International Council for the Exploration of the Sea

C.M. 1981/G: 35
emersal Fish Committee

PRELIMINARY RESULTS OF SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN COAST 1975-77.

by

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ABSTRACT

In 1975-77, 18 942 saithe were tagged on the Norwegian coast, a continuation of a tagging program which started in 1972. The results confirm the migration pattern indicated by experiments in 1970-74. There is a substantial migration of immature saithe to the North Sea from the Norwegian coast between 62° and 66°N, and this coastal area seems to a large extent to serve as a nursery area for the North Sea stock of saithe.

INTRODUCTION

Saithe tagging has been carried out in northern Norway each year from 1954 and results from the experiments 1954-64 have been reported by Olsen (1959a, b, 1961) and Anon. (1965). In 1955-58 tagging was also carried out between 63° and 64°N (Olsen 1959b, Anon. 1965). From 1972 extensive tagging experiments on saithe have been carried out along most of the Norwegian coast each year. The main objective of the more recent experiments was to obtain more detailed information about the migration of saithe along and away from the coast. Results of tagging experiments 1970-74 were presented by Jakobsen (1978a, b, c) and showed that migration from about 63°N was predominantly southward in contrast to the basically northward

migration from the experiments in 1955-58. Also, the more recent experiments do not indicate any substantial migration to Iceland like the one which was recorded in 1957-62 (Olsen 1959a, 1961, Anon. 1965). Although the taggings now are expected generally to produce little new information, the experiments are continued to see if any change back to previous migration patterns occur. In this paper, results of the tagging experiments 1975-77 are presented.

MATERIAL AND METHODS

Details of the saithe tagging experiments 1975-77 are given in Table 1. In all, 18 942 saithe were tagged in 34 experiments in June-August, each comprising 400-630 fish. The southernmost locality was at 59°N and the experiments were distributed northwards along the coast nearly to the border between U.S.S.R. and Norway, covering the main area of distribution of saithe on the Norwegian coast. Hydrostatical tags of Lea's type were fastened to the fish with a nylon gut in front of the anterior dorsal fin.

The tagged fish were immature predominantly 2-5 years old saithe, generally oldest and largest in northern Norway. The saithe had been caught by commercial purse seiners and kept alive in a net for a period varying from a few hours to a couple of weeks. The net had usually been towed from the fishing ground to a more sheltered area. Poor condition of the fish caused by long towing and storage may explain the low recovery rate of some of the experiments.

The data comprise all recaptures reported up to 1979. In all, 2832 recaptures have been reported which give a recovery rate of 15%. Of these, 305 reports gave no or inadequate position of the recapture and these are not included in the charts.

RESULTS

The experiments have been grouped by year and area. Recaptures from the first year (i.e. up to new year), second year and third year after tagging have been charted together with the total recaptures up to 1979.

Tagging experiments south of 62°N (Figs. 1-3).

Migration from the Norwegian coast south of 62°N appears to have followed basically the same pattern as from the experiments in 1972-74 (Jakobsen 1978a) with most of the recaptures of saithe outside the coastal area being reported from the eastern side of the North Sea north of 57°N. However, the migration in general seems to be less extensive and reports showing long distance migrations to the west or north are clearly fewer than in the previous period. Saithe tagged in 1976 seem to have migrated less to the west than those tagged in 1975 and 1977.

Tagging experiments between 62° and 64°N (Figs. 4-6).

The experiments in 1975-77 confirm the migration pattern indicated by experiments in 1971-74, that immature saithe from the coastal area between 62° and 64°N migrate chiefly southward and to a large extent to the North Sea (Jakobsen 1978b). The tagged saithe were in all three years predominantly 2-3 years old and substantial migration of 3 years old saithe to the North Sea must have taken place at least in 1975 and probably also in the other years. After the age of 4-5 years, most of the surviving fish seem to have left the tagging area. Migration to the north is even more rare than from the 1971-74 experiments.

Tagging experiments between 64° and 66°N (Figs. 7-9).

The results of the experiments in 1975-77 show a stronger tendency towards a southern migration than from the 1973-74 experiments (Jakobsen 1978b). There has been a substantial

migration to the North Sea from the experiments in 1976 and 1977 and the fish has also to a large extent migrated further south into the North Sea than from previous experiments. Migration northward seems to have been significantly less frequent than in the earlier years. The experiments demonstrate more clearly than those between 62° and 64°N that most of the saithe migrate southward from the tagging area before they are 5 years old.

Tagging experiments between 66° and 68°N (Figs 10-12).

Recaptures from the tagging experiments between 66° and 68°N indicate that the migration is mostly to the north and this tendency is clearer than indicated by the experiments in 1974 (Jakobsen 1978b). Recaptures in the North Sea are still substantial, but some of them probably represent spawning saithe which may return north after spawning.

Tagging experiments between 68° and 69°30'N (Figs 13-15).

Tagging experiments in the area between 68° and 69°30'N, especially in the southern part has usually given poor results (Jakobsen 1978c), possibly because of long towing distance from the fishing grounds to sheltered areas. The experiments in 1975-77 have produced better results, but it is still difficult to get a clear picture of the migration pattern. It seems that the saithe in this area usually do not undertake long migrations before the spawning migrations start and most of the recaptures south of 65°N is probably spawning saithe. The immature saithe appear to migrate chiefly towards deeper water on the coastal banks which in this area are found relatively close to the coast.

Tagging experiments north of 69°30'N (Figs. 16-18).

The immature saithe on the northernmost part of the Norwegian coast seem to be migrating chiefly towards deeper water on the

coastal banks before they reach maturity. It is difficult to separate the migration of immature saithe and spawning saithe on the north coast. Recaptures of saithe migrating southwards beyond the Lofoten Islands are, however, believed to be chiefly spawning saithe. The experiments in 1975-77 have given a much lower rate of recaptures from southern areas, especially the North Sea, than the experiments in 1979-74. However, most of the recaptures from the North Sea in the earlier experiments were fish tagged west of 23°E and comparison with the experiments east of 23°E does not show large differences.

DISCUSSION

In general the results of the tagging experiments 1975-77 confirm the migration patterns indicated by the experiments in 1970-74. There is a more pronounced difference between the areas south and north of about 66°N with a stronger tendency than previously towards a southern migration from the area between 64° and 66°N and a northern migration from the area between 66° and 68°N. There seems to have been less long distance migration than in the former period.

For management purposes, it has been assumed that there is one self-contained stock of saithe in the North Sea and another on the Norwegian coast north of 62°N. The tagging experiments indicate, however, that part of the Norwegian coast north of 62°N, at least for the time being, is a nursery area for saithe which recruit to the North Sea stock. The distribution of recaptures indicate that immature saithe from the Norwegian coast north and south of 62°N to a large extent mix in the North Sea and the tagging experiments do not give evidence of substantial numbers of saithe returning north of 62°N to spawn later in life. This means that the fisheries for young saithe on the Norwegian coast from 62°N and at least north to 65°N probably have a larger negative effect on the North Sea spawning stock than on the North East Arctic spawning stock and that a reduction in these fisheries will increase the sustainable yield south of 62°N more than north of 62°N.

REFERENCES

Anon. 1965. Report of the Coalfish Working Group. Co-op. Res. Rep. int. Coun. Explor. Sea, Ser. A, 6: 1-23.

Jakobsen, T. 1978a. Saithe tagging experiments on the Norwegian west coast south of 62°N, 1972-74. Coun. Meet. int. Coun. Explor. Sea, 1978(G 32): 1-13.

Jakobsen, T. 1978b. Saithe tagging experiments on the Norwegian coast between 62°N and 67°N, 1971-74. Coun. Meet. int. Coun. Explor. Sea, 1978(G 33): 1-9.

Jakobsen, T. 1978c. Saithe tagging experiments in northern Norway north of 68°N, 1970-74. Coun. Meet. int. Coun. Explor. Sea, 1978(G 34): 1-14.

Olsen, S. 1959a. Migration of coalfish (Gadus virens L.) from Norway to Faroe Islands and Iceland. Coun. Meet. int. Coun. Explor. Sea, 1959(12): 1-5.

Olsen, S. 1959b. Preliminary results of the Norwegian coalfish taggings 1954-58. Coun. Meet. int. Coun. Explor. Sea, 1959(114): 1-7.

Olsen, S. 1961. An account of the Norwegian coalfish investigations with special reference to the tagging experiments. Coun. Meet. int. Coun. Explor. Sea, 1961(125): 1-8.

Table 1. Saithe tagging experiments on the Norwegian coast 1975-1977.

Date	Position	No. released	Size range (cm)	Principal age groups	Recaptures					
					1975	1976	1977	1978	1979	Total
7.7.75	N 59°04' E 05°26'	600	30 - 38	2	28	35	11	3	3	80
8.7.75	N 59°19' E 04°53'	599	29 - 37	2	3	3	2	-	-	8
10.7.75	N 60°14' E 05°41'	600	31 - 52	2 - 3	137	57	13	7	-	214
30.6.75	N 63°04' E 07°28'	600	33 - 48	2 - 3	44	27	11	7	2	101
27.6.75	N 64°20' E 10°28'	600	28 - 41	2	26	11	6	4	2	49
28.6.75	N 64°20' E 10°28'	400	28 - 40	2	13	20	5	2	-	40
24.6.75	N 67°31' E 15°16'	500	31 - 50	2 - 3	23	34	13	2	3	75
30.7.75	N 68°42' E 14°24,	499	31 - 51	2 - 3	11	26	4	3	3	47
1.8.75	N 70°43' E 23°20'	501	38 - 70	3 - 4	10	33	37	14	1	95
5.8.75	N 70°50' E 26°46'	500	43 - 81	4 - 6	27	48	21	5	4	105
10.8.75	N 69°55' E 29°45'	500	39 - 66	3 - 5	18	33	17	2	2	72
16.6.76	N 59°04' E 05°26'	600	31 - 41	2 - 3		21	7	3	1	32
14.6.76	N 60°05' E 05°15'	600	32 - 41	2 - 3		36	24	9	1	70
10.6.76	N 61°17' E 04°38'	600	30 - 39	2 - 3		7	5	-	1	13
8.6.76	N 63°04' E 07°29'	600	28 - 39	2 - 3		38	28	5	2	73
3.6.76	N 64°20' E 10°26'	600	30 - 51	3		67	45	8	-	120
2.6.76	N 66°46' E 12°28'	600	31 - 56	3		36	14	9	1	60
1.6.76	N 67°18' E 13°30'	600	31 - 48	2 - 3		17	9	6	6	38
4.8.76	N 68°41' E 14°24'	500	31 - 50	3		20	8	10	2	40
9.8.76	N 70°37' E 23°31'	500	39 - 66	3 - 4		36	44	17	10	107
11.8.76	N 70°58' E 26°01'	400	41 - 72	3 - 5		24	31	14	5	74
16.8.76	N 70°05' E 30°11'	600	40 - 64	2 - 4		110	39	6	1	156
1.6.77	N 59°04' E 05°24'	613	31 - 44	2 - 3			72	29	12	113
2.6.77	N 59°24' E 05°06'	600	35 - 51	2 - 4			48	44	13	105
3.6.77	N 61°17' E 04°38'	600	37 - 50	2 - 4			42	33	12	87
6.6.77	N 63°03' E 07°25'	600	31 - 46	2 - 3			38	25	5	68
14.6.77	N 63°32' E 07°59'	600	32 - 50	2 - 3			86	16	4	106
7.6.77	N 64°20' E 10°28'	630	35 - 51	3 - 4			80	44	9	133
8.6.77	N 66°46' E 12°29'	600	32 - 48	3			15	18	6	39
10.6.77	N 67°31' E 14°14'	600	34 - 50	3			18	41	17	76
4.8.77	N 69°03' E 16°05'	600	35 - 57	3			130	24	23	177
25.8.77	N 70°45' E 23°20,	400	37 - 62	3 - 4			34	32	17	83
23.8.77	N 70°35' E 26°39'	500	40 - 75	3 - 5			38	50	18	106
16.8.77	N 70°16' E 30°55',	500	47 - 73	3 - 5			10	44	16	70

