ICES CM 2001/O:14

Factors influencing tag-recovery rates in the Norwegian spring-spawning herring tagging scheme

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The tag-recovery data on Norwegian spring-spawning herring is an important input when the stock size is estimated in the ICES working group. Basically one compares the number of tagged fish with the number of recovered fish given a known number of screened fish for a given year class. One further assumes that the tagged individuals undergo tagging mortality immediately after tagging and throughout the rest of the year, whereas in subsequent years tagged fish are subjected to natural mortality and to fishing mortality at the same rate as untagged fish. However, it turns out that this assumption is rather uncertain. Despite the fact that this stock has been tagged with the same methodology almost on an annual basis since the late 1940s, there have been significant variations in returns from the various releases even within the same experiment. Obviously these variations add significant uncertainty to the abundance estimates. In the present paper the effect of all possible influencing factors on tag-recovery rates are tested based on data recorded during the wide number of historic experiments; such as data on the catch operations, handling, tagging, fish size and quality, besides data on the environmental conditions and location of the experiments.

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ICES CM 2001/O:15

The correlation between tag-recovery data and VPA-data in Norwegian spring spawning herring

Aril Slotte and Are Dommasnes

The present paper compares the results from two methods of abundance estimation in Norwegian spring-spawning herring: the tag-recovery model and the VPA-model. More specifically the number of recovered tags from selected year classes is correlated with the expected tag recoveries from VPA-tunings in the ICES working group. In the tag-recovery model two parameters have significant influence on the result: the tagging mortality and the number of years allowed to mix before recovered. Thus, the analysis includes results with tunings of both these parameters.

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ICES CM 2001/O:16

Use of tag-recovery data to determine migration routes of Norwegian spring-spawning herring

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At present Norwegian spring-spawning herring are tagged annually with tags of steel (20x4x1 mm) injected into the belly of the fish, which are later detected when catches are screened through metal detectors. This is a tag-recovery method that in fact was introduced in this stock in the late 1940s. In the years to come the tag-recovery data was used to demonstrate the characteristic homing migration pattern between selected wintering grounds, spawning grounds, and feeding grounds. At the same time they clearly demonstrated how this stock might stray and change both wintering areas, spawning grounds, and feeding grounds. The present paper gives an overview of the results of these tagging experiments and how they have contributed to new knowledge of the migration behaviour of this stock from the 1940s until present time.

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ICES CM 2001/O:17

Spatial pattern of migration and recruitment of Northeast Atlantic mackerel

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An international tagging program on both adult and young mackerel was implemented in 1997 (and partly in 1998) from Portugal to the Shetland Isles within the frame of the European Study Project 96-035, with the objectives of clarifying the migration pattern of adult mackerel from the southern and western areas and determining the recruitment spatial pattern of juveniles from two nursery areas, different from the current Mackerel box, i.e. from the Northwest of Ireland and West of the Iberian Peninsula. Both external and internal tags were used in all the surveys in different proportions. A total of 161,115 mackerel were tagged along the European Atlantic coasts, 119,913 of them in 1997 and 41,202 extras in 1998. We report here for the recaptures obtained up to year 2000: Adult recoveries show that almost all adult mackerel (regardless of the discrete areas of tagging, southern or western areas) follow the same northward migration in late spring and summer time from the spawning grounds along the west coast of the British Islands to the north of the Faroes, the Norwegian Sea, and the northern part of the North Sea. The northward migration often extends in summer time into the north-eastern areas of the Faroes EEZ and further north to the international waters. From September to December mackerel from all areas are mainly found in Norwegian Sea and northern part of North Sea (mainly Division IVa). At the end of the year and during wintertime those mackerel migrate southward towards the spawning grounds along the west coast of the British Islands. These observations on migration behaviour of adults are consistent with the results obtained from previous tagging experiments. A strong presence of southern adult mackerel during spring in the western spawning grounds was observed in 1998, which cast doubts on the reliability of the assumption of separate spawning components in these areas. Recaptures of tagged juveniles (both from the west of the Iberian Peninsula and from the north-west of Ireland) suggest that in general, juveniles remain closer to the areas where they were tagged. Once they become adults, recoveries show the recruitment to the general migration pattern of adults.

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ICES CM 2001/O:18 (Poster)

A non-parametric Von Bertalanffy model for estimating growth curves of Atlantic cod

Noel G. Cadigan and John Brattey

A non-parametric model is developed for estimating growth of Atlantic cod in NAFO Sub-division 3Ps and Divisions 3KL based on fishery tag-returns. The tag-returns provide information on lengths at release and capture, and time to capture. One use of the growth curves is to predict lengths-at-capture when estimating length-specific fishery exploitation rates using tagging information. We use a simple version of the Von Bertalanffy growth model, modified to accommodate seasonal variations in growth rates. The growth rates are modelled using nonparametric regression splines. A measurement bias component is also incorporated in the model because the tag-return data suggest that there is some bias in the lengths-at-capture reported by fishermen. The interesting implications of intra-population variability in growth rates are also considered.

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