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Tagging results of mature dab in the Southern Bight.

R. De Clerck
Fisheries Research Station
Ankerstraat, 1
8400 Oostende/Belgium



ABSTRACT

During 1979 mature dab was tagged in the Belgian coastal waters. The main migration route in a NE- direction started during the second half of the year. The main distance of this migration was about 80 miles. A small fraction also migrated into the eastern Channel. During the next spring season a return to the release ground became apparent.

RESUME

Pendant l'année 1979 des limandes matures ont été marquées dans les eaux côtières belges. La migration principale dans la direction NE commença dans le second semestre de l'année. La distance moyenne couverte lors de la migration était d'environ 80 milles. Une fraction minime se retrouvait dans la Manche orientale. Pendant le printemps suivant, un retour vers le lieu de libération se manifesta.

INTRODUCTION

In the North Sea dab are very abundant and along the coasts they occur in large quantities. However dab catches usually do not reflect stock abundances as vast quantities of dabs are discarded and on many fishing trips in the North Sea 100 % of the dab catches are discarded (Anon, 1977).

As dab is a gross feeder, eating practically any organism that is locally common, its importance in a multispecies model is not negligible. However little is known of the behaviour of dab, especially of the migration. So far results on dab tagging experiments have not yet been published and some migration patterns were derived from recordings of seasonal densities.

Dab seems to occur at greater depths in winter time (20-60 meters) whereas during summer dab favours the shallower regions (Bohl, 1957, Rae, 1970, Creutzberg and Fonds, 1971). However there seems to be few limitations according to the depth as dab was observed at depths varying from 150-200 meters (De Veen, 1954, Sahrhage, 1964).

The wide distribution of dab can be ascribed to its high resistance to extreme high or low temperatures or salinities (Bohl 1957, De Veen 1954, Sahrhage, 1967). Spawning season is from January to August in the North Sea. In the Southern North Sea spawning occurs earlier than in the Northern North Sea (De Veen, 1954).

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MATERIAL AND METHODS

A tagging experiment was carried out off the Belgian coast on board of the commercial vessel 023 "Geoffrey William" (240 hp). The experiment took place in the period 13 to 28 June 1979. From the 1688 released 149 are as yet recaptured (a recapture rate of 8.8 %). The release position was 51°20' N - 2°45' E. The length frequency distribution of the tagged dab is shown in figure 1. The majority varied from 19 to 24 cm in length. On the basis of these data it can be assumed that most of the tagged dab was mature.

The following migration parameters were calculated (Jones, 1965) :

- ψ : mean direction of dislocation,
- a^2 : mean square dispersion coefficient,
- V : mean velocity in this direction (nautical miles/day),
- $tn.V$: mean distance (n : number of recaptures).

When clear differences in the direction were noted a separation was made in the calculations :

- A : recaptures around the release point (20 nautical miles)
- B : migration in NE- direction
- C : migration in SW- direction (English Channel)
- D : migration in NW- direction

the recaptures were also grouped into 4 recapture periods :

- 1 : January-March
- 2 : April-June
- 3 : July-September
- 4 : October-December

The resulting parameters are given in table 1. The position of the recaptures as well as the mean direction and the mean distance are illustrated in figures 2a-2h.

RESULTS

Several studies have been published concerning the densities of different length classes of dab in the Belgian coastal waters (De Clerck, 1975a, 1976). Although densities can differ from one year to another generally high concentrations of dab were found. A permanent mature dab stock (dab of more than 15 cm in length) was recorded but the density seemed the lowest during the summer.

The Belgian coastal waters are also an important nursery area for dab. Small dab of 4-5 cm occurred in experimental catches during August. The maximum length during the first year varied during the period 1970-1981 between 6 and 7 cm (De Clerck, 1976, 1978a, 1979, 1980). A growth stagnation was observed during the winter period (November-March). Growth acceleration took place from April onwards and the maximum length during the second year showed a mean value of 15 cm. Highest weights of food in the stomach were indeed found in the period June-October (Gilis, 1966).

Former studies also indicated a sex-ratio of 80/20 for the females (Gilis, 1966). More or less the same ratio was found in the recoveries from this experiment.

