BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XI JANUARY, 1940 No. 1

# PRESENT RANGE, MIGRATION AND ABUNDANCE OF THE ATLANTIC MURRE IN NORTH AMERICA[1]

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THE breeding range of the Altantic Murre (*Uria aalge aalge*) in North America is, I believe, very well known. In the following pages I have listed every breeding colony which I find to be in existence. Excepting the possibility that a few small stations may still be unreported from the eastern coast of Newfoundland and possibly one or more in Newfoundland Labrador, I believe the list is complete. Beginning at Bonaventure Island, Gaspé County, Quebec, one might outline the breeding range by traveling southeastward to the Magdalen Islands, thence to northeastern Anticosti Island, and the north shore of the Gulf of St. Lawrence east of Anticosti; then, proceeding eastward along the North Shore, one finds the greatest concentration of breeding colonies in the region around Cape Whittle. Besides these, there is a small colony near Bradore, at the west end of the Straits of Belle Isle, two on the east coast of Newfoundland Labrador, two on the east coast of Newfoundland, and the Funk Island group.

## PRESENT ABUNDANCE

The total number of breeding birds of this species for eastern North America, according to this study is approximately 60,626. The notes which follow the tables (list of individual colonies) explain the manner by which I have arrived at a count of the breeding population for each colony. In the region of the north shore of the Gulf of St. Lawrence there is a greater number of individual breeding colonies. For practically the whole of this region exact counts have been made (see table). In three of the sanctuaries along this coast a large nucleus of the total breeding population for North America is now located. It is gratifying to note that a splendid increase in the number of birds nesting in these three sanctuaries has taken place during the past ten years. In the ten years from 1925 to 1935 the murre population of these three sanctuaries increased from 3,978 to 12,162. However, a considerable propor-

[1] Many of the data for this paper have been used as part of a thesis submitted to Cornell University in June, 1936.

tion of this increase was undoubtedly due to the movements of breeding birds to the protection of the sanctuaries. The one instance of the entire murre population in the Cape Whittle Sanctuary which moved out during the period indicates that the great increase for the other three sanctuaries was due to a considerable extent to the shifting of breeding birds.

In listing the colonies in the table I have not followed geographical sequence but have listed the nonsanctuary colonies in one part of the table and the sanctuary populations in another.

I am especially indebted to Dr. Harrison F. Lewis for invaluable assistance in securing data regarding the location of breeding colonies as well as counts of the breeding birds for these colonies along the north shore, and for those near Gaspé and in the Magdalen Islands. Mr. V. C. Wynne-Edwards has very kindly given me his estimate for the Newfoundland colonies. Dr. Alfred O. Gross supplied me with the data regarding the birds which he saw at the Button Islands and along the Newfoundland Labrador. To Mr. D. H. S. Davis of the Oxford University Hudson Strait Expedition, I would express my appreciation for the information concerning the birds on Akpatok Island.

TABLE SHOWING THE LOCATION AND SIZE OF ATLANTIC MURRE COLONIES BREEDING IN NORTH AMERICA

| *Nesting Colonies (U. a. aalge)* | *Authority* | *Data Recorded* | *Breeding Population* |
|---|---|---|---|
| ISLANDS | | | |
| Pegatchiou (lat. 51° 3′ N.) (long. 58° 39′ W.) | H.F.L. '32 | 4 eggs | 8 |
| Eastern Whale Head (lat. 51° N.) (long. 58° 43′ W.) | H.F.L. '31 | Estimate | 100 |
| Bun Rocks (lat. 50° 58′ N.) (long. 58° 45′ W.) | H.F.L. '32 | 7/5/32, 78 eggs | 156 |
| Murre Rocks (lat. 50° 54′ N.) (long. 58° 49′ W.) | H.F.L. '32 | Count eggs | 800 |
| Double Hill Island (lat. 50° 54′ N.) (long. 58° 51′ W.) | H.F.L. '31 | Estimate | 24 |
| Island near Cove Is. (lat. 50° 22′ N.) (long. 59° 42′ W.) | H.F.L. | Estimate for several islets | 200 |
| Boat Islands (lat. 50° 17′ N.) (long. 59° 43′ W.) | R.A.J. '34 | Count | 150 |
| Eastern Islet, outside Long Island (lat. 50° 15′ N.) (long. 59° 53′ W.) | H.F.L. '31 | Estimate | 60 |
| Black Duck Island (lat. 50° 15′ N.) (long. 59° 54′ W.) | H.F.L. '31 | Estimate | 12 |
| Island Southwest Etamamu River (lat. 50° 14′ N.) (long. 59° 58′ W.) | H.F.L. '31 | Estimate | 150 |
| The Wolf Bay Region outside the Sanctuary[4] (long. 60° 17′ W.): | | | |
| Islands inside Bay: | | | |
| North Red Island | R.A.J. '31 | Count 30 eggs | 60 |
| South Red Island | R.A.J. '31 | 20 eggs | 40 |
| Duck Island | R.A.J. '31 | Est. 12 eggs | 24 |
| Tinker Island | R.A.J. '31 | 12 eggs | 24 |
| Little Green Island | R.A.J. '31 | 12 eggs | 24 |
| Islands off Summer House Point: | | | |
| Long Flat Island | R.A.J. '31 | Est. 25 eggs | 50 |
| Pistol Harbor Island | R.A.J. '31 | 30 eggs | 60 |
| Whale Island (Wapitagun) | R.A.J. '31 | 12 eggs | 24 |
| Tinker Island | R.A.J. '31 | 12 eggs | 24 |
| Round Island | R.A.J. '31 | 12 eggs | 24 |
| Audubon Islands (lat. 50° 11′ N.) (long. 60° 22′ W.) | R.A.J. '31 | Count, 7/19 | 80 |
| Island west of Coacoacho Bay[3] (lat. 50° 11′ N.) (long. 60° 22′ W.) | R.A.J. '31 | Count 127 eggs | 254 |
| Black Island, west of Audubon Island (lat. 50° 11′ N.) (long. 60° 24′ W.) | H.F.L. '26 | Estimate | 24 |

