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SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN WEST COAST
SOUTH OF 62°N, 1972 - 74

by

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INTRODUCTION

From 1972 to 1974, 6291 saithe were tagged and released on the Norwegian west coast between 59°N and 62°N. Before 1972, only 40 saithe have been tagged in the area, in 1956 and 1959, and these experiments were not extensive enough to produce significant results. Preliminary results of the tagging experiments in 1972 and 1973 were presented by Jakobsen (1975, 1976a, b). Subsequent recaptures from these experiments have been relatively few and have not added much new information. Therefore, only results of the experiments from 1974 are presented separately, whereas the older experiments are summarized.

MATERIAL AND METHODS

In 1972, 2394 saithe were tagged in four experiments, in 1973, 1500 saithe were tagged in three experiments, and in 1974, 2397 saithe were tagged in four experiments. Hydrostatical tags of Lea's type were used, fastened to the fish with a nylon gut in front of the anterior dorsal fin. Details about each experiment are given in Table 1.

Table 1. Saithe tagging experiments on the Norwegian west coast south of 62°N 1972 - 1974.

Date	Position	No. released	Size range (cm)	Recaptures					
				1972	1973	1974	1975	1976	Tot.
15.6.72	N 59°19' E 04°53'	598	34-43	18	15	5	-	-	38
14.6.72	N 59°35' E 05°09'	600	31-43	44	45	26	7	-	122
13.6.72	N 60°02' E 05°07'	597	24-46	52	38	16	2	-	107
19.6.72	N 61°17' E 04°36'	599	31-50	40	65	16	2	2	125
13.6.73	N 59°27' E 05°05'	600	31-51		61	63	18	1	143
12.6.73	N 59°59' E 05°05'	300	24-40		20	27	8	2	57
7.6.73	N 61°56' E 05°07'	600	32-54		31	24	7	1	63
22.5.74	N 59°19' E 04°53'	598	37-53			101	26	2	129
21.5.74	N 59°44' E 05°09'	599	33-51			94	26	4	124
24.5.74	N 60°16' E 04°56'	600	31-44			25	43	8	76
27.5.74	N 61°17' E 04°38'	600	37-52			71	31	7	109

In all cases, the tagging was carried out in May or June. Nearly all the tagged saithe were of the age groups 2 - 4, usually with three year olds dominating. The saithe were caught with purse seine or beach seine, except for the experiment of 21 May 1974 where hand-line had been used. The saithe had been kept alive in a net for a period varying from a couple of days to four weeks. In some cases the net had been towed some distance from the fishing ground to a more sheltered area. Long towing and storage resulting in poor condition of the fish probably account for the relatively low recapture rate of some experiments.

The data comprise all recaptures up to 1976. In all, 1094 recaptures have been reported, but in 153 (14 per cent) of the cases, the position of recapture was not, or inadequately, reported and these recaptures are not included in the charts.

RESULTS AND DISCUSSION

Figs. 1 - 4 show the recaptures in 1974 - 1976 from the tagging experiments in 1974. The geographical distribution of the recaptures is similar in the four experiments. The majority of the saithe recaptured outside the coastal areas were found on the eastern part of the North Sea plateau west and southwest of the Norwegian Deep. However, recaptures were made also in northern Norway, at Iceland, at Faroe, and west of Scotland, demonstrating a considerable individual variation in the migrational behaviour of the saithe.

Figs. 5 - 7 show the recaptures successively during the first three years after release from the experiments in 1972. Similarly, recaptures from the experiments in 1973 and 1974 are shown on Figs. 8 - 10 and Figs. 11 - 13, respectively. The charts show that there is a gradual migration from the coast. This migration from the coastal area is clearly dependent on age and size. On the average, the saithe seem to leave the west coast when it is about three years old, at a length of about 35 cm.

There are some differences in the pattern of recaptures from the experiments of the three years. Migration from the coast started later in the 1973-experiments than in the experiments from the other years. On the other hand, comparison between the recaptures two years after release (Figs. 7, 10, 13) shows that saithe tagged in 1972 to some extent were still present in coastal waters, whereas saithe tagged in 1973 and 1974 had nearly all left the coast.

There is no information which indicates that the fishing pattern for saithe in the North Sea region was much changed during the period 1972 - 1976. Age and size of the tagged fish in 1972, 1973 and 1974 were very similar (Table 1) and the observed differences in migrational behaviour are probably caused chiefly by varying availability of food or by other environmental factors.

On Fig. 14 all recaptures up to 1976 from the experiments in 1972 - 1974 where the position of recapture was given, are charted. Of the 941 returns, 385 (40.9 per cent) came from inside the area where tagging was carried out.

Of the 556 saithe that were recaptured outside the area, 440 (79.1 per cent) were found in the North Sea region, 96 (17.3 per cent) on the Norwegian coast north of 62°N , 11 (2.0 per cent) at Faroe, 6 (1.1 per cent) west of Scotland and 3 (0.5 per cent) at Iceland. In all, 87.7 per cent of the recaptures were made inside the area which defines the North Sea stock of saithe. Migration to the north of 62°N may be large enough to be of some significance for saithe stock assessment in that area, whereas migration to the areas of the western stocks appears to be negligible.

As the majority of the recaptured saithe clearly were still not sexually mature, the pattern of recaptures reflects chiefly the distribution of immature saithe in the North Sea. It is important to bear in mind that this is only representative of the part of the North Sea stock that has its nursery area on the Norwegian west coast and that saithe from the western part of the North Sea may and probably will have a different distribution after they leave the coastal areas. The recaptures in the North Sea from the Norwegian experiments are concentrated along the eastern side of the plateau, west and southwest of the Norwegian Deep. The highest numbers are reported between $57^{\circ}30'\text{N}$ and 59°N . Recaptures near the Danish north coast are common, but only 4 saithe were reported recaptured south of 57°N .

The pattern of recaptures is obviously influenced by the fishing pattern, but to what extent is difficult to assess since detailed effort data are not available from most countries. There is little seasonal variation in the pattern of recaptures and Fig. 14 probably gives a reasonably good impression of the distribution of young saithe that have migrated from the Norwegian west coast.

