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Comparison of mortalities calculated from virtual population assessments and from research vessel survey data for cod stocks in ICNAF Divisions 3NO and 3Ps

by

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Introduction

Mortality estimates at each age for a series of year-classes have been obtained for the major cod stocks in Subareas 2 and 3 by the virtual population technique. Survey data provide independent estimates of average mortality rates for the same year-classes over similar ages. Comparisons between these two sets of estimates are provided in this document for cod stocks in ICNAF Divisions 3NO and 3Ps.

Materials and Methods

Divisions 3NO

Canada (Nfld.) survey data for the years 1963-72 were utilized. The system of surveying for 1963-70 was the standard line survey as outlined by Pinhorn (1971) and the sets made during the cruises in each year were allocated to the strata designed by Pinhorn and Pitt and referred to in Res. Doc. 71/128. The surveys during 1971 and 1972 utilized the stratified-random system and no post-allocation was necessary. Numbers per standard haul at each age were then calculated as indicated by Grosslein (1971). Only the survey data for Division 3N were complete enough to be used for mortality estimates since Division 3O was not surveyed in 1967, 1969, 1970 and 1972 during the same period as the earlier surveys. Log_e of numbers per standard haul were then plotted for the year-classes 1959-64 (Fig. 1) and mortality estimates calculated in the usual manner. Mortality estimates from virtual population assessments were taken from Pinhorn and Wells (1973).

Division 3Ps

Canada (Nfld.) survey data for the years 1957-72 were utilized. Surveys in 1957-70 were with the standard line system and in 1972 with the stratified-random system. No surveys were conducted in 1961, 1966 and 1971. For the years 1957-70 sets were allocated to strata outlined by Pinhorn (1972a) and numbers per standard haul at each age calculated. Log_e of numbers per standard haul were plotted for the year-classes 1952-63 (Fig. 2) and mortality estimates calculated in the usual manner. Mortality estimates from virtual population assessments were taken from Pinhorn (1972b).

Results

3NO cod

Comparisons between mortality estimates from surveys and virtual population assessments (Table 1 and Fig. 1) indicated general agreement with only the last two year-classes, 1963 and 1964, differing to

any great degree (Z from surveys being 1.2 and from virtual population assessments being 0.8). The average for the 6 year-classes was 1.0 from survey data and 0.86 from virtual population data. The catch curve from surveys for all data combined (Fig. 1) resulted in Z = 0.66 and for a similar range of ages and year-classes the average Z was 0.77 from virtual population assessments.

3Ps cod

There was again general agreement between the two sets of estimates with only the 1962 and 1963 year-classes differing to any degree (Z from surveys being 0.76 and 0.82 and from virtual population data being 0.58 and 0.55, respectively). The average for the 12 year-class was 0.69 from surveys and 0.63 from virtual population assessments. The catch curve from surveys for all data combined (Fig. 2) resulted in Z = 0.57 and for a similar range of ages and year-classes 0.61 from virtual population data.

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Table 1. Comparison of mortality estimates from survey data and virtual population assessments.

Year-class	Survey			Virtual Population Assessment		
	$\bar{Z}$	Ages	Years	$\bar{Z}$	Ages	Years
			3NO Cod			
1959	0.86	6-12	1965-71	0.87	5-9	1964-68
1960	0.85	5-12	1965-72	0.92	5-8	1965-68
1961	1.09	4-11	1965-72	0.81	5-9	1966-70
1962	0.93	3-10	1965-72	0.95	5-8	1967-70
1963	1.20	4-9	1967-72	0.82	4-7	1967-70
1964	1.20	4-8	1968-72	0.81	4-6	1968-70
Average	1.02			0.86		
			3Ps Cod			
1952	0.81	5-11	1957-63	0.59	7-11	1959-63
1953	0.59	4-12	1957-65	0.71	6-11	1959-64
1954	0.48	5-11	1959-65	0.49	5-11	1959-65
1955	0.68	4-12	1959-67	0.74	4-11	1959-66
1956	0.64	4-12	1960-68	0.62	4-11	1960-67
1957	0.59	3-12	1960-69	0.54	4-11	1961-68
1958	0.80	5-10	1963-68	0.70	4-10	1962-68
1959	0.58	4-10	1963-69	0.61	4-10	1963-69
1960	0.81	4-12	1964-72	0.69	4-10	1964-70
1961	0.76	4-11	1965-72	0.70	4-10	1965-71
1962	0.76	3-10	1965-72	0.58	4-9	1966-71
1963	0.82	4-9	1967-72	0.55	4-8	1967-71
Average	0.69			0.63		

