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Preliminary results of tagging experiments on  
American plaice in NAFO Divs. 3LNO

by

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Abstract

This paper reports on preliminary results of two tagging experiments conducted on American plaice in NAFO Div. 3LNO. The first was aimed at examining the movements of juvenile A. plaice released near the tail of the Grand Bank and the second examined the movements of adult A. plaice mainly released on the top of the bank in Div. 3L. A total of 9715 juvenile and 3154 adult plaice were released. Both juvenile and adult A. plaice generally appeared to be rather sedentary with juvenile plaice moving an average of 33.8 nm in 400 days free and adult plaice moving 52 nm in 250 days free. There was no indication of any large scale migrations.

Introduction

American plaice in the northwest Atlantic appear to be fairly sedentary. Tagging studies by Pitt (1969) found that A. plaice on the Grand Bank do not appear to undertake any extensive migrations and that even 7 years after release, most returns were within 25 nm of the release position. Tagging by Powles (1965) in the Gulf of St. Lawrence indicated that A. plaice there did undertake a short feeding migration but the distance covered was small.

*In recent years 3 spatially separated nursery areas have been identified on the Grand Banks (Walsh, 1990). As well there are some differences in growth in different areas of the bank (Pitt, 1975). There may be more than one stock component on the Grand Bank (Bowering and Brodie, 1991; Pitt, 1975).*

This study describes the preliminary results of two tagging experiments conducted on the Grand Bank in Div. 3LNO. The first was aimed at examining the movements of juvenile A. plaice released near the tail of the Grand Bank and the second examined the movements of adult A. plaice mainly released on the top of the bank in Div. 3L.

Materials and Methods

Two experiments were conducted, one involving juvenile American plaice in the area of the tail of the Grand Bank in NAFO Div. 3N and 3O and the other involving adult plaice in the same area and in NAFO Div. 3L. Fish were tagged and released during four research vessel trips from 1990 to 1993. Fish were captured using a Yankee 41 shrimp trawl which was towed for 15 minutes at a speed of 3.0 knots. Fish were placed in holding tanks and then tagged and total length measured. Only fish between 15 and 35 cm were tagged in the juvenile category while larger fish were considered to be adults. Any fish with excessive bruising or scale loss were not tagged. The fish were returned to a

holding tank after tagging and held until the release position was reached. There were 15 release positions, 6 inside Canada's 200 mile limit and 3 outside the 200 mile limit near the tail of the bank and 6 in NAFO Div 3L. The release positions as well as the number of fish released are given in Table 1 the positions are also shown in Figure 1. Only the releases of Petersen discs are shown. In 1990, 1177 juvenile fish were also tagged with operculum dangler tags but none of these fish were returned. Morgan and Walsh (1993) showed that these dangler tags were not retained well by juvenile fish and this may explain the total lack of returns from these releases. A total of 9715 juvenile fish with Petersen discs were released, 6624 inside of the 200 mile limit and 3091 outside of the 200 mile limit. In the second experiment, 261 adult plaice were released in the area of the tail of the bank and 2893 adults were released in Div. 3L.

When tags were returned the return information was entered into a data base and a \$20 reward sent to the person returning the tag for juvenile tags and \$5 for adult tags. From this information, return position, days free, distance and direction travelled were calculated. Return positions for juveniles were plotted for each release position separately, for release position inside or outside the 200 mile limit and for fish returned up to 1 year following release, from between 1 to 2 years following release and for more than 2 years following release. For adult A. plaice returns were also plotted for each release position separately, for all release positions in Div. 3L combined, and for fish returned up to 1 year following release, from between 1 to 2 years following release and for more than 2 years following release for those released in Division 3L.

### Results

A total of 118 juvenile A. plaice were returned or 1.8% of the number released. Of these 28 or 23.7% were returned by Canadian fishers. Figure 2 shows the return positions for each of the release positions separately. The greatest number of days free was 1305 and the farthest distance travelled was 200 nautical miles. The mean number of days free was  $400.0 \pm 35.1$  days ( $x \pm \text{std err}$ ) and the mean distance travelled was  $33.8 \pm 3.8$  nm. The returns were most frequently southeast, west, southwest or north of the release positions (direction relative to true north), although there were returns from all compass directions (Fig 3). There was some tendency for the fish to spread out from the release positions but there was also substantial persistence in the area of release with most of the returns even more than 2 years after release being from the area of the Tail of the Bank (Fig. 2 and 4).

For fish released inside the 200 mile limit there 67.5% of the returns were from outside of the 200 mile limit (Fig 5). For fish release outside of the 200 mile limit 92.7% of the returns were from outside the 200 mile limit (Fig 6).

A total of 132 adult A. plaice were returned or 4.2% of the number released. Figure 7 shows the return positions for each of the release positions separately. The greatest number of days free was 1423 and the farthest distance travelled was 218 nautical miles. The mean number of days free was  $251.1 \pm 29.0$  days ( $x \pm \text{std err}$ ) and the mean distance travelled was  $51.9 \pm 4.6$  nm. The returns were most frequently southeast of the release positions (direction relative to true north), although there were returns from all compass directions and all directions other than west were frequent (Fig 3). Fish that were released in 3L were commonly returned from Div. 3N or 3O (Fig. 8). If returns from all release positions in 3L are included, 23.2% of the returns were in 3NO. If release position 13, which was very close to the 3NO border, is excluded, 13.4% of the returns were from 3NO. For A. plaice released in 3L that were returned between 0 and 1 years after release, 20% were returned from 3NO (Fig.9). For fish that were returned 1 to 2 years after release, 54% were returned from 3NO and for the three returns more than 2 years after release, 2 were from Div. 3N.

