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Cod migrations Canadian Atlantic offshore

by

R. A. McKenzie

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ABSTRACT

Canadian Atlantic offshore cod tagging has only been carried on eastward of Halifax and during the months of March to June inclusive in the years 1935 to 1938 inclusive.

Of 5291 cod tagged 5.4% were recaptured. No major advantage has been found in placing the monel metal strap tag on the operculum rather than ventrally on the caudal peduncle or in the addition of a scarlet celluloid disc to attract the attention of fishermen.

Tagged cod have been recaptured up to 5 years following tagging and have showed rates of movement of up to 13 miles per day.

Those cod tagged during this season in the Emerald bank region remained mostly on the offshore banks, moving eastward to some extent during the summer.

The school of "steak" cod which yields some large catches of very large fish on the western part of Sable Island bank was traceable only during the months of February to June inclusive and not proven to leave this region.

The cod tagged south-east of Sable island and on Banquereau up to early May showed a definite migration into the gulf of St. Lawrence past eastern Cape Breton and the Magdalens as far as Gaspe for the summer and out again for the winter.

Late May tagging on eastern Banquereau showed most of the cod remaining chiefly on this bank all year around with a few only moving along the route into the Gulf as far as Cape Breton.

The cod tagged in late May just north of Sable island showed a definite movement inshore over Middle bank and a spreading out along the eastern Nova Scotia mainland shore.

Inshore tagging in this area previously has shown a slight offshore movement for the winter.

No movement was found between the eastern and western offshore regions.

COD MIGRATIONS CANADIAN ATLANTIC OFFSHORE

Introduction

The first Canadian Atlantic cod tagging was carried on in 1924 to gain experience in methods. Thereafter until 1940 at least some cod tagging was done during almost every year, but until 1935 all tagging was done in what may be called the inshore waters (defined as, shoreward of the 60 fathom contour) of the Canadian Maritimes.

During 1935 and 1936 from about 3 to 5 hundred cod were tagged annually in the offshore waters east of Halifax. However, the percentage of recaptures from this tagging was so low that there were not enough actual returns to give any definite results. To obtain quite definite results about 200 recaptures are needed over the period of yearsⁱⁿ which recaptures are made and on the basis of at least 5% returns from the tagging, it is seen that 4000 tagged fish are necessary. Accordingly in 1937 the program was enlarged and 4246 cod were tagged in offshore waters during the late winter and early spring when the fishery there was at its peak.

In 1938 a beginning was made in tagging adequate numbers of a particular group of very large cod which appears on the grounds immediately west of Sable island during the late winter each year. These fish are known to the fishermen as the "steaker school" ("steak" is the Canadian commercial name for the largest size of cod). However, it was possible to tag only several hundred that year and no opportunity of continuing has occurred since.

METHODS AND ACKNOWLEDGEMENTS

During May and June 1935 several trips to the eastern Canadian offshore banks were made by the research M. V. "Zoarces", Captain A. E. Calder in charge. On these trips a total of 294 cod, ungraded as to size, were tagged, at the base of the caudal fin in a ventral position, with the usual Canadian cod haddock monel metal strap tag.

Late in April 1936 Mr. C. K. Darrach of the Fisheries Experimental Station, Halifax, N. S., made a trip to these same offshore grounds on board the Lunenburg, N. S., vessel E. F. Zwicker, Captain Wm. Deal. On this trip he tagged 499 cod in the same manner as described above for 1935.

In 1937, March to May inclusive, 4246 cod were tagged on these eastern offshore grounds. Mr. C. K. Darrach made 6 trips with Captain Oran Mossman, Lunenburg, N. S., vessel "Marjorie and Dorothy", tagging a total of 3191 cod. Mr. Wm. Brown made 1 trip tagging 380 and Mr. R. Kaiser made 3 trips

tagging 675 cod, on board the Lunenburg vessel "Haligonian", Captain Geo. Himmelman. All sizes of cod were tagged using the monel metal strap tag. About half of these tags were placed on the caudal peduncle as in other years, while the remainder were clinched through the operculum from the free or posterior edge and as dorsad as possible. Using two positions was to determine which yielded the better results. In addition a scarlet celluloid disc was threaded onto a number of tags in order to make them more conspicuous.

In late April 1938, Mr. R. Fralich made 1 trip with Captain Gran Mossman, vessel "Marjorie and Dorothy", for the purpose of tagging large fish on the "steaker" cod school which appears during the late winter on the offshore banks off Halifax. Only 252 cod were tagged, half on the caudal peduncle and half on the operculum. The average weight of the fish tagged was considered to be twenty-five pounds.

Tagging from the research M. V. "Zoarces" was conducted both by setting line-trawl and hand-lining. The former was handled either from a dory or the deck of the vessel while the latter was done only from the deck of the vessel. Length measurements only were recorded, no scales being collected.

When tagging from the Lunenburg vessels the cod were caught on line-trawl all of which was handled from dories. Usually the fish were taken from the gear and passed to the tagger, the third man in the dory, but often, when the fish were large the tag was affixed without taking the fish from the water by just leaning over the side of the dory and putting the tag on before taking out the hook.

In all cases, except 1938 when only large fish were tagged, lively fish of all sizes were tagged just as they came on the gear. When tagging from the dories of Lunenburg vessels neither measurements or scales were taken.

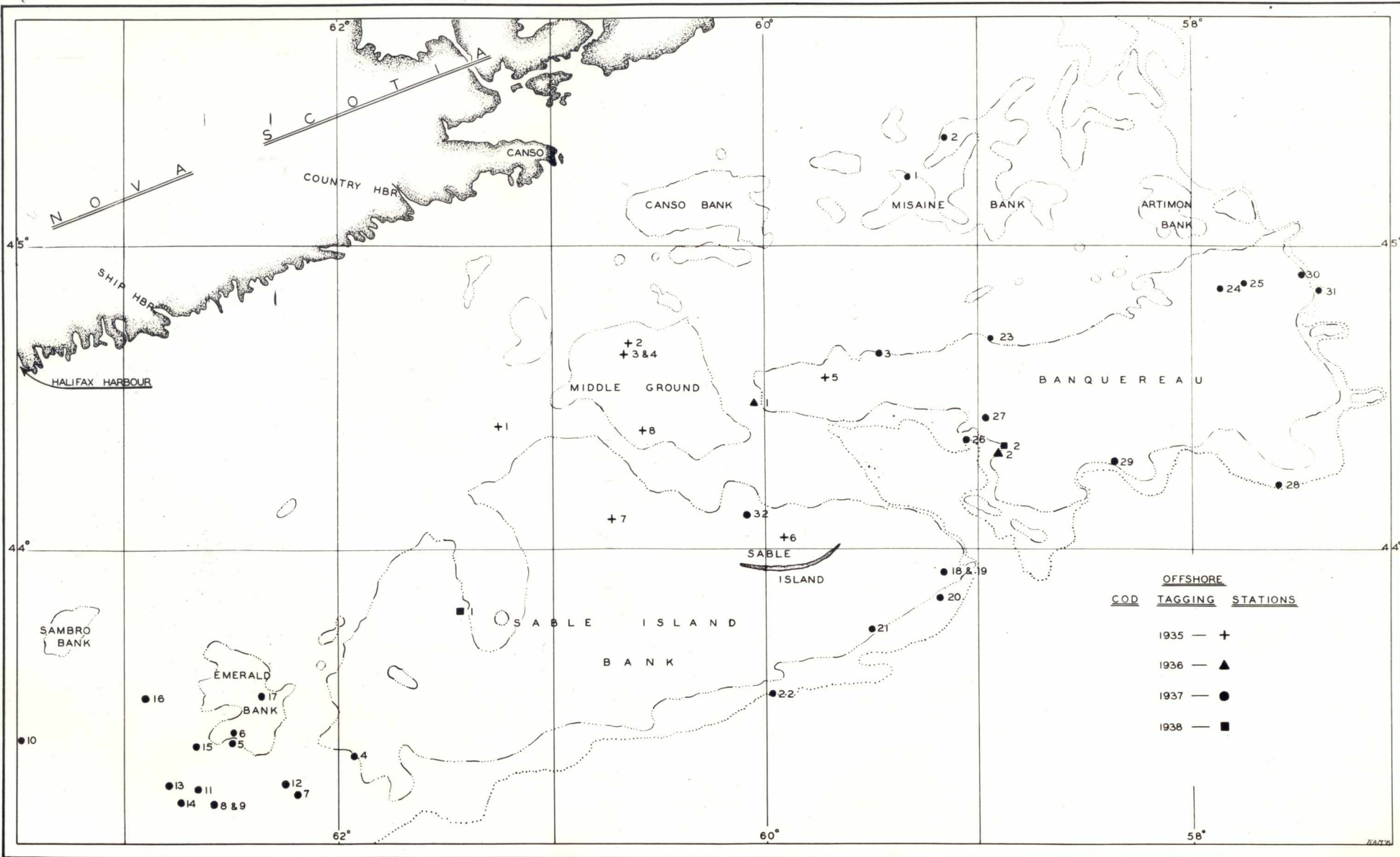
Since these tagged offshore fish were recaptured up to 6 years and 3 months after tagging and also since 2715 inshore tagged cod, 1934 to 1936 inclusive, yielded not only 26% returns but recaptures up to 5 years after tagging it is believed that the Canadian method is on a par with any other.

The details concerning all the taggings are set forth in tables I and II. Water temperature records at the tagging locations were obtained, with one exception, only in 1935 when the tagging was done from the M. V. "Zoarces".

The positions of the tagging locations in all years are shown in fig. 1.

Appreciation is herewith expressed to all those mentioned above, as well as many others, for the parts they played in this offshore cod tagging.

Figure 1 - Canadian Atlantic offshore cod tagging locations, 1935-1938 inclusive.



In 1938 and 1939 Dr. J.-L. Tremblay, Director, Department of Biology, Laval University, Quebec, and also of the St. Lawrence Biological Station undertook to have cod tagged around the coast of Gaspé. This tagging served not only to elucidate the movements of the cod in this region but, in view of the offshore tags retaken off Gaspé in the summer of 1937 and thereafter, acted as a counterpart to our offshore tagging.

Great appreciation is herewith expressed for Dr. Tremblay's co-operation not only in carrying on the tagging at such an opportune time but in permitting the use of records which complement those from our Canadian Atlantic eastern offshore tagging. According to a communication from Dr. Tremblay, December 23, 1946, the detailed account of this work is to be published in the not too distant future.

Table I

CANADIAN ATLANTIC OFFSHORE COD TAGGING

Tagging Sta. No.	Date	Location		Depth metres	Temp. °C.	Number Fish Tag.
		Lat.	Long.			
1935	<u>1935</u>					
1	May 13	44°25' N.	61°15' W.	144	--	6
2	June 15	44°41' N.	60°39' W.	43	1.15	7
3	June 19	44°38' N.	60°40' W.	45	3.5	105
4	June 20	44°38' N.	60°40' W.	45	3.5	26
5	June 28	44°34' N.	59°43' W.	65	.9	93
6	June 28	44°02' N.	59°56' W.	37	6.8	7
7	June 29	44°06' N.	60°45' W.	50	1.7	2
8	June 29	44°24' N.	60°35' W.	48	2.6	48

294

<u>1936</u>						
1	April 23	44°29' N.	60°03' W.	101	--	422
2	April 26	44°19' N.	58°56' W.	119	--	77

499

<u>1938</u>						
1	April 20	43°48' N.	61°26' W.	55	1.5	248
2	April 24	44°20' N.	58°55' W.	128	--	4

252

Table II

CANADIAN ATLANTIC OFFSHORE COD TAGGING, 1937

Tagging Sta. No.	Date	Location		Depth Metres	Number Fish Tag.
		Lat.	Long.		
1	March 1	45°14' N.	59°21' W.	92	53
2	March 1	45°23' N.	59°09' W.	90	62
3	March 2	44°40' N.	59°28' W.	84	41
4	March 5	43°18' N.	61°56' W.	88	16
5	March 12	43°20' N.	62°30' W.	95	35
6	March 13	43°22' N.	62°30' W.	88	28
7	March 14	43°10' N.	62°12' W.	106	39
8	March 14	43°08' N.	62°35' W.	101	26
9	March 15	43°08' N.	62°35' W.	101	35
10	March 12	43°21' N.	63°31' W.	156	19
11	March 13	43°11' N.	62°40' W.	101	18
12	March 20	43°12' N.	62°15' W.	102	20
13	March 21	43°12' N.	62°48' W.	104	9
14	March 21	43°08' N.	62°45' W.	110	21
15	March 25	43°20' N.	62°40' W.	95	36
16	March 26	43°30' N.	62°55' W.	117	70
17	March 26	43°18' N.	62°22' W.	93	14
18	March 28	43°56' N.	59°10' W.	73	208
19	March 29	43°56' N.	59°10' W.	73	387
20	April 2	43°50' N.	59°10' W.	101	169
21	April 5	43°44' N.	59°30' W.	75	110
22	April 6	43°30' N.	59°58' W.	110	101
23	April 18	44°42' N.	58°55' W.	128	286
24	April 19	44°52' N.	57°54' W.	73	434
25	April 20	44°53' N.	57°48' W.	51	394
26	April 30	44°22' N.	59°04' W.	113	9
27	May 3	44°25' N.	58°58' W.	70	73
28	May 4	44°12' N.	57°36' W.	137	150
29	May 5	44°18' N.	58°22' W.	73	275
30	May 28	44°55' N.	57°30' W.	49	686
31	May 29	44°50' N.	57°23' W.	88	169
32	May 30	44°06' N.	60°05' W.	37	253

NUMBER OF TAGS RETURNED

Most of previous Canadian Atlantic cod tagging has been done on inshore grounds and by far the greater number of the recaptures also were made in Canadian Maritime inshore waters where operations of both Newfoundland and United States fishermen are quite limited.

However, the present account deals with tagging done in Canadian Maritime offshore waters where United States operations are quite extensive. In a previous account of the Canadian Atlantic cod fishery in offshore waters east of Halifax, (McKenzie 1942), it is shown that in 1938 the United States cod landings from this region totalled about 46 million pounds as compared to the Canadian average for 1938 and 1939 of about 64 million pounds. A "small portion" also of the Newfoundland "Deep Sea Fishery" landings of about 75 million pounds, on the average, also originates on the so-called Canadian Atlantic eastern offshore grounds. This might possibly make the Newfoundland and United States catch equal to the Canadian.

Offshore Cod

Year	Tagged	Recaptured	%Recaptured
1935	294	13	4.5
1936	499	19	3.8
1937	4246	234	5.5
1938	252	21	8.3
	<u>5291</u>	<u>287</u>	<u>5.4</u>

However, the records of the recaptures from the offshore tagging done in 1938 to 1939 inclusive show that less than a dozen tags were returned from Newfoundland and only about half a dozen from the United States in a total of 285. Thus, assuming that equal landings from the same region during the same period of time should contain about an equal number of tagged fish, it is seen that probably 10% of these taggings were actually retaken but only 5.4% of the tags were found and turned in.

This compares very well with the 8% recaptured from inshore tagging done during the years 1925 to 1933 inclusive (McKenzie, 1934), but it falls far short of the 26% recaptured from the 2715 tagged during 1934 to 1936 inclusive in eastern

Nova Scotian inshore waters.

A possible explanation of the differences lies in the amount of publicity given the tagging and the amount of effort expended in connection with the return of the tags. The earlier inshore tagging received little publicity and the return of the tags was left entirely to the fishermen. That done after 1934 received a lot of publicity through posters and the newspapers and frequent patrols were made to all the fishing ports along the outer Nova Scotian coast in search of tags. During the period of the offshore tagging experiment equal or more contact was maintained with all the Canadian drag trawlers and offshore fishing vessels to ensure the return of all tags found.

The difference in tag returns during these later years must therefore reflect the difference in fishing intensity in the various regions. This being the case it is seen that the fishing intensity in eastern Nova Scotian inshore waters must be at least 2 to 3 times as great as that in the eastern Nova Scotian offshore waters even when operations there by all countries are considered.

CAUDAL PEDUNCLE VERSUS OPERCULUM TAGGING

Up to 1937 all Canadian Atlantic cod and haddock tags were placed ventrally at the base of the caudal fin and as far onto the scales as possible. To see whether or not better returns might be obtained if the tag was placed on another part of the fish half the tags affixed during the 1937 offshore tagging were placed on the left operculum being pushed as far on from the posterior free edge and as dorsally as possible. The sharp end was then pushed out through the operculum and clenched in place.

The odd numbered tags in the series were placed on the operculum and the even ones on the caudal peduncle. To facilitate affixing the odd numbered tags, the part going through the operculum was cut shorter and sharper with tin shears.

