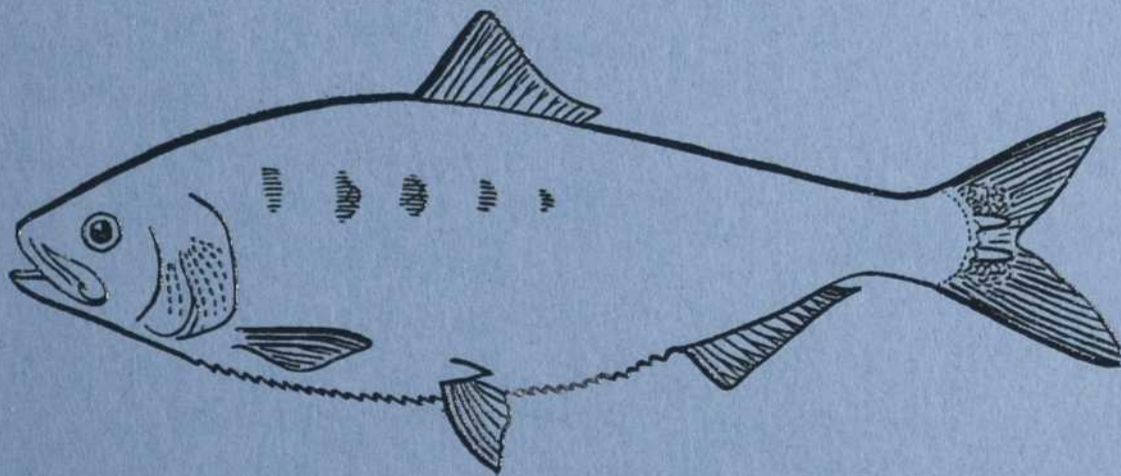


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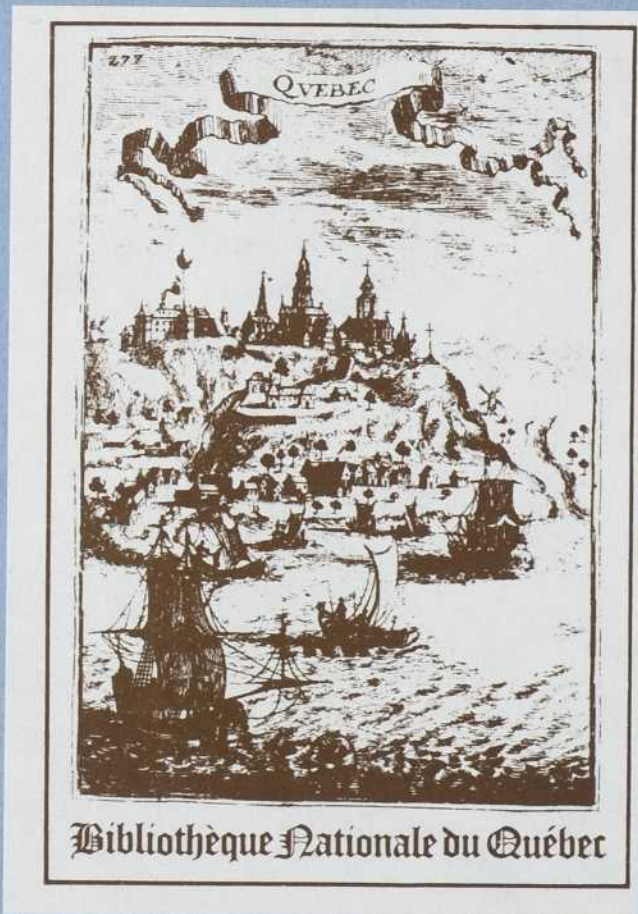
# DISTANT RECAPTURES OF SHAD (*Alosa sapidissima*) TAGGED IN QUEBEC

by  
VADIM D. VLADYKOV



DEPARTMENT OF FISHERIES  
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## DISTANT RECAPTURES OF SHAD (*Alosa sapidissima*) TAGGED IN QUEBEC<sup>1</sup>

by

Vadim D. VLADYKOV  
*Department of Fisheries, Quebec*

### RÉSUMÉ

Durant les six années, 1945-1950, 2,223 Aloses furent étiquetées et libérées dans le Québec. La principale station était établie sur l'Île Verte, où 85% des poissons furent étiquetés. Les résultats généraux de l'étiquetage ont déjà été publiés dans un travail antérieur (VLADYKOV, 1950). Le présent article sera consacré aux seules recaptures éloignées. En tout, 13 poissons, qui avaient été libérés à l'Île Verte, furent repris en dehors de la Province de Québec. Le plus grand nombre d'Aloses (7) fut capturé au cours de 1949 et 1950, années où l'eau de l'Atlantique ouest était plus chaude que d'habitude. Apparemment en 1947 et 1951, années chaudes elles aussi, d'autres causes ont joué, car seulement 4 recaptures éloignées furent rapportées. En général, le territoire des recaptures éloignées s'étendait du détroit de Canso jusqu'à l'entrée de la Baie de Chesapeake. En 1949 seulement, des Aloses du Québec furent prises au sud de Cap Cod, entre le Delaware et la Virginie. La distance maximum parcourue par un de nos poissons approchait les 2,000 milles.