### Discussion

Both juvenile and adult A. plaice generally appeared to be rather sedentary with juvenile plaice moving an average of 33.8 nm in 400 days free and adult plaice moving 52 nm in 250 days free. There was no indication of any large scale migrations. This is in agreement with the findings of Pitt (1969) who found that most tags were recovered less than 25 nm from their release position even 7 years after release.

The juvenile A. plaice showed some tendency to spread from the area of the tail of the bank but many of the returns were within this area up to 3 years after release, indicating a

good deal of persistence in this area. This is consistent with the results of Walsh (1994) who showed that the area of distribution of a cohort increased with age but that fish of all ages occurred frequently within the nursery area.

Those juvenile A. plaice that were released outside of the 200 mile limit were almost invariably recaptured there, indicating that there is little movement back inside the 200 mile limit by fish from that area. Also, many fish that were released inside of the 200 mile limit were recaptured from the regulatory area. These results may indicate that during the period of the experiment that fishing pressure was higher outside than inside the 200 mile limit.

Many of the returns of adult plaice that were released in 3L were from Div. 3NO, indicating mixing between these divisions. Pitt (1969) found little interchange between these divisions but most of his tagging positions were along the eastern edge of the bank while most of the releases here were on the top of the bank in 3L. More work will be required to determine if the fish from different areas of the bank differ in their degree of mixing.

The return rates from these experiments were very low, 4.2% for adults and 1.2% for juveniles compared to returns from Pitt (1969) of 30 to 40% and 10% from Fowler and Stobo (1991). It is not known why the return rate was so low. It may be that many of the smaller fish died before entering the fishery. For the adults, the fishery closed less than a year after the final tagging trip and only three years after the first release in Div. 3L.

#### Acknowledgements

This work could not have been done without the many technical staff and ships crew that were involved in the tagging of these fish. Lorene Tuck, R. Ennis and L. Mansfield handled the returns. D. Stansbury wrote the program to calculate days free, distance and direction travelled.

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Table 1. Release positions and number fish released for American plaice tagged from 1990 to 1993.

| Position | Latitude °N | Juveniles    |        |
|----------|-------------|--------------|--------|
|          |             | Longitude °W | Number |
| 1        | 4345        | 5125         | 1717   |
| 2        | 4331        | 5047         | 1046   |
| 3        | 4404        | 5030         | 254    |
| 4        | 4340        | 5104         | 2426   |
| 5        | 4400        | 5025         | 116    |
| 6        | 4353        | 5040         | 1111   |
| 7        | 4344        | 4952         | 1040   |
| 8        | 4340        | 5030         | 1005   |
| 9        | 4353        | 5050         | 1000   |
| Total    |             |              | 9715   |
|          |             | Adults       |        |
| 1        | 4345        | 5125         | 86     |
| 2        | 4331        | 5047         | 38     |
| 3        | 4404        | 5030         | 137    |
| 10       | 4710        | 4952         | 1105   |
| 11       | 4656        | 5145         | 54     |
| 12       | 4640        | 5002         | 9      |
| 13       | 4604        | 5157         | 681    |
| 14       | 4612        | 5045         | 65     |
| 15       | 4620        | 4950         | 979    |
| Total    |             |              | 3154   |

