

DOCUMENTS

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 364

Tagging of Canadian Atlantic cod

Section C

Movements and characteristics of Canadian Atlantic
cod in the Lunenburg to Canso shore area of Nova Scotia

by

R. A. McKenzie

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F I S H E R I E S R E S E A R C H B O A R D
O F C A N A D A

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ABSTRACT

During May and June, 1934, 1,983 cod were tagged at the base of the caudal fin with monel metal strap tags off Halifax county, N. S., and about 29% were retaken, while only 12% of the 478 cod tagged off Canso about the same time were recovered. During early May, 1935, 152 were tagged off Halifax county yielding 24% recaptures and at the same time of year in 1936, 102 were tagged in the same general district yielding 31% recaptures.

The peak in weekly recaptures occurred during the fourth week following tagging, and fishing was so intense that about 20% of the tagged fish were recaptured the first year, though some were retaken as much as five years later.

Off Halifax county the majority of the cod were of the restricted migration type, only about one-quarter of the recaptures coming from out-side the tagging regions.

The cod tagged off Canso were found to be intermediate in character between the more resident type off Halifax county and the more migratory type off eastern Cape Breton.

As measured when tagged, the cod were found to increase in size with increasing depth of water on these shore fishing grounds.

The highest percentage of recaptures was obtained from fish tagged from 2°C. to 3°C. water and the highest proportion of migration away from the tagging regions also occurred from tagging at these same temperatures. On the whole, this movement was roving in character rather than an extended orderly migration.

The average depths of water in which fish were recaptured in summer were much the same as those where they were tagged, but in winter the recapture depths increased as much as 50%.

MOVEMENTS AND CHARACTERISTICS OF CANADIAN ATLANTIC COD IN
THE LUNENBURG TO CANSO SHORE AREA OF NOVA SCOTIA

INTRODUCTION

It is well known to fishermen that cod (Gadus callarias L.) carry out seasonal movements in both inshore and offshore waters and from one part of the coast to another. Such movements are attributed to the spawning urge, and the search for food or more suitable water conditions. Only regular seasonal movements are termed migrations in this account.

The movements of cod as indicated by recaptures from the first Canadian Maritime cod tagging done between 1925 and 1933, inclusive, have been set forth by Huntsman (1932) and McKenzie (1934a). These accounts indicate that there are among Canadian Atlantic cod both restricted and extended migrations. The latter may be divided into orderly and roving. Water temperature was found to be one of the factors correlated with some of the cod movements.

To further elucidate the movements and characteristics of cod in the inshore waters of the Lunenburg to Canso region of Nova Scotia more tagging was conducted in 1934, 1935, and 1936. The data on these taggings are summarized in table I and the tagging locations off Halifax county are shown in figure I.

METHOD

In this, as in most Canadian Atlantic cod tagging, some cod were caught on the hand-line, some on short-duration sets of the line trawl. The regular Canadian monel strap cod tags used were placed either dorsally or ventrally at the base of the caudal fin just anterior to the last few scales. Schroeder (1930) gives photographs of methods, apparatus and tagged cod similar to ours in this instance. By not collecting scales, and taking only a total length measurement the time the fish were out of the water was reduced to a minimum. In this way the fish were in as good condition as possible when returned to the water. All fish that seemed injured in any way were not tagged.

Rewards of fifty cents each were paid for returning tags accompanied by information on the date and place of recapture of the fish.

Our appreciation is herewith expressed to Captain A. E. Calder of the research M. V. "Zoarces" for his care in supervising the actual tagging of these fish. Professors

Figure 1 - Cod tagging locations in Halifax district 1934, 1935, and 1936.

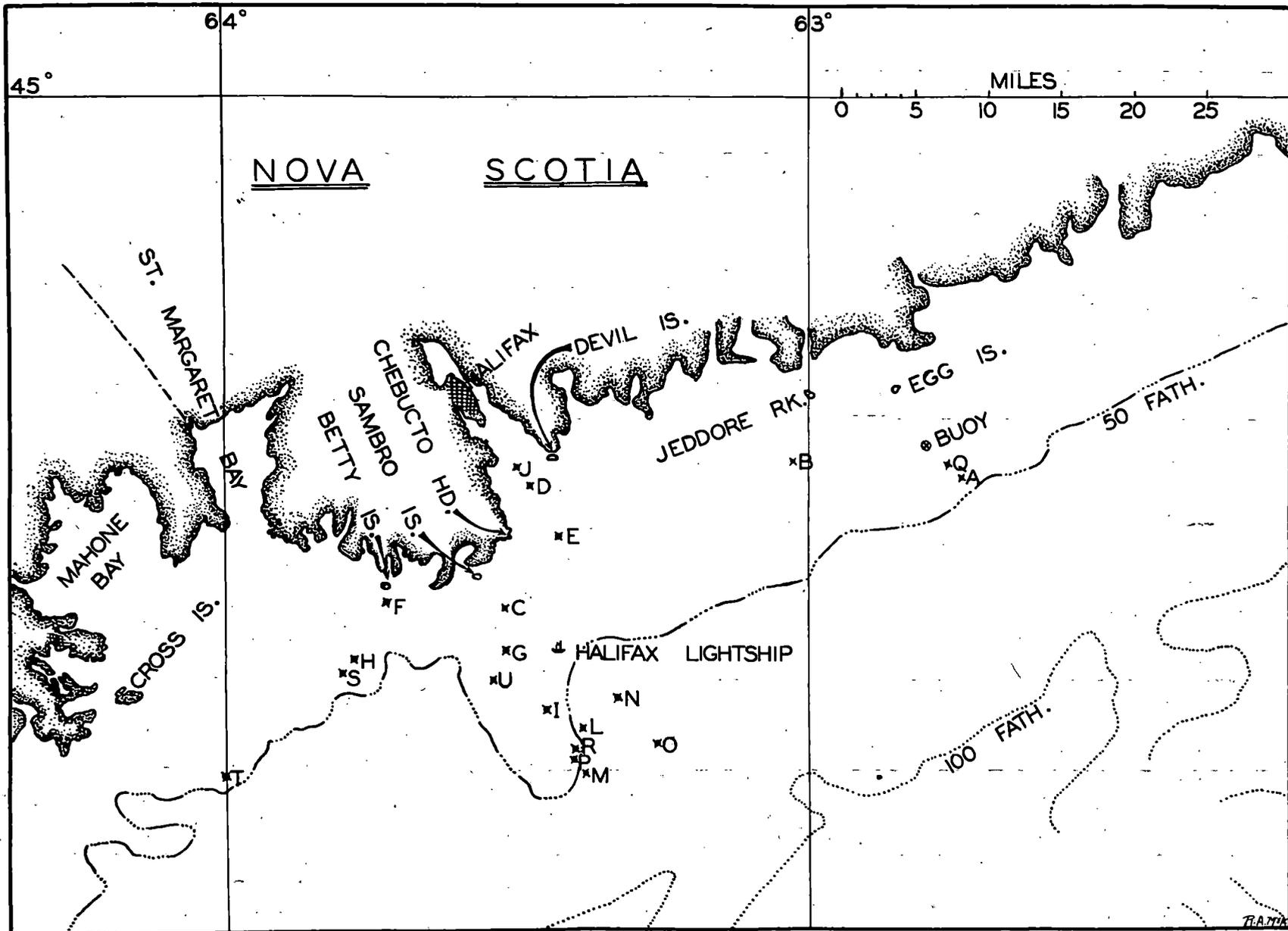


Table I

Inshore Cod Taggings 1934 - 1936, inclusive, and all Returns

Tagging Location(m=miles)	Date 1934	Depth Metres	Temperature °C.	No. Fish Tagged
a-3 m. SE Egg Island buoy	May 22, 24	80	1.0°-1.5°	488
b-5 m. SWxS Jeddore Rock	May 25, 26	45	2.75°	807
c-5 m. SSW Chebucto Head	June 4	25	2.35°	47
d-2.4 m. SW Devils Island	June 5	20	4.9°	12
e-3.5 m. SW Chebucto Head	June 4, 5, 21 22, 23, 28	50	1.90°-2.65°	414
f-1.0 m. off Betty Island	June 19	40	5.95°	21
g-8.0 m. SSW Chebucto Head	June 18, 21	45	2.65°	80
h-6.0 m. SWxS Betty Island	June 21	80	?	1
i-12.0 m. S½W Chebucto Head	June 26, 27, 28	75	2.50°-2.95°	112
j-Lighthouse Bk. Halifax Harbour	June 29	18	?	1
k-Carousse Shoal off Canso	July 31, Aug. 1	28	5.35°-6.75°	478
				2,461
	<u>1935</u>			
l-6 m. S½W halifax Lightship	May 3	87	.65°	97
m-15 m. S½E Sambro Light	May 9	111	.9°	22
n- 5 m. SExS Halifax Lightship	May 9	132	.8°	31
o-27.5 m. SW Jeddore Rock	May 10	158	5.00°	2
				152
	<u>1936</u>			
p-7.5 m. SxW Halifax Lightship	May 6	95	1.70°	23
q-2 m. SE Egg Island buoy	May 6	?	?	3
r-7 m. SxW Halifax Lightship	May 7	?	?	3
s-7 m. SW Betty Island Light	May 7	70	1.45°	3
t-9 m. SExS Cross Island	May 8	95	1.70°	57
u-5 m. W Halifax Lightship	May 9	93	1.40°	13
				102

Tags Returned to June 30

1935	1936	1937	1938	1939	Total	Percentage Recaptured
101	8	6	2	0	117	24
219	22	7	6	1	255	32
14	0	0	0	0	14	30
2	0	0	0	0	2	17
87	28	3	3	0	121	29
4	1	0	0	0	5	24
25	2	2	1	0	30	37
0	0	0	0	0	0	0
28	10	0	0	0	38	34
0	0	0	0	0	0	0
24	16	8	6	1	55	12
					<u>637</u>	<u>26</u>
---	19	3	0	0	22	23
---	4	1	0	1	6	27
---	5	2	1	0	8	26
---	0	0	0	0	0	0
					<u>36</u>	<u>24</u>
---	---	6	0	0	6	26
---	---	0	0	0	0	0
---	---	0	0	0	0	0
---	---	1	1	0	2	67
---	---	19	2	0	21	37
---	---	3	0	0	3	23
					<u>32</u>	<u>31</u>

J. R. Dymond and W. J. K. Harkness, University of Toronto, kindly reviewed the manuscript and made numerous constructive suggestions.

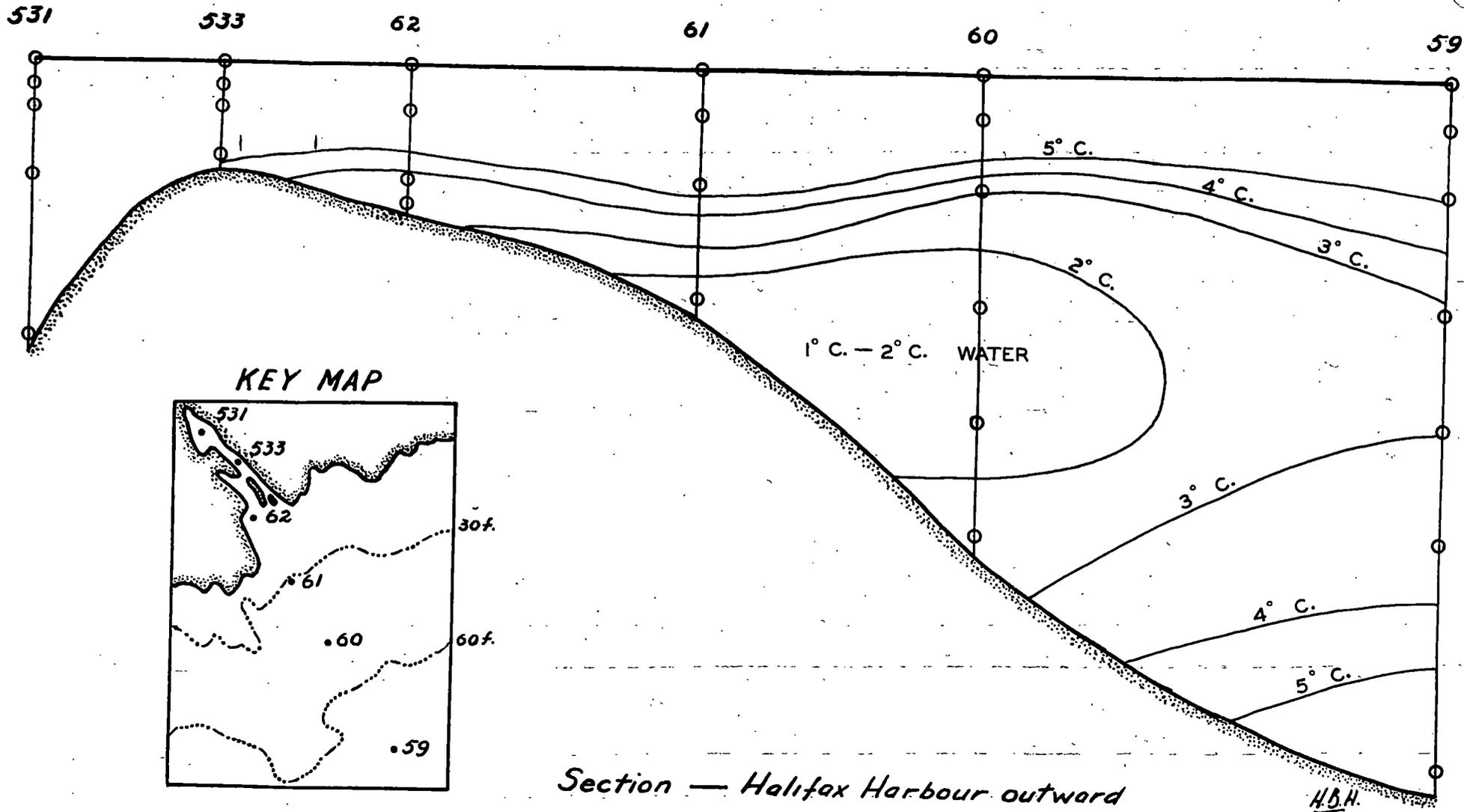
HYDROGRAPHY OF THE AREA

The waters off Halifax county and bordering the northern edge of the Scotian Gulf (Hachey, 1936) are highly stratified in summer and may be divided into an "upper warm layer", an "intermediate cold layer" and a "deep warm layer" (Hachey, 1934 and 1935). However, during the winter the Scotian shelf is flooded by cold water from the north and east, and the upper and intermediate layers lose their identity in respect to temperature for some miles off Halifax (Hachey, 1941). The ice cold water leaving the gulf of St. Lawrence moves out around the eastern coast of Cape Breton and spreads out in a south-westerly direction both in the offshore bank area and along the outer Nova Scotian coast. As winter progresses this water moves farther and farther south-westward along the coast, in the shape of a wedge with the cutting edge in front to the westward and one side along the shore, as well as farther and farther offshore in the eastern bank region. Generally it extends from surface to bottom except in the deeper gullies, and offshore at least to, if not over, the more eastern offshore banks by late winter. The steady advance of this icy water, much of it below 0°C. and part of it even below -1.0°C. is coincident with the great reduction in cod catches from the inshore summer grounds to a great extent in this eastern district. The extremely poor catches last for a period of four to five months. By late winter this cold water usually reaches the Halifax district and often goes beyond.

In figure 2 a cross-section of the waters from Bedford basin (Halifax harbour) outward has been prepared for June 11/34 by Hachey and as in Hachey 1935 and 1941. Station 533 has been considered in drawing out this section, but no temperatures on this date were available for station 531. As a rule, there is cold water on the bottom at this point almost all year round. The section shows that at an intermediate depth there is a layer of water as cold as 1.2° C. in places, extending more or less horizontally off shore with warmer water both above and below it.

In table II three sets of temperature records during the months of May and June when the tagging was done are shown, as well as three in 1935 at approximately the same time of year, one in May, 1936 and two off Canso at about the time of tagging there on Carousse shoal. This table reveals the fact that the waters in this Halifax region were colder in 1935 than in 1934 at the same time of year. The lone 1936 set of records indicates that 1936 was a warmer year than 1935 but no comparison may be made at this time of year

Figure 2 - A cross-section of the waters from Bedford Basin (Halifax harbour) outward for June 11, 1934, by Hachey.



Section — Halifax Harbour outward

between 1934 and 1936 for lack of records. The table also shows that there is a greater temperature layering effect in the waters off Halifax than off Canso.

Since this intermediate cold layer bathes the shore fishing grounds at depths of roughly 25 to 75 metres, depending on the month and year, it will affect the inshore cod fishery. That the temperatures in this layer vary from week to week and year to year is easily seen in table II and the differences from year to year have been shown by McKenzie and Hachey (1939) to have a decided influence on the success of the spring-summer fishery in this area. The year 1934 was shown to be a "warm water" year with high cod landings, while 1935 was a "cold water" year with very low landings. This, in part, explains why so few cod were tagged in 1935 during the time available for this work. Thompson (1932-36 inclusive) has shown that the cod of different sizes from Banquereau to Labrador and at different seasons inhabit different water temperatures. LeDanois 1932 and McKenzie 1934b have shown that the cold water of the intermediate layer is colder than what may be termed the optimum temperature range of cod of the Nova Scotia Newfoundland area. Accordingly our data will be analysed to see what differences in characteristics and habits are exhibited by the cod tagged in the three different water layers found off the outer Nova Scotian coast.

THE NUMBER OF RECAPTURES

Most of the tagging discussed in this report in detail was done in 1934 and 26% of the 2,461 tags put on in that year were returned. The 152 tags put on in 1935 yielded 24% recaptured, and of the 102 tags put on in 1936, 31% were returned. Of the total tags put on during these three years approximately 26% were returned.

The foregoing percentage is much higher than the 8% which was returned from the 8,774 cod tagged during 1925 to 1933 inclusive (McKenzie, 1934) or the 3.4% returns from the 7050 haddock (calculations by author) tagged off the Canadian Maritimes during the summers of 1926-29 (Needler, 1930). It is also higher than the 12% returns from Newfoundland cod tagging (Thompson and Blackwood, 1936) and the 3.2% returns to the end of 1929 from the 24,450 cod tagged (calculations by author) to the southward of Cape Cod from 1923 to 1928 (Schroeder, 1930), but it falls far short of the high returns at the Faroes where Taning (1934 and 1937) reported 45% recaptures from the 1909-1913 tagging and of the 50% to 75% recaptures from their later tagging.

It is believed that the publicity given to the tagging and the interest created among the fishermen in the work is an important factor in determining the percentage returns.

Table II

Water Temperatures off Halifax and Canso
(Depths in metres)

<u>Stations</u>					<u>Stations</u>					<u>Stations</u>							
Depth	#62	61	60	59	Depth	#62	61	60	59	Depth	#62	61	60	59			
May 28/34	0	9.6	8.0	7.9	7.3	June 11/34	0	9.2	9.0	8.0	8.3	June 25/34	0	9.0	9.1	9.6	9.8
	10	5.6	5.3	5.5	5.8		10	7.7	8.2	7.2	7.7		10	7.2	8.7	9.0	9.4
	25	3.3	2.6	3.7	4.3		25	3.9	5.2	3.0	5.0		25	3.0	3.5	7.1	8.4
	30	3.3	---	---	---		30	3.8	---	---	---		30	2.4	---	---	---
	50	---	2.4	2.0	1.6		50	---	1.5	1.2	2.7		50	---	1.3	2.1	2.8
	75	---	---	2.15	1.8		75	---	---	1.7	3.0		75	---	---	1.8	2.5
	100	---	---	1.8	2.2		100	---	---	2.4	3.7		100	---	---	3.3	4.5
	150	---	---	---	7.1		150	---	---	---	6.9		150	---	---	---	7.9
May 4/35	0	2.4	2.7	3.4	2.4	June 3/35	0	7.9	6.4	6.7	7.7	July 1/35	0	12.8	12.8	13.0	12.3
	10	2.2	1.6	2.0	1.8		10	6.1	4.8	5.7	6.4		10	10.8	6.8	7.4	11.4
	25	-.25	-.35	.7	.2		25	1.9	.2	0.0	2.0		25	1.4	4.7	3.4	3.2
	30	---	---	---	---		30	1.8	---	---	---		30	.2	---	---	---
	50	---	.1	0.0	-.1		50	---	.2	-.5	2.6		50	---	.5	.5	.2
	75	---	---	.2	-.1		75	---	---	-.7	.3		75	---	---	.4	1.1
	100	---	---	2.2	.1		100	---	---	-1.0	1.0		100	---	---	.9	3.6
	150	---	---	---	7.6		150	---	---	---	5.3		150	---	---	---	7.0
May 1/36	0	5.5	4.8	4.0	4.2	July 30/34	0	#143	142	141	140	Aug. 6/34	0	#143	142	141	140
	10	2.8	.26	2.6	3.0		10	15.4	16.7	16.8	16.3		10	14.2	14.1	13.2	13.8
	25	1.4	1.2	1.2	1.8		25	13.4	15.9	15.7	15.6		25	13.2	13.2	12.8	13.6
	30	1.3	---	---	---		30	7.0	7.2	5.5	5.8		30	8.8	4.9	4.6	4.5
	50	---	1.1	1.0	.9	Off	50	---	3.3	2.8	1.6	Off	50	---	3.3	1.3	1.8
	75	---	---	1.8	1.0		75	---	2.0	1.1	1.5		75	---	1.1	1.4	1.2
	100	---	---	2.3	2.1	Canso	100	---	---	1.7	---	Canso	100	---	---	1.2	---
	150	---	---	---	5.8		140	---	---	1.1	---		140	---	---	1.3	---

from any tagging. In the investigation herein discussed, more contact was maintained during 1934-38 with the fishermen of the tagging districts than in the earlier tagging and it is felt that this played an important part in producing the higher percentage of recorded recaptures.

