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Offshore and Inshore Catches of Atlantic cod in NAFO

Divisions 2J, 3K, and 3L during 1958-83

by

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INTRODUCTION

During the early 1960's European trawlers began an intensive winter and spring fishery on the pre-spawning, spawning, and post-spawning concentrations of cod on the Southern Labrador Shelf. This fishery was mainly on the southeastern slopes of Hamilton Bank in depths of about 230-370 m. There was also an autumn trawler fishery in Div. 2J during the 1960's (Templeman 1966). Apparently, as a result of the increased offshore landings, the catch per unit effort in the inshore fishery declined markedly (May 1967), even though the offshore catch per unit effort increased. Templeman et al. (1976), based on infection rates of the gill parasite *Lernaeocera branchialis*, stated that the larger offshore and inshore fish of Div. 2J and 3K were from the same intermingling population but that the smaller offshore fish did not visit the coast in sufficient numbers to obtain high infection rates. They attributed the relative failure of the cod fishery of coastal Labrador and northeastern Newfoundland to the great reduction in numbers of larger, older cod of NAFO Subarea 2 and Div. 3K by the offshore fishery. The inshore fishery failed in spite of the presence in the related offshore areas of large populations of smaller, younger cod available to the winter-spring offshore fishery.

Earlier taggings (Templeman 1979) and more recent taggings of Atlantic cod (Lear MS 1982) demonstrate that the several major offshore components of the 2J3KL stock complex contribute to the coastal inshore fishery in specific, though wide, geographic areas from Labrador to southeastern Newfoundland, including the entrance to the Strait of Belle Isle. Thus the effects of a sustained high exploitation rate on a major offshore component of the overwintering concentration would be expected to have an adverse effect on the coastal inshore fishery.

Total catches of cod offshore and inshore by NAFO Division are presented in this paper to determine the trends and effects of offshore catches on subsequent inshore catches during 1958-82. Also, catches during 1978-83 for Fisheries and Oceans statistical areas by Newfoundland fishermen are presented to show the distribution of catches inshore and offshore by fishing season and to determine if catches offshore are concentrated mainly on any specific major cod stock components.

METHODS

Total offshore catches of cod during 1958-82 are reported in ICNAF/NAFO Statistical Bulletins by NAFO Division and month. Any comparison of offshore-inshore catches therefore had to be done on the basis of division. The offshore fishery was conducted mainly during autumn, winter and spring. To reflect the level of offshore catches prior to the summer inshore fishery, the offshore catches are totalled from May-December of a previous year (N-1) and from January-March of a present year (N). These are compared with the inshore catches, totalled from May to December of a present year (N). The inshore catches of the previous year (N-1) for May-December and present year (N) for January-March are also totalled separately with offshore catches for comparisons with the offshore catches and the succeeding inshore catches.

The catches during 1978-83, by Newfoundland fishermen, for Fisheries and Oceans Statistical Areas (Fig. 1) are presented for selected areas and fishing seasons in NAFO Div. 2H, 2J, 3K, 3L, and 4R. The areas selected were those which reflected the fishing activity by the Newfoundland fishery and the assumption is made that this is also

representative of the total fishing activity, especially in 2J, 3K, and 3L. The periods January-April and May-December generally conform to the major offshore and inshore fisheries respectively for Atlantic cod.