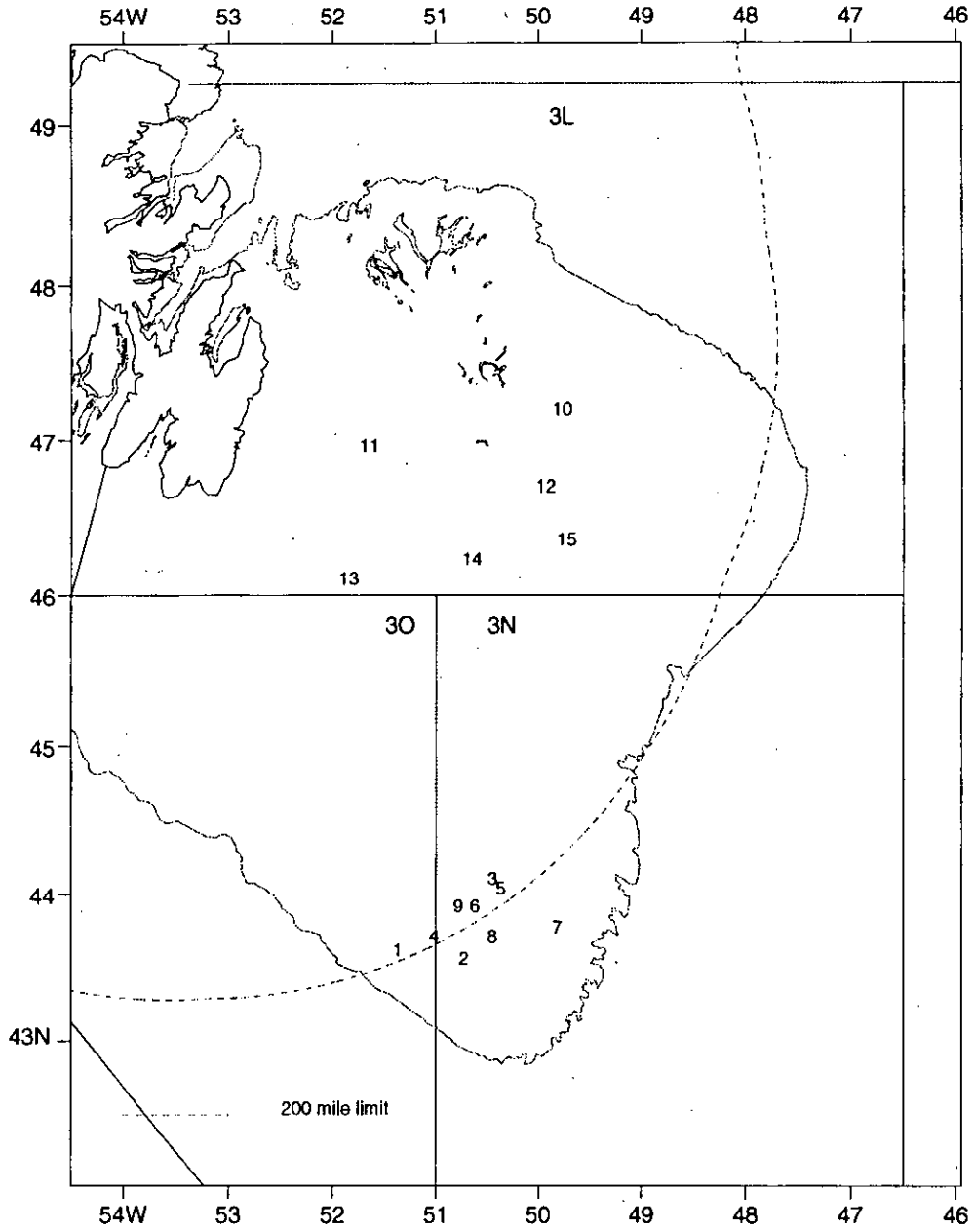


Figure 1. Release positions of juvenile and adult American plaice

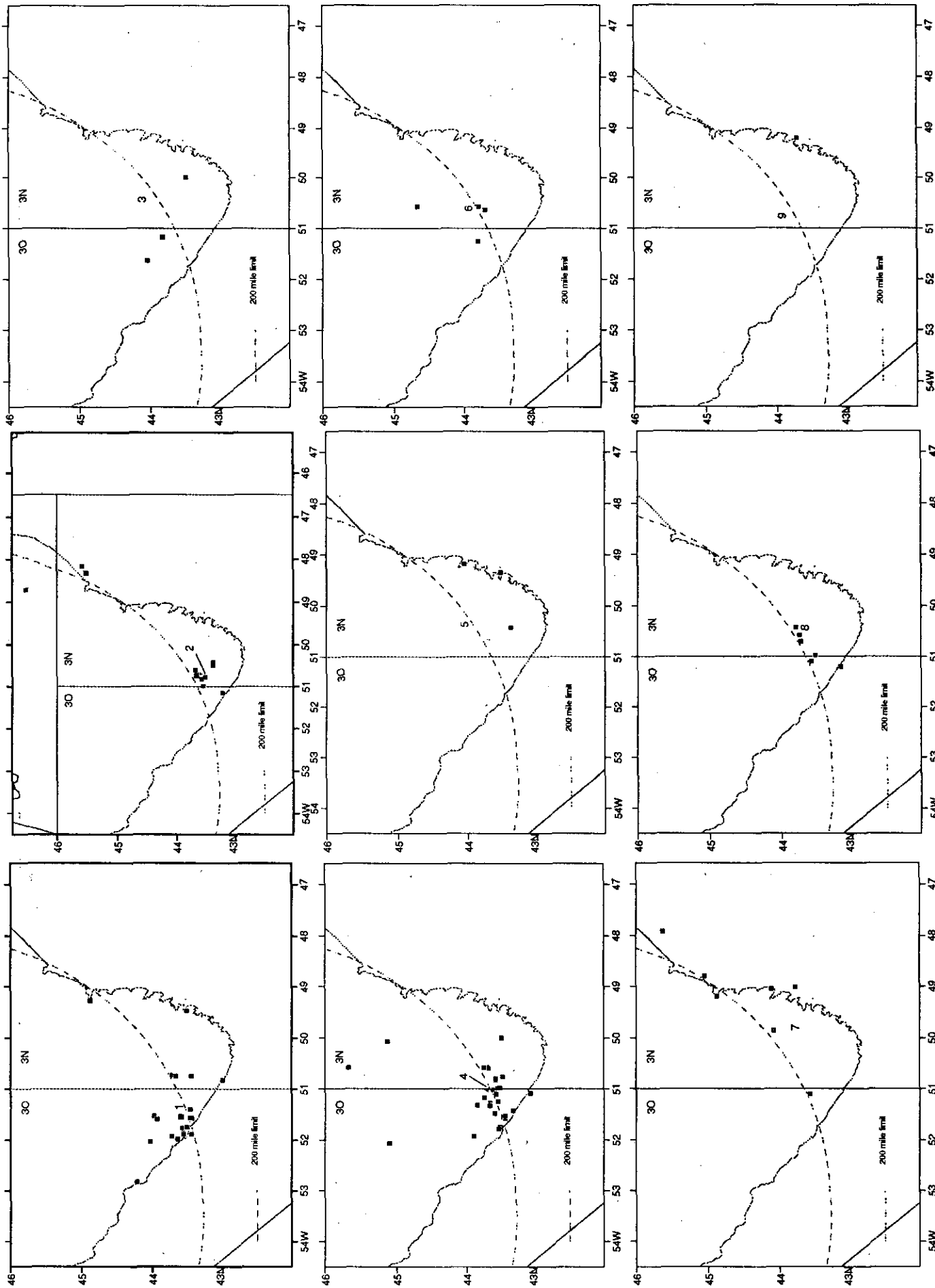
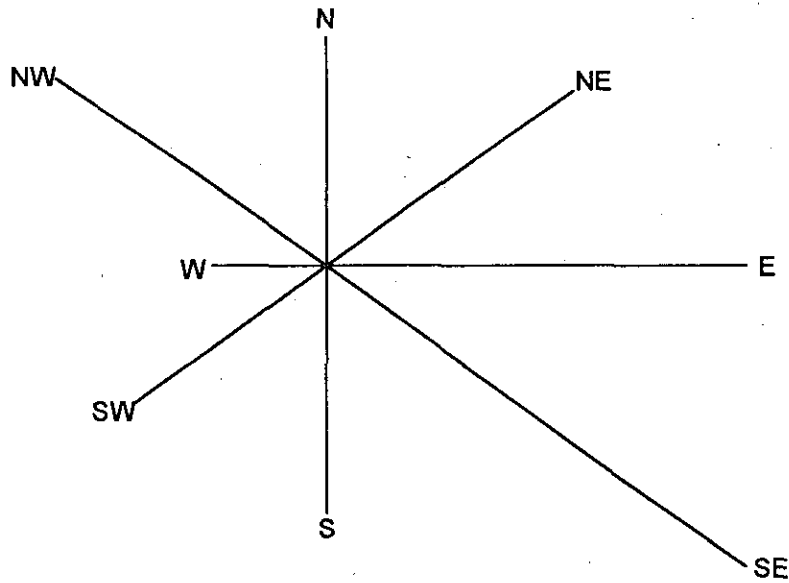