### INTRODUCTION

Since 1945 we have undertaken extensive tagging of Shad in Quebec waters (Figure 1). In the six years, 1945-1950, we tagged and liberated 2,223 fish (Table 1). The main tagging station was established at Isle Verte, a small island, only nine miles in length and from one half to one and one half miles in width, in the St. Lawrence River, about 150 miles east of Quebec City. Isle Verte is located in an important path of Shad migration to and from the St. Lawrence River. Along the south shore of this island

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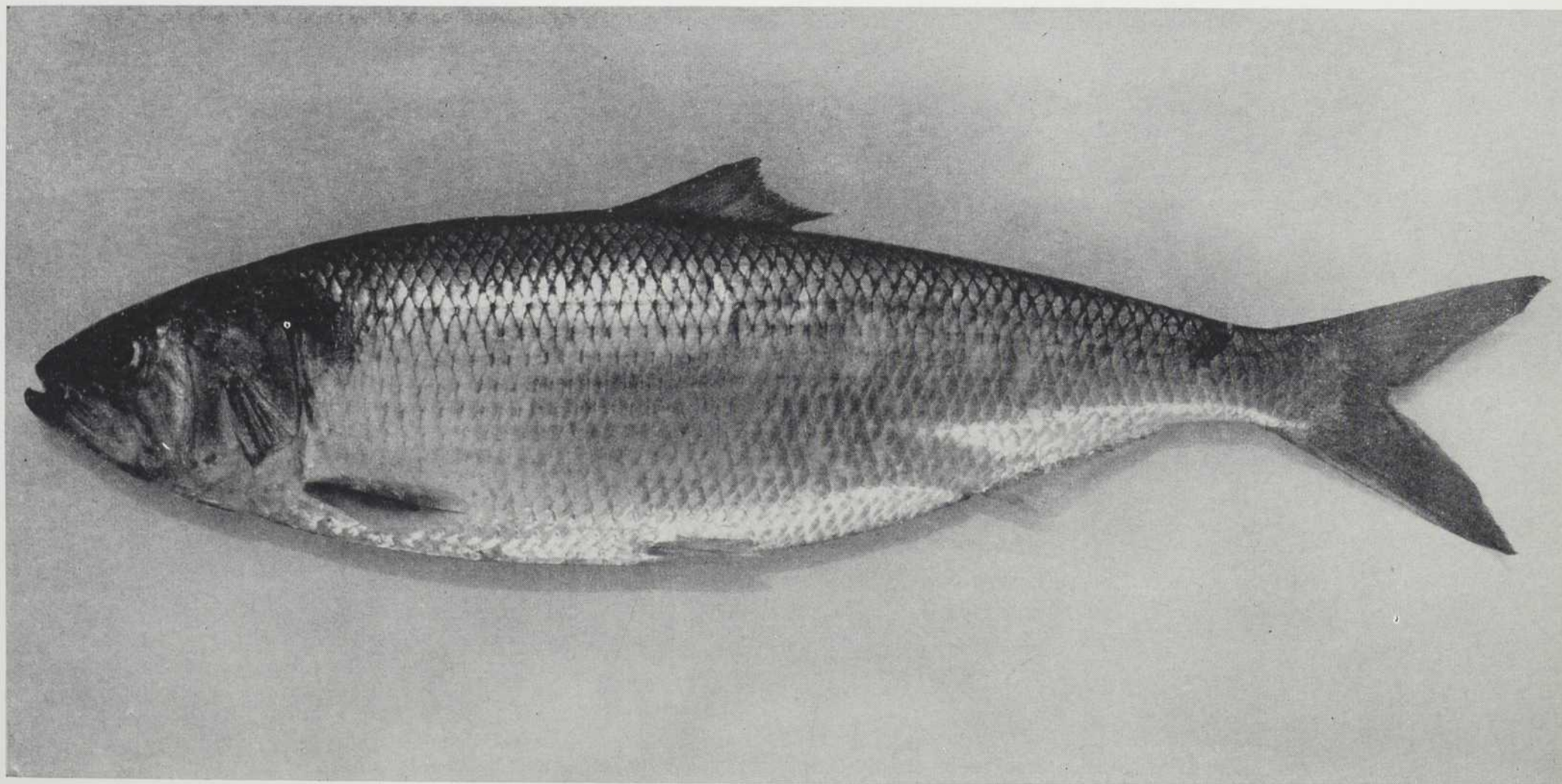


FIGURE 1.— An adult female Shad (*Alosa sapidissima*), taken in Quebec waters. Two fifths natural size.

TABLE 1.— BRIEF SUMMARY OF THE SHAD TAGGING IN QUEBEC DURING SIX YEARS, 1945-1950

Year	Number of fish tagged		
	Isle-Verte	Other localities	Total
1945	—	157	157
1946	501	25	526
1947	478	—	478
1948	632	56	688
1949	123	99	222
1950	152	—	152
Total	1,886	337	2,223
%	84.8	15.2	100.0

are built several small Herring traps made of fascines. In those traps, locally known as *pêches*, many Shad are taken yearly. Altogether 1,886 fish, or 85 per cent of the total number, were released there.