RESULTS AND DISCUSSION

The offshore catches in NAFO Div. 2J increased sharply from 1959 to 1961. Catches during 1960-61 to 1966-67 remained relatively stable at about 225,000 t (range from 192,000 to 257,000 t) (Fig. 2). The inshore landings in 2J remained relatively stable up to 1967 even though there was a marked decrease in catch per unit effort during 1959-64 (May 1967). After the large offshore catch during autumn 1967 and winter 1968 there was a steep decline in the inshore catch in 2J from 28,000 t in 1967 to 13,000 t in 1968. After the record offshore catch of the 1968-69 winter fishery, catches both in inshore and offshore 2J declined dramatically possibly in response to the decreased biomass of older cod (7+ years of age) by 40% from 1959-63 to 1964-68 (Pinhorn 1971). The decline in inshore catches of Div. 3K were not quite as sharp as in 2J but generally paralleled the collapse of the 2J stock of older cod. There was a lag of about 1 year before the inshore catches in 3K declined significantly. Even during 1969-71 the inshore catches in 3K remained slightly above 20,000 t, possibly because they were dependent also on the offshore component in 3K where catches did not increase to the same level as in 2J. Only as the total exploitable biomass of 2J3KL stock has increased from 3,111,000 t in 1976 to 16,951,000 t in 1982 (Gavaris and Bishop MS 1983) and the offshore catches regulated at a low level (<80,000 t) have the inshore catches in 2J and 3K begun to increase again. The inshore catches in Div. 3K showed a steady declining trend from 1959 to 1974 (Fig. 3) when it reached a level of 10,749 t. The offshore catches in 3K during 1959-69 increased from 42,000 to 121,000 t and peaked at 145,000 t during the autumn and winter of 1972-73 after which they declined. The inshore catches in Div. 3L showed a similar pattern to those in inshore 3K. The total 2J+3K offshore catch peaked during the autumn of 1968 and winter of 1969 and declined sharply thereafter at the same time as the inshore fisheries collapsed. The offshore catches in Div. 3L during 1959-69 are almost inversely proportional, i.e. a large catch offshore followed by a low catch inshore (Fig. 4). This is what the results of the recent tagging experiments (Lear MS 1982) would lead one to expect since the cod of the northern Grand Bank which migrate inshore do not extend north of Cape Freels in Div. 3K. Thus the inshore fishery in 3L is directly affected by the population biomass of 3L and neighboring 3K with some influence from 2J. Only since the catches from offshore 3L have been decreased have the inshore catches in Div. 3L shown an increase from 22,600 t in 1975 to 57,000 t in 1982 (Fig. 4).

The catches of cod by Newfoundland fishermen by Fisheries and Oceans Statistical Areas (Table 1, Fig. 1) from Div. 2J during 1978-82 indicate that the offshore winter fishery occurred mainly in 203, 206, or 204. Catches were not taken within one area exclusively either within a year or over a period of years. Whereas during January-April 1982, 22,104 t (62% of the offshore catch in 2J) were taken in 203, during 1983, 16,522 t (80%) were taken in 206, the adjoining area. Most of the 2J catch in January-April was taken in 204 during 1978, 1979, and 1980, in 203 and 204 during 1981, in 203 and 206 during 1982, and in 206 during 1983.

The catches from offshore 3K have been mainly from 347, 346, and 343. Catches from offshore 3L have been mainly from 330 (the north cape of the Grand Bank) and 328 (Virgin Rocks). The offshore 3L catches have been mainly during May-December in 330, except for 1983, and almost exclusively during May-December in 328, 326, 327, and 329.

Thus although within a division, the offshore catches mainly during January-April have been localized in one or two areas, the overall catches from 2J3KL have been distributed over the whole area. As an example for 1983 the January-April catches in 2J accounted for 46%, 3K for 31%, and 3L for 25% of the Newfoundland catches in 2J3KL during January-April. Thus for the present at least, the effort is being distributed over most of the area along the outer slopes of the continental shelf of 2J3KL, possibly in response to ice conditions, catch rates, time of spawning concentrations, and dispersals of schools and proximity to fish plants. There is no evidence at present to suggest that any one component is being fished more intensively than others even though there may be a real possibility in some years for this to occur. Over the past several years the fishing pattern, as a result of factors listed above, has generally equalized and regulated itself through the whole area of 2J3KL.

The inshore catches in coastal Labrador (201) increased from 5655 t in 1978 to 12,688 t in 1980 and have decreased since then to 6979 t in 1983 (Table 1). Catches in 208 showed a similar trend. Catches in 209 (Smokey to Hopedale) have shown an increasing trend from 492 t in 1978 to 3313 t in 1982. Catches in 341 and 342 (White Bay and St. Anthony area) increased from 1978 to 1980 but decreased in 1983 to about 8000 t. The 1982 catch was about 13,000 t, about the same as in 1980. Catches from 401, the Strait of Belle Isle, where cod of the 2J3KL stock complex intermingle with cod of the Gulf, also increased from 16,454 t in 1978 to about 30,000 t during 1980, 1982 and 1983.

