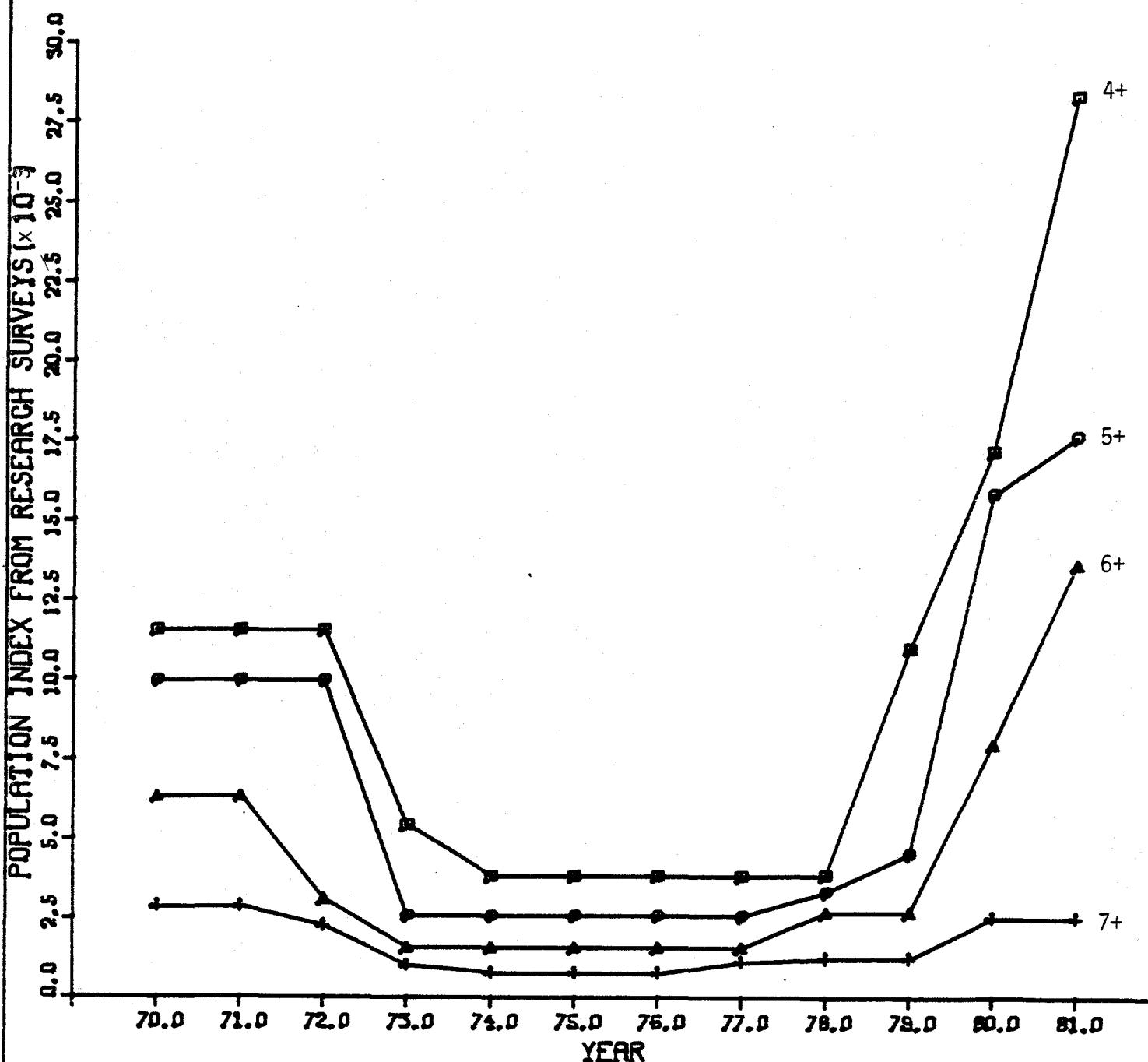


Figure 2. Research Survey population indices (3 year median smooth) 4Vn (May-Dec)
Cod. Numbers-at-age 4+, 5+, 6+, 7+.

Figure 3a. Comparing Age Composition from Research Surveys and Longliners 1970
Cod 4Vn (May-Dec).