The results of maturity studies (Gilis, 1966) demonstrated that maturity stages VI to VIII were limited to ovary samples from the period March-April. On the basis of these results the Belgian coastal waters could be considered as a spawning area for dab. Eggs and larvae of dab were however seldom detected during studies with a Gulf III sampler (De Clerck and Van De Velde, 1977). Perhaps the resulting tidal streams cause the drifting in NE- directions as already observed with plaice eggs and larvae (De Clerck, 1978b).

The migration pattern of the tagged dab can be described as follows :

Period 0/2 - June 1979 (figure 2a)

During the month of release some recaptures were already made. Most of them were still present around the release point. However one recovery indicated a migration in a NE direction (28 miles/ in 7 days).

Period 0/3 - July-September 1979 (figure 2b)

During the first summer period it became apparent that an overall migration in a NE -direction took place. Indeed some 42 out of 46 recaptures were taken NE of the release position. Most of them were found in the East Deep Water and the Brown Bank Grounds. The dispersion coefficient of this group was the highest of the whole experiment, viz 32. The mean distance was in the order of 70 miles. The furthest distance was a recovery in the Oyster Grounds. A female dab of about 25 cm had migrated some 150 miles in a period of 86 days.

Despite this general migration direction one dab was recaptured in the Thames Estuary, viz a clearly western migration. This migration of 53 miles was undertaken by a female dab of about 26 cm in length in a period of 68 days.

During this period three recoveries (7 % of the total) were still observed in the release area. However two of them were already at a distance of about 16 miles and also in a NE direction from the release point.

Period 0/4 - October-December 1979 (figure 2c)

A more or less identical picture was observed from the distribution of the recoveries during the last quarter of the first year of release. Indeed with a high dispersion coefficient of about 14 the main distribution area was again in a NE direction from the release point (80 % of the recoveries). The most important areas were the East Deep Water and the Zeeland Grounds. Again two tagged dabs were fished in the Oyster Grounds at distances from the release point of 145 and 167 miles.

The percentage of dab returning to or remaining at the release point increased to 17 % of the total recaptures. As 2 of these 5 recoveries were fished mid December it could be more an indication of a return to the release point. This is also supported by the findings in the periods 1/1. and 1/2.

In contradiction with all the former results during period 0/4 one recovery was observed near Calais indicating a SW- migration.

Period 1/1 - January-March 1980 (figure 2d)

Although the number of recaptures amounted only to 11 all the different migration routes observed during the first year became again apparent: one dab was found close to the release point, three tagged dab were fished at a distance of about 70 miles NE of the release point, three recoveries indicated a NW- migration (two of them close to Harwich) and finally four recaptures were observed in the English Channel. The latter observation indicated a migration of a mean distance of about 90 miles from the release point.

Period 1/2 - April-June 1980 (figure 2e)

Only 6 recoveries were made during this period. Half of them were found very close to the place where the tagging was carried out one year earlier. Two recaptures were reported in the Brown Bank Grounds at a distance of 37 miles NE of the release point. Again the migration into the English Channel was shown by a recapture on the Vergoyer Bank close to Boulogne.

Period 1/3 - July-September 1980 (figure 2f)

All the recoveries came from the same area, viz. the Brown Bank Grounds with a mean distance of 75 miles and a low dispersion coefficient.

Period 1/4 - October-December 1980 (figure 2g)

The main conclusion of the recoveries during this period was the fact that tagged dab was again recovered from the Brown Bank Grounds and the English Channel. No recaptures were found in the release area.

Period 2/2 and 2/3 - April-September 1981 (figure 2h)

Only two recoveries were reported both North of the release position. The respective distances were 17 and 132 miles.

DISCUSSION

From this experiment some major conclusions can be drawn.

First of all the main direction of movement of dab in the Southern Bight is into Northeastern areas. The Brown Bank Grounds showed in nearly all recovery periods the highest concentrations of tagged dab.

Secondly on several occasions there were reports from the English Channel indicating that a part of the population took this direction to move.

Apart from these two main migration routes some migrations with much lower numbers were observed in the direction of the UK Southeast coast.

Generally large distances were covered. In some cases a migration up to 150 nautical miles was covered within a period of 86 days.

Those two main direction, viz. NE (Dutch coast) and SW (English Channel) had already been observed in tagging experiments on plaice (De Clerck, 1975b) and on sole (Anon. 1984).

On both occasions these flatfish populations showed two opposite migration directions when leaving the Belgian coastal waters. This migratory behaviour certainly prevents the identification of the stocks. For stock management purposes it seems that seasonal intermixing between the Southern Bight and the Eastern English Channel occurs. This seriously interferes in the management strategy.

