

Migrations of Coalfish (*Gadus virens* L.) from Norway to
Faroe Islands and Iceland

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As shown by Seemundsson (1929) and later by Schmidt (1955) the coalfish at Iceland are characterized by a fast growth compared with the same species in Norwegian waters. Bertelsen (1942) found the growth of coalfish in Faroe waters to be intermediate between that of the Icelandic and the Norwegian stock. Other characters, such as age at maturity, otolith types, relative strength of year-classes etc. are also found to vary between the different areas. Consequently, the stocks of coalfish in these geographically separated areas have been regarded as independent populations between which little or no intermingling takes place.

However, in 1953 Schmidt (1955) observed the sudden disappearance of practically a complete year-class from Icelandic waters, for which the most likely explanation given was emigration to another, at that time unfished area. A similar peculiar phenomenon occurred in 1956 when the Icelandic stock showed a sudden loss of large fish. Subsequently to this German trawlers got large catches of coalfish on a new fishing ground off Faroe Islands, and from the otolith types, age distribution and growth pattern, these fish were, in all probability, of Icelandic origin (Schmidt 1957).

During the winter of 1957 Norwegian tagged fish started to occur in catches from Faroe waters, and later in the year also from the SE and NW coasts of Iceland. Schmidt was then able to demonstrate an anomaly in the age and length composition of the catches at Iceland caused by a sudden appearance of slow-growing fish, and he concluded that the Icelandic stock in 1957 included an element of Norwegian coalfish, which had migrated from the spawning areas off the west coast of Norway, over Tampen and the Faroe banks to the SE coast of Iceland and later to the NW coast (Schmidt 1957).

We may now raise the question whether these are unique phenomena resulting, for instance, from a rare environmental condition, and which would thus not render our previous concept of independent coalfish populations invalid; or are such mass migrations frequent occurrences which have to be considered, for instance in population dynamics studies.

The further tagging results may throw some light on this question, hence a full account of all recoveries to date reported from Faroe and Icelandic waters is presented in Table 1, page 4, and on the chart in Figure 1 are plotted the positions of the recaptures.

It appears that the coalfish recaptured in 1958 and 1959 were derived from tagging experiments in 1957 and 1958, respectively, as well as from earlier experiments, consequently an immigration into these areas has taken place each year since 1957.

It would also appear that of those fish recaptured in Icelandic waters, 11 were tagged as medium-sized fish in Eastern Finnmark, 6 in Western Finnmark, 3 at Sveet near North Cape, and one at Griptaren on the west coast of Norway. The taggings of large coalfish in Mid-Finnmark have given 4 recaptures at Faroe Islands but none at Iceland. At Faroe Islands the fish were large, over 80 cm when recaptured, whereas the mean length at recapture in Icelandic waters was about 77 cm. The age at recapture for 12 fish at Iceland ranged from 6 to 9 years, and from 8 to 9 years for three fish in Faroe waters. We may thus assume that they had most likely reached sexual maturity when recaptured.

Considering the numbers recaptured from the various tagging localities and the difference in size, the lack of recaptures at Iceland of fish tagged as large mature fish in Mid-Finnmark, and vice versa in Faroe waters from some of the tagging localities in Eastern and Western Finnmark, is hardly just a coincidence, and indicates different migratory patterns for various groups of fish.

The coalfish recapture data from the Norwegian waters give many indications of migrations in groups, as two or more fish from the same tagging experiment are frequently recaptured a year or more afterwards on the very same date and locality, sometimes hundreds of miles away from where they were released. A similar non-random distribution of tagged fish is indicated by the recaptures in Icelandic and Faroe waters, as already stated by Schmidt (1957).

It would thus appear that the group or groups of coalfish migrating from Norway to Iceland do not follow the route via Faroe Islands, and those travelling to Faroe waters do not proceed to Iceland. The material is inconclusive with regard to the exact migration routes. One possible route would be the one suggested by Schmidt from the spawning areas off the Norwegian coast over Tampen and the Shetland area, but so far only two recaptures from Tampen and one from Shetland have been reported, in spite of a considerable fishery in these areas.