Inshore catches in other areas: 340 (Green Bay area), 339 (Notre Dame Bay), 338 (Bonavista Bay), and 337 (Trinity Bay) have steadily increased since 1978. Catches in 336 (Conception Bay), 337 (eastern Avalon Peninsula), and 334 (St. Mary's Bay) declined from 1978 to 1980 but have increased again since then to about the same level as during 1978. The 1983 catch figures are provisional and may not reflect the total catch although it is reasonable to assume that they reflect the true catch for Newfoundland fishermen.

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Table 1. Cod landings (metric tons) by Newfoundland fishermen from selected statistical areas in NAFO Divisions 2H, 2J, 3K, 3L, and 4R (+ indicates a catch <500 kg).

Zone	Stat. Area	1978		1979		1980		1981		1982		1983	
		Jan.- April	May- Dec.	Jan.- April	May- Dec.	Jan.- April	May- Dec.	Jan.- April	May- Dec.	Jan.- April	May- Dec.	Jan.- April	May- Dec.
Offshore	202	0	6	0	5	0	0	147	0	946	520	1,391	986
	203	1,238	0	865	9	0	6,654	9,726	224	22,104	3,791	1,177	1,855
	204	2,520	0	5,002	4	3,423	0	4,572	0	1,509	40	1,487	2
	206	199	0	58	6	0	264	1,433	3	8,899	577	16,522	3
	210	0	4	0	1,073	0	13	0	7	162	454	0	172
	211	0	+	77	9	0	17	0	0	2,182	+	0	0
	325	0	10	1	147	45	0	21	0	86	307	30	101
	326	0	116	379	74	0	239	0	132	52	109	3	256
	327	0	150	+	288	0	821	0	196	0	341	0	373
	328	0	2,225	0	2,034	0	851	0	3,597	+	3,402	41	6,238
	329	0	598	7	681	0	1,218	0	1,424	14	1,207	88	1,302
	330	1,445	8	5,434	256	0	10,532	632	12,781	6,310	9,659	10,127	6,465
	331	0	2,219	2,231	211	0	1,135	1,458	172	350	686	459	2,489
	332	0	441	0	2,118	0	2,194	0	1,416	1,684	2,248	768	754
	333	0	285	0	534	0	558	198	1,012	10	1,050	16	2,281
	343	1,204	+	1,759	9	137	2,825	787	0	1,931	951	2,260	2,521
	344	1,208	3	1,682	23	1,614	27	0	4,112	998	236	695	562
	345	2,455	0	13	1,052	1,956	53	1,080	16	74	157	29	291
	346	321	1	2,798	10	3,210	0	1,383	0	2,464	507	3,377	353
	347	457	2	12,528	99	364	8,128	10,805	0	639	698	8,112	4,234
Inshore	201	0	5,655	0	6,826	0	12,688	0	9,325	0	7,544	0	6,979
	208	0	492	104	1,301	0	3,044	0	2,904	0	3,564	0	1,441
	209	0	486	0	813	0	634	0	986	0	3313	0	2,183
	212	0	5	0	67	0	66	0	71	0	1,628	0	151
	215	0	14	0	8	0	34	0	9	0	286	0	66
	334	0	8,924	7,092	2,442	2,804	5,342	0	5,880	29	6,254	18	7,947
	335	0	14,827	0	17,016	0	12,950	51	14,342	34	18,309	3	15,527
	336	0	7,541	1,310	6,018	0	6,164	0	4,965	28	8,285	1	8,038
	337	381	8,667	4,299	5,734	1,830	5,960	2	7,489	611	12,434	99	12,290
	338	0	6,261	0	7,366	3,186	4,643	3	8,875	343	10,751	68	11,716
	339	156	15,052	0	11,239	413	14,986	14	10,393	228	19,073	6	21,947
	340	0	5,687	0	8,015	0	9,127	0	6,046	31	10,762	1	11,139
	341	5	5,076	0	4,559	0	7,503	0	3,780	22	6,748	7	3,813
	342	62	4,017	0	3,533	0	5,421	0	2,924	0	6,048	1	4,908
	401	0	16,454	0	18,930	297	30,285	0	26,196	32	31,114	541	29,184

