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1986 Canada/USA age comparisons for 5Z haddock

by

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ABSTRACT

Results of three Canada/USA age comparisons on 5Z haddock are presented. The analysis indicates that incongruencies in the first comparison were due to the tendency for the Canadian ager to misinterpret the first annulus, particularly in ages 3 and 4, thereby overestimating the age. In the second and third comparisons, agreement between Canadian and US agers was 93 and 91%, respectively. The method of otolith preparation and the use of ageing material (otoliths vs scales) did not influence the apparent accuracy of the age determinations.

RESUME

On présente les résultats de trois comparaisons ayant eu lieu entre le Canada et les Etats-Unis concernant l'établissement de l'âge de l'aiglefin de la Division 5Z. L'analyse indique que les divergences dans la première comparaison sont dues à une tendance chez les évaluateurs canadiens à mal interpréter le premier anneau, surtout dans les âges 3 et 4, ce qui entraîne une surestimation de l'âge. Dans la deuxième et la troisième comparaison, la concordance entre les résultats obtenus par les évaluateurs canadiens et américains a été de 93 % et de 91 %, respectivement. La méthode de préparation des otolithes et le type de matériel utilisé pour l'établissement de l'âge (otolithes vs écailles) n'ont pas influé sur la précision apparente des résultats obtenus lors de la détermination de l'âge.

INTRODUCTION

Differences in the age composition of the catch of two countries fishing the same stock may reflect true differences in gear selectivity, or the seasonal and age-specific distribution of the population. Considering the 5Z haddock stock, differences in age interpretation must also be considered since each country uses different ageing structures, sample preparation and, of course, age readers. The latter has been compounded by recent personnel changes in both countries due to retirements and reassignment of duties.

Recently, Waiwood and Neilson (MS 1984) indicated that large recruiting year-classes (age 2) in the USA fishery appeared as two adjacent year-classes (ages 2 and 3) in the Canadian fishery (Fig. 1). The apparent strength of the older year-class was not evident in subsequent years suggesting that a significant proportion of the 3-yr-old fish was initially over-aged. This interpretation was supported in a later analysis (Waiwood and Neilson, MS 1985) which demonstrated that, in 1980, there was a higher proportion of fish below 45 cm in the Canadian otter trawl compared to the USA catch although the Canadian age/length keys indicated relatively more, not less, older fish (age 3) in the Canadian catch (Fig. 2). An ageing comparison between the two laboratories, the Biological Station, St. Andrews and the Northeast Fisheries Center (NEFC), Woods Hole, was recommended in order to determine if apparent differences in ageing were due to differences in interpretation and/or the methods and materials used. This report summarizes the results of three age comparisons conducted in 1986.

METHODS

Three separate ageing comparisons were made involving both commercial and research vessel samples (Table 1). Age determinations were conducted in both laboratories for each collection. In all cases the lengths, but not pre-assigned ages, were available to the age interpreters.

In the first comparison, otoliths were collected from Canadian stern otter trawl samples during June and August, 1985. The otoliths were prepared using the sectioning method of Strong et al. (MS 1985) and sent to the NEFC, for ageing. The ageing samples were then returned to St. Andrews and re-aged.

The second comparison was based on samples collected on the 1985 National Marine Fisheries Service (NMFS) fall survey in Division 5Z. Both scales and otoliths from the same fish were removed and aged using NEFC methods. Scale impressions were made on cellulose acetate strips and projected for reading (Arnold 1951). The sagitta were embedded in black wax on small cards and sectioned through the nucleus with an Isomet saw. The otoliths were sent to St. Andrews for re-ageing.

The third comparison involved otoliths from the length-stratified samples collected during the 1986 Canadian spring survey in Division 5Z. Sagitta were fractured across an interruption in the logitudinal groove (sulcus acusticus) on the convex side, mounted in plasticine, covered in alcohol and examined under reflected light through a Wild M5 dissecting microscope. The otoliths were taken to Woods Hole and read using NEFC procedures.