The mature coalfish tagged during the summer on the Finnmark coast do not seem to reach the spawning grounds off the west coast of Norway until the month of February, and the distance from the Lofoten banks to Svinøy is covered in a time of not less than one month. Thus, if the two recaptures reported at Iceland in January 1956 and 1958 of fish tagged in the previous summer, are correct, the route along the Norwegian coast and across the ocean over Tampen and Faroe waters would seem very unlikely. Such a migration in the matter of five months only is particularly improbable considering the current system en route.

Another possibility is a pelagic transoceanic migration from North Norway or the Barents Sea. According to the latest current charts of the Norwegian Sea produced by Alexejev and Istoshin (1956) or Eggvin (private communication), SW-erly countercurrents in the areas east of Jan Mayen might provide a quick transport for part of the way from the Barents Sea to Iceland.

In this connexion it is noticed that in 1957 and 1958 a number of tagged coalfish were recaptured at Bear Island, a locality where previously no recoveries had been reported. This may be correlated with the general cooling of the Eastern Barents Sea which started in 1956, and seems to be paralleled by aggregations in the Bear Island area of other species, for instance haddock (Sætersdal, private communication).

A third possibility, and probably the most likely one, is that the coalfish follow the Atlanto-Scandian herring on the return migration from the Norwegian coast. This is supported by the observations made by Norwegian fishermen of coalfish feeding pelagically on herring in the Norwegian Sea, and that coalfish are frequently taken with jiggers at the weather ship station "M" (65°00'N, 02°00'E). According to Devold (1959) the spawning areas of the Atlanto-Scandian herring have in recent years gradually been extended northwards, and the spawning time has been delayed. Thus, at the present time herring and coalfish are pretty well matched as regards both spawning time and areas. This would infer that a much larger proportion than previously of the coalfish stock is in contact with the herring when these leave the Norwegian coast after spawning, and may explain the recent mass migrations of Norwegian coalfish to Icelandic waters.

While the tagging material clearly shows a yearly migration since 1957 of Norwegian coalfish to Icelandic waters, it is inconclusive as regards the time prior to this year, because the taggings in those localities which have given recaptures at Iceland were not started until 1955. On the other hand, the immigration into Icelandic waters in 1957 resulted in a marked anomaly in the age and length distribution, and this would indicate an irregular or insignificant immigration prior to 1957.

The previously mentioned non-random distribution of tagged fish would invalidate any calculations of the magnitude of the transoceanic migrations on the basis of tagging data alone. However, there can be little doubt that over the past three years rather extensive migrations from Norway to Iceland have taken place, and unless compensated for by return migrations, the Norwegian stock of coalfish has thereby suffered a net loss of a significant number of fish.

A b s t r a c t

Since 1957 a number of coalfish tagged in Norwegian waters has been recaptured at Iceland and Faroe Islands. It thus appears that the stocks of coalfish in these areas, which previously were considered as independent populations, receive a regular immigration of Norwegian fish, and unless compensated for by a return migration, the Norwegian stock suffers a net loss of a significant number of fish.

The tagging material is inconclusive with regard to the actual migration routes followed, but it would appear that the fish migrating to Iceland follow a different path from those travelling to the Faroe Islands.

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(See Table 1 and Figure 1 on following pages).

Table 1. Records of Coalfish Migrations from Norway to Faroe Islands and Iceland.