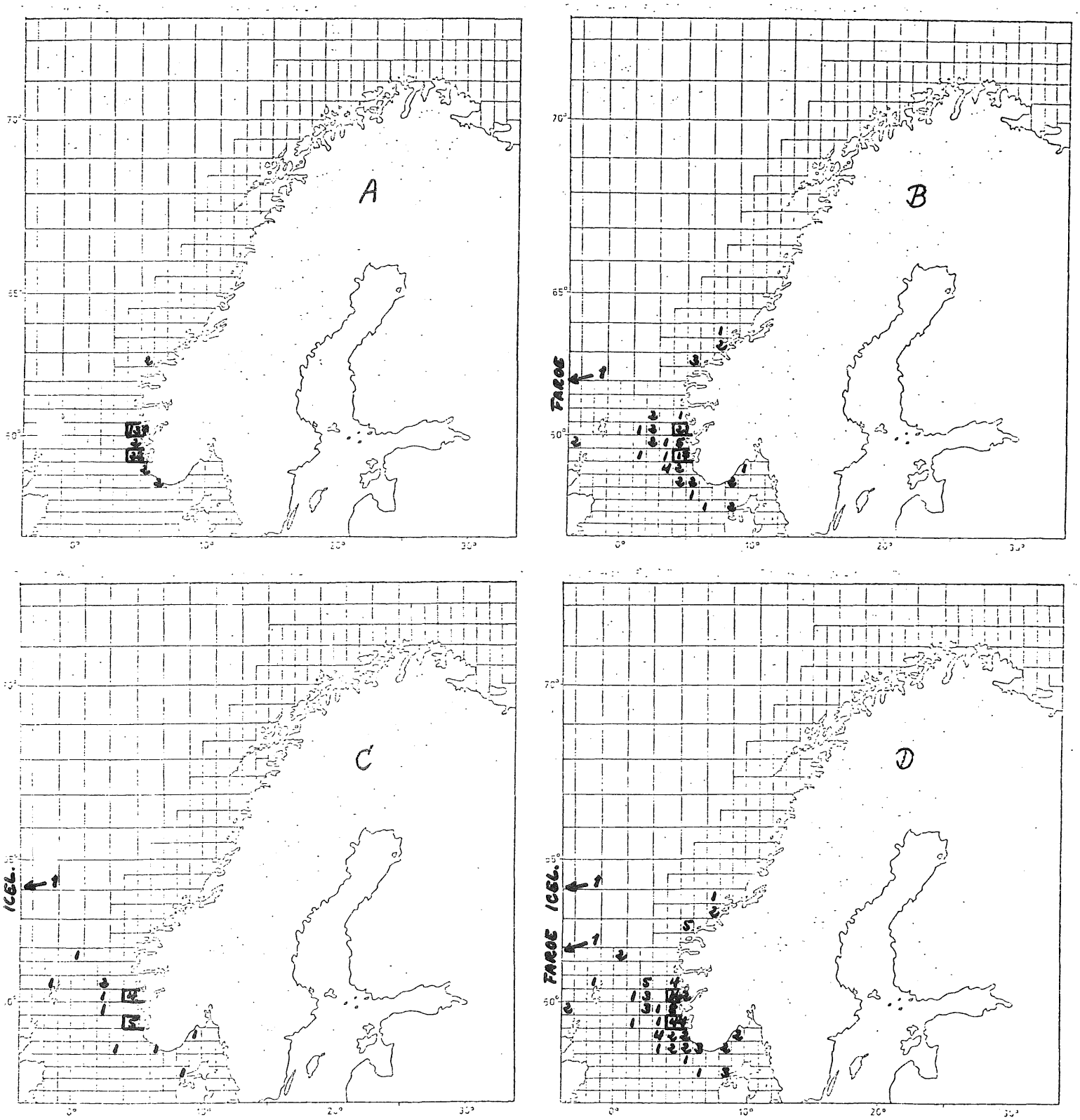

Fig. 1. Tagging experiments south of 62°N in July 1975.
1799 saithe released inside the outlined areas.
Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

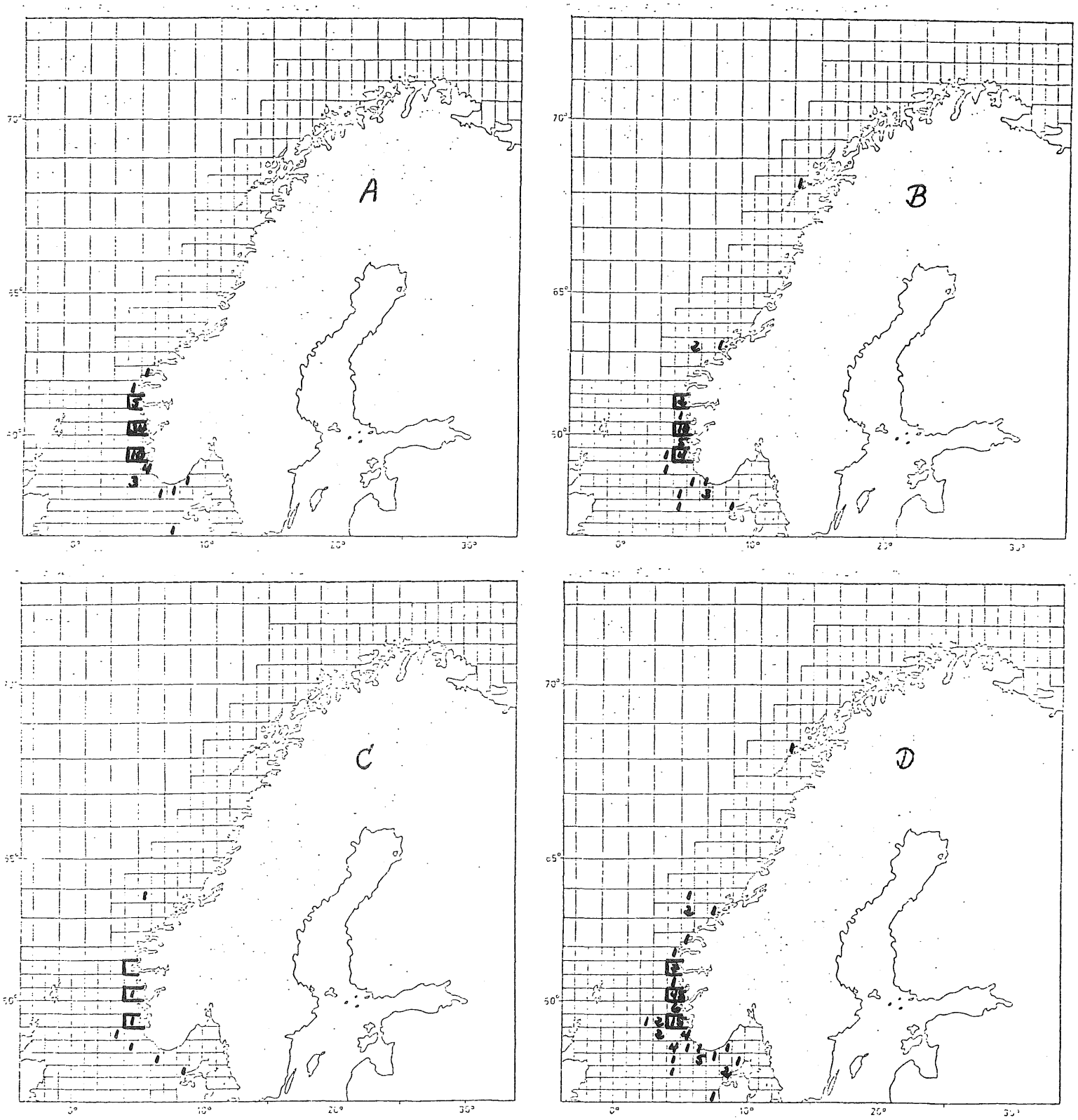

Fig. 2. Tagging experiments south of 62°N in June 1976. 1800 saithe released inside the outlined areas. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