THE FISHING INTENSITY

Arranging the data in table I so that the returns are grouped in yearly periods succeeding the time of tagging, it is found that of the 2,715 cod tagged during 1934-36 inclusive, 561 were recaptured in the first year following tagging, 96 in the second, 27 in the third, 19 in the fourth and 2 in the fifth, or 705 in all, about 26%. Thus, of our returns 80% were taken in the first year and 14% in the second, or 94% within the first two years. One group of taggings shown by Taning (1937) yielded 64% returns in the first year (372 returns out of a total of 581) and 33% in the second year (194 returns, or 97% within the first two years.

To have 80% of the recaptures, or about 20% of all the fish tagged, retaken within twelve months of tagging indicates an even more intensive fishery than occurred at the Faroes where Taning indicated that only 16% (372 recaptures from 2,363 tagged) of the fish tagged were recaptured in the first year. It is also higher than the 9.8% recaptures within a year reported by Thompson and Blackwood (1936) for the inshore waters of Newfoundland. Even considering Thompson's (1935) report of 7½% returns within three months, we find that during the three months immediately following the completion of our tagging, 340 or 12.5% were recaptured.

It seems quite definite, therefore, that the cod fishery in the inshore water of the eastern mainland outer coast of Nova Scotia is more intense (or the fish move less) than that of either the inshore waters of Newfoundland or the waters around the Faroes Islands.

THE LENGTH OF TIME TAGS REMAIN ATTACHED

During the first year following the tagging, many fishermen operating in the tagging regions reported that they were catching some cod with split tails. Their descriptions, together with some examples actually seen, lead to the conclusion that many of the tags were lost through the tearing apart of the membrane between two rays of the caudal fin permitting the tag to slip off. How many tags were lost in this way we have no way of estimating. Nevertheless in spite of this loss, relatively high returns were obtained as shown in the preceding section.

The fact that returns were made up to five years after marking seems to warrant the conclusion that this method of tagging cod must be fairly satisfactory. This same method

used in earlier Canadian cod tagging has yielded recaptures during the fifth year after tagging off Shelburne, N. S., and during the sixth year after tagging at Seal island, N. S. (McKenzie, 1934a). Since the aforementioned account was written four more recaptures, listed below for the first time, from this earlier tagging have been made.

- Tag #8790 - Put on June 10/27, 13 miles SSW of Seal Island, N. S.
 - Recaptured Aug. 29/35, 10 miles S of Seal Island, N. S.
- Tag #9589 - Put on June 11/27, 13 miles SSW of Seal Island, N. S.
 - Recaptured Nov. 13/35, Carousse shoal off Canso, N. S.
- Tag #9201 - Put on June 11/27, 13 miles SSW of Seal Island, N. S.
 - Recaptured May/36, SE of Cape Negro light, N. S.
- Tag #1886 - Put on Aug. 13/25, Shoal Ground off Sambro, N. S.
 - Recaptured July 31/34, 5 miles SE Sambro light, N. S.

These records of recaptures made eight and nine years after tagging give further proof that this method is satisfactory and compares favourably with the Danish operculum tagging, for Taning (1937) speaking of their method says "For larger cod especially, this method seems to be better than others which have been tried, the marks remaining attached up to 8-10 years!"

THE EFFECT OF INITIAL CAPTURE

Cod that are tagged and liberated in apparently the very best of condition do show some effects of their struggles on the hook, of the handling, and being out of water for a short time. This is demonstrated by a consideration of the first six weeks' returns from the major taggings. If there were no after effects at all and the fish went about feeding on the grounds just the same as previous to tagging, there should be about the same number of recaptures per day or at least per week during the first month or so. However, this was not the case in the tagging under consideration.

In table III the daily returns are set forth covering the recaptures during the first six weeks following each day's tagging. Only major taggings during 1934 to 1936 are considered in table III. Here the returns from taggings on eleven different days, during which time a total of approximately 2,200 cod were tagged, are set forth. It is seen that no recaptures were made on the day immediately following tagging nor were any taken on the fifth day. The maximum for any day during the first week was 4 and the total for the week 15. During the second week the highest was 11 in a day and the weekly total was 36. The peak in both daily and weekly recaptures was reached in the fourth

week. A decline followed this in the fifth and sixth week.

Table III

Number of Recaptures per Day During First Six Weeks, Beginning the Day Immediately Following Each Tagging

	<u>Days after Tagging</u>							Totals
	1	2	3	4	5	6	7	
1st. Week	0	3	3	3	0	2	4	15
2nd. Week	1	3	6	8	1	11	6	36
3rd. Week	2	3	8	3	5	4	1	26
4th. Week	3	1	3	15	9	8	5	44
5th. Week	1	2	3	4	1	6	7	24
6th. Week	2	2	1	2	4	3	7	21

It is apparent, therefore, that all of the tagged cod remained without food (at least without biting a baited hook) for the first day after tagging, for there would be no diminution in the amount of fishing effort expended on these grounds which were well fished. In fact, the knowledge that fish carrying tags worth fifty cents each were in the vicinity would possibly stimulate at least some of the hand-line fishermen to fish more hours per day than usual. However, very few were retaken during the first 9 days and none at all during the first and fifth days. By the 10th day, however, the cod were being recaptured in fair numbers.

These findings agree with our experience with cod in tanks. Captive cod in tanks after being caught with a dip net, handled as in measuring, weighing, taking scales and marking, usually eat little, if any, for the next day or so and are very "jumpy" for some days. The least thing will scare them and send them dashing around or even up over the side of the tank.

As a result of tagging, therefore, it is quite possible that the fish are easily scared and are shy of food similar to the baits which led to their being caught.

DESCRIPTION OF MOVEMENTS

1. Movements off Halifax.

(a) 1925 Tagging

In 1925, 275 cod were tagged off Halifax during July, August and early September. This tagging was done after the early summer peak in the fishery had passed. This peak during 1925-31 inclusive, occurred in June with the May and July landings being about equal but a good 35% lower than those of June. The results of this tagging from which only two dozen tags were ever returned, showed that of these summer cod, 1 went offshore, 1 went less than 10 miles east of the tagging area, 4 went up to 25 miles west of the tagging area and the others remained within the tagging area throughout the year only shifting off shore into a little deeper water during the winter (McKenzie, 1934a).

(b) 1934 Tagging

This second tagging off Halifax was carried out to see if the cod comprising the "spring run" and making the early summer peak in the fishery of this region exhibited the same migrations and characteristics as the summer stock tagged in 1925.

The recorded recaptures from the 1934 tagging have been plotted in figures 3 and 4. In these figures, as in all other similar ones in this account, the lines joining the tagging region with the point of recapture follow the route which in the author's opinion was the one most probably followed by the tagged fish. For ease in preparing the figures the various tagging locations ("c" to "j" inclusive in table I) off Chebucto head on the south-west side of the entrance to Halifax harbour have all been considered as one tagging of 688 fish. Of these, 210 or about 31% were recaptured, 180 of them or 86% during succeeding summers (May to October inclusive) and 30 during the winters. From the standpoint of movements, 78% of the recaptures were taken in the tagging region and 22% outside of it.

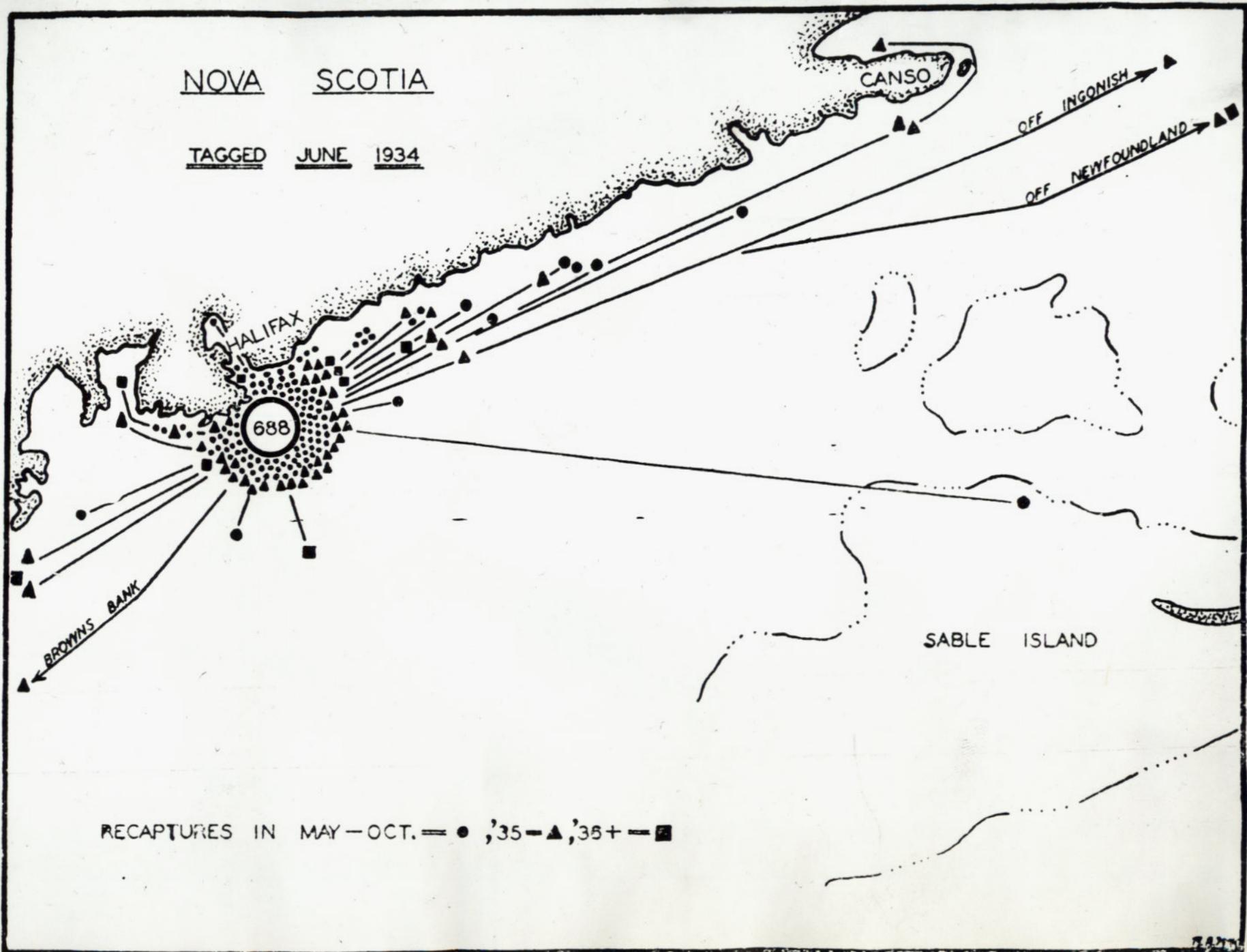
The "tagging region" is considered to be an area of about 20 kilometres (12½ miles) radius around the tagging location. Arbitrary limits are thus set for what have been termed restricted migrations among Canadian Atlantic cod.

It is obvious in figure 3 that by far the greatest number of the summer (May to October) recaptures, even in later years, came from the tagging region. It appears, in table IV that after the initial separation, between those that stayed and those that moved away, little change took place in later years. Only 19% of the 180 recaptures made at this time of year occurred outside the tagging region. More of these were to the eastward than westward (figure 3) and while the greatest westward migration was to

Figure 3 - Summer recaptures from cod tagged off Chebucto head, Halifax, in 1934.

NOVA SCOTIA

TAGGED JUNE 1934



RECAPTURES IN MAY-OCT. = ●, '35-▲, '35+■

Browns bank about 240 kilometres (150 miles) several cod went much farther to the eastward, two to the Cabot Strait region, about 480 kilometres (500 miles). One also went to Western bank. These few that went great distances may definitely be classed as wanderers or rovers - fish that moved away going farther and farther each year and not returning at regular intervals to the tagging region.

The recaptures during the months November to April, inclusive, are shown in figure 4 and in table IV. That the total recaptures during this season are much lower than during the summer season may in part be attributed to the fact that no small gasoline boats operate at this time of year and that inshore fishing is restricted to a few small vessels with one to four or five dories operating out of such winter ports as Halifax and Lunenburg. At the semi-winter ports of Canso and Sydney, fishing operations continue into January as a rule.

In winter, more recaptured fish were taken offshore than in summer, figures 3 and 4. Those taken offshore were only part of the total number recaptured "outside tagging region". Probably most of the extra recaptures may have been due to increased operations on such offshore banks as Sable Island bank, Middle bank and Banquereau during the winter season for a large part of the "salt fishing" fleet which operates on the Grand bank in summer, "fresh fishes" on these banks in winter.

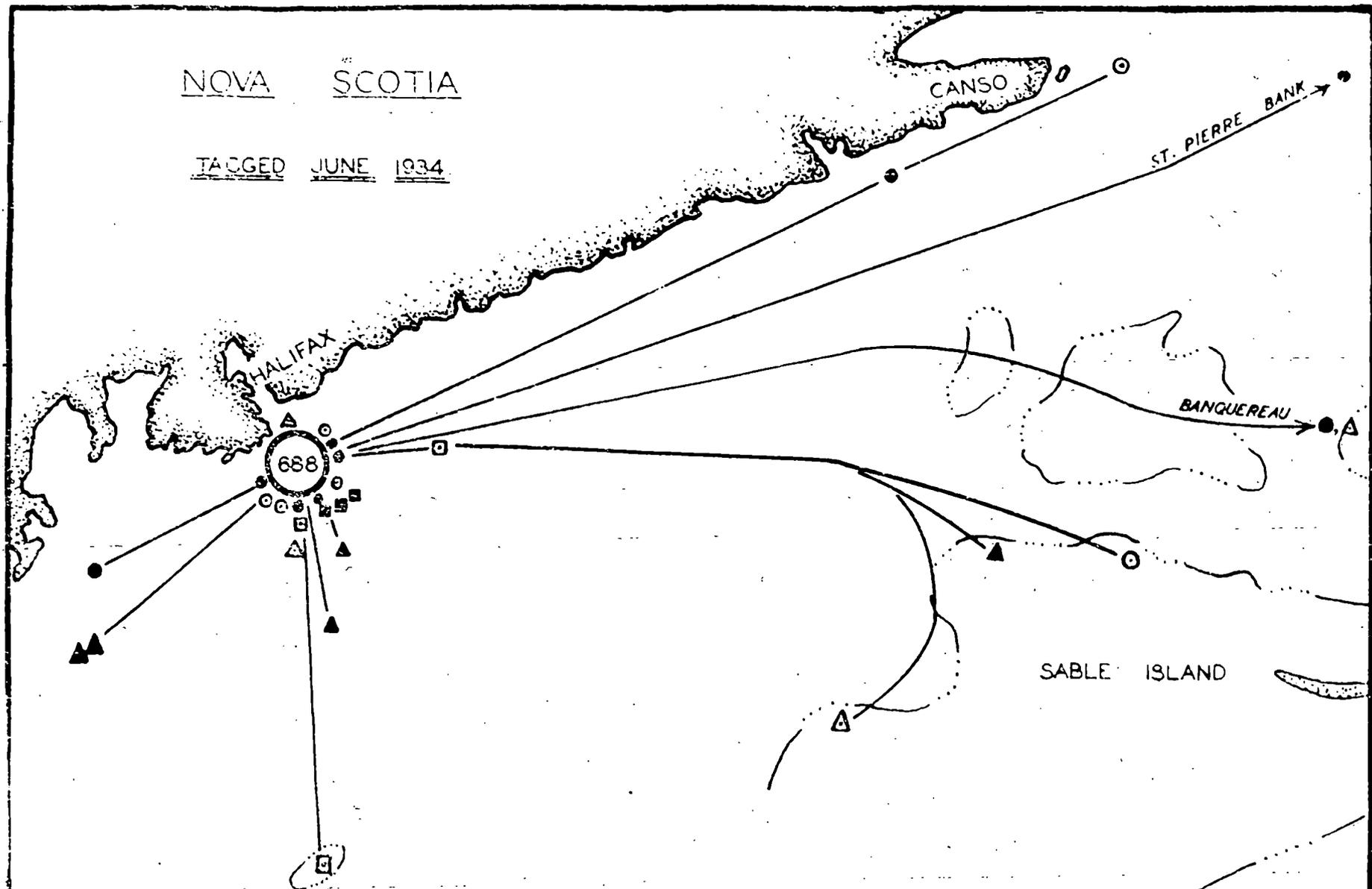
(c) 1935 Tagging

The next year, 1935, turned out to be a "cold water year" with cod landings from the inshore waters off Halifax extremely poor (McKenzie and Hachey, 1939). As a result of cod being scarce, especially in the deeper inshore water, only 152 were tagged at the peak of the "spring run" season (table I) and the returns from these, 36 in all or 24%, are shown in figure 5 and table V. As in the case of the 1934 tagging, the majority - about 70% - of the recaptures were made during the months of May to October. The recaptures outside the tagging area, although alike in both winter and summer for the 1935 tagging, compare favourably only with the winter recaptures from the 1934 tagging, for the summer recaptures in 1934 only yielded 19% outside the tagging region. The movements of 1935 tagged cod are thus more like the winter-recaught-1934-tagged fish than the summer recaptures. Another difference is that in comparing figures 3 and 4 with 5 it is seen that while the recaptures in the tagging region, to the north-eastward, and offshore, compare favourably, there were 5 cod retaken a considerable distance to the south-westward from the 1935 tagging and only 1 from that direction from the 1934 tagging (figure 3). This difference is still more pronounced when it is remembered that these 5 recaptures were made from less than one-quarter as many tagged fish. To compare favourably, the 1934 tagging should have yielded about 23 recaptures instead of 1 from this south-westward direction.

Figure 4 - Winter recaptures from cod tagged off Chebucto head, Halifax, in 1934.

NOVA SCOTIA

TAGGED JUNE 1934



RECAPTURES IN NOV & DEC. 1934 == ●, '35 + == ○

" " JAN. - MAR. 1935 == ▲, '36 + == △

" " APRIL 1935 == ■, '36 + == □

Figure 5 - Recaptures from cod tagged off Chebucto head, Halifax, in 1935.

NOVA SCOTIA

TAGGING MAY 1935.

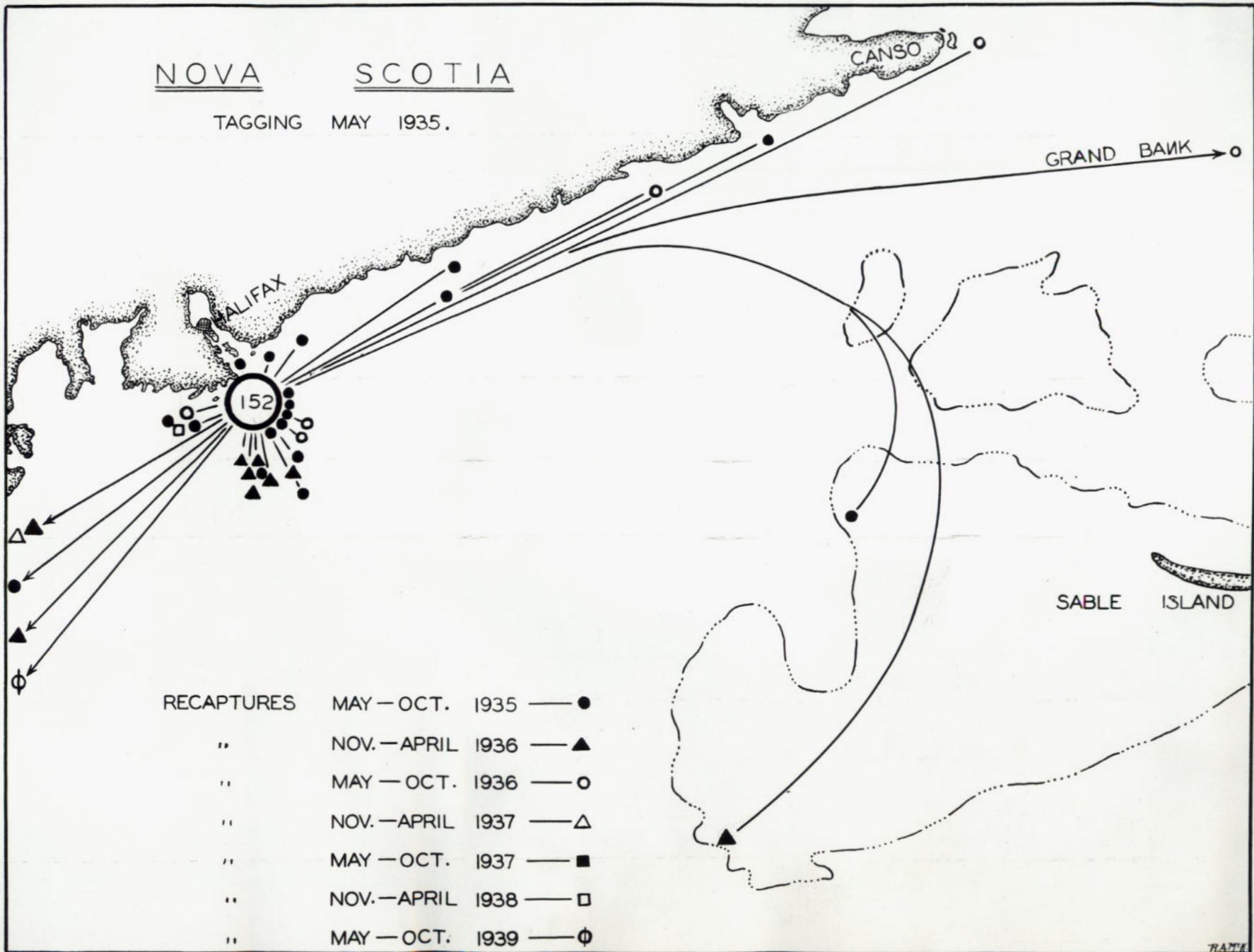


Table IV

Recaptures from Tagging off Halifax in 1934

<u>May to October</u>	<u>Total Recaptures</u>	<u>Percentage Recaptures</u>	
		<u>Tagging Region</u>	<u>Outside Tagging Region</u>
1934	118	88	12
1935	52	67	33
1936	7	71	29
1937	3	67	33
Total	180	81	19
 <u>November to April</u>			
1934-1935	17	53	47
1935-1936	10	60	40
1936-1937	1	100	00
1937-1938	2	100	00
Total	30	60	40

Table V

Recaptures from Tagging off Halifax in 1935

May to October	Total Recaptures	<u>Percentage Recaptures</u>	
		Tagging Region	Outside Tagging Region
1935	18	72	28
1936	6	50	50
1937	0	0	0
1938	0	0	0
1939	1	0	100
Total	25	64	36
<u>November to April</u>			
1935-1936	9	67	33
1936-1937	1	0	100
1937-1938	1	100	0
Total	11	64	36

(d) 1936 Tagging

Failing to tag an adequate number of cod in the deeper inshore waters off Halifax county in 1935, such tagging was again carried on in 1936. The fishery, however, continued at a very low level as in 1935, though the water conditions were not quite so extreme, and only 102 fish were tagged though fishing was carried on over a greater coastal distance than in either of the two preceding years, and 32 recaptures or about 31% have been recorded. Of these 32, 77% came from within and 23% from outside the tagging region. The summer recaptures, table VI, show decidedly more recaptured within the tagging region than from the 1935 tagging, and even somewhat more than from the 1934 tagging. The winter recaptures compare very well with those from both the 1935 and 1934 tagging, about one-third of them being retaken outside the tagging region. In figure 6, it is seen that there were none of these "outside" recaptures made on the Canadian offshore banks. Three were made some distance to the north-eastward, one even on St. Pierre bank off southern Newfoundland, while only one went any distance south-westward along the shore and this one only to Lockeport, a distance of about 104 kilometres or 65 miles.