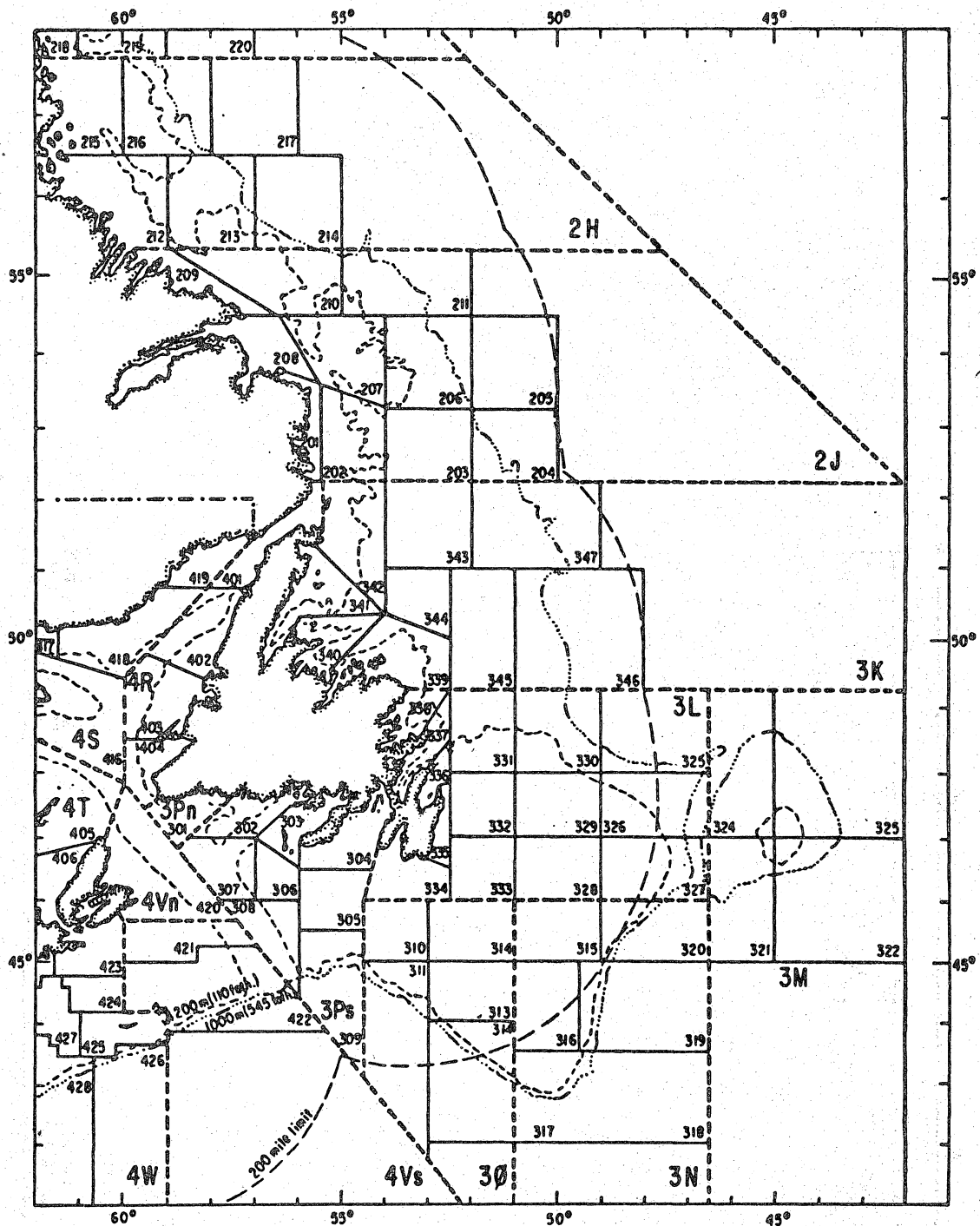


Fig. 1. Area map showing NAFO Divisions and Fisheries and Oceans Statistical Areas.