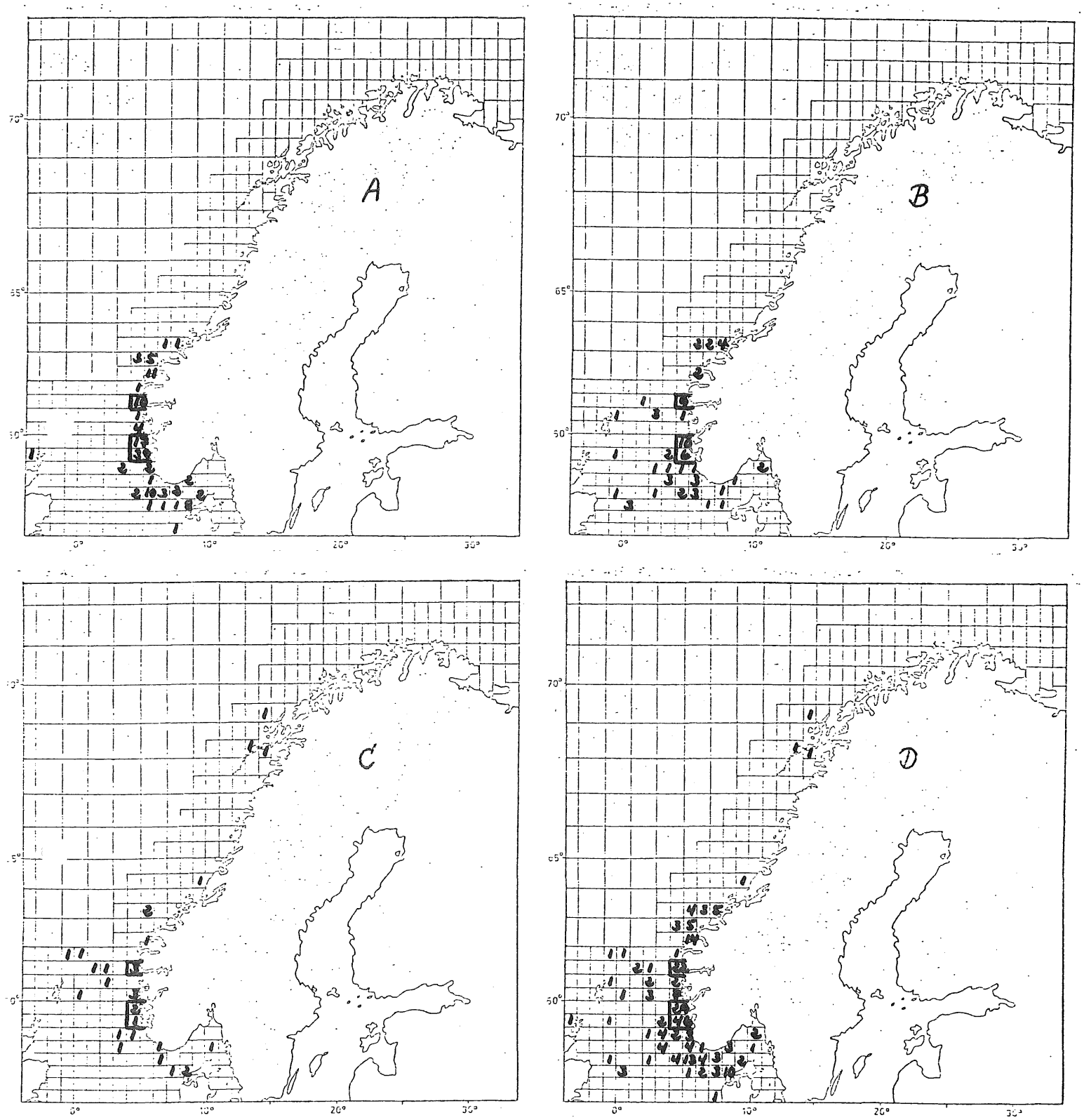

Fig. 3. Tagging experiments south of 62°N in June 1977. 1813 saithe released inside the outlined areas. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.

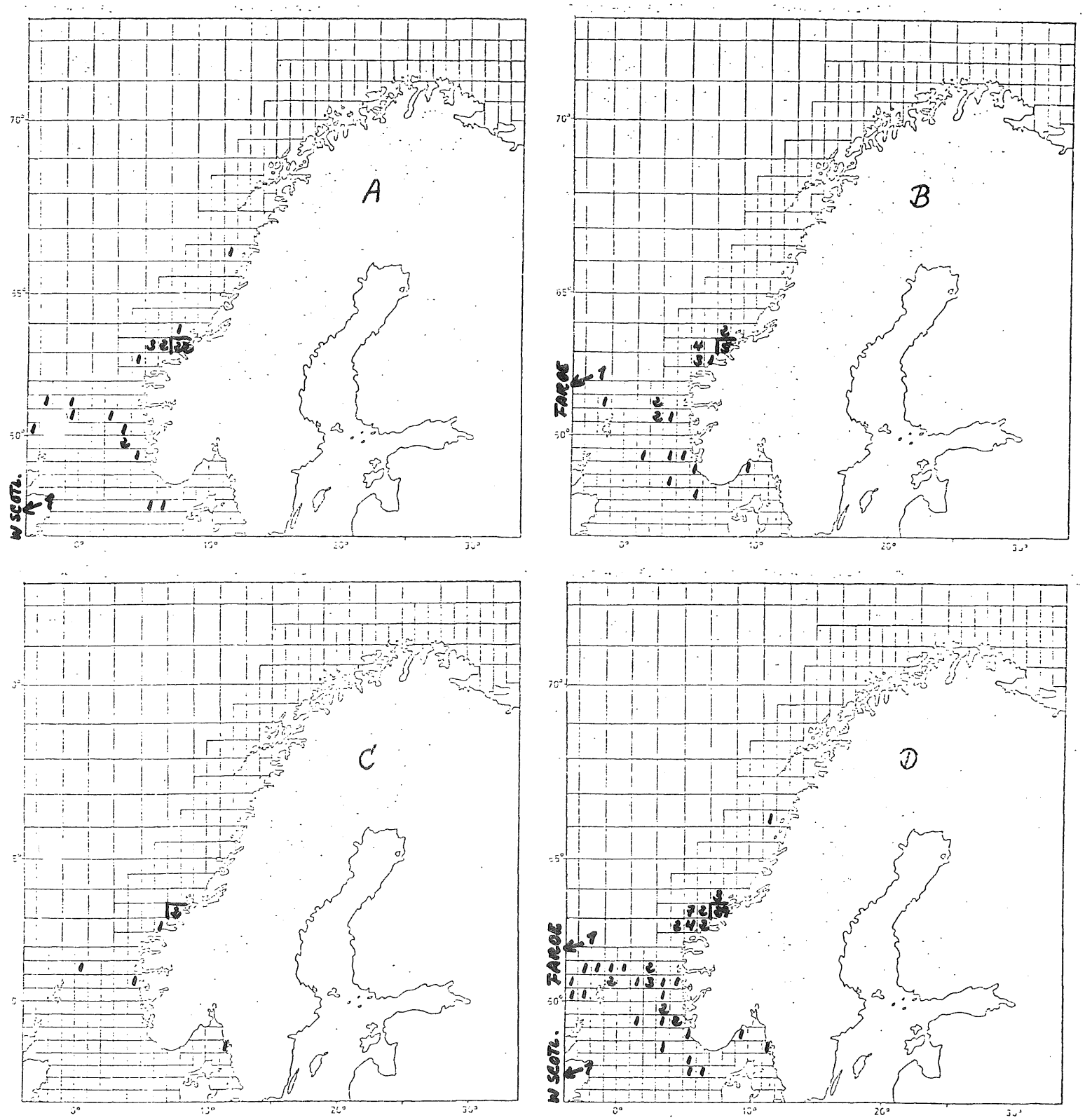

Fig. 4. Tagging experiment between 62° and 64°N in June 1975. 600 saithe released inside the outlined area. Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

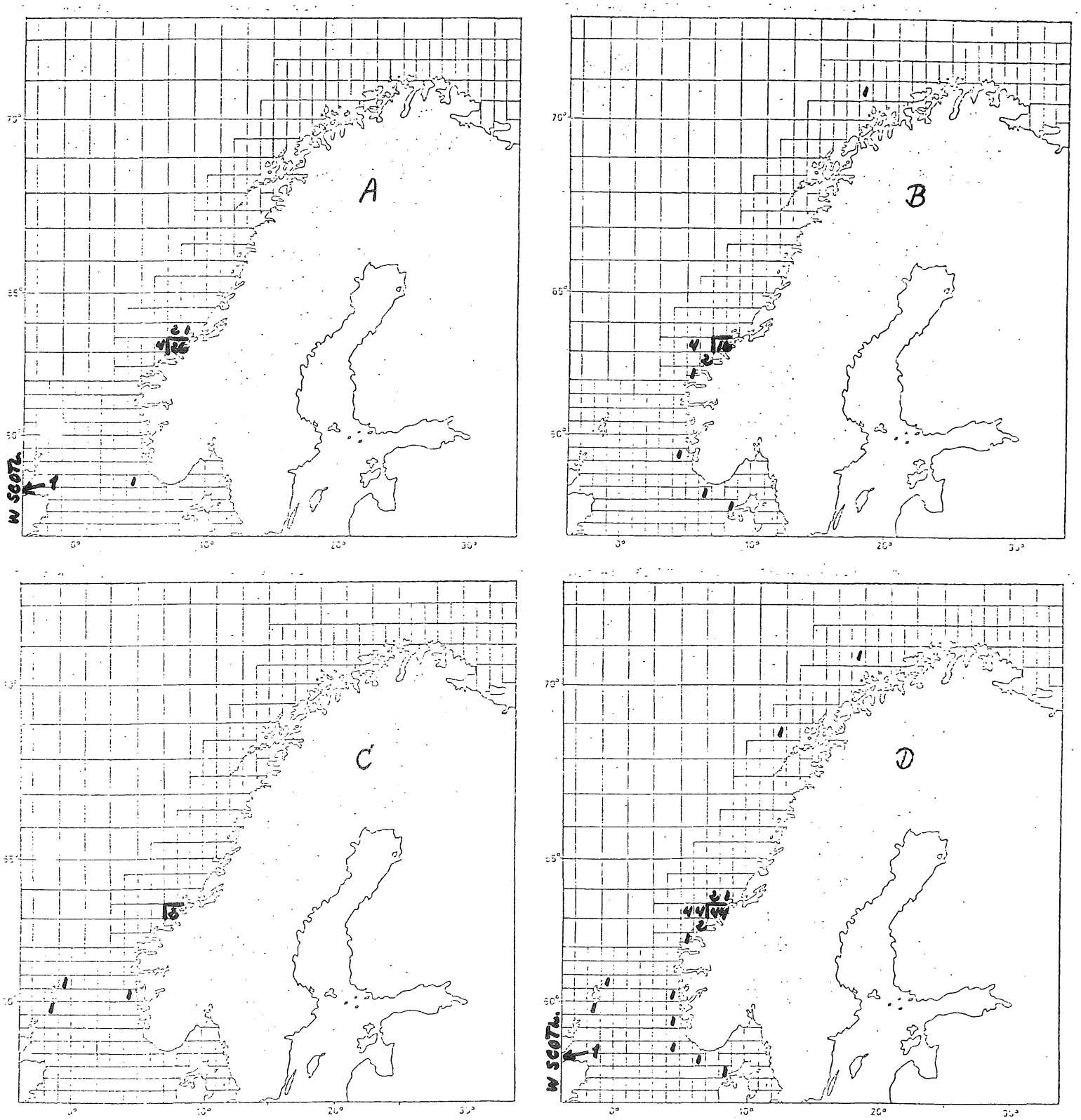

Fig. 5. Tagging experiment between 62° and 64°N in June 1976. 600 saithe released inside the outlined area. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