In this migration away from the tagging region, the 1936 tagged cod resemble those of 1934 rather than those of 1935. The fish tagged in 1936 were from water that averaged 2 metres shoaler and .78°C. warmer than that from which the 1935 fish were taken. This may account for some of the differences found between the fish tagged during these two years.

2 - Movements in the Jeddore rock-Egg island region

All but 3 of the 1,298 fish tagged in this region were tagged in 1934, and none of the 3 were ever recorded as recaptured, though 372 or about 29% of these 1934 taggings were retaken and the tags returned. Of the 372 recaptures, 348 or 94% were retaken during succeeding May to October summer seasons, and 301, or 81%, of all the recaptures were made within the tagging regions themselves. From 1934 to 1936, inclusive, see table VII, the proportion retaken outside the tagging region increased due, no doubt, to a lower fishing intensity not taking the tagged fish out so fast as in the tagging region. This compares very well with the division of the summer recaptures from the Halifax tagging of 1934 and 1936. On the other hand, the November to April recaptures making up only about 6% of the total recaptures as compared to about 22% in the case of the Halifax tagging, were 80% from outside the tagging area. This difference may possibly be due to the fact that there is much less winter fishing off this region than off Halifax or that these fish actually move in numbers to grounds where considerable winter fishing is carried on. Considering all the recaptures, irrespective of season, 71 or 19% of them were retaken outside of the tagging region. Of these, 31 or 8% of the total recaptures were taken south-westward along the shore from the tagging region

Figure 6 - Recaptures from cod tagged in the Lunenburg to Halifax region in 1936.

NOVA SCOTIA

TAGGING MAY 1936.

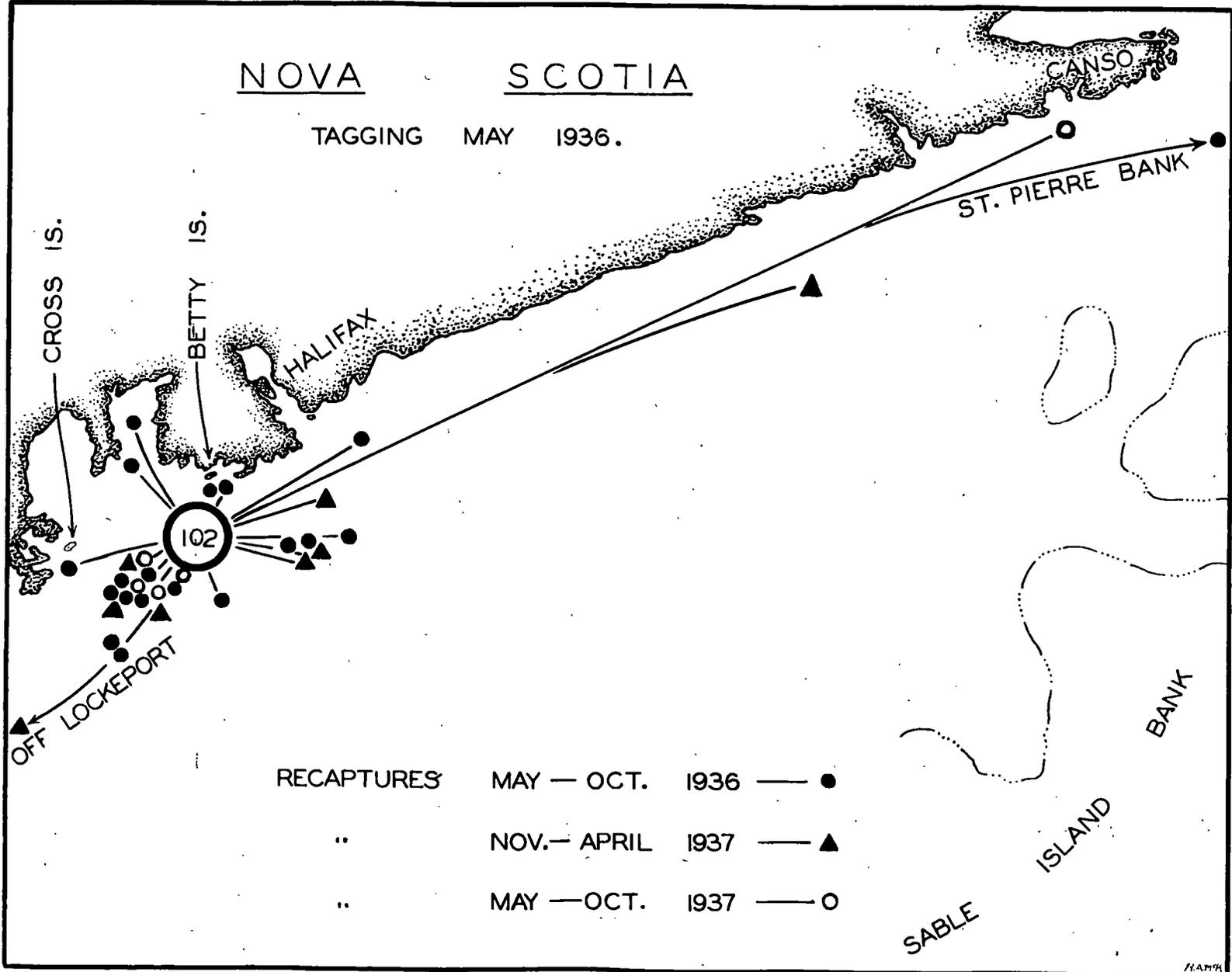


Table VI

Recaptures from Tagging in the Lunenburg
to Halifax Region in 1936

May to October	Total Recaptures	Percentage Recaptures	
		Tagging Region	Outside Tagging Region
1936	18	89	11
1937	5	80	20
Total	23	87	13
<u>November to April</u>			
1936-1937	9	67	33
1937-1938	0	0	0
Total	9	67	33

Table VII

Recaptures from Tagging in the Jeddore rock-
Egg island region in 1934

May to October	Total Recaptures	<u>Percentage Recaptures</u>	
		Tagging Region	Outside Tagging Region
1934	277	89	11
1935	49	73	27
1936	14	43	57
1937	4	100	0
1938	4	50	50
Total	348	85	15
<u>November to April</u>			
1934-1935	15	12	88
1935-1936	4	75	25
1936-1937	3	0	100
1937-1938	2	0	100
Total	24	20	80

32 or 9% to the north-eastward and 8 or 2% offshore. The shift to offshore grounds was thus only about one-eighth as great as shorewise and the movement along shore was only slightly greater in degree to the north-east than to the south-west. However, some of those cod moving north-eastward went considerably farther than any moving to the south-westward. The maximum distance to the south-westward was about 250 kilometres or 160 miles, while the migrations to the north-eastward took them as far into the gulf of St. Lawrence as Gaspé, a distance of about 625 kilometres (410 miles) and to the Newfoundland fishing grounds, an average distance of about 800 kilometres or 500 miles.

The recaptures are plotted in figures 7, 8, 9 and 10. For clarity and convenience in plotting, one point of origin has been used midway between the actual tagging locations which were about 21 kilometres or 13 miles apart. Figure 7 shows the recaptures for the period up to the end of October, 1934. By far the greater number were retaken in the tagging region, though some moved south-westward, one as far as Cape Negro, some north-eastward, one even to Gaspé, and one went offshore to Sable Island bank. The main part of the south-westward shift went only to the Halifax vicinity, but to the north-eastward they went in some numbers, as far as Canso, a distance over twice as great. During the summer of 1935, there was a great reduction in the recaptures in the tagging region, figure 8. The westward picture was about the same as in 1934 with a few less recaptures, but to the north-eastward practically none were taken along the shore as far as Canso where 3 were retaken. Instead of 1 being taken at a great distance as in 1934, 4 were retaken, 2 on the east and north-west side of Cape Breton and 2 off Newfoundland.

Figure 9 showing the recaptures during the succeeding summers in which tagged fish were retaken presents a picture quite similar to that for 1935 shown in figure 8. The easterly rovers during these years, 1936-1938 inclusive, had apparently passed well beyond the eastern limits of Nova Scotia as the only two recaptures were made off Gaspé (625 kilometres or 410 miles) and Newfoundland (800 kilometres or 500 miles). During the summer of 1934, the average extent of their migration north-eastward was about to Canso, a distance of 160 kilometres or 100 miles. In 1935, they had almost all moved beyond this locality, being retaken from this point on around Cape Breton as far as Cheticamp, an average distance of another 150 kilometres or about 95 miles. Following this they disappeared from this area entirely. In all years, of course, a few moved much faster than the majority and covered great distances. A rate of 160 to 250 kilometres or about 100 to 150 miles roving movement per year was found for fish tagged at Seal island and Shelburne (McKenzie, 1934a).

In figure 10, the recaptures during the winter seasons

Figure 7 - Summer 1934 recaptures from 1934 cod tagging in the Jeddore rock-Egg island region.

NOVA SCOTIA

TAGGED LATE MAY 1934

RECAPTURES IN JUNE—OCT. 1934

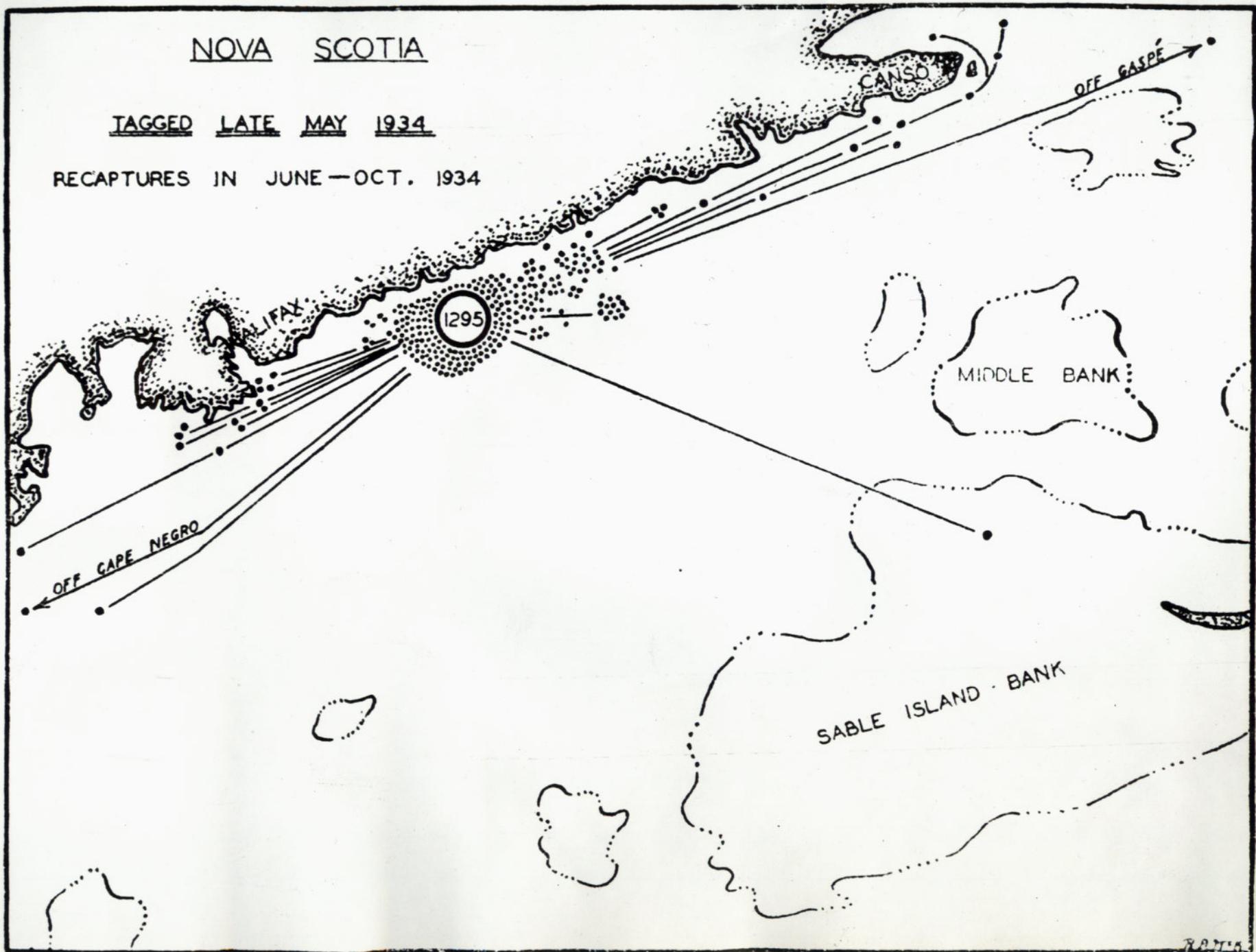
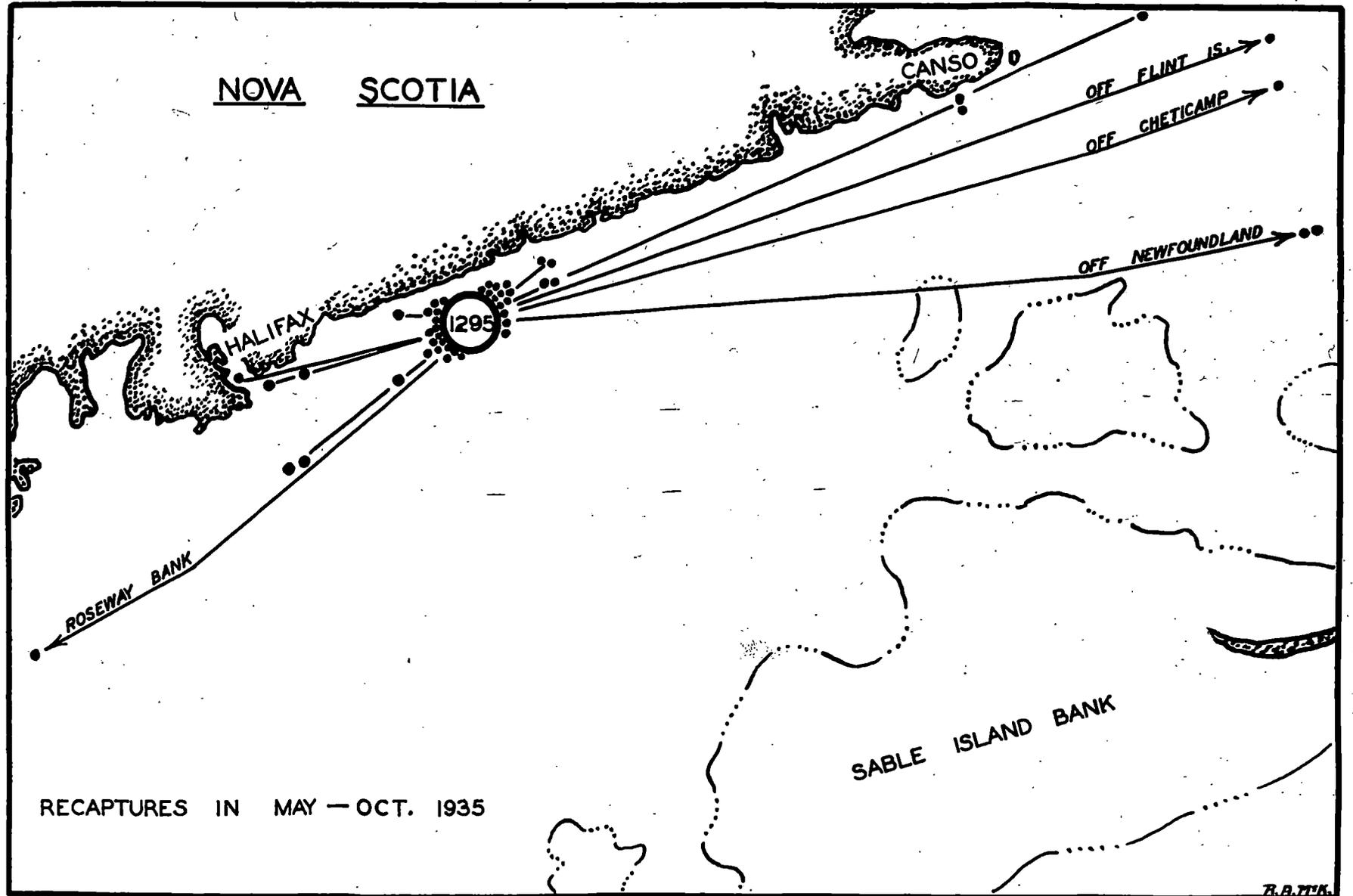


Figure 8 - Summer, 1935, recaptures from 1934 cod tagging in the Jeddore rock-Egg island region.

NOVA SCOTIA



RECAPTURES IN MAY - OCT. 1935

Figure 9 - Summer, 1936+, recaptures from 1934 cod tagging in the Jeddore rock-Egg island region.