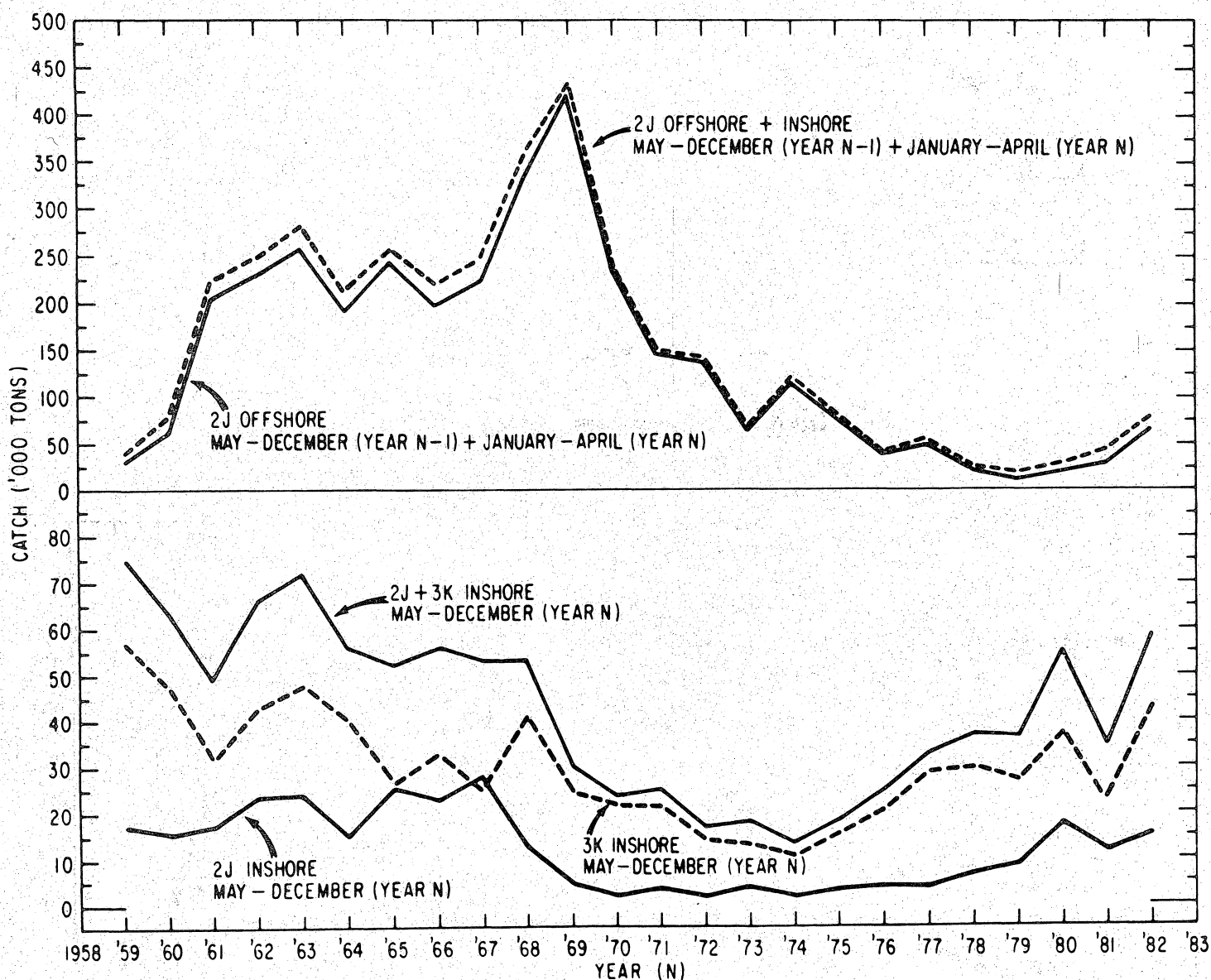


Fig. 2. Catches of Atlantic cod taken in Division 2J during May-April, 1958-82 from offshore areas and in Divisions 2J and 3K during May-December, 1959-82 from inshore areas.