By the end of 1976, 17.4 per cent of the released saithe had been recaptured. The recovery-rate of the single experiments varies from 6.4 to 23.8 per cent. The rate of exploitation of the North Sea saithe indicates that one should expect a recovery-rate of at least 40 per cent. In some experiments there is obviously a high mortality rate shortly after tagging. However, in most of the recent Norwegian saithe tagging experiments the recovery rate has been 15 - 25 per cent and in these cases mortality caused directly by the tagging procedure is probably relatively low. It is known that a high percentage of recaptured tags are not returned and also that the tags some

times are not seen neither by the fishermen nor by people subsequently handling the fish. This accounts partly for the low recovery-rates. However, the decrease in number of recaptures from one year to the next is much higher than one would expect from the exploitation rate. For the experiments in 1972 - 1974, the decrease in recaptures from one to two years after tagging indicates an instantaneous mortality rate (Z) of 1.24, whereas the true value is about 0.6 - 0.8 (Anon. 1978). The difference may have been caused by shedding of tags, but it may also be that tagged fish suffer a higher mortality rate than the rest of the population.

SUMMARY

In 1972, 1973 and 1974, 6291 young saithe were tagged on the Norwegian west coast south of 62°N. By the end of 1976, 1094 (17.4 per cent) were reported recaptured. Of these, 87.7 per cent were found in the North Sea region. Of the saithe that had left the tagging area, 79.1 per cent were recaptured in the North Sea, and 17.3 per cent on the Norwegian coast north of 62°N. Most of the recaptures in the North Sea were made north of 57°N and east of 2°E.

The recovery-rate was less than half of what would be expected from the exploitation rate on saithe in the North Sea region. This is partly caused by non-return of tags, but the tagged saithe also seem to suffer a higher mortality rate than normal, in some cases immediately after tagging but probably also over longer periods.

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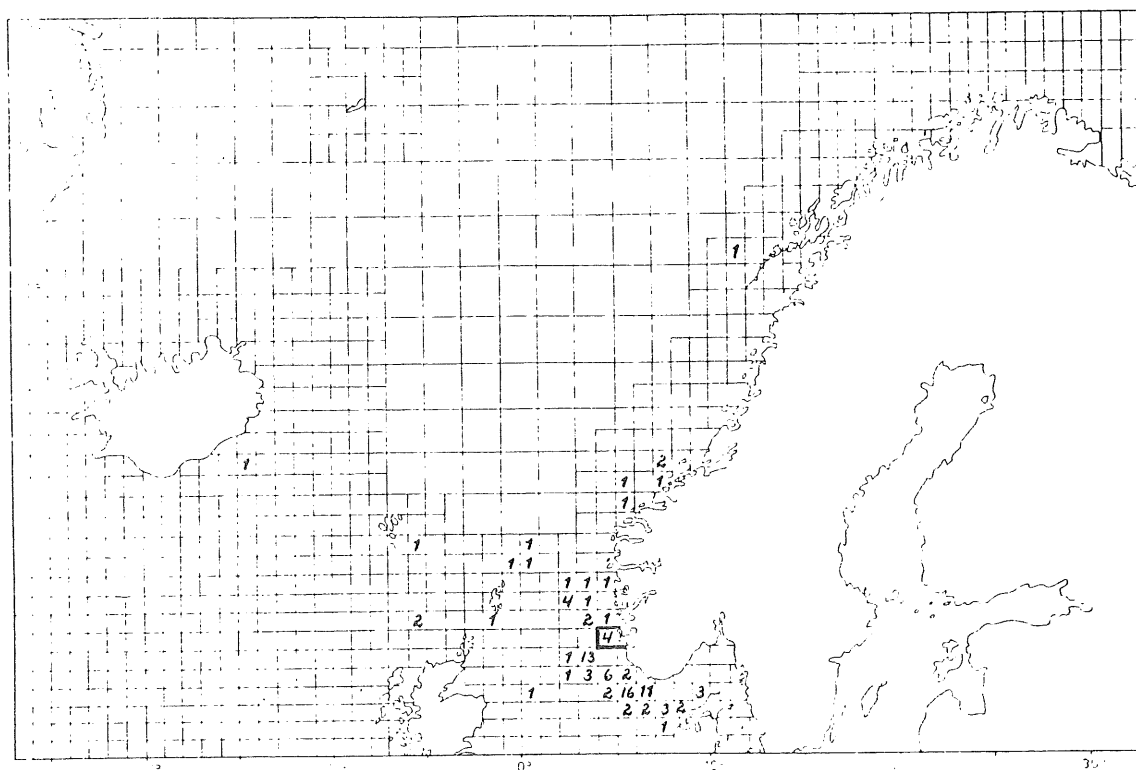


Fig. 1. Saithe tagging experiment 22 May 1974. 598 fish released inside the outlined area. Recaptures 1974 - 1976.