In table III the returned tags are shown according to the men doing the tagging and the position where the tag was placed. The unequal number of fish tagged by the three men is responsible for the unequal number of returns but it is seen that there is very little difference in the percentage returns of the three different taggers, and when considered all together 53% of the returned tags were from the operculum position and 47% from the caudal peduncle position. This slight advantage in favour of the operculum position for the tag does not seem to be enough to merit changing to the opercular position of affixing the Canadian Atlantic cod tags.

Table III

COMPARISON OF CAUDAL PEDUNCLE VS.
OPERCULUM POSITION OF TAGS

Taggers	No. of Recaptures from tagging on the -		Percentage Recaptures	
	Operculum	Puduncle	Operculum	Peduncle
Darrach	97	89	52	48
Kaiser	19	15	56	44
Brown	7	6	54	46
	<u>123</u>	<u>110</u>	<u>53</u>	<u>47</u>

THE ADDITION OF A SCALET CELLULOID DISC TO THE CANADIAN
ATLANTIC COD TAG

The regular cod tag made of monel metal is not very conspicuous on the caudal peduncle of a cod or haddock and no doubt many are not found by those that handle the fish. In an attempt to render them more conspicuous and thus obtain a higher percentage return, a scarlet delluloid disc commensurate in size with the monel metal tag used was threaded onto a number of the tags used during 1937.

Offshore 494 fish were tagged with the disc on the tag at the same time and places that 1896 were tagged without the disc on the monel metal tag. Inshore off Cheticamp 397 tags were used with the scarlet disc and 398 without.

Table IV shows how the tag returns compared when the disc was used and when it was not used. In the offshore tagging there is a slight difference in favour of using the disc while at Cheticamp there was a greater advantage in not using the disc. On the whole, however, there was a slight improvement in the number of tags returned when the discs were placed on the monel metal tags, though not enough, it is believed to merit using the discs in all taggings.

Table IV

COMPARISON OF THE RETURNS FROM TAGS

WITH AND WITHOUT THE SCARLET DISC ATTACHED

Location of Tagging	<u>Tags returned</u>		<u>Percentage returns</u>	
	Discs	No Discs	Discs	No Discs
Offshore	32	115	6.5	6.1
Inshore (Cheticamp)	31	37	7.8	9.3
	<u>63</u>	<u>152</u>	<u>7.1</u>	<u>6.6</u>

RATE OF MOVEMENT

In an earlier account on cod movements (McKenzie, 1934) it was shown that some cod roved away from the point of tagging about 160 to 250 kilometres (100 to 150 miles) per year, never returning to the tagging location.

In the present account some of the long distance travellers may have been rovers but some were no doubt on extended migrations. The most definite of the latter is that from the Canadian Atlantic eastern offshore banks into the gulf of St. Lawrence as far as Gaspe, a distance of roughly 500 miles. Along this route 7 fish were retaken in the general region of cape North, C. B., N. S. about 2 months after being tagged. The average distance was about 200 miles making a daily rate of about 3 miles per day.

Three were taken on the Grand bank and off southern Newfoundland having gone from 175 to 350 miles by the shortest routes at a rate of about 4 miles per day.

Five were recaptured off eastern Cape Breton and as far as Cloridorme Gaspe having gone distances of from 175 to 450 miles by the shortest routes at an average rate of about 6½ miles per day.

The highest rate, however, was set by a fish 62 cm. long which was tagged on Middle ground June 19, 1935 and was retaken on Browns bank July 2-16, 1935 (trip of trawler Ripple) a distance along the Nova Scotian shore of from 275 to 300 miles or about 240 miles in a straight line. The shore route is favoured in view of many recaptures there and this makes an average rate of about 13 miles per day.

No progressive roving movement of the cod has been found in the offshore tagging but the rate of 100 to 250 miles per year mentioned above is less than a mile a day. It appears therefore that cod on an extended migration travel much faster than rovers.

Thompson, 1943, in discussing cod tagging in the north-east Atlantic mentions a cod tagged at Lofoten and recaptured 41 days later 500 miles away off east Finmark. This is slightly less than 13 miles per day. In an addendum to the section on the results of cod tagging experiments, he mentions a somewhat uncertain record of a cod, tagged on southern Grand bank, going to Greenland (2000 miles in 433 days), - - an average rate of 4.6 miles per day.

Speaking of Newfoundland tagged cod Thompson shows that "the average net mileages travelled per cod per day" were less than 1 mile per day. The fastest average speed over a long distance of these cod was made by a fish going from St. Pierre bank to north-east Grand bank (330 miles in 115 days), an average rate of 3 miles per day. The fastest rate over a short-distance was $7\frac{1}{2}$ miles per day.

It is seen thus that Canadian Atlantic cod in some numbers migrate faster than the tagged cod of any other region in the North Atlantic.

Table V

RECAPTURES FROM CANADIAN ATLANTIC OFFSHORE COD TAGGING

Tagging Sta. No.	Fish Tagged	<u>No. of Tags Returned</u>					Total		
		1935-36	1936-37	1937-38	1938-39	1939-40		1940-41	1941-42
<u>1935</u>		<u>July 1 - June 30</u>							
1	3							0	
2	3							0	
3	7		1					1	
4	131	3	2					5	
5	7							0	
6	93	3	2					5	
7	2		1					1	
8	48			1				1	
	294	6	6	1				13	
<u>1936</u>		<u>May 1 - April 30</u>							
1	422		8	3	3	2	2	18	
2	77			1				1	
	499		8	4	3	2	2	19	
<u>1937</u>		<u>April 1 - March 31</u>							
1	248				10	9	1	1	21
2	4								0
	252				10	9	1	1	21

DESCRIPTION OF MIGRATIONS

1 - The 1935 Tagging

In table I the details of this tagging are recorded and in figure I the locations at which the 294 cod were tagged are shown. Some details of the 13 recaptures are shown in tables V and VI. The last recapture is recorded as being made in April, 1938, almost 3 full years after tagging. A few more recaptures per month appear to have been made in the late autumn than at any other time of year.

In figure 2, and in all other similar figures in this account, the lines joining the points of tagging with those of recapture are drawn along what the author believes to have been the likeliest route of migration, not necessarily the shortest.

Almost three-quarters of the recaptures were made offshore and in the general tagging region, the remainder inshore along the outer Nova Scotian coast. The fact that most of the offshore recaptures were made relatively close (maximum distance was 80 kilometres or about 50 miles) to the tagging locations and during all seasons seems to indicate that the fish tagged in this Middle bank district during late May and June must have been mostly resident or native cod.

The 4 that were taken inshore were caught also at all seasons of the year indicating that they did not all withdraw to offshore regions at regular intervals. This would class these fish as rovers rather than members of an extended migratory stock of cod.

2 - The 1936 Tagging

Tables V and VII set forth some of the details concerning the 19 or 3.8% recaptures from the 499 cod tagged April 23 and 26 at the locations shown in Table I and figure I. Most of the recaptures were made in the late winter and spring or the late autumn and all of them within 5 years after tagging.

The tagging at location No. 1, 1936 on the extreme western tip of Banquereau where some of the 1935 offshore tagging was carried out, was done about a month earlier than that done in 1935. Hence different results might appear. That done at location No. 2 some 80 kilometers or 50 miles to the SE on April 26 was of less importance since it yielded only 1 of the 19 recaptures.

The recaptures during 1936 and 1937 are plotted in figure 3 and those thereafter in figure 4. Figure 4 shows much the same picture as figure 3; namely, an extended movement towards eastern Cape Breton, or a little farther, (1 recapture was

Figure 2 - Recaptures from the cod tagging offshore of May 13 to June 29, 1935.

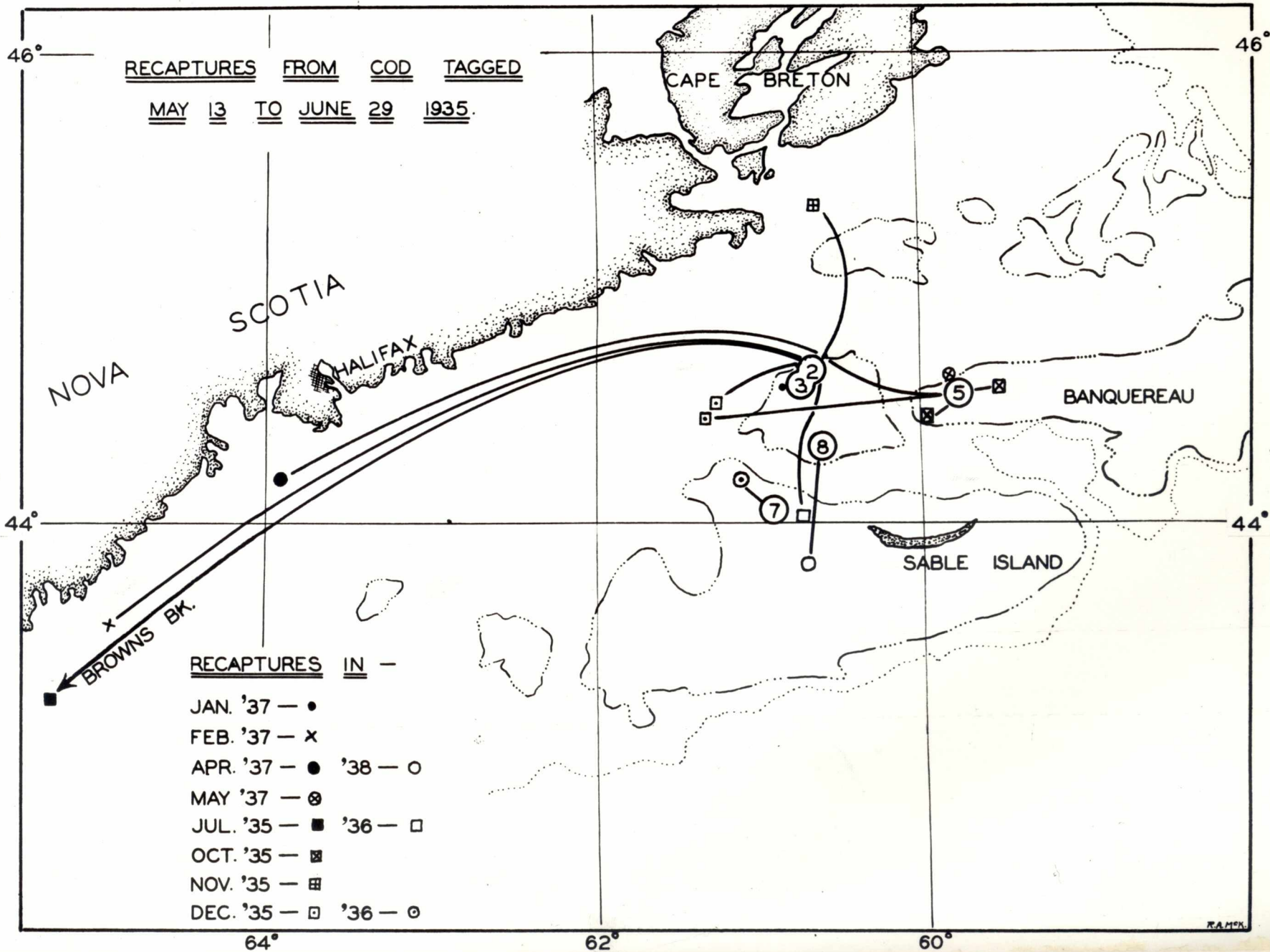


Figure 3 - Recaptures during 1936 and 1937 from 1936 offshore cod tagging done April 23 and 26.

RECAPTURES FROM COD TAGGED OFFSHORE

APRIL 23 & 26 1936.

RECAPTURES IN

- MAR. '37 — ■
- APR. '37 — ▲
- MAY '36 — •
- JUN. '36 — ●
- JUL. '37 — □
- NOV. '36 — △
- DEC. '36 — ○; '37 — ⊗

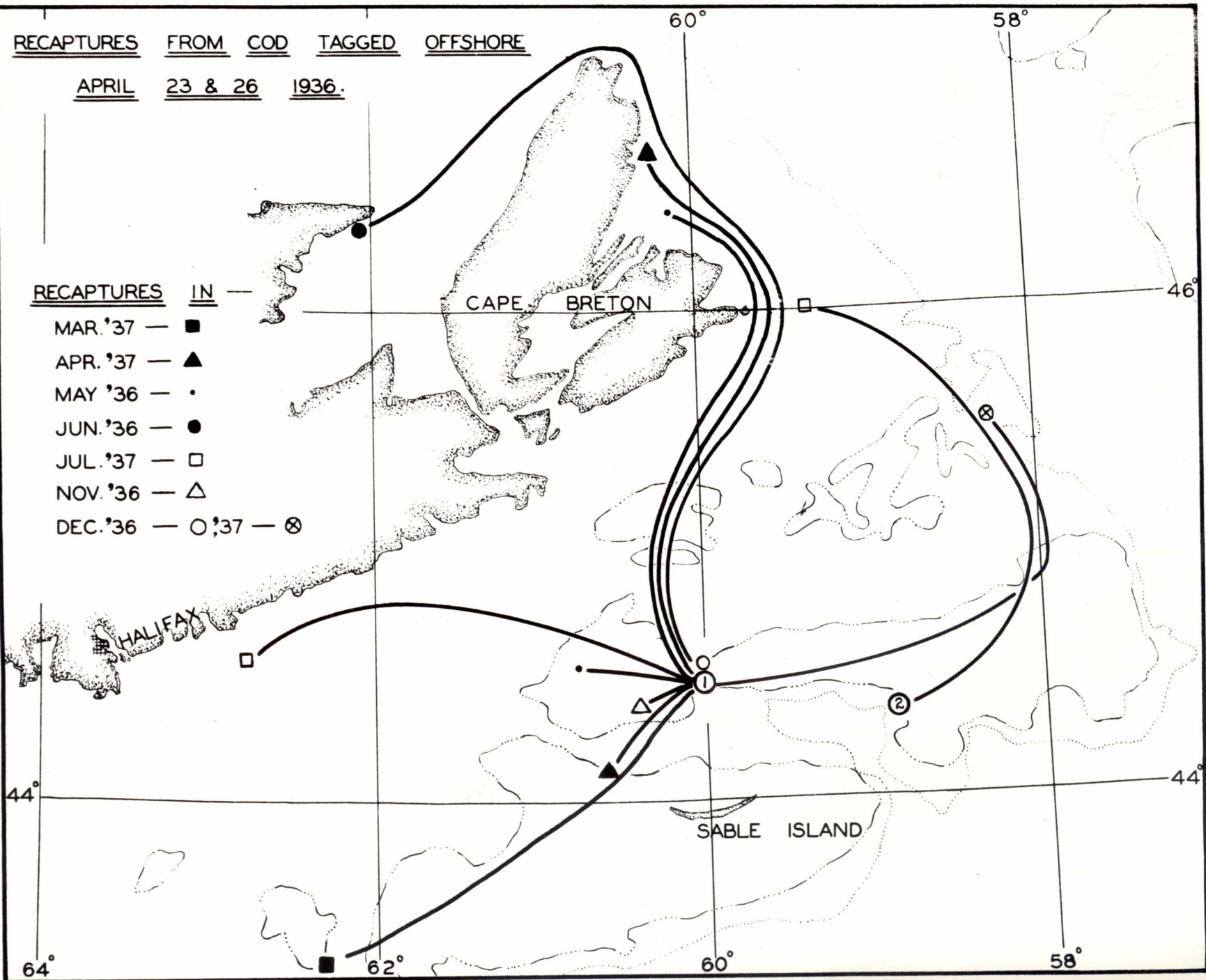


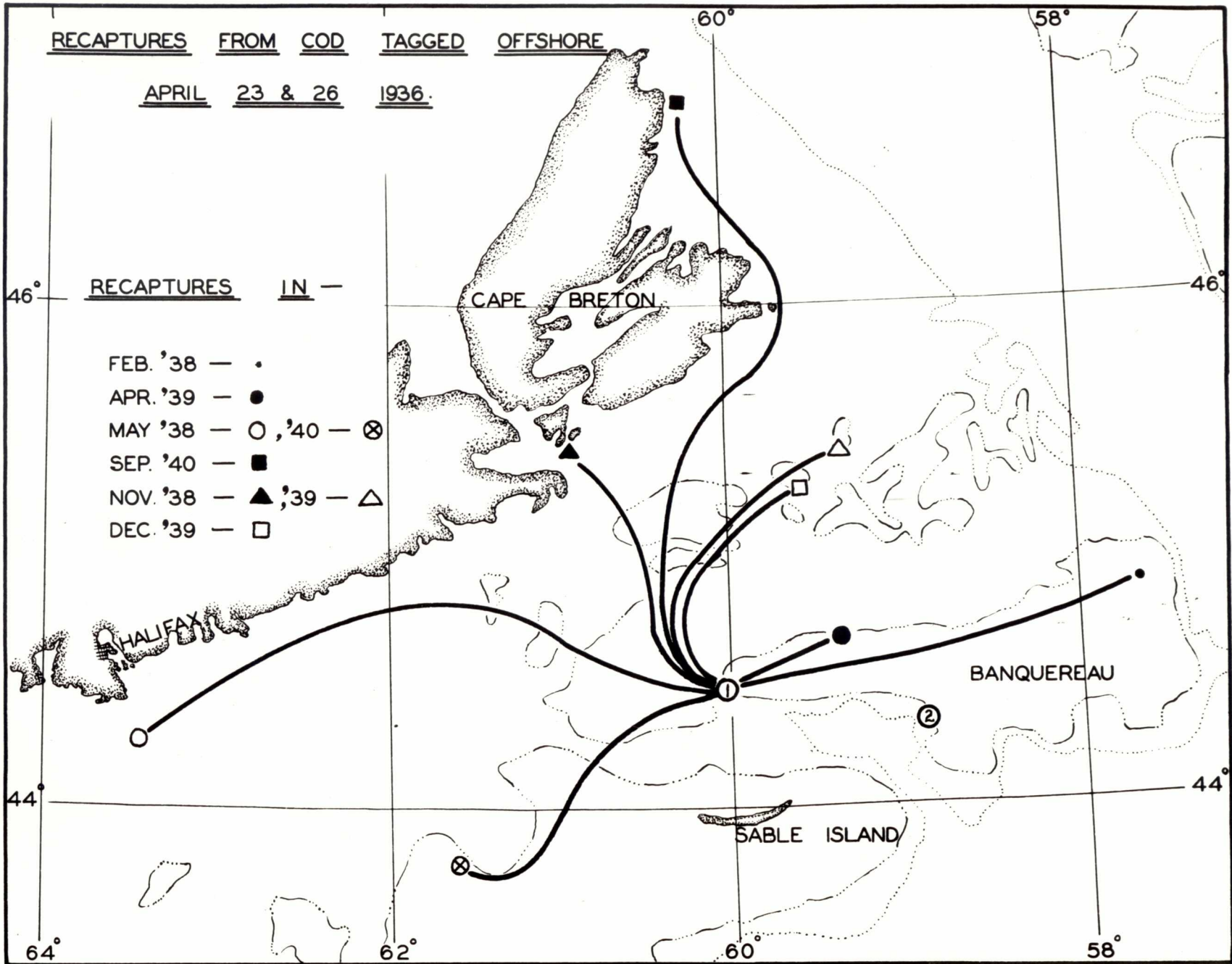
Figure 4 - Recaptures during 1938 and later from 1936 offshore cod tagging done April 23 and 26.