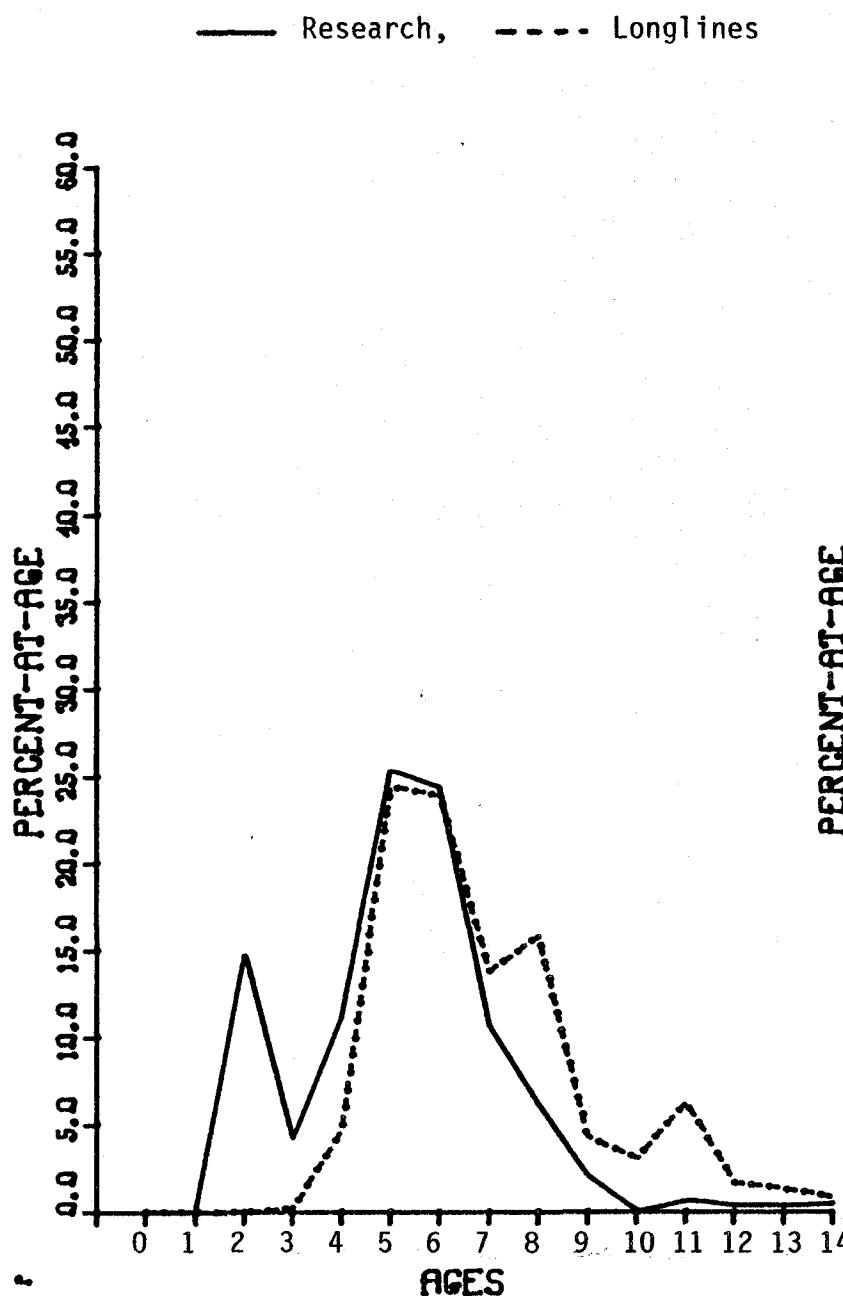


Figure 3b. Comparing Age Composition from Research Surveys and Longliners 1971
Cod 4Vn (May-Dec).