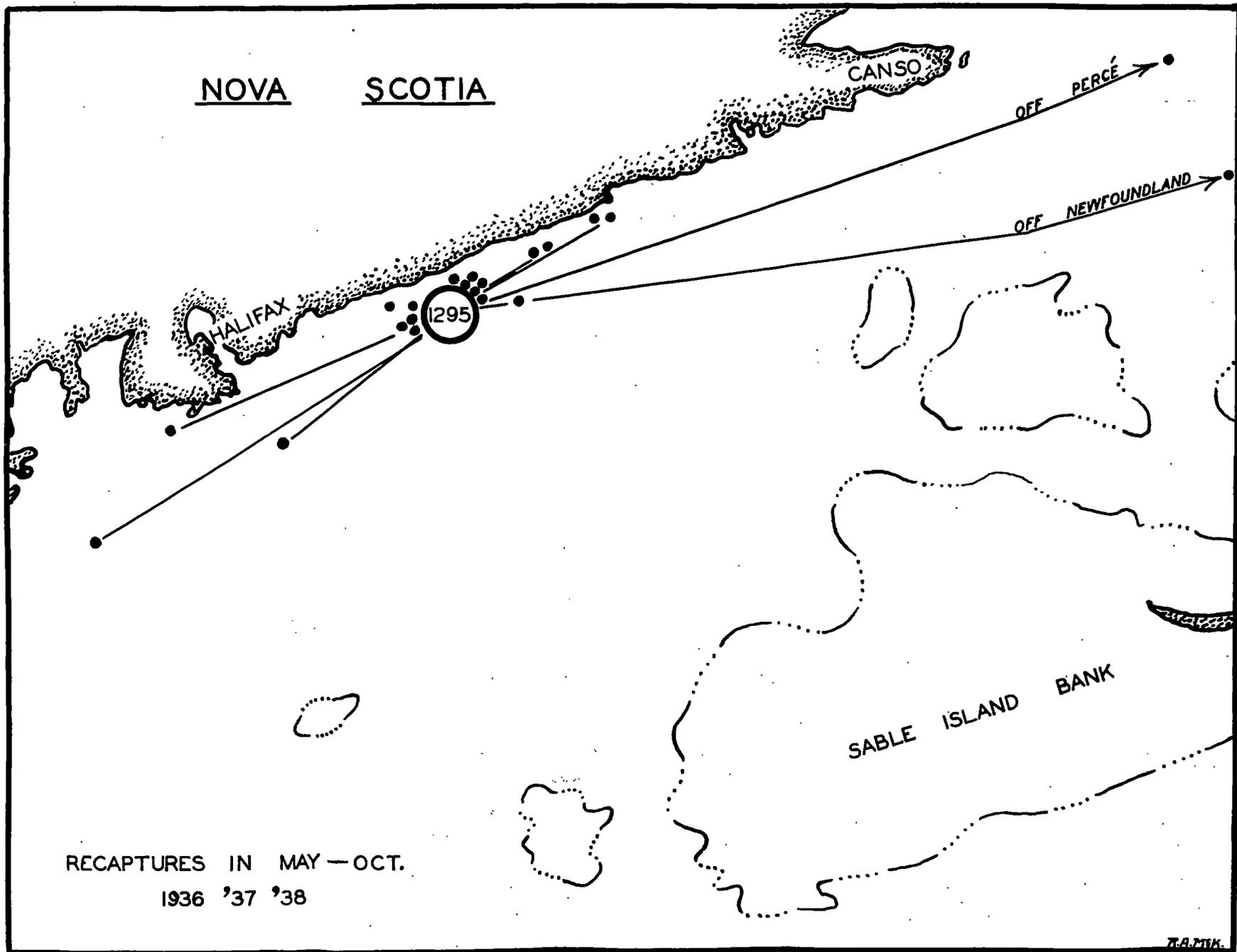
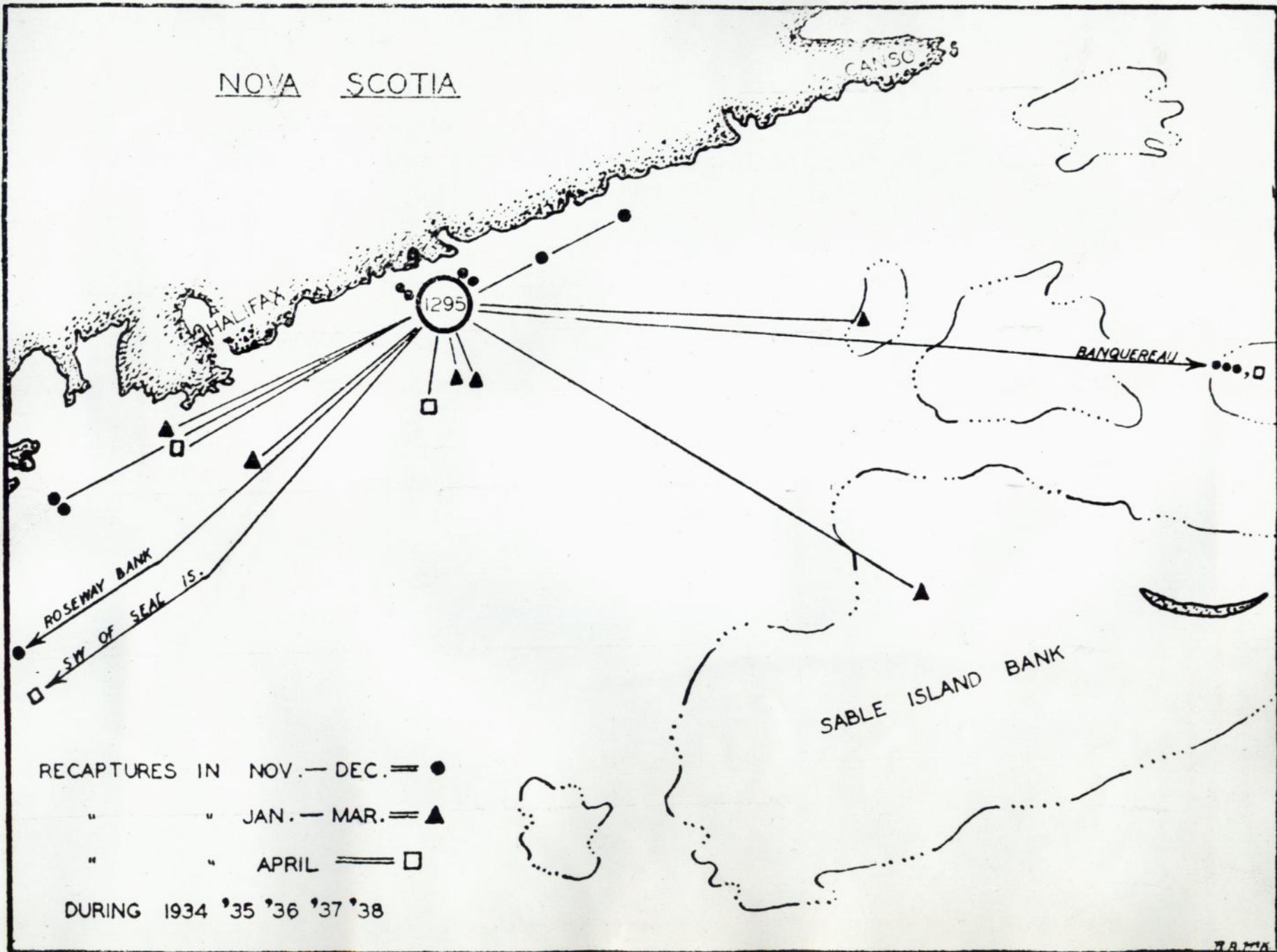


Figure 10 - Recaptures during the winter seasons from 1934 cod tagging in the Jeddore rock-Egg island region.

NOVA SCOTIA



RECAPTURES IN NOV.—DEC. = ●
" " JAN.—MAR. = ▲
" " APRIL = □

DURING 1934 '35 '36 '37 '38

are shown. Two more should be added to this figure (both recorded since this plate was made), one on Banquereau, November 1934, and one close to shore just west of Halifax, April 1938. In spite of fishing being conducted around Cape Breton at least to some extent during November and December no recaptures were ever made in these waters during the winter season. This, together with the fact that 4 were caught on the eastern Nova Scotian offshore banks the first winter, 2 the second winter and 1 the third winter, while 1 only was retaken on these offshore grounds in summer, seems to indicate that possibly the tagged fish which moved off north-eastward after tagging shifted off shore to these banks in winter and continued their easterly migration from there the next spring.

3 - Movements at Canso

On July 31 and August 1, 1934, 478 cod were tagged on Carousse shoal, caught in water 28 metres in depth and varying from 5.35°C. to 6.75°C. (Table I). In succeeding years 55 recaptures have been recorded, 34 within the first year, 16 the second, 8 the third, 6 the fourth and 1 during the fifth year after tagging. This makes a return of 12% which is the lowest recapture percentage of any of the taggings dealt with in this account. During July 9-12, inclusive, 1927, 97 cod were tagged in the Canso region in water 28 to 34 metres in depth and 41°C. to 2.05°C. in temperature and 4% were recaptured. This small number of returns, half with insufficient data, follows the pattern of the recaptures from the 1934 tagging but does not permit drawing conclusions.

The tagging in 1934 at Canso, while done on two consecutive days, yielded some differences among the recaptures. On July 31, 344 cod were tagged in 28 metres of water with the bottom temperature 5.35°C. Of these, 40 were recaptured or 11.6%. On August 1, 134 were tagged at the same location but the temperature at the bottom had changed to 6.75°C. The recapture of 15 or 11.2% was about the same as the preceding day, but in the latter case only 1, or 7%, of the 15 returns came from outside the tagging region, while from the former day's tagging 16 or 40% of the recaptures were made outside the tagging region.

The recaptures from the 1934 Canso tagging arranged in table VIII show that 44 or 80% of all the recaptures were made during the summer, May to October inclusive, and almost three-quarters of these were retaken within the tagging region. Of the 11 fish or 20% taken during November to April, inclusive, almost half were recaptured outside of the tagging region. Considering all the recaptures irrespective of date of capture, it is found that 17 of the 55 or 31% were taken outside of the tagging region. Recaptures continued to be made even to the summer of 1939, and 27% of all the summer recaptures were from

Table VIII

Recaptures from Cod Tagging off Canso
July and August, 1934

May to October	Total Recaptures	Percentage Recaptures	
		Tagging Region	Outside Tagging Regions
1934	15	87	13
1935	15	67	33
1936	8	63	37
1937	5	80	20
1938	0	0	0
1939	1	0	100
Total	44	73	27
<u>November to April</u>			
1934-1935	8	62	38
1935-1936	1	0	100
1936-1937	1	100	0
1937-1938	1	0	100
1938-1939	0	0	0
Total	11	55	45

outside the tagging region. While only about one-fifth of the total recaptures were made during the winter, almost one-half of them come from outside the tagging region. In figure 11 all the recaptures are plotted on one chart.

RECAPTURES MADE OUTSIDE THE TAGGING REGIONS

An analysis of the recaptures from all the taggings shows that, 88% of the tagged cod were recaptured during the summer months of May to October, inclusive and throughout the years only 23% were retaken outside the tagging regions. In table IX the recaptures from the taggings have been arranged according to season and whether or not they were made inside or outside of the tagging regions. The small percentage of returns from outside the tagging regions indicates that no extended orderly migration by large schools of fish took place.

Table X shows that there is no readily apparent correlation between the percentage of recaptures from outside the tagging regions or the general location in which these recaptures were made and either the temperatures at the points of tagging or the average depths at these locations.

In table XI it is shown that during the summer about two-thirds of the "outside" recaptures came from north-east of the tagging region and one-third from south-west, while in the winter this changed over to about two-fifths each from both the south-west and offshore and only one-fifth from the north-east. In the summer-time this distribution of the recaptures probably represents the actual abundance of the tagged fish in these various regions since fishing is quite intense almost everywhere. However, from November to April with fishing activities very greatly reduced in the "NE" and increased somewhat offshore, the proportions recaptured in the three districts may not represent the actual distribution of the tagged fish. Still, with the coming of the ice-cold water from eastward into the "NE" region at this season many cod no doubt did actually leave.

Of the 160 recaptures made outside the tagging regions 65 were over 90 kilometres or 50 miles away from their points of tagging. The tagging at location 1 in the deep layer yielded the highest percentage, 21%, of distant returns, while 16% of the recaptures from the intermediate layer tagging came from

	Total Recaptures	Distant Recaptures	% Distant Recaptures
Upper Layer, 2°C. plus	424	18	4
Intermediate layer 0-2°C.	243	39	16
Deep Layer 2°C. plus	38	8	21

Figure 11 - Recaptures from cod tagging off Canso on
July 31 and August 1, 1934.

TAGGED THE LAST
OF JULY 1934.

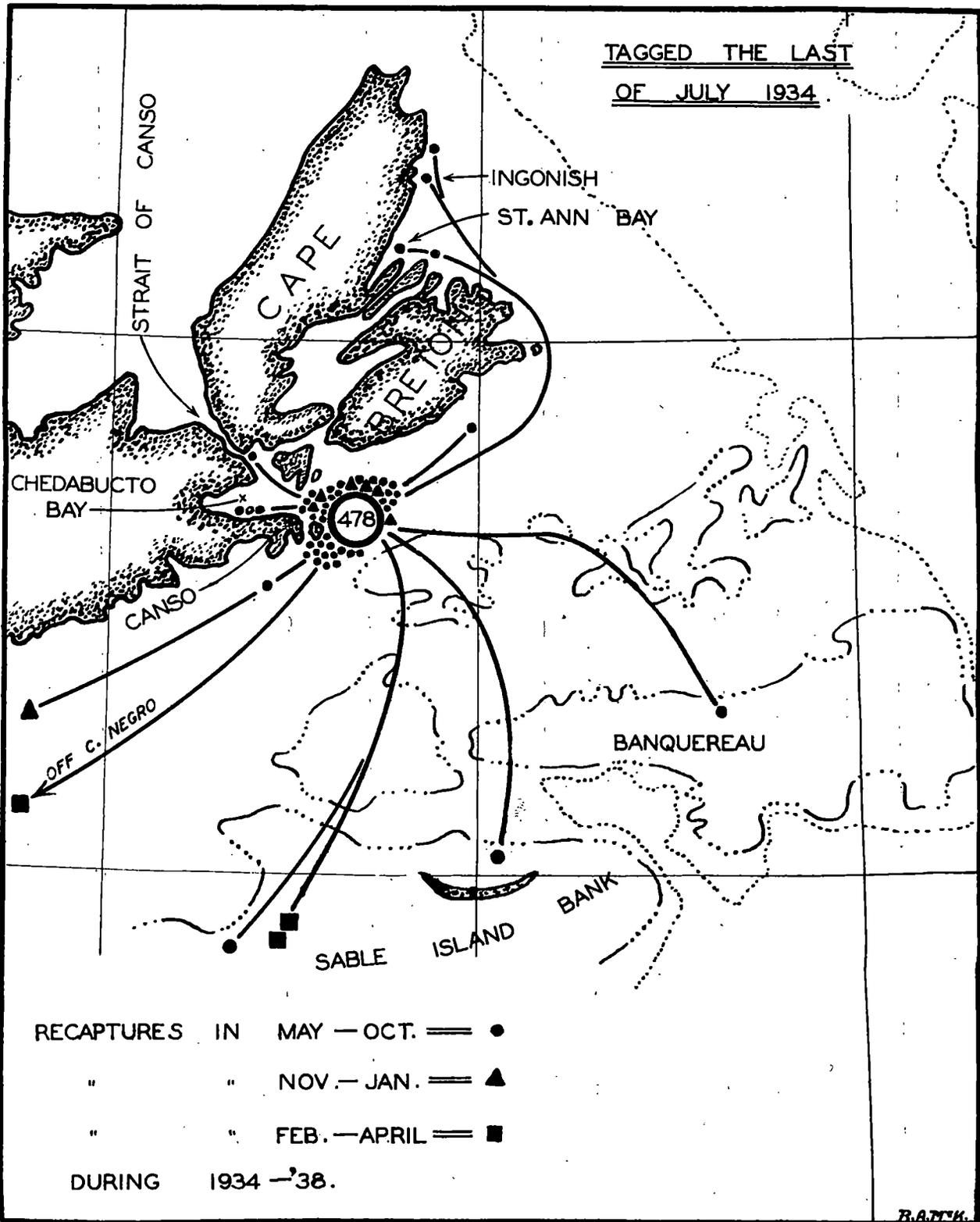


Table IX

Recaptures According to Season and Location

Tagging Location	<u>Summer Recaptures</u> (May-Oct. inclusive)		<u>Winter Recaptures</u> (Nov.-April inclusive)		Total Recaptures
	Tagging Region	Outside Tag. Region	Tagging Region	Outside Tag. Region	
a	80	27	1	9	117
b	210	31	4	10	255
c	14	0	0	0	14
d	2	0	0	0	2
e	45	7	8	3	63
ee	46	7	1	4	58
f	4	1	0	0	5
g	22	4	3	1	30
i	12	15	6	5	38
k	21	12	3	4	40
kk	11	0	3	1	15
l	10	3	4	5	22
m	3	1	2	0	6
n	5	2	1	0	8
p	3	1	2	0	6
s	0	2	0	0	2
t	15	2	3	1	21
u	0	1	1	1	3
Totals	503	116	42	44	705
Percent	71	17	6	6	100

Table X

Distribution of Recaptures from Outside the Tagging Regions According to Direction from, and Temperature on Bottom at the Tagging Locations

(No Tagging in 3°C. to 5°C.)

Bottom Temp	Av. Depth Metres	Tagging		Recaptures outside Tagging Region		Percentages Recaptured		
		Loc's	No.	% all Recap's	E. of Tag. Reg.	Off-Shore	W. of Tag. Reg.	
0 - 1°C.	110	l,m,n	11	31	55	9	36	
1 - 2°C.	80	p,s,t, u,ee,a	55	26	54	13	33	
2 - 3°C.	47	g,e,b	56	16	44	5	51	
2 - 3°C.	75	i	20	53	65	25	10	
5 - 6°C.	34	f,k	17	40	50	28	22	
6 - 7°C.	28	kk	1	7	0	0	100	
Total			160	23	51	13	36	

Table XI

Distribution of Recaptures made outside the
Tagging Regions According to Season
and Direction from the Tagging Regions.

Tagging Location	Recaptures outside Tagging Region	Percentage Recaptures made in Various Directions						
		May - October			November - April			
No. of Fish	% of Total Recaptures	SW of Tagging Region	Offshore from Tagging Region	NE of Tagging Region	SW of Tagging Region	Offshore from Tagging Region	NE of Tagging Region	
d	0	0						
c	0	0						
k	17	31	6	18	46	12	12	
r	1	20	0	0	100	0	0	
g	5	17	20	0	60	20	0	
b	41	16	37	0	39	14	5	
e	21	17	24	0	43	9	15	
s	2	100	0	50	50	0	0	
i	20	53	5	10	60	5	15	
a	36	30	28	0	47	11	11	
l	8	36	0	0	38	38	24	
u	2	67	50	0	0	0	0	
t	3	14	0	0	67	33	0	
p	1	17	100	0	0	0	0	
m	1	17	100	0	0	0	0	
n	2	25	50	0	50	0	0	
Total	160	23	23	4	46	12	10	5

distant regions. However, distant recaptures from the upper layer tagging, or grounds closest to shore and in the shoalest water, amounted to only 4%. These distinctly inshore summer fish do not migrate long distances, therefore, as a rule. If the Canso recaptures are excluded, this figure drops to about 2%.

Of the 8 distant recaptures from the deep layer tagging, 5 came from offshore grounds, 3 from the eastward and 0 from westward. About half of the cold layer distant recaptures came from the eastward, one-quarter from offshore and one-quarter from the westward. From the upper layer tagging almost half of the distant recaptures were made offshore, with one-quarter from the east and the same from the westward.

COD AND THEIR CHARACTERISTICS IN RELATION TO SOME ASPECTS OF THEIR HABITAT

1. Size of cod in Relation to Temperature and Depth at the Tagging Locations

In order to discover differences, if any, in the size of cod living in the different depths and water temperatures, the lengths of the tagged cod have been grouped as in table XII to show the size frequencies and averages at the various tagging locations. In table XIII the average sizes of the fish of the various taggings have been grouped according to depth, water temperatures, and the three temperature layers found off eastern Nova Scotia. The 0°C. to 1°C. group were fish caught right in the intermediate cold layer in 1935. The 1°C. to 2°C. group is made up of some 1934 and some 1936 taggings. The 666 1934 fish averaged 66.2 cm. in length while the 96 1936 fish averaged 67.8 cm. The fish of the two different years were thus much alike in size. The 2°C. to 3°C., 4°C. to 5°C. and 5°C. to 7°C. groups were all 1934 caught fish, but the latter group consisted of a few Halifax region fish with the larger Canso group. The former averaged 58.8 cm. and the latter 61.8 cm., a difference of 3 cm. The 2°C. to 3°C. water "below cold layer" in table XIII was really part of the under side of the intermediate cold water layer in 1934, while the 5°C. to 7°C. water, group 0 in 1936, was distinctly below the cold water layer. Unfortunately only 2 fish were caught at this temperature. Off Halifax the bottom is generally muddy outside of about 117 metres or 65 fathoms, and cod are rarely found in numbers on such bottom. Since this warmer water is usually located deeper than this, it was difficult to secure any quantity of cod for tagging under these temperature conditions. In addition to this, a good portion of those caught at these depths are "poke blown" on reaching the surface and hence unsuitable for tagging. Table XIII shows that on the average the cod caught above the cold layer, i. e. above 2°C. and in the shoaler inshore waters were smaller than those taken in the cold layer, 0°C. to 2°C. The latter fish were about 5 cm. longer on the average. Those caught immediately below the cold

Table XII

Size Distribution of Cod Tagged

e - June 4, 5 and 21 - 2°C. to 3°C.
 ee - June 22, 23, and 28 - 1°C. to 2°C.
 k - Carousse Shoal, July 31, 5.35°C.
 kk - Carousse Shoal, August 1, 6.75°C.

Lengths in cm.

Tagging Locations as in Table I.	No. of Fish	30- 39	40- 49	50- 59	60- 69	70- 79	80- 89	90- 99	100- 109	110- 119	Average Length
a-off Egg island, 1934	483	0	12	107	170	122	44	19	7	2	68.1
b-off Jeddore rock, 1934	804	0	69	341	276	94	14	7	3	0	60.5
c-off Chebucto head, 1934	47	0	7	21	14	2	2	1	0	0	60.2
d-off Devils island, 1934	12	0	3	8	1	0	0	0	0	0	54.1
e-off Chebucto head, 1934	225	0	19	109	60	28	5	4	0	0	56.8
ee-off Chebucto head, 1934	183	0	16	79	53	26	5	2	2	0	61.2
f-off Betty island, 1934	21	1	4	6	6	3	0	0	1	0	58.8
g-off Chebucto head, 1934	79	1	9	33	25	6	2	2	1	0	59.8
i-off Lightship, 1934	112	0	0	29	41	23	7	5	7	0	69.7
k-on Carousse shoal, 1934	344	1	21	134	124	46	12	2	3	1	62.3
kk-on Carousse shoal, 1934	133	1	18	53	33	22	5	0	1	0	60.5
l-off Lightship, 1935	64	0	7	13	25	14	3	0	1	1	65.1
m-off Sambro light, 1935	17	2	2	3	5	5	0	0	0	0	60.8
n-off Lightship, 1935	26	0	1	6	7	8	3	1	0	0	69.0
o-off Jeddore rock, 1935	2	0	0	0	0	1	0	0	0	1	94.5
p-off Lightship, 1936	23	0	4	6	7	5	1	0	0	0	61.4
q-off Egg island, 1936	3	0	0	2	0	0	0	0	1	0	68.3
r-off Lightship, 1936	3	0	0	0	1	1	0	1	0	0	75.3
s-off Betty light, 1936	3	0	0	2	1	0	0	0	0	0	58.3
t-off Cross island, 1936	57	0	4	11	12	14	9	2	4	1	71.4
u-off Lightship, 1936	13	0	1	2	2	8	0	0	0	0	65.8

layer were 3 or 4 cm. longer still and the 2 caught at a greater depth in the deep warm layer averaged about 30 cm. larger than those last mentioned. It is seen thus that irrespective of the arrangement of water temperatures, the fish were larger with increased depth of water. This agrees with the findings of Thompson (1935) on the Grand banks of Newfoundland and McKenzie (1934) at Shelburne, N. S.