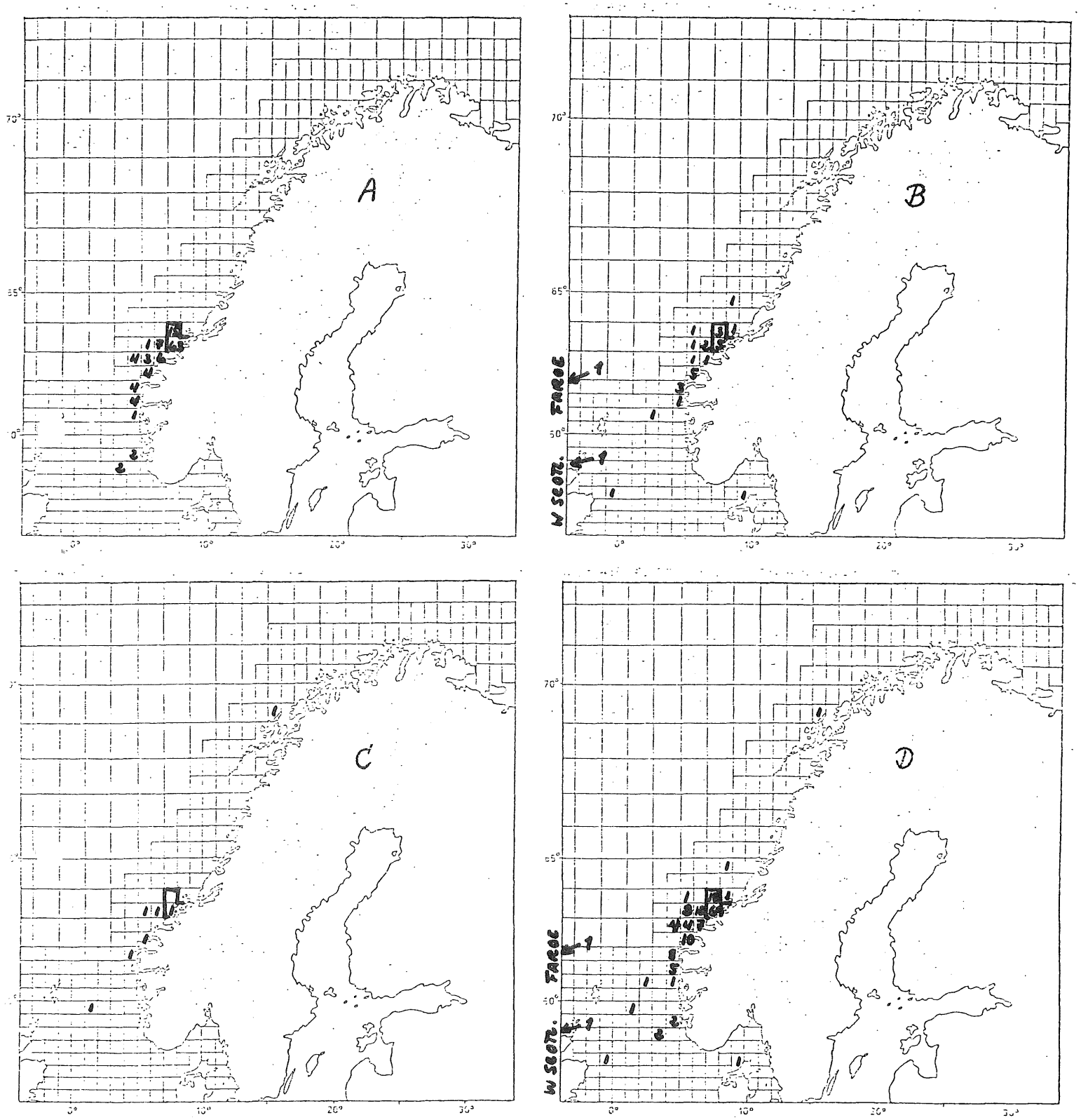

Fig. 6. Tagging experiments between 62° and 64°N in June 1977. 1200 saithe released inside the outlined area. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.

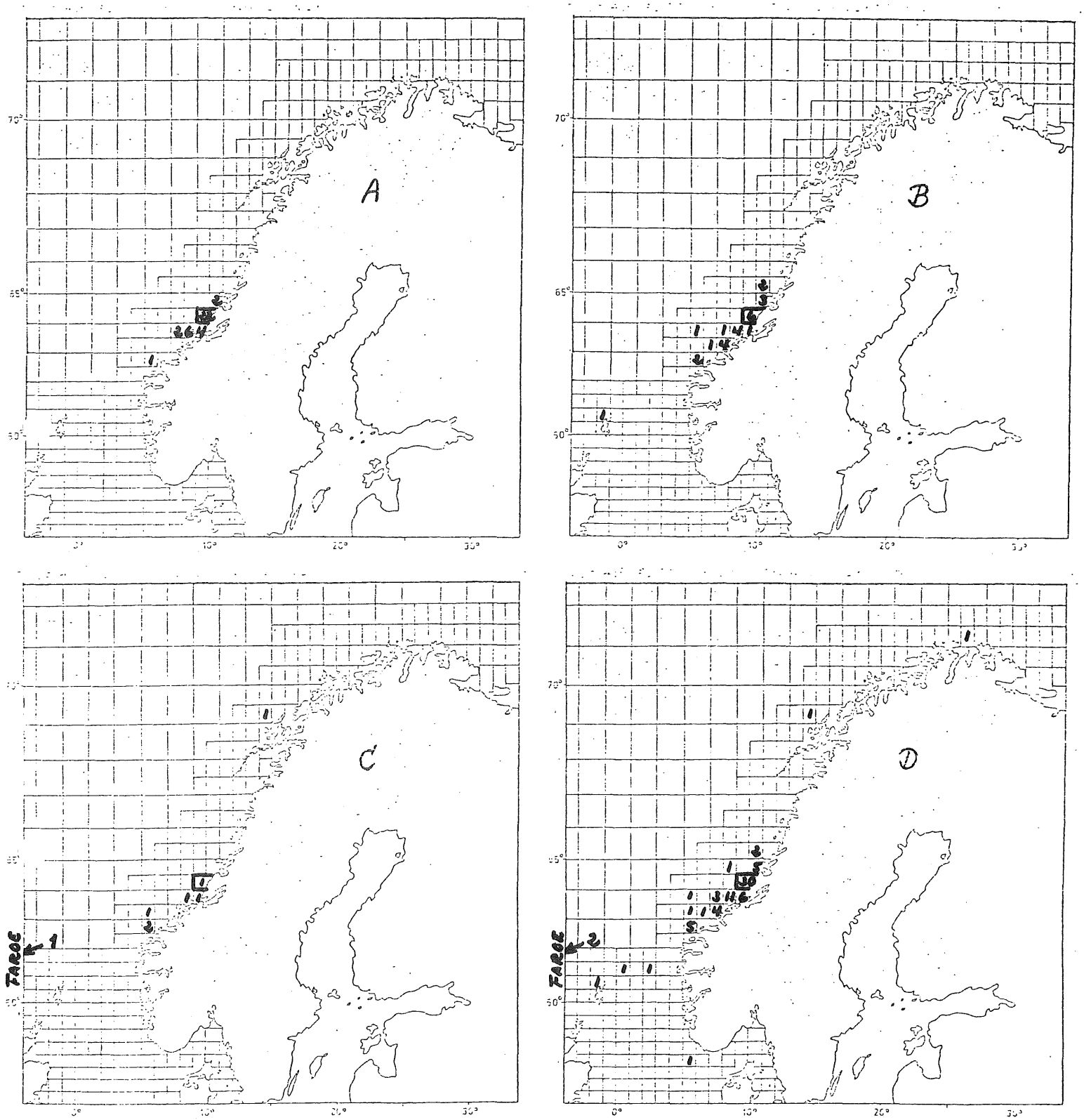

Fig. 7. Tagging experiments between 64° and 66°N in June 1975. 1000 saithe released inside the outlined area. Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