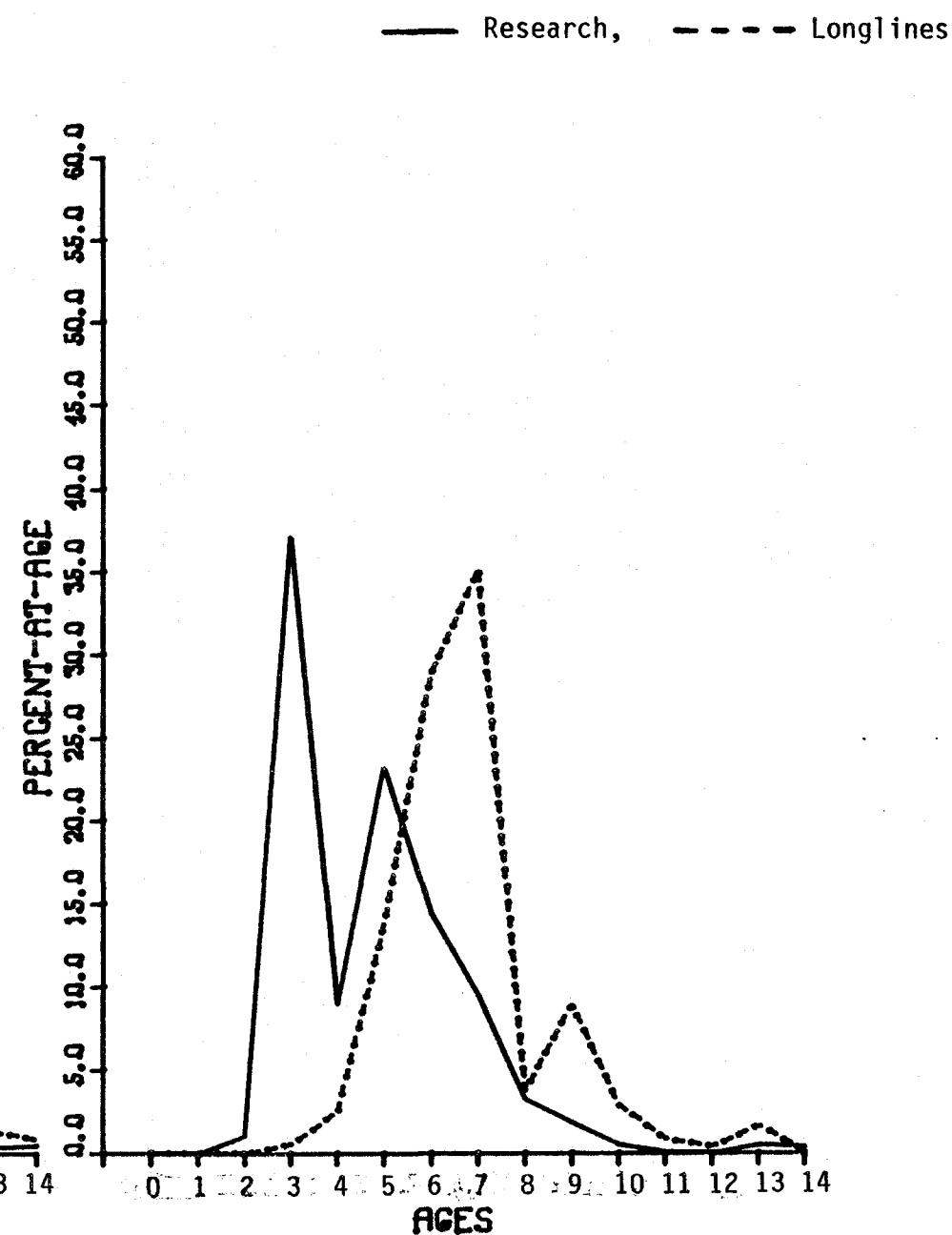


Fig. 3c. Comparing age composition from Research Surveys and longliners 1972 (Cod 4Vn, M-D).

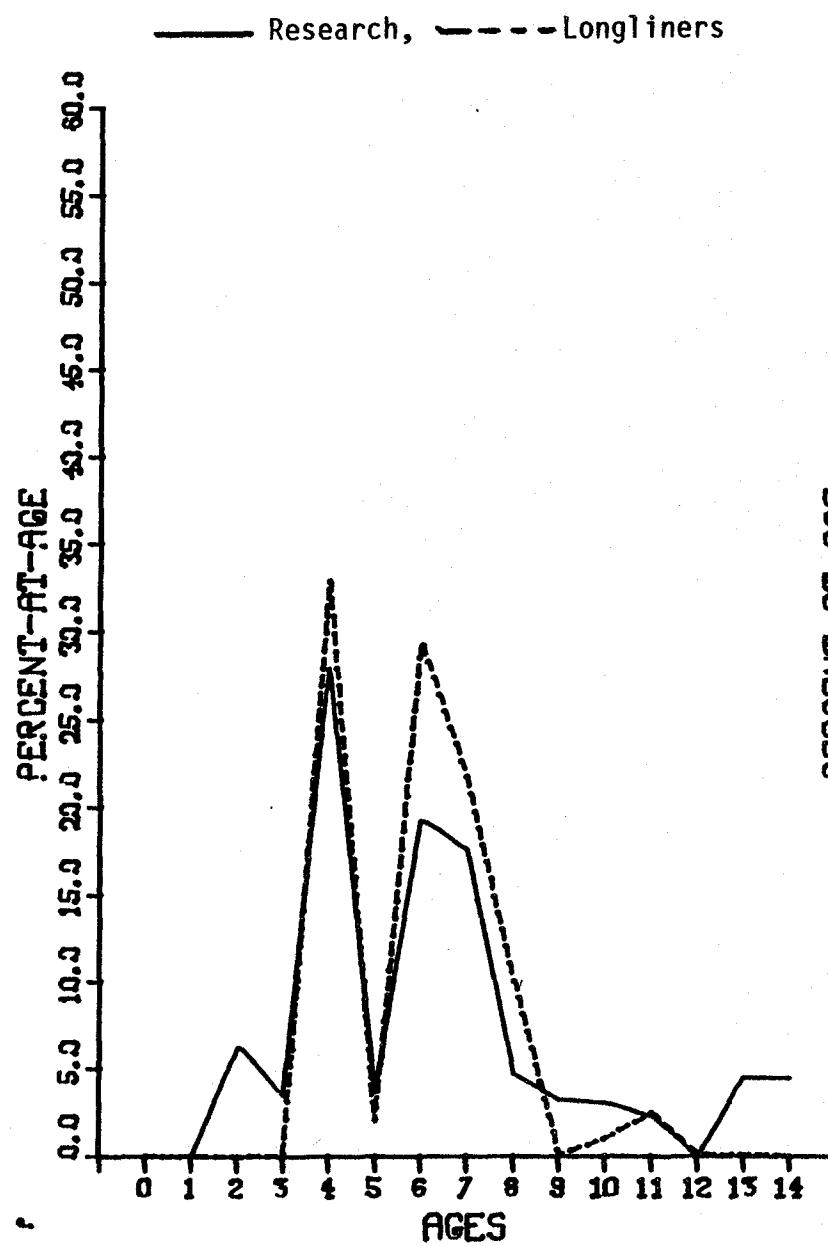


Fig. 3d. Comparing age composition from Research Surveys and longliners 1973 (Cod 4Vn, M-D).

