

The Norwegian Coalfish Investigations.

Growth of immature fish and tagging experiments.

By

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In November 1955 a meeting between the German and the Norwegian scientists in charge of the coalfish investigations was arranged in Bergen to discuss cooperation and coordination of the investigations on coalfish.

As concerns the biological part of the investigations it was agreed upon a long term program where Norway should concentrate on the different stages of immature coalfish and on tagging experiments.

In this report we shall first deal with the growth of the immature coalfish and some results of the tagging experiments as concerns migrations.

At the Norwegian Institute of Marine and Fisheries Research we have now a material of young coalfish which includes about 6000 specimens of the 0-group, collected since 1945 in the littoral zone at different localities from Møre on the West coast of Norway to Finnmark in the north. In addition we have a smaller number of the I, II and III groups and a rather good material of immature coalfish of the IV and V groups collected especially in the Finnmark area during the past three years. This material reveals a great variation in the growth of the 0-group, from 7 to more than 20 cm. with a mean of about 15 cm. In his famous work: "Contributions a la Biologie des Gadides", Damas (1909) states that the growth of the coalfish decreases with increasing latitude.

In the present material there is some evidence of a larger growth rate in young coalfish in the outer than in the inshore localities within the same district. For instance, in Finnmark we find a difference of 1 - 2 cm in the meanlengths between samples from the fjords and outside the fjords.

However, the present material reveals no evidence of a trend in the growth rate related to the latitude as suggested by Damas.

In the material of Damas, the greatest differences in the mean lengths of the 0-group exist between the samples from the south coast and those from the west coast, whereas the difference between the west coast and Northern Norway is small and hardly of any significance.

Unfortunately, the present material includes none samples south of Møre on the west coast, hence, we cannot state whether conditions are changed since the days of Damas' work as concerns the growth of the very young coalfish.

Our material of older age groups than the 0-group is mainly derived from the coast of Finnmark. Consequently, we cannot make any definite conclusions as to eventual geographical variations in growth rate within these age groups.

However, we have some few samples of 3-4 year old coalfish from Møre on the west coast. These do not reveal any larger rate of growth than found in corresponding age groups in the Finnmark area, the mean lengths in the samples from Møre are, on the contrary, a little lower than those of the corresponding age groups from Finnmark waters.

In fig. 1 the mean lengths calculated from the material of immature coalfish less than five year old is plotted against the date of capture as open circles. The dots represent means calculated from scale measurements by means of the formula:

$$l = \left(\frac{L - 1}{S} s + 1 \right) \text{ cm.}$$

These are plotted in the first of April as the growth period and the formation of broad sclerites in the scales seems to start about that date.

The growth curve drawn on free hand to follow the seasonable variations in growth during the year, reveals a mean annual growth rate of about 15 cm. during the first two years, 12.5 cm. the third year and about 12 cm. the fourth. This curve fits fearly well to that of mature coalfish, presented by Schmidt (1955) at this meeting last year.

Bertelsen (1942) and also Schmidt has pointed out that the growth in the Norwegian stocks of coalfish is by far the lowest when compared with those of the Icelandic and of the Faroe waters.

However, the difference in mean growth rate is small and probably not significant in young coalfish and it is not obvious ^{before} in the fifth year. Perhaps this difference might in some way be related to differences in spawning age etc. or to the very long spawning migrations undertaken by the Norwegian spawning stocks.

In August 1954 528 tagged coalfish were released at one locality in Finnmark.

In 1955 in all 1725 were tagged and released at four different localities, and this season 1500 has been released. Some of the results of the 1954-taggings were presented at this meeting last year. Since then a great number of recoveries has been reported.