| | | | |
|---|---|---|---|
| Murre Rock, Frenchmans' Bay[1] (lat. 50° 10′ N.) (long. 60° 24′ W.) | H.F.L. '31 | Estimate | 800 |
| Other small breeding groups off Frenchman's Bay | H.F.L. | | 50 |
| Bonaventure Island, Gaspé County,[5] Quebec (lat. 64° 9′ W.) (long. 48° 29′ N.) | C.W.T. '19 | Estimate | 1,000 |
| Great Bird Rock and North Bird Rock, Magdalen Islands[6] (lat. 61° 8′ W.) (long. 47° 51′ N.) | A.C.B. '04 | Estimate | 1,400 |
| Bryon Island, Magdalen Islands[7] | H.F.L. and E.F.K. '33 | Estimate | 12 |
| Anticosti Islands[8] (lat. 48° 11′ N.) | R.A.J. | Estimate | 20,000 |
| Newfoundland, Labrador[9] | R.A.J. | Estimate | 100 |
| Gannet Islands | O.L.A.,Jr. | | |
| Nunarsuk | O.L.A.,Jr. | | |
| Button Islands | R.A.J. | | 0 |
| Newfoundland:[10] | | | |
| Cape St. Mary (lat. 46° 49′ N.) (long. 54° 11′ W.) | V.C.W.-E '36 | Estimate | 10,000 |
| Baccalieu Island, Conception Bay | V.C.W.-E | Estimate | 2,000 |
| Funk Island[11] | V.C.W.-E '34 | Estimate | 10,000 |
| Nova Scotia[12] | R.A.J. | | 0 |

| *Nesting Colonies (U. a. aalge)* | *Authority* | *Data Recorded* | *Breeding Population* |
|---|---|---|---|
| SANCTUARIES ALONG THE NORTH SHORE OF THE GULF OF ST. LAWRENCE | | | |
| Fog Island Bird Sanctuary[1] | H.F.L. '35 | Count, 7/2 1,996 eggs | 4,000 |
| Cape Whittle Sanctuary[2] | | | |
| Wolf Bay Bird Sanctuary: | | | |
| Rock N. W. of Beacon Island | H.F.L. '35 | Count, 7/2 642 eggs | 1,284 |
| Rock near Haystack Island | H.F.L. '35 | Count, 7/3 180 eggs | 360 |
| The Black Land | H.F.L. '35 | Estimate, 7/3 | 180 |
| With eggs eaten by Gulls and Ravens, total for Wolf Bay Bird Sanctuary—1,824 | | | |
| St. Mary Islands Bird Sanctuary: | | | |
| Eastern Island | H.F.L. '35 | Count, 2,128 eggs and young 7/8/35 | 4,256 |
| Middle Island | H.F.L. '35 | Est., 7/9/35 | 70 |
| Cliff Island | H.F.L. '35 | Count, eggs and young | 1,456 |
| Fox Island | H.F.L. '35 | Count, eggs and young | 476 |
| Little Fox Island | H.F.L. '35 | Count, eggs and young | 80 |
| With some loss to Gulls, total for St. Mary, Islands Bird Sanctuary—6,338 | | | |
| Bradore Bay Bird Sanctuary: | | | |
| Perroquet Island | H.F.L. '35 | Count | 30 |
| Total for Bradore Bay Bird Sanctuary—30 | | | |
| 1935, TOTAL FOR ALL SANCTUARIES ON NORTH SHORE | | | 12,192 |
| Total for Other Colonies | | | 48,434 |
| Total for North America | | | 60.626 |