Another conclusion from this study is the indication that the migration period started some few weeks after tagging. Indeed from July onwards the majority of the recoveries were found far away from the release point. Taking into account that the spawning period can be situated between January and June the observed migration could be attributed to a feeding migration. Moreover by this migration the dab moved into much deeper water of up to 40 meters while at the release point depths from 15-20 meters occur. This is not in line with earlier statements (Bohl, 1957), that dab should return to shallow waters during summer while in winter the population is heading towards the open sea. Although the observations during the following year were rather scarce the recoveries in the first half of the year could support the hypothesis some return to the release point. In that case it could be the spawning ground too. As a matter of fact all tagged dab were mature and no differences were noted in length sizes between the migrating population and the population remaining at the release point.

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Table 1. - Migration parameters.

Season of recapture			V n. m/day	a ²	ψ (%)	\bar{S} n. m.	n
year	quarter	direction ¹	mean velocity	mean square dispersion coef.	mean direction of dislocation	mean distance	numbers of recaptures
0	2	A	.265	13.258	63	1.5	10
		B	4.	0.	53	28.	1
0	3	A	.527	4.179	20	9.	3
		B	1.110	32.303	20	70	42
		D	.78	0.	279	53.	1
0	4	A	.039	.507	329	6.	5
		B	.601	14.208	29	81.	24
		C	.169	0.	224	23.	1
1	1	A	.072	0.	342	17.	1
		B	.281	3.058	37	68.	3
		C	.432	3.184	236	90.	4
		D	.227	2.669	309	49.	3
1	2	A	.016	.017	197	6.	3
		B	.281	3.058	37	37.	2
		C	.279	0.	224	86.	1
1	3	A	0.	0.	0	0.	1
		B	.189	.542	24	75.	4
1	4	B	.102	2.6	24	51.	4
		C	.116	.048	225	60.	2
2	1	-	-	-	-	-	-
2	2	A	.025	0.	342	17	1
2	3	B	.164	0.	2	132	1