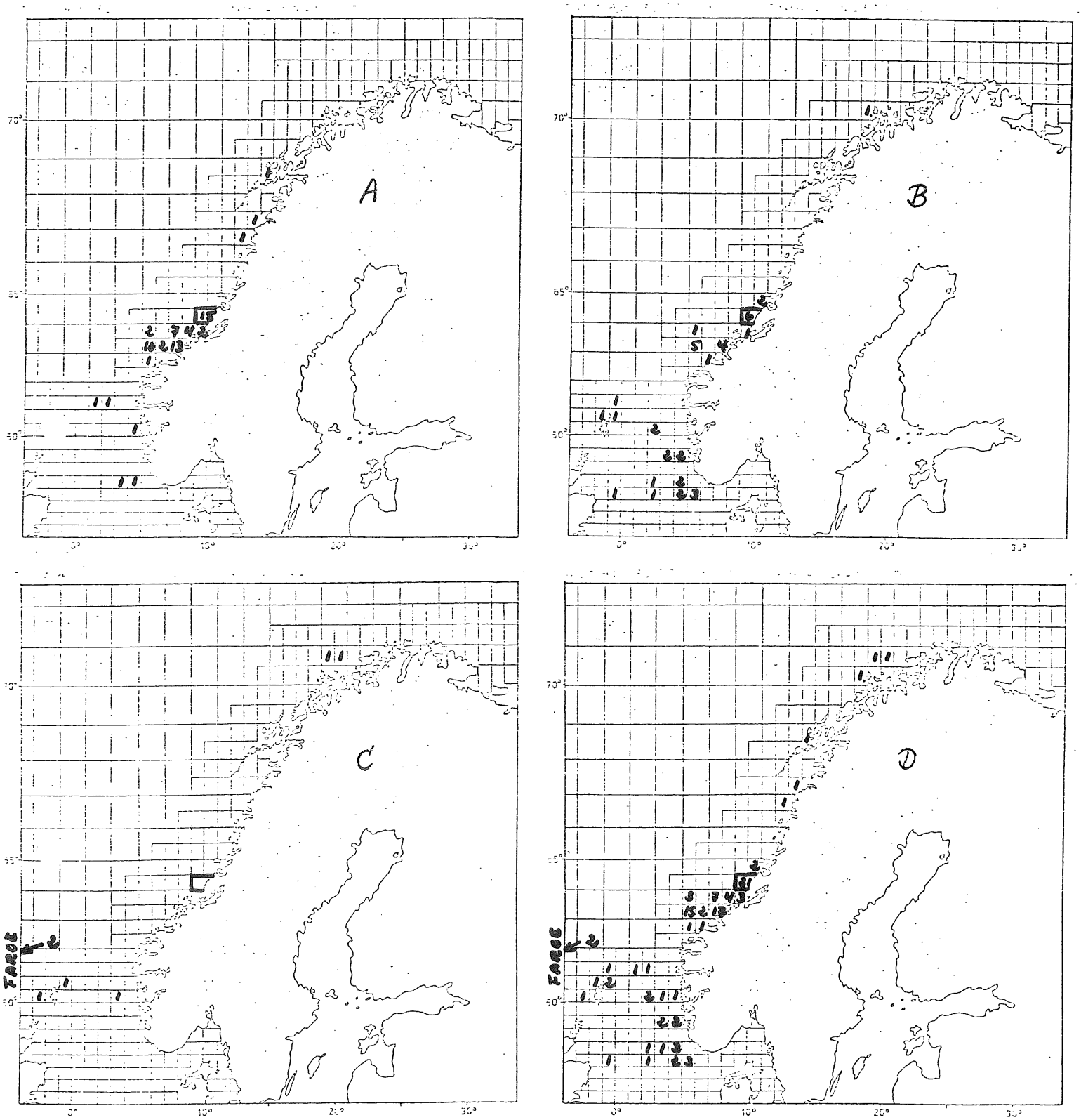

Fig. 8. Tagging experiment between 64° and 66°N in June 1976. 600 saithe released inside the outlined area. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

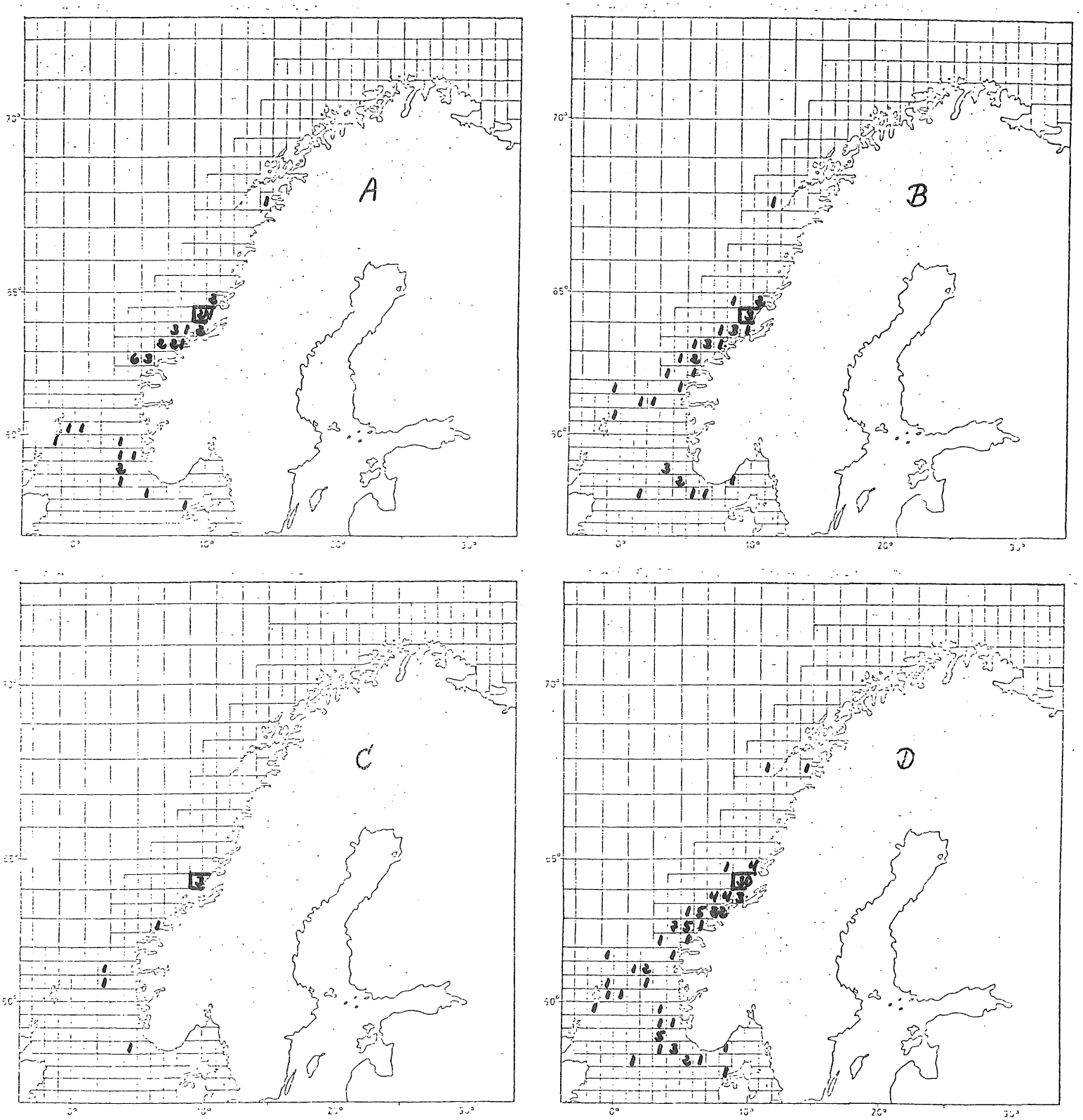

Fig. 9. Tagging experiment between 64° and 66°N in June 1977. 630 saithe released inside the outlined area. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.

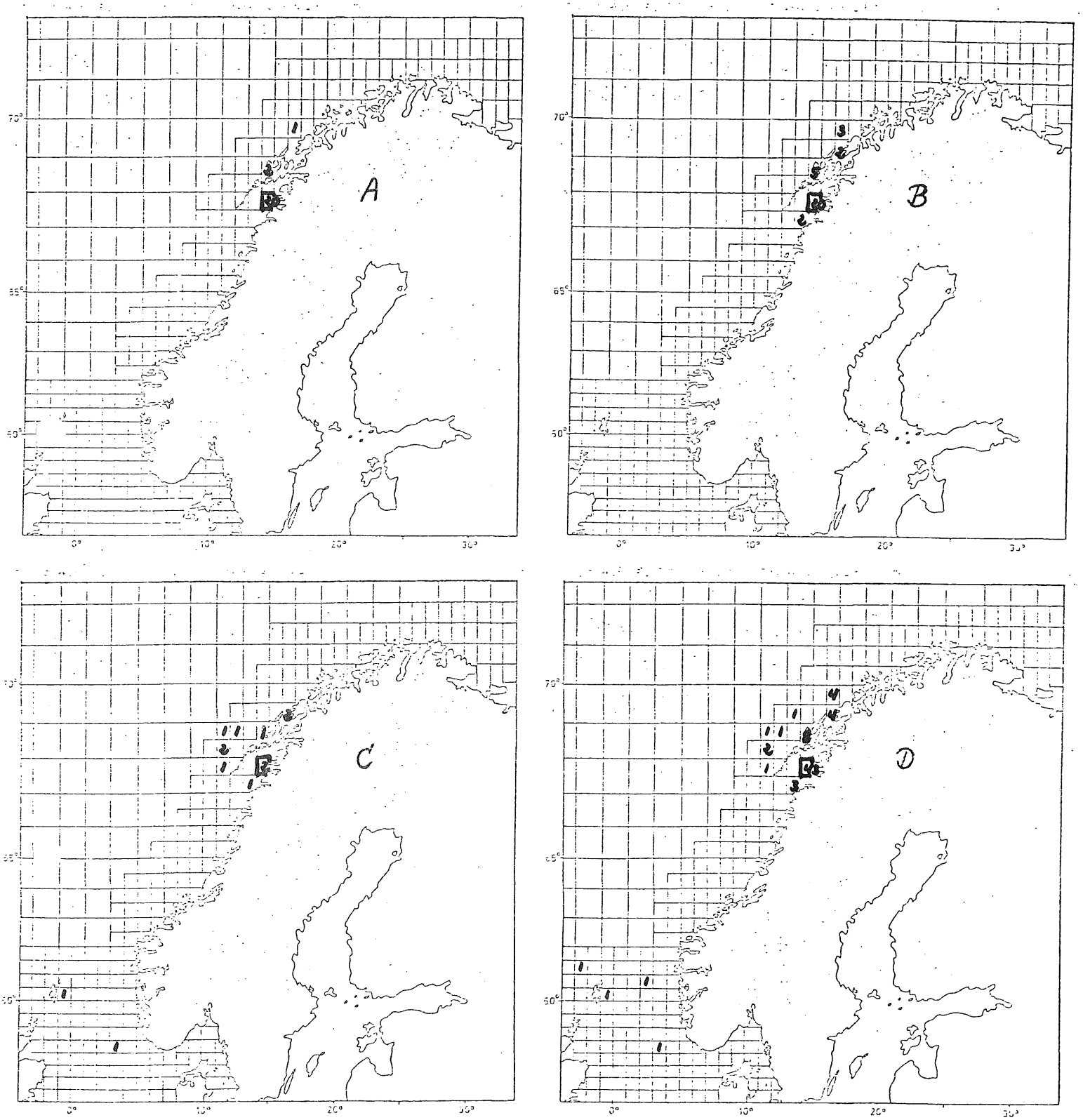

Fig. 10. Tagging experiment between 66° and 68°N in June 1975. 500 saithe released inside the outlined area. Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

