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Estimating Fishing Activity, Subarea 4

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Estimates of fishing activity related to landings (nominal catch), begun in 1964, are intended to show fairly gross changes in the various ICNAF subareas. This result has been achieved. However, the methods used to estimate fishing activity have been questioned on various occasions. The methodology of estimation for Subarea 4 has not been critically reviewed since its inception.

Since beginning these calculations, the estimated amount of fishing activity in Subarea 4 has been derived from the combined otter trawl-pair trawl fleets. Total days fished by all these trawlers over 50 gross tons were added together. The landings for these vessels were then compiled and, by dividing the latter by the former, an estimate of landings per day fished was obtained. Total landings of all groundfish were then combined (all other gears and by small vessels). Dividing the catch per day into total landings provided an estimate of the fishing activity which would have been required to take these.

This methodology was chosen because, in the early years for which these estimates were made, otter trawlers from 51-500 tons dominated in landings and fishing activity. They still do. However, since about 1963, the proportion of the total landings being provided by the larger trawlers has increased greatly (Fig. 1). Since 1963, trawlers over 1800 tons have taken about half as much fish as those between 51-500 tons. In 1963 and 1964, fish landed by these large trawlers were mainly silver hake. The fishery

was therefore not considered particularly pertinent to the estimates of activity on the more traditional species. Thus no change was made. However, by 1965, the more traditional groundfish species made up more than half the landings by the large trawlers. These changes have prompted us to do a more thorough analysis to see what effect different methods used in computing activity would have on the end result. The analysis provides some interesting comparisons.

Landings per day fished

There are marked differences in the trends in landings per day fished for different segments of the fleet (Table I). From 1957 to 1960, landings per day fished for trawlers of 51-500 tons was between 10-12 tons. From 1962 to 1966, these landings declined to around 8 or 9 tons per day. For trawlers over 500 tons there have been marked fluctuations but no persistent trends. Trawlers of 500-1800 tons caught between 25-30 tons per day, while those over 1800 tons usually had catches of about 33-40 tons per day. Estimates for the pair trawlers show a rather marked increase in catch per day in recent years. Between 1957 and 1961, catch per day was between 11-13 tons, while between 1964 and 1966 it increased to 17-19 tons. The results suggest that the large trawlers (over 500 tons) were able to compensate (at least in the earlier years) for the reduction in catch/effort being experienced by the small trawlers (51-500 tons). Probably the compensation was obtained by more shifting of activity to other species and subareas. The trend for pair trawlers needs to be examined more closely to see whether it is real or some change in reporting.

Estimating fishing activity

The standard estimating technique for Subarea 4 (described earlier) shows the marked increase in fishing activity between 1959 and 1963 and a relatively small change

thereafter (Fig. 2). Levelling off for total activity parallels a plateau for total landings.

However, landings/day fished for large trawlers are much greater than for the 51-500 ton class. Therefore, an "effective fishing effort" comparison, using 1957 as the base year, should really be related to catch/effort for the 51-500 ton trawler class (since large trawlers were much fewer in 1957). Such estimations (dividing total landings by catch/effort for 51-500 ton trawlers) show a much more pronounced increase in fishing activity (Fig. 3). The results, however, do parallel those obtained by the "standard" technique, in that both show the increased activity between 1959 and 1963, and a subsequent levelling off.

The results in Fig. 3, however, suggest a marked drop in fishing activity for 1966, which is not so apparent from the "standard" estimates. The decrease seems spurious and is probably related to the slight increase in landings/day fished by the 51-500 ton trawlers for 1966 versus 1965 (probably related to increased redfish catches).

Discussion

Various methods of weighting landings/day for large trawlers relative to small trawlers have been tried to obtain a better estimate of "effective fishing activity" in Subarea 4. None has proved completely effective. All have been open to possible bias. All have shown the same general pattern of increased activity and a subsequent levelling off in activity. These patterns have been associated with increased landings and then a plateau of landings, with a subsequent downward trend.

Because none of the more elaborate schemes for estimating fishing activity in Subarea 4 gives appreciably better results, it is proposed to continue with the technique used since beginning these activity estimates. However, the methodology should be kept under review to recognize possible changes in fleet pattern.