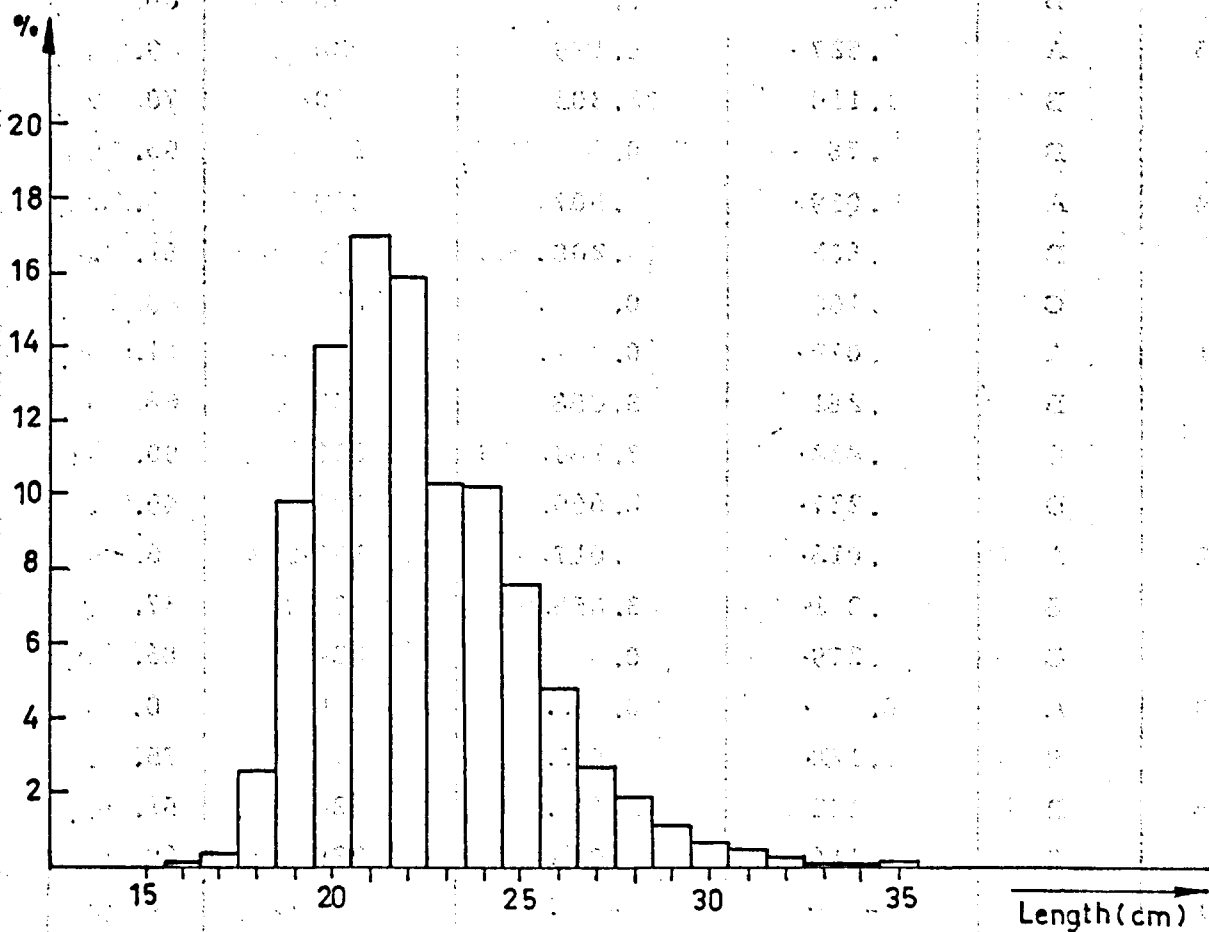
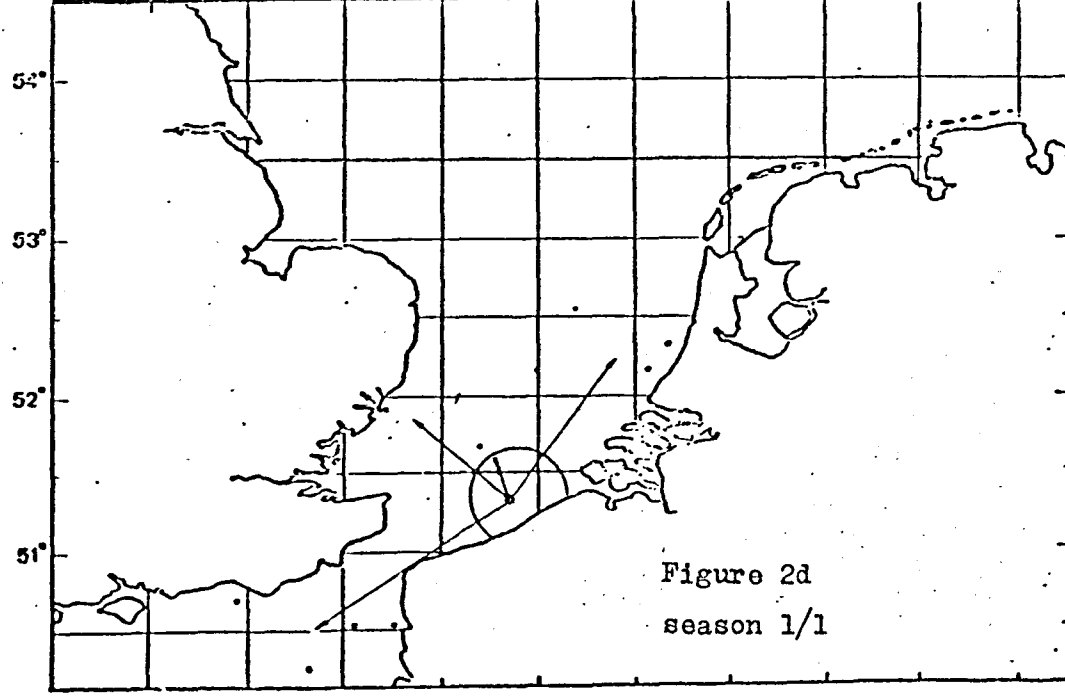
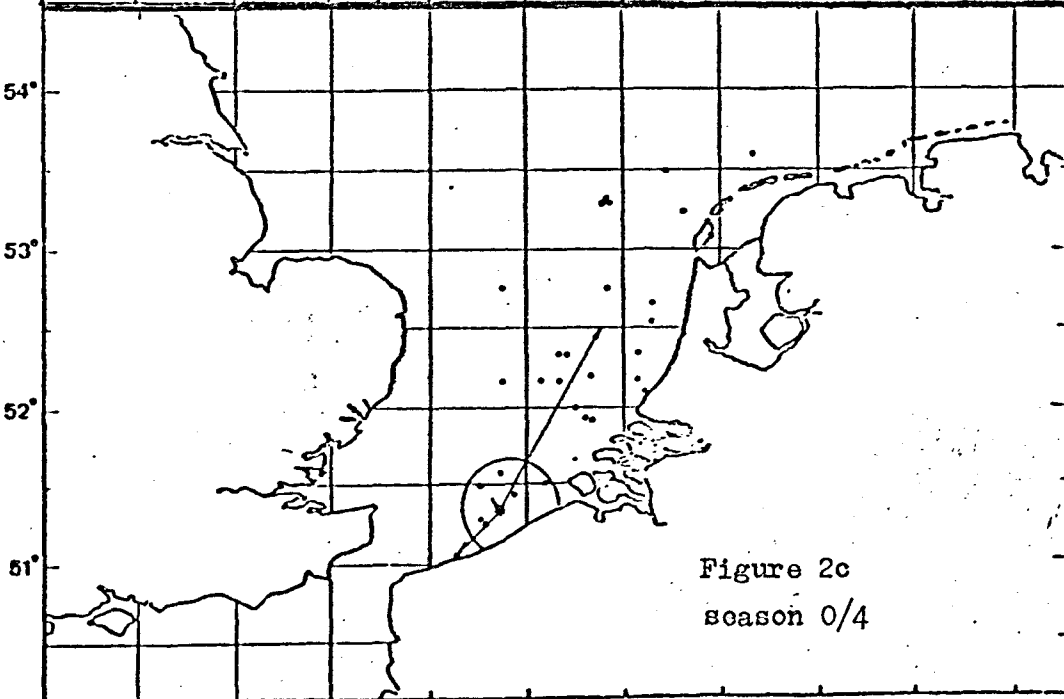
