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Maximum age of cod in Subareas 2 and 3 with comment
on natural mortality-at-age

by

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INTRODUCTION

The number of ages of cod greater than 20 years is usually quite small in samples reported to NAFO. In many cases, the oldest ages are grouped as an aggregate such as age 15 plus. To determine what age, on average, is a suitable estimate for maximum age of cod for such uses as yield-per-recruit analysis or long-term catch projections, ages available at the St. John's laboratory were examined.

MATERIALS AND METHODS

Ages were determined from otolith sections. Such age determinations were available for the period 1940-83, from samples taken from the commercial fishery and also from research collections. The material includes samples collected at random, samples from large and small specimens selected to augment the random samples and also stratified samples. Samples were mostly from Subareas 2 and 3 but also contained specimens from the eastern Gulf of St. Lawrence. Records of about 414,000 age determinations were available. Of these, some 67,000 were collected at random from research sources.

RESULTS

Ages determined from the entire collection ranged from 0 to 29 years. For ages above 20 years, the numbers of cod were:

Age	21	22	23	24	25	26	27	28	29
Number	355	190	108	74	48	22	4	1	3

After age 26, numbers decline very rapidly.

From the random research samples, catch curves were constructed for the periods 1946-50, 1951-60, 1961-70, and 1946-70. For each of these periods, it is clear that cod of ages 15-20 and older experienced higher total mortality than those younger but still on the descending limb of the catch curve (Fig. 1). From Table 1, it would appear that cod of age 15 and older experienced a total instantaneous mortality of about 0.20 higher than younger cod.

Catches of cod from Subareas 2 and 3 combined were taken from Statistical Bulletin as follows:

Period	Average catch (000 mt)
1951-55	426
1956-60	477
1961-65	736
1966-70	965

For the period 1951-60, the catches appear rather stable. Increasing catches after 1961 would tend to be exemplified by higher mortalities on the younger ages rather than the older ages. It is, therefore, postulated that the increased total mortality after age 15-20 is due to increased natural mortality.

If $M = 0.20$ on ages up to 15 years, it might not be unreasonable to suppose the following schedule:

Ages (years)	Natural mortality
15	.20
16	.24
17	.28
18	.32
19	.36
20 to 26	.40

Age 26 can be considered the maximum age.

Table 1. Total mortality estimates of cod for different periods and groups of ages.

Period	Age group (Years)		Z Estimate		Increase in Z
1946-50	11-20	17-23	.34	.66	.32
1951-60	7-15	15-25	.29	.40	.11
1961-70	7-18	18-26	.27	.48	.21
1946-70	7-13	13-22	.22	.38	.16