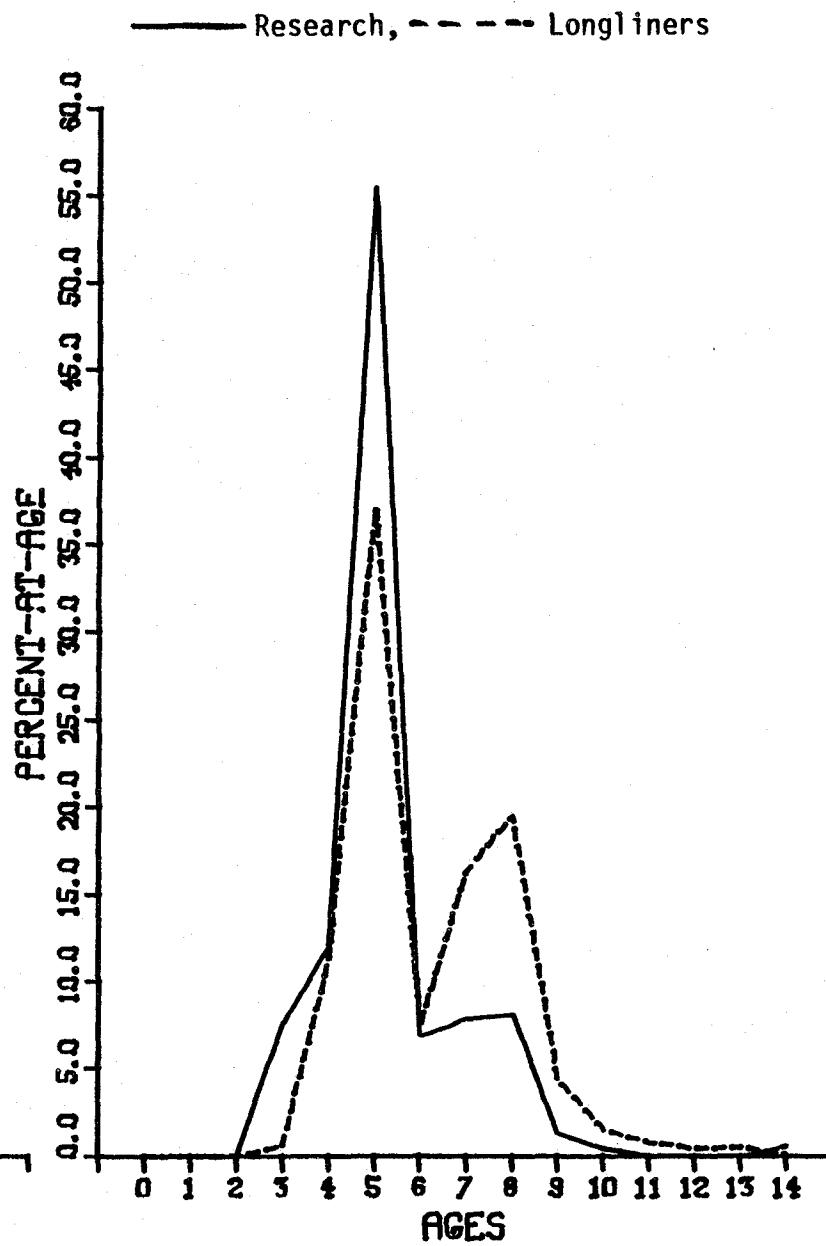


Figure 3e. Comparing Age Composition from Research Surveys and Longliners 1974 (Cod 4Vn, May-Dec.)