RESULTS AND DISCUSSION

The first ageing analysis, using the three Canadian commercial samples, was intended more as a training exercise than an actual comparative analysis. Mr. McFarlane was assigned the 5Z ageing responsibility in 1985 and had not been involved with ageing and this stock for about 20 years. The results indicated a 72% agreement between the two age readers (Fig. 3). Nineteen of the incongruent readings were due to the assignation of an extra year by the Canadian age reader, of which 16 occurred in ages 3 and 4. It was concluded that the Canadian reader had misinterpreted the first year's growth in the majority of cases.

In the second comparison (AL 8508) ages 0, 2 and 3 made up about 90% of the total sample (Fig. 4). There was a 93% agreement in ageing between the Canadian and American age readers. Five of the seven disagreements were due to Canadian assigning ages one year older relative to the American age reader. Agreement in age between otoliths and scales with the same American reader (Munroe) was 99%.

The final comparison (NO59), also indicated very good agreement (91%) although the age spread was also relatively restricted (Fig. 5). Seven of the nine incongruencies were ascribed to the assignment of ages by the Canadian age reader, which were one or more years greater than the corresponding values assigned by the American ager.

From the above results, and discussions between the Canadian and American agers, we conclude that the most apparent bias has been the tendency for the Canadian ager to overestimate age of fish from this stock, particularly in the younger ages. Although this bias may also be present in the latter comparisons, the agreement is generally very good (>90%).

This apparent bias has been noted in other comparisons for this stock (Kohler and Clark 1958; Hunt, pers. comm.). Kohler and Clark (1958) demonstrated no significant difference, at least in younger years, between scale vs otolith readings. Their study concluded that in older ages the clarity of annuli at the scale edges diminishes. Saetersdal (1953) also indicated that haddock scale readings gave, in a small percentage of cases, incorrect ages. The methods of otolith preparation (sectioning, cutting or breaking) appear to be equally satisfactory and were considered a question of individual preference. It was noted, however, that in a few cases sectioning the otolith by the method of Strong et al. (MS 1985) missed the nucleus and the first annulus because of incorrect embedding in resin.

To ensure consistency in the future, it is recommended that these comparisons be continued. However, it is suggested that further studies incorporate true "blind" design where neither ager is aware that the sample is being aged for comparative purposes. Intra-reader variation should also be evaluated.

ACKNOWLEDGEMENTS

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Table 1. Details of ageing comparison of Georges Bank haddock by St. Andrews and NEFC.

	Source	Date of collection (Sample #)	Method of peparation	Age reader	N
A	Commercial samples (stern otter trawl)	June (220, 275) Aug. (360)	Strong et al. 1985	Gifford (NEFC) McFarlane (St. A.)	107
B	Albatross (AL8508)	Oct. 1985	[1]Sc. acetate impress.	Munroe (NEFC)	101
			[2]Ot. wax-mounted, sectioned	Munroe (NEFC) McFarlane (St. A.)	
C	Needler (NO59)	May 1986	Hand-broken	McFarlane (St. A.) Munroe (NEFC)	100