Two types of tags were employed. The majority of the fish was marked with a metallic (monel or nickel) strap bent into the shape of a ring (Figure 2). The description of this tag, specially designed by our Laboratory, was given in a previous paper (VLADYKOV, 1950). A small number of fish was marked by a new



FIGURE 2.—Shad with a strap tag (No. 3001 DPQ) recaptured 371 days after tagging. The upper jaw (premaxillary) and the right side of the tongue are slightly indented by the tag, otherwise the fish was in perfect health.

type of tag, consisting of a split stainless ring and a vinylite plate.<sup>2</sup> As there was no great difference in the returns among the fish marked by either tag, we shall not treat them separately.

As we mentioned in a previous paper (VLADYKOV, 1950) during the first four years, 1945-1948, altogether 105 fish, or 5.7 per cent, were recovered. Among these, four recaptures were made outside of the Province of Quebec. The farthest recovery (tag no. 3452) was at Cape Cod. In the three succeeding years, nine more fish were reported from several areas outside of the Province of Quebec. Thus, the present paper will deal altogether with 13 fish. This rather small number is nevertheless very interesting. Tables 4-5 summarize the details of these recaptures.

#### WATER TEMPERATURES DURING 1945-1951

It is of significance to note that the number of distant recaptures of Quebec Shad varies with different years. This fact, no doubt, must have a correlation with prevailing water temperatures and possible salinities in the spring along the Atlantic sea coast (Table 2).

During the last twenty years, several authors have made observations on the temperature variations of the sea along the Western Atlantic coast. HACHEY and McLELLAN (1948) and LAUZIER (1954) dealt with the trends and cycles in surface temperatures of the Canadian Atlantic. They observed temperature variations in the sea water at St. Andrews, New Brunswick. They concluded that local conditions in the Bay of Fundy are indicative of variations in surface water temperatures over the main portion of the Atlantic coast of North America as well. Their data are summarized in Table 2. They found that the years 1940-1945 were characterized by water temperatures below the average (cold period) and that the years 1949-1953 represented a warm period.

During 1949, which was the first of the recent element years, the waters of the Gulf of Maine, from June to October, were unusually warm. On account of this several fish species and other

<sup>2</sup> A detailed description of this new type of tag will be given in a separate paper.

TABLE 2.—MONTHLY MEAN SURFACE-WATER TEMPERATURES IN CENTIGRADE AT ST. ANDREWS, N.B.

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1945	0.8	0.3	2.1	5.1	7.6	9.9	12.8	13.8	12.2	10.6	7.5	3.5	7.3
1946	1.0	0.5	1.5	3.6	7.0	9.0	12.1	13.3	12.9	11.8	8.8	4.9	7.2
1947	1.6	1.2	2.1	3.6	6.7	9.9	13.7	14.8	14.2	12.0	8.8	4.3	7.8
1948	1.0	-0.6	0.4	2.4	6.3	8.3	11.3	12.9	12.1	10.4	8.6	5.6	6.5
1949	2.9	1.4	2.0	5.0	8.0	11.0	13.4	14.7	14.3	12.5	8.9	5.7	8.3
1950	3.8	1.6	1.5	4.0	6.8	10.0	12.4	13.6	12.8	10.8	8.8	5.9	7.7
1951	3.9	2.4	3.1	5.3	8.1	11.1	13.8	14.9	14.2	11.8	8.7	5.2	8.5

N.B.— Temperatures for the years 1945-1947 are taken from Hachey and McLellan (1948, p. 357) and the remaining were kindly furnished by Drs. L. Lauzier and H. J. McLellan.