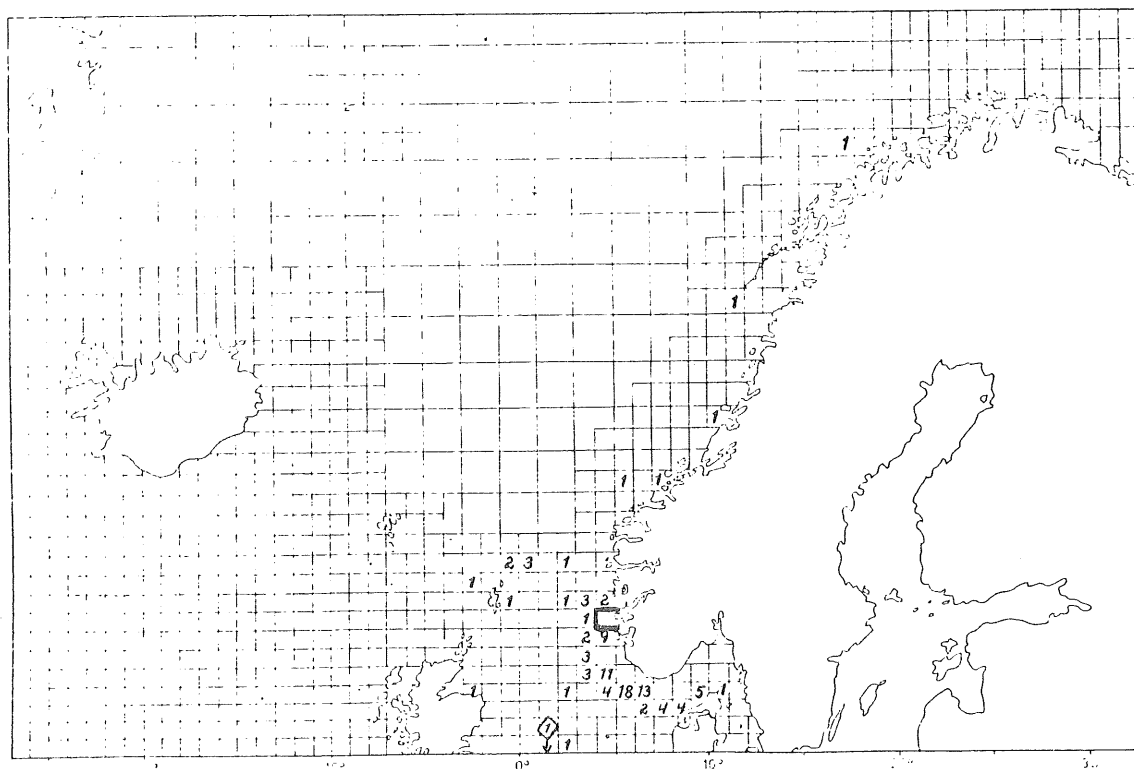


Fig. 2. Saithe tagging experiment 21 May 1974. 599 fish released inside the outlined area. Recaptures 1974 - 1976.

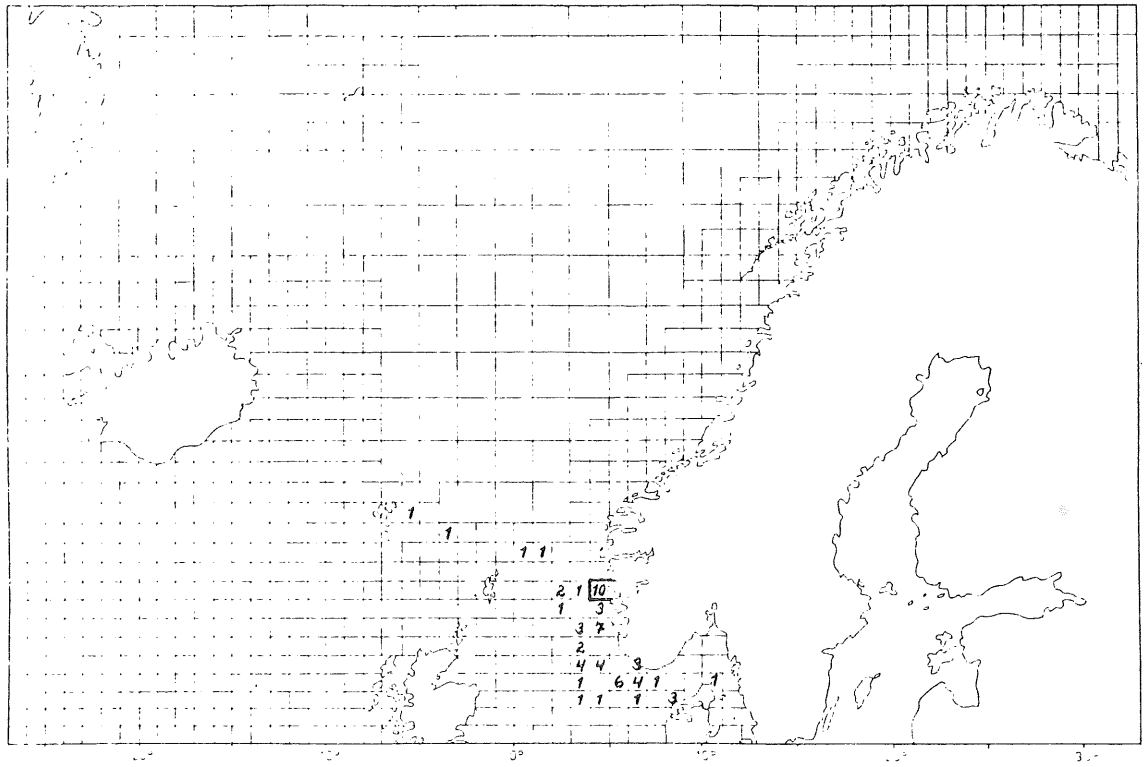


Fig. 3. Saithe tagging experiment 24 May 1974. 600 fish released inside the outlined area. Recaptures 1974 - 1976.