As long as the purse seine season lasts, that is till the beginning of November, very few recoveries are made outside the Finnmark area, but after then the recoveries at the coast of Finnmark are few. In late autumn and in the winter time a great number of tagged fish is recaptured on the coastal banks south of Finnmark, at Malangsgrunnen, Sveinsgrunnen, at Andenes, on the Røst Bank, in the Svinøy area on the west coast and even in the northern part of the North Sea. The map on fig. 2 shows the monthly distribution of the recoveries made during the winter time, of coalfish tagged in Finnmark in July August 1954 and 1955.

We notice the very few recoveries at the coast of Finnmark during these months, only three in December and one in January.

In December two recoveries are reported at Andenes and two from the Røst Bank.

In January a few were recaptured on Malangsgrunnen and Sveinsgrunnen while the fishery on the Røst Bank revealed many recoveries of tagged fish.

A number of recoveries were still made in the district from Malangen to Røst in February, but in this month some are also taken on the west coast in the Svinøy area and one even in the northern part of the North Sea.

March reveals about the same picture as February, but in this month there are more recoveries from the West coast and the Northern North Sea than from the north west coastal banks. April shows one recovery from the North Sea and two at Andenes.

The recoveries plotted on this figure are some from the season 1954/55 and some from 1955/56. There is no great difference in the monthly distribution between the two seasons, although, there may exist a small evidence of a delay in the migration last season as compared with that of 1954/56. For instance, the recoveries in February and March are relatively more numerous on the north western banks in 1955 than in 1956.

In May and in June very few tagged coalfish has been recovered, nearly all of them in the northern areas. During the next four months, from July to October, a great number of fish tagged the previous seasons are recaptured at the coast of Finnmark.

The length distribution of the coalfish (the length at the time of release) recovered in the district of Finnmark the same or the next season, does not differ significantly from that of the fish released, but the fish migrating southward, which is recovered during the winter is of a length not less than 63 cm at the time of tagging. In general this is coalfish of five years or more, which has reached sexual maturity, or will do so within the next spawning season.

The tagging of spawning coalfish at the west coast in the winter is a rather difficult task because of the sensitivity to rapid changes in water pressure in this species. Till now less than 100 spawning coalfish have been tagged. Only a few recoveries of these taggings are reported, at present the most of which from the tagging locality a short time after the release. There is only one which has covered a longer distance before the recovery. This was tagged in February 1956 30 miles west of Svinøy and recaptured on August 31. at Sørfolla (near the West Fjord), and at present this recovery reveals the only northwards long distance migration known.

However, from these experiments it seems just to conclude that in general, the mature coalfish, which during the summer seeks the coastal waters of Northern Norway to feed together with the stocks of young fish, in late autumn segregates from the immatures and migrates southwards to the spawning places at the west coast and returns again in the spring.

The immature coalfish of 3-5 years, which appears in the coastal waters of Northern Norway in May and June is caught in

large quantities by the purse seiners during the summer, and disappears from the coast in October - November.

Where this young coalfish soujourns during the winter we do not know. At least the majority of the stock must be hiding somewhere outside the areas generally fished or behave in a manner not likely to be caught, as the catches taken in the winter include only a small amount of immature fish.