Mr. Parrish's circular letter, asking for comments on estimating fishing activity, suggested periodic review on changes in activity, not annual estimates. The results presented here indicate that this may be the more reasonable approach. At any rate, statements about changes in activity from year to year must be treated with care.

Table I. Landings (= nominal catch), landings per unit effort and fishing activity, 1957-1966.

		1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Landings ('000 tons)	Cod	188	213	214	218	212	219	218	229	225	215
	Haddock	48	49	53	46	47	44	51	60	85	66
	Redfish	55	55	42	50	42	43	59	53	68	106
	Halibut	3	3	2	3	2	2	2	2	2	2
	Flounder	16	17	20	26	27	25	30	34	48	55
	Silver Hake	-	-	-	-	-	9	123	81	50	10
	TOTAL (Demersal)	369	403	395	406	387	412	586	548	565	541
	Herring	91	92	102	105	81	116	111	140	180	236
Landings (tons) per day fished (all groundfish species)		14	15	14	13	13	12	13	14	13	13
Estimated fishing activity for all groundfish in days fished		26,400	27,100	27,900	31,000	28,800	35,200	45,000	39,100	43,500	42,600
Alternative estimate*		33,500	33,600	32,900	40,600	38,700	45,800	73,250	68,500	70,600	60,100
Landings (tons) per day fished (all groundfish species) by gross tonnage	Over 1800	none	none	none	?	22	35	35	35	41	33
	501-1800	33	25	22	28	31	31	25	36	25	27
	51-500	11	12	12	10	10	9	8	8	8	9
	Pair trawlers (all tonn.)	12	11	11	12	13	13	15	17	19	17
Estimated fishing activity for all groundfish in days fished by gross tonnage	Over 1800	none	none	none	90	28	600	4,006	3,418	3,038	3,077
	501-1800	1,295	2,853	2,747	2,645	2,062	1,274	1,290	1,424	1,539	1,176
	51-500	10,027	10,316	9,949	13,029	12,327	14,124	21,769	20,520	25,737	23,915
	Pair trawlers (all tonn.)	650	986	1,305	2,747	3,164	3,859	3,580	2,856	2,382	3,039

*Based on landings per day fished, 51-500 gross ton otter trawlers only.