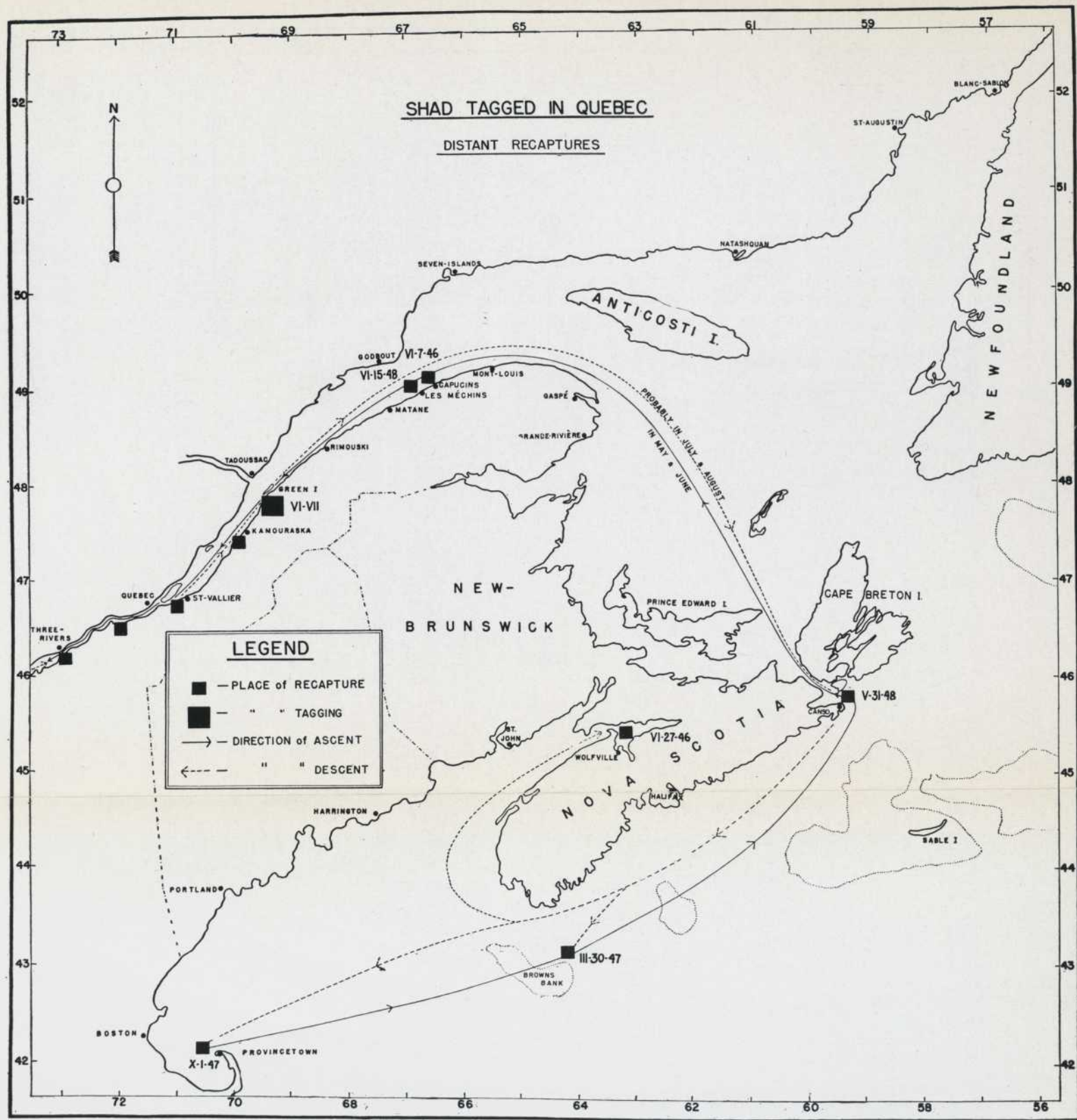
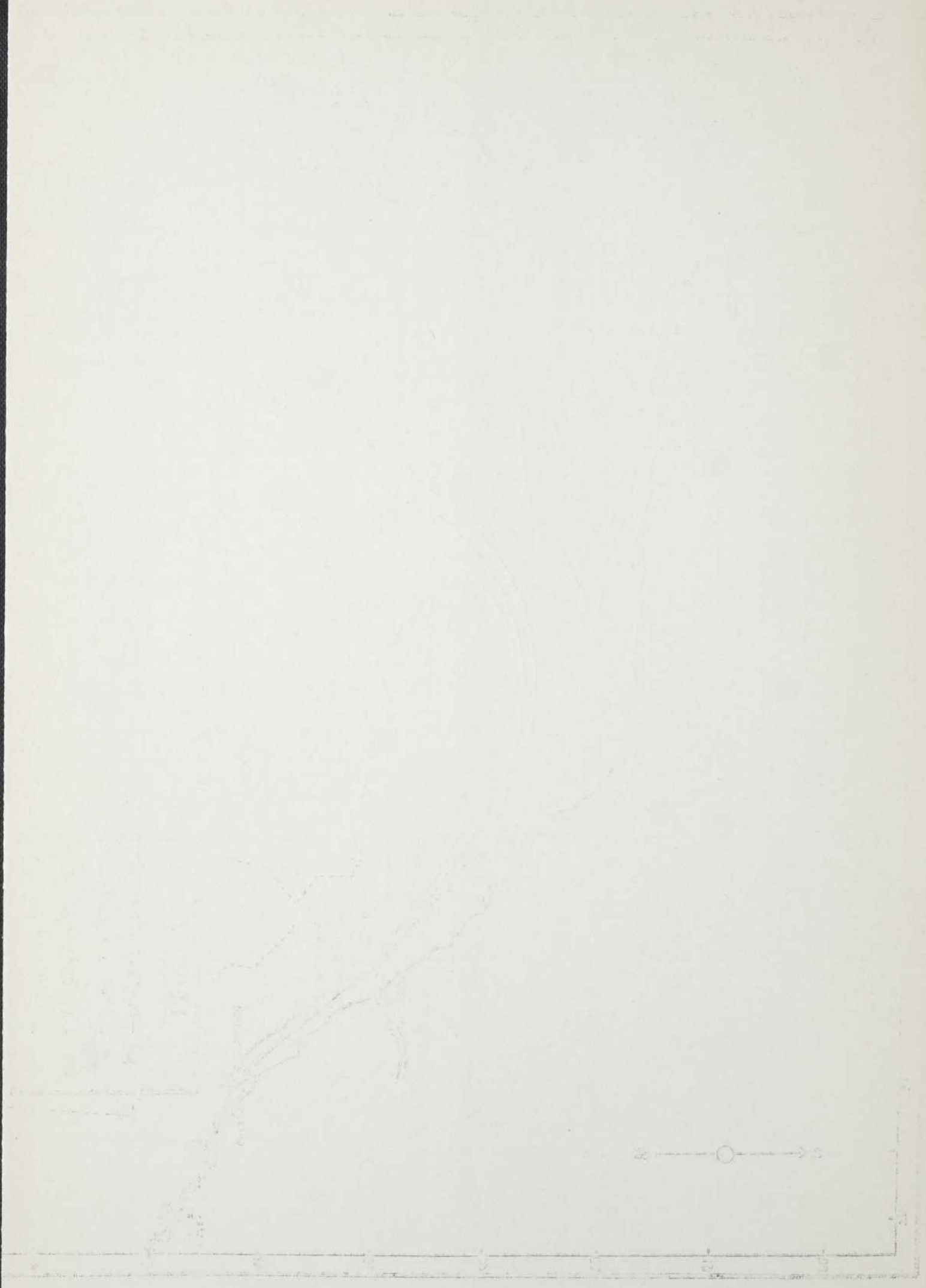