1Scales

[2]Otoliths

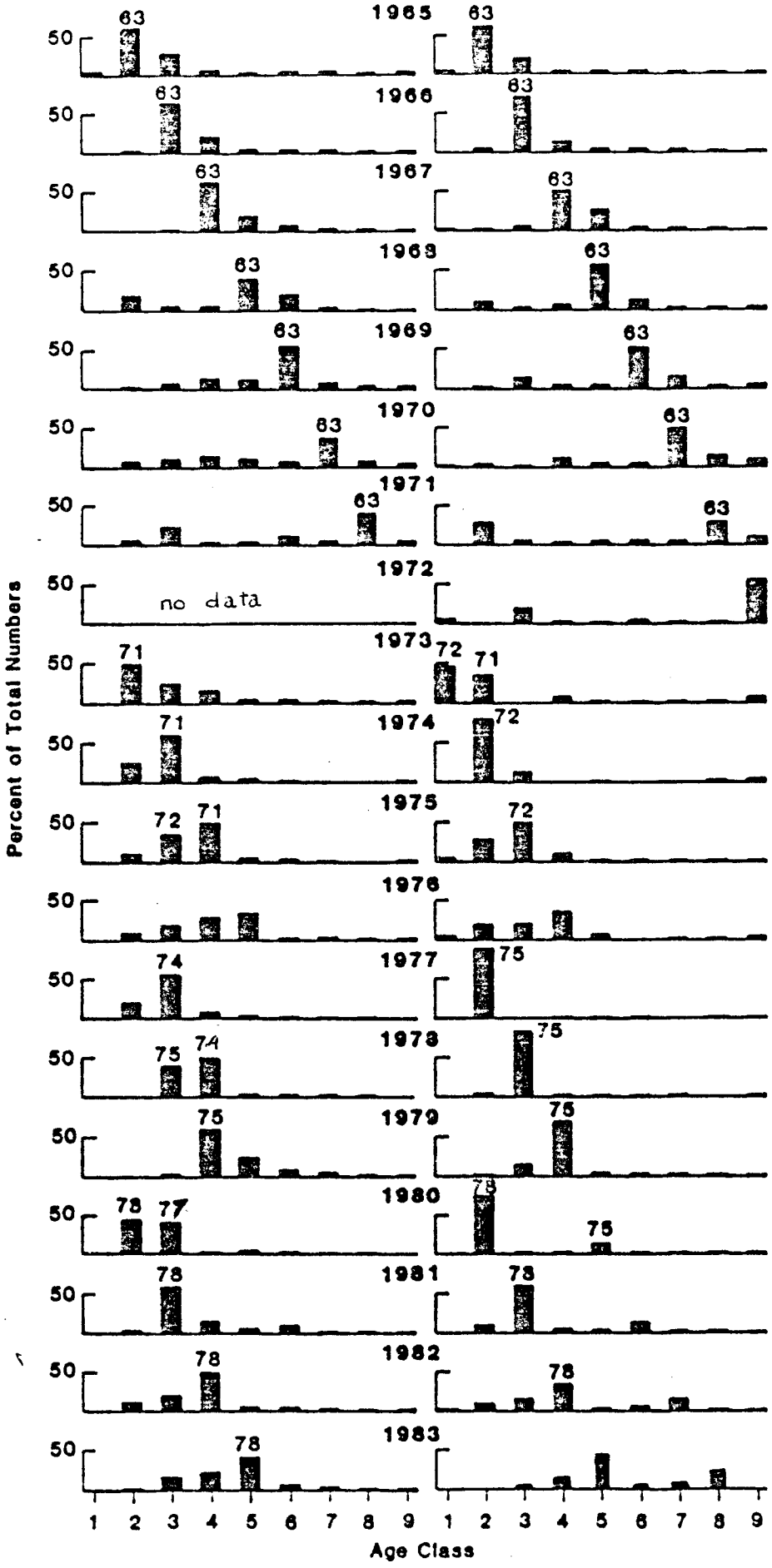

Figure 1. Percent composition by numbers of age-classes in Canadian otter trawl samples (left) and US total fishery (right). From Waiwood and Neilson (MS 1984).