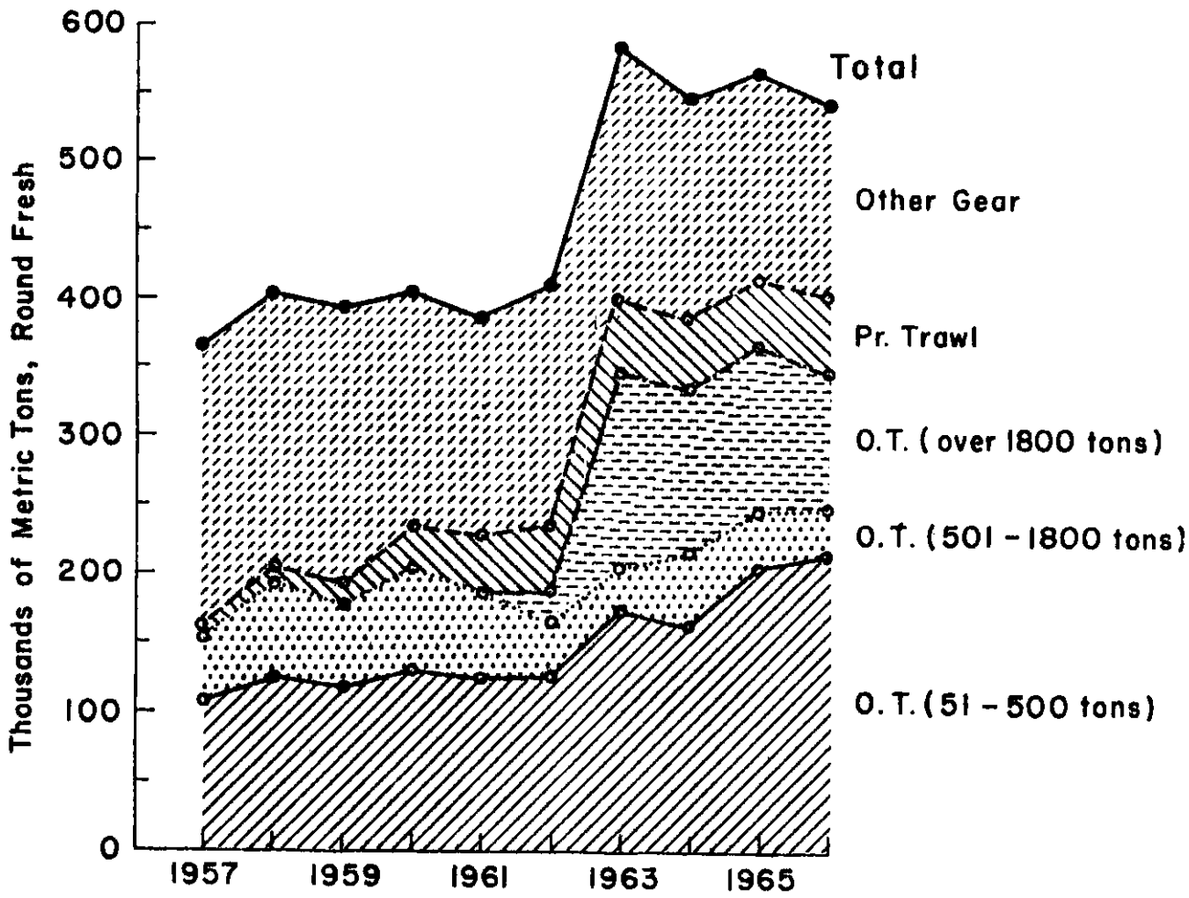

Fig. 1. Landings of groundfish and other demersal species from Subarea 4 by gear and vessel size category.

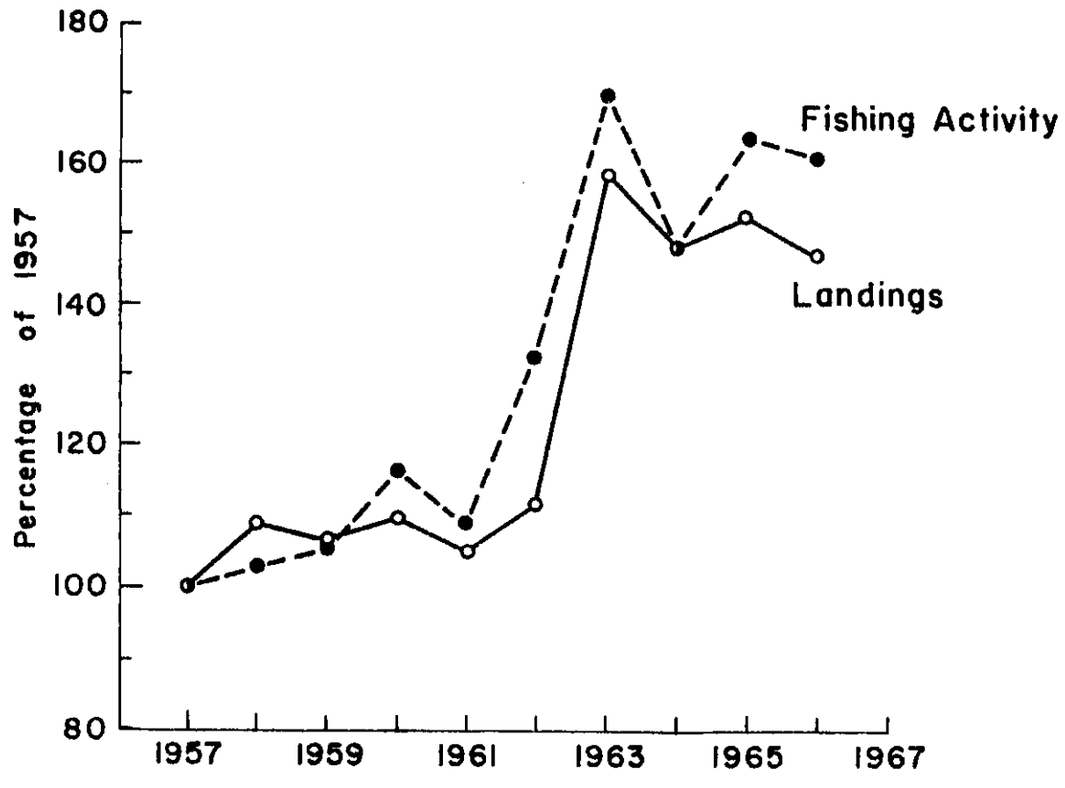

Fig. 2. Groundfish landings and fishing activity, Subarea 4, using days fished and landings/day, all otter trawlers and pair trawlers over 50 tons.