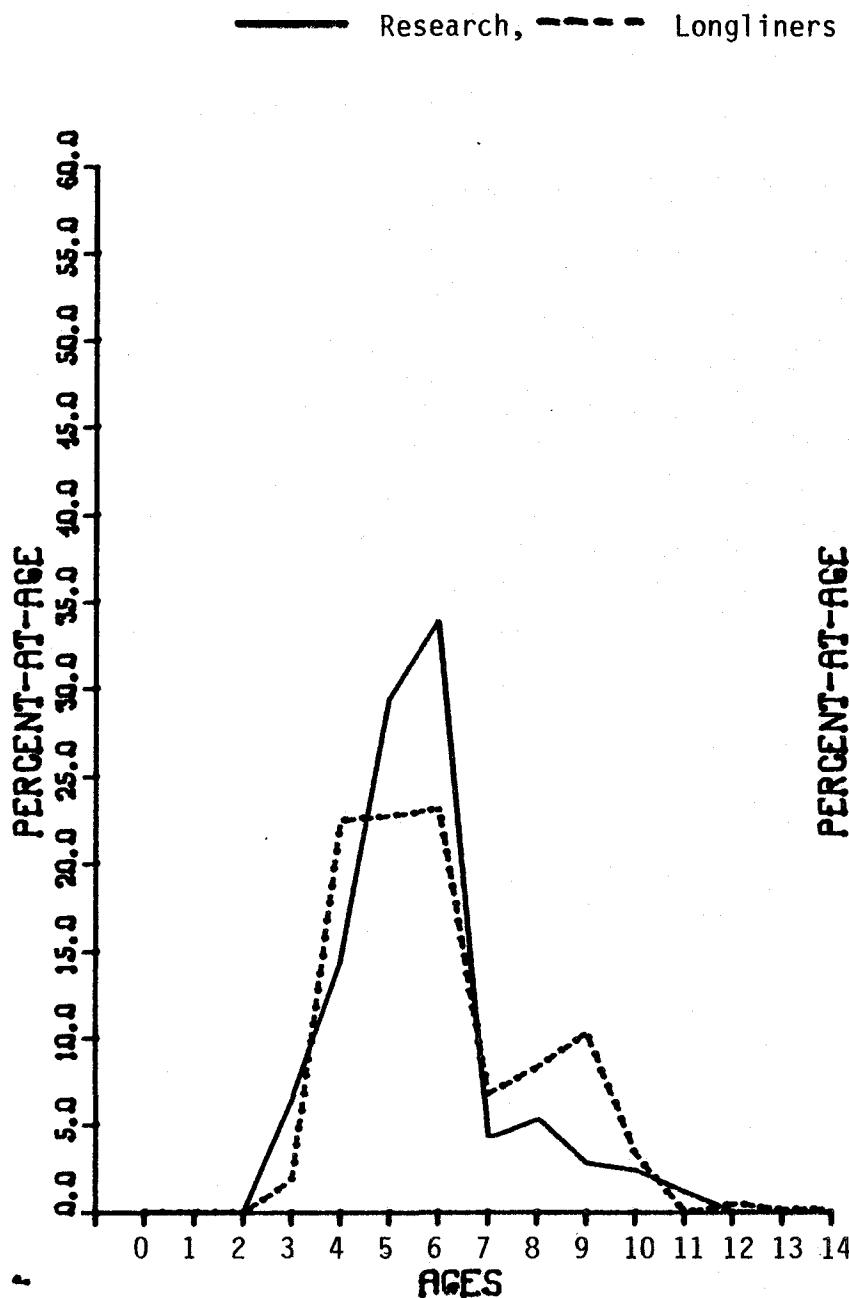


Figure 3f. Comparing Age Composition from Research Surveys and Longliners 1975 (Cod 4Vn, May-Dec.)