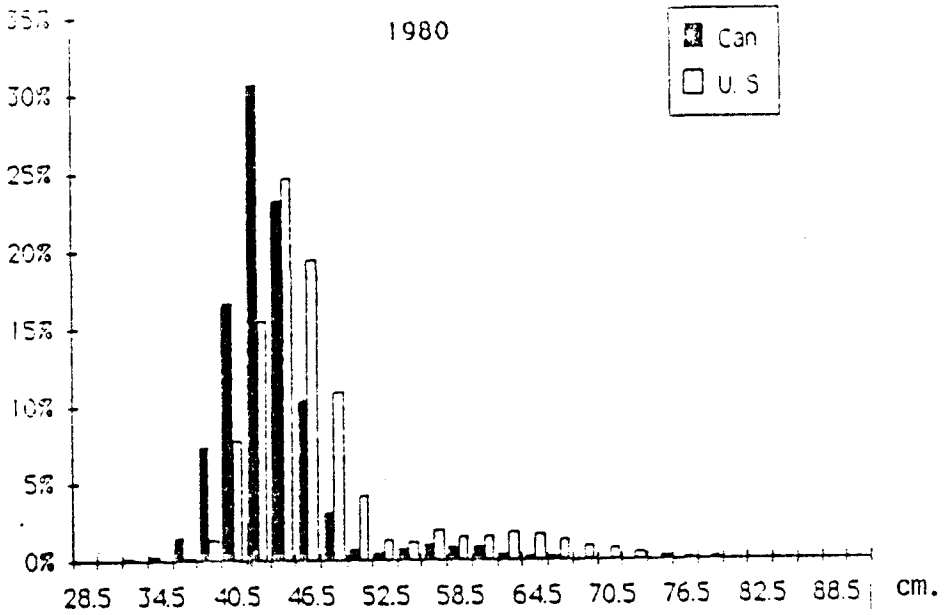

Figure 2. Percent composition by numbers of length categories in Canadian otter trawl samples and US total fishery. From Waiwood and Neilson (MS 1985).

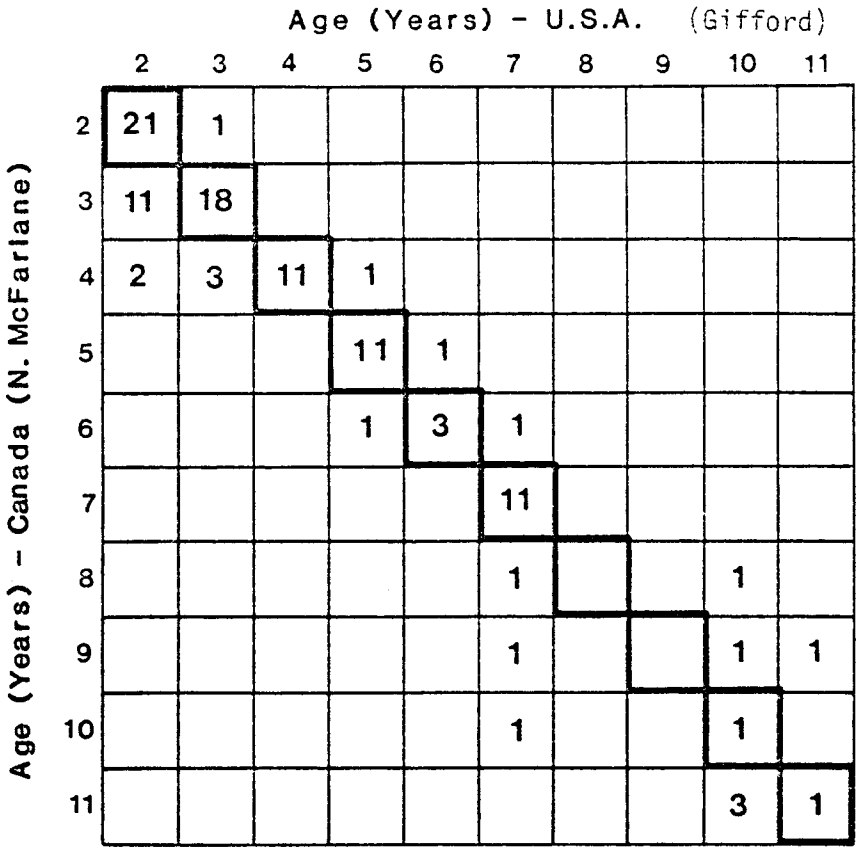

Figure 3. Canada/USA ageing comparison of 5Ze haddock using Canadian otter trawl samples from Georges Bank (June and August 1985).