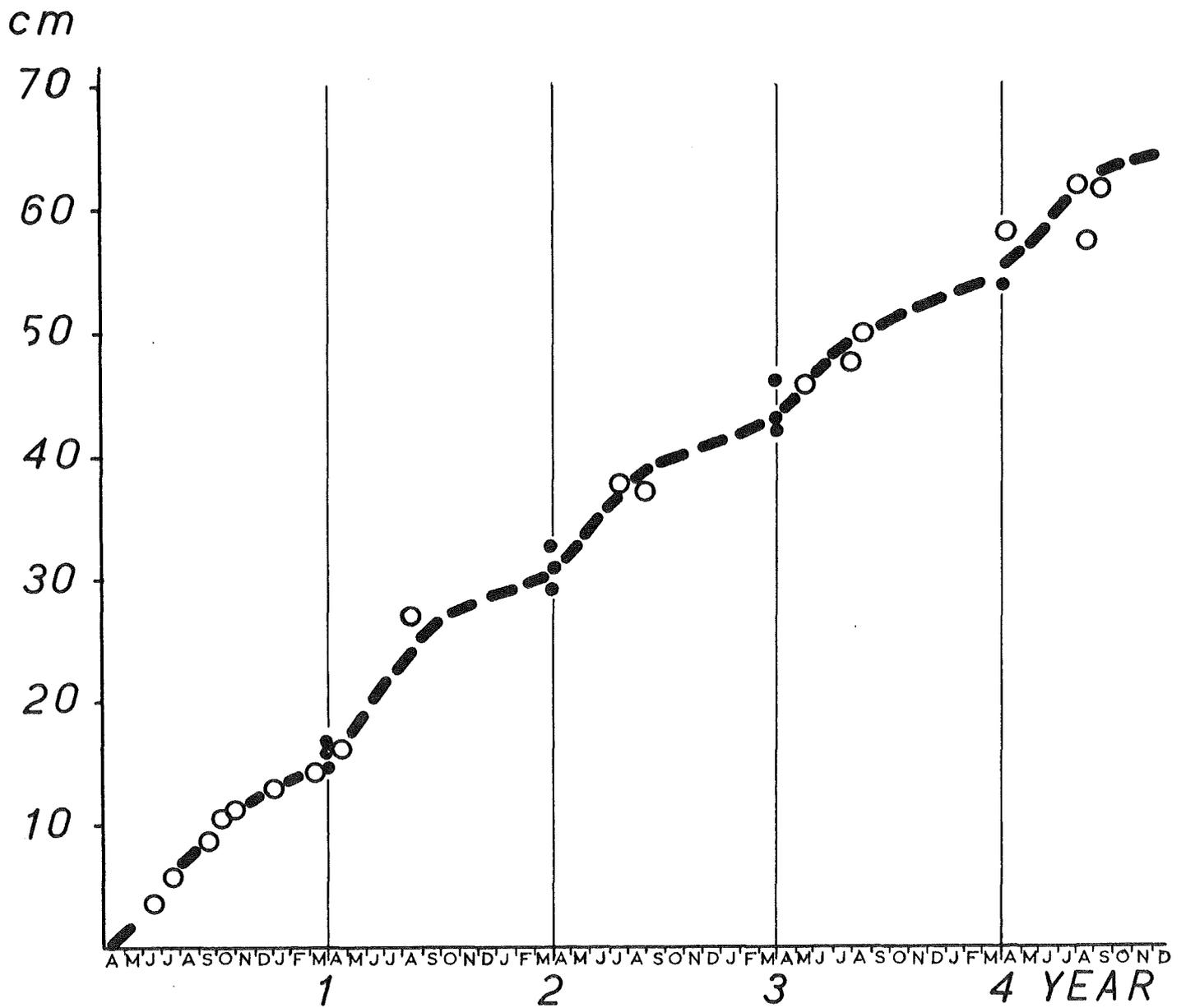
In the end I should like to point out a rather astonishing feature of the migrating habits indicated by these experiments. As mentioned the taggings were carried out in July and August.

The fish recaptured in the same season as released was in general taken on or in the close vicinity of the tagging places, thus, indicating no particular migrations as long as the feeding season lasts. In late autumn the fish suddenly disappears from the feeding areas and returns the next spring and summer, but it seems as if the coalfish preferably seeks the same feeding area as visited the previous season.

This is strongly indicated by the distribution of recoveries of fish tagged one or two seasons in advance of the recovery. About 75 % are made on or within 30 miles off the tagging place. We cannot, of course, disprove that this fish might have stayed in the vicinity of the tagging place all year round. This may be true as regards the immature fish, but the mature fish, we believe, has to go south to spawn. In any case we don't know any spawning place farther north than the Halten Bank.