Released				Recaptured						
Date	Locality	Position	Length	Date	Area	Position	Length	Age	Year-class	Remarks
15/8-55	Tanasnaget	70°58'N, 29°10'E	66	abt.10/1-56	Iceland	65°50'N,25°40'W	69 ¹⁾	-	-	a
14/8-56	Tubåen, Finnmark	70°59'N, 23°24'E	71	10-18/6-57	Iceland	64°10'N,13°50'W	75	7+	1950	a
15/8-55	Tanasnaget	70°58'N, 29°10'E	70	2/7-57	Iceland	66°53'N,24°45'W	80	7+	1950	
1/8-56	Sveet, Finnmark	71°06'N, 25°19'E	69	3-11/7-57	Iceland	66°53'N,24°45'W	73	7+	1950	a
26/5-55	Griptaren	63°17'N, 07°20'E	45	14-24/7-57	Iceland	66°53'N,24°45'W	67	6+	1951	a
3/8-55	Off Kiberg, Finnm.	70°15'N, 31°01'E	71	1-12/8-57	Iceland	66°53'N,24°45'W	82	8+	1949	a
14/8-56	Tubåen, Finnmark	70°59'N, 23°24'E	77	Sept. -57	Iceland	66°53'N,24°45'W	82 ¹⁾	-	-	a
14/8-56	Tubåen, Finnmark	70°59'N, 23°24'E	71	abt.2/11-57	Iceland	66°15'N,13°20'W	77 ¹⁾	-	-	a
23/7-55	Tubåen, Finnmark	71°01'N, 23°22'E	58	abt.5/1-58	Iceland	63°50'N,14°40'W	85	7	1951	
26/7-57	Tubåen, Finnmark	70°58'N, 23°22'E	69	Jan. -58	Iceland	-	71 ¹⁾	-	-	a
3/8-55	Off Kiberg, Finnm.	70°15'N, 31°01'E	62	Febr./May-58	Iceland	-	81	8	1950	
6/8-57	Tanasnaget	70°56'N, 28°58'E	84	17/5-58	Iceland	-	85	-	-	a
15/8-55	Tanasnaget	70°58'N, 29°10'E	57	21/5-2/6-58	Iceland	64°20'N,14°00'W	76	8+	1950	a
31/7-56	Sveet, Finnmark	71°06'N, 25°19'E	68	14/7-58	Iceland	66°34'N,25°00'W	75	-	-	
30/7-57	Off Sørøy, Finnmark	70°46'N, 22°08'E	61	15/8-58	Iceland	65°52'N,24°48'W	68 ¹⁾	6+	1952	
13/8-58	Tanasnaget	71°00'N, 28°52'E	78	2/4-59	Iceland	64°00'N,14°00'W	79 ¹⁾	7+	1952	
13/8-58	Tanasnaget	71°00'N, 28°52'E	70	25/4-4/5-59	Iceland	-	72 ¹⁾	-	-	
13/8-58	Tanasnaget	71°00'N, 28°52'E	75	4/5-59	Iceland	63°50'N,14°00'W	76 ¹⁾	-	-	
13/8-58	Tanasnaget	71°00'N, 28°52'E	81	abt.7/5-59	Iceland	64°20'N,14°00'W	81	-	-	
31/7-56	Sveet, Finnmark	71°06'N, 25°19'E	67	28/5-59	Iceland	SW-coast	84	9	1950	a
7/8-58	Tanasnaget	71°01'N, 28°50'E	77	2/6-59	Iceland	64°02'N,13°14'W	77	7+	1952	
3/8-55	Off Kiberg, Finnm.	70°15'N, 31°01'E	69	1-9/1-57	Faroes	-	80	8	1949	a
17/8-54	Oksefjord, Finnm.	71°05'N, 27°25'E	74	abt.1/7-57	Faroes	62°19'N,07°05'W	84	-	-	a
17/8-55	Laksefjord, Finnm.	70°48'N, 26°45'E	70	18/9-57	Faroes	62°12'N,04°10'W	85	-	-	
17/8-55	Laksefjord, Finnm.	70°48'N, 26°45'E	69	17-30/9-57	Faroes	-	80	8+	1949	a
17/8-56	Oksefjord, Finnm.	71°05'N, 27°25'E	76	20/9-57	Faroes	62°15'N,04°13'W	80	-	-	
23/7-55	Tubåen, Finnmark	71°01'N, 23°22'E	70	29/9-12/10-58	Faroes	-	90 ¹⁾	9+	1949	a

1) = Estimated length.

a = Tag discovered in fish plant, hence position may be doubtful.