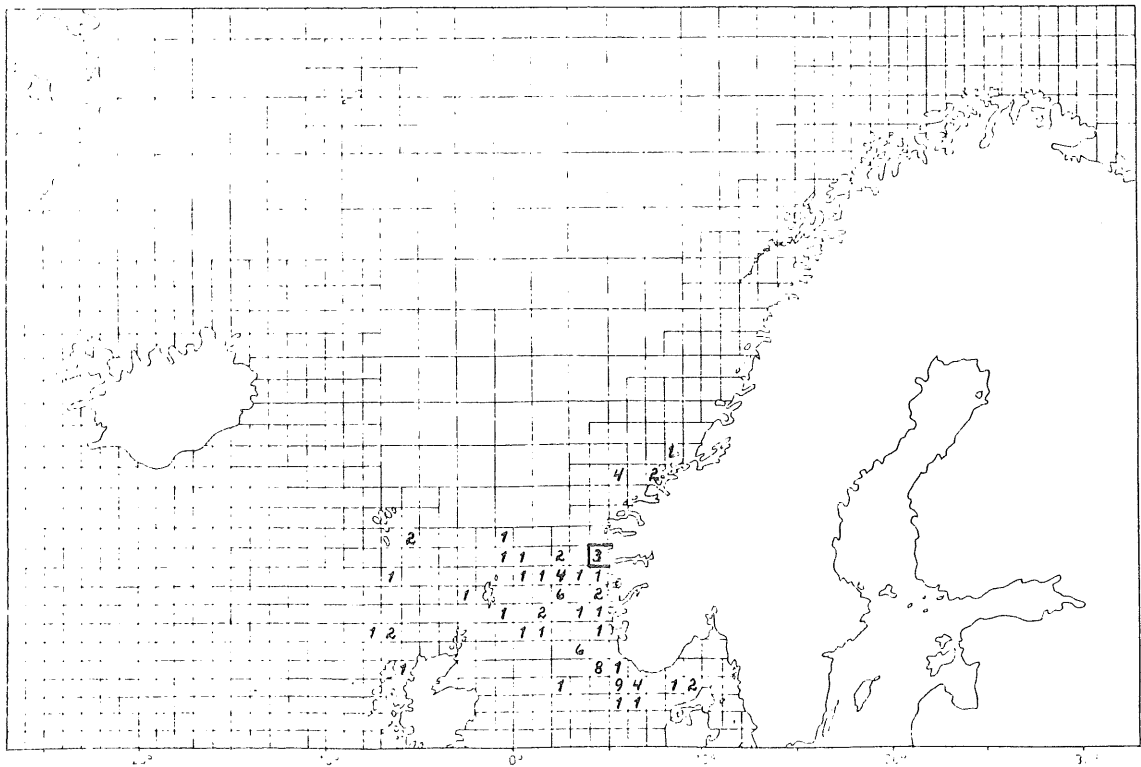


Fig. 4. Saithe tagging experiment 27 May 1974. 600 fish released inside the outlined area. Recaptures 1974 - 1976.

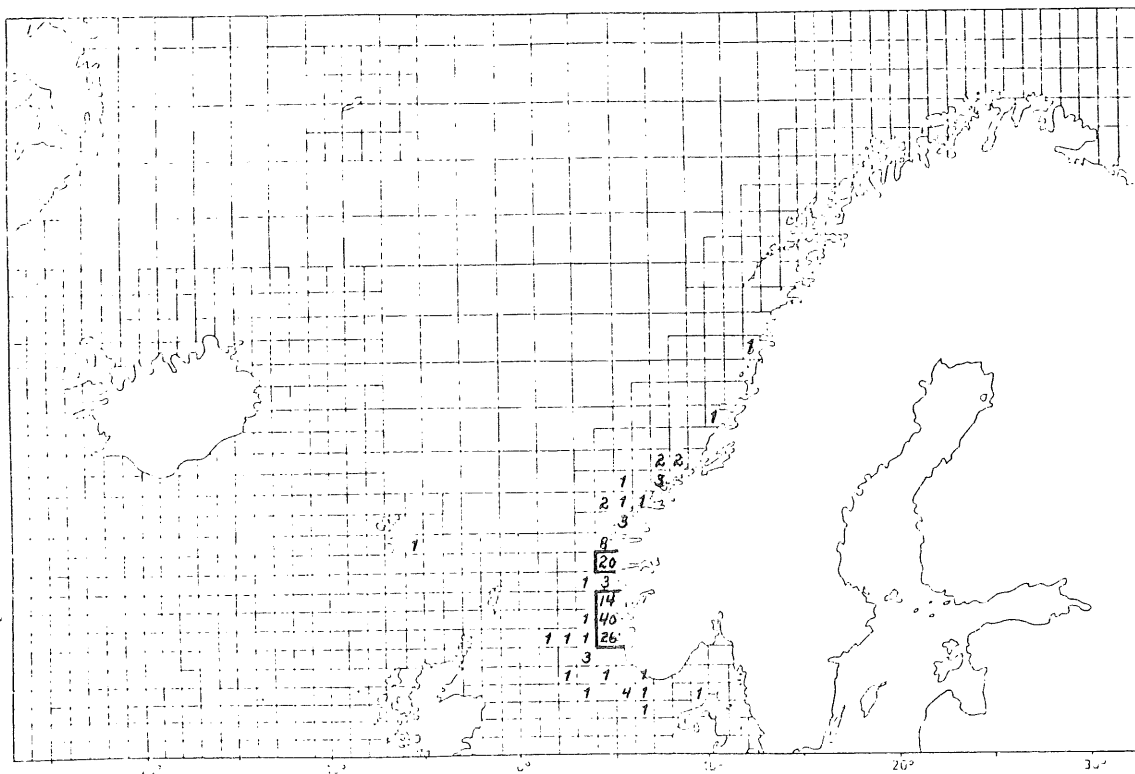


Fig. 5. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1972. 2394 fish released inside the outlined areas. Recaptures 1972.

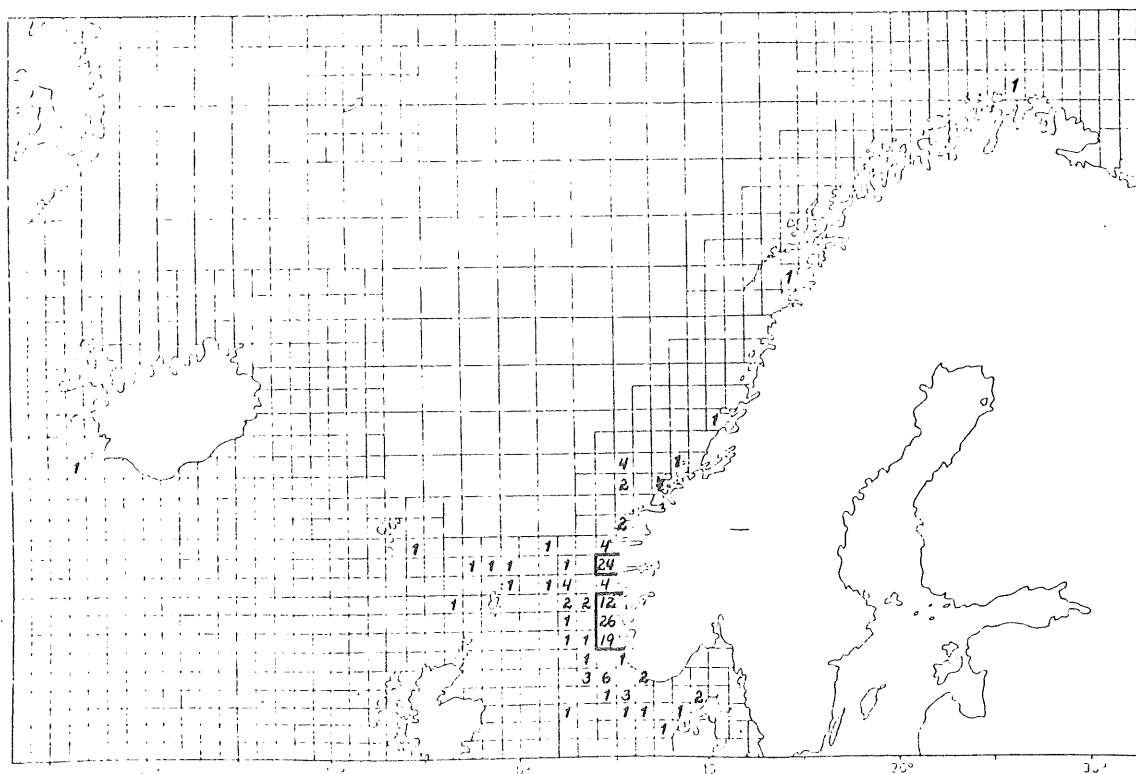


Fig. 6. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1972. 2394 fish released inside the outlined areas. Recaptures 1973.