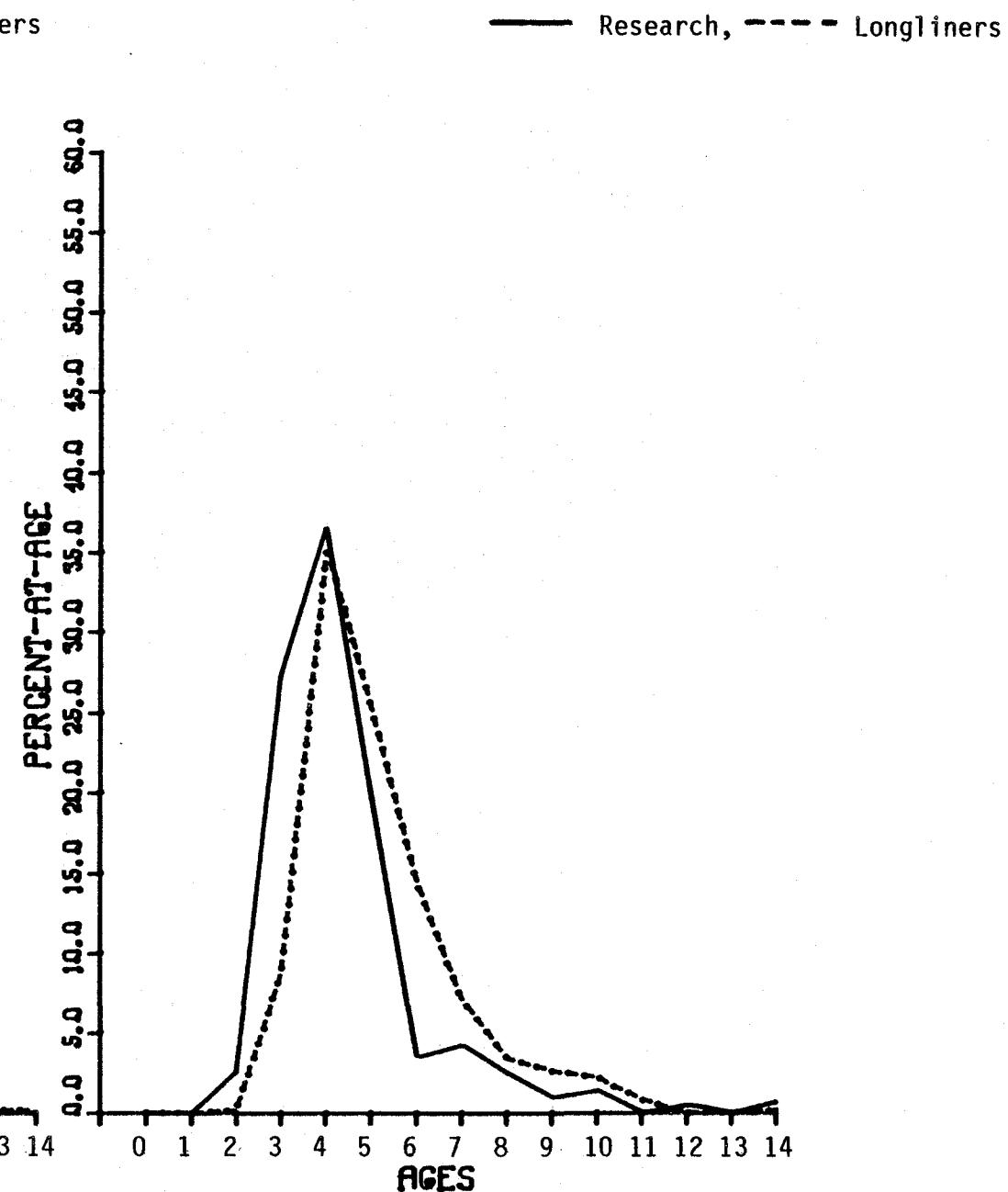


Fig. 3g. Comparing age composition from Research Surveys and longliners 1976 (Cod 4Vn, M-D).

— Research, - - - Longliners

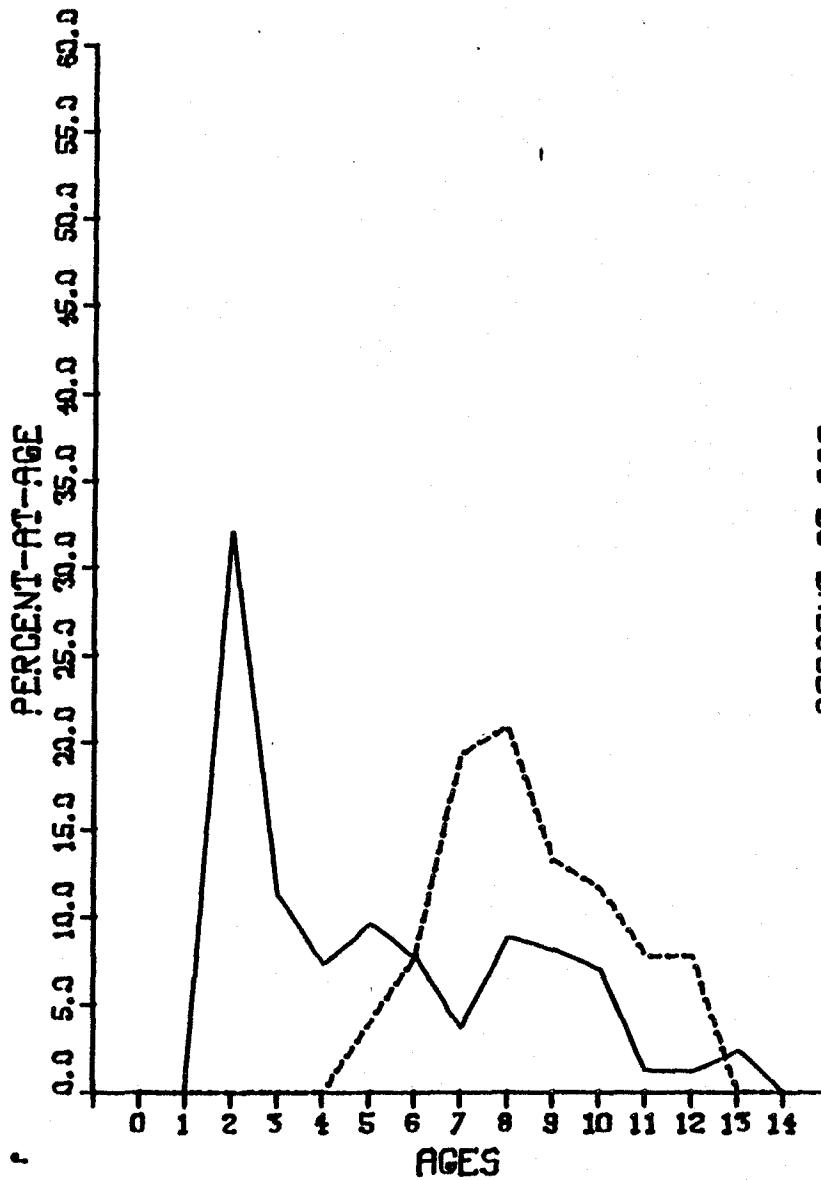


Fig. 3h. Comparing age composition from Research Surveys and longliners 1978 (Cod 4Vn, M-D).