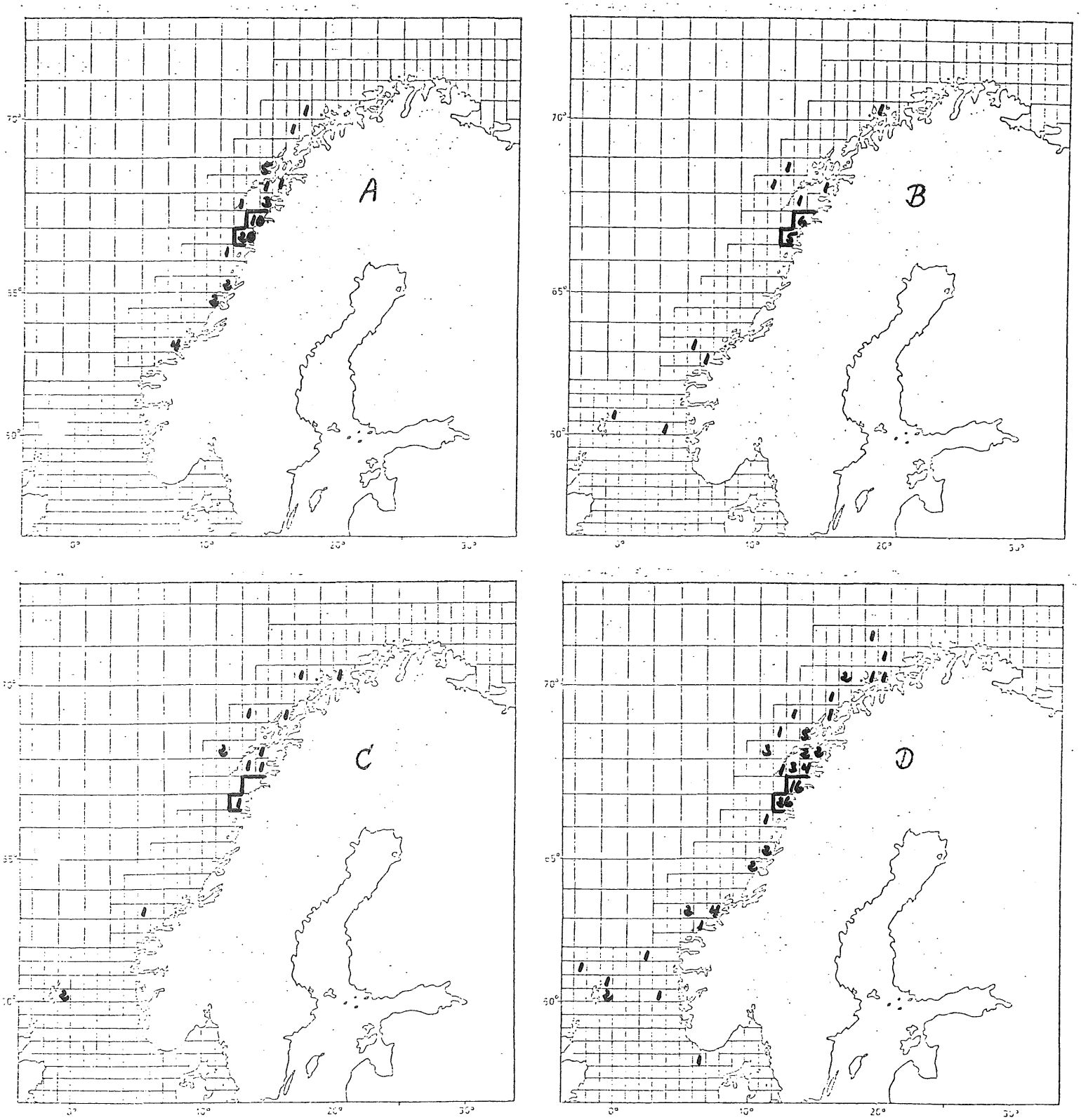

Fig. 11. Tagging experiments between 66° and 68°N in June 1976. 1200 saithe released inside the outlined area. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

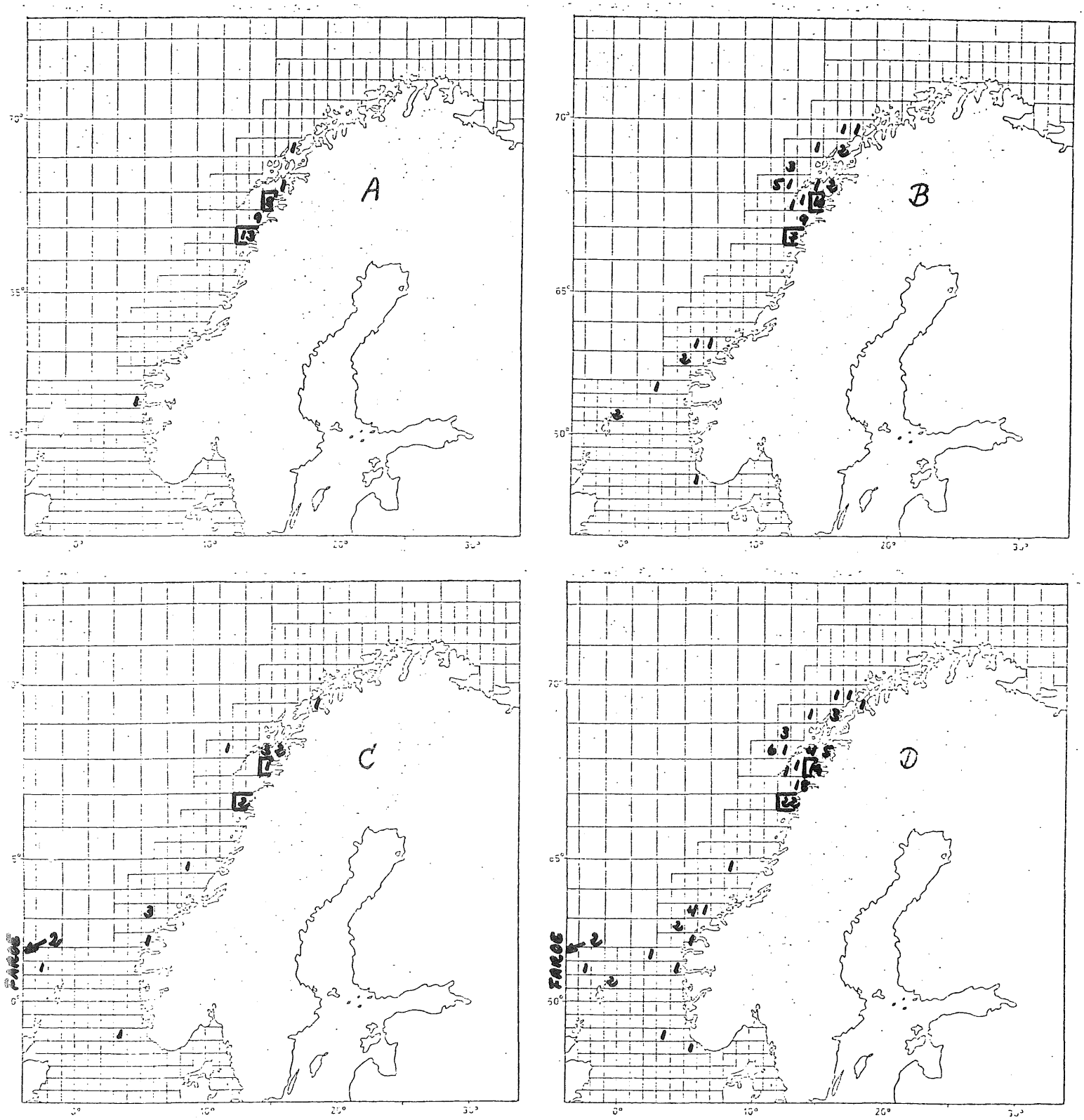

Fig. 12. Tagging experiments between 66° and 68°N in June 1977. 1200 saithe released inside the outlined areas. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.

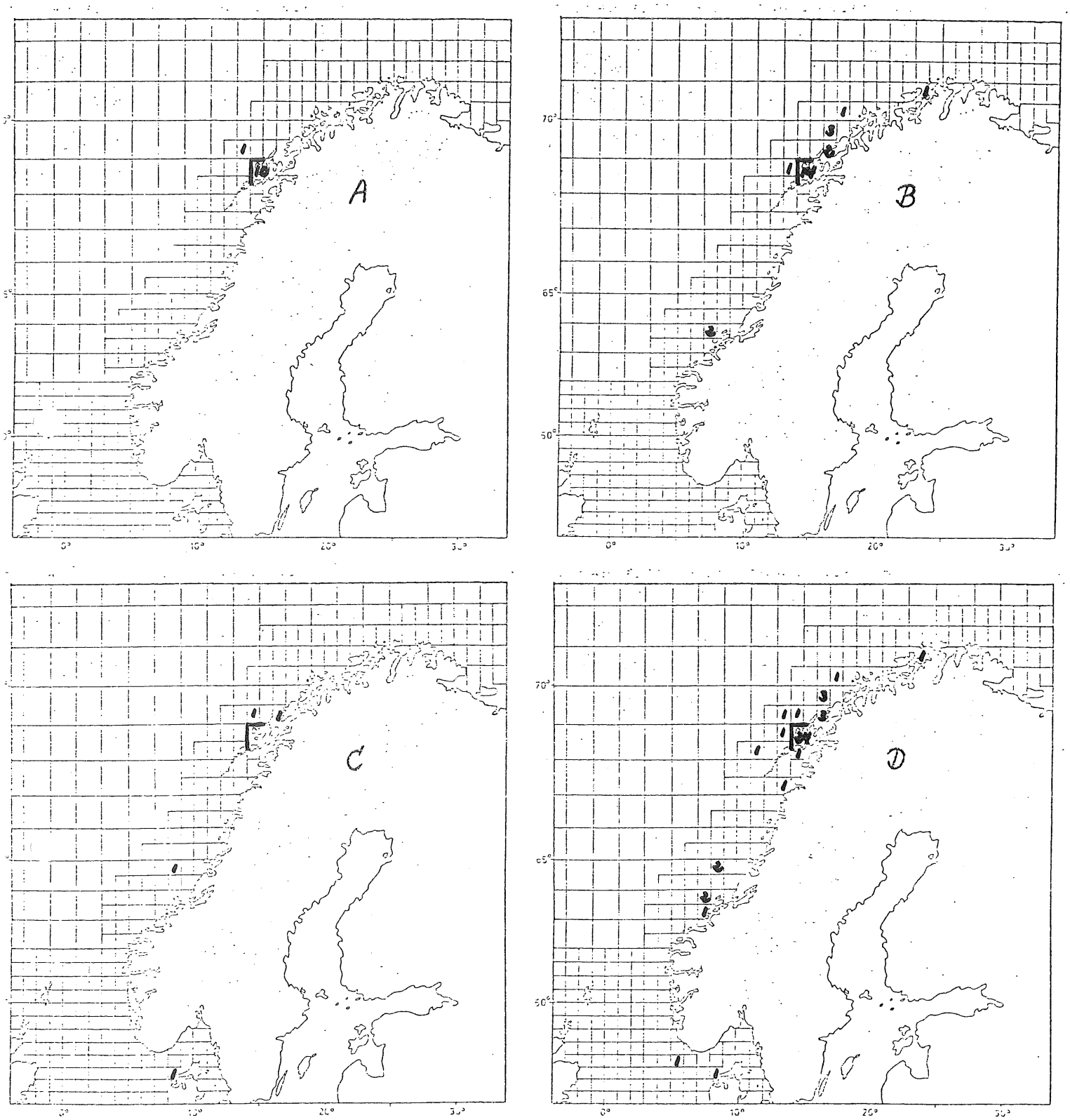

Fig. 13. Tagging experiment between 68° and 69°30'N in June 1975.
499 saithe released inside the outlined area.
Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