2. The Effect of the Winter Cooled Water of the Gulf of St. Lawrence on the Cod of Eastern Nova Scotia

On comparing the recaptures from tagging off the eastern Nova Scotian coast with the distribution of winter cooled water on the shore fishing grounds and the length of time it is present, it is found that the presence of such water may be correlated with a reduction in the percentage recaptured and also with an increase in the proportion of recaptures made outside the tagging regions. In table XIV all the taggings carried out off each of the four districts have been included irrespective of depth or bottom water temperature where the tagging was done. It may be seen that the more easterly points as Glace Bay and Canso not only have a lower percentage of recaptures but more of them were made outside the tagging regions.

The fishing grounds off Eastern Nova Scotia and Cape Breton are peculiar in being affected to a great extent by the winter cooled waters from the gulf of St. Lawrence and eastward. These give rise to the intermediate cold water layer, described previously, found off these shores during late spring to early winter. (Sandstrom 1919 and Hachey 1941).

In all the districts east of Halifax shore fishing ceased in January and even as early as November between Halifax and Canso where there were only small boats. Larger boats operated later out of the larger ports as Canso and Sydney, but even these ceased due to lack of fish from sometime in January until about May. In some districts cod fishing does not begin again before June or even July. At Halifax itself, some shore fishing continues all year around, though the February and March landings per boat are very poor.

3. Recaptures in Relation to Bottom Water Temperatures at Tagging Locations

It is found that there is some correlation between the recaptures and the bottom water temperatures on the tagging locations when the data are arranged as in table XV. Unfortunately, it was impossible to tag even approximately equal numbers at all depths and temperatures. In 1934, as explained previously, the cold layer of water was neither as thick nor as cold as in 1935 and 1936, and as a result the upper waters of the deep warm layer extended in onto the outer edge of the hard bottom suitable for cod which extends along shore. By reason of this, some cod were located and tagged in water just below the coldest part

Table XIII

Average Size of Cod According to
Water Temperature, Tagging Depths

<u>Temperature</u>	<u>Average Tagging Depth</u>	<u>Taggings</u>	<u>No. of Fish</u>	<u>Average Length</u>
<u>Cold Layer</u>				
	<u>Metres</u>			
0 - 1°C.	110	l,m,n	107	65.4 cm.
1 - 2°C.	80.5	a,ee,p,s,t,u	762	66.4 cm.
<u>Above Cold Layer</u>				
2 - 3°C.	41.2	b,c,e,g	1,155	59.7 cm.
3 - 4°C.	-----	-----	-----	-----
4 - 5°C.	20	d	12	54.1 cm.
5 - 7°C.	34	f,k	498	61.7 cm.
<u>Below Cold Layer</u>				
2 - 3°C.	75	1	112	69.7 cm.
5 - 7°C.	158	o	2	94.5 cm.

Table XIV

Taggings and Recaptures along the
Eastern Nova Scotian Shore

Tagging District	Year	Number		Percentage Recaptured		
		Tagged	Recap'd	Those Tagged	Within Tag.Reg.	Outside Tag.Reg.
Glace Bay	1927	2,295	72	3	54	46
Canso	1934	575	59	10	68	32
Egg. Is.						
Jeddore rock	1934	1,295	372	29	80	20
Halifax	(1934)					
	(1935)	880	257	29	72	28
	(1936)					

of the cold layer. However, during the succeeding two years the cold layer covered all the outer "shore soundings" and out onto the mud bottom to some extent. Because of this, little, if any, suitable bottom was available for cod below the cold water layer and practically no cod were found to tag in the deeper warm layer. In table XV, the taggings on various days at the same location have all been considered as one lot except where the bottom temperature varied more than a degree between any two days. Location k and kk off Canso is the only place where it has been necessary to divide the cod tagged at one position into two lots for this reason. Examination of the table reveals that on the average a higher percentage of recaptures occurred from temperatures ranging from 2°C. to 3°C. than either below or above this range. To bring this out more clearly, the contents of the table have been arranged into groups of 1°C. range as shown at the bottom of the table. There it is seen that the coldest water, 0°C.-1°C. and 1°C.-2°C., yielded only about three-quarters as high a percentage of captures as the 2°C. to 3°C. groups, while the 3°C. to 7°C. groups only yielded three-eighths as many returns as the latter group. A higher percentage of recaptures was obtained in 2°C. to 3°C. both from the fish tagged just above the coldest water of the intermediate layer in 1934 (e.g. taggings b, g, e, and c) and from those just below at location i than from those tagged right in the cold water of the intermediate layer at locations a and ee. The coldest water taggings of 1935 and 1936 also yielded returns on a par with a and ee of 1934. In the warmest water group, Canso, only 12% of the tags were returned and almost all of these from the tagging region. Quite intensive fishing takes place in this Canso area during the summer but it ceases about the middle of January and is not resumed until June or even July. The latest tags returned were 4 on January 11, 1935, and the earliest were 2 on July 5, 1935, 1 on July 7, 1936 and 1 on July 3, 1937. The main reason for the cessation in operations is lack of fish, which occurs as the ice cold water comes in from the north-east.

Considerable variation is seen in the percentage of the recaptures coming from within and without the tagging regions but no order is clearly seen.

Thus the cod living in the 2°C. to 3°C. water just under and just over the coldest part of the intermediate layer yield the highest percentage of recaptures, but there appears to be no correlation between temperature and the percentage recaptures inside or outside the tagging regions.

Table XV.

Recaptures According to Bottom Water
Temperatures at Tagging Locations

Tagging		Number Tagged	Recap- tured	Percentage Recaptured		
Temperature	Location			Of those Tagged	Tagging Outside Region	Tagg- ing Region
6.75°C.	kk. (Aug. 1)	134	15	11	93	7
5.95°C.	f.	21	5	24	80	20
5.35°C.	k. (July 31)	344	40	12	60	40
4.90°C.	d.	12	2	17	100	0
2.75°C.	b.	807	255	32	84	16
2.50°C.-2.95°	i.	112	38	34	47	53
2.65°C.	g.	80	30	37	83	17
1.90°C.-2.65°	e.	414	121	29	83	17
2.35°C.	c.	47	14	30	100	0
1.70°C.	p.	23	6	26	83	17
1.70°C.	t.	57	21	37	86	14
1.45°C.	s.	3	2	67	0	100
1.40°C.	u.	13	3	23	33	67
1.0°C.-1.5°C.	a.	488	117	24	70	30
.9°C.	m.	22	6	27	83	17
.8°C.	n.	31	8	26	75	25
.65°C.	l.	97	22	23	64	36

Summary

6 - 7°C.	kk.	134	15	11	93	7
5 - 6°C.	f, k	365	45	12	62	38
4 - 5°C.	d,	12	2	17	100	0
3 - 4°C.	--	---	---	---	---	---
2 - 3°C.(1)	b, g, e, c,	1,163	362	31	85	15
2 - 3°C.(2)	i,	112	38	34	47	53
1 - 2°C.	a, u, s, t, p,	769	207	27	74	26
0 - 1°C.	ee, l, m, n,	150	36	24	69	31

(1) Just over (2) just under the cold intermediate layer.

4. The Depths where Tagged in Relation to Average Depth where Recaptured

A survey of the recapture depths compared to the tagging depths has shown that on the average the summer recaptures were made in about the same depth as where tagging took place, while the average winter recapture was in somewhat deeper water. To determine if the fish remained in about the same temperatures and depth of water as that from which they were tagged, the average depth at the points of recapture has been calculated. In a few cases the depth of water was given by the finder of the tag, but usually the point of recapture has been indicated as distance and direction from a known shore point. Using these to locate the point of recapture on standard navigation charts the nearest sounding has been considered as the depth at which the fish was retaken. Table XVI is arranged from top to bottom in order of increasing depth at the tagging locations. Excluding locations d, s, and u where less than 5 recaptures were made, the average depth of the other recaptures increases from top to bottom in the table fairly regularly, following the order of the depths at the tagging locations. The average depth of the summer (May to October, inclusive) recaptures within the various tagging regions (T.R.) also follows the same trend, while those made in the tagging regions during the winter do so to a less extent. The order, if any, among the recaptures made outside the tagging regions in both summer and winter is obscure. It appears, therefore, that in general the cod remained in about the same depth as that from which they were tagged. By remaining at these depths, they no doubt stayed in approximately the same range of temperatures as those from which they were tagged, but, from the fact that larger fish lived in the 2°C. to 3°C. water below the coldest water of the intermediate layer than lived in the same temperature range above this layer, it is believed that depth or pressure regulated the initial distribution.

When all the recapture depths of those taken within the tagging regions during the summer are compared with those taken during the winter, it is found that on the average the depth at which the winter recaptures were made is 50% greater than that where the summer recaptures were made. The same type of comparison made on the recaptures from outside the tagging regions shows that the winter recaptures were made on the average at depths 40% greater than those where the summer recaptures were made. It is thus demonstrated that these cod lived at deeper levels during the winter than summer. An inspection of figures 3, 4, 5 and 6 also shows that the majority of inshore recaptures during the winter season were made in deeper water than during the summer.

Table XVI

Comparison of Depths where Tagged with
Average Depths where Recaptured

Tagging Location	Depth (Metres)	No. of Recaptures	Average Depth Where Recaptures Made in Metres										
			All Recaptures	No. of Fish	In T.R. Summer	No. of Fish	In T.R. Winter	No. of Fish	Outside Summer	No. of Fish	Outside Winter		
d	20	2	67										
c	25	15	36	15	36								
r	28	55	40	32	31	6	28	12	50	5		90	
f	40	5	43	4	45	0	0	1	36	0		0	
s	45	30	53	22	53	3	55	4	62	1		72	
e	45	255	43	211	40	4	38	30	56	10		76	
s	50	121	46	91	40	9	67	14	55	7		80	
i	70	2	39	0	0	0	0	2	39	0		0	
a	75	38	58	12	53	6	79	15	49	5		59	
i	80	117	53	82	53	1	99	25	51	9		46	
l	87	22	74	12	73	2	67	3	54	5		90	
u	93	3	63	0	0	1	63	1	45	1		81	
t	95	21	80	16	82	3	72	2	54	1		90	
p	95	6	78	3	82	2	81	1	58	0		0	
m	111	6	71	3	74	2	86	1	32	0		0	
n	132	8	71	5	81	1	63	2	51	0		0	

DISCUSSION AND CONCLUSIONS

The tagging off Halifax during late July, August, and early September, 1925, showed that 74% of the recaptures were made in the tagging region. The others were retaken either a short distance south-westward or north-eastward with one on the offshore banks. Only about 5% were retaken in winter. The majority of the fish off Halifax at this time of the year were, therefore, concluded to be of the restricted migration type.

The 1934-1936 tagging done in the shore waters off the eastern coast of the Nova Scotian mainland between Lunenburg and Canso in May and June does not show results very different in nature from the above. As from the 1925 tagging off Halifax, about three-quarters of the recaptures both from the Halifax and Egg island districts 1934-1936 tagging were made within the various tagging regions and mainly during the summer. About 50% of the remainder were retaken to the north-eastward, 35% to the south-westward and 14% offshore. That more tagged cod were caught to the north-eastward than to the south-westward is worth considering for the same was found to occur in earlier years with the cod tagged in the Seal island to Shelburne district (McKenzie, 1934a). This is in spite of the fact that there is progressively less inshore winter fishing as you go eastward, and that cod are numerous and the fishery intense in the gulf of Maine to the south-west. From Halifax eastward there is little fishing after December except at Canso where they carry on into January.

This movement is in general of a roving character taking the cod well into the gulf of St. Lawrence or to the Newfoundland fishing grounds. If the movement along shore to the north-eastward was of the extended migration type rather than roving, recaptures should have been made in fair numbers in the Halifax to Canso region at about the same season for a number of years after the tagging. However, after the first summer, recaptures immediately east of tagging regions were rare, while those at progressively greater distances were more numerous, indicating that these easterly migrants were roving farther and farther eastward each year and not returning at regular intervals.

That 14% of all the recaptures made outside the tagging regions were taken offshore may have been part of a movement offshore for the winter, but when the difference between the summer and winter offshore recaptures - 4% compared to 10% - is balanced against the increased fishing effort offshore in winter, it is concluded that only a very slight seasonal movement of this character could have occurred. On the whole, therefore, the cod off the Halifax district in May and June seem in the majority to be of the restricted migration type.

No significant results were obtained from the little tagging done off Canso in 1927.

The results from the Canso tagging of 1934 are intermediate in character between those from the Glace Bay tagging in 1927 and those from the tagging off Halifax county, 1934-1936. Only about one-half as many recaptures were made as from the Halifax tagging but these in turn were about four times greater than those from the Glace Bay tagging. The proportion of the recaptures made outside the tagging region was also intermediate between that at Glace Bay (69%, McKenzie 1934a), where a distinct orderly extended migration occurs with the seasons between this shore area and the eastern Canadian offshore banks, and that at Halifax to Egg island (26% - 19%) where there is in the main only restricted migration.

That such is the case seems to be correlated with the water conditions. Off Glace Bay on the eastern coast of Cape Breton island the fishing grounds are subject to the cold water outflow from the gulf of St. Lawrence for a longer period each winter and spring than are the grounds off Canso, and much longer than the grounds off Halifax. The arrival of this extremely cold water (temperatures as low as $-1.0^{\circ}\text{C}.$) coincides with the withdrawal of the cod from the Cape Breton to Canso area early in January. Such water does not reach the Halifax area until late in the winter. Because the cod landings of the more easterly regions are reduced to a minimum for a longer period each year than in those regions farther west, the total recaptures per year are lower and a higher percentage comes from outside the tagging region.

However, it is postulated that some but not all of these cod move to warmer water regions where winter fishing continues. If all moved and were subject to a winter fishery it is believed more recaptures should have been made. That cod could remain in this extremely cold water and the fact not be revealed through catches on baited fishing gear is shown by the author's experiments in feeding cod in captivity, (McKenzie, 1934b). These investigations have shown that cod feed less and less as the water temperature approaches $0^{\circ}\text{C}.$ and the larger fish may go without food entirely for weeks at a time. Under such cold water conditions it is unlikely that baited hooks would be readily taken, if at all.

At Canso, too, it has been demonstrated that the influx of water $1.4^{\circ}\text{C}.$ warmer on the second day of tagging was probably the cause of only 134 cod being caught and tagged the second day compared to 344 the first day. Also, the recaptures from the second day's tagging yielded only 7% from outside the tagging region compared to 40% from the previous day's tagging. Apparently fish preferring the cooler water either moved away, or did not feed, and only those were caught that would tolerate the warmer water which had suddenly moved into the area. Another point in favour of this theory is the fact that the average size of the fish tagged the second day was 1.8 cm. smaller than those tagged the first day - 60.5 cm., compared to 62.3 cm. This conforms to the finding that the shoaler and warmer the water the smaller are the cod that live in such places.

While most of the summer recaptures at Canso from the 1934 tagging were made in the tagging region, still a few were retaken along the shore at no great distance from the Canso region, the majority of these roving towards the north-east along the south and east coast of Cape Breton, and not returning at regular intervals to the tagging region. In the late autumn and early winter most of the shore fishing off Canso and around Cape Breton draws to a close due partly to weather conditions and iced-over harbours, and also to the fact that by mid-January the fish are scarce along these shores. As a result, no recaptures were made along shore in this district during the months of February, March or April. The decline in the shore fishery by late January, together with the fact that some recaptures were made on the offshore banks during these months, seems to indicate that possibly there is at least some migration from these shore waters to the offshore grounds in early winter and back again in the spring. The average 1938 and 1939 Canadian cod catch from the eastern banks off Nova Scotia during November to April, inclusive, was about 17.5 million pounds (McKenzie, 1942). This, together with the United States cod catch, which is almost twice as great in this area as the Canadian indicates a heavy fishery compared to a total yearly inshore landing from Halifax, Guysboro and the Cape Breton island counties of about 20.5 million pounds, i. e., about 50 compared to 20 million pounds. Thus, with this heavy offshore winter fishery many more recaptures should have been made if a large-scale migration to the offshore grounds occurs in the late autumn and early winter. It is believed, therefore, that the movement on and off shore from Canso is more of a wandering or roving than a definite seasonal movement off for the winter and back for the summer.

The recaptures to the north-east from Canso make up almost one-half of the "outside" recaptures, yet none of them occurred during the latter part of 1934 after the tagging. Not until June of the following year were any of these fish retaken to the eastward along southern or eastern Cape Breton. This seems to indicate that this movement took place more from the offshore grounds to these Cape Breton areas than from offshore to Canso then to these areas. Otherwise, some movement from Canso in an easterly direction should have occurred in 1934. It seems quite probable, therefore, that these fish when offshore during the 1934-1935 winter joined with the offshore schools which move regularly each spring past the eastern Cape Breton shores into the gulf of St. Lawrence (McKenzie, 1938).

In regard to returns from the various taggings, it was found that the highest percentage was obtained from taggings in bottom water temperatures of 2°C. to 3°C. During tagging, fish were found to be most abundant in 2°C. to 3°C. water with the 1°C. to 2°C. water being in second place. Because of this, it may reasonably be assumed that the greatest fishing effort would be expended in these waters by the shore fishermen who would naturally fish where the fish were most abundant. It is

quite probable, therefore, that this accounts for the highest percentage of recaptures being secured from tagging done in these temperatures. The opposite type of circumstances would no doubt act to produce the lowest percentage of recaptures from fish tagged in water so warm that no great number of cod live in it, for all fishermen try to fish where the fish are most abundant, avoiding water where they know the cod are scarce.

A higher percentage of recaptures come from outside the tagging region in the case of those tagged in 2°C. to 3°C. water under the intermediate layer than from that water above this layer. Hard bottom with suitable cod food extends out from shore only to certain depths off Nova Scotia. Beyond and deeper than this is a mud bottom unsuitable for cod food. During "warm water" years the under part of the intermediate cold layer does not go quite as deep as the junction of the hard and soft bottoms. Consequently there is some bottom with suitable cod food not covered with extremely cold water at the shore end of the intermediate water layer and just under it. Here the large cod of the deep water can live and feed some years, but if the intermediate layer is very thick and cold as in a "cold water" year this outer deeper part of the hard bottom is covered with ice-cold water in which these large cod feed but little. Consequently, it is believed that in order to feed during the summer season they move in deep water either along or off shore. In either case they move out of the tagging region, thus possibly accounting for the high percentage of such fish found at location 1.

The fact that the cod were found to shift to deeper water in winter off eastern Nova Scotia agrees with our findings off Shelburne in western Nova Scotia (McKenzie, 1934a). Such findings seem to indicate quite definitely that the winter cooling of the surface water and or the influx of cold water from the north-eastward is responsible for the cod going to deeper levels during the winter.

SUMMARY

From the 1934 tagging off the Halifax district, about 29% of the 1,983 were recaptured, 24% of the 1935 tagging and 31% of the 1936 tagging. Only 12% of the 478 tagged at Canso were recaptured. Some tagged fish were retaken up to five years later, but fishing was so intense in that area that 20% of the tagged fish were recaptured within the first year from tagging.

After initial capture and tagging no recaptures were made the following day. A few were retaken the second day, increasing irregularly thereafter until a peak was reached in the fourth week following tagging.

The cod as measured and tagged were found to be larger with increased depth on these shore fishing grounds.

No correlation was found between the depths at the tagging locations and the percentage recaptured.

The presence of winter cooled water on the eastern Nova Scotia fishing grounds in winter and early spring is correlated not only with the recapturing of a smaller percentage of tagged fish but also a higher percentage of these recaptures being made outside the tagging regions.

The highest percentages of recaptures were obtained from cod tagged in the 2°C. to 3°C. water just above and just below the coldest part of the intermediate cold water layer which lies between the upper and deep relatively warm layers of water common to this outer Nova Scotian coast. Fish in this water just below the coldest part of the intermediate layer gave the highest percentage returns from outside the tagging region.

Of all recaptures 77% were retaken inside the tagging regions and 23% outside. Of this 23%, 17% were recaptured in summer and 6% in winter. Half of the recaptures made outside the tagging regions came from north-eastward, one-eighth from offshore and three-eighths from the south-west. The variation between the summer and winter percentages recaptured in these three directions is probably due to seasonal change in the fishing effort in these areas.

The percentage of recaptures made in distant places increased from taggings in the upper to intermediate to deep layers of water.

A comparison of the depths where tagged with the average depths where recaptured shows that in general the fish remained in about the same depth of water during the summer but increased this depth as much as 50% on the average during the winter.

Off the Halifax district the three years taggings yielded quite similar results. Three-quarters of the recaptures were made during May to October, inclusive and about 75% of the

1934 and 1936 recaptures were made in the various tagging regions, while only 64% of the 1935 recaptures were. More of the recaptures made outside the tagging region were to the eastward than offshore or to the westward, some going as far as Caspe and Newfoundland. This movement away from the tagging regions was chiefly roving in character, though there may have been a very small-scale movement offshore for the winter and back for the summer.

In the Jeddore rock - Egg island region off the eastern shore of Halifax county, 94% of the recaptures were made during May to October, inclusive, and 81% of all of them were retaken in the tagging regions. Migrations away from these regions were of the same nature as off Halifax.

The tagging at Canso done on consecutive days when the bottom water temperature rose from 5.35°C. to 6.75°C. shows that such a rise in temperature probably is responsible for fewer fish being caught the second tagging day and the recaptures from these showing only 7% retaken outside the tagging region compared to 40% retaken outside from the previous day's tagging. On the whole, 31% of the recaptures were made outside the tagging region. This indicates that the cod at Canso are intermediate in character between the more resident type off Halifax and the more migratory type off eastern Cape Breton.

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Appendix

Shows details of the cod tagging carried out by the Fisheries Research Board of Canada during the years 1934 to 1936 inclusive in the inshore waters of eastern outer Nova Scotia.