RECAPTURES FROM COD TAGGED OFFSHORE

APRIL 23 & 26 1936.

RECAPTURES IN —

- FEB. '38 — •
- APR. '39 — ●
- MAY '38 — ○, '40 — ⊗
- SEP. '40 — ■
- NOV. '38 — ▲, '39 — △
- DEC. '39 — □



reported from inside the "Gulf" off Prince Edward Island) where recaptures were made in the summer and autumn, and a movement among the offshore banks where recaptures were made mostly in winter and spring. Some roving or possibly a small extended migration to the Nova Scotia inshore grounds from Halifax eastward also occurred.

These results differ from those of 1935 in that only 58% instead of 78% were retaken on offshore grounds. The remainder or 42% of the 1936 recaptures from the 1936 tagging came mainly from eastern Cape Breton or a route towards the gulf of St. Lawrence while the smaller percentage, 22%, of 1935 came from the inshore waters of outer Nova Scotia.

This implies that there is a movement of cod away from the eastern offshore grounds towards the gulf of St. Lawrence in late April and early May as shown by the returns of 1936 and that this movement is over by late May since none of the recaptures from the 1935 tagging came from this region.

Table VII

RECAPTURES FROM 1936 OFFSHORE COD TAGGING

Recaptures During	Tag. Location	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1936	1					2	1					1	1
	2												
1937	1			1	2			1					1
	2							1					
1938	1		1			1						1	
	2												
1939	1				1							1	1
	2												
1940	1					1				1			
	2												
Totals		0	1	1	3	4	1	2	0	1	0	3	3

RECAPTURES FROM CANADIAN ATLANTIC 1937 OFFSHORE COD TAGGING

Table VIII

No. of Tags Returned April 1 - March 31

Tag Sta. No.	No. Fish Tagged	37-38	38-39	39-40	40-41	41-42	42-43	43-44	Total
1	53				1				1
2	62	3	1	1					5
3	41								0
4	16	1	1	1					3
5	35	1							1
6	28								0
7	39								0
8	26	2*							2
9	35	1			1				2
10	19								0
11	18								0
12	20								0
13	9	1							1
14	21								0
15	36	1							1
16	70	2		2					4
17	14								0
18	208	9	3	1	1				14
19	387	14	2	1	2				19
20	169	7							7
21	110	4							4
22	101	2							2
23	286	10	2	1	1	1			15
24	434	11	5	4	3	1	1		25
25	394	17	7	6	3			1	34
26	9								0
27	73	1				1			2
28	150	4	3	2					9
29	275	2	2	3					7
30	686	29	8	6	4				47
31	169	5	4		2				11
32	253	11	6		1				18
Total	4246	138	44	28	19	3	1	1	234

* 1 recapture in March, 1937.

3 - The 1937 Tagging

Table VIII shows the recaptures from the 1937 offshore tagging according to 12 month periods following the tagging. In many cases only the month of recapture was given, not the exact date. Accordingly it has been impossible to subdivide April in order to obtain a mid-tagging period date as a common starting point for all the tagging. Because of this, April 1 has been considered the starting date for all recaptures.

In table IX are shown the number of recaptures from each of the 1937 offshore taggings during the first 2 years following tagging according to the month of recapture from April, 1937, to March, 1939, inclusive. This period embraces 181 or 77 % of the total 234 recaptures and gives a good picture of the monthly variation in recaptures. A slightly greater number of recaptures is seen to have occurred in the spring and autumn than summer and winter.

For convenience in plotting recaptures the 32 1937 tagging locations have been grouped as shown in table X because of similarity in time and or place of tagging. The total fish tagged in, and recaptures made from, each of the various areas is also shown in the table.

Table IX

RECAPTURES FROM 1937 OFFSHORE COD TAGGING, APRIL 1, 1937 - MARCH 31, 1939

Tag.	Loc.	Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Jan.		Feb.		March			
		'37	'38	'37	'38	'37	'38	'37	'38	'37	'38	'37	'38	'37	'38	'37	'38	'37	'38	'39	'38	'39	'38	'39	
Sta. 1																									
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" 22		3															1								
" 23		1	1	3				1						2	2	1							2		
" 24		1	1	2	1	3		3	2			1		2											
" 25		1	1	6	1	4	2	1	2	1				1	2					1		1			
" 26																									
" 27																					1				
" 28			1		1	1		2											1				1		
" 29			1		1	1		4	1													1	1		
" 30					2	2							16	5	6	1						1	1		
" 31					3	2							3	1	2	2									
" 32							2	1		1		1	2	3	2	2					1		1		
Total		19	5	14	8	17	4	12	4	5	4	5	2	30	9	13	5	0	5	3	1	5	2	8	2

* - 1 recapture in March, 1937.

Table X

TAGGING STATIONS, 1937, GROUPED FOR PLOTTING RECAPTURES

Group	Stations included in groups	Number fish tagged	Recaptures No.	%
(A) Emerald	4,5,6,7,8,9,10,11,12,13,14, 15,16,17, (Mar. 5-26 incl.)	386	14	3.6
(B) Southeast peak	18,19,20,21,22, (Mar.28-April 6 incl.)	975	46	4.7
(C) Southwest Cove	26,27, (April 30 and May 3)	82	2	2.4
(D) S. edge Quereau	28,29, (May 4 and 5)	425	16	3.7
(E) Eastern shoals, April	24,25, (April 19 and 20)	828	59	7.1
(E) Eastern shoals, May	30,31, (May 28 and 29)	855	58	6.5
(F) Misaine	1,2, (March 1)	115	6	5.2
Considered separately	3,23,32	580	33	5.7
		4246	234	5.5

RECAPTURES FROM TAGGING IN THE EMERALD BANK REGION (A)

Figure 5 shows that none of the 14 recaptures from this tagging came from westward of this region, and while 11 came from the Canadian Atlantic eastern offshore grounds still 1 came from inshore, 1 from the gulf of St. Lawrence and 1 from inshore off southern Newfoundland.

Recaptures from tagging on Misaine bank (F)

While not quite one-third as many fish were tagged in this region as that just mentioned above, still 4 of the 6 recaptures came from the gulf of St. Lawrence in place of only 1. Even though recaptures were made up to 3 years after tagging, still none of them ever came from the Canadian Atlantic offshore grounds.

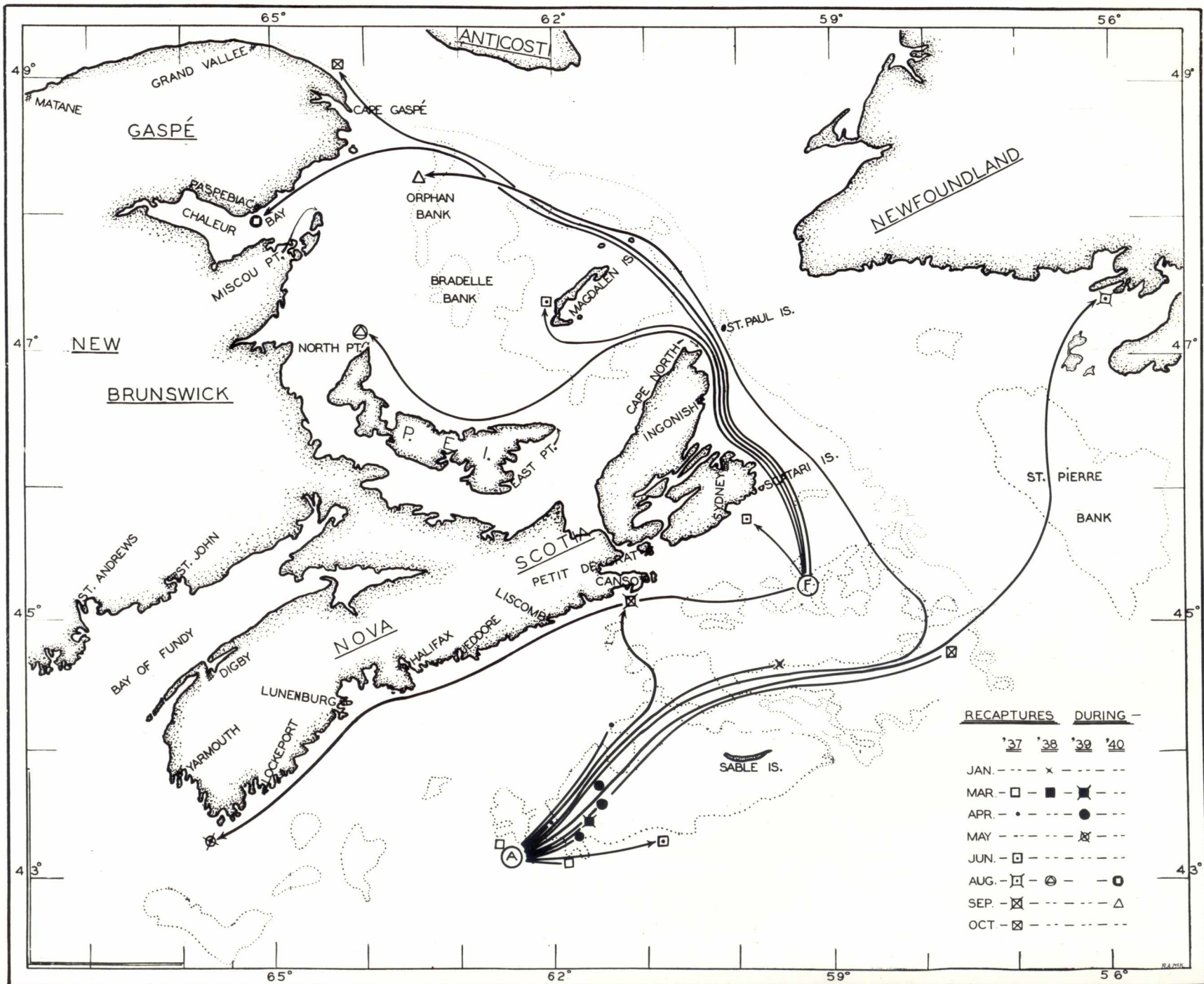
Misaine bank is fished by Canadians for a very short time in both the spring and autumn and but few vessels do even this. At other times of year paying fares of cod cannot be obtained here. This seems to indicate that at these two seasons schools of cod pass over this bank in the course of their migrations.

In early March, however, little fishing is as a rule done east of Sable island as good fares can usually be obtained from the cod and haddock concentrated off Halifax in the Emerald bank region. At this time in 1937 no great concentrations, however, were to be found there and the fishermen operated all over these eastern offshore grounds in search of them. As few fish were found at F the time spent there by the commercial fishing vessel from which the tagging was being done was short and allowed of only a few cod being tagged.

Since none of these fish were recaptured on the offshore grounds and 5 of the 6 recaptures were taken either in or enroute to the gulf of St. Lawrence, it appears that these cod summered in the gulf and wintered either in it or just outside of it where little if any fishing is done at that season of the year. As a result no recaptures were made as would have occurred if these cod had moved to the offshore banks like Quereau and Western bank.

In figure 5 the line joining position F with the recapture at the Magdalens should possibly have been drawn around the northeast rather than the southwest end of the Magdalens. Also, that connecting F and the recapture at North point, P. E. I., should no doubt have been drawn up the centre of the Gulf to the tip of Gaspé and then around to the westward across the mouth of Chaleur bay and past Miscou point to the location of recapture. Both these changes in figure 5 are more in keeping with the other recaptures shown in this figure.

Figure 5 - All the recaptures from the tagging of 1937 in the Emerald bank region (A), and also the Misaine bank region (F).



RECAPTURES FROM TAGGING IN THE SOUTHEAST PEAK REGION
OF SABLE ISLAND BANK (B)

Of this group of 975 cod tagged during the last week of March and the first week of April, 46 or 4.7% were recaptured over a period of 4 years with 39% of the recaptures being taken in the tagging area. Altogether 36, figure 6, or 78% of the recaptures came from Canadian offshore grounds and again all of these were from eastward of Emerald bank. Thirty of the 36 recaptures were made during the months of November to April inclusive. This of course is the period of the year during which the most intense Canadian offshore fishing occurs. The fact that most of the autumn and early spring offshore recaptures were made eastward of Sable island and the mid-winter ones mostly in the western Sable Island bank to Emerald bank region seems to indicate a movement from east to west in the late autumn and back in the spring in this offshore region.

Eight recaptures, see fig. 6, were made enroute from the offshore region to Gaspe in the north-west part of the gulf of St. Lawrence. That 4 of these were retaken along the way towards Gaspe - during the next 2 years, and 4 at Gaspe, seems to indicate an annual extended migration from the eastern offshore banks to Gaspe.

Only 4 other recaptures were made outside of this offshore tagging region, 1 inshore near Halifax and 3 in Newfoundland waters, both in and offshore and all at very widely separated points. These, therefore, appear to be in the roving migration category.

RECAPTURES FROM TAGGING IN THE SOUTH-WEST COVE REGION
OF BANQUEREAU (C)

Only 2 fish were recaptured from the 82 tagged in this region at stations 26 and 27. These recaptures are plotted in fig. 7.

Recaptures from tagging in the Saw-Teeth region of Banquereau

Tagging stations 3 and 23

On March 2, 41 cod were tagged here at station 3 but none were ever reported as recaptured. However, on April 18 at tagging station 23, 286 were tagged a few miles eastward of the "saw-teeth" along the northern edge of the bank and 15 of the tags were recovered. These are also plotted in fig. 7. Here too, a movement into the gulf of St. Lawrence for the summer is seen to have occurred, for, in spite of drag trawlers operating over these offshore grounds all summer as well as some Lunenburg-type vessels, still none of these fish were

Figure 6 - All the recaptures from the 1937 tagging in the southeast peak region of Sable island bank (B).