L i t e r a t u r e :

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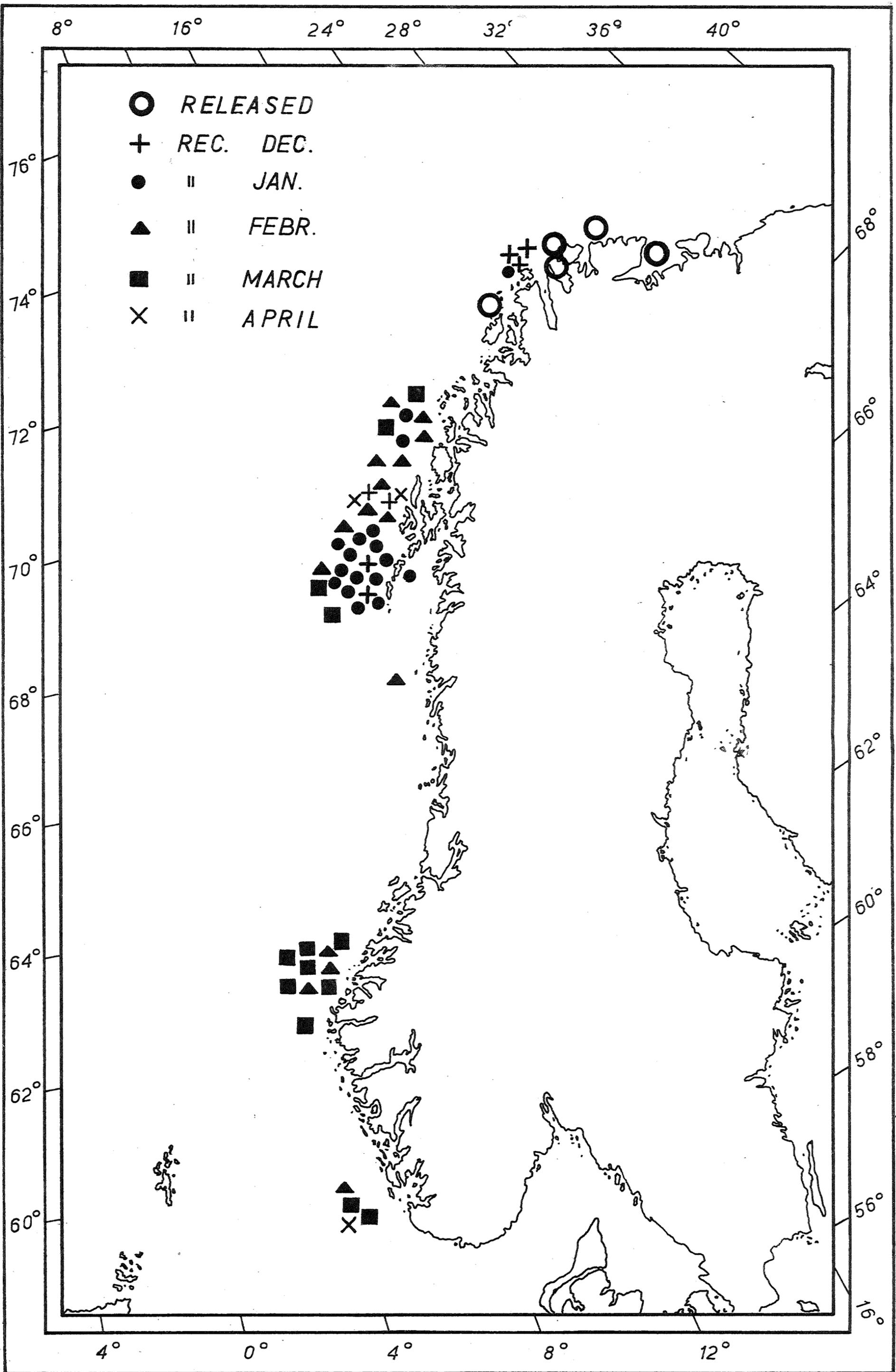


Fig. 2. Recoveries of tagged coalfish during the months December - April.