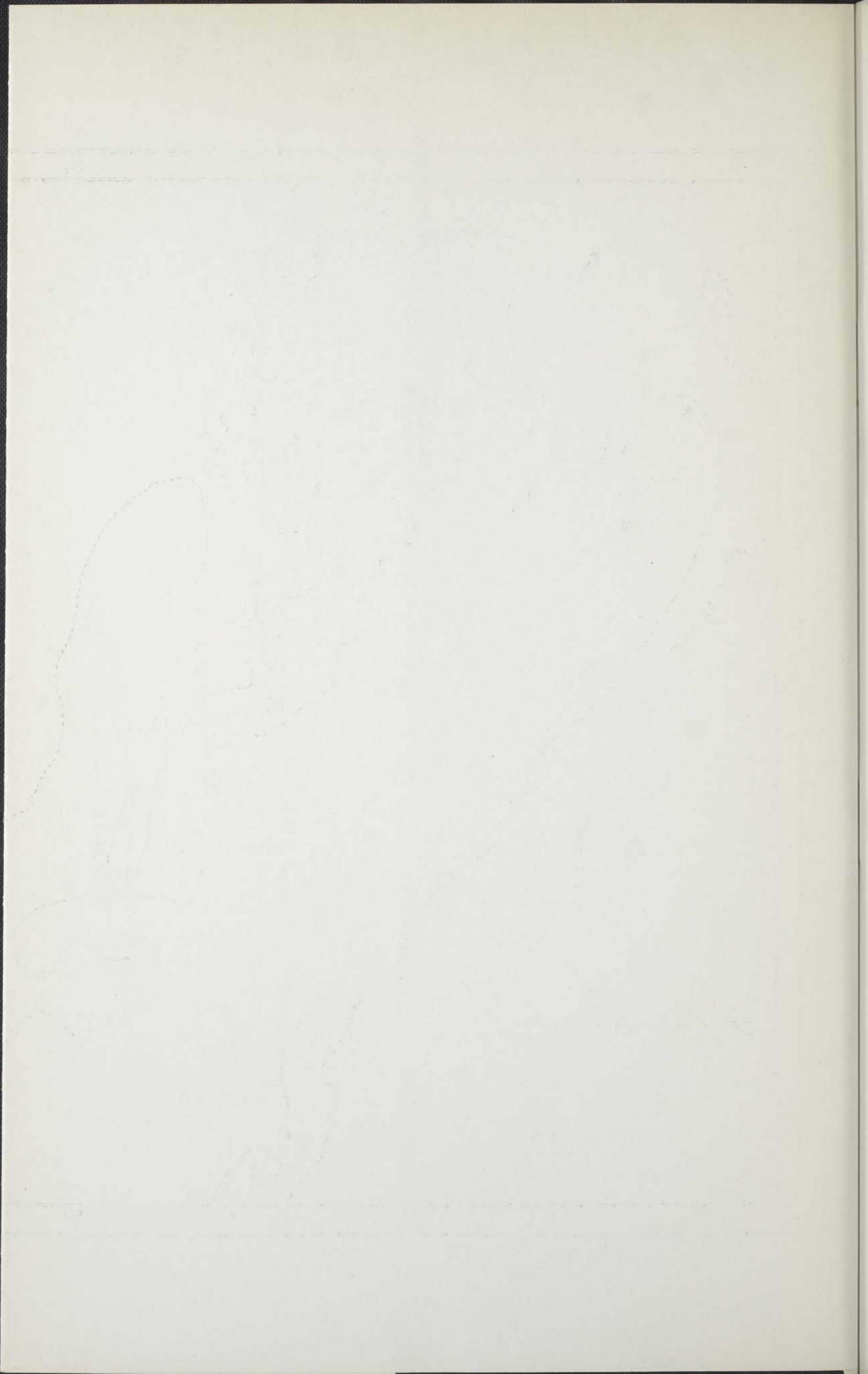