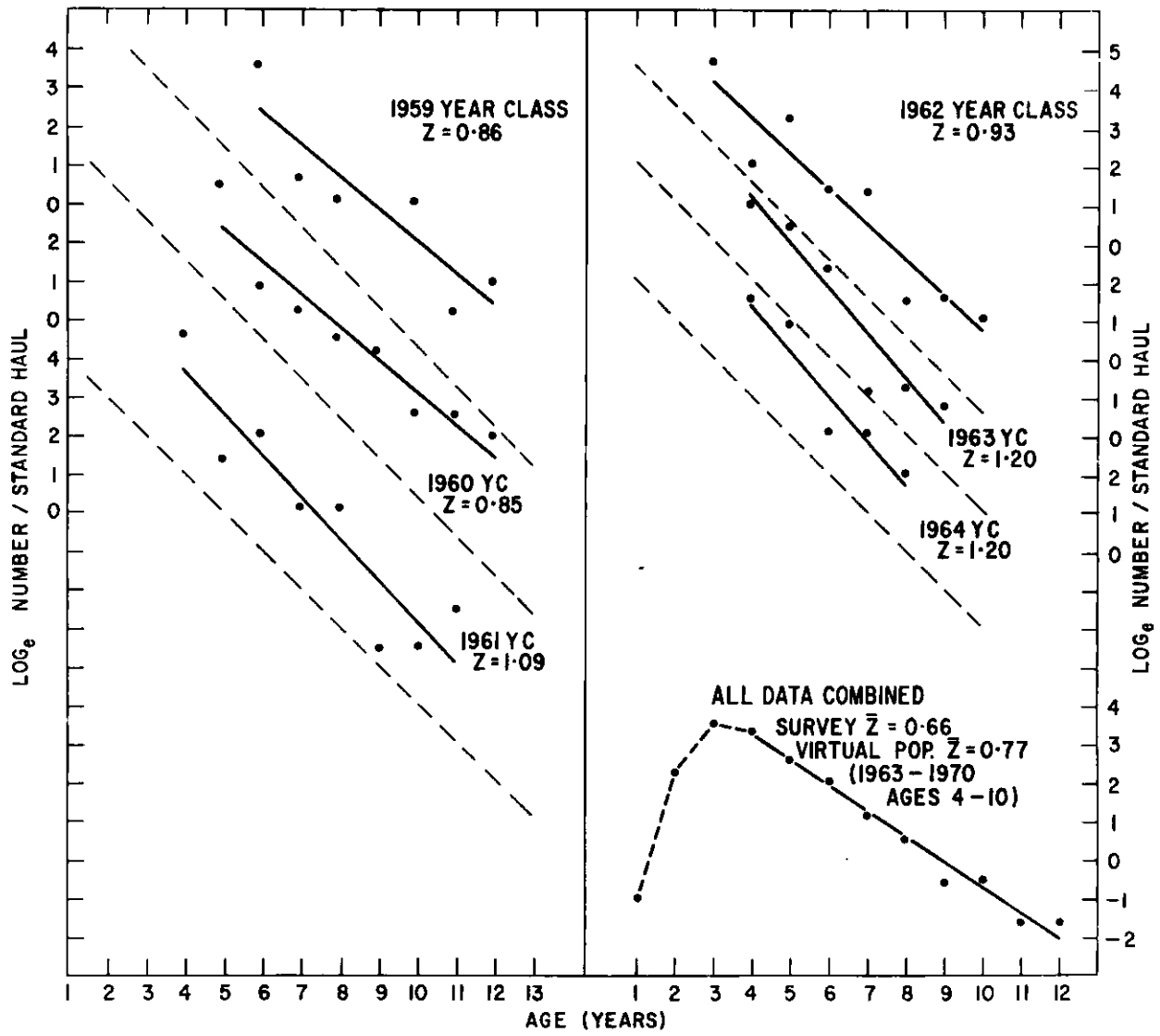

Fig. 1. Catch curves by year-class from survey data and resulting total mortality estimates, 3NO cod.