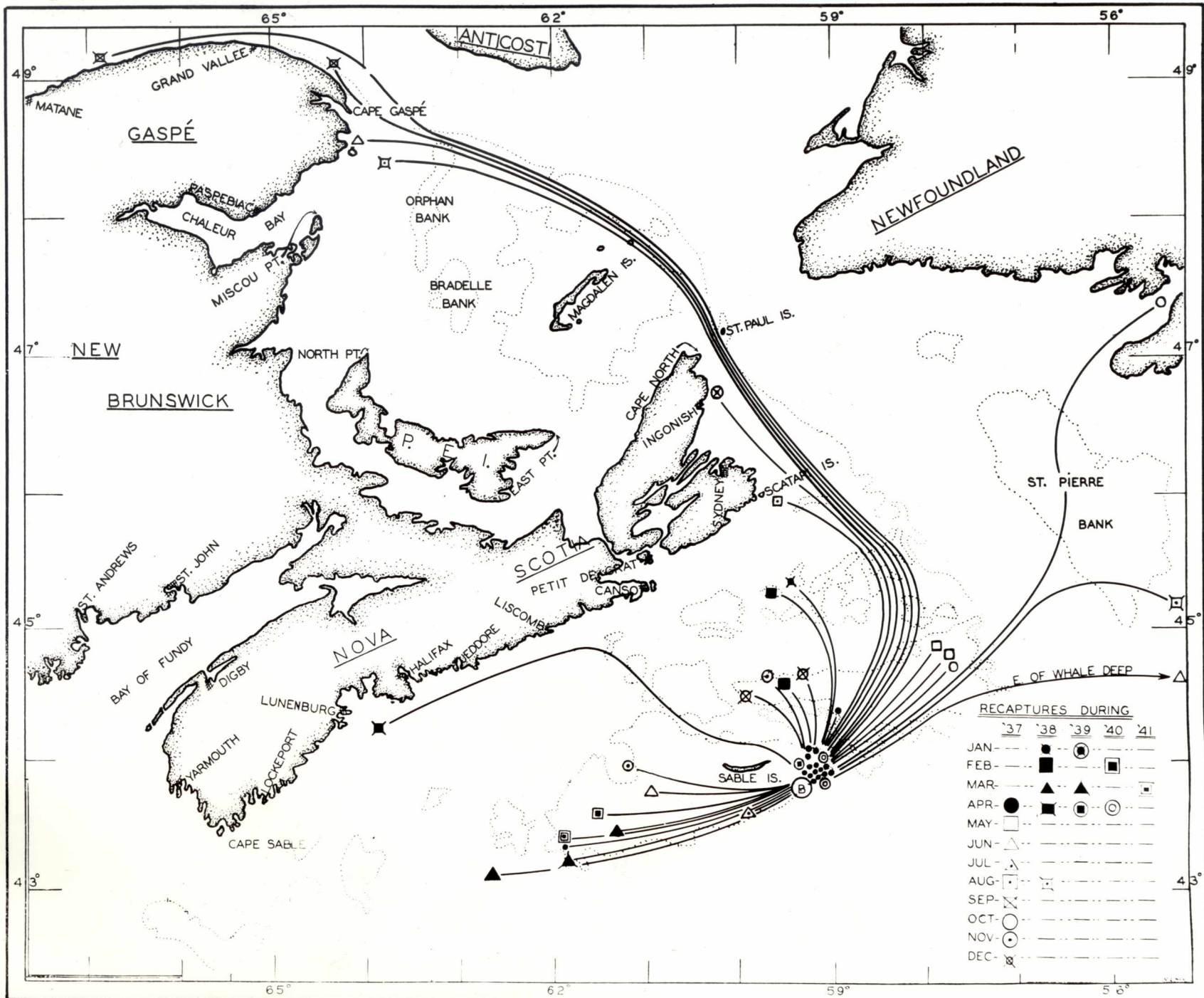
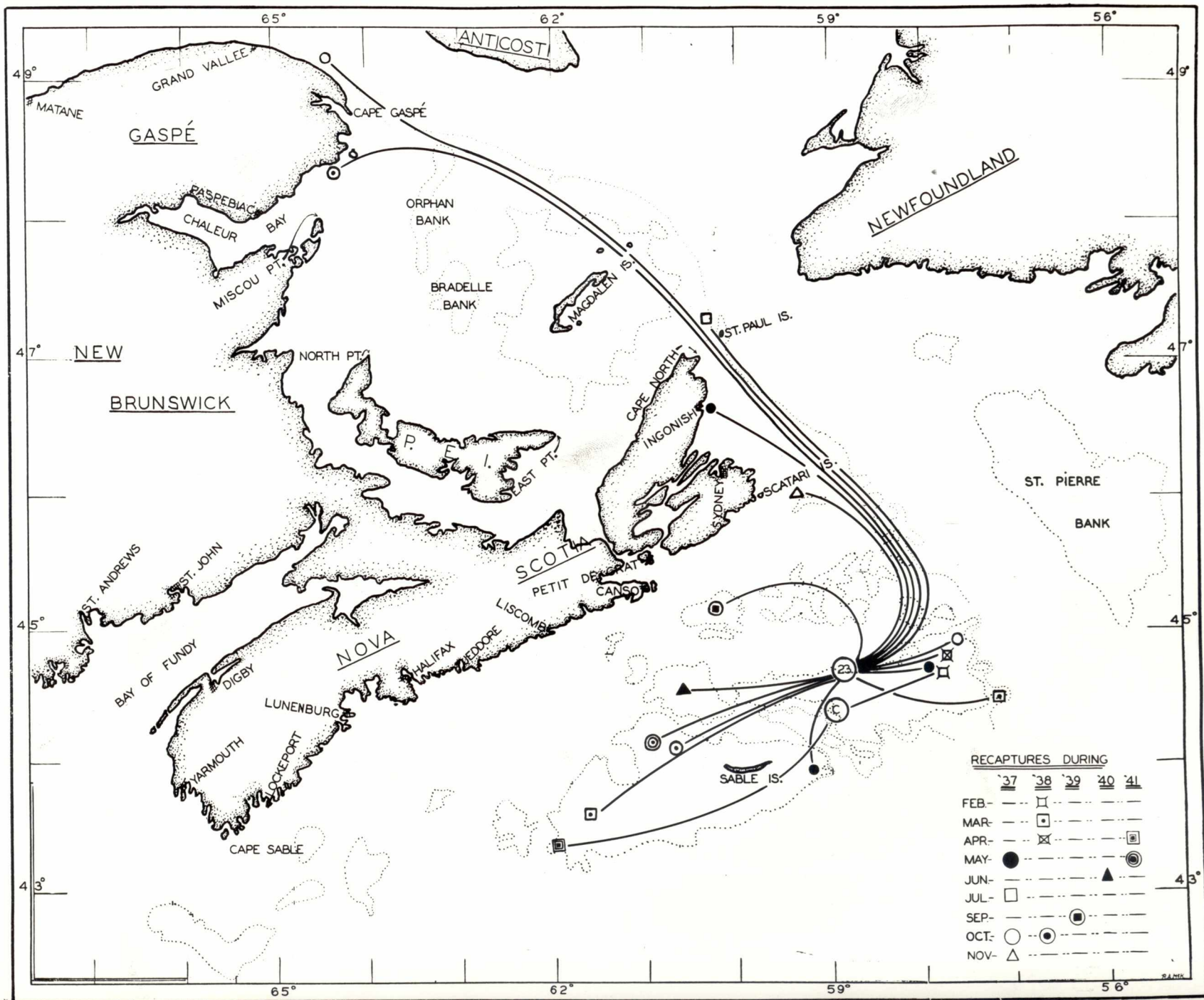


Figure 7 - All the recaptures from 1937 offshore tagging station 23 and location (C).



recaptured on the offshore grounds from July to September inclusive. Recaptures were made, however, on these grounds during winters following the tagging. This indicated that the tagged fish were away during the summers but returned for the winters.

RECAPTURES FROM TAGGING IN THE BEND OF SABLE ISLAND

TAGGING STATION 32

The pattern of these recaptures in fig. 8 shows a movement shoreward over Middle bank in the summer with a spreading out along the eastern Nova Scotia inshore grounds by those fish that moved farthest inshore. All did not move into inshore waters for some recaptures were made around Middle bank during the summer and early autumn. The recapture of 3 on Sable island bank in the autumn and early winter of '37 and 1 almost at the tagging location in February '38 after none were recaptured in these regions during the summer of '37 seems to indicate a return to this region in the winter from grounds closer to shore.

RECAPTURES FROM TAGGING ALONG THE SOUTHERN EDGE

OF BANQUEREAU (D)

Here 425 cod were tagged early in May with 16 or 3.7% being recaptured. Figure 8 shows a slightly different picture to those in figures 6 and 7. While 11 recaptures were made on the offshore banks, all but 1 was retaken not only east of Emerald bank but east of Sable island as well.

Three were recaptured around Cape Breton with only 1 of these being along the east coast region which is directly enroute Gaspe. The other 2, 1 off the north-west coast and 1 off Isle Madame were retaken a little off the so-called "beaten track" to Gaspe and might possibly have been rovers rather than members of the extended migration group which went to Gaspe from the eastern Canadian offshore grounds.

Two other definite rovers were also recaptured; 1 on the Grand banks and 1 inshore off Lockeport, N. S.

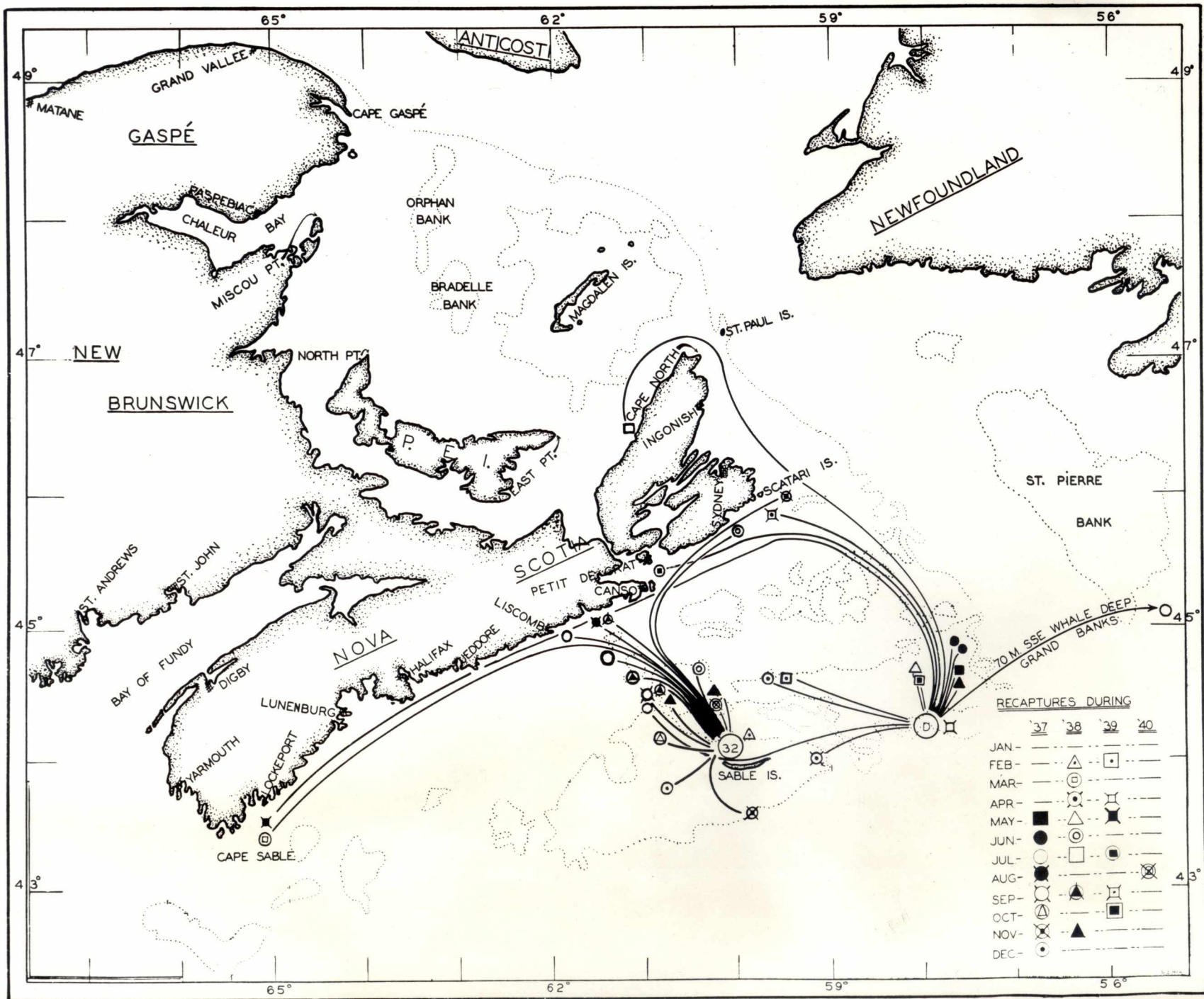
The cod of this part of Banquereau therefore, in early May did not show the extended migration tendency very definitely since over half of the recaptures during the following 2 years and at almost all times of year came from Banquereau.

RECAPTURES FROM TAGGING IN THE "EASTERN SHOAL" REGION

OF BANQUEREAU, APRIL (E)

The recapture of 59 of the 828 tagged cod released in this region on April 19 and 20, 1937, is a return of about 7% which is the highest from any of the offshore tagging.

Figure 8 - All the recaptures from 1937 offshore tagging station 32 and also from location D.



Thirty-two or 55% of these recaptures, see fig. 9 came from the eastern Canadian offshore grounds and only 2 of these from as far west as Sable island. In this respect this group of taggings resembles that done in 1936 on western Banquereau.

Of the 26 or 45% not taken on Canadian offshore grounds, 4 came from Newfoundland waters and all the others either from Gaspé or along a route generally towards Gaspé with one exception, that of a cod retaken in the Belle Isle Strait region.

The cod of eastern Banquereau at this time of year, therefore, consist to a large degree of fish which leave eastern Banquereau for the summer, none being taken there from July to October inclusive of the year in which they were tagged, and only 4 in later years. During these months, however, recaptures were made either at or along a route towards Gaspé both in the summer of 1937 and in later years.

The decline in offshore recaptures during the summer months is in part due to a reduction in fishing effort (Canadian) on these eastern offshore grounds but not entirely for there is some Canadian fishing carried on there and the United States fishermen operate there slightly more than during the winter months.

RECAPTURES FROM TAGGING IN THE EASTERN SHOAL REGION
OF BANQUEREAU, MAY 28 and 29 (E)

Figure 10 showing the 58 recaptures, 6.6% from the 855 cod tagged in this region presents a slightly different picture than that shown in fig. 9. In this case over 85% of the recaptures were made on the Canadian offshore grounds and all but 3 east of Sable island.

Two apparently roved to Newfoundland waters and 7 were taken along the route towards Gaspé but none any farther in that direction than about cape North, Cape Breton.

The great majority, therefore, of this group of taggings were what may be termed resident offshore cod. Apparently the migratory cod were still in this region on April 19 and 20, see fig. 9, but between that time and May 28 and 29 these fish had moved away leaving mostly resident fish to be tagged late in May as seen in fig. 10.

4 - The 1938 Tagging

Table I gives details of this tagging the locations of which are shown in fig. 1. Of the 252 large cod tagged, 248 of them were released on the western part of Sable Island bank on April 24, 1938. The 21 recaptures or 8.3% which is the highest from any of this offshore tagging were all from this lot of 248 and details concerning them are given in tables V and XI. While recaptures were made up to 4

Figure 9 - All the recaptures from cod tagged on eastern Banquereau on April 19 and 20, 1937 (E).