Figure 2 Returns of juvenile A. plaice from each of nine release positions near Canada's 200 mile limit.

### Adult American plaice



### Juvenile American plaice

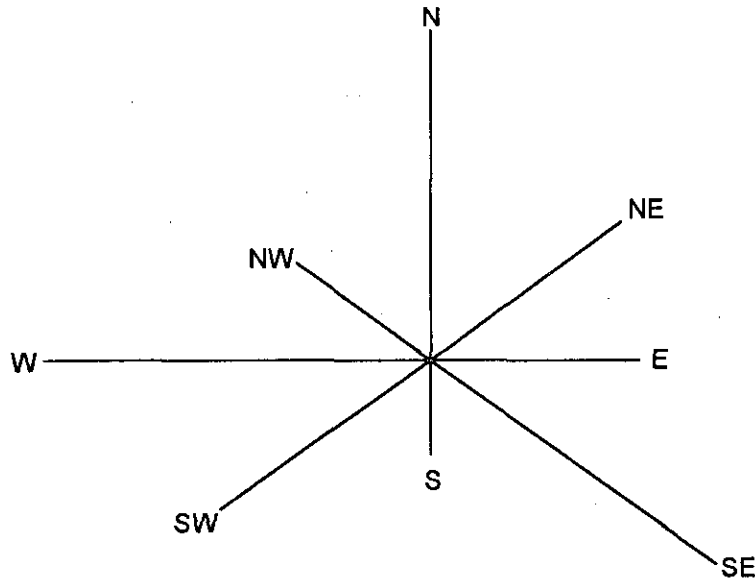


Figure 3 Frequency of direction of recapture position relative to release position for adult and juvenile American plaice. Direction is relative to true north. Length of an arm indicates the frequency.

