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Estimates of future abundance levels of cod stocks  
in ICNAF Subarea 5 based on U. S. Research Survey

Cruise Indices

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Introduction

This report summarizes an attempt to utilize abundance estimates of pre-recruit cod in ICNAF Subarea 5, obtained from research vessel surveys, to predict the level of abundance of the exploitable population 2-3 years in advance.

Groundfish Survey Studies

The U. S. research vessel Albatross IV has conducted seasonal groundfish surveys since the summer of 1963. The catch-per-tow from these surveys, which are conducted independently of the existing commercial fishery for cod, has been used to estimate the relative abundance of cod stocks from Subarea 5 (strata 9-30, 36-39). Table 1 presents the stratified mean number of fish caught per tow during the fall survey series from 1963 to 1971, for fish larger than, and fish smaller than or equal to 37 cm. Length frequencies of commercial catches indicate that this length represents first recruitment to the fishery (Brown and Heyerdahl, 1972).

Estimates of Commercial Abundance

When the estimate of abundance of "pre-recruit" fish ( $\geq 37$  cm) from survey data was compared with the commercial landings-per-day-fished (Brown and Heyerdahl, 1972), the best empirical fit was observed by using a three year time lag (Table 2).

This paired data was then plotted and a least-squares linear regression fit to the plot (Figure 1). The resulting regression,  $Y = 1.0528 + 0.174X$ , yielded a coefficient of determination of  $r^2 = 0.808$  with the slope significant at  $F (.005, 1, 4)$ .

Using the fitted line, estimates of the abundance of the commercial stock of cod were made for the years 1972, 1973, and 1974. Confidence limits were then computed at the 98 percent level for the predicted mean values (Table 2). Assuming total fishing effort remains constant over the next three years (1972-1974) the level of commercial stock abundance should also remain relatively unchanged.

Literature Cited

Brown, B. E. and E. G. Heyerdahl. 1972. An assessment of the Georges Bank cod stock (Div. 5Z). ICNAF, Res. Doc. 72/ , 24 p.

Table 1. -- Numbers per tow of cod from U.S. fall survey cruise in ICNAF Subarea 5.

<u>Year</u>	<u>Stratified Mean Number per Tow</u>		
	<u><math>\bar{z}_{37cm}</math></u>	<u><math>\bar{z}_{&gt;37 cm}</math></u>	<u>Total</u>
1963	.40	2.60	3.00
1964	.10	1.86	1.96
1965	.55	1.50	2.05
1966	.70	1.54	2.24
1967	1.54	2.09	3.63
1968	.06	2.09	2.15
1969	.06	1.38	1.44
1970	.75	2.07	2.82
1971	.56	1.51	2.07

Table 2. -- Stratified mean number per tow of fish less than 37 cm from U.S. fall survey cruises and index of commercial abundance in terms of landings per day.

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<u>Year</u>	<u>Number per Tow</u>	<u>Landings per Day (M.T.)</u>	<u>Year</u>
1963	.40	1.1	1966
1964	.10	1.0	1967
1965	.55	1.2	1968
1966	.70	1.2	1969
1967	1.54	1.3	1970
1968	.06	1.2	1971
1969	.06	.95-1.17*	1972
1970	.75	1.10-1.27*	1973
1971	.56	1.07-1.23*	1974

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\*Estimated (98% confidence limits) from regression.

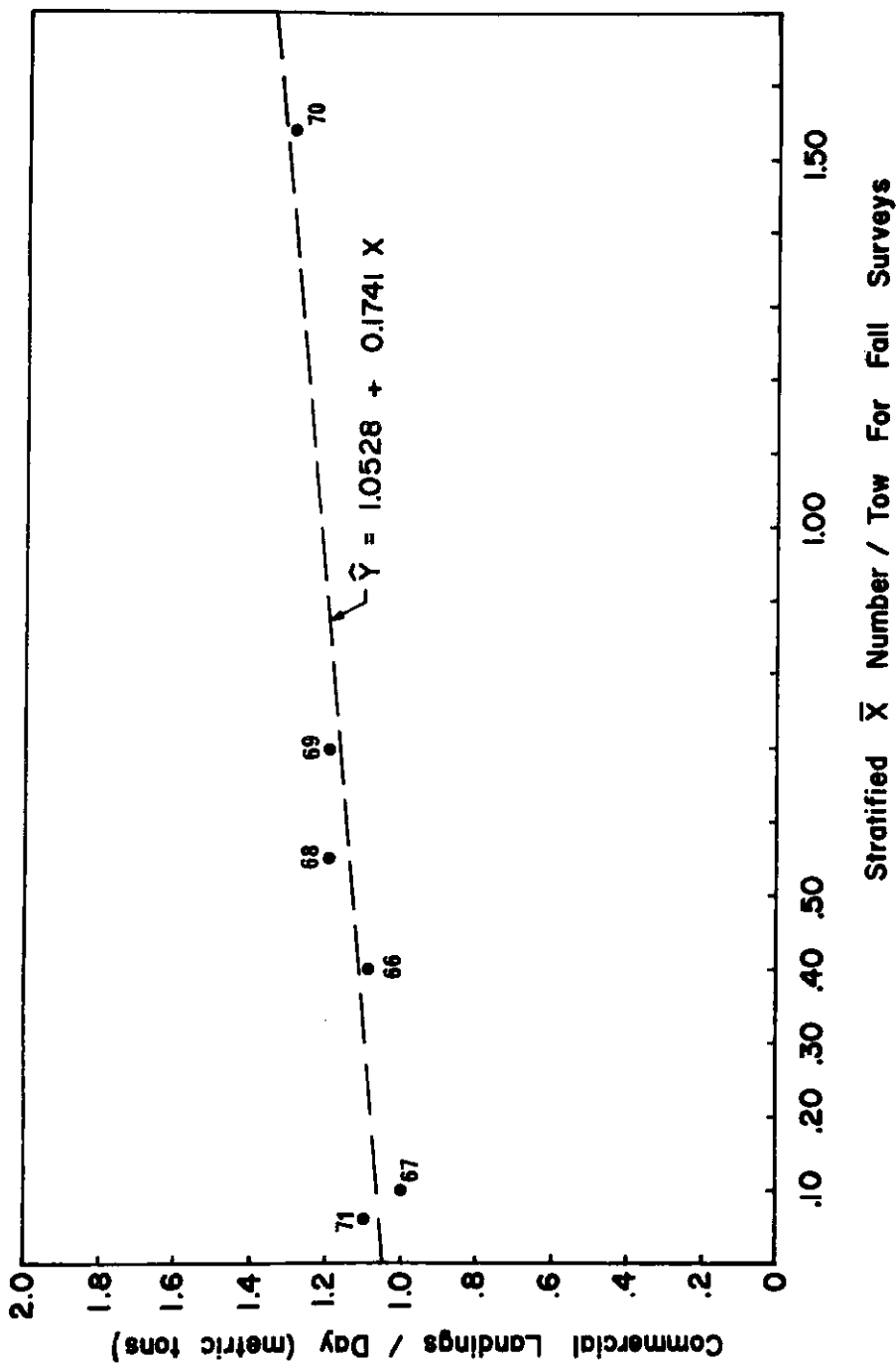


Figure 1. -- Commercial landings-per -day-fished versus numbers per tow from U. S. fall survey cruises, for cod in Subarea 5.