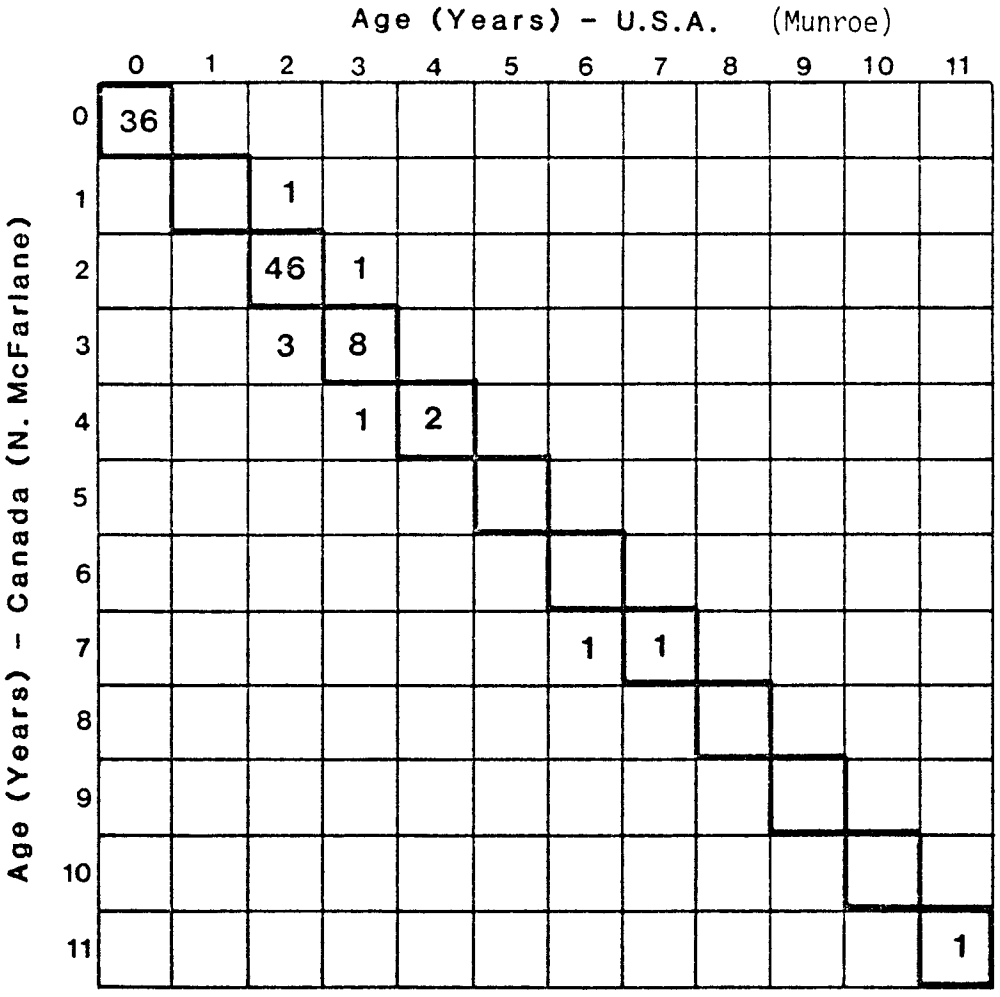

Figure 4. Canada/USA ageing comparison of 5Ze haddock from samples collected on RV survey AL8508 (October 1985).

