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**Tagging of saithe (*Pollachius virens* L.) at a Norwegian fish farm:
preliminary results on migration**

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ABSTRACT

Wild fish, particularly saithe (*Pollachius virens* L.) are commonly observed in the vicinity of fish farm sea cages on the Norwegian west coast and the fish are known to feed on excess salmon food pellets. To investigate residence time at the farm site and subsequent migration pattern, saithe were tagged and released once monthly during the period Nov 1990 to Nov 1991 at the sea cage facility of the Austevoll Marine Research Station, near Bergen, Norway.

A total of 2607 saithe were tagged. Preliminary results from tag recoveries show that the saithe can stay in the vicinity of the farm cages for several months before offshore migration to the North Sea, Shetland, Faroe Islands and Iceland.

INTRODUCTION

Attraction of fish to artificial habitats like wrecks and oil platforms is well known and this is also utilized to aggregate fish for capture e. g. at so called fish aggregation devices (FAD's, see Buckley et al. 1989). The extensive establishment of marine salmon farms represents numerous artificial habitats that act as aggregation devices for wild fish that are known to feed on excess food pellets (Carss 1990). Among several fish species that are attracted to fish farm cages, saithe is found to be most abundant around Scottish and Norwegian fish farms (Carss 1990, Samuelsen et al. 1992). Little is known about the behaviour of wild fish in the vicinity of farm cages, like abundance, residence time and migration pattern. This paper presents preliminary results on migration of saithe that were captured and tagged at a fish farm on the west coast of Norway.

MATERIALS AND METHODS

Saithe were tagged and released once monthly at the sea cage facility of the Austevoll Marine Research Station near Bergen, Norway. The fish were captured by lowering one panel of a (12x12 m) sea cage, enticing the fish into the cage by feeding and then entrapping them by hauling up the net panel. The fish were then brailled into a tank, anaesthetized (Methomidate, 3 ppm), length measured, tagged with Floy tags and put back in the sea cage to recover for 1 to 3 h before release. A total of 2607 saithe were tagged from Nov 1990 to Nov 1991, (Table 1).

RESULTS

Fish size ranged from 30 to 66 cm (total length) with an overall mean length of 48.0 cm. As shown in Figure 1, the mean size of the fish in the catches decreased from Nov to March followed by increasing size during summer and fall. A sample of 51 saithe taken in Oct 1991, showed that most fish were two or three years old (Fig. 2)

The catches varied from 26 to 634 saithe with highest catches from May to September and the proportion of previously tagged fish ranged from 7.8 to 43.9%, (Table 1). Of the fish that were recaptured at the cage site, number of fish and number of times recaptured (in parenthesis) were: 1948 (1), 503 (2), 108 (3), 29 (4), 5 (5), 1 (6) and 1 (7). The recaptured fish had thus spent from one to seven months in the vicinity of the cages.

A total of 334 tags had been recovered by the end of July 1992 (12.8 % recovery rate). As shown in Fig. 3, most of the tag recoveries are from the Austevoll area where the fish either were caught by local fishermen (mainly by gillnet) or at commercial fish farms by trapping the fish in pens as described in this study. The offshore tag recoveries are from saithe caught by trawl.

DISCUSSION

This study supports earlier observations on the aggregation of saithe at fish farm cages (Carss 1990, Samuelsen et al. 1992) and it was found that the fish can be stationary at the cages for several months. In a complementary study on tracking of individual saithe by ultrasonic telemetry it was found that the saithe at the cages could be classified into two groups, either fish that spent most of their time at the cages or fish that had a core area elsewhere, but visited the cages on a daily basis (Bjordal & Johnstone, in press). The catch and length distribution data suggest a continuous immigration of smaller fish and emigration of larger fish, with a marked emigration of larger fish from Jan to March.

The migration pattern found in this study does not differ significantly from those found in previous saithe tagging experiments which show significant offshore migration of saithe, mainly to the North sea, but also to Shetland, Faroe Islands and Iceland (Jakobsen 1985, Jakobsen & Olsen 1987). The fact that saithe may spend relatively long periods at fish farms does not seem to affect the natural migration behaviour of the fish. A matter of concern, however, may be the possible residue of antibiotics in saithe that have been feeding at fish farms (see Samuelsen et al., 1992) and shortly afterwards appear in commercial or recreational catches.

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Table 1. Dates of capture, number of saithe caught and tagged, and recaptures (%) of previously tagged fish.