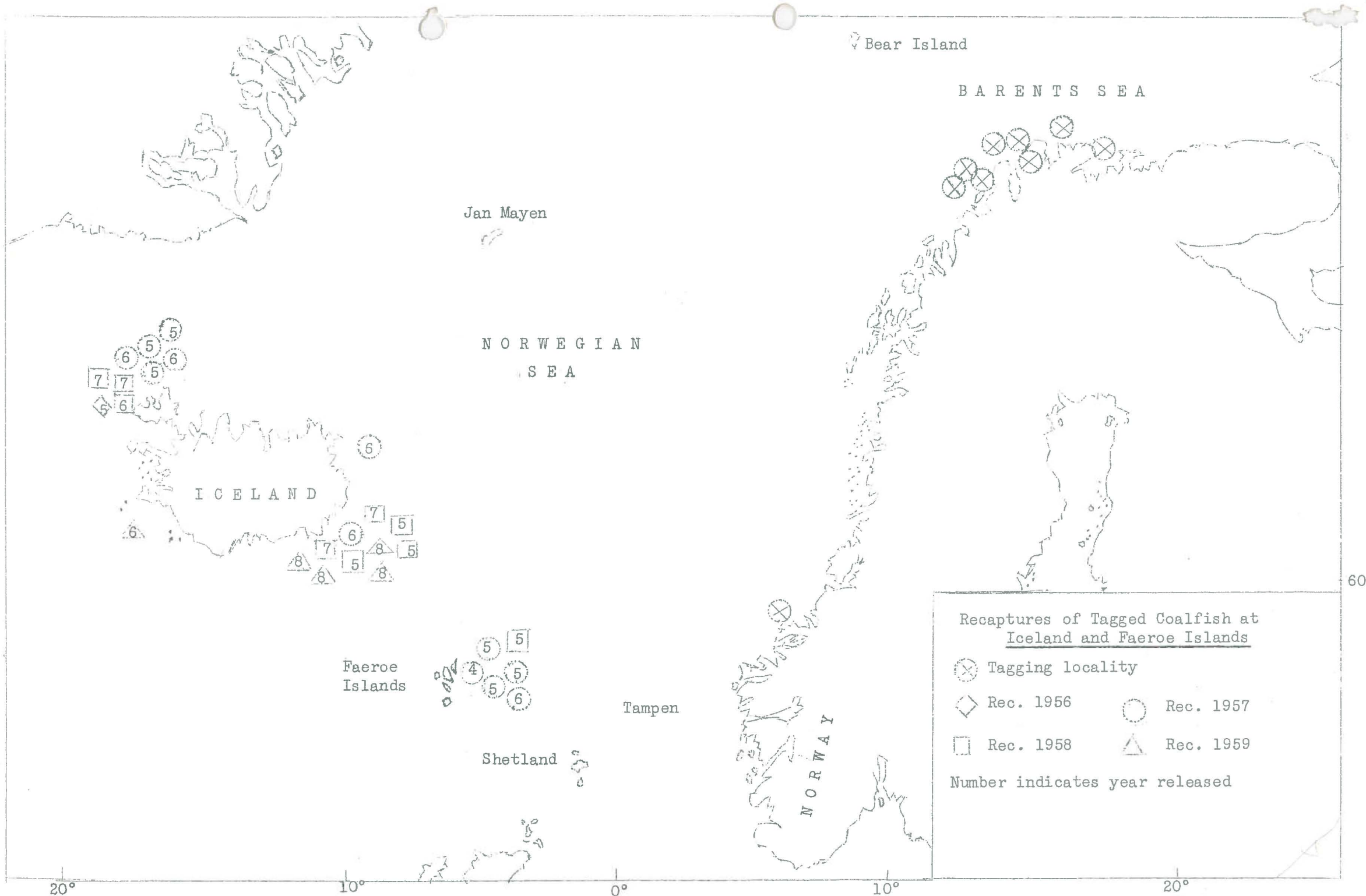


Figure 1.