FIGURE 3.— Distant recaptures of tagged Quebec Shad during the years 1945-48. The main tagging station was at Isle Verte (Green I.).







forms of marine life, that typically occur in semi-tropical or tropical environments, were caught in the Gulf of Maine (ARNOLD, 1951, p. 88; and SCATTERGOOD, TREFETHEN, and COFFIN, 1951, pp. 297-298).

These variations in water temperatures during the recent period were, no doubt, responsible for the fact that in some years more Quebec Shad were taken farther south than in others (Table 3). Apparently, when the water is warmer in the spring along the Atlantic seaboard, as during 1949 and 1950, our Shad have the tendency to swim farther south. However, the relation between the water temperatures and distant recaptures is not a simple one. In effect, during two other warm years, 1947 and 1951, only 4 fish were caught outside of our Province, against 7 taken during 1949 and 1950. It should be added that during normal (1946) or cold (1948) years only a single tagged fish was reported along the Atlantic shore. The variation in the number of distant recaptures could also depend on the number of fish previously tagged. Unfortunately the mortality among tagged Shad varied greatly from year to year.

#### TREND OF MIGRATION

Judging by the dates of recovery, we can reconstruct quite accurately the periods of seasonal migrations of Shad to and from Quebec waters. Figure 3 contains information for the three year period, from 1946 to 1948, while Figure 4 represents a map of the Atlantic sea coast from Quebec to North Carolina, on which all distant recaptures are plotted. Although there may occur one or two weeks difference in dates of migration from one year to another, on the whole the trend remains the same.<sup>3</sup>

*Spawning fish* — The sexually matured Shad, as Figure 4 illustrates, head homeward from the Atlantic to the St. Lawrence River, passing late in the spring through Canso Strait. In effect two recaptures were made there, one on May 31st and the other on June 7th. After completing spawning, the Quebec Shad leave the St. Lawrence area late in the summer (Figure 3). They

3. Details of the spring ascent of Shad within the St. Lawrence River are given in a previous paper (Vladykov, 1950).

TABLE 3.—NUMBER OF SHAD RECAPTURES OUTSIDE OF QUEBEC PROVINCE IN DIFFERENT YEARS

Year	Surface-Water temperature	Number of recaptures
1945	Normal	-
1946	"	1
1947	Warm	2
1948	Cold	1
1949	Very warm	4
1950	Warm	3
1951	Very warm	2
Total		13

spend the fall, winter, and early spring in the Western Atlantic. The southern limit that they can attain varies greatly from year to year.

In general, from October 1st to the middle of April, recaptures were made along the Atlantic seaboard, from Brown's Bank to the entrance of Chesapeake Bay, near Old Point Comfort, Virginia. The latter recapture (tag no 5590) was made on April 13, 1949, after the fish had been out 312 days. This female Shad, tagged at Isle Verte on June 5, 1948, must have travelled about 2,000 miles. This is the farthest recapture of a Quebec fish. Another Shad,

male, (tag no. 5778) was taken in the Delaware River, off Bower's Beach, on March 1, 1949, after being in the water only 267 days. This fish was liberated at Isle Verte on June 7, 1948. The third recapture (Shad no. 5706) was made at Sandy Hook Bay, New Jersey, on March 31, 1949, after being out 298 days. This female also was tagged at Isle Verte on June 6, 1948. The most striking point is that these three most distant recaptures were all made in the spring of 1949. Never previous nor since have any Quebec Shad been taken farther than Cape Cod. The most plausible explanation can be attributed to certain changes in hydrographical conditions along the western Atlantic in the spring of 1949.

*Non-spawning fish.*— Some adult Quebec Shad do not spawn regularly each successive season, thus, during sterile years, they do not undertake habitual migrations and their movements outside of Quebec area are erratic. Of these « lost » Shad we can quote the recaptures of three specimens, made at the head of the Bay of Fundy. According to information from fishermen (Table 5), these fish at time of recapture were recovering from the aftermath of spawning and hence had only poorly developed gonads, so much so that the person who caught them was unable to determine their sex. These recaptures were made from May 17 to July 12, after the Shad had been in the water from 1 to 2 years (Figure 4).

#### GENERAL REMARKS

In conclusion, we can add that the longest period spent in water previous to recapture was four years and twelve days, or 1,472 days. This Shad (no. 5021) was tagged on June 4, 1947 at Isle Verte and was recaptured on June 15, 1951 at St. Vallier, about 100 miles west of the original tagging station. It was a male which had grown only 3 centimetres in fork length. The recaptured fish did not display any great injury by the strap tag placed on its lower jaw. Two other Shad, marked with split ring tags and liberated outside of one of the *pêches* at Isle-Verte on May 29, 1950, were recaptured in this same *pêche* during the second week of June, 1954, after being in the water about 10 days longer than four years.