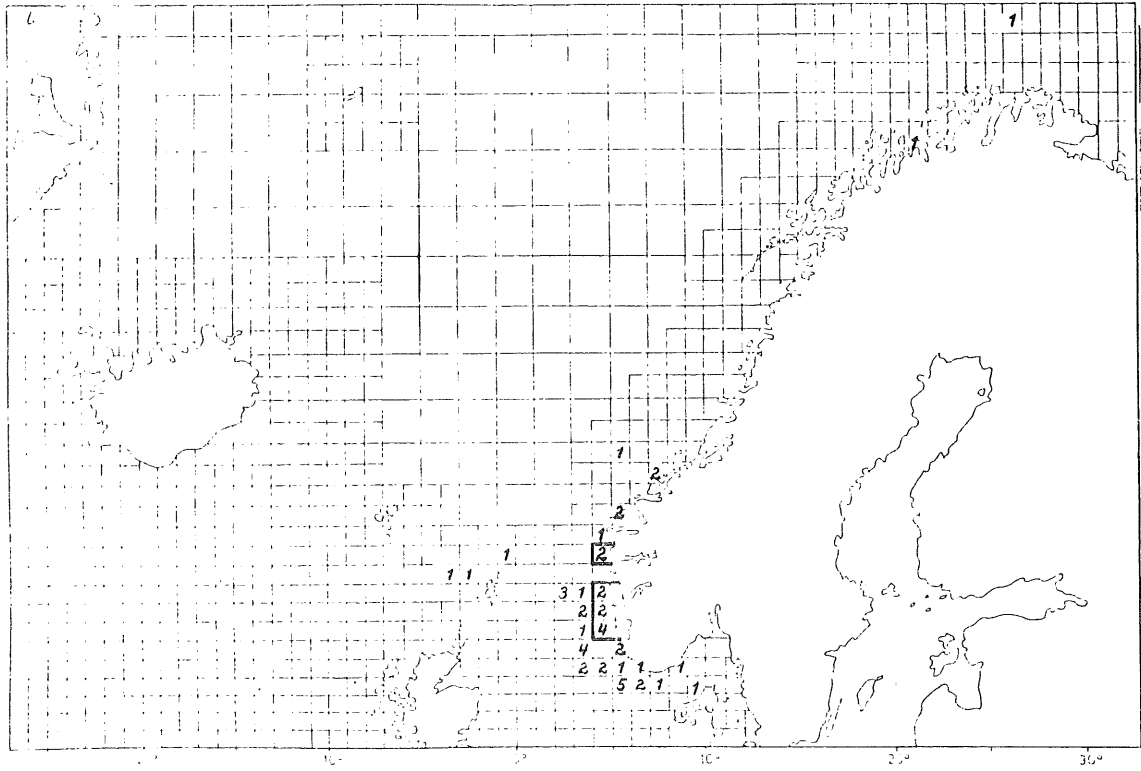


Fig. 7. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1972. 2394 fish released inside the outlined areas. Recaptures 1974.

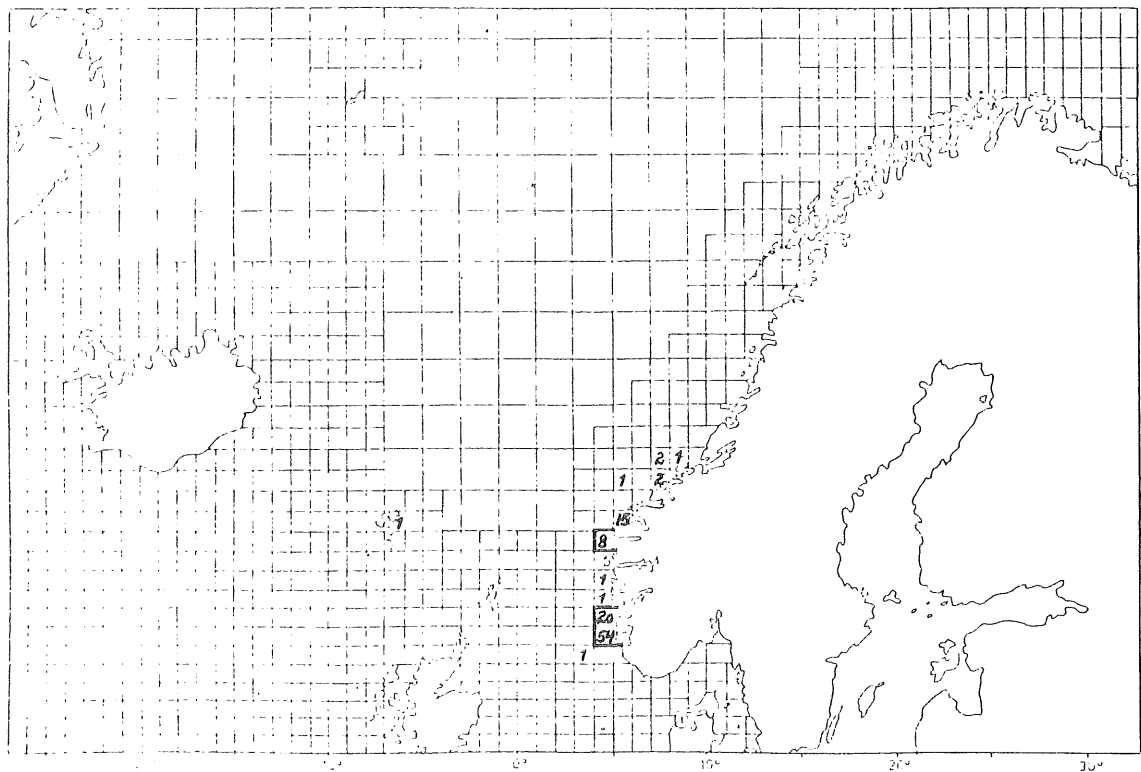


Fig. 8. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1973. 1500 fish released inside the outlined areas. Recaptures 1973.