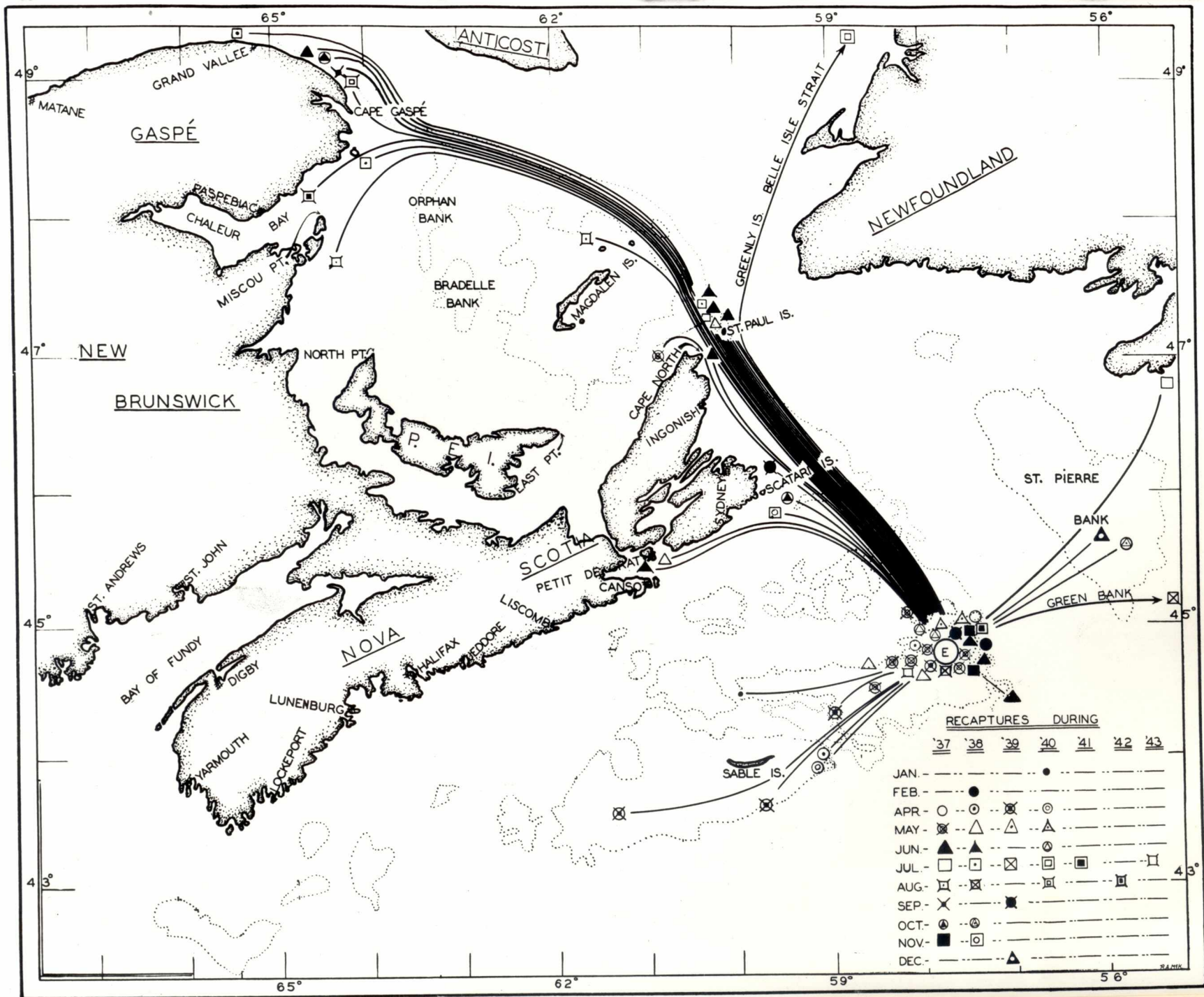
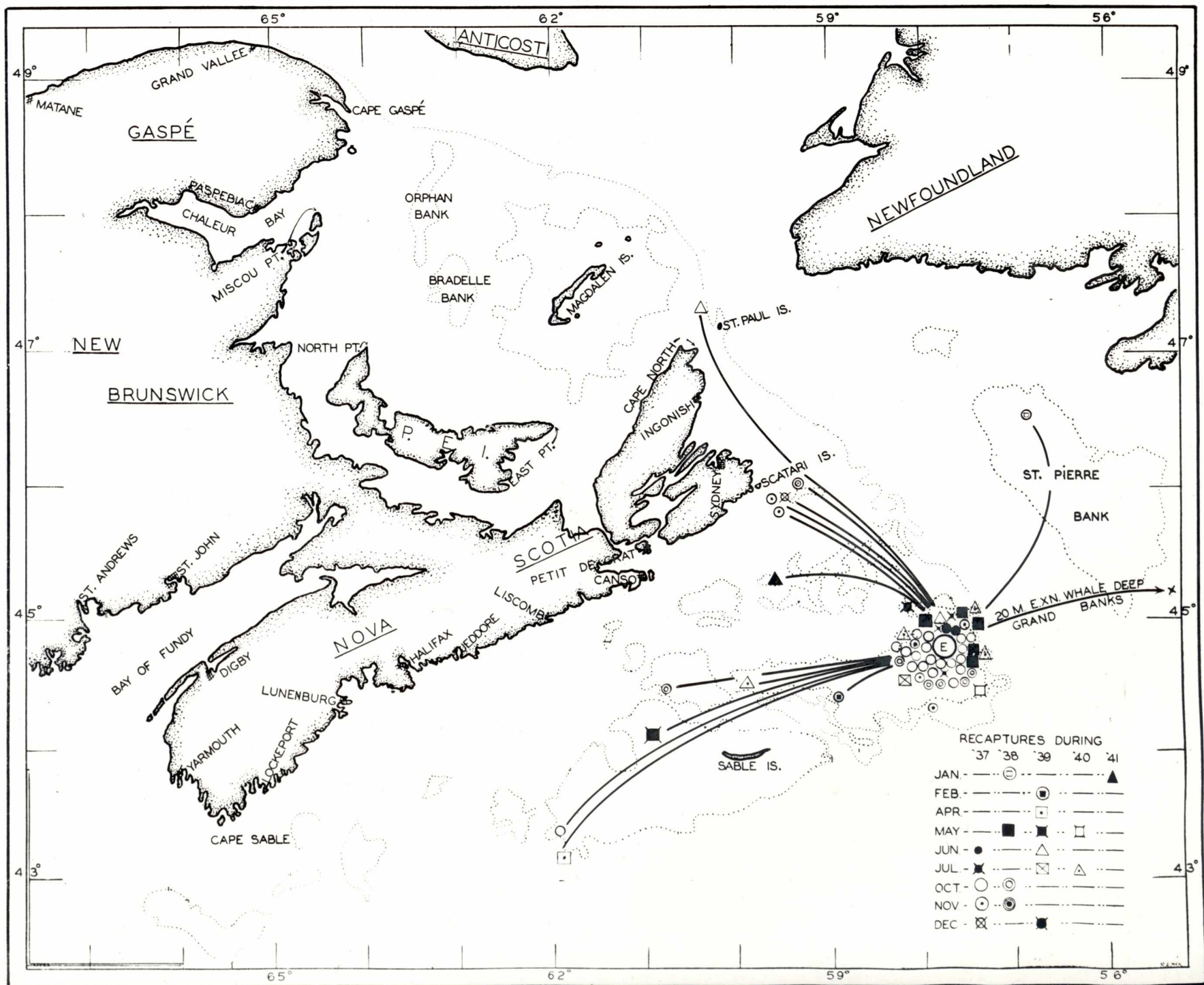


Figure 10 - All the recaptures from cod tagged on eastern Banquereau on May 28 and 29, 1937, (E).



years following this tagging it is noteworthy that according to table XI about 75% of all these recaptures were made during the months of March to May inclusive. The remainder were retaken in February, June, August, September and December. There is a remarkable dearth of recaptures at any time except February to June inclusive, yet on the whole the 8.3% returns are the highest in the offshore groups. Since this is the case it can be accounted for only by this group of fish migrating to some region where there is little or no fishing during the period of July to January.

According to the fishermen this school of "steakers" is encountered first around Sable island sometime during February each year. The school is quite easily recognized by being almost entirely large fish. It then moves south-westward over Sable Island bank to the extreme south-west part of this bank and even on to the southward of Emerald bank. After several weeks it begins to move back towards Sable island until the fishermen lose contact with it somewhere just to the westward of Sable island. All this is quite a regular annual event on this bank. Where they go is a matter of conjecture.

In fig. 11 this movement towards Sable island is shown in April and May immediately following the tagging. Later one was taken inshore off eastern Nova Scotia in June, another in September, then no more until 3 recaptures occurred in March, 1939, in the Emerald Sable Island bank region (1 rover was recaptured on Georges bank in February). The summer picture of 1938 was repeated in 1939, see fig. 12, with 1 rover being retaken on north-east Banquereau in December. It could not have been other than a rover because the October to December fishery on eastern Banquereau is quite intense, and if more of this tagging were present more should have been recaptured. Single recaptures in 1940, 1941 and 1942 were made during February and March on the western Sable Island grounds.

The tagging picture is the same as the fishermen's description of the movements of these "steakers" except for the rovers. These in every case must have been rovers since the heavy fisheries at these times and places would have yielded more returns if many tagged fish were present.

Fishing on these eastern Canadian offshore banks continues all summer as evidenced by recaptures of other taggings during this period, but the Canadian effort is not as great as during the winter. Inshore grounds are also heavily fished as is the gulf of St. Lawrence and the Grand banks, yet no recaptures were made in the latter two areas.

To have such a school of cod disappear during the summer season is, to say the least, distinctly unusual. Even if it disbanded and moved about still recaptures should be forthcoming. All this lends credence to the fishermen's theory that they go onto the very shoal sandy bottom around Sable

Figure 11 - Recaptures during the first twelve months following the tagging on the western part of Sable Island bank on April 24, 1938.

Figure 12 - All the recaptures made following the first twelve month period succeeding the tagging on the western part of Sable Island bank on April 24, 1938.

RECAPTURES FROM COD TAGGED OFFSHORE

APRIL 20 & 24 1938

46°

RECAPTURES

IN

'39

'40

'41

'42

FEB. - — — ○ — — — —
MAR. - — — — ■ — — — — □
APR. - ▲ — — — — — — — —
MAY - △ — — — — — — — —
AUG. - ● — — — — — — — —
DEC. - ⊗ — — — — — — — —

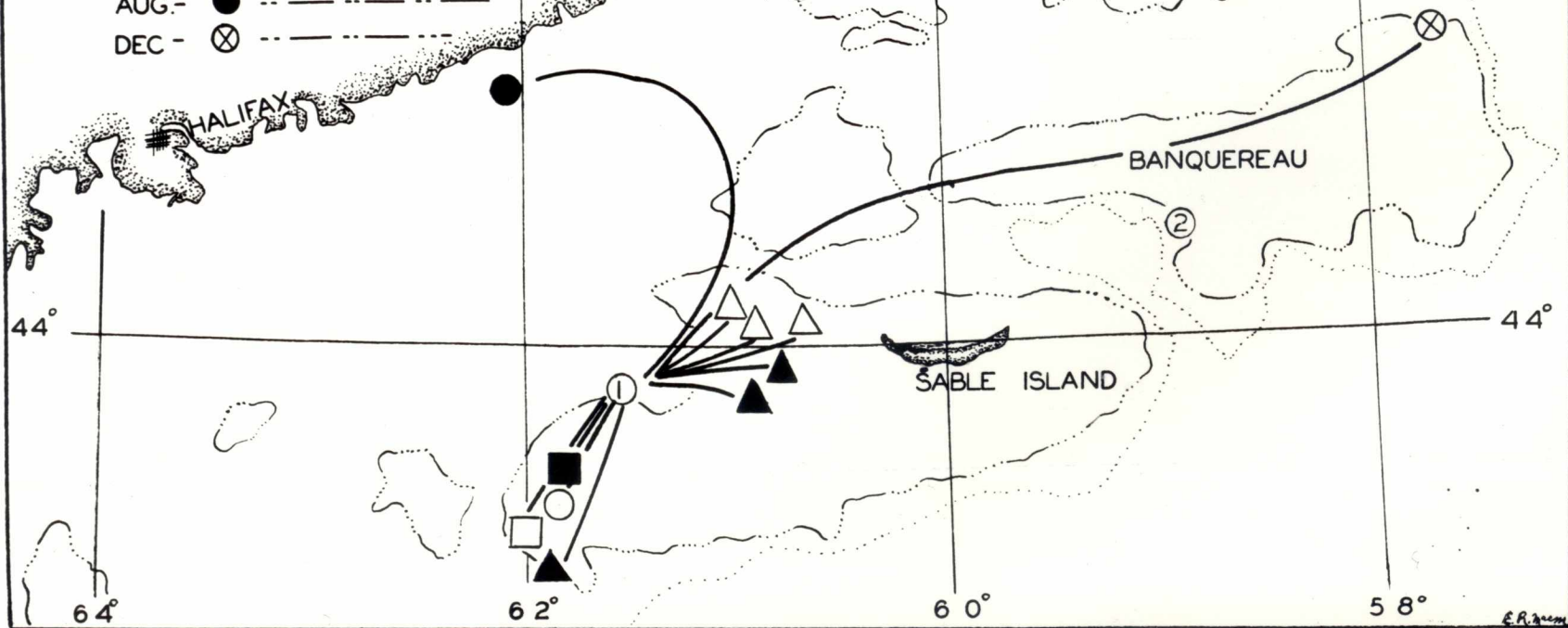


Table XI

RECAPTURES FROM 1938 OFFSHORE COD TAGGING AT LOCATION 1(No recaptures from tagging location 2)

Recaptures During	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1938	0	0	0	1	3	1	0	0	1	0	0	0
1939	0	1	3	3	3	0	0	1	0	0	0	1
1940	0	1	0	0	0	0	0	0	0	0	0	1
1941	0	0	1	0	0	0	0	0	0	0	0	0
1942	0	0	1	0	0	0	0	0	0	0	0	0
Totals	0	2	5	4	6	1	0	1	1	0	0	1

island, where no one fishes now-a-days. That large cod have done this in years past is borne out by the fact that years ago when hand-lining during the summer was in vogue among the Lunenburg deep-sea vessels, many good fares of very large cod were obtained by hand-lining so close to Sable island (sometimes called the grave-yard of the Atlantic) during the fine weather that the fishermen could see the big cod lying on the sandy bottom.

5 - The Gaspé Tagging

This tagging was carried out under the direction of Dr. J. -L. Tremblay, Director, Department of Biology, Laval University, and as part of a program of the St. Lawrence Biological Station which operates under Laval University, Quebec, P. Q.

When it was found that some of the cod tagged on the Nova Scotian offshore banks in the winter of 1936 - '37 were recaptured during the summer around Gaspé, Dr. Tremblay very kindly agreed to carry on summer tagging about Gaspé to see if the reverse was true.

Between July 12 and September 16, 1938, 1032 cod altogether were tagged off cape Gaspé, Grand River and Miscou island, all these places being around and on both sides of the mouth of Chaleur bay.

In 1939 from June to September, 1947, more cod were tagged altogether in Chaleur bay, around Gaspé and off the west end of Anticosti island.

Many recaptures were made for a number of years close to the points of tagging as well as throughout the general Gaspé area. However, our interest lies in those, if any, that showed tendencies to move good distances away from this area.

The 1938 taggings showed 9 of such recaptures while in 1939 both the number tagged and the number returned from distant places was about doubled. These recaptures are shown in tables XII and XIII.

Time of Tagging	<u>Gaspé Cod Tagging</u>		Number Recaptures at considerable distance
	Number tagged	Total Recaptures	
July 12- Sept. 16/38	1032	231	9
Late June-early Sept./39	1947	354	18

Table XII

GASPE 1938 TAGGING, DISTANT RECAPTURES

No. Tagged	Date Tagged	Place Tagged	Distant Recaptures
293	Aug. 30/38	Off C. Gaspe	1 -- June 3/40 - Off Magdalens basin 1 -- July 14/39 - 12 m. NWxW St. Pauls Is. 1 -- July 17/40 - Sable Is. bank 1 -- July /40 - 5 m. off Thunder River, Saguenay Co.
357	July 13-Sept. 16/38	Off Grand River	1 -- Sept. 2/40 - Off Cheticamp, C. B., N. S. 1 -- Apr. 24/39 - Lat. 44°10' N. Long. 60°15' W.
382	July 12-Sept. 1/38	Off Miscou	1 -- July 20-24/40 - Off Cheticamp, C. B., N. S. 1 -- May 3/40 - E. Banquereau 1 -- Dec. 8/38 - E. Banquereau

Table XIII

GASPE 1939 TAGGING DISTANT RECAPTURES

No. Tagged	Date Tagged	Place Tagged	Distant Recaptures
82	Aug. 9/39	W. end Anticosti Is.	1 -- June 23/42 - Off Harrington - on way to Belle Isle Strait.
299	end June/39	Fame Pt. region	1 -- Jan. 10/40 - Chanel Hd. SW Nfld. coast 1 -- July 27/39 - Off North Lake, P.E.I. 1 -- Dec. 30/41 - Off Ingonish
521	Early Sept./39	Fox R. Region	1 -- June 28/40 - Off Long Pt., C.B., N.S. 1 -- Apr. 11/40 - Off Port au Basques 1 -- July 14/39 - Near St. Paul Island 1 -- Jan. 3/40 - Off Ingonish 1 -- Dec. 16/39 - Off Ingonish 1 -- Jan. 11/40 - Lat. 45°15' N. Long. 59°15' W. 1 -- Apr. 2/41 - 18 m. NE Seatari Is.
269	Early Sept./39	New Carlisle region	1 -- June/41 - Magdalens Islands. 1 -- Jan. 1/41 - Off Ingonish
337	July/39	Green Pt. (Petit Rocher)	1 -- Jan. 21/40 - Saw Teeth, Lat. 44°36' N. Long. 59°45' W.
439	Early Sept./39	Off Miscou Is.	1 -- Dec. 26/39 - Off Ingonish 1 -- July 15/40 - Off Sydney 1 -- March 15/40 - Middle Ground 1 -- Jan. 20/40 - Louisburg Patch, Lat. 45°20' N. Long. 59°25' W.

Figure 13 shows that 8 of the 9 1938 distant returns came from along the route to or on, the Canadian Atlantic Eastern offshore banks, and 1 of them arrived by December of the year it was tagged. One more was also recaptured offshore very late in the 1938-39 winter.