TABLE 4.—DISTANT RECAPTURES OF SHAD TAGGED AT ILE VERTE, QUEBEC, DURING 1945-1950

Tag No	Details of Returns				Details of Tagging		
	Date	Days fish were out	Distance trawled (miles)	Place	Date	FL * (mm.)	Sex
65 V	June 7'51	373	516	Canso Strait, Mulgrave, Nova Scotia.	May 29'50	544	—
5,135 D.P.Q.	May 31'48	327	536	Canso Strait, Arichat, Nova Scotia.	July 7'47	534	—
3,528 "	Mar. 30'47	258	866	Brown Bank, off Nova Scotia.	July 14'46	530	M
5,845 "	April 4'50	665	1,030	Georges Bank, near Cashes Ledge.	June 8'48	500	M
5,593 "	Febr. 1'50	247	1,096	Off Cape Cod, Massachusetts.	May 30'49	558	—
3,452 "	Oct. 1'47	444	1,100	Off Provincetown, Massachusetts.	July 13'46	495	—
104 V	Nov. 24'51	543	1,130	Off Gloucester, Massachusetts.	May 30'50	550	—
5,706 D.P.Q.	Mar. 31'49	298	1,366	Sandy Hook Bay, New Jersey.	June 6'48	528	F
5,778 "	Mar. 1'49	267	1,456	Off Bowers Beach, Delaware.	June 7'48	490	M
5,390 "	Apr. 13'49	312	1,650	Old Point Comfort, Virginia.	June 5'48	550	F
5,272 "	May 17'49	676	1,086	Shubenacadie River, Nova Scotia.	July 11'47	504	M
5,638 "	July 12'50	767	1,056	Cobequid Bay, off Portauisque, Nova Scotia.	June 5'48	517	F
13,864 P.Q.	June 27'46	322	1,060	Cumberland Basin at Minudie, Nova Scotia.	Aug. 7'45	470	—

\* FL = Fork length.

TABLE 5.—DETAILS OF DISTANT RECAPTURES OF SHAD TAGGED IN QUEBEC

<i>Tag No</i>	<i>Excerpts from letters</i>
65 "V"	<p>« Kind: Shad. Position: Strait of Canso, Guysboro Co., N.S. Date: June 7, 1951. Fisherman: William McCall, Mulgrave, N.S. This fish was described as a large Shad tangled up in a bait net » (Mr. James M. Meagher, Fisheries Inspector, Mulgrave, N.S., June 9, 1951).</p> <p><i>Additional details:</i> « We do not fish Shad in this place but we get a few rolled up in the Herring nets at that time of the year about every Spring as that was the only one that morning. I got 3 this season as I did not take notice if it was male or female » (Mr. William McCall, Mulgrave, N.S., June 19, 1951).</p>
5,135 DPQ	<p>« The tag . . . was taken by Mr. Godfrey Boudreau, of Arichat, N.S. Mr. Boudreau states that it was taken from a Shad weighing seven pounds and measuring twenty-five inches in length. The fish was taken in a fish trap off Arichat Harbour on May 31, 1948 » (Dr W. R. Martin, Atlantic Biological Station, St. Andrews, N.B., June 4, 1948).</p>
3,528 DPQ	<p>« The tag was found in the lip of a male Shad caught by the trawler <i>Brookline</i> on March 30, 1947, in Subarea XXI-N, Toe of Browns Bank, latitude 42° 50', longitude 65° 05', in 70 fathoms. The fish measured about 22½ inches (presumably fork length) and weighed 3 pounds ungutted. This tag was turned in by Paul Silverberg, 55 Queensbury Street, Boston 15, Mass. » (Dr. Howard A. Schuck, U.S. Fish and Wildlife Service, Cambridge, Mass., April 8, 1947).</p>
5,845 DPQ	<p>« Enclosed is a tag and information which was obtained by our Boston representative, Mr. David F. Hammack, from the trawler <i>Texas</i>. Fork length 51 cm. Taken in 65 fathoms in square F-2, on April 4, 1950, by William P. Dunphy, 35 High Street, Dorchester, Mass. » (Dr. William F. Royce, U.S. Fish and Wildlife Service, Woods Hole, Mass., April 17, 1950).</p> <p><i>Additional details:</i> Square 42-69, F-2, refers to the Georges Bank chart, prepared by U.S. Fish and Wildlife Service, and is found near Cashes Ledge.</p>