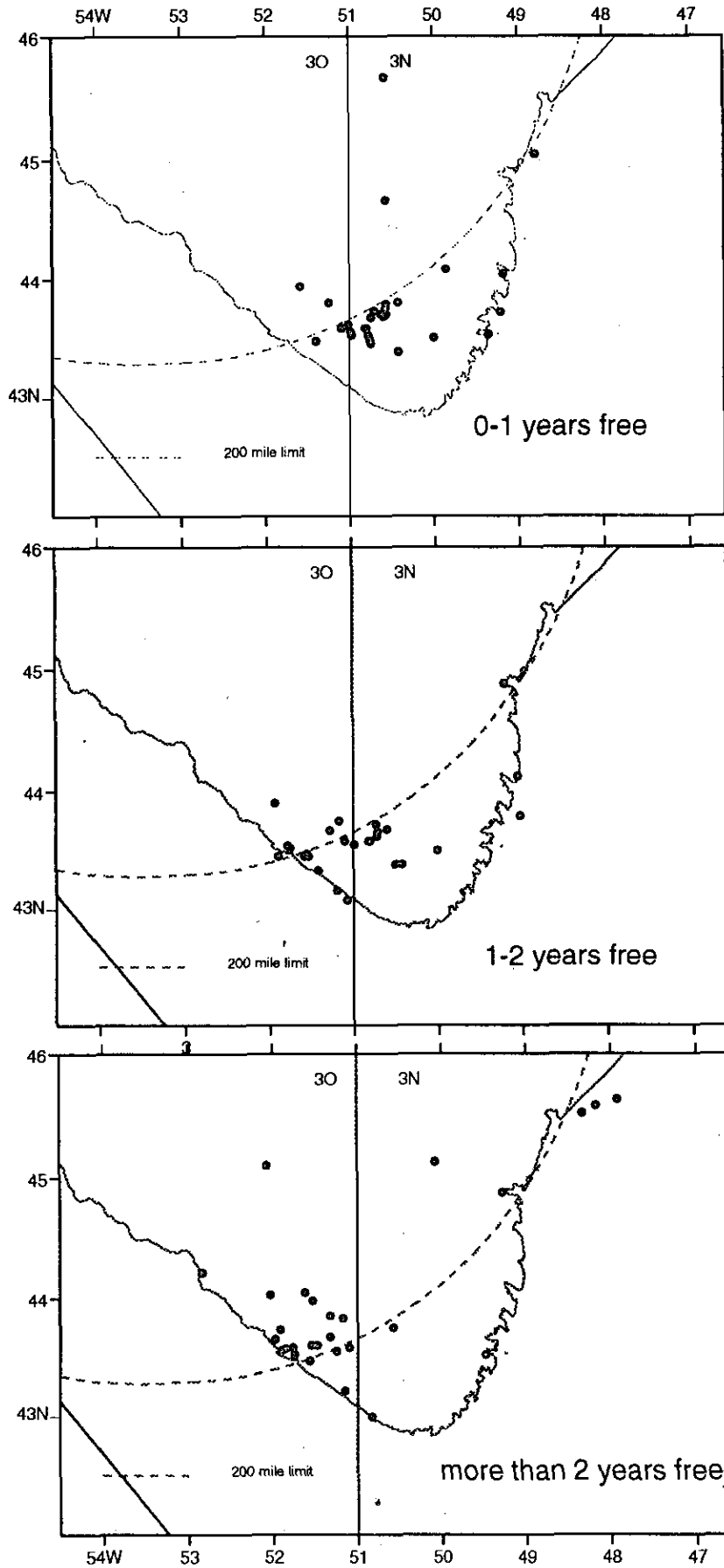


Figure 4 Returns of juvenile A. plaice from differing periods after release.



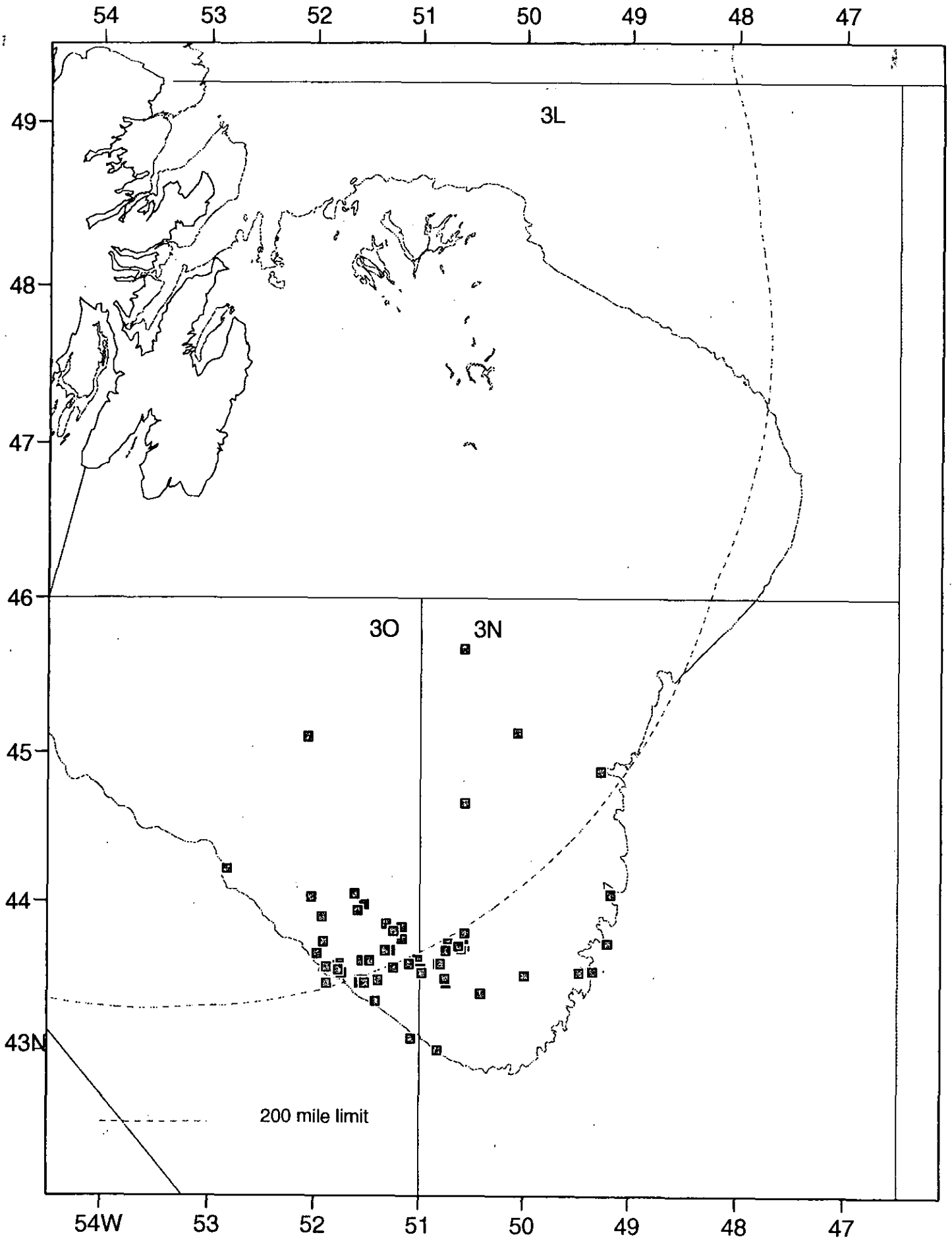


Figure 5 .Returns of juvenile A. plaice released inside the 200 mile limit.