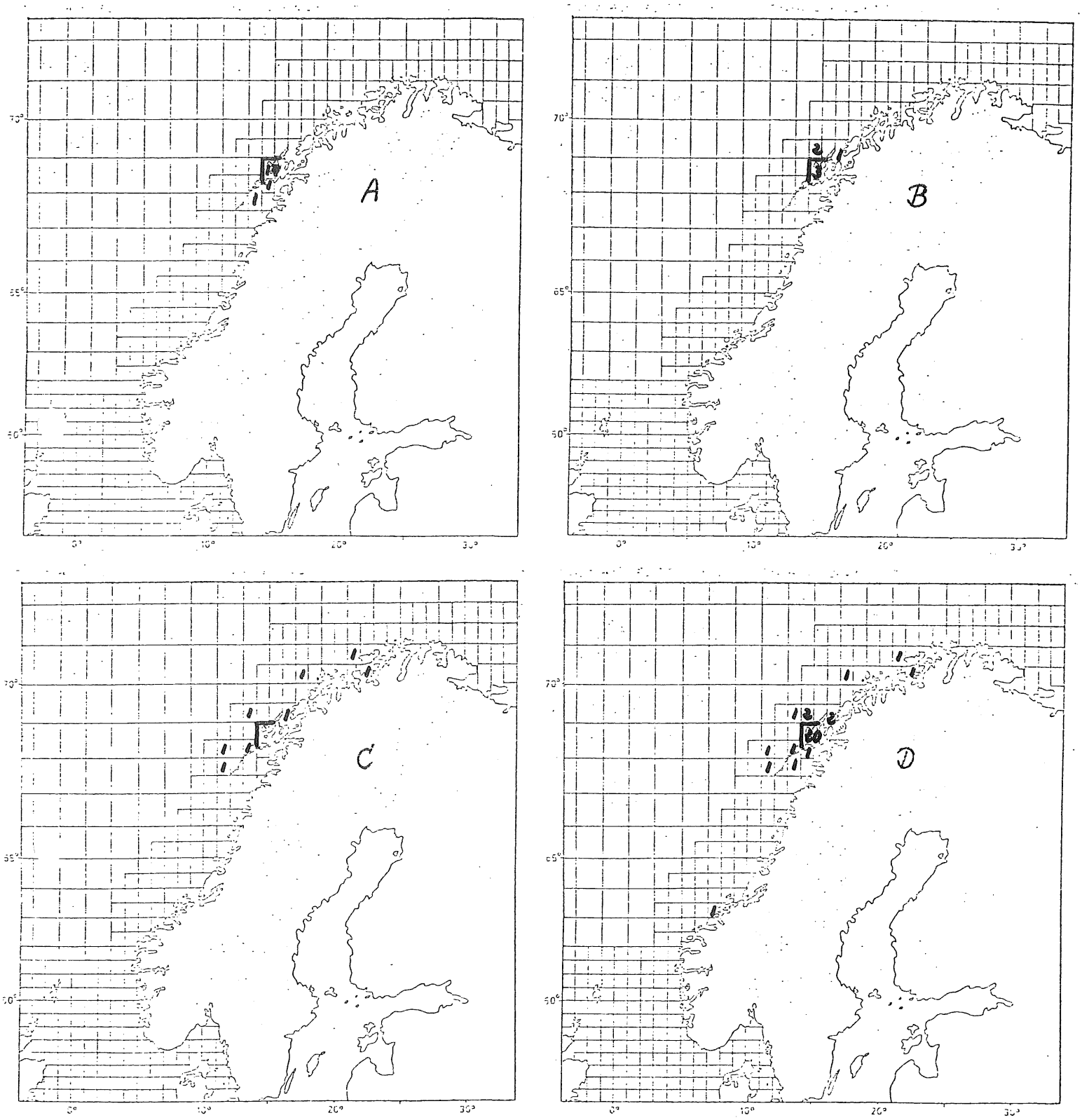

Fig. 14. Tagging experiment between 68° and 69°30'N in August 1976. 500 saithe released inside the outlined area. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

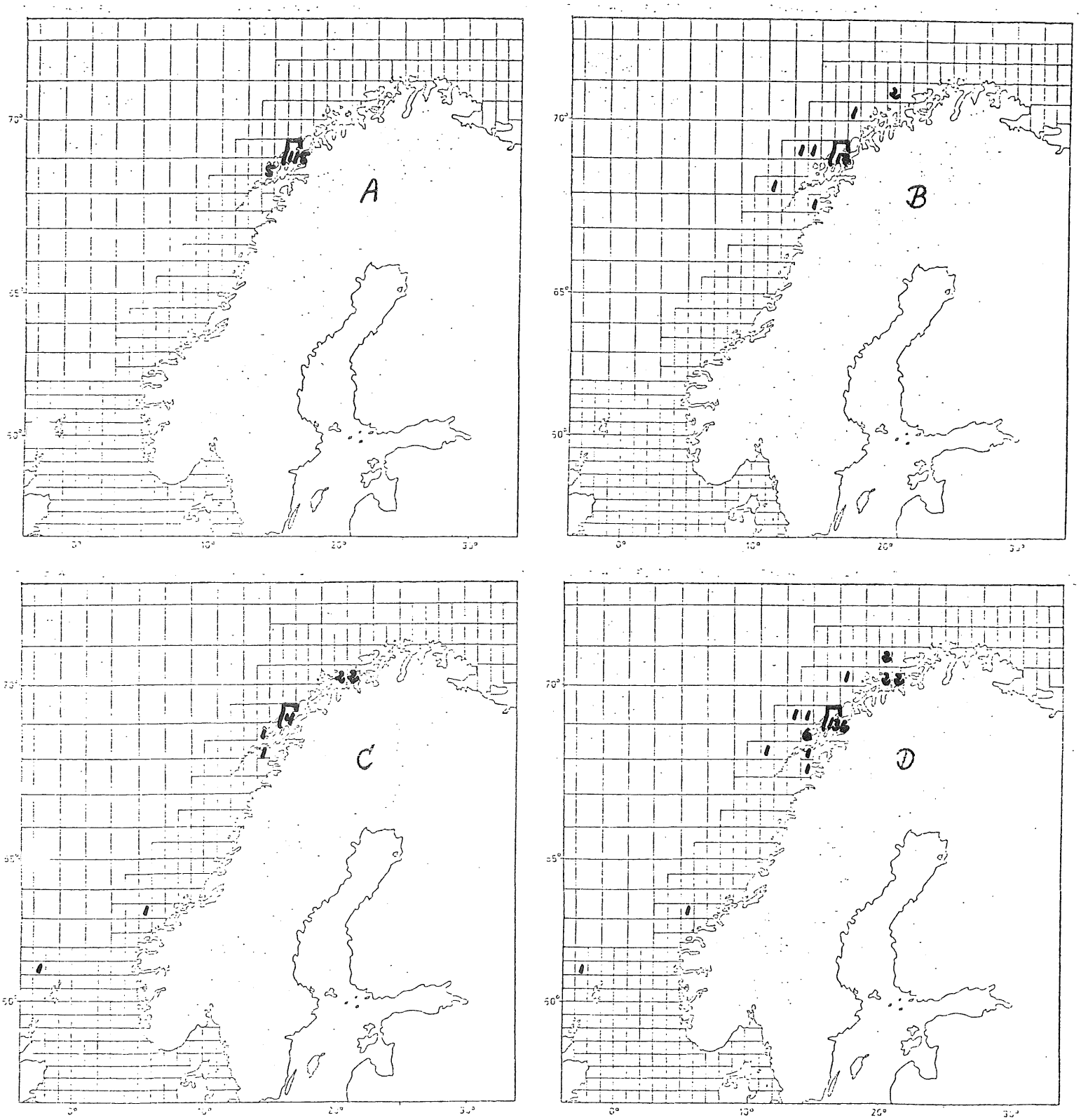

Fig. 15. Tagging experiment between 68° and 69°30'N in August 1977. 600 saithe released inside the outlined area. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.