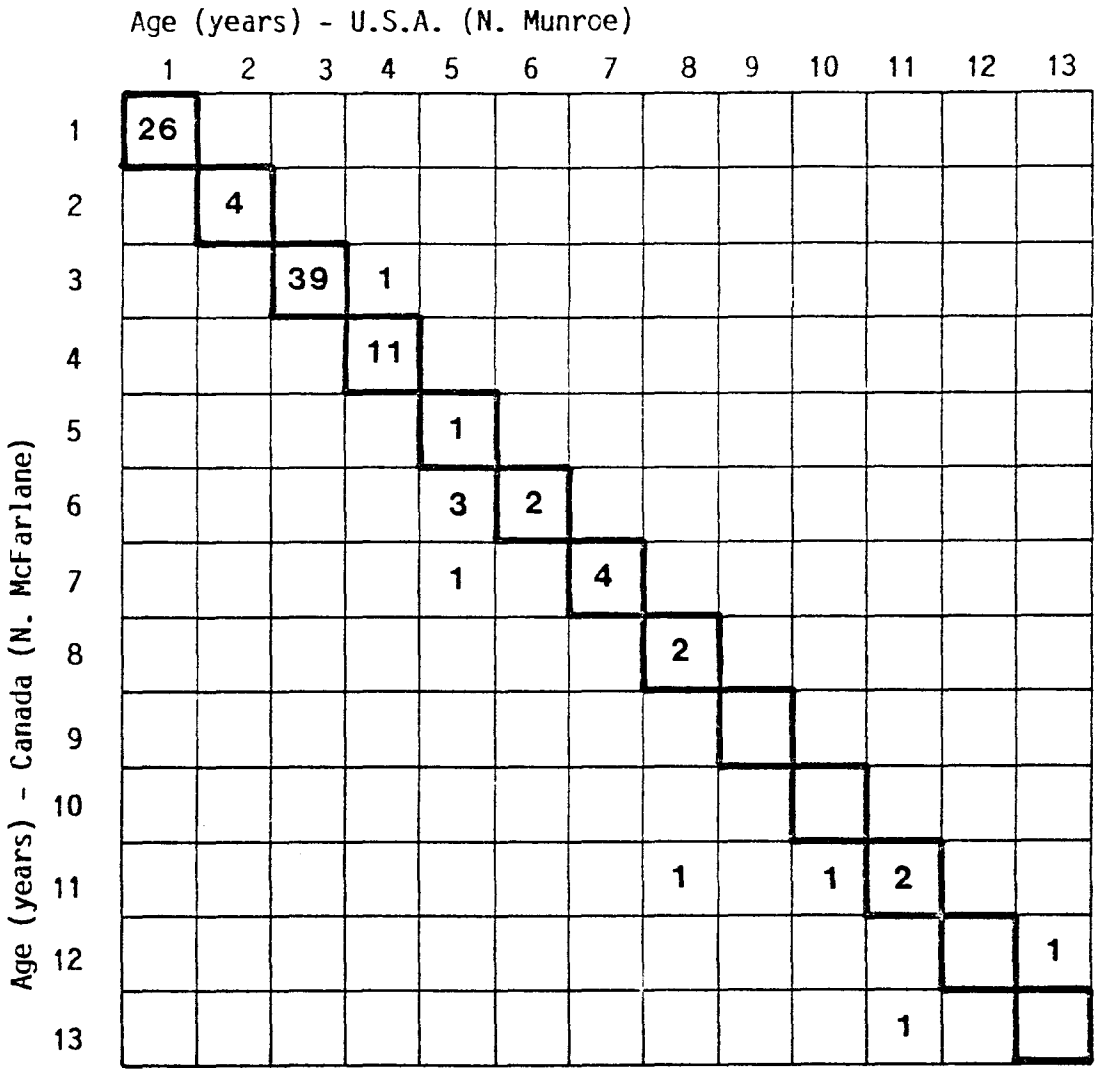

Figure 5. Canada/USA ageing comparison of 5Ze haddock using samples collected on RV survey N059 (May 1986).