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Growth and mortality changes in cod
from ICNAF Subareas 2 and 3

by

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Abstract

Cod growth and mortality rates for the 1964-68 period are compared with those of the late 1950's and early 1960's. Preliminary analysis in progress indicates growth changes are related to the reduction of older fish in the commercial fishery.

Introduction

Growth and mortality rates for cod in ICNAF divisions 2J, 3KL and 3Ps were estimated for the period 1964-68 and used in mesh assessments by Pinhorn and Wells (1970). A comparison is made with rates derived from the late 1950's and early 1960's. Rates listed by Pinhorn (1970) for 3NO are also included.

Materials and methods

Total mortality

To obtain total mortality estimates (Z) for the 1964-68 period for divisions 2J and 3KL, per thousand age compositions of the landings of each country in each month reported in ICNAF Sampling Yearbooks were adjusted to the numbers landed by that country in that month. These monthly frequencies were then combined by quarters and adjusted to the numbers landed by all countries in each quarter. Age compositions of the total landings in each quarter were then combined for each year and annual catch curves plotted from the resulting percent frequencies. Catch curves for 1964-66 were concave reflecting the recent sharp increase in effort in this area. Z-values estimated for the earlier ages in those years where the catch curves were concave together with the single values for the other years were averaged to produce values in the vicinity of 0.70, the value used in the assessments for 2J and 3KL.

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Total mortality estimates were obtained from Canada (Nfld.) research age frequencies for division 3Ps. Age length keys in each year were adjusted to the catch frequency of the research vessel for that year and catch curves plotted from the resulting percent age frequencies. Z-values estimated for each year were averaged for the 1964-68 period to produce a value of 0.60 which was used in the assessments (Fig. 1).

Estimates of total mortality for the 1956-59 period in 2J were derived as were those for 2J in the 1964-68 period (Fig. 2).

Growth

Bertalanffy growth parameters (L_{∞} , K, t_0) were obtained for divisions 3KL and 2J by fitting curves to combined age-length keys of the countries reporting ages in ICNAF Sampling Yearbooks for the first half of each year, adjusted to the catch frequency of all countries for the first half year. The calculated average lengths at each age from these curves were then averaged for the 1964-68 period and a final curve fitted to these averages.

Growth parameters for division 3Ps were derived in a similar manner, except that Canada (Nfld.) research age-length keys were used and these were adjusted to the catch frequency of the vessel in each year (Fig. 3). The growth curve for 3KL for the period 1960-62 was derived by combining growth curves for 3K and 3L shown in May et al. (1965).

Results

Growth parameters are shown in Table 1 and mortality rates in Table 2.

Analysis of these growth and mortality changes is in progress. Observed changes in growth appear to be correlated with the reduction of older fish in the commercial fishery.

References

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- Wells, R. 1969. Growth estimates for Grand Bank cod, 1963 and 1965. 1969 ICNAF Annual Meeting, Res. Doc. 69/76, Serial No. 2241.
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Table 1. Growth parameters for ICNAF divisions, in Areas 2 and 3, for the periods 1960-62 and 1964-68.

Division	Period	L_{∞}	K	t_0	Source
2J	1964-68	81	.15	-.31	this paper
	1960-62	65	.31	1.74	May et al. (1965)
3KL	1964-68	114	.11	-.35	this paper
	1960-62	89	.21	1.55	derived from 3K and 3L estimates May et al. (1965)
3NO	1963, 65	152	.09	.34	Wells (1969)
	1960-62	130	.12	1.03	May et al. (1965)
	1960-62	140	.11	.60	Williamson (1965)
3Ps	1964-68	137	.10	.13	this paper
	1960-62	101	.17	1.48	May et al. (1965)

Table 2. Total mortality estimates for ICNAF divisions in Areas 2 and 3, for the periods 1964-68 and for the late 1950's.

Division	Period	Z	Source
2J	1964-68	.70	this paper
	1956-59	.63	" "
3KL	1964-68	.70	this paper
	1955-57	.50	Hodder (1964)
3NO	1965	.45	Pinhorn (1969)
	1953-56	.70	Hodder (1964)
3Ps	1964-68	.60	this paper
	1955-59	.37	Williamson (1965)