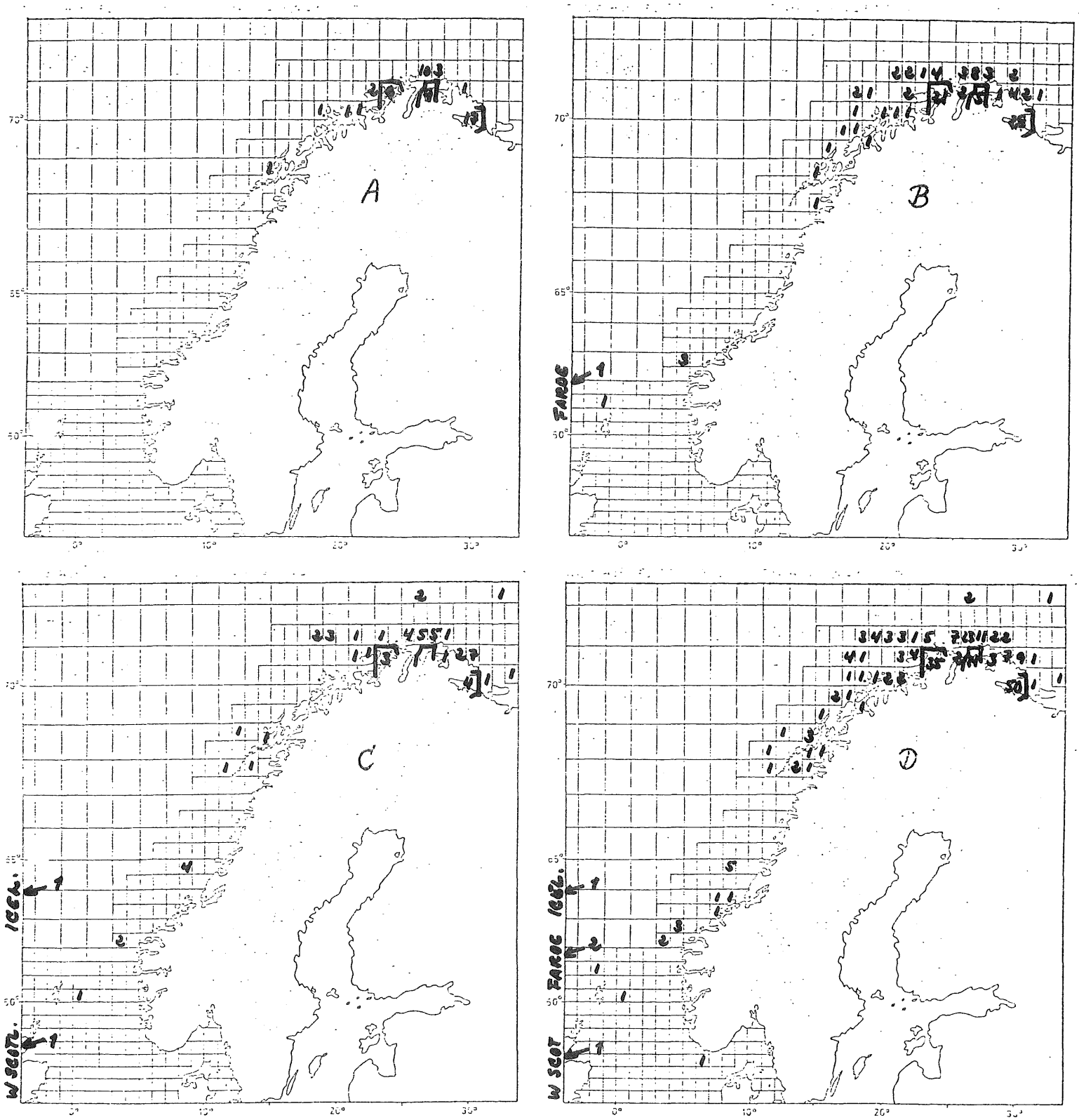

Fig. 16. Tagging experiments north of 69°30'N in August 1975. 1501 saithe released inside the outlined areas. Recaptures: A) 1975, B) 1976, C) 1977, D) 1975-1979.

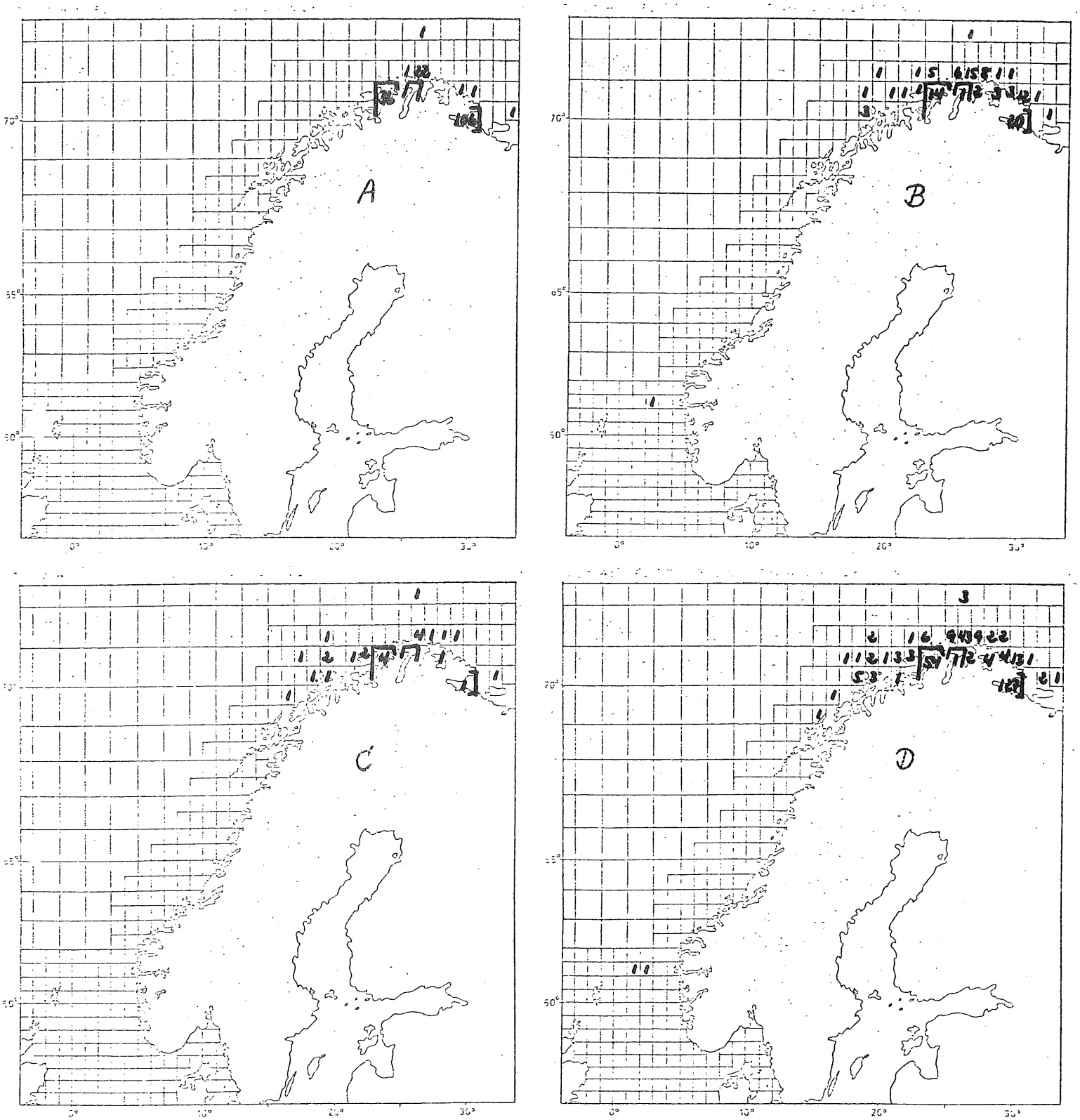

Fig. 17. Tagging experiments north of 69°30'N in August 1976. 1500 saithe released inside the outlined areas. Recaptures: A) 1976, B) 1977, C) 1978, D) 1976-1979.

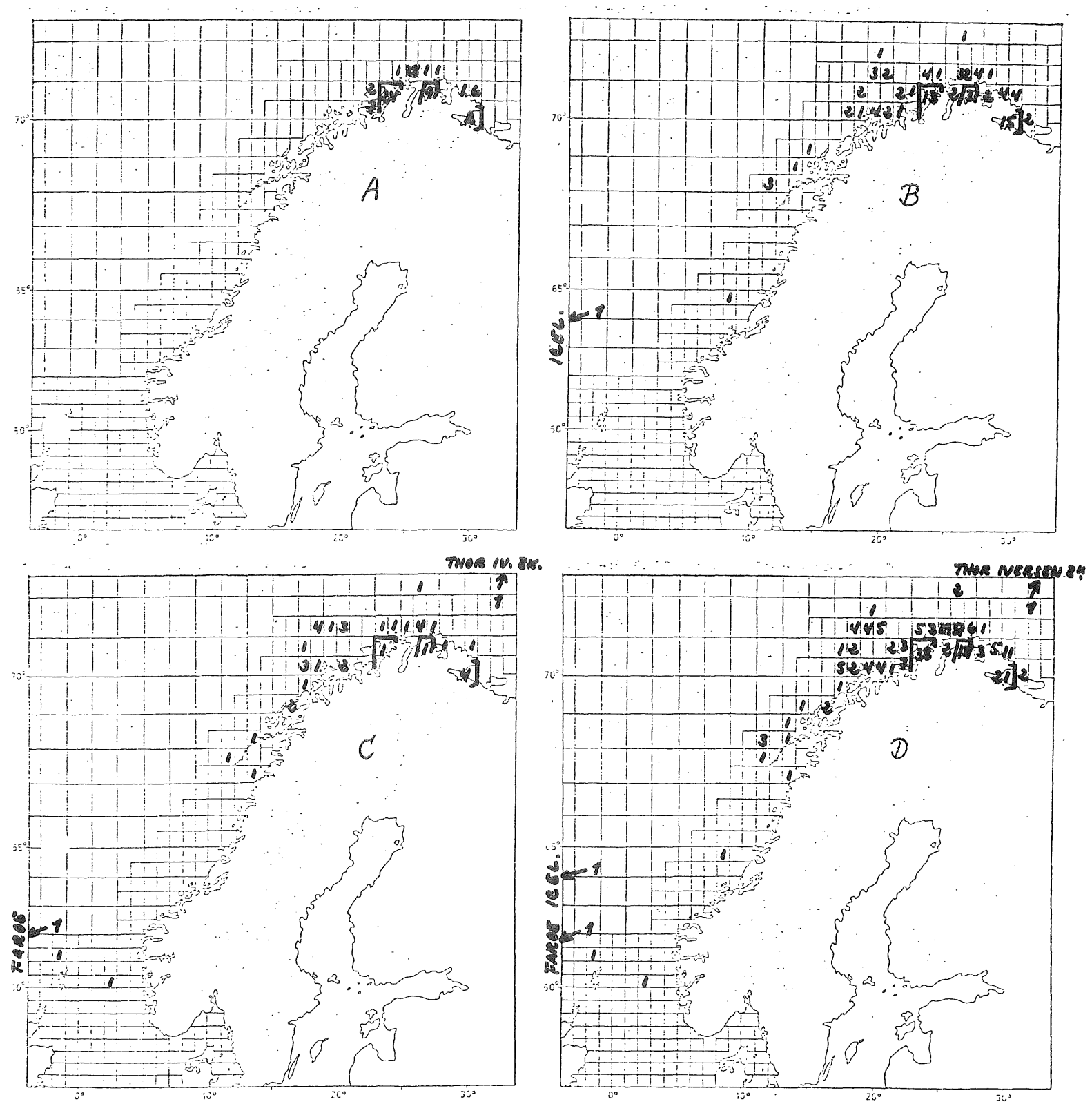

Fig. 18. Tagging experiments north of 69°30'N in August 1977. 1400 saithe released inside the outlined areas. Recaptures: A) 1977, B) 1978, C) 1979, D) 1977-1979.