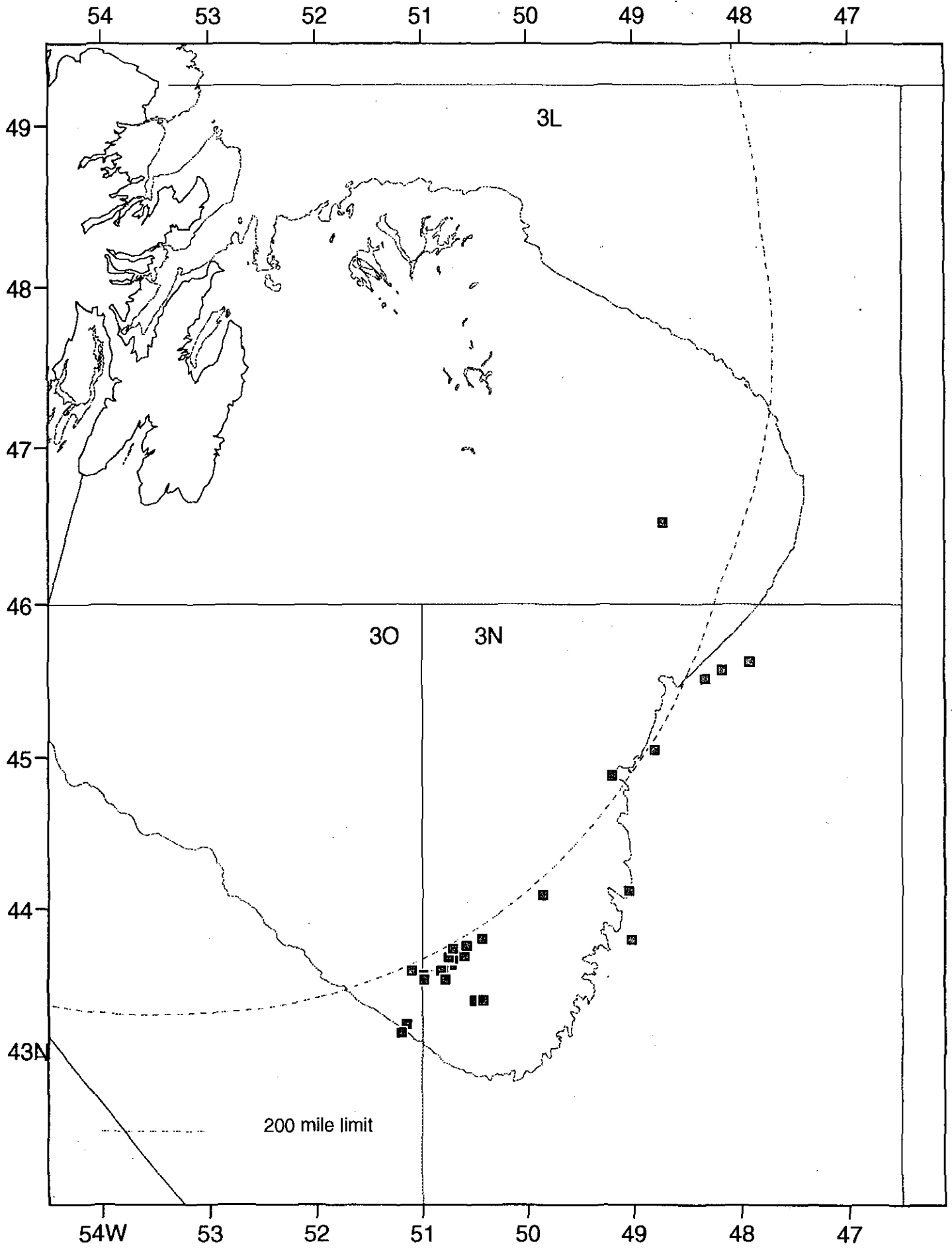


Figure 6 . Returns of juvenile A. plaice released outside the 200 mile limit.