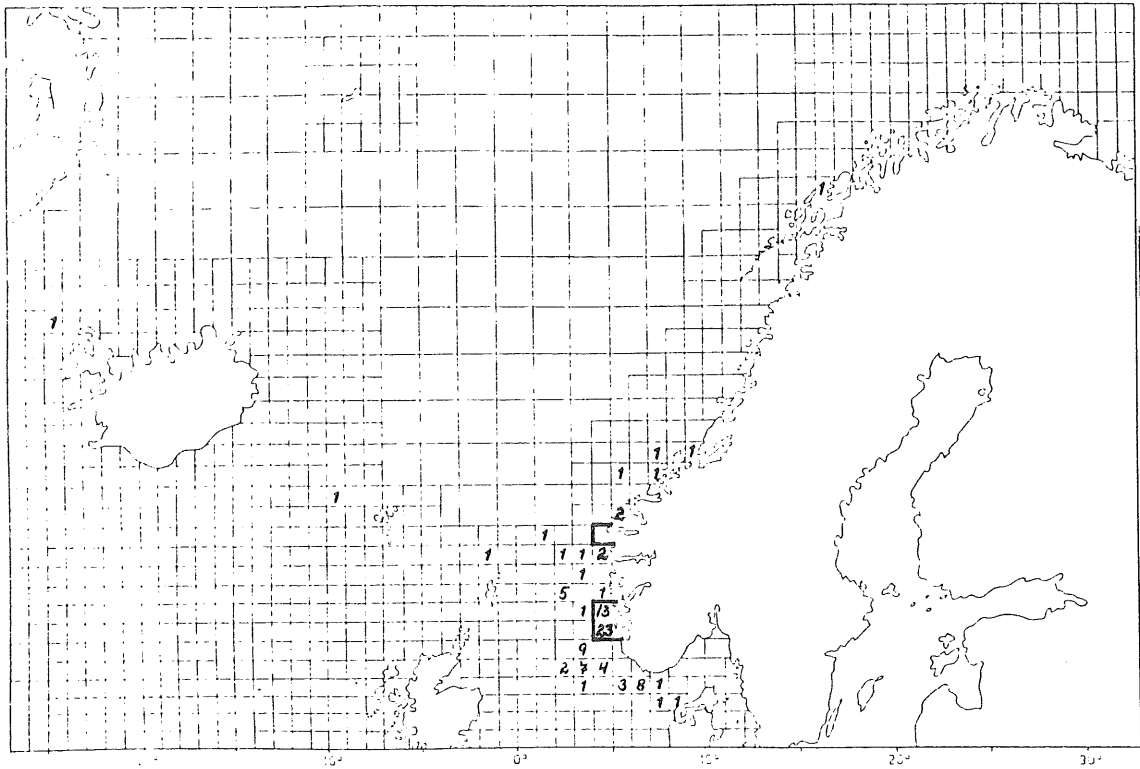


Fig. 9. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1973. 1500 fish released inside the outlined areas. Recaptures 1974.

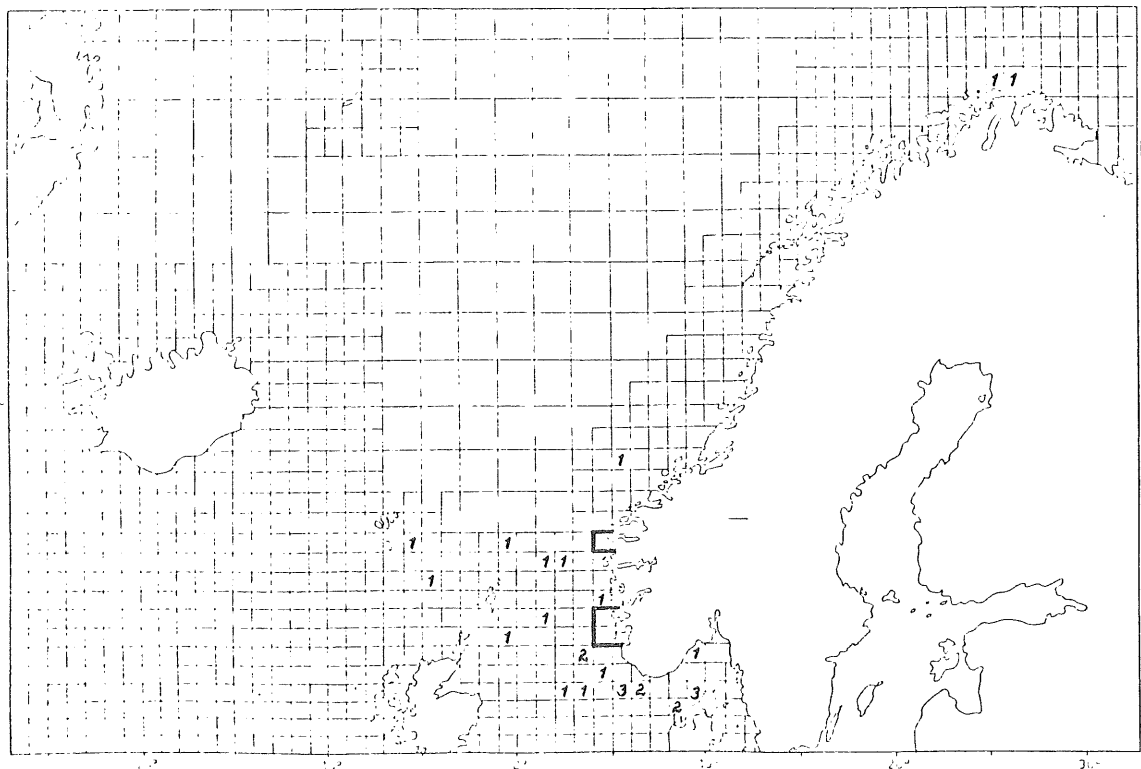


Fig. 10. Saithe tagging experiments on the Norwegian west coast south of 62°N June 1973. 1500 fish released inside the outlined areas. Recaptures 1975.