INSHORE COD TAGGING 1934 - 1936 INCLUSIVE

Tagging Location (m = miles)	Key Letter used for Location	Dates of Tagging
<u>1934</u>		
3 m. SE Egg Is. buoy (Station Z#140)	a	May 22, 24
5 m. SWxS Jeddore Rk. (Station Z#141)	b	May 25, 26
5 m. SSW Chebucto Hd. (Shoal Grd., Station Z#100)	c	June 4
2.4 m. SW Devils Is. (Station Z#96)	d	June 5
3.5 m. SW Chebucto Hd. (Station Z#61)	e	June 4, 5, 21, 22, 23, 28
1.0 m. Off Betty Is.	f	June 19
8.0 m. SSW Chebucto Hd. (Outer Shoal)	g	June 18, 21
6.0 m. SWxS Betty Is.	h	June 21
12.0 m. S $\frac{1}{2}$ W Chebucto Hd. (3 m. SW Hfx. Ltshp.)	i	June 26, 27, 28
Lighthouse Bk. Halifax Hbr.	j	June 29
Carousse Shoal off Canso	k	July 31, Aug. 1
<u>1935</u>		
6 m. S $\frac{1}{2}$ W Halifax Lightship	l	May 3
15 m. S $\frac{1}{2}$ E Sambro Light (Station Z#69)	m	May 9
5 m. SExS Halifax Lightship	n	May 9
27 $\frac{1}{2}$ m. SW Jeddore Rock	o	May 10
<u>1936</u>		
7 $\frac{1}{2}$ m. SxW Halifax Lightship	p	May 6
2 m. SE Egg Is. buoy	q	May 6
7 m. SxW Halifax Lightship	r	May 7
7 m. SW Betty Is. Light	s	May 7
9 m. SExS Cross Is. Lunenburg Co.	t	May 8
5 m. W. Halifax Lightship	u	May 9

TAGGING RETURNS FROM 1934 TAGGING

Tag No.	Date Tagged	Sta. Tagged	Size	Date Retaken	Place Retaken
30335	May 25	b	-	May 31/34	3 m. off Musquodoboit Hbr.
30078	May 24	a	62	June 4/34	H. Williams, Ostrea Lake. 13 m. ESE Egg Is. buoy, John Keeping Indian Hbr.
30003	May 24	a	64	June 4/34	Same as foregoing.
30117	May 24	a	104	June 4/34	Same as foregoing
17445	May 24	a	101	June 4/34	Same as foregoing
17435	May 24	a	70	June 4/34	Same as foregoing
17407	May 22	a	60	June 4/34	Same as foregoing
17460	May 24	a	74	June 4/34	Same as foregoing
17441	May 24	a	62	June 4/34	Same as foregoing
17464	May 24	a	68	June 4/34	Same as foregoing
17335	May 22	a	81	June 4/34	Same as foregoing
17371	May 22	a	78	June 4/34	Same as foregoing
17274	May 22	a	84	June 4/34	Same as foregoing
17148	May 22	a	?	June 4/34	Same as foregoing
30707	May 25	b	69	June 4/34	Off Petpeswick, N. S.
31239	June 5	e	71	June 11/34	½ m. ESE in her Automatic, Halifax Harbour.
17275	May 22	a	65	June 2/34	6 m. off Ship Har., Head, Halifax Co.
30220	May 25	b	58	June 4/34	6 m. SW Jeddore Cape
30231	May 25	b	56	June 11/34	Near Jeddore Rk.
30269	May 25	b	71	June 11/34	Near Jeddore Rk.
30284	May 25	b	73	May 28/34	5-6 m. off Musquodoboit Hbr.
30373	May 25	b	57	May 28/34	5-6 m. off Musquodoboit Hbr.
30400	May 25	b	61	June 11/34	5 m. out from W. Jeddore Lt.
30417	May 25	b	51	June 8/34	6 m. SW from Jeddore cape
30432	May 25	b	54	May 29/34	5-6 m. off Musquodoboit Hbr.
30511	May 25	b	58	June 4+9/34	5 m. SxE from Musquodoboit fairway buoy.
30563	May 25	b	63	June 1/34	3 m. S of Musquodoboit Automatic buoy.
30719	May 25	b	65	June 1/34	5 m. out from West Jeddore Lt.
30779	May 26	b	72	June 4+9/34	5 m. SxE from Musquodoboit Fairway buoy.
30900	May 26	b	54	June 11/34	5 m. out from W. Jeddore Lt.
30906	May 26	b	69	June 11/34	Near Jeddore Rk.
30912	May 26	b	62	June 11/34	Near Jeddore Rk.
30947	May 26	b	59	May 29/34	5-6 m. off Musquodoboit Hbr.
30986	May 26	b	65	June 6/34	6 m. SW Jeddore Cape
30995	May 26	b	53	June 4+9/34	5 m. SxE from Musquodoboit Fairway buoy
31121	May 26	b	57	June 4+9/34	5 m. SxE from Musquodoboit Fairway buoy
17117	May 22	a	-	June 19/34	10 m. SE Jeddore rock

Tag No.	Date Tagged	Sta. Tagged	Size	Date Retaken	Place Retaken
17298	May 22	a	75	June 19/34	10 m. SE Jeddore Rock
17418	May 24	a	60	June 19/34	10 m. SE Jeddore Rock
30024	May 24	a	80	June 23/34	Off Pleasant Har. N.S. 6 m. off Headland
30235	May 25	b	69	June 14 or 18, 1934	About 4 m. WSW from Jeddore Rock.
30253	May 25	b	66	June 14 or 18, 1934	About 4 m. WSW from Jeddore Rock.
30254	May 25	b	64	June 12/34	8 m. off Musquodoboit Hbr.
30324	May 25	b	74	June 19/34	5 m. Sw of Jeddore Rock
30536	May 25	b	64	June 19/34	10 m. SE from Jeddore Rock
30546	May 25	b	66	June 19/34	$\frac{1}{2}$ m. W from Jeddore Rock
30581	May 25	b	49	June 19/34	5 m. SW of Jeddore Rock
30615	May 25	b	44	June 19/34	5 m. SW of Jeddore Rock
30781	May 26	b	71	June 14 or 18, 1934	About 4 m. WSW from Jeddore Rock
30886	May 26	b	61	June 1-7/34	8 m. off Musquodoboit Hbr.
30963	May 26	b	69	June 14 or 18, 1934	About 4 m. WSW from Jeddore Rock
31111	May 26	b	60	June 1-7/34	8 m. off Musquodoboit Hbr.
31132	June 4		60	June 18/34	South East shoal Halifax Hbr. (1-2m. SE of Shoal Grd.)
31155	June 4		57	June 16/34	Outer Shoal (1-2 m. S of Shoal Grd.)
31315	June 5	e	57	June 16/34	$2\frac{1}{2}$ m. S of Devils Is.
17260	May 22	a	87	June 23/34	$5\frac{1}{2}$ m. out of Popes Hbr.
17264	May 22	a	71	June 18/34	6 m. SxE from Jeddore Rock
17334	May 22	a	70	June 18/34	Ship Harbour ($3\frac{1}{2}$ m. S $\frac{1}{2}$ E Ship Hbr. Whistle Buoy)
17370	May 22	a	92	June 29/34	Tangier Shoal, 3 m. off-shore
17336	May 24	a	67	July 2/34	$\frac{1}{2}$ m. SE from Tuffin Bank, coast of New Harbour
17484	May 24	a	71	June 27/34	12 m. S Cape Negro
30051	May 24	a	78	June 13/34	Ship Har. ($2\frac{1}{2}$ m. S Ship Har. Whistle Buoy)
30069	May 24	a	70	June 7/34	8 m. SxW off Musquodoboit Groaner
30197	May 24	a	77	June 18/34	6 m. SxE from Jeddore Rock
30312	May 25	b	78	June 19/34	5-7 m. off Musquodoboit
30420	May 25	b	56	June 12/34	5 m. SxW Musquodoboit Groaner
30431	May 25	b	50	June 7/34	8 m. SxW Musquodoboit Groaner
30438	May 25	b	53	June 1/34	5-7 m. off Musquodoboit
30552	May 25	b	71	June 28/34	5 m. SWxS from Jeddore Rock Light

Tag No.	Date Tagged	Sta. Tagged	Size	Date Retaken	Place Retaken
30571	May 25	b	63	June 19/34	5-7 m. off Musquodoboit
30668	May 25	b	59	June 14/34	5 m. SWxS from Jeddore Rock Light
30678	May 25	b	63	June 20/34	11 m. SWxS of Egg Is. Buoy
30697	May 25	b	69	June 29/34	7 m. off Musquodoboit
30706	May 25	b	60	June 11/34	5-7 m. off Musquodoboit
30752	May 25	b	76	June 28/34	5 m. SWxS from Jeddore Rock Light
30757	May 25	b	57	June 18/34	6 m. SxE from Jeddore Rk.
30899	May 26	b	56	July 3/34	Ship Har. 3 $\frac{1}{2}$ S $\frac{1}{2}$ E Ship Hbr. Whistle Buoy
30936	May 26	b	58	June 30/34	About 7 m. off Musquodoboit
31107	May 26	b	61	June 12/34	5-7 m. off Musquodoboit
31109	May 26	b	55	June 18/34	5-7 m. off Musquodoboit
31138	June 4	c	65	June 29/34	2 m. S. East Sambro Light
31185	June 4	c	55	June 27/34	3 m. SxE of Chebucto Hd.
31192	June 4	c	50	June 27/34	3 m. SxE of Chebucto Hd.
31411	June 18	e	62	June 22/34	SE Shoal off Sambro Lt.
31493	June 21	e	67	June 30/34	6 $\frac{1}{2}$ -7 m. E of Devils Is.
17434	May 24	a	80	June 19/34	6 m. SW of Betty's Is.
17444	May 24	a	76	June 28/34	1 $\frac{1}{2}$ m. SE from Cape Sambro
30134	May 24	a	64	June 21/34	In Chedabucto Bay
30230	May 25	b	85	June 16/34	5 m. off Musquodoboit
30248	May 25	b	63	July 9/34	3 m. SxE Musquodoboit Fairway buoy
30288	May 25	b	56	July 19/34	5 m. SW Jeddore Rock
30289	May 25	b	72	July 19/34	5 m. SW Jeddore Rock
30303	May 25	b	70	July 29/34	2 $\frac{1}{2}$ m. SSW Jeddore Rock
30322	May 25	b	68	June 18-22 1934	4 m. SSW Jeddore Rock
30390	May 25	b	63	July 6/34	6 m. WSW Jeddore Cape
30407	May 25	b	44	July 9/34	2 m. ExS Musquodoboit Fairway Buoy
30411	May 25	b	106	July 6/34	The Gardens off Sambro
30421	May 25	b	49	July 7/34	2 m. SxW Musquodoboit fairway buoy
30427	May 25	b	54	June 20/34	5 m. off Musquodoboit Hbr.
30452	May 25	b	63	June 30/34	5 m. off Musquodoboit Hbr.
30515	May 25	b	57	June 29/34	6 m. SW Jeddore Rock
03521	May 25	b	61	June 21/34	5 m. SE Musquodoboit Fairway Buoy
30527	May 25	b	76	July 7/34	6 m. SW Jeddore Rock
30556	May 25	b	67	June 30/34	5 m. SxW Musquodoboit Groaner
30566	May 25	b	55	June 18-22 1934	4 m. SSW Jeddore Rock
30567	May 25	b	82	June 29/34	2 $\frac{1}{2}$ m. SSW Jeddore Rock
30605	May 25	b	52	June 18-22 1934	4 m. SSW Jeddore Rock

Tag No.	Date Tagged	Sta. Tagged	Size	Date Retaken	Place Retaken
30639	May 25	b	68	July 5/34	6 m. SW Jeddore Rock
30642	May 25	b	67	June 29/34	5½ m. SxW Jeddore Rock Lt.
30793	May 25	b	62	July 9/34	6 m. SW Jeddore Rock
30772	May 26	b	56	June 18/34	5 m. from Jeddore Rock
30819	May 26	b	57	June 20/34	5 m. SE Musquodoboit Fairway Buoy
30838	May 26	b	65	June 26/34	5½ m. SxW Jeddore Rock Lt.
30850	May 26	b	67	June 29/34	5½ m. SxW Jeddore Rock Lt.
30891	May 26	b	76	June 29/34	6 m. SW Jeddore Rock Lt.
30922	May 26	b	58	June 18-22 1934	4 m. SSW Jeddore Rock Lt.
30932	May 26	b	63	June 18-22 1934	½ m. WSW Jeddore Rock Lt.
30939	May 26	b	62	July 5/34	6 m. SW Jeddore Rock
30966	May 26	b	49	July 5/34	2 m. SxW Musquodoboit buoy
31020	June 23	e	57	July 6/34	The Gardens, off Sambro
31277	June 5	e	88	July 2/34	Off Chezzetcook, Halifax Co., N. S.
30301	June 5	e	76	July 6/34	The Gardens, off Sambro
31535	June 22	e	66	June 19/34	4 m. SE Cape Sambro (SE shoal)
31118	May 26	b	60	June 9/34	3 m. off Petpeswick Hbr.
17354	May 22	a	68	July 18/34	5 m. S of Tangier Is. Halifax Co.
17287	May 22	a	80	June 13/34	6 m. off Ship Hbr.
17314	May 22	a	77	July 10/34	12 m. E from East Dover Lightship
17465	May 24	a	59	June 20/34	2 m. S. of Jeddore Hbr.
17467	May 24	a	69	June 20/34	2 m. S. of Jeddore Hbr.
17499	May 24	a	82	July 14/34	10 m. SxW of "Old Man" East Jeddore
30008	May 24	a	73	July 3/34	1 m. SE of Ship Hbr. Blow Buoy
30109	May 24	a	73	July 14/34	10 m. SxW of "Old Man" East Jeddore
30144	May 24	a	76	June 30/34	3 m. SW of Egg Is. Light
30151	May 24	a	83	June 21/34	5 m. SSE of Jeddore Rock
30233	May 25	b	76	June 26/34	¼ m. S. of Devils Is.
30301	May 25	b	90	July 11/34	3 m. SE of Musquodoboit Buoy
30302	May 25	b	53	July 14/34	5 m. SxW of Musquodoboit Groaner
30353	May 25	b	66	June 20/34	3 m. SE of Musquodoboit Buoy
30392	May 25	b	62	July 10/34	4½ m. SxW of Musquodoboit Buoy
30409	May 25	b	82	June 13/34	3 m. SE of Musquodoboit Buoy
30433	May 25	b	52	June 13/34	3 m. S. from Jeddore Rock
30446	May 25	b	63	July 5/34	Off the "Sisters" Sambro

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
30523	May 25	b	55	June 13/34	3 m. SE of Musquodoboit Buoy
30559	May 25	b	69	June 15/34	3 m. SE of Musquodoboit Buoy
40638	May 25	b	59	July 14/34	4½ m. SW of Jeddore Rk.
30676	May 25	b	71	June 18/34	Fishing Br. S. of Big Rock off Jeddore Harbour
30798	May 26	b	75	July 11/34	3 m. S. of "Old Man", East Jeddore
30806	May 26	b	64	June 7/34	4 m. SxSE of Jeddore Rk.
30868	May 26	b	82	July 11/34	3 m. S from Jeddore Rk.
30926	May 26	b	64	July 2/34	3 m. SW of Egg Is. Lt.
30934	May 26	b	76	July 11/34	4 m. SSW of Jeddore Rk.
30937	May 26	b	55	July 5/34	6 m. SE from Jeddore Rk.
31035	June 23	e	56	July 7/34	Found at National Fish Co. plant--from "offshore"
31113	May 26	b	61	July 7/34	6 m. S. of Tangier Is.
31147	June 4	c	66	June 16/34	½ m. E. of "sisters" Grd. Sambro Ledges.
31178	June 4	c	47	June 23/34	1 m. E. of Sambro Lt.
31182	June 4	e	66	June 22/34	3 m. SE of Inner Automatic, Halifax Harbour
31210	June 5	d	55	June 28/34	A few miles SE Halifax Lightship
31223	June 5	e	57	July 17/34	3 m. SE of Groaner Automatic, Halifax Hbr.
31236	June 5	e	58	July 17/34	3 m. SE of Groaner Automatic, Halifax Hbr.
31278	June 5	e	59	June 7/34	The "Gardens", Sambro Ledges
31350	June 5	e	61	July 9/34	2½ m. SE of Devils Is.
31377	June 18	g	60	July 17/34	4½ m. S. from Sambro Lt.
31408	June 18	g	58	July 13/34	2 m. SE from Sambro Lt.
31440	June 21	g	54	July 2/34	Outer Shoal, 1½ m. SxSE from Sambro Light
31455	June 21	g	69	July 15/34	2½ m. SE from Sambro Lt.
31526	June 21	e	63	July /34	2 m. SxW off Chebucto Hd.
31554	June 22	e	74	June 9/34	2½ m. SE of Devils Is.
31595	June 22	e	63	June 29/34	2 m. SE of Devils Is.
31613	June 27	i	58	July 12/34	About 35 m. SxW ½ W off Sambro Lt.
31614	June 27	i	98	July 6/34	½ m. due E of SE shoal Sambro Ledge
31702	June 26	i	81	July 11/34	½ m. E. of "Sisters" Grd. Sambro Ledge
17133	May 22	a	66	July 19/34	"The Sisters" off Ketch Harbour
17318	May 22	a	65	July 18/34	4 m. from Ecum Secum, 1 m. outside Lockwood Rock
17394	May 24	a	62	June 10/34	Off Owls Head, N.S. (8 m. Sth.)

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
17400	May 24	a	88	July 10/34	Toms Shoal, Clam Harbour, N. S.
17429	May 24	a	69	July 7/34	3 m. SW ship Harbour Buoy
30005	May 24	a	65	July 25/34	3 m. off Tangier Island
30028	May 24	a	62	July 16/34	4 m. Ecum Secum, 1 m. outside Lockwood Rock.
30048	May 24	a	72	June 23/34	3 1/2 m. SxW of Black Ledge, SExE Egg Is.
30098	May 24	a	67	July 25/34	5 m. S of Egg Is. Buoy
30145	May 24	a	58	July 4/34	Black Ledges off White Head Guysboro Co. (1 m. off SW)
30158	May 24	a	105	July 27/34	3 m. S. of Jeddore Rock
30168	May 24	a	64	July 12/34	1 m. SE from Green Island or Egg Island
30471	May 25	b	68	July 12/34	1 m. ESE Musquodoboit Automatic Buoy
30512	May 25	b	70	July 7/34	4 m. S of Musquodoboit Automatic Buoy
30519	May 25	b	82	July 14/34	3 m. SxW Musquodoboit Automatic Buoy
30529	May 25	b	58	July 21/34	3 m. SE of Three Fathom Har.
30538	May 25	b	68	July 5/34	12 m. S of Tangier Is.
30561	May 25	b	58	July 9/34	8 m. SxW from Duno He., Darby Rk., N. S.
30705	May 25	b	56	June 20/34	Petpeswick Shoal, 3 m. off Petpeswick Harbour
30748	May 26	b	57	July 12/34	1 m. NxE from Musquodoboit Buoy
30945	May 26	b	48	June 20/34	1 m. E from Musquodoboit Buoy
30958	May 26	b	69	July 11/34	SE of "Old Man", East Jeddore
30972	May 26	b	58	Aug. 2/34	5 m. S of Tangier Is.
31001	May 26	b	62	July 23/34	4 m. SE of Chebucto Hd.
31031	June 23	e	44	July 16/34	E of Head Rock Buoy, Halifax Har.
31053	June 23	e	65	July 20/34	5 m. SSE of Chebucto Hd.
31069	June 23	e	68	July 20/34	5 m. SSE of Chebucto Hd.
31070	June 23	e	59	July 20/34	5 m. SSE of Chebucto Hd.
31075	June 23	e	76	July 20/34	5 m. SSE of Chebucto Hd.
31099	June 23	e	50	July 21/34	3 m. SE of Three Fathom Har.
31151	June 4	c	60	Aug. 1/34	1 m. From "Sisters" bell buoy, Sambro, N. S.
31180	June 4	e	75	July 20/34	"The Gardens", 3 m. SE Chebucto Hd.
31227	June 5	e	62	July 15/34	4 m. SE of Chebucto Hd.
31259	June 5	e	58	July 7/34	Between Devils Is. and Eastern Passage
31326	June 5	e	63	July 7/34	Between Devils Is. and Eastern Passage

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31328	June 5	e	51	July 20/34	5 m. SSE of Chebucto Hd.
31447	June 21	g	69	July 23- 28/34	In Terrence Bay, N. S.
31574	June 22	e	66	July 1/34	2 m. SSE of Cow Bay Head
31631	June 27	i	66	Aug. 1/34	6 m. ExS of Devils Is.
31663	June 26	i	73	July 16/34	1 m. ESE Musquodoboit Automatic Buoy
31722	June 28	i	59	July 24/34	1/2 m. E Head Rk. Buoy
17120	May 22	a	?	July 3/34	8 m. SW Port Felix Lt., and 6 m. from Berry Hd. Lt.
17482	May 24	a	76	May 28/34	6 m. E. of E. Jeddore
30041	May 24	a	59	May 28/34	6 m. E. of E. Jeddore
30067	May 24	a	85	Aug. 8/34	6 m. S of Ship Har. Lt.
30137	May 24	a	87	July 24/34	12 m. S. of Jeddore Lt.
30557	May 25	b	60	Aug. 16/34	1 m. SW Egg Is., Duck Rk.
30580	May 25	b	60	July 28/34	3 m. E. of Ship Harbour
30610	May 25	b	59	July 18/34	4 m. SE of Ship Har. Buoy
30775	May 26	b	49	July 24/34	3 m. S. Tangier Is.
31814	May 26	b	56	June 28/34	2 m. SW Jeddore Rk.
30866	May 26	b	76	July 4/34	2 m. SW Jeddore Rk.
30908	May 26	b	64	July 20/34	9 m. WSW Jeddore Rk.
30953	May 26	b	75	June 26/34	2 m. SW Jeddore Rk.
31024	June 23	e	57	Aug. 8/34	Thomas Shoal, 3 m. SE Chebucto Hd.
31063	June 23	e	53	Aug. 8/34	Thomas Shoal, 3 m. SE Chebucto Hd.
31204	June 5	d	58	July 16/34	Thomas Shoal, Halifax Har.
31246	June 5	e	60	Aug. 9/34	Thomas Shoal SE Chebucto Hd.
31344	June 5	e	72	July 16/34	Thomas Shoal Halifax Har.
31355	June 5	e	50	Aug. 12/34	Pt. Pleasant, Entrance to N. W. Arm
31391	June 18	g	62	July 30/34	Shoal Grd. Off Sambro
31405	June 18	g	69	Aug. 1/34	3 m. SE Devils Is.
31425	June 19	f	67	July 1-5/34	1 1/2 m. off Dover
31501	June 21	e	72	July 16/34	Thomas Shoal, Halifax Har.
31537	June 22	e	60	Aug. 9/34	Thomas Shoal, Halifax Har. SE Chebucto Hd.
31655	June 27	i	108	July 25/34	7 m. SSW Port Bickerton Lt. Station
31719	June 28	i	65	July 11/34	Head Rock, Halifax Har.
31568	June 22	e	66	Aug. 8/34	South East Grd. Halifax Har.
31927	July 31	k	62	Aug. 13/34	Crouse Bank, Canso
30140	May 24	a	77	Aug. 1/34	6 m. SE Owls Hd.
30250	May 25	b	68	July 14/34	1/8 m. SE Indian Is. Bell Buoy 3 m. off Broad Cove, W. Lunenburg Co.
30532	May 25	b	58	Aug. 2/34	2 m. SxE Musquodoboit Buoy
30572	May 25	b	73	July 31/34	6 m. E of Jeddore Rk. Lt.