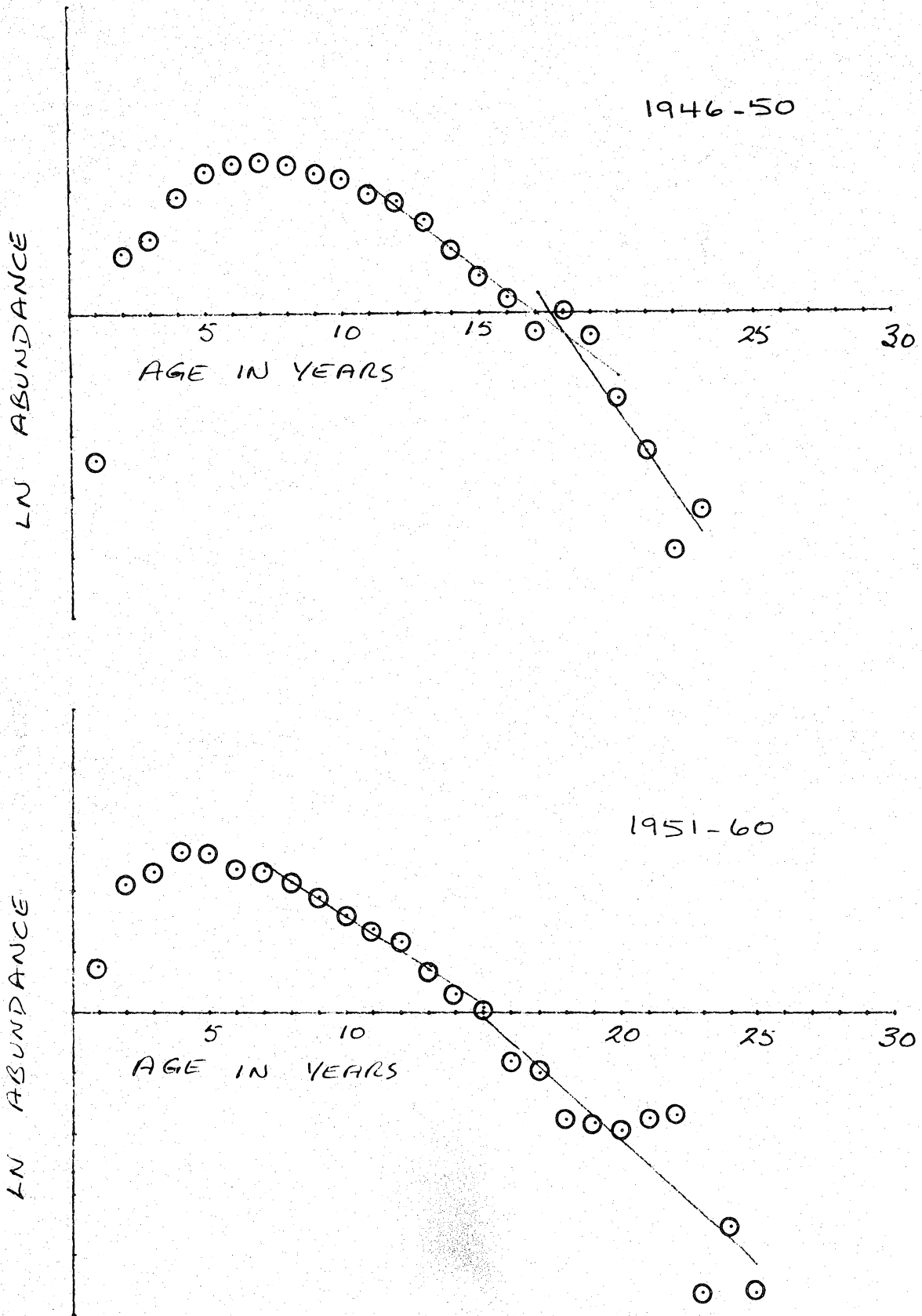


Fig. 1. Catch curves of cod in different periods.

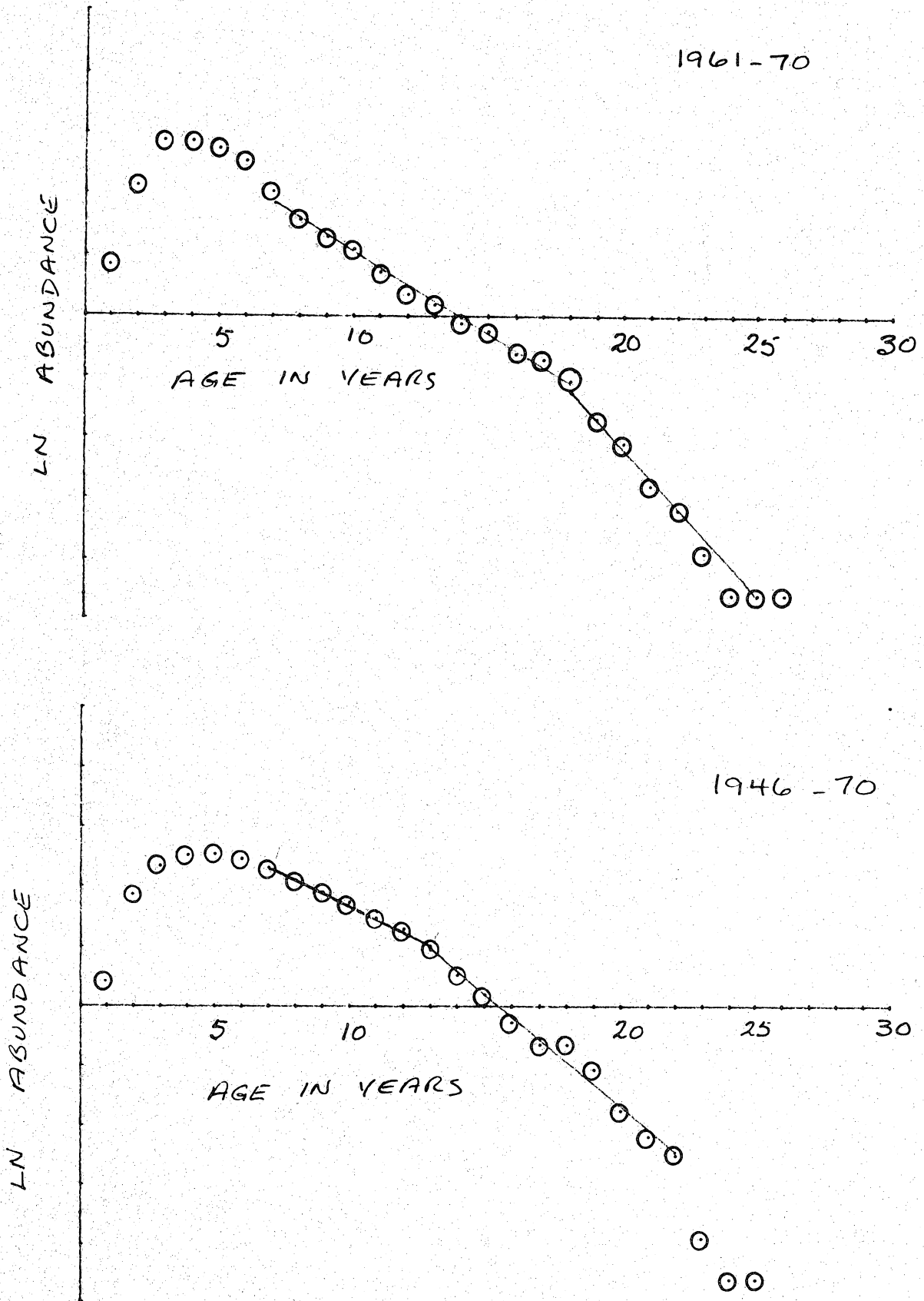


Fig. 1. Continued.