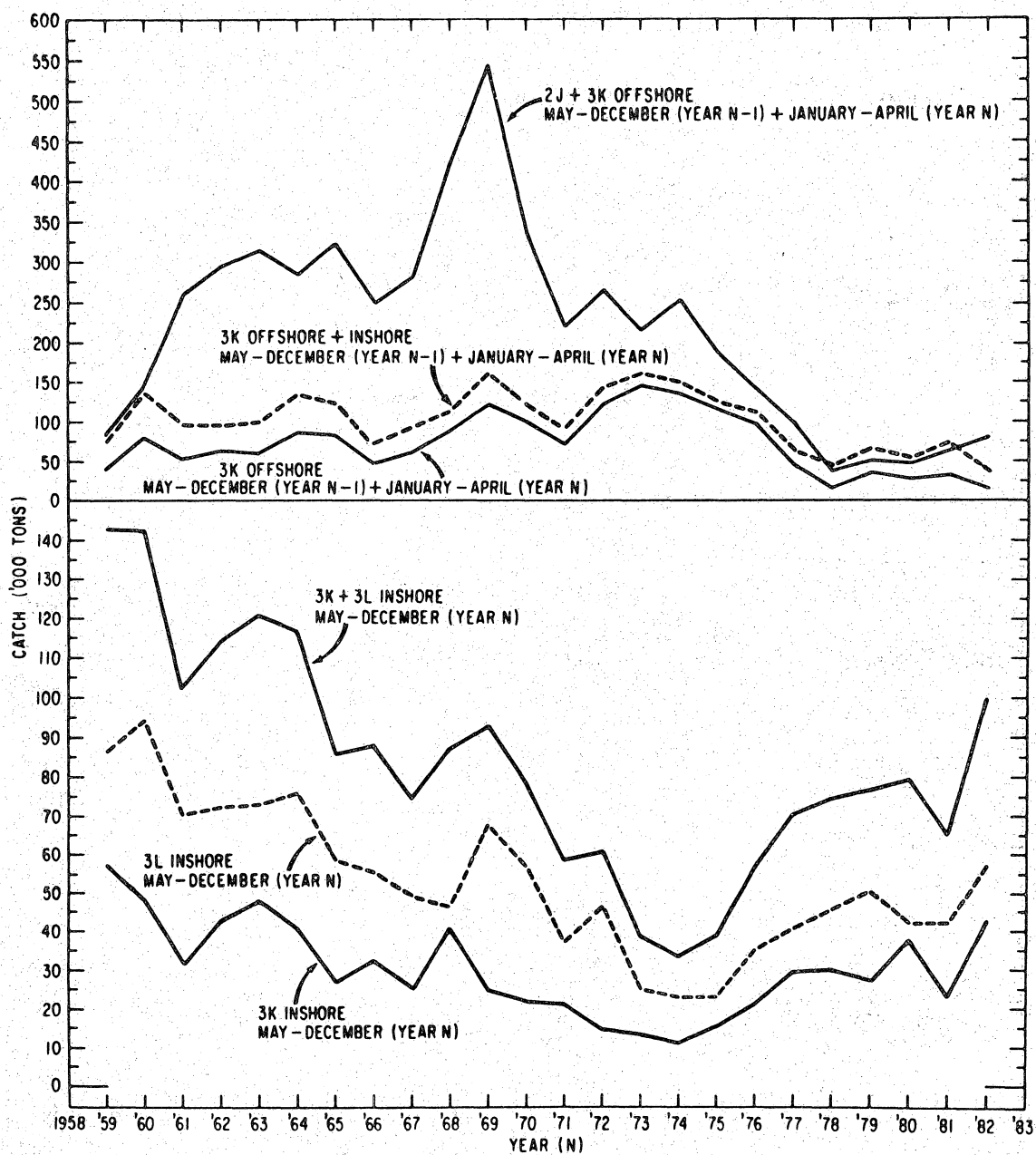


Fig. 3. Catches of Atlantic cod taken in Divisions 2J and 3K during May-April, 1958-82 from offshore areas and in Divisions 3K and 3L during May-December, 1959-82 from inshore areas.