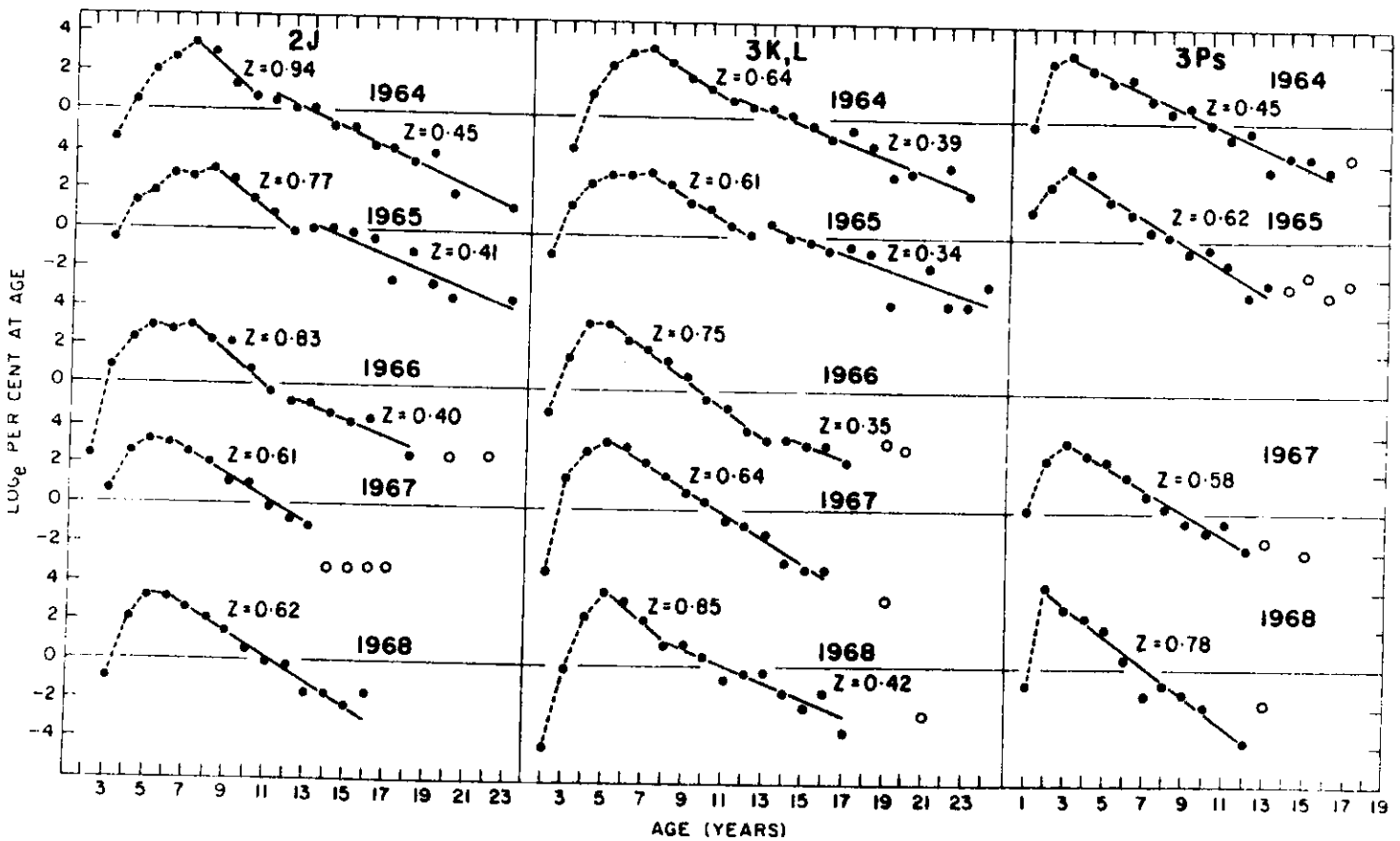


Fig. 1. Catch curves used to derive total mortality estimates for ICNAF Divisions 2J, 3KL and 3Ps, 1964-68. Circled points are not included in fitting straight lines.