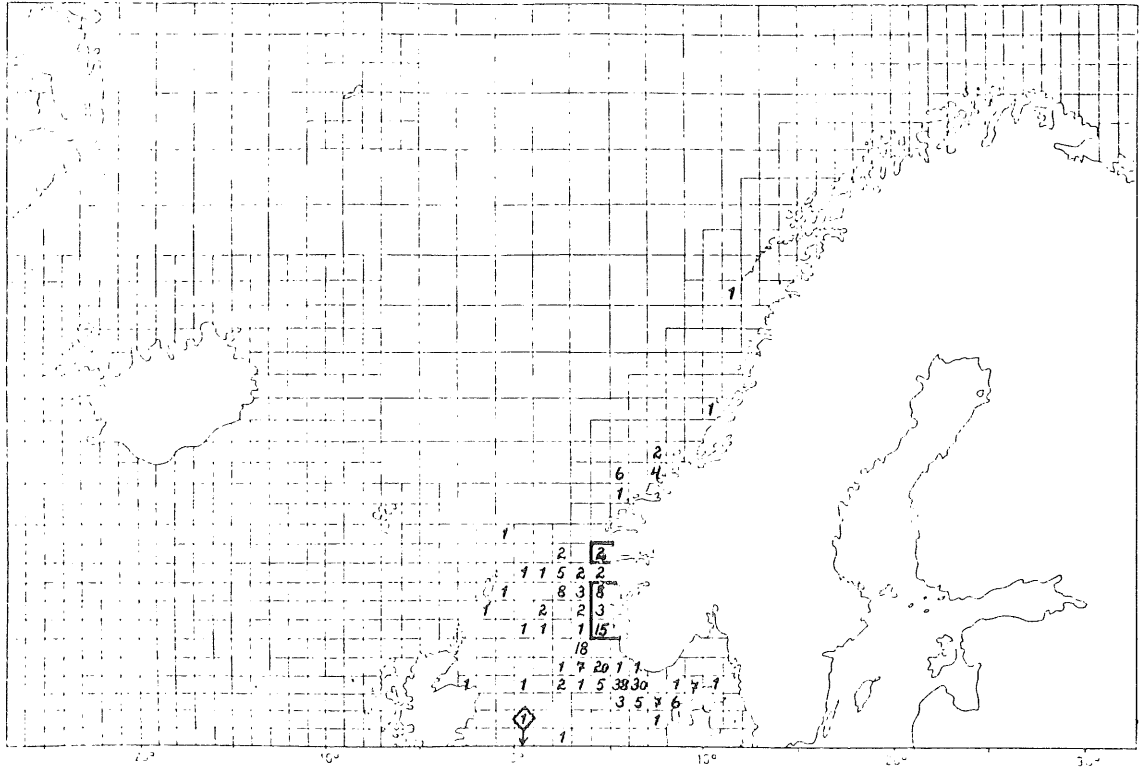


Fig. 11. Saithe tagging experiments on the Norwegian west coast south of 62°N May 1974. 2397 fish released inside the outlined areas. Recaptures 1974.

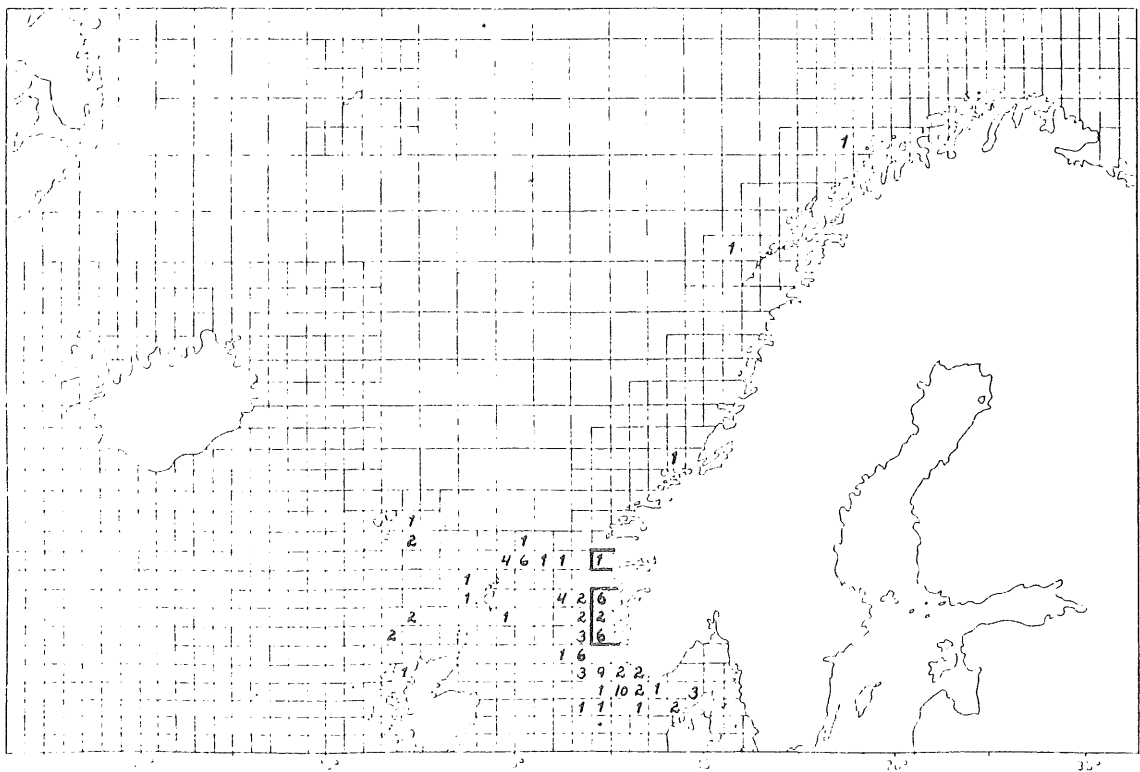


Fig. 12. Saithe tagging experiments on the Norwegian west coast south of 62°N May 1974. 2397 fish released inside the outlined areas. Recaptures 1975.