Date	Catch	Tagged	Recapture (%)
12.11.90	231	231	
12.12.90	233	179	23.2
14.01.91	151	112	25.8
12.02.91	144	107	25.7
14.03.91	26	23	11.5
11.04.91	226	189	13.7
14.05.91	634	454	22.7
27.06.91	502	463	7.8
02.08.91	472	346	26.7
09.09.91	433	267	38.3
23.10.91	91	51	43.9
25.11.91	291	173	40.5
27.01.92	180	---	20.6
Tot	3614	2607	

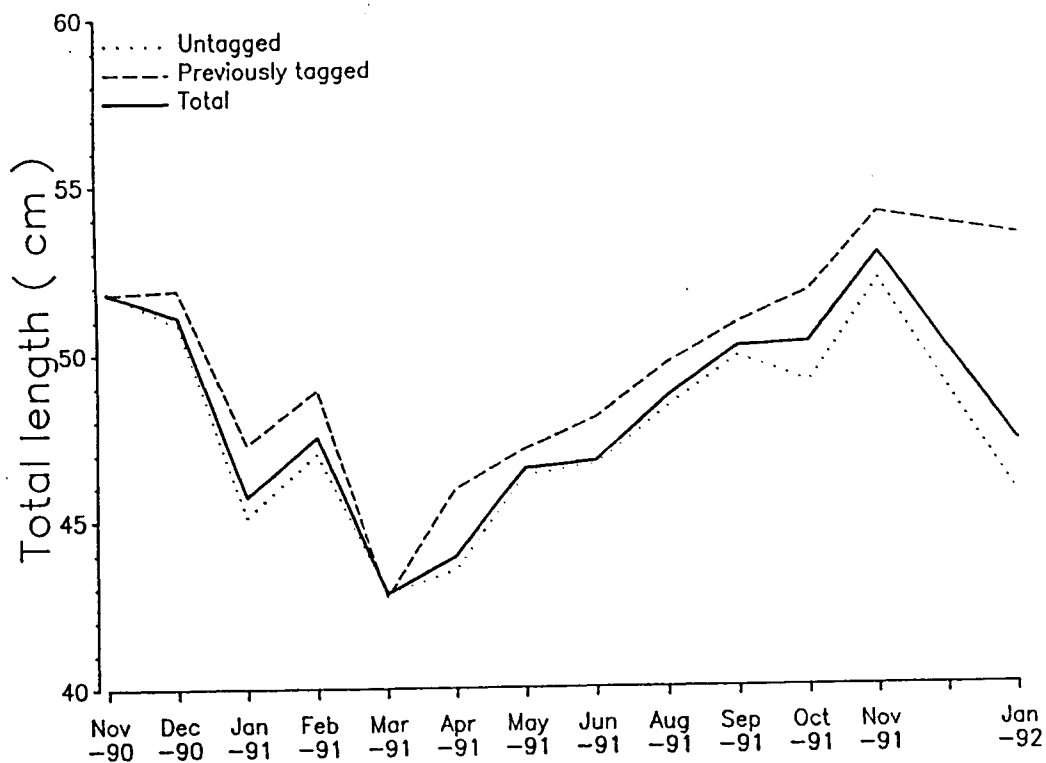


Figure 1. Mean (total) length of saithe in the monthly catches.