- 5,593 DPQ { « Tag . . . was taken from a Shad by Mr. George Meister, 237 Northern Avenue, South Boston, Mass., a fisherman on *M. C. Ballard* out of Boston. The *M. C. Ballard*, sailed January 28 and returned to Boston on February 5, 1950. All of their fishing was done in the area outlined on the enclosed chart » (Dr. William R. Royce, U.S. Fish and Wildlife Service, Woods Hole, Mass., February 10, 1950).  
*Additional details:* The Shad was taken in the square 41-69 on the Georges Bank chart, off Cape Cod, Mass. This chart was prepared by U.S. Fish and Wildlife Service.
- 3,452 DPQ { « Tag (was) taken from a four pound Shad caught in the vicinity of Provincetown, Massachusetts and sold in Fulton Market, New York City on October 3, 1947 » (Miss Louella E. Cable, U.S. Fish and Wildlife Service, College Park, Ma., November 16, 1947).
- 104 "V" { « On November 24, 1951, twenty four miles east half south of Gloucester, Mass., in 50 fathoms of water with gill nets we caught a Shad (tag No. 104 V). We sell (it) round, therefore I don't know the sex of the fish. There wasn't any soreness around the ring » (Mr. Burnand A. Worrall, Essex, Mass., October 18, 1951).
- 5,076 DPQ { « Fish was caught  $\frac{1}{2}$  mile west of U.S. Naval Pier in Sandy Hook Bay, N.J., on March 31, 1949, by Walter Eastmond » (Miss Louella E. Cable, U.S. Fish and Wildlife Service, College Park, Ma., April 26, 1949).  
*Additional details:* « The fish was not measured as we were quite busy at the time. It was a roe fish and in poor condition. There seemed to be not actual soreness around the tag although a little red. It was caught in a pound net trap in about 20 ft. of water and the bottom was mud » (Mr. Walter Eastmond, Bedford, N.J., May 17, 1949).
- 5,778 DPQ { « It was found on a Shad caught in the Delaware Bay off Bowers Beach by Britten E. Hollinger, Bowers, Delaware, about March 1. The Shad, a buck 21 inches long, weighed  $3\frac{1}{4}$  pounds. » (Miss Louella E. Cable, U.S. Fish and Wildlife Service, College Park, Ma., March 28, 1949).  
*Additional details:* « The Shad was red around the tag; caught in 400 fathom net in about 9 ft low water, about March 1, 1949 » (Mr. Britten E. Hollinger, Bowers, Delaware, April 16, 1949).

- 5,390 DPQ { « Tag was recovered from a Shad caught at Hampton Roads near Old Point Comfort, Virginia, by Samuel C. Rust, Sr., 45 Water Street, Phoebus, Virginia. No date furnished. Letter post marked April 13, 1949 » (Miss Louella E., Cable, U.S. Fish and Wildlife Service, College Park, Ma., April 26, 1949).
- 5,390 DPQ { *Additional details:* « The fish was extra large and weighed around 5½ or 6 pounds. It was a female Shad and acted as if it had just laid its roe a short time before being caught. It was tagged through the lip, and it did not seem to be sore from the tag. I did not measure the fish, but it surely was plenty long » (Mr. Sam C. Rust Sr., Phoebus, Va., May .5, 1949).
- 5,272 DPQ { « We are enclosing an envelope containing a tag and scales forwarded to this office by D. M. Pettis, Senior Inspector of Fisheries, Truro, N.S. The tag and scales were taken from a Shad caught by a drift net fisherman on the Shubenacadie River on May 17 » (Dr. A. W. H. Needler, Atlantic Biological Station St. Andrews, N.B., May 31, 1949).
- 5,272 DPQ { *Additional details:* « I am sorry to say, I did not measure this fish, nor weigh it, as it was the first tagged fish caught here, and none of us fishermen knew anything about it. I would say this Shad weighed about six pounds, and measured about 22 inches. There was no soreness around mouth where the tag was, it was a good healthy fish, and it was a male. » (Mr. Robert Watson, Stewiacke Town, Colchester Co., N.S., July 13, 1949).
- 5,638 DPQ { « Enclosed please find one small steel tag removed from the lower jaw of a Shad. This fish was caught two days ago in the Cobequid Bay off Portauquique, Colchester Co., by Mr. Raymond Cooke, fisherman at Portauquique » (Mr. Jas. B. Fleury, Inspector of Fisheries, Truro, N.S., July 14, 1950).
- 5,638 DPQ { *Additional details:* The fish was caught between Great Village and Economy Point approximately 12 miles from the latter, by means of a drift net. The fish was sold by me undressed and I couldn't say about the milt or roe, but I would think by the look of the fish it was spent. I didn't take the length of the fish but it was of a large size. The fish was in good health and there was no irritation around the tag; very clean and the tag was in firm. I had 51 Shad on that night, and this was the only tagged one. » (Mr. Lloyd Raymond Cooke, Bass River, Colchester Co., N.S., August 20, 1950).

- 13,864 PQ { « I am enclosing herewith a tag received from Inspector C. C. Hollis which was found attached to a Shad at Treens Fish Market, Amherst, N.S., by Mr. H. C. Leary. The weight of the fish was  $3\frac{1}{4}$  lbs. and it was taken at Minudie, Cumberland Basin, during the week ending July 6th » (Mr. E. D. Fraser, Fisheries Supervisor, Pictou, N.S., July 17, 1946).
- Additional details:* « The following information on the fisherman who caught this Shad: his name Carl Burbine, Minudie, N.S. This fish was caught by gill net, in the Cumberland Basin, head waters of the Bay of Fundy, on June 27th 1946 at Minudie. This fish did not carry milt or roe. In all appearance, this fish was in first class condition: it was fat and appeared to us very white and clear. Where the tag was in the jaw, it showed no signs of soreness of any kind. This fish measured 21 inches to the extremity of the caudal fin and weighed between  $3\frac{1}{2}$  and  $3\frac{3}{4}$  lbs » (Mr. H. C. Leary, Amherst, N.S., August 19, 1946).

Due to the scientific value that distant recaptures possess and on account of the interesting information furnished by fishermen, we are adding Table 5. This table contains excerpts from letters received from different persons, to whom the author wishes to express his appreciation for their valuable help.

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