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31171	June 4	c	57	July 30/34	Shoal Grd., Sambro
31177	June 4	c	60	July 18/34	SE Shoal Ketch Har.
31194	June 4	e	72	June 11/34	Duncans Reef, 2 m. SxW Chebucto Hd.
31220	June 5	e	56	July 30/34	Duncans Reef, 2 m. SxW Chebucto Hd.
31522	June 21	e	62	July 15/34	3½ m. Off Sambro Lt.
31639	June 27	i	58	July 23/34	4 m. SxW Sambro Lt.
17326	May 22	a	69	Aug. 18/34	5 m. off Popes Harbour
17417	May 24	a	58	June 15/34	Brigg Rock, East Jeddore
17493	May 24	a	71	Aug. 20/34	6 m. SxE Jeddore Rk.
30036	May 24	a	61	July 5/34	6 m. SxE Jeddore Rk.
30072	May 24	a	80	July 9/34	Near Upper Sambro
30092	May 24	a	70	Aug. 17/34	5 m. SxW Jeddore Rk. Lt.
30272	May 25	b	61	Aug. 15/34	3 m. S Petpeswick Hd.
30334	May 25	b	62	Aug. 17/34	8 m. SW Jeddore Rk.
30480	May 25	b	73	Aug. 18/34	5 m. SxE Jeddore Rk.
30534	May 25	b	58	Aug. 16/34	7 m. SSW Musquodoboit Buoy
30658	May 25	b	60	Aug. 28/34	1½ m. S. Musquodoboit Buoy
30702	May 25	b	74	Aug. 20/34	6½ m. S. Jeddore Rk.
30710	May 25	b	54	Aug. 16/34	6 m. SSW Jeddore Rk. Lt.
30721	May 25	b	63	Aug. 20/34	6½ m. S. From Jeddore Rk.
30723	May 25	b	68	Aug. 20/34	6½ m. S. From Jeddore Rk.
30726	May 25	b	68	Aug. 21/34	6 m. SSW Jeddore Rk. Lt.
30766	May 26	b	57	July 25/34	Charles Cove, off Tor Bay Pt.
30827	May 26	b	59	Aug. 20/34	6 m. SxE Jeddore Rk.
31021	June 23	e	59	Aug. 30/34	5 m. off Chezzetcook Har.
31055	June 23	e	80	Aug. 23/34	2 m. off Chebucto Head. Thomas Shoal
31058	June 23	e	68	Aug. 23/34	2 m. off Chebucto Head. Thomas Shoal
31143	June 4	c	51	Aug. 24/34	Shoal Grd. off Sambro
31188	June 4	e	56	Aug. 3/34	2½ m. SxE off Devils Is.
31230	June 5	e	77	Aug. 17/34	17 m. SSE Green Is., Mouth Mahone Bay
31381	June 18	g	57	Aug. 11/34	Off Sambro Halifax Co.
31544	June 22	e	51	Aug. 23/34	2 m. off Chebucto Head, Thomas Shoal
31599	June 22	e	74	Aug. 10/34	3 m. SE Chebucto Head, Thomas Shoal
31651	June 27	i	63	Aug. 10/34	3 m. SE Chebucto Head, Thomas Shoal
31668	June 26	i	67	Aug. 10/34	4 m. WSW Halifax Ltshp.
31704	June 28	i	62	July 10/34	4 m. SW Halifax Ltshp.
31772	July 31	k	62	Aug. 10/34	Southern Shoal, off Canso
31793	July 31	k	60	Aug. 23/34	½ m. SW of Crouse, Canso
31797	July 31	k	62	Aug. 18/34	½ m. SW of Crouse, Canso
31858	July 31	k	?	Aug. 15/34	Crouse Bank

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31878	July 31	k	83	Aug. 10/34	Southern Shoal
32006	July 31	k	66	Aug. 30/34	Middle Ground, Canso
32105	Aug. 1	k	49	Aug. 3/34	Crouse Bank, Canso
32107	Aug. 1	k	55	Aug. 20/34	SW of Crouse, Canso
32131	Aug. 1	k	92	Aug. 3/34	Crouse Bank, Canso
17300	May 22	a	74	Aug. 27/34	4 m. SE Jeddore Rk.
17401	May 22	a	70	Sept. 7/34	6 m. Due S. Spry Bay, Bell Buoy
17448	May 24	a	92	Aug. 30/34	4 m. SE of Egg Is. off Owls Hd.
30032	May 24	a	95	Aug. 29/34	7 m. SE White Is. Guys. Co.
31165	May 24	a	68	Aug. 15/34	1 m. W. of Egg Is.
30088	May 24	a	92	July 1-7/34	Clam Bank, west of Egg Is.
30147	May 24	a	70	Sept. 4/34	3 m. NE Egg Is. Buoy
30165	May 24	a	62	Sept. 4/34	10 m. SxSE Jeddore Rock
30348	May 25	b	64	Aug. 15/34	$\frac{1}{2}$ m. NE of Chebucto Hd.
30393	May 25	b	50	Sept. 7/34	6 m. due S of Spry Bay Bell Buoy
30418	May 25	b	51	Sept. 11/34	6 m. SW from Jeddore Rock
30440	May 25	b	54	Sept. 11/34	6 m. SW from Jeddore Rock
30666	May 25	b	63	Aug. 16/34	4 m. SWxS Jeddore Rock Lt.
30808	May 25	b	67	Aug. 27/34	Off Jeddore
30923	May 25	b	61	July 16/34	5 m. SSW Jeddore Rk. Lt.
30977	May 25	b	59	July 16/34	5 m. SSW Jeddore Rk. Lt.
31029	June 23	e	49	July 10/34	Edge of "Sisters Ground"
31041	June 23	e	56	Aug. 28/34	Duncans Reef, Halifax Har.
31159	June 4	c	45	Aug. 10/34	3 m. SSE Sambro Lt.
31443	June 21	g	78	Sept. 6/34	3 m. SE of Chebucto Hd.
31444	June 21	g	65	Sept. 10/34	Outer Shoal off Sambro
31512	June 21	e	62	Aug. 8/34	$3\frac{1}{2}$ m. SW Chebucto Hd.
31559	June 22	e	54	Aug. 10/34	$3\frac{1}{2}$ m. off Devils Is.
31641	June 27	i	105	Aug. 23/34	The "Gardens Grounds" off Sambro
17257	May 22	a	54	Aug. 15/34	$2\frac{1}{2}$ m. SW of Egg Is.
17288	May 22	a	79	Aug. 15/34	4 m. SWxW--SSW from Jeddore Cape
17328	May 22	a	79	Sept. 26/34	6 m. SxE from Jeddore Rock
17425	May 24	a	74	Aug. 7/34	$2\frac{1}{2}$ m. SW of Egg Is.
17477	May 24	a	72	July /34	5 m. off Spry Bay
30020	May 24	a	64	Sept. 27/34	6 m. SW from Jeddore Rock
30074	May 24	a	59	Sept. 20/34	SSW of Jeddore Rock
30252	May 25	b	56	Aug. 27/34	3 m. SE of Egg Is. Buoy
30336	May 25	b	67	July 21/34	4 m. SWxW-SSW from Jeddore Cape
30391	May 25	b	63	Sept. 5/34	3 m. SSW of Jeddore Rock Light
30405	May 25	b	57	Sept. 14/34	6 m. SWxS of Jeddore Rock Light
30444	May 25	b	51	Sept. 17/34	East Ecum Secum
30475	May 25	b	58	Aug. 30/34	5 m. off Musquodoboit Automatic Buoy
30550	May 25	b	63	Sept. 14/34	4 m. SE from Petpeswick Har.

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
30660	May 25	b	63	Aug. 8/34	4 m. SWxW-SSW from Jeddore Cape
30667	May 25	b	57	Sept.12/34	5 m. SWxW from Jeddore Rock Lt.
30685	May 25	b	65	Sept.11/34	7 m. SW from Jeddore Rock Lt.
30698	May 25	b	57	Sept.22/34	6 m. SSW from Jeddore Rock Lt.
30712	May 25	b	48	Sept.17/34	7 m. SW from Jeddore Rock Lt.
30797	May 26	b	61	Aug. 29/34	1 m. off Upper Prospect
30948	May 26	b	51	Sept.22/34	6 m. off Three Fathom Harbour
30952	May 26	b	80	Aug. 4/34	4 m. SWxW-SSW from Jeddore Cape
30959	May 26	b	56	Aug. 30/34	4 m. SWxW-SSW from Jeddore Cape
30964	May 26	b	59	Aug. 8/34	4 m. SWxW-SSW from Jeddore Cape
30990	May 26	b	63	July 23/34	WNW Egg Is.
31051	June 23	e	52	Sept.29/34	3 m. SE of Chebucto Hd.
31074	June 23	e	72	Sept. 3/34	2 m. SE of Cross Is. Light
31093	June 23	e	65	Aug. /34	Shoal Ground (near) off Sambro Is.
31094	June 23	e	51	Sept.29/34	3 m. SE of Chebucto Hd.
31117	May 26	b	64	Sept.14/34	5 m. SxE from Jeddore Rock
31127	May 26	b	57	Aug. 4/34	4 m. SWxW-SSW from Jeddore Cape
31136	June 4	c	54	Sept.29/34	Sambro Ledges, off Sandy Cove
31245	June 5	e	60	July /34	5 m. off Spry Bay
31319	June 5	e	59	Sept.12/34	½ m. NE from SE Automatic Outer Buoy
31392	June 18	g	66	July 23/34	3 m. SxE from Egg Is.
31421	June 19	f	71	Aug. 25/34	"Stone Horse", SxSE from White Is. E Dover
31441	June 21	g	64	Sept.24/34	3 m. S of Sambro Lt.
31448	June 21	g	96	Sept.24/34	2 m. S from Sambro Lt.
31464	June 21	g	52	Sept.15/34	1½ m. SE of Sambro Lt.
31505	June 21	e	92	Aug. /34	Outer Shoal, Sambro
31667	June 26	i	83	July 19/34	5 m. off Chezzetcook Har.
31713	June 28	i	67	Sept.22/34	5 m. S. of Devils Is.
32012	July 31	k	53	Aug. 20/34	Crouse Shoal, Canso
31086	July 31	k	81	Sept.17/34	Banquereau Bank
				-22	
32138	Aug. 1	k	68	Aug. 30/34	Crouse Shoal, Canso
30021	May 24	a	73	Sept.14/34	4 m. SW of Jeddore Rock
30038	May 24	a	62	Aug. /34	Off Little Anse, near Green Is., S coast of Isle Madame

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
30056	May 24	a	61	Sept. 20/34	8 m. SxE of Three Fathom Har.
30070	May 24	a	66	Sept. 20/34	3 m. NE of Egg Is. Buoy
30076	May 24	a	62	July /34	2-3 m. SxE of Egg Is. Buoy
30094	May 24	a	65	Sept. 15/34	Off Owls Head Har.
30124	May 24	a	72	Sept. 15/34	Crouse Shoal of Canso
30163	May 24	a	63	Oct. 3/34	5 m. E. of Jeddore Rock
30287	May 25	b	61	July 30/34	1½ m. ExS Musquod. fairway buoy
30332	May 25	b	74	July 25/34	4 m. NE of Egg Is. Buoy
30402	May 25	b	58	Sept. /34	2-3 m. SxE of Egg Is. Buoy
30415	May 25	b	63	Sept. 19/34	8 mi. SWxS from Jeddore Rock
30455	May 25	b	68	Oct. 4/34	5 mi. SSW of Jeddore Rock
30584	May 25	b	56	Sept. 26/34	7 m. S from Jeddore Rock
30661	May 25	b	68	Sept. 11/34	3 m. S of Jeddore Rock
30665	May 25	b	52	Oct. 3/34	6 m. SWxW Jeddore Rock
30686	May 25	b	66	Oct. 3/34	3 mi. off Three Fathom Har. SE of the buoy
30722	May 25	b	65	Sept. 20/34	10 mi. S. of Story Hd. Chezzet. Har.
30830	May 26	b	59	Aug. 23/34	5 m. SW of Jeddore Rock
31064	June 23	e	43	Aug. 17/34	Blind Sisters Ledges off Sambro Island
31129	June 4	c	57	Sept. 20/34	Off Sambro
31388	June 18	g	60	Sept. 6/34	6 mi. SSE Mars Hd., Terrence Bay
31406	June 18	g	56	Sept. 20/34	Liscomb, Guysboro Co.
31453	June 21	g	44	Oct. 2/34	Ring Shoal, ½ mi. SW of Outer Shoal and 4 mi. from Sambro Lt.
31459	June 21	g	61	Oct. 1/34	12 m. SWxS Jeddore Rock
31473	June 21	g	51	Oct. 3/34	Ring Shoal, ½ m. SW of Outer Shoal and 4 mi. from Sambro Lt.
31566	June 22	e	57	Oct. 4/34	Thomas Shoal, 2 mi. off Chebucto Hd.
31617	June 27	i	61	Sept. 23/34	4 m. SW of Sambro Lt.
31677	June 26	i	65	Sept. 11/34	3 m. SW of Jeddore Rk.
31681	June 26	i	79	Aug. 28/34	8½ m. SxW Meaghers Hd.
31843	July 31	k	67	Sept. 22/34	10 m. off Port Felix Har.
32024	July 31	k	75	Sept. 15/34	Crouse Shoal
17411	May 24	a	-	July 1/34	5 m. SW of Egg Is.
17450	May 24	a	75	Nov.18-20/34	Banquereau/ St. Tr. Sq #321
30046	May 24	a	80	Nov.18-20/34	Banquereau
30083	May 24	a	75	Nov.18-20/34	Banquereau
30317	May 25	b	58	Sept. 10/34	½ m. SE of "Yankee Jack" (S. ? Sheet Har. 5 m. from Mth. Hbr.)
17415	May 24	a	61	July 1/34	5 m. SW of Egg Is.

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
30347	May 25	b	53	Oct. 6/34	4 m. S. of Lower East Chezzetcook
30541	May 25	b	56	Nov. 28/34	Banquereau
30578	May 25	b	68	Oct. 2/34	4½ m. SSW Jeddore Rock
30599	May 25	b	68	Nov. 10/34	7 m. S. of Cross Is.
30656	May 25	b	63	Nov. 15/34	8 m. SSE of Cross Is.
30742	May 26	b	64	Oct. 1-6/34	5-6 m. E of Fame Pt. Lighthouse Gaspé
30815	May 26	b	79	Sept. 25/34	7 m. SW of Jeddore Rock
31012	June 22	e	57	Aug. 15/34	6½ m. S½W from Petpeswick Hd.
31126	May 26	b	57	Sept. 4/34	1½ m. S. from Big Darby
31396	June 18	g	51	Nov. 15/34	8 m. SSE of Cross Is. Lighthouse
31413	June 19	f	74	Oct. 15/34	Off Prospect
31545	June 22	e	57	Nov. 14-18/34	4-5 m. off Drum Hd., Guys. Co
31557	June 22	e	73	Nov. 9/34	On St. Pierre Bank
30605	June 27	i	59	Nov. 15/34	8 m. SE of Cross Is. Lthse.
31626	June 27	i	68	Nov. 15/34	1 m. SSE of Sambro Ltshp.
31703	June 26	i	58	Nov. 5/34	3 m. SSW of Sambro Ltshp.
31732	July 31	k	75	Nov. 19/34	Off Canso NS (found in Hendsbee Plant)
30862	May 26	b	52	Nov. 15/34	2 m. SxW of Musquodoboit Fairway Buoy
30879	May 26	b	97	Nov. 15/34	2 m. SxW of Musquodoboit Fairway Buoy
31000	May 26	b	53	Sept. 6/34	5 m. SSW of Pennant Pt.
32258	Oct. 26	Ives Knoll	82	Nov. 12/34	200 yds. off Imperial Oil Co. Whf.
30436	May 25	b	55	Nov. 21/34	On Roseway Bank
30865	May 26	b	55	Dec. 17/34	8 m. off Sheet Harbour
31081	June 23	e	74	Nov. 30/34	3 m. S of Sambro Lt.
31266	June 5	e	67	Dec. 10/34	8-9 m. SE of Thrumcap Buoy, Hal. Har.
31478	June 21	e	54	Dec. 10/34	8-9 m. SE of Thrumcap Buoy, Hal. Har.
31647	June 27	i	58	Nov. 27/34	Banquereau Bk.
31778	July 31	k	63	Nov. 25/34	On Liscomb Ridges.
30096	May 24	a	60	June 25/34	3 m. S. Ship Har. Whistle Buoy
30582	May 25	b	50	Jan. 10/35	27 m. SE Thrum Cap Buoy
31272	June 5	e	62	Feb. 10/35	On Western Bank. (Howard and Donald Schnr.)
31675	June 26	i	63	Feb. 8/35	22 m. SxW of Sambro Lt.
31958	July 31	k	56	Jan. 11/35	3 m. SE Grimes Rk. Buoy, Canso
32196	Aug. 1	k	54	Jan. 11/35	3 m. SE Grimes Rk. Buoy, Canso

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
32234	Aug. 1	k	50	Jan. 11/35	3 m. SE Grimes Rk. Buoy, Canso
32251	Aug. 1	k	51	Jan. 11/35	3 m. SE Grimes Rk. Buoy, Canso
17478	May 24	a	75	Nov. 29/34	4 m. S of Black Ledges, Ecum Secum
30180	May 24	a	78	Aug. 24-	
				31/34	9 m. S Tangier Is.
30682	May 25	b	65	Sept. 4/34	In Spry Bay
31258	June 5	e	51	April 8/35	3 m. SE Halifax Ltshp.
31311	June 5	e	72	Mar. 5/35	20 m. SSW Cross Is. Lunenburg Co.
31407	June 18	g	61	April 1/35	7 m. SE Sambro Light
31524	June 21	e	52	March 5/35	20 m. SSW Cross Is. Lunenburg Co.
31669	June 26	i	58	April 8/35	3 m. SE Halifax Ltshp.
32223	Aug. 1	k	55	March 25/35	10 m. SW of Cape Negro
30019	May 24	a	58	Sept. 15/34	10 m. off Tangier Island
30057	May 24	a	69	Aug. 22/34	Off LaHave Ironbound Is.
30166	May 24	a	87	April /35	15 m. SW from Seal Island
30294	May 25	b	75	June 19/35	6 m. SxW outer Range Light Musquod. Hbr.
30414	May 25	b	57	June 3/35	4½ m. SW of Jeddore Rock
30448	May 25	b	53	April 25/35	12-15 m. SE outer Automatic Buoy, Halifax Hbr.
30497	May 25	b	74	May 11/35	½ m. SSE Herring Cove Lt.
30513	May 25	b	76	June 18/35	2 m. S Musquod. Buoy
30516	May 25	b	74	June 10/35	SSW Jeddore Rock
30533	May 25	b	44	June 21/35	5 m. S Tangier Is.
30593	May 25	b	54	June 10/35	SSW Jeddore Rock
30631	May 25	b	56	June 19/35	6 m. SxW, outer Range Lt. Musquod. Hbr.
30694	May 25	b	54	Mar. 24/35	35 m. SE Liscomb, fairway buoy
30756	May 25	b	67	June 26/35	4 m. SW from Jeddore Rock
30807	May 26	b	47	June 6/35	4½ m. SWS from Jeddore Rock
30816	May 26	b	49	June 24/35	1½ m. SW from Jeddore Rock
30837	May 26	b	57	June 20/35	2 m. S from Jeddore Rock
30992	May 26	b	62	June 15/35	3 m. SW of Jeddore Rock
31110	May 26	b	58	June 10/35	On Roseway Bank
31042	June 23	e	78	June 5/35	½ m. SE of Ketch Harbour Head
31057	June 23	e	65	May 10/35	Duncan's Reef, about ¼ m. from shore
31214	June 5	e	56	May 18/35	2½ m. SE of Devils Island
31263	June 5	e	80	May 15/35	3½ m. off Pennant Point
31292	June 5	e	60	May 8/35	3 m. NE Halifax Lightship
31312	June 5	e	53	May 14/35	3 m. off Chebucto Head
31314	June 5	e	63	March /35	Vic. Halifax Lightship
31384	June 18	g	47	May 14/35	Outer shoal off Sambro Light