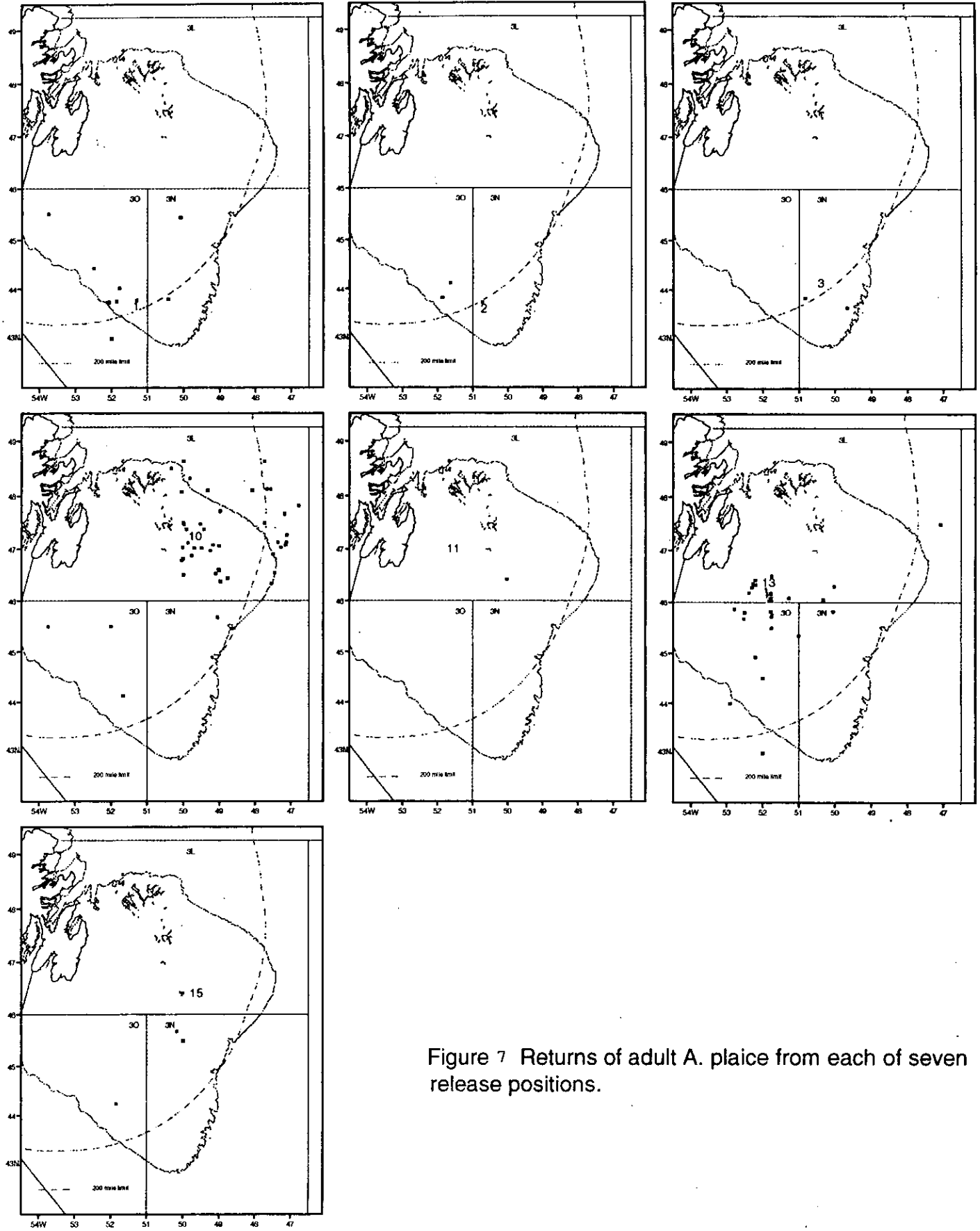


Figure 7 Returns of adult A. plaice from each of seven release positions.