In fig. 14 fourteen of the eighteen 1939 tagged distant recaptures were made along this route to offshore and some of them during the latter part of the year in which they were tagged. All in all 12 were recaptured either enroute or out of the gulf of St. Lawrence by the end of March, 1940.

Both the 1938 and 1939 Gaspé taggings show that cod in some numbers moved towards the offshore banks before the end of the season and year in which they were tagged for some were recaptured even in July of the tagging season off Prince Edward island and St. Pauls island and off eastern Cape Breton and one even on Banquereau by December. Others were retaken on various parts of the offshore banks, mostly during the winter seasons, only one being recaptured there during the summer.

Of the distant migrants only 2 moved off in directions not towards the offshore banks. One of these was retaken off Thunder river, Saguenay county, on the north shore of the gulf of St. Lawrence and the other towards Belle Isle strait. This latter recapture is shown in fig. 14 as moving south of Anticosti island, but in view of the recapture off Thunder river shown on fig. 13 it is quite probable that this fish moved towards Belle Isle around the north-west end of Anticosti island and thence along the north shore of the Gulf.

DISCUSSION

Apart from routes of migration it can be shown that an emigration of cod takes place each summer from the Canadian Atlantic eastern offshore grounds.

In 1938 and 1939 it was found that the average total monthly cod landings by Canadian fishermen (McKenzie, 1942) from these grounds during the months of June to September inclusive was 1,076 thousand pounds while during October to May inclusive it was 2,830 thousand pounds per month. At the same time the monthly landings from St. Pierre bank increased from an October to May period low of 510 thousand to a summer high of 1,504 thousand pounds per month. It was during this same summer period that the Grand bank cod landings rose to an average of 6,050 thousand pounds from practically zero landings during November to April inclusive.

This change in the location of operations and source of fares of the offshore cod fishermen during the summer months

Figure 13 - The distant recaptures from cod tagging done around Gaspé in the summer of 1938.

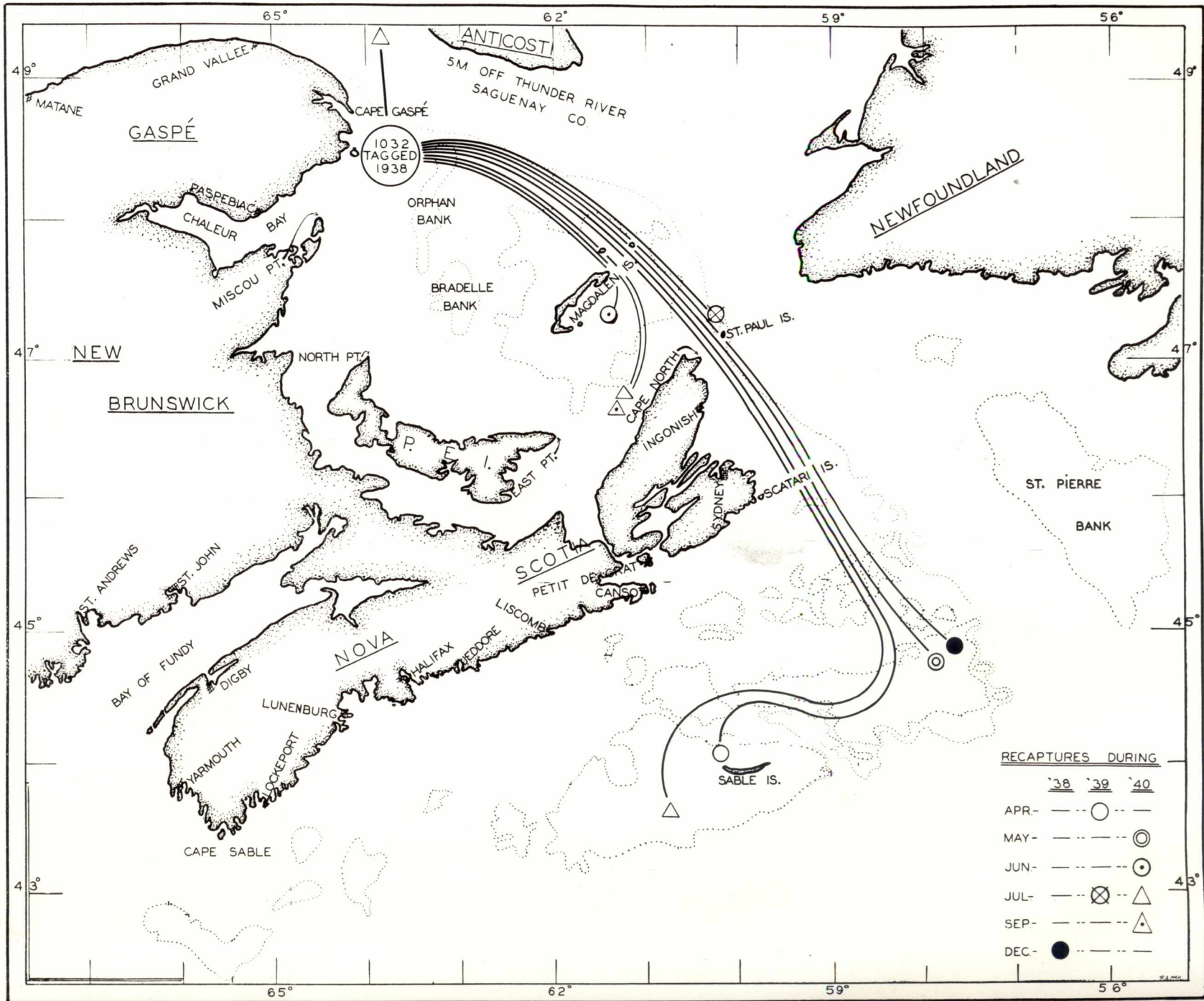
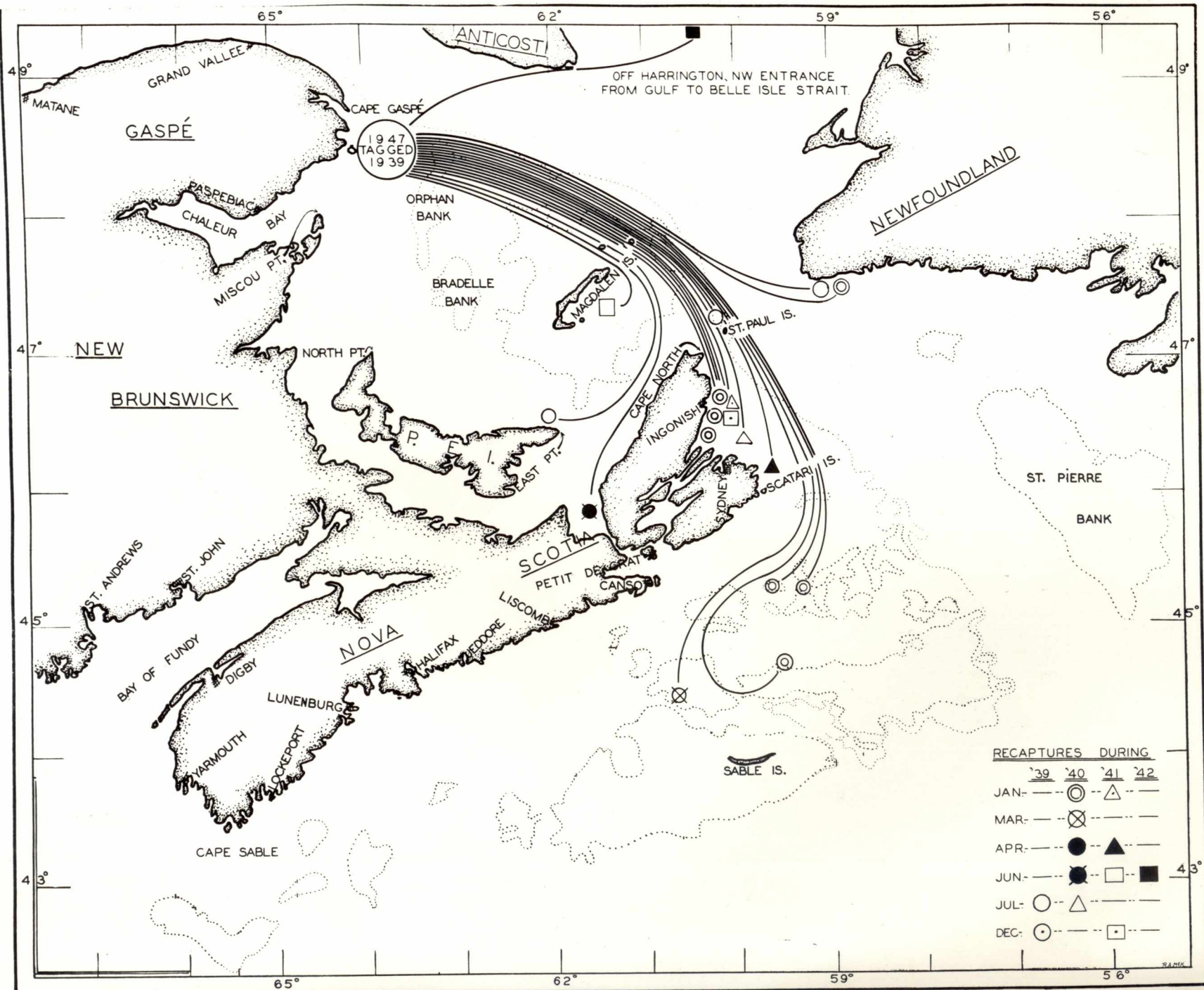


Figure 14 - The distant recaptures from cod tagging done around Gaspé in the summer of 1939.



can mean nothing less than that fishing on these Canadian Atlantic eastern offshore grounds is not as good at this time of year as it is on St. Pierre and the Grand banks east of the Laurentian channel. Occasional good trips are made, but not regularly enough to make it worthwhile to fish on these grounds off eastern Nova Scotia steadily at this season or even to counteract the increased cost of fishing grounds from one to four hundred miles farther away; such as, St. Pierre and the Grand banks.

In fig. 15 all the recaptures (285) from the 4 years' offshore tagging are shown. No lines have been drawn connecting the tagging locations (not shown on this figure at all, see fig. 1) with the recaptures.

Only 1 recapture was recorded from the western offshore area and 1 from the United States side of the gulf of Maine. Little, if any, cod migration thus seems to take place between the Canadian eastern and western offshore areas.

However, there does appear to be some movement to inshore Nova Scotian waters from the region around and immediately north of Sable island. This includes Sable Island bank north of the Island, western Banquereau and Middle ground. About 16 recaptures were made inshore west of cape Canso along western Nova Scotia. As a result it is believed that those cod moving westward went along inshore rather than offshore, some doing it possibly as they moved away from the offshore grounds in the spring, others going south westward along shore as they left the Gulf in the autumn instead of going to the offshore grounds.

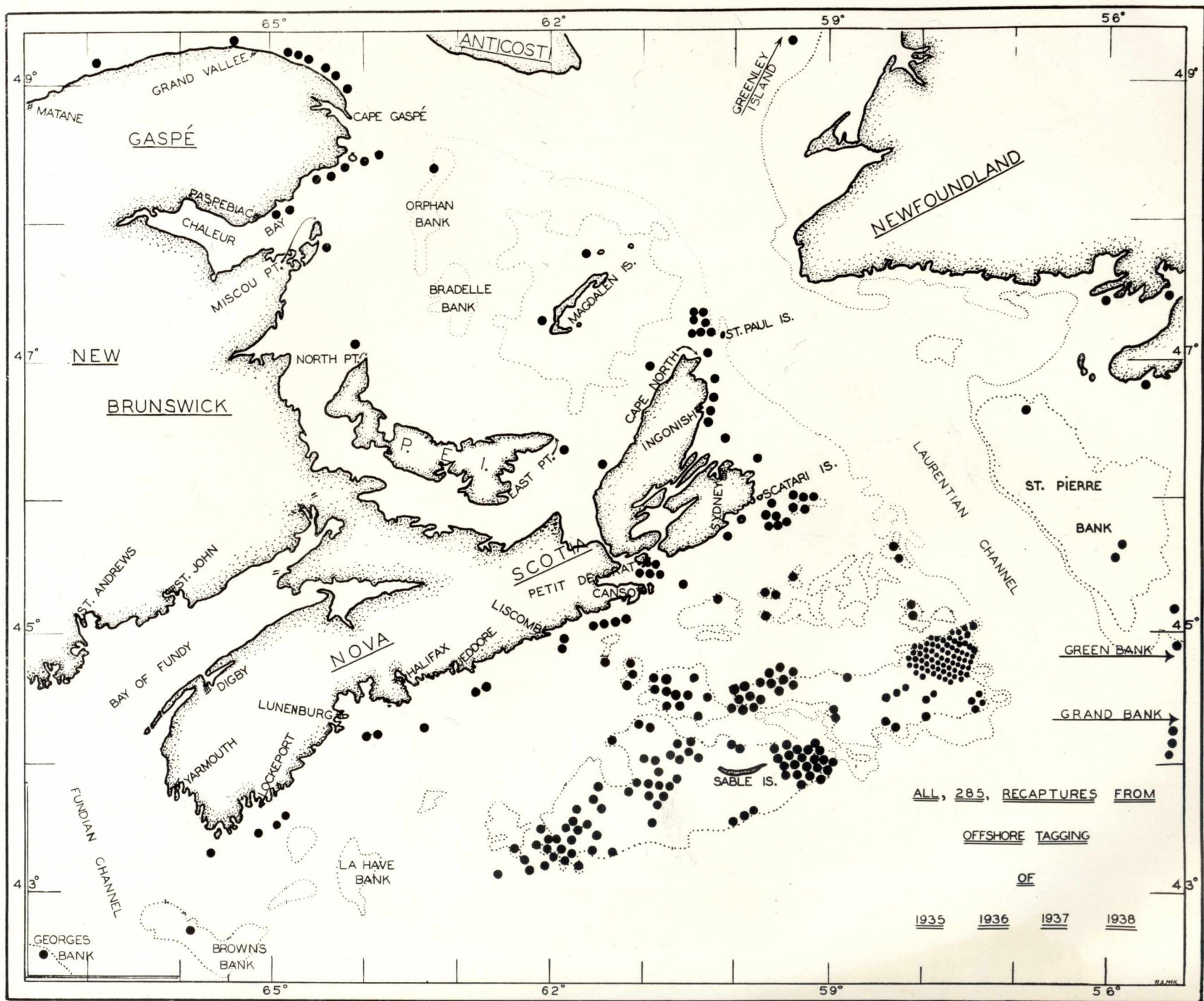
The eastern Nova Scotian inshore tagging of 1934, 1935, and 1936 showed there was at least some movement in the reverse direction though it was not as pronounced as the opposite movement in the case of the tagging done at station 32 in 1937.

Around Cape Breton between cape Canso and cape North 25 recaptures were made as compared to 16 recaptures in the Canso to cape Sable area. This indicates that cod move in and out of the Gulf as well as south-westward along the shore.

Some of these "Gulf-ward" migrants may have moved on and offshore via Canso and Middle banks and some via Misaine and Artimon banks. In both cases these banks form closer "stepping-stones" or feeding grounds over the deep water to the banks farther off than are found directly off from Cape Breton or the Halifax Liscomb shore region.

In the Canadian gulf of St. Lawrence 30 recaptures were made inside cape North, about 17 of them in the Gaspé vicinity. The route of migration was no doubt along the shoal water just west of the deep water channel down the centre of the

Figure 15 - Shows the location of all the recaptures from the cod tagging on the Canadian Atlantic eastern offshore grounds during the years 1935 to 1938 inclusive.



Gulf and out past eastern Cape Breton to the offshore area, since 3 recaptures were made in the south western part of the Gulf.

Since the migration of the cod towards and into the gulf of St. Lawrence from the Canadian eastern offshore banks occurred between late April and the last of May, mid-May has been considered the "dead-line", i. e. cod tagged before this date included the migratory school and those after this date excluded it. On this basis the 1935 tagging and that done in 1937 at stations 30, 31 and 32 did not include the migratory school. In the following calculations then, these have been excluded.

If we consider that the recaptures made around Cape Breton were caught enroute either to or from the Canadian gulf of St. Lawrence and add these to those recaptured within the gulf of St. Lawrence we have 49 recaptures, or 25% of a total of 198 recaptures made from 3889 cod tagged on the eastern offshore banks prior to mid-May in the tagging years.

Since most of the offshore tagged Gulf recaptures were made around Gaspé - few elsewhere except off eastern and southern Cape Breton- it seems that quite a number of these offshore cod must make this trip to the Canadian side of the gulf of St. Lawrence.

Dr. Tremblay's tagging records show that there was a definite movement of fish from the Gaspé area out of the Gulf to the offshore banks in the autumn and early winter of the years in which they were tagged.

Together, these records indicate return movement of considerable magnitude, between the Canadian Atlantic eastern offshore banks and Gaspé in the northwest part of the gulf of St. Lawrence.