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31606	June 27	i	56	June 13/35	6 m. SW from Jeddore Rock
31912	July 31	k	62	June 18/35	1 m. from entrance to St. Anns Hbr., Vic. Co.
31999	July 31	k	110	Apr. 23/35	On Western Banks, 65 fath.
30042	May 24	a	79	July 22/35	$\frac{1}{2}$ m. West of Bald Rock off White Hd.
30183	May 24	a	63	July 10/35	$2\frac{1}{2}$ m. WnW Cranberry Lt; SSE White Hd. Light
30273	May 25	b	73	July 19/35	Outside Hal. Ltshp. E. edge
30423	May 25	b	64	May 30/35	About 4 m. SSW of Jeddore Rock Lt.
30487	May 25	b	55	June 6/35	3 m. SWxW from Jeddore Rock Light
30508	May 25	b	56	Oct. /34	1 m. from Chezzetcook Har.
30525	May 25	b	58	Aug. 1/35	$\frac{1}{4}$ m. SxW from Ship Har. Blow Buoy
30547	May 25	b	68	July 29/35	$1\frac{1}{2}$ m. NW Jeddore Rock
30736	May 25	b	61	June 14/35	About $\frac{1}{3}$ m. WxS from Jeddore Rock Lt.
30738	May 26	b	57	June 27/35	10 m. SW from Jeddore Lt.
30792	May 26	b	70	Aug. 1/35	1 m. SW of Buoy of Three Fathom Har.
30813	May 26	b	-	July 9/35	$\frac{1}{4}$ m. off Devils Is.
30825	May 26	b	64	July 12/35	1 m. SW from Jeddore Rock Lt
30845	May 26	b	53	June 12/35	3 m. SWxW from Jeddore Rock Lt.
30882	May 26	b	63	July 11/35	10 m. SE from Jeddore Lt.
30931	May 26	b	80	June 5/35	About $3\frac{1}{2}$ m. SWxW from Jeddore Rock Lt.
30951	May 26	b	-	July 29/35	$1\frac{1}{2}$ m. NW Jeddore Rock
30991	May 26	b	57	July 24/35	About $\frac{1}{2}$ m. S. from Jeddore Cape
31056	June 23	e	53	July 24/35	Off Ketch Har. at the "Sisters"
31242	June 5	e	77	June 10/35	Thomas' Shoal, 3 m. SE of Chebucto Hd.
31243	June 5	e	52	June /35	Around St. Paul's Is. Nfld.
31334	June 5	e	-	July 31/35	$\frac{1}{2}$ m. off Silver Sands, Cow Bay.
31338	June 5	e	50	June 11/35	Thomas' Shoal, 3 m. SE of Chebucto Hd.
31378	June 18	g	46	June 15/35	$\frac{1}{2}$ m. SW outer Shoal, Sambro
31386	June 18	g	46	June 20/35	5 m. SSW of Rose Pt. Lunenburg Co.
31416	June 19	f	38	June 15/35	1 m. SSW from Spry Bay Bell Buoy
31542	June 22	e	64	June 15/35	Thomas' Shoal, 3 m. SE Chebucto Hd.

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31552	June 22	e	60	June 16/35	Thomas' Shoal, 3 m. SE Chebucto Hd.
31556	June 22	e	56	June 17/35	Thomas' Shoal, 3 m. SE Chebucto Hd.
31577	June 22	e	56	June 17/35	Thomas' Shoal, 3 m. SE Chebucto Hd.
31580	June 22	e	-	June 17/35	Thomas' Shoal, 3 m. SE Chebucto Hd.
31652	June 27	i	68	May 25/35	5 m. South of Tangier
31658	June 27	i	58	July 4/35	5 m. S of Musquodoboit Buoy
31706	June 28	i	79	July 17/35	NEXN White Hd. Lt. and NW Port Felix Lt.
31723	June 28	i	85	June 17/35	Thomas' Shoal, 3 m. SE Chebucto Hd.
31984	July 31	k	81	July 19/35	On Grimes Shoal, Canso
32069	July 31	k	70	July 9/35	Strait of Canso
32176	Aug. 1	k	60	July 5/35	About 4 m. SE Cranberry Light, Canso
32208	Aug. 1	k	78	July 5/35	About 4 m. SE Cranberry Light, Canso
32214	Aug. 1	k	64	July 5/35	About 4 m. SE Cranberry Light, Canso
30560	May 25	b	60	Aug. 5/35	Johnston's God Trap Ferryland, Nfld.
31054	June 23	e	55	Aug. 10/35	The "Sisters" Sambro, N. S.
31078	June 23	e	58	Aug. 5/35	Devils Is. off Cow Bay
31108	May 26	b	58	July /35	Clam Bank, 2-3 m. W of Egg Is. Light
31183	June 4	e	48	Aug. 23/35	Near Portuguese Shoal, Halifax Harbour
31251	June 5	e	47	Aug. 23/35	Near Portuguese Shoal, Halifax Harbour
31351	June 5	e	76	July 12/35	The "Sisters" off Ketch Har. N. S.
31654	June 27	i	65	July 5/35	Browns Bank
31671	June 26	i	63	Aug. 10/35	Shoal Grd. off Bald Rk, Halifax Co.
31978	July 31	k	58	Aug. 15/35	4 m. SE Cranberry Lt., Canso
32197	Aug. 1	k	70	Aug. 15/35	Crouse Shoal
32156	Aug. 1	k	58	Aug. 15/35	Crouse Shoal
17143	May 22	a	64	Aug. 21/35	7 m. S of Fourcher Lt. C.B.
30191	May 24	a	73	Sept. 26/35	1½ m. off Cheticamp Is.
30573	May 25	b	69	Sept. 18/35	7 m. SW Jeddore Rk.
30728	May 26	b	58	Aug. 5/35	1 m. SW Egg Is.
30909	May 26	b	64	Sept. 4/35	5 m. SSW Jeddore Rk.
30917	May 26	b	46	Sept. 9/35	6 m. SWxS Jeddore Rk.
31090	June 23	e	69	June 22/35	2 m. S of Cape Smoky, C.B.
31297	June 5	e	52	July 15/35	Portuguese Cove Hal. Har.
31316	June 5	e	54	Sept. 3/35	1 m. SxW Devils Is.

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31360	June 5	e	54	July /35	In Chedabucto Bay, off Queensport
31419	June 19	f	50	Sept. 1/35	2 m. SW of Mars Hd., (Pennant Pt.)
31551	June 22	e	73	July 10/35	½ m. off Chebucto Hd., Halifax Har.
31562	June 22	e	60	Aug. 20/35	Near Portuguese Cove, Halifax Har.
31582	June 22	e	77	Sept. 6/35	2 m. SE of Sambro Lightship
31589	June 22	e	52	Sept. 5/35	1 m. E of Musquodoboit Buoy
31801	July 31	k	65	July /35	In Chedabucto Bay, off Queensport
31949	July 31	k	56	Sept. 5/35	Crouse Shoal
32022	July 31	k	62	Sept. 14/35	11 m. SE Fairway Buoy Canso
32032	July 31	k	71	Sept. 14/35	Grimes Shoal, Canso
31323	July 5	e	-	Aug. 22/34	Bedford Basin
17423	May 24	a	68	June 21/35	12 m. from Egg Is.
17453	May 24	a	64	May 15/35	7 m. S from Halifax Ltshp.
30237	May 25	b	70	July /35	Off Jeddore
30424	May 25	b	65	Aug. 20/35	½ m. SE of Egg Is.
30494	May 25	b	76	June 13/35	Near Jeddore Rock
30745	May 26	b	63	Nov. /35	3 m. S from Jeddore Rock
30746	May 26	b	72	July 12/35	(4 m. from Burin Is. fog alarm, 6 m. from Burin Light)
30822	May 26	b	77	June 13/35	Near Jeddore Rock
30927	May 26	b	68	Nov. 12/35	5 m. S from Jeddore Rock
31022	June 23	e	51	Sept. 23/35	Outer Shoal, off Sambro (22 f.)
31085	June 23	e	64	Nov. 8/35	At Sable Is. Western Bank
31095	June 23	e	104	Aug. 23/35	Outer Rock "Sisters" Sambro
31244	June 5	e	54	Aug. /35	Off Cape Lallave
31254	June 5	e	67	July 29-31/35	½ m. S. Musquodoboit Har.
31336	June 5	e	64	Oct. 3/35	Near Terrance Bar
31521	June 21	e	56	Nov. 5/35	Shore Boats out of Halifax
31343	June 5	e	70	Aug. 23/35	Outer Rock "Sisters" Sambro
31548	June 22	e	67	Aug. 1-15/35	5 m. S from Egg Is.
31653	June 27	e	57	Nov. 4/35	Off Canso
32017	July 31	k	66	Oct. 7/35	Fourchu Bank
17321	May 22	a	64	June 10/35	3 m. off Petpeswick Har.
30159	May 24	a	62	Feb. 4/36	10 m. S of Egg Is.
31450	June 21	g	52	July 20/35	5 m. off Sambro
31503	June 21	e	78	Dec. 15/35	2 m. Sx E Chebucto Hd.
31615	June 27	i	66	June 23/35	"Big Shoal" near entrance St. Margaret Bay
31642	June 27	i	77	Nov. 10/35	2 m. SW "Sisters Shoal", off Ketch Har.
31673	June 26	i	64	Jan. 15/36	4 m. W Halifax Ltshp.
31806	July 31	k	69	Feb. 25/35	Western Bk. found in Lockeport Plant
30242	May 25	b	65	Apr. 2/36	Quereau

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
30524	May 25	b	60	May 24/36	6 m. S $\frac{1}{2}$ W from Tangier Is.
31076	June 23	e	66	June /35	Yarmouth fish shed brought from Port Felis in fall of 1935
31273	June 5	e	54	Mar. 28/36	$\frac{1}{2}$ m. off Chebucto Hd.
31637	June 27	e	106	Apr. 10/36	Sambro Bank
31715	June 28	e	64	Feb. /36	Western Bank
32049	July 31	k	60	June 12/35	Off Pt. Aconi
30530	May 25	b	43	July 19/36	1 m. SW Jeddore Rock
30695	May 25	b	61	Aug. 20/34	20 m. S $\frac{1}{2}$ W from Cross Is.
30925	May 26	b	58	June 5-6/36	7 m. SxW Hal. Ltshp.
31231	June 5	e	69	July 9/36	E of "Sisters Shoal", Sambro Ledges
30270	June 5	e	52	June 10/36	Rock Head Shoal, Halifax Bay
31461	June 21	g	56	June 18/36	A few miles off Devils Is.
31541	June 22	e	51	June 8/36	11 m. SnW from St. Pauls.
31848	July 31	k	65	July 7/36	Sand Shoal off Canso
31850	July 31	k	64	July 23/36	Chedabucto Bay
31863	July 31	k	72	July 7/36	Sand Shoal off Canso
31942	July 31	k	45	May 14/36	4 m. off Neils har., C. B., N. S.
30091	May 24	a	68	May 3/36	16 m. S of Cross Is. 55 f.
30154	May 24	a	100	Aug. 28/36	Howes Clam Bk. near Sheet Har. Lt.
31114	May 26	b	61	Sept. 14/36	Miscou Bk., 35 m. S of Perce
31684	June 26	i	62	June 5/36	4 m. SxW Petpeswick Bell Buoy
31902	July 31	k	69	Aug. 1/36	Crouse
32066	July 31	k	67	July 23/36	Crouse
32193	Aug. 1	k	72	Aug. 10/36	Crouse
30100	May 24	a	72	Aug. 14/35	$\frac{1}{4}$ m. E of Tangier Is.
30462	May 25	b	66	Aug. 11/36	6 m. SSW Jeddore Cape
30659	May 25	b	79	July 9/36	6 m. SSW Jeddore Cape
30674	May 25	b	84	Sept. 29/36	5 m. SE of Jeddore Rock
31399	June 18	g	68	Aug. 2-8/36	20 m. SxW Sambro Is.
31916	July 31	k	67	Sept. 15/36	In Chedabucto Bay
17428	May 24	a	92	Sept. /36	10 m. off Owls Head
30326	May 25	b	63	Aug. 31/36	5 m. off Musquodoboit (Buoy?)
30396	May 25	b	90	July 10/36	6 m. S of Tangier Is.
31046	June 23	b	54	July 4/36	2 m. SW of Halketts Cove
32095	July 31	k	68	Nov. 20/36	Big Fish Shoal, Canso
17279	May 22	a	73	Aug. /36	2 m. off Morris Hd., Terrence Bay
30673	May 25	b	52	Jan. 18- 23/37	Off Halifax Ltshp
17146	May 22	a	99	Mar. 28/37	Lat. 43°48', Long. 61°32' (Cod Grd. on the "Spit")
30211	May 24	a	65	Apr. 20/37	3 m. outside Pennant Pt.
31435	June 21	g	46	Apr. 29/37	Outer Shoal off Sambro

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
31664	June 26	i	60	Mar. /36	E. Quereau, Lat. 44°45' Long. 57°50'
31594	June 22	e	58	June 12/37	Lat. 44°29' Long. 63°29' 30"
32099	July 31	k	69	July 3/37	Flaherty's Shoal off Canso
30960	May 26	b	56	July 13/37	4 m. SSW Jeddore Rk. Lt.
31816	July 31	k	54	July 23/37	¾ m. WnW of Grimes Buoy
32186	Aug. 1	k	61	July 7/37	Grimes Shoal
30114	May 24	a	78	Aug. /35	6 m. SE of Flint Is.
31308	June 5	e	63	Aug. /37	Off Cape LaHave
31547	June 22	e	65	Sept. 6/37	1 m. S ₂ E Herring Cove Lt.
31463	June 21	g	63	Nov. 6/37	Off Halifax Ltshp.
32091	July 31	k	59	Oct. 28/37	1 m. S of Crouse Shoal
17285	May 22	a	73	July /36	Off Sober Is. Hal. Co.
31911	July 31	k	80	Dec. 16/37	Off Ingonish
30234	May 25	b	70	June 22/37	6 m. SSW Jeddore Rock
30443	May 25	b	54	Sept. 29/37	3 m. W. of Jeddore Rock
30540	May 25	b	60	July 14/37	6 m. SSW of Jeddore Rock
30018	May 24	a	111	Mar. 16/38	4 m. off Terrance Bay
30123	May 24	a	78	Apr. 20/38	2 m. SE of East Dover
30834	May 26	b	57	June 6/38	7 m. SSW of Jeddore Rock Lt.
31510	June 21	e	64	Apr. /37	18 m. SE of Thrum Cap Buoy
30690	May 25	b	70	June 23/38	5 mi. SSW from Petpeswick Harbour
30938	May 26	b	75	May /38	About 7 mi. off Tangier Is.
(30740-					
30749)	May 26	b	-	Aug. 17/38	2 mi. SE Sambro Light
-----	A no. in this range but badly corroded.				
31743	July 31	k	71	July /37	Western Bank
31944	July 31	k	72	May 18/39	"Cowpen", Western Bank

Recaptures from the 1936Inshore Cod Tagging off Halifax County

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
34868	May 6	p	55	May 27/36	3 m. outside Halifax Ltshp.
34881	May 7	r	90	May 29/36	9 m. SxE Devil's Is. Hal.Har.
34860	May 6	p	51	July 24/36	3 m. SE Halifax Ltshp.
34895	May 8	t	86	June 13/36	14-19 m. SE Cross Is.
35521	May 8	t	62	July 10/36	19½ m. SE½W from Cross Is.
35525	May 8	t	57	June 19/36	9 m. SE Cross Is. Lighthouse
35527	May 8	t	103	June 22/36	1 m. S of SE Is., Westside St Margaret Bay
35543	May 9	u	77	June 26/36	Mason's Pt., St. Margaret Bay
34891	May 8	t	78	Aug. 22/36	SSE of Cross Is. in 40 F. (8 m.)
34892	May 8	t	59	Aug. 22/36	SSE of Cross Is. in 40 F. (8 m.)
34898	May 8	t	70	Sept.15/36	10 m. SSE of Cross Is. in 50 F.
35501	May 8	t	55	Aug. 22/36	SSE of Cross Is. in 40 F.
35541	May 8	t	67	Aug. 20/36	1½ m. SW of Pennant Point
34858	May 6	p	60	Sept.22/36	Outer Shoal off Sambro Is.
35522	May 8	t	57	Sept. 5/36	15 m. SSW from Cross Is.
35536	May 8	t	80	Sept. 5/36	15 m. SSW from Cross Is.
35502	May 8	t	--	July 5/36	1½ m. SE½S Rose Head Lunenburg Co.
34863	May 6	p	72	Nov. 1/36	4 m. SE from "Sisters" (Sambro)
34884	May 7	s	67	Oct. 25/36	St. Pierre Bank (Marshall Frank)
34894	May 8	t	82	Dec. 7/36	9 m. SxE from Gullrock Lthse. off Lockeport
35505	May 8	t	58	Nov. 14/36	14 m. SSE Cross Is. Lthse.
35533	May 8	t	48	Nov. 14/36	10 m. SSW Pearl Is. Lthse.
35553	May 9	u	71	Dec.1-7/36	Off Liscomb, R. J. Knickle
34865	May 6	p	44	Feb. 6/37	Western Edge, 6-7 m. SW Hal. Ltshp.
34888	May 8	t	55	Mar. 10/37	7 m. SSW Cross Is. Light
35510	May 8	t	76	Oct. /36	2 m. Off Morris Hd., Terrence Bay
35544	May 9	u	52	Mar. 2/37	3½ m. SSW Sambro Ltshp.
34883	May 7	s	--	July 6/37	1 m. S of Berry Hd. Buoy (Torr Bay)
34896	May 8	t	--	June 22/37	8 m. SSE Cross Is. Lt.
34899	May 8	t	--	June 30/37	14 m. SSE Cross Is. Lt.
35504	May 8	t	--	Sept.24/37	12 m. SSE of Cross Is. Lt.
35520	May 8	t	--	Sept. 1/37	10 m. SE of Cross Is. Lt.

Returns from 1935 Nova Scotia Mainland Inshore Tagging

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
32691	May 3	1	-	May 15/35	5 m. SW of Marr's Head
32699	May 3	1	66	May 28/35	20 m. off Sambro Island
32704	May 3	1	-	May 28/35	Off Halifax, N. S.
32713	May 3	1	-	June 18/35	8 m. S from Egg Is. Buoy
32779	May 3	1	-	May 28/35	Off Halifax, N. S.
33817	May 9	m	-	May 16/35	6½ m. S. of Halifax Lightship
33824	May 9	n	-	May 21/35	2½ m. SE of Devil's Island
32706	May 3	1	-	July 24/35	3 m. SE from Sambro Ltshp.
32720	May 3	1	59	July 4/35	120 m. SExE from Chebucto Hd. (40 m. W of W. Lt. Sable Is.)
32724	May 3	1	75	July /35	Outside Halifax Ltshp., E edge
32749	May 3	1	62	Aug. 5/35	3 m. SSE of Halifax Ltshp.
33857	May 9	m	-	July 17/35	1 m. South of Tangier Is.
33813	May 9	m	47	Aug. 27/35	Off Cow Bay Hd., East of Devil Island
32790	May 3	1	60	Aug. 29/35	3½ m. S of Mars Head (Pennant Pt.?)
33833	May 9	n	58	Aug. 30/35	Head Rock Shoal, Halifax Har.
33820	May 9	n	-	Aug. 20/35	7 m. SxW Brazil Rock
32710	May 3	1	-	Nov. 22/35	5 m. SxW Halifax Ltshp.
32727	May 3	1	48	Dec. 9/35	7 m. SxW Halifax Ltshp.
32780	May 3	1	59	Dec. 9/35	7 m. SxW Halifax Ltshp.
33822	May 9	n	95	May 15/35	7 m. S Halifax Ltshp.
32697	May 3	1	70	Sept. 2/35	1½ m. SE Isaac's Har. Cass Buoy
32695	May 3	1	61	Jan. 22/36	Off Halifax Ltshp.
32781	May 3	1	68	Feb. 25/36	On Western Bank, found in Lockeport plant
33809	May 9	m	45	Feb. 24- 28/36	9 m. SxW Halifax Ltshp.
33815	May 9	m	59	Feb. 15/36	7 m. S. Halifax Ltshp.
32784	May 3	1	75	Mar. 15/36	19 m. SExE Liverpool Fairway Buoy
32696	May 3	1	80	Apr. /36	35-50 F. soundings off Lockeport
33856	May 9	m	-	July 15/36	½ m. SE of Bell Buoy off Canso
32715	May 3	1	-	July 15- 16/36	6 m. off Liscomb bell buoy
33826	May 9	n	86	July 10/36	6 m. SE Halifax Ltshp.
33827	May 9	n	70	July 10/36	6 m. SE Halifax Ltshp.
32743	May 3	1	58	Dec. 28/36	12 m. SSE from Whistle Buoy 6 m. from Lockeport

Tag No.	Date Tagged	Station Tagged	Size	Date Retaken	Place Retaken
32745	May 3	1	57	Apr. 14- May 15/36	Grand Banks, Nfld.
32742	May 3	1	84	Aug. /36	2 m. off Norris Hd. Terrence Bay
33818	May 9	n	-	Nov. 17/37	3 $\frac{1}{2}$ m. SW of Betty's Lt., Halifax Co.
33804	May 9	m	-	June 21/39	18 m. SE of Cape LaHave