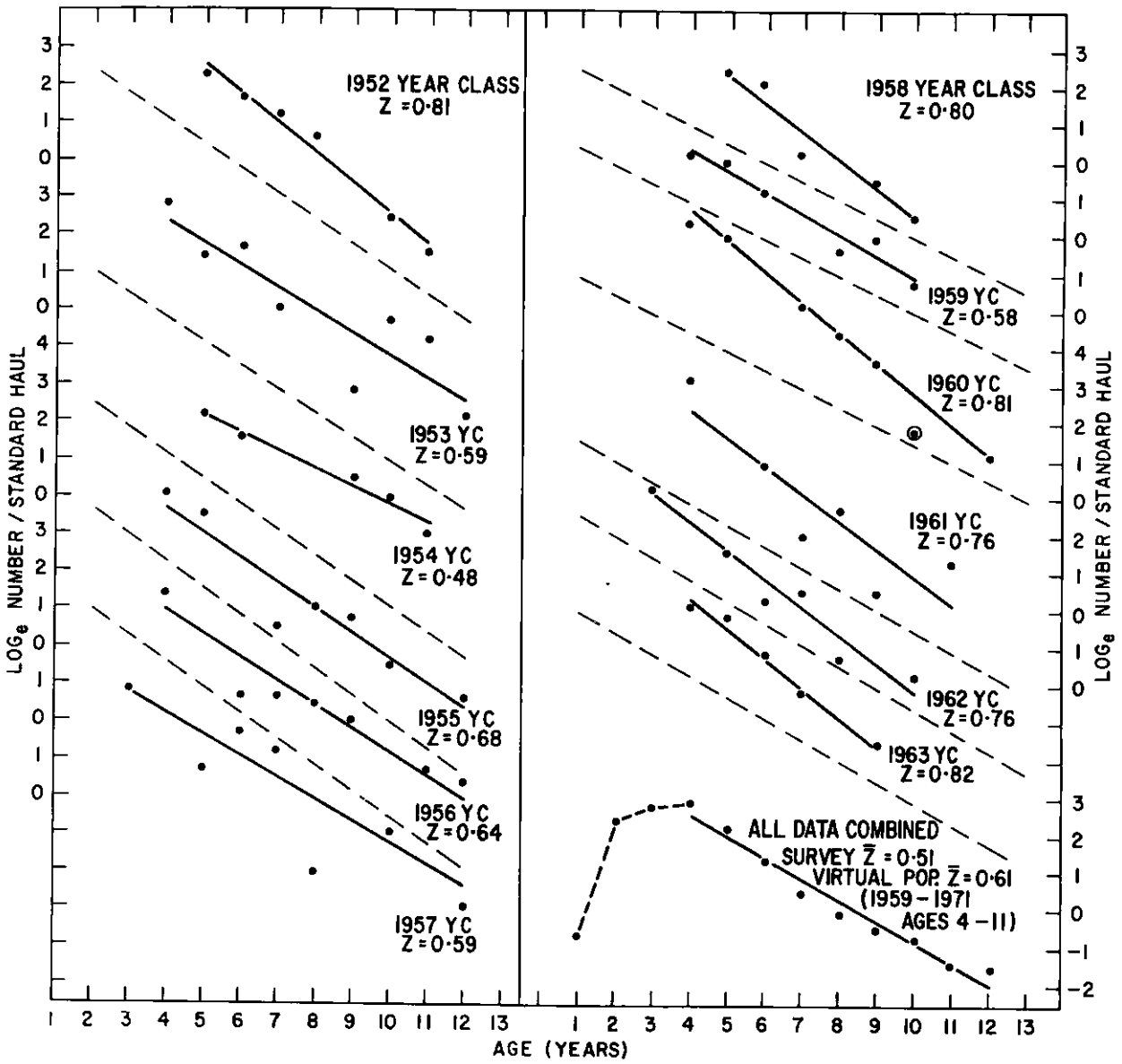

Fig. 2. Catch curves by year-class from survey data and resulting total mortality estimates, 3Ps cod.