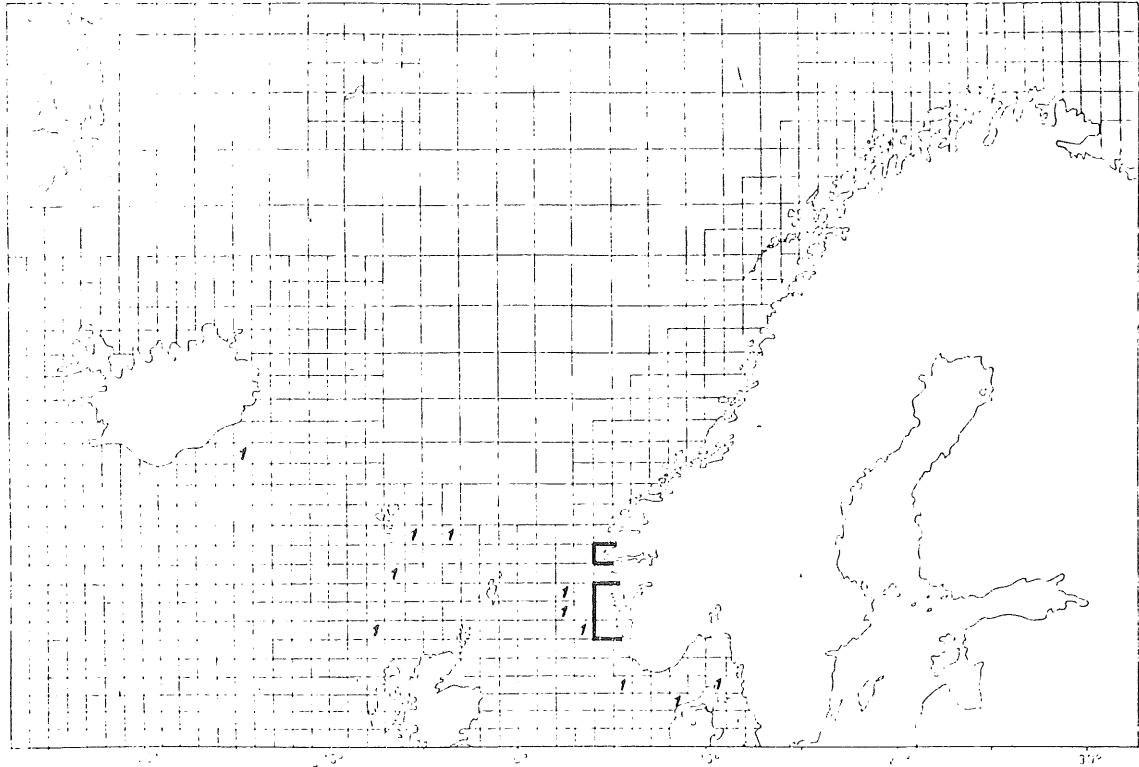


Fig. 13. Saithe tagging experiments on the Norwegian west coast south of 62°N May 1974. 2397 fish released inside the outlined areas. Recaptures 1976.

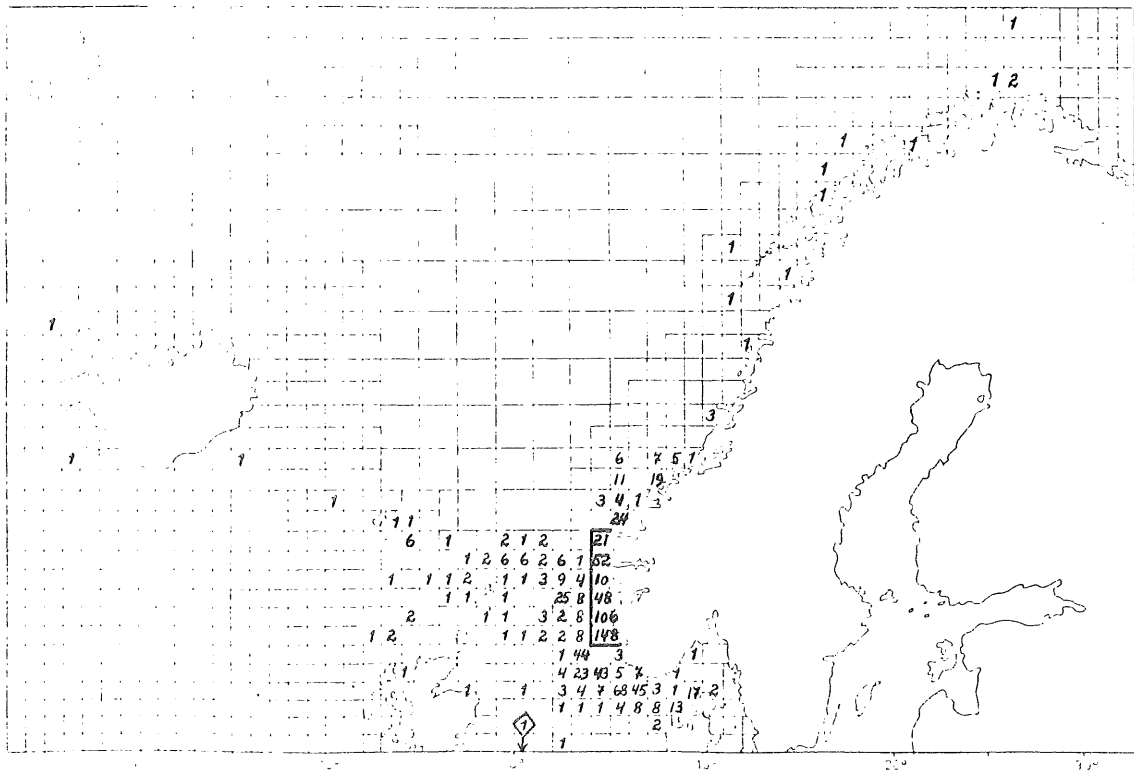


Fig. 14. Saithe tagging experiments on the Norwegian west coast south of 62°N 1972 - 1974. 6291 fish released inside the outlined area. Recaptures 1972 - 1976.