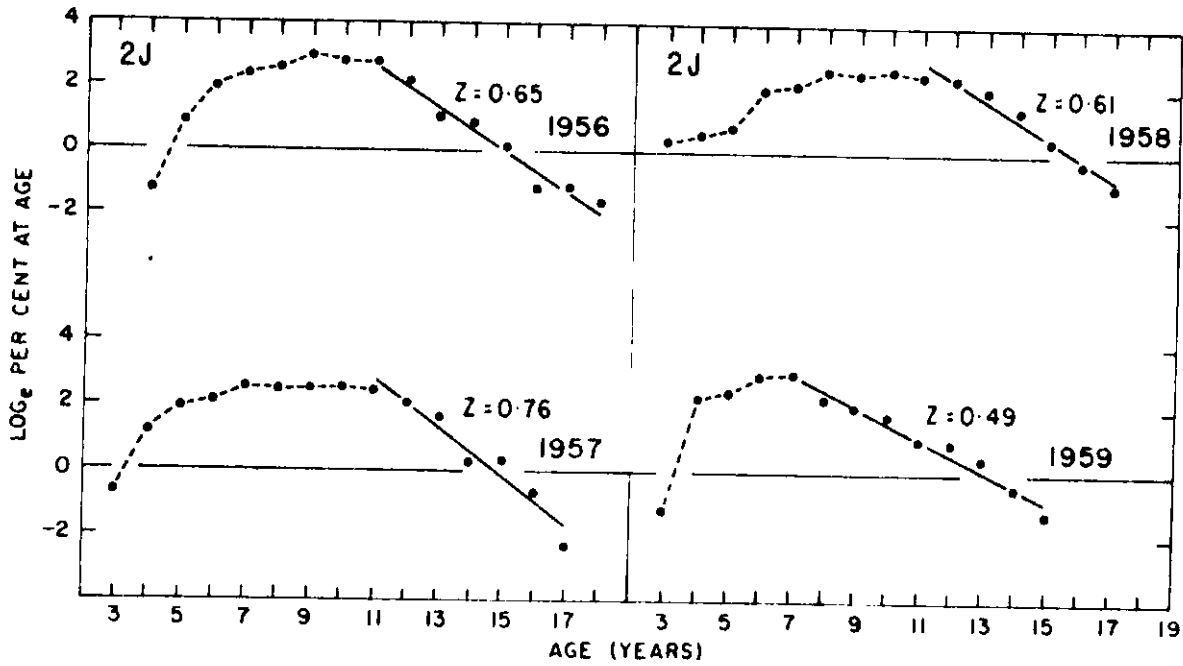


Fig. 2. Catch curves used to derive total mortality estimates for ICNAF Division 2J, 1956-59.

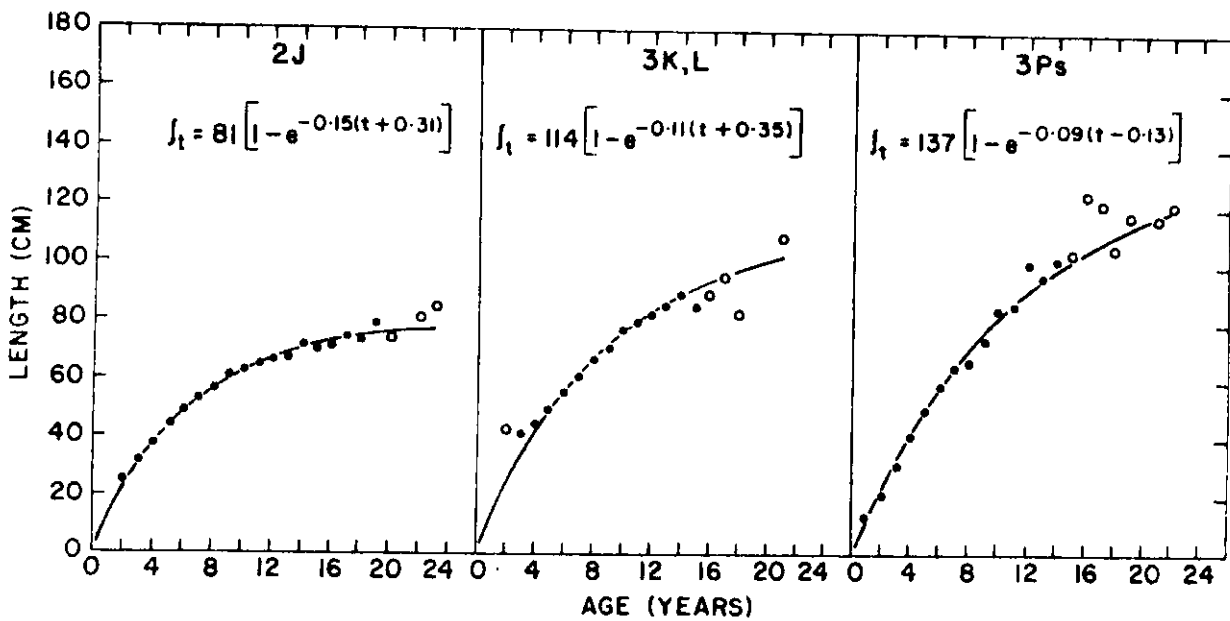


Fig. 3. Bertalanffy growth curves fitted to length at age data from ICNAF Divisions 2J, 3KL and 3Ps, 1964-68. Average lengths are shown; circled points represent less than 10 fish.