Thompson, 1943, records a movement from the Rose-Blanche region off south western Newfoundland into the Gulf along the western coast of Newfoundland to Belle Isle and even Notre Dame bay on the north eastern coast. This is a distance of about 500 miles but Thompson gives no evidence that the cod make this complete return journey every year. Rather he indicates that the movement at least from Belle Isle strait went to the Port au Basque-Rose Blanche region, a distance of 275 to 360 miles, but only 1 fish was recaptured the same year it was tagged. This, therefore, does not seem to be quite as extensive a migration as that performed on the western side of the Gulf from the Canadian offshore banks to Gaspé.

Only one of the Canadian recaptures and none of the Newfoundland recaptures from offshore tagging showed a crossing of the Gulf to the side of the other country when the fish

went into the Gulf, however, Tremblay's Gaspé tagging showed some returns from Newfoundland waters outside the Gulf.

Eleven of these Canadian offshore tagged cod were recaptures in waters both inshore and offshore off southern Newfoundland. This was 11 of 287 recaptures (2 without record of time or place), or 4% of all recaptures and 13% of the recaptures made outside the Canadian Atlantic eastern offshore grounds. On the other hand Thompson 1943 reported only 1 or 2 recaptures on Canadian Atlantic offshore banks from his tagging of 1752 cod on Newfoundland offshore banks. There thus appears to be a greater movement from Canadian to Newfoundland waters than in the reverse direction. Since these 11 Canadian recaptures were made, as also the 16 west of Cape Canso, over a period of years, mostly from June to January and at very widely separated places, this movement can scarcely be termed an orderly extended migration. Moving seems to be more descriptive of this movement.

SUMMARY AND CONCLUSIONS

In the Canadian Atlantic offshore cod tagging has been carried on only eastward of Halifax. This was done during 1935 to 1938 inclusive using the monel metal caudal peduncle "strap" tag when a total of 5291 cod were tagged from which 5.4% recaptures were obtained. All of this was done from March to June inclusive, about 20% in March, 45% in April and 30% in May.

A comparison of the caudal peduncle versus operculum position for the tags showed practically no difference one place with the other.

The addition of a small scarlet celluloid disc to the tag the better to attract attention proved of minor benefit.

In their migrations Canadian Atlantic eastern offshore cod move at least as fast as any others recorded for the North Atlantic -- up to 13 miles per day for distances up to 300 miles.

During the four years of offshore cod work tagging was done always at points where the Captains of the vessels hoped there were large quantities of cod. Altogether 44 tagging locations are listed in tables I and II and the fact that fishing was carried on during two consecutive days at the same point only twice indicates how often cod were found in satisfying quantities.

In March the cod found on Misaine bank were scarce but when tagged they showed a migration into the gulf of St. Lawrence as far as Gaspé in summer.

The cod mixed with the haddock to the south and west of Emerald bank during the greater part of March remained

to the extent of 75% on the offshore banks throughout the summer moving only to more easterly districts. The remaining 25% of the recaptures came from Newfoundland waters and along the route to Gaspé.

In April the "steakers" on western Sable Island bank were found to move a little nearer Sable island and disappear from July to January inclusive. In February they again appeared in this general region, moving almost to Emerald bank and back to the tagging location again by April.

The cod tagged during this same period south and south-east of Sable island were found to move across Banquereau into the gulf of St. Lawrence even to Gaspé in some numbers during the summer, being again retaken on Banquereau in the autumn and on Sable Island bank as far west as Emerald bank during the winter and early spring.

The cod of western Banquereau at this time went through much the same sort of annual migration, though there did not seem to be quite as much movement to western Sable Island bank during the winter as with the cod found on the south-east peak in April.

On the eastern shoal water of Banquereau in April a large percentage of the cod were just about to move into the gulf of St. Lawrence as far as Gaspé for the summer. A much greater movement to Gaspé seems to have begun from eastern Banquereau than any other part of this offshore region. Tremblay's records show that there is a movement from Gaspé out of the Gulf in the autumn and thus it may be said that some Canadian Atlantic eastern offshore cod move into the gulf of St. Lawrence as far as Gaspé for the summer.

In May, however, this movement as far as Gaspé slackened off and the cod found on the eastern shoals of Banquereau late in May remained, on the whole, on the Canadian eastern offshore banks throughout the year, mostly even on Banquereau. A few did move along the route towards Gaspé but none any farther than Cape Breton. Those cod found along the southern edge of Banquereau at this time behaved in the same way, remaining mostly on Banquereau but going to some extent to the inshore waters around Cape Breton.

Just north of Sable island the cod of late May moved inshore over Middle bank to spread out to some extent in the shore waters of the Nova Scotia eastern mainland.

Tagging done inshore off eastern Nova Scotia, and reported on previously, showed a slight return movement offshore in the autumn and early winter.

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Appendix

Shows details of the cod tagging carried out by the Fisheries Research Board of Canada during the years 1935 to 1938 inclusive on the off-shore banks east of Halifax and consequent recaptures in later years.

Eastern Offshore Tagging1935Station No.

1	May 13	Lat. 44°25' N.	Long. 61°15' W.	6 cod tagged
2	June 15	Lat. 44°41' N.	Long. 60°39' W.	7 " "
3	June 19	Lat. 44°38' N.	Long. 60°40' W.	105 " "
4	June 20	Lat. 44°38' N.	Long. 60°40' W.	26 " "
5	June 28	Lat. 44°34' N.	Long. 59°43' W.	93 " "
6	June 28	Lat. 44°02' N.	Long. 59°56' W.	7 " "
7	June 29	Lat. 44°06' N.	Long. 60°45' W.	2 " "
8	June 29	Lat. 44°24' N.	Long. 60°35' W.	48 " "

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Returns from 1935 Eastern Offshore Tagging

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
34658	June 19	# 3	62	July 5/35	Browns Bank
34755	June 28	# 5	68	Oct. 10/35	Western Banks (Geo. Macklin)
34671	June 19	# 3	59	Nov. 4/35	Off Canso
34744	June 28	# 5	82	Oct. 22/35	R. J. Knickle Sq. # 24
34393	June 19	# 3	73	Dec. 20/35	61°10' W. 44°33' N.
34730	June 28	# 5	68	Dec. 15/35	61°15' W. 44°30' N.
34397	June 19	# 3	63	July 18/36	Western Bank
34823	June 29	# 7	76	Dec. 24/36	S: T. S. #201 (Viernoe) "Prong"
34657	June 19	# 3	64	Jan. 29/37	N. W. part Middle Ground
34732	June 28	# 5	--	Apr. 10/37	10 m. SE from Cross Is.
34780	June 28	# 5	--	May 19/37	Quereau Lat. 44°37' Long. 59°40' Saw Teeth
33850	June 15	# 2	--	Feb. /37	Approx. 10 m. off Lockeport
34806	June 29	# 8	--	Apr. /38	Sable Is. Bank

Offshore Cod Tagging, Western Banquereau

April 23 - 26, 1936

Location		No. Tagged	Offshore
Lat.	Long.		Tagging Station (OTS)
			Number
44°29' N.	60°03' W.	422	1
44°19' N.	58°56' W.	77	2

Recaptures from the 1936

Offshore Cod Tagging

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
35184	Apr. 23	OTS # 1	--	May 15/36	Middle Bank
35432	Apr. 23	OTS # 1	--	May 19/36	Off Pt. Aconi
35088	Apr. 23	OTS # 1	--	June 10/36	5m. E. of Souris, $\frac{1}{2}$ m. off shore, P. E. I.
35022	Apr. 23	OTS # 1	--	Dec. 9/36	Lat. 44°30' Long. 60°05'
35006	Apr. 23	OTS # 1	--	Apr. 15-17/36	44°10' 60°25', NW Bar 35 F.
35315	Apr. 23	OTS # 1	--	Mar. 20/37	43°20' 62°18' (SE edge Emerald)
35284	Apr. 23	OTS # 1	--	Apr. 10/37	3m. off Ingonish
35431	Apr. 23	OTS # 1	--	July 10/37	6m. SE of Jeddore Rk.
35466	Apr. 23	OTS # 1	--	Dec. 15-20/37	Lat. 45°35' Long. 58°15' Geo. Himmelman's Patch
35386	Apr. 26	OTS # 2	--	July 1/37	Off Scatari
35159	Apr. 23	OTS # 1	--	Feb. 3/38	Eastern part of Banquereau
35482	Apr. 23	OTS # 1	--	May /38	Off Sambro Ledges
35281	Apr. 23	OTS # 1	--	Apr. 25/39	North Edge Quereau
35348	Apr. 23	OTS # 1	--	Nov. 5/39	Misaine Bank
35109	Apr. 23	OTS # 1	--	Dec. 14/39	Misaine Bank
35275	Apr. 23	OTS # 1	--	May 9/40	Along SW Edge of Cowpen Western Bank
35147	Apr. 23	OTS # 1	--	Sept. 5/40	1m. SE of Cape Egmont, C.B.
35047	Apr. 23	OTS # 1	--	Nov. 18/36	Western Middle and Quereau Banks (Lemberg)
35282	Apr. 23	OTS # 1	--	Nov. 25/38	Off Petit de Grat

OFFSHORE COD TAGGING 1937

Location			Date	Tagging Station	No. Cod Tagged
Lat.		Long.			
45°14'	N.	59°21' W.	March 1	OTS #1	53
45°23'	N.	59°09' W.	March 1	OTS #2	62
44°40'	N.	59°28' W.	March 2	OTS #3	41
43°18'	N.	61°56' W.	March 5	OTS #4	16
43°20'	N.	62°30' W.	March 12	OTS #5	35
43°22'	N.	62°30' W.	March 13	OTS #6	28
43°10'	N.	62°12' W.	March 14	OTS #7	39
43°08'	N.	62°35' W.	March 14	OTS #8	26
43°08'	N.	62°35' W.	March 15	OTS #9	35
43°21'	N.	63°31' W.	March 12	OTS #10	19
43°11'	N.	62°40' W.	March 13	OTS #11	18
43°12'	N.	62°15' W.	March 20	OTS #12	20
43°12'	N.	62°48' W.	March 21	OTS #13	9
43°08'	N.	62°45' W.	March 21	OTS #14	21
43°20'	N.	62°40' W.	March 25	OTS #15	36
43°30'	N.	62°55' W.	March 26	OTS #16	70
43°18'	N.	62°22' W.	March 26	OTS #17	14
43°56'	N.	59°10' W.	March 28	OTS #18	208
43°56'	N.	59°10' W.	March 29	OTS #19	387
43°50'	N.	59°10' W.	April 2	OTS #20	169
43°44'	N.	59°30' W.	April 5	OTS #21	110
43°30'	N.	59°58' W.	April 6	OTS #22	101
44°42'	N.	58°55' W.	April 18	OTS #23	286
44°52'	N.	57°54' W.	April 19	OTS #24	434
44°53'	N.	57°48' W.	April 20	OTS #25	394
44°22'	N.	59°04' W.	April 30	OTS #26	9
44°25'	N.	58°58' W.	May 3	OTS #27	73
44°12'	N.	57°36' W.	May 4	OTS #28	150
44°18'	N.	58°22' W.	May 5	OTS #29	275
44°55'	N.	57°30' W.	May 28	OTS #30	686
44°50'	N.	57°23' W.	May 29	OTS #31	169
44°06'	N.	60°05' W.	May 30	OTS #32	253

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Notes: -

- OTS - Offshore tagging station
- Original tagging records on file at the Atlantic Biological Station.

TAG RETURNS FROM 1937 TAGGING, OFFSHORE

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
36074	Apr. 2	#20	Apr. 12/37	West end Sable Is. Bank
36185	Apr. 5	21	Apr. 8/37	43°50' 59°15' (The Peak)
36206	Apr. 5	21	Apr. 8/37	43°51' 59°06' (The Peak)
36212	Apr. 5	21	Apr. 15/37	43°50' 59°09' (The Peak)
37571	Mar. 26	16	Apr. 12/37	43°28' 62°02' (E side of Gulley)
37678	Mar. 25	15	Apr. 10/37	44°12' 61°23' (Tip of the Prong)
38751	Mar. 29	19	" 28-29/37	44°07' 59°15' (N. Edge of Peak)
39029	Mar. 28	18	Apr. 8/37	43°50' 59°15' (The Peak)
39091	Mar. 28	18	Apr. 12/37	S.E. portion Area XXI F, NE Sable Island.
39198	Mar. 28	18	Apr. 21/37	Quero Bank. 44°22' 58°51'
39453	Mar. 29	19	Apr. 12/37	43°55' 59°05' (The Peak)
39462	Mar. 29	19	May 4-9/37	44°40' 57°50' (E Shoal Water Quero)
39490	Mar. 29	19	Apr. 8/37	43°51' 59°06' (The Peak)
39494	Mar. 29	19	Apr. 2/37	43°55' 59°10' (The Peak)
36079	Apr. 2	20	May 5/37	44°46' 57°56' (E. Quero)
36145	Apr. 2	20	Apr. 4-6/37	Western Bank (Peak)
37291	Mar. 1	2	June 5/37	2½ m. offshore from Etang du Nord, Magdalens,
37314	Mar. 1	2	June 21/37	3 m. SWxS from Louisburg, Fairway Buoy
37507	Mar. 14	8	Mar. 25/37	Emerald Bank
37603	Apr. 18	23	May 27/37	Off Ingonish, C. B.
37860	Apr. 18	23	May 27/37	Cutting Fish in Boston Mkt.
38125	Apr. 19	24	June 7/37	44°45' 57°40' (E. Quer)
38171	Apr. 19	24	May 17/37	44°35' 57°40' (E. Quer)
38572	Mar. 29	19	Apr. 10/37	Western Bank (Peak)
38952	May 29	31	June 4/37	44°45' 57°40' (E. Quer)
39195	Mar. 28	18	Apr. 4-6/37	Western Bank (Peak)
39296	Mar. 28	18	Apr. /37	44°00' 59°05' (Peak)
39566	Apr. 19	24	May 21/37	7-8 mi. WSW of Cape St. Lawrence
39670	Apr. 19	24	June 7/37	44°22' 56°50' (SW of Quer)
39849	Apr. 20	25	May 20/37	44°48' 47°58' (E. Quer)
39864	Apr. 20	25	May 17/37	44°53' 57°36' (E. Quer)
39965	Apr. 20	25	May 6/37	44°30' 58°30' (Central Quer)
40025	Apr. 20	25	May 4/37	44°49' 58°12' (E. Quer)
40211	May 29	31	June 1-10/37	44°45' 57°40' (E. Quer)
36339	May 28	30	July 2/37	E. Part Quereau
36489	May 4	28	June 24/37	Quereau (Boston)
36706	May 5	29	June 9-12/37	44°45' 57°40' East Shoals
37160	May 4	28	July 28/37	44°23' 61°00' Prong
37511	Mar. 14	8	June 22/37	43°20' 60°55'
37604	Apr. 18	23	May 10-15/37	Western Bank

(cont'd)

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
37854	Apr. 18	23	July 3/37	12 m. NW St. Pauls Is. Gulf of St. Lawrence
38109	Apr. 19	24	July 3/37	12 m. NW St. Pauls Is. Gulf of St. Lawrence
38195	Apr. 19	24	July 13/37	1 m. off High Beach Lamaline Nfld. (near Burin)
38540	Mar. 29	19	Early June/37	45°00' 52°00' (E. Whale Deep)
39319	May 30	32	July 21/37	Off Liscomb
39690	Apr. 19	24	July 17/37	3 m. NEXE from Cape North, N. S.
39807	Apr. 20	25	June 30/37	Cloridorme East Gaspé
39719	Apr. 20	25	June 21/37	Banquereau Bk. (Boston)
39897	Apr. 20	25	May 12/37	44°45' 58°15'
41101	May 28	30	July 1/37	Quereau Bk.
41389	May 28	30	July 4/37	44°35' 57°40'
36121	Apr. 2/37	OTS #20	July 4/37	E. Shl. Wtr. Quereau
36880	May 28	30	Oct. 16/37	" " " "
36984	May 28	30	Oct. 18/37	SW Peak of Western Bk.
37171	May 4	28	July 12/37	Grand Bks 165 m. S _W of Cape Broyle Nfld.
38056	Apr. 19	24	Sept. 18/37	1 m. E of L. Anse a Fugere
38623	Mar. 29	19	July 17/37	S. of Sable Is. Western Bank
39014	Mar. 28	18	Sept. 6/37	Near Shore at L'Anse a Valteau
39289	Mar. 28	18	June 19/37	Between Perce, Gaspé Co. and Bonaventure Is.
39309	May 30	32	Aug. 28/37	5 m. SE of Country Is.
39330	May 30	32	Sept. 24/37	On Middle Ground
39576	Apr. 19	24	June 19/37	12 m. WNW of St. Pauls Is. Gulf of St. Lawrence
39883	Apr. 20	25	May 22/37	On Artimon Bank
39901	Apr. 20	25	Aug. 1/37	10 m. off St. Morie Shippigan Island
40104	May 28	30	Oct. 16/37	E. Shl Wtr. Quereau
40116	May 28	30	Oct. 16/37	" " " "
40118	May 28	30	Oct. 16/37	" " " "
40128	May 28	30	Oct. 16/37	" " " "
40204	May 29	31	Oct. 10/37	Banquereau
41500	May 28	30	Oct. 12/37	"
36076	Apr. 2	20	Aug. 29/37	2 m. off Scatari Light
36117	Apr. 2	20	Nov. 2/37	43°55' 61°10' W. (S part of Cow Pen)
36264	Apr. 6	22	Nov. 12/37	44°38' 59°43' W. (Saw Teeth)
36572	May 5	29	May 5-24/37	Landed by Bay State fishing trawler
36998	May 28	30	Nov. 5/37	Banquereau
37317	Mar. 1	2	Oct. /37	Fox River Gaspé
37968	Apr. 19	24	Oct. 20/37	12 m. ESE of Scatari Is.