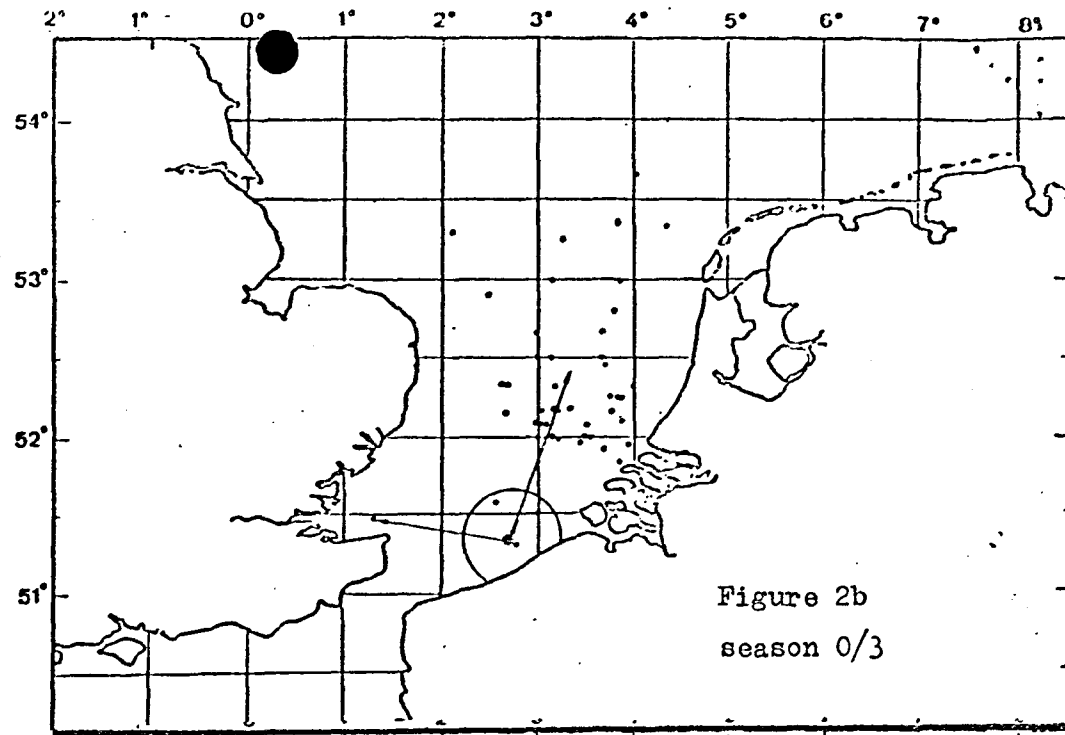
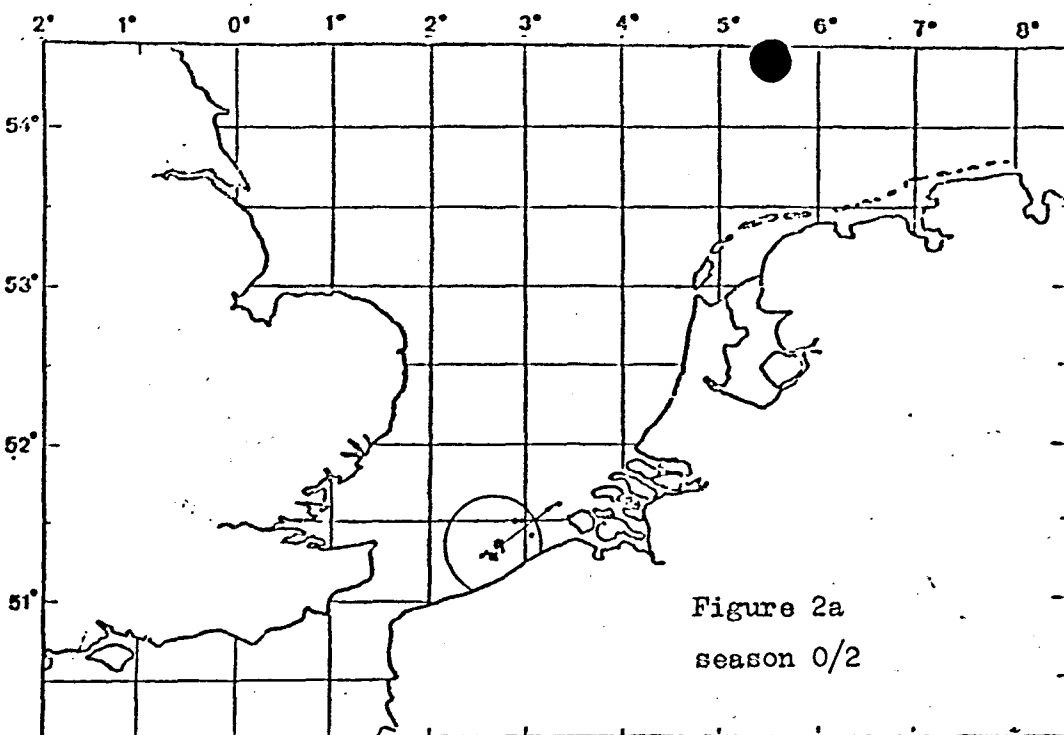
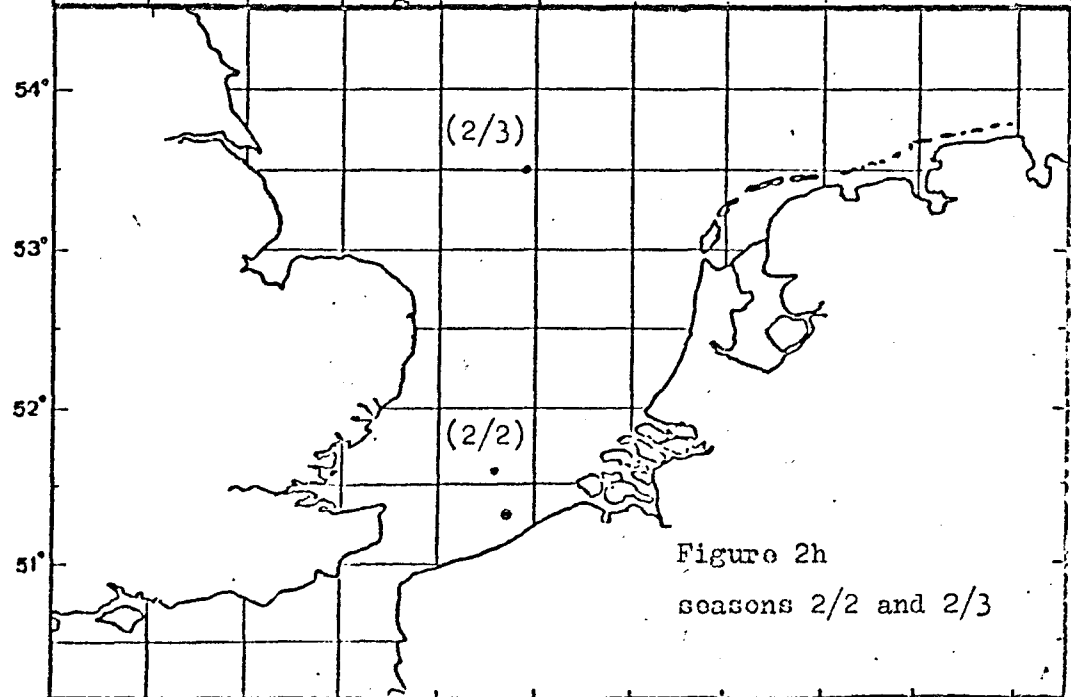