— Research, - - - Longliners

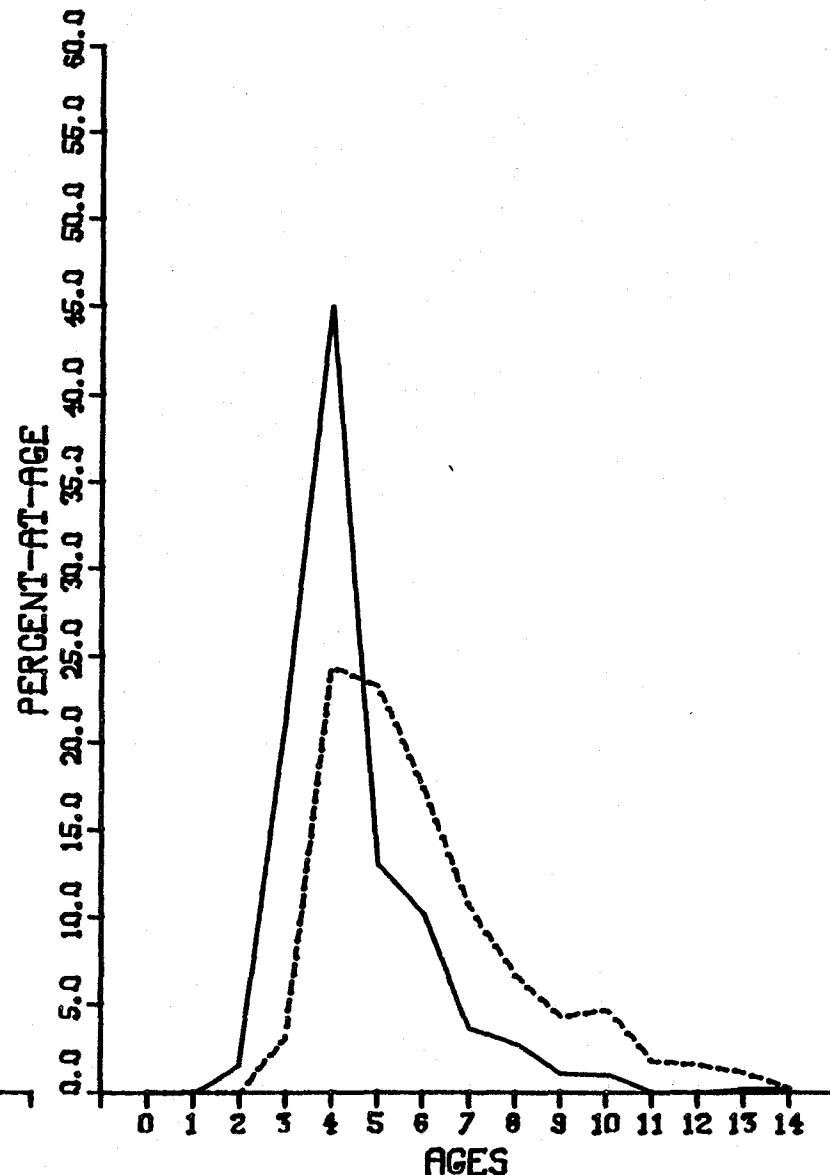


Fig. 3i. Comparing age composition from Research Surveys and longliners 1979 (Cod 4Vn, M-D).