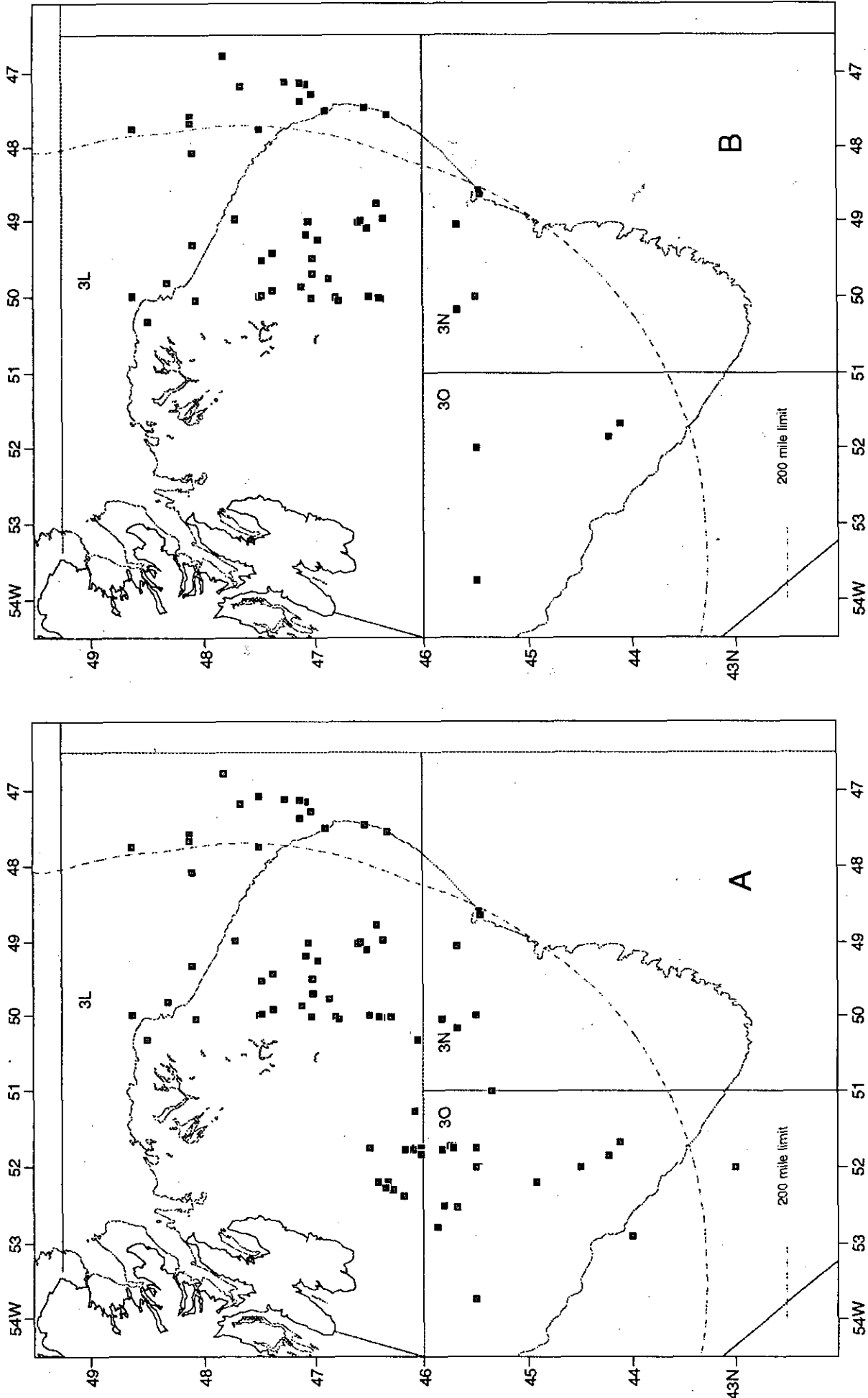


Figure 8 Returns of adult A. plaice released in 3L. Panel A includes all released. Panel B does not include fish released at position 13.

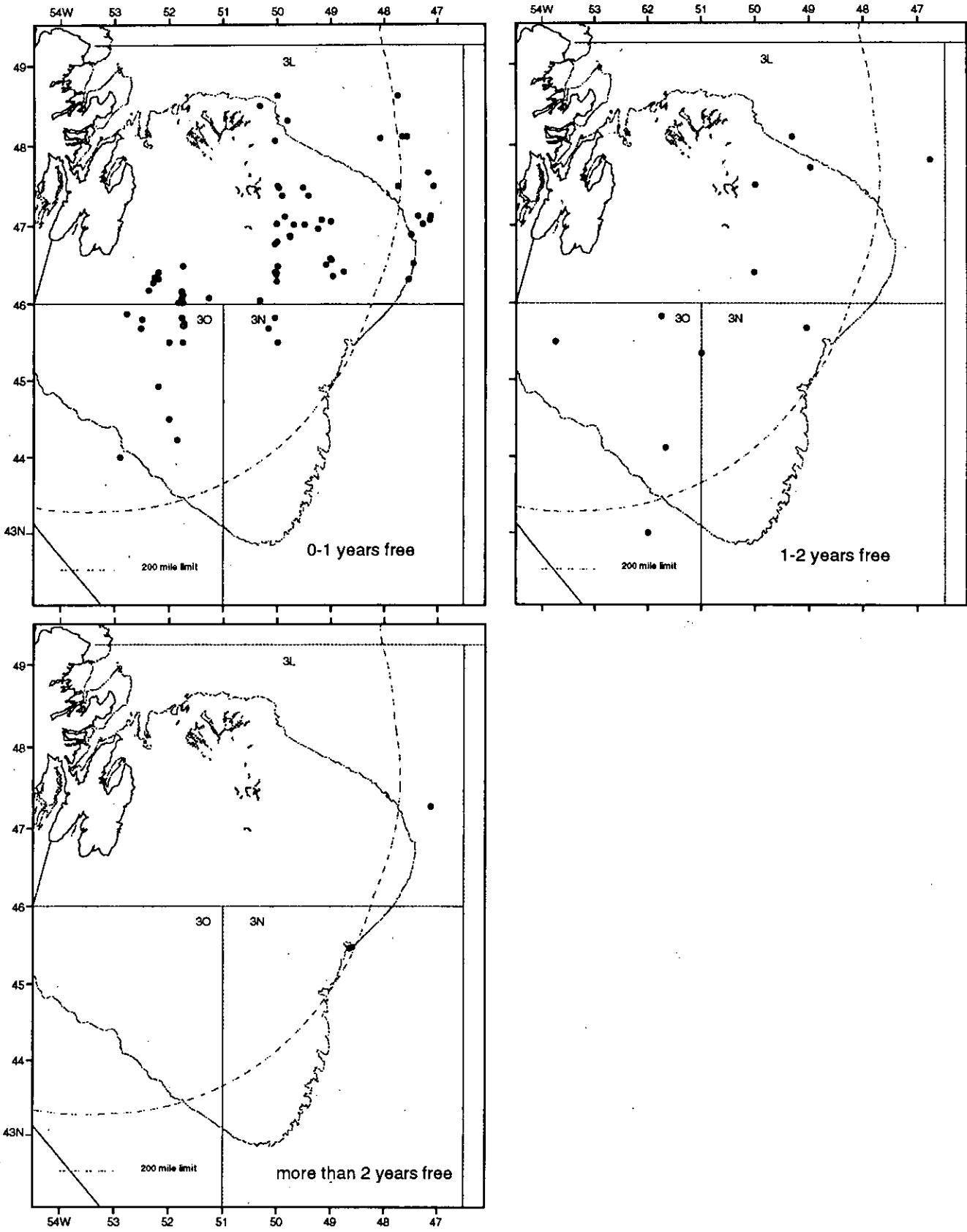


Figure 9 Returns of adult *A. plaice* from differing periods after release.