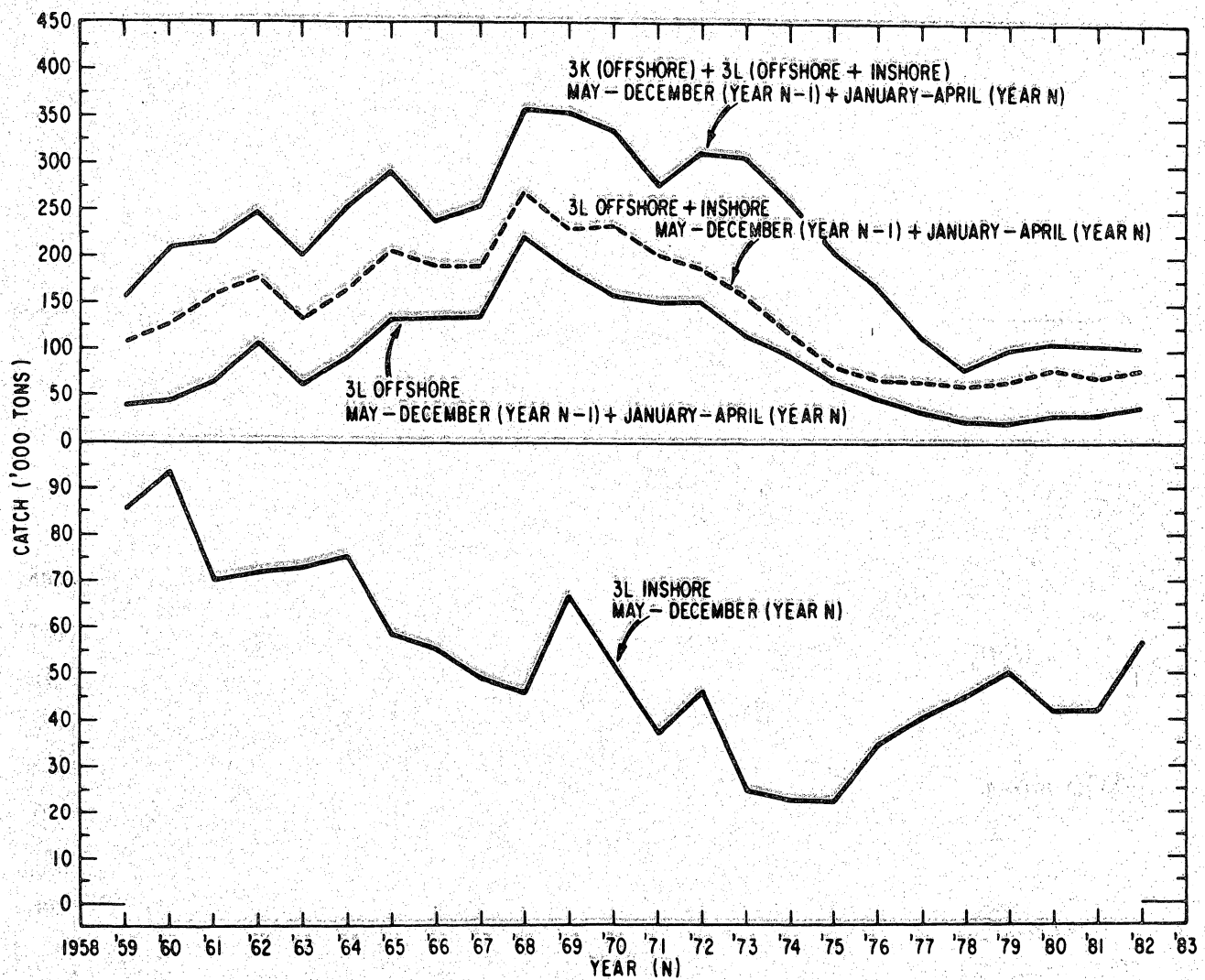


Fig. 4. Catches of Atlantic cod taken in Divisions 3K and 3L during May-April, 1958-82 from offshore and inshore areas and in Division 3L during May-December, 1959-82 from inshore areas.