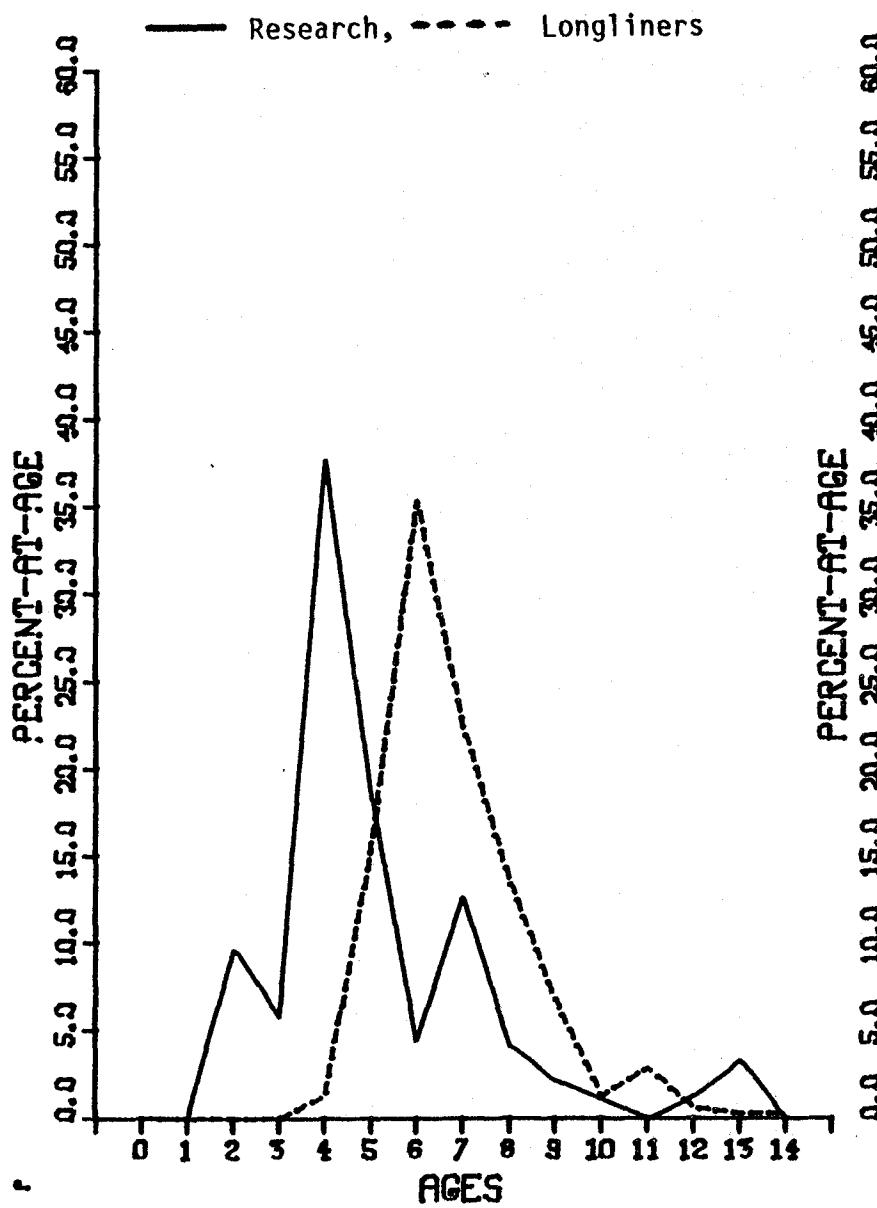


Fig. 3j. Comparing age composition from Research Surveys and longliners 1980 (Cod 4Vn, M-D).

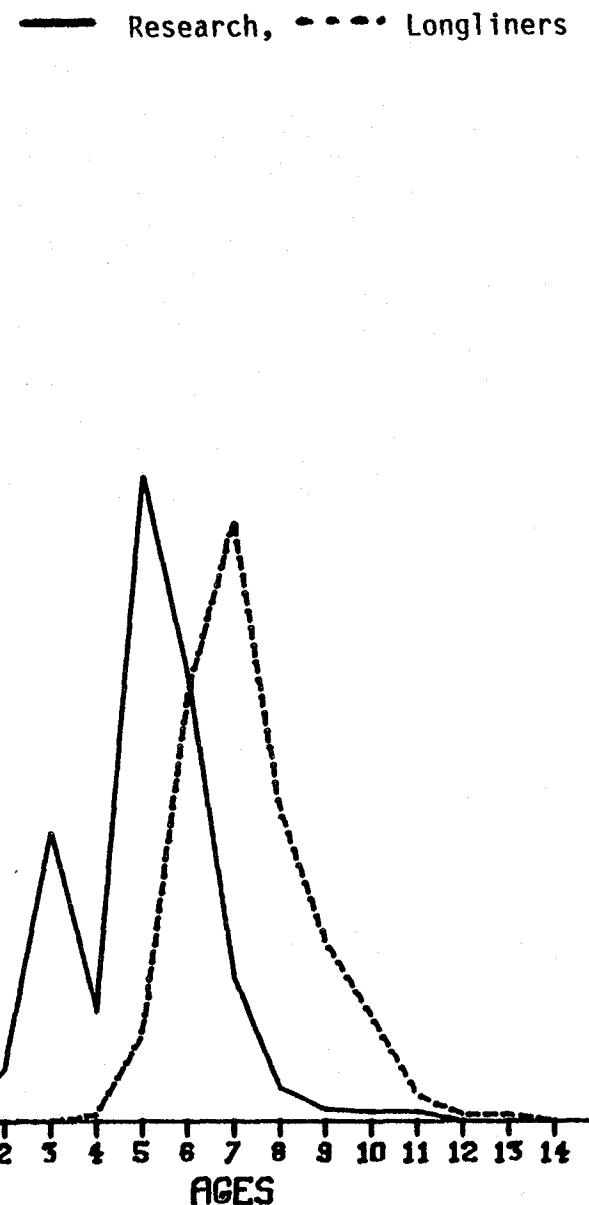


Fig. 3k. Comparing age composition
from Research Surveys and
longliners 1981 (Cod 4Vn, M-D).

— Research, - - - Longliners