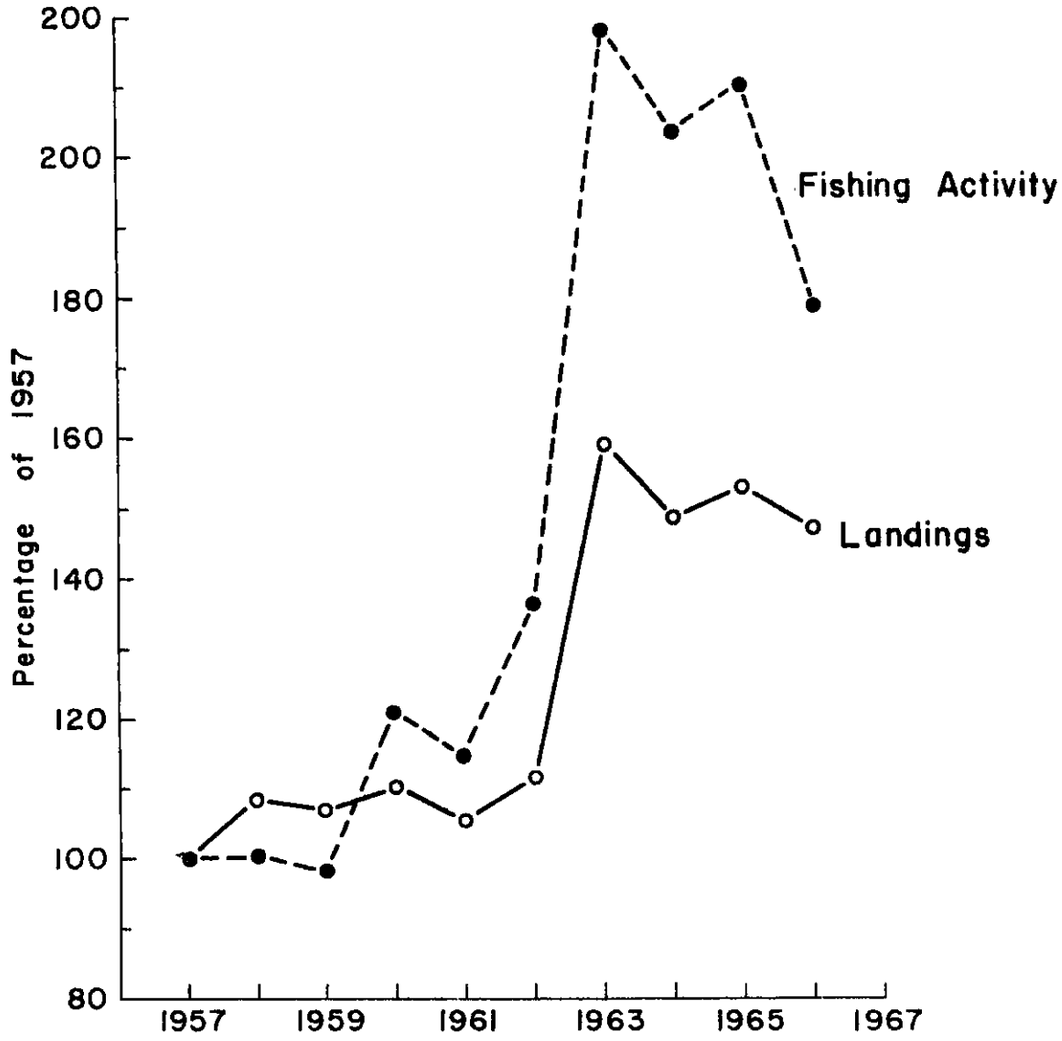

Fig. 3. Groundfish landings and fishing activity, Subarea 4, estimating activity from landings per day for trawlers 51-500 tons.