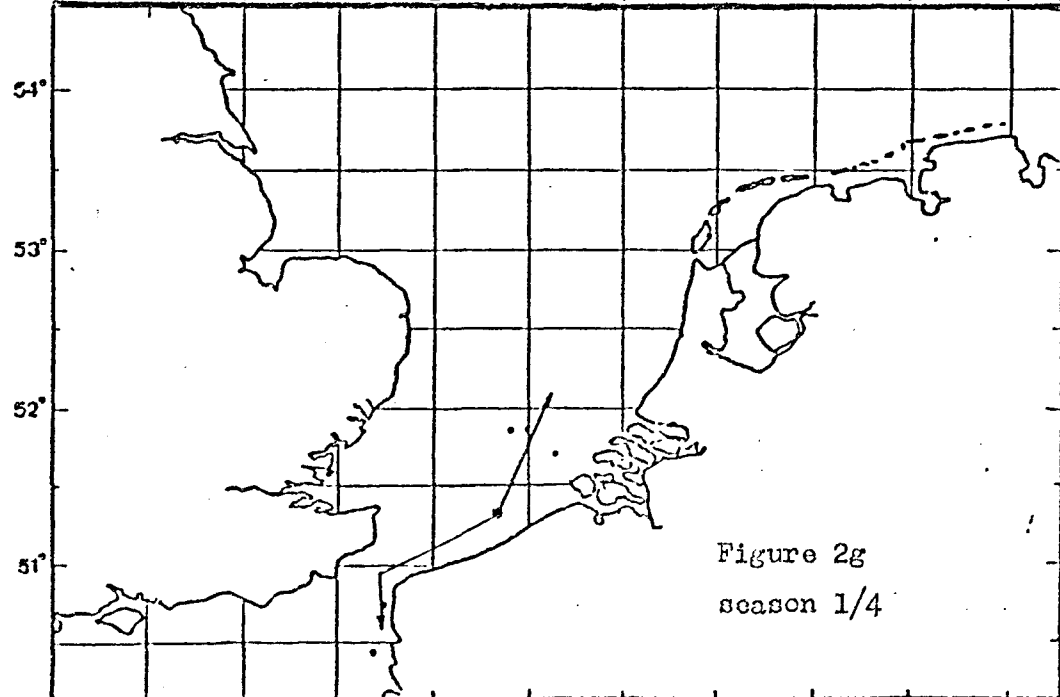
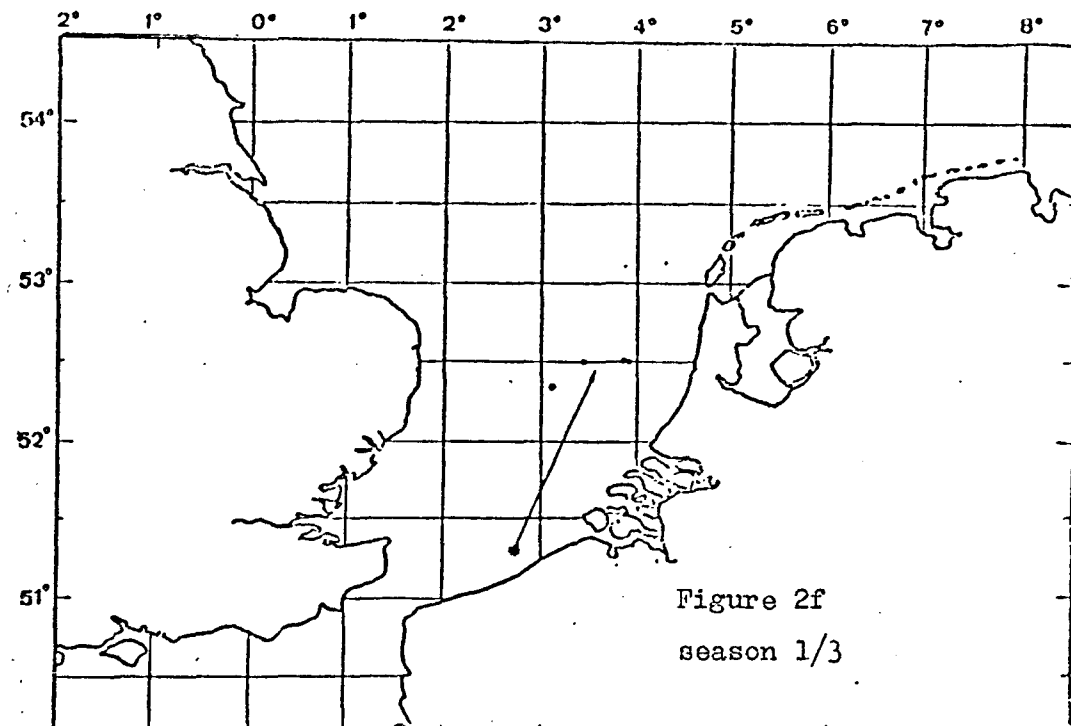
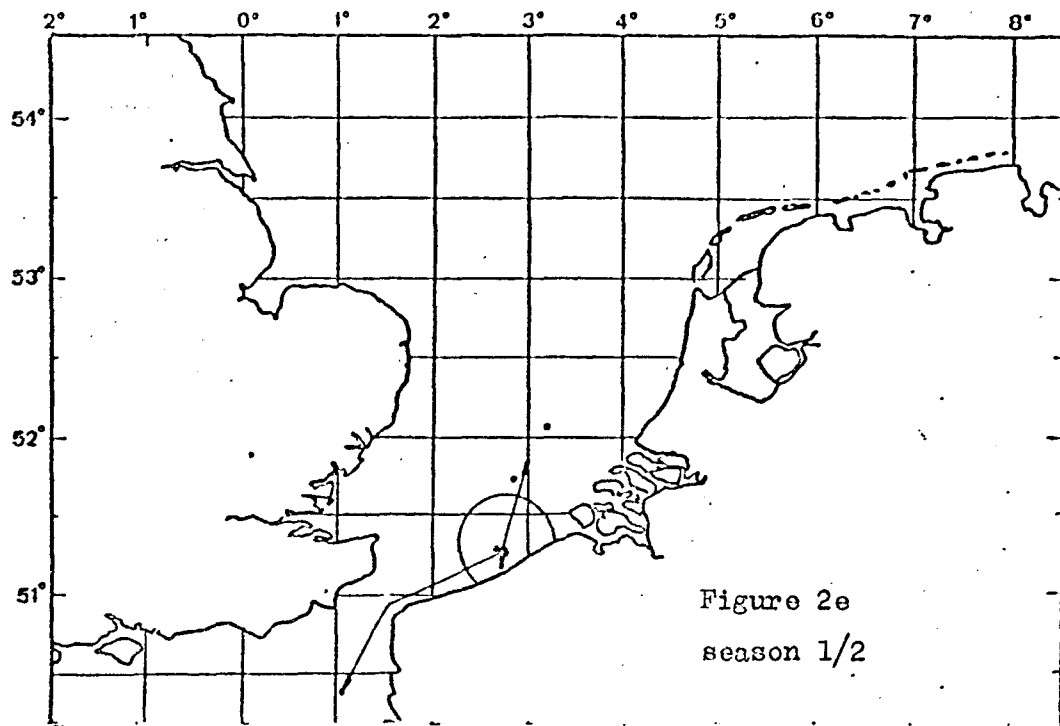


Figure 1. — The length frequency distribution of the tagged dab population.



Figures 2a-2d.- Position of the recaptures during the different seasons.
• : release point



Figures 2e-2h.-- Position of the recaptures during the different seasons (continued).

•: release point