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
38876	May 30	32	Nov. 1-6/37	Western Bk. south of Sable Is.
38966	May 30	32	Nov. 8/37	Off Scatari Is.
39163	Mar. 21	13	Oct. 14/37	Banquereau
39324	May 30	32	Oct. 16/37	28 m. SxW $\frac{1}{2}$ W from White Head Buoy
39325	May 30	32	Oct. 20/37	44°48' 61°24' W (10 m. NW of Middle Grd. Patch)
39467	Mar. 29	19	Sept. 10/37	$\frac{1}{2}$ m. off Petite Mechins
39735	Apr. 20	25	Aug. /37	3 m. NNW of Bryon Is.
39857	Apr. 20	25	June 19/37	Off St. Pauls Is., Gulf of St. Lawrence
40031	Apr. 20	25	Apr. 20/37	44°53' 57°45' W. (N. part E. Shl. Water)
40149	May 28	30	July 17/37	45°30' and 52°00'W (20 m. ExN of Whale Deep)
40220	May 29	31	Oct. 18/37	Banquereau
41381	May 28	30	Oct. 20/37	Banquereau
41408	May 28	30	Oct. 27/37	Quereau Bank
41457	May 28	30	Oct. 28/37	Quereau Bank
41484	May 28	30	Oct. 14/37	Banquereau
36253	Apr. 6	22	Apr. /37	Western Bank (Peak)
36389	May 4	28	Dec. 3/37	West. Quereau 44°33' 59°31' (Saw Teeth)
36891	May 28	30	Oct. /37	East. Shoal Water Quereau
37047	May 28	30	Oct. /37	" " " "
37396	Mar. 12	5	Aug. ?	6 m. SSW from Seal Cove Connaigre Bay Nfld.
37931	Apr. 18	23	Oct. 4/37	East Shoal Water, Quereau
37936	Apr. 18	23	Nov. 19/37	8-11 m. off Scatari Is.
38945	May 29	31	Oct. /37	East Shoal Water Quereau
38986	May 30	32	Oct. /37	Western Bank
40127	May 28	30	Nov. /37	Southern Part of Quereau
41251	May 28	30	Nov. 18/37	Curdo Bank
37513	Mar. 15	9	Sept. 9/37	8 m. SSW white Hd. Buoy (Canso)
39259	Mar. 28	18	Oct. 20/37	Harbour Mille, Fortune Bay, Nfld.
38725	Mar. 29	19	Dec. 10/37	44°38' 59°15' (Just E of Saw Teeth)
38607	Mar. 29	19	June 10/37	Western Bank
36183	Apr. 2	20	Dec. 15/37	West Quereau
37822	Apr. 18	23	Oct. 30/37	Fox River, Gaspé
38009	Apr. 19	24	Oct. 30/37	" " "
39743	Apr. 20	25	Nov. 20/37	Quereau Bk.
40051	Apr. 20	25	Nov. 1-6/37	Quereau Bk.
36872	Mar. 28	30	Dec. 20/37	Curdo Bk.
36986	May 28	30	Oct. 25-30/37	Quereau Bk.
41257	May 28	30	Oct. 25-30/37	Quereau Bk.
41424	May 28	30	Oct. 25-30/37	Quereau Bk.
41458	May 28	30	Jan. 7/38	St. Pierre Bk.

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
41499	May 28	30	Nov. 27/37	Off Curdo Bk.
39382	May 30	32	Dec. 16/37	Western Bk.
37376	Mar. 5	4	Jan. 29/38	Saw Teeth
38532	Mar. 29	19	Jan. 29/38	Louisburg Patch
39466	Mar. 29	19	Feb. 2/38	45°15' 59°40' (Louisburg Patch)
40160	May 28	30	Nov. 20/37	Eastern Shoal Water Quereau
40184	May 28	30	Nov. 20/37	Eastern Shoal Water Quereau
37690	Mar. 26	16	Mar. 29/38	43°12' 61°50' (SW Peak West Bk)
39214	Mar. 28	18	Apr. 8/38	10 mi. South of Cross Is. Lt.
36248	Apr. 5	21	Feb. 1-5/38	Quereau
37758	Apr. 18	23	Apr. 5/38	Eastern end Quereau
37892	Apr. 18	23	Mar. 25/38	Western Bk.
39553	Apr. 19	24	Apr. 20/38	Western Bk.
39672	Apr. 19	24	May 3/38	West of E. Shoals Quereau
39773	Apr. 20	25	May 1/38	44°41' 58°20' N Edge Quereau (½ way Saw Teeth and E. Shoals)
39836	Apr. 20	25	Apr. 16/38	Eastern part of Quereau
39838	Apr. 20	25	Feb. 3/38	Eastern Edge of Quereau
36503	May 3	27	Feb. 7-10/38	Quereau
36819	May 30	32	Feb. 16/38	44°10' 59°50' -15 m. off Bend in Sable Is.
37889	Apr. 18	23	Mar. 19/38	SE Banquereau
38812	May 29	31	May 25/38	E. Shoals, Quereau, 44°50' 57°58'
41333	May 29	31	May 24/38	E. Shoals, Quereau, 44°45' 57°55'
40291	May 29	31	May 25/38	E. Shoals, Quereau, 44°47' 57°55'
38862	May 30	32	Mar. 9/38	10 m. SSW of Gull Rock Light
39304	May 30	32	June 16/38	Middle Ground "Venosta"
39213	Mar. 28	18	Mar. 15/38	43°21' 61°30' (12 mi. SSE of "Hole")
39432	Mar. 29	19	Mar. 15/38	SW of Emerald Bank
39893	Apr. 20	25	June 9/38	Near Carabrus Rock off Arichat
39917	Apr. 20	25	Mar. 20/38	S. Side Cape Auget, Richmond Co.
36353	May 4	28	Apr. 14/38	44°08' 59°12' SE Peak
36846	May 28	30	May 14/38	44°47' 57°55' NW part of Eastern Shoals

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
36395	May 4	28	May 16/38	East Quereau
37181	May 5	29	July 8/38	3 m. off Friars Hd., Boat Har. Inverness County
38010	Apr. 24	24	July 23/38	St. Antoine de Gros Morne, Gaspé Co.
39338	May 30	32	June 20/38	Trawl at Gabarous
39701	Apr. 24	24	July 26/38	Off Bonaventure Is.
39858	Apr. 20	25	July 11/38	12 mi. WNW from St. Pauls Is.
40008	Apr. 20	25	June 28/38	10 mi. N. of St. Pauls Is.
36821	May 30	32	Nov. 15/38	Edge Middle Ground
36950	May 28	30	Oct. 29/38	N. Edge East. Shoals, Quereau
36969	May 28	30	Nov. 1-5/38	Off Scatari
37166	May 4	28	Nov. 9/38	Banquereau Bank
37869	Apr. 18	23	Oct. /38	Near Shore at St. Therese Que.
37891	Apr. 18	23	Oct. /38	13 m. NW West Light, Sable Is.
38888	May 30	32	Sept. 19/38	NW part of Middle Ground
38972	May 30	32	Sept. 27/38	Flying Pt. Shoal, off Drum Head
38993	May 30	32	Nov. 11/38	Central Part Middle Ground
37003	Mar. 28	18	Aug. 22/38	45°10' N. 55°20' W. (Deep water 75-85 f. S of St. P and SW of Gran)
39729	Apr. 20	25	Aug. 7/38	East Shoals Quereau
39820	Apr. 20	25	Oct. 10-15/38	St. Pierre Bk.
40109	May 28	30	Oct. 23/38	NE part East. Shoals Quereau
40300	May 29	31	Oct. 23/38	East Shoals, Quereau
41460	May 28	30	Oct. 17-21/38	Quereau Bk.
36344	May 28	30	Feb. 9/38	Letter Quereau "seen in Lockeport Mkt."
36959	May 28	30	May 13/38	Quereau Bk. 60 f.
40256	May 28	30	Oct. 28/38	SW Part of Middle Ground
40262	May 28	30	Oct. 21/38	East Shoals of Quereau.
37182	May 5	29	Feb. 23/39	Saw Teeth of Western Quereau
38097	Apr. 19	24	Nov. 22/38	Curdo Bank
38575	Mar. 29	19	Mar. 5/39	SW Peak of Western Bk.
39479	Mar. 29	19	Aug. 15/38	12 m. SE little Bk. off Bonaventure Is. and 18 m. from L'Anse-a-Beaufils, 58 f.
39053	Mar. 28	18	Jan. 12/39	2 m. off New Haven, Vict. Co., C. B.

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
37275	Mar. 1	2	Aug. 15/38	NW of North Pt., P.E.I. (20 f.)
37377	Mar. 5	4	Mar. 20/39	43°19' 61°33' South of Hole 20 m.
37685	Mar. 26	16	Apr. 21/39	SW Peak -Hole, Western Bank
37689	Mar. 26	16	Apr. 14/39	10 m. NE of Hole
39084	Mar. 28	18	Apr. 18/39	Western Bk.
37986	Apr. 19	24	May 11/39	44°55' 58°00' Edge N. of East Shoals
37990	Apr. 19	24	Apr. 6/39	East end Quereau
39707	Apr. 20	25	Apr. 28/39	43°30' 61°20' 20 m. ESE of Hole
39723	Apr. 20	25	Apr. 27/39	SW Cove of Quereau
40036	Apr. 20	25	Apr. 6-11/39	43°35' 59°48' Edge S. of Sable Is.
36601	May 5	29	May 6/39	Shore fish off Lockeport
37189	May 5	29	Apr. 25/39	Central southern edge Quereau
41121	May 30	30	Apr. 14/39	43°10' 61°52' Off SW Peak West.B.
41448	May	30	May 10/39	NW Bar out to Prong Region
37363	Mar. 5	4	Apr. /39	Hole region Western Bk.
39816	Apr. 20	25	July 10/39	Green Banks (Eastern one)
40146	May 28	30	June 13/39	Eastern Quereau
41454	May 28	30	July 14/39	44°38' 57°50' A little SW of East Shoals
37177	May 5	29	Sept. 25/39	45°50' 59°40' Curdo Bk.
37925	Apr. 18	23	Sept. 25/39	Canso Bank
40081	Apr.	25	Sept. 24/39	3 m. off Flint Is. in 18-20 f.
38157	Apr. 19	24	Sept. 21/39	NE end Quereau
37264	Mar. 1	2	May 25/39	Cape Sable - Seal Is. Grounds
36536	May 4	28	Oct. 10/39	Quereau
40258	May 28	30	June 17/39	11 m. NWxN of St. Pauls Is.
36477	May 4	28	July 12/39	Off West Arichat
38155	Apr. 19	24	Dec. 15/39	St. Pierre Bank
36971	May 28	OTS#30	Dec. 11/39	Artimon Bk. 45°07' and 58°07'
39586	Apr. 19	24	Jan. 3/40	West. end Quereau.
39083	Mar. 28	18	Apr. 17/40	SE Peak Sable Is. 44°04' and 59°10'
39469	Mar. 29	19	Apr. 1/40	Western Bk. 43°55' 59°09'
39878	Apr. 20	25	Apr. 27/40	SE Peak Sable Is.
41339	May 29	31	May 8/40	SE Banquereau

Tag No.	Date Tagged	Station Tagged	Date Retaken	Place Retaken
39579	Apr. 19	24	May 16/40	NE of Eastern Shoals, Quereau
38662	Mar. 29	19	Feb. 28/40	"Hole" region of Western Bank
36342	May 28	30	July 10/40	West Banquereau
41154	May 28	30	July 20/40	NE end of Banquereau
40224	May 29	31	July 18/40	Eastern Shoals of Banquereau
39651	Apr. 19	24	June 20/40	Eastern Shoals of Banquereau
39811	Apr. 20	25	June 1-10/40	Eastern Shoals of Banquereau 25 f.
37747	Apr. 18	23	June 30/40	Centre of Middle Ground
36970	May 28	30	July 13/40	NE Banquereau
39944	Apr. 20	25	July 7/40	S of Greenly Is. Saguenay Co. West Entrance to Belle Isle Off L'Anse au Griffon, Gaspé, Co.
39672	Apr. 19	24	Aug. 28/40	Off Paspebiac in 80 ft. water Gaspé
37224	Mar. 1	1	Aug. 24/40	NW Edge Orphan Bank
37524	Mar. 15	9	Sept. 22/40	Middle Ground
39311	May 30	32	Aug. 8/40	Misaine Bank
41410	May 28	30	Jan. 4/41	Hole - SW Peak, Western Bank
38600	Mar. 29	19	Mar. 17/41	43°18' N. 61°58' W. The north one of the SW Peaks of Western Bank
37113	May 3	27	Apr. 11/41	Off Sable Is., Bar-Spit, W. of Island
37637	Apr. 18	23	May 7/41	29 f. NE corner Quereau, near the 3 29s.
38167	Apr. 19	24	July 7/41	Bay of Chaleur
38179	Apr. 19	24	Aug. 8/42	NE edge Quereau
39889	Apr. 20	25	July 13/43	Cloridorne East, Gaspé
39807	Apr. 20	25	June 30/37	

Offshore Cod Tagging, 1938

Date	Location		Offshore	Cod Tagged
	Lat.	Long.	Tagging Station (OTS) Number	
Apr. 20	43°48'N.	61°26' W.	(West Sable Island Bank) 42 (1)	248
Apr. 24	44°20'N	58°55' W.	(West Banquereau) 43 (2)	4

Note: -

As with all taggings, original records on file at the Atlantic Biological Station.

For convenience in preparing report the tagging stations have been called 1 and 2 not 42 and 43.

Recaptures from April 20 and 24, 1938Offshore Cod Tagging

Tag No.	Tag. Date	Tagging Location	Date of Recapture	Location of Recapture
42367	Apr. 20/38	OTS #42	May 10/38	30m. WNW from NW light Sable Is.
42468	Apr. 20/38	OTS #42	May 5/38	SW Spit of Sable Is.
42332	Apr. 20/38	OTS #42	June 3/38	1½ m. S. Ball Rock, White Head
42341	Apr. 20/38	OTS #42	May 10/38	15 m. E. of NE Light Sable Is.
42416	Apr. 20/38	OTS #42	Apr. 30/38	43°47' 61°04' (½ way "Hole" to NW Lt. and North a little bit)
42300	Apr. 20/38	OTS #42	Sept. 10/38	14 m. S. from Owls Hd.
42496	Apr. 20/38	OTS #42	Feb. 14/39	Georges Bk. "Gale" NNE Georges.
42272	Apr. 20/38	OTS #42	Mar. 2/39	Emerald Bk.
42378	Apr. 20/38	OTS #42	Apr. 5/39	Western Bk.
42452	Apr. 20/38	OTS #42	May 10/39	NW of NW Light out to Prong
42462	Apr. 20/38	OTS #42	Apr. 15/39	43°12' 61°54' SW Peak
42467	Apr. 20/38	OTS #42	Mar. 25/39	Western Bank
42491	Apr. 20/38	OTS #42	May 13/39	NW Bar out to Prong
42498	Apr. 20/38	OTS #42	May 21/39	Western Bank
42495	Apr. 20/38	OTS #42	Aug. 12/39	6m. off Harringan Cove
42364	Apr. 20/38	OTS #42	Apr. /39	On Quero (?) More likely western part West. Bk.
42465	Apr. 20/38	OTS #42	Mar. 16/39	43°29' 61°45' "The Hole"
42399	Apr. 20/38	OTS #42	Dec. 18/39	44°58' 57°40' (NE Quereau)
42260	Apr. 20/38	OTS #42	Feb. 5/40	SW Part Western Bk.
42281	Apr. 20/38	OTS #42	Mar. 20/41	"Hole" region of West. Bk.
42488	Apr. 21/38	OTS #42	Mar. 10/42	West. part of Western Bank