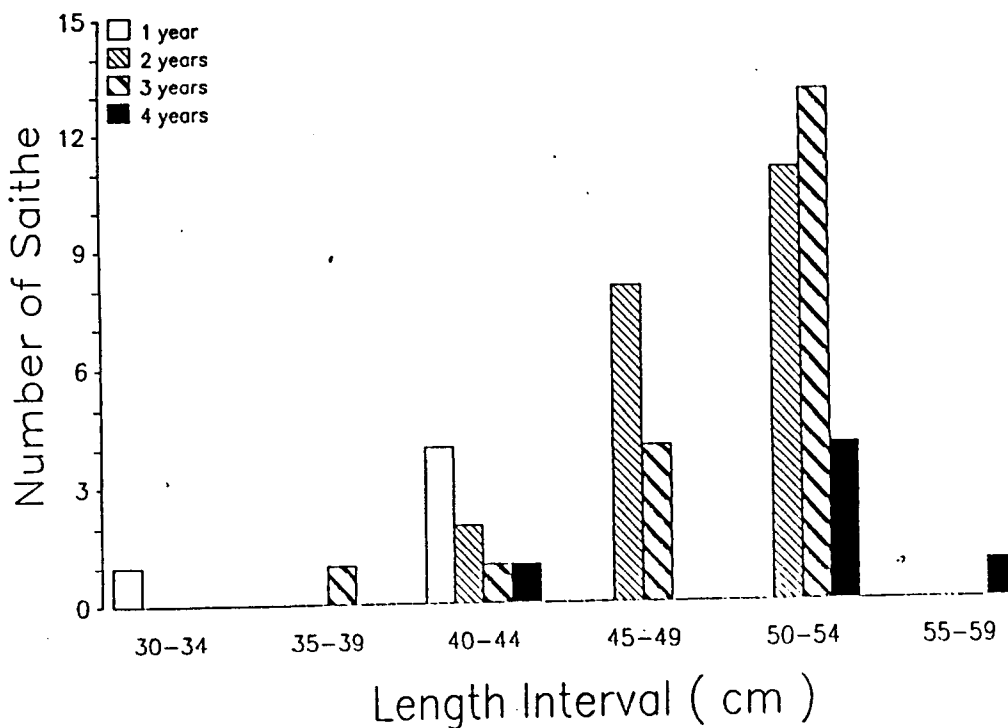


Figure 2. Length and age distribution of saithe, Oct. 1991 (n = 51). (From Bjordal & Johnstone, in press.)

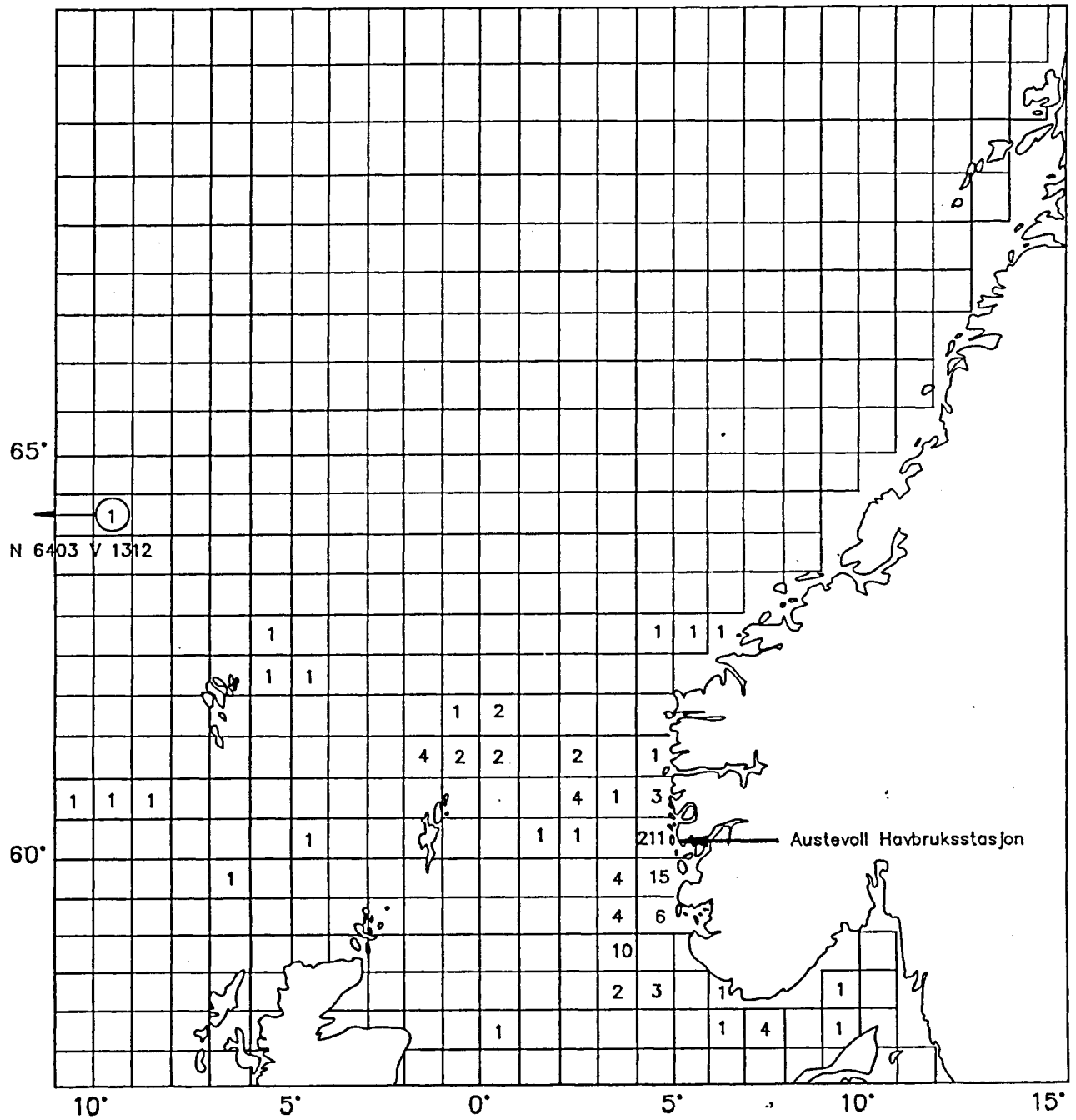


Figure 3. Geographical distribution of tag recoveries per 31 July 1992.