## NOTES ON INDIVIDUAL COLONIES

THE PARAGRAPH NUMBERS REFER TO THE REFERENCES IN TABLES

1. Referring to one colony in this sanctuary, Lewis (1931) says, "They [Murres] were first observed there [on a rock in Fog Island Sanctuary] in 1925, when 32 eggs representing 64 birds were counted. Since then the number of Murres' eggs in this colony has increased every year, until in 1930 I counted personally 1,293 eggs, representing 2,586 Common Murres. This increase is due in large part to the strict prevention of molestation of this colony of Double-crested Cormorants, among whose nests the Murres apparently like to place their eggs. Such a great increase in the Murre population in this sanctuary cannot be entirely due to local

reproduction, in view of the fact that a pair of these birds does not raise more than one young a year. Some of the increase must represent the shifting of birds from elsewhere into the sanctuary."

2. Dr. Lewis explains the absence of birds in the 1935 count of the Cape Whittle Sanctuary. He says, "While it has been guarded like the others, it has been notably unfortunate, and the decrease in its bird population is due to two very conspicuous happenings. A flour-laden freight steamer was wrecked on the western end of the sanctuary, close to the most important nesting island, in the late summer of 1928, but it remained partly above water until the following winter. Within a few days after the wreck took place, hundreds of fishermen in motorboats assembled from far and near to obtain as much of the flour as they could and for weeks afterward salvaging operations, generally of a very noisy character, were going on about the wrecked vessel on every fine day. . . . Then, beginning in the autumn of 1928 and continuing throughout the summer of 1929, the Department of Marine built a new lighthouse and fog alarm station on the largest island on the eastern end of the sanctuary. This means that 20 to 30 men lived on the island, which is very small, for months at a time, while blasting, drilling, and other noisy operations were carried on. Consequently most of the nesting birds left that vicinity also. As the sanctuary has only a very small land area, divided into two groups of islets, a western and an eastern, and as these were both very seriously disturbed by the above mentioned unavoidable occurrences, the resident bird population was greatly reduced."

3. This colony was visited by the author in company with Dr. Harrison F. Lewis on July 19, 1931.

4. All these small islands in the Wolf Bay region were visited, some of them several times, during the summer of 1931 by the author, and by Henry Jones or the late Arthur Court of Wolf Bay.

5. This estimate is by Charles W. Townsend. (Can. Field-Naturalist, 34 : 80.)

6. A. C. Bent (1904) made this estimate. H. F. Lewis in a letter dated May 26, 1933, refers to the data by Bent and says that there has been little change in many years so the number is probably about the same now. Dr. Lewis informed me in 1933 that there are two rather large groups of breeding murres on the north island of the bird rock group, but that this island being made up of soft rock, is disintegrating rapidly and is expected to be lost within a period of ten years as a nesting site for these birds. Since great Bird Rock is already well populated with birds the murres from the North Island will have to go elsewhere.

7. In a letter of June 10, 1933, Mr. F. E. Keating wrote Dr. Lewis regarding the murres on Bryon Island as follows; "As for Puffins, Tinkers and Murres they are decreasing for the last five years. There are only about a dozen Murres nesting around the Island this year." Mr. Keating is the lighthouse keeper on the Island.

8. There are no reliable data regarding the number of breeding murres for the island of Anticosti. Lewis (1924), has presented the conflicting evidence regarding the occurrence of the Atlantic Murre as a breeding bird. However, since that time (Lewis, personal communication) two deputy wardens visited the vicinity of the bird cliffs near Fox Bay on the northeastern coast and have given an estimate for the number of breeding birds there. From their report Dr. Lewis considers that there are at least 20,000 breeding there. They report no murres breeding on the south coast.

9. Regarding the number and distribution of breeding birds of the Atlantic Murre on the Newfoundland Labrador coast, the work of Austin (1932 : 132–133), gives us the results of his long study pertaining to the species in that part of the range. He says, "The Murre is an uncommon summer resident locally on the various alcid islands. I have seen a very few, mostly the ringed form (the eye-rings made them stand out from the prevalent Brunnich's Murre more sharply than the thinner-edged bill) in the colonies on both the Gannet Islands and Nunarsuk. There are two specimens in the Museum of Comparative Zoölogy, both collected by Doane at Loup Bay, a male taken June 19, 1899, and a female of the ringed variety taken July 1, 1899." . . . "Bigelow (1902:26) found it fairly

common as far north as Hamilton Inlet in 1900, and was told of a colony near Eclipse Harbor which I have never been able to learn anything from either the natives or Mr. Perrett. Neither Coues or Hantzsch saw the bird." Austin (personal communication, 1932), speaks of the Nunarsuk and Gannet Island breeding colonies as containing about 100 and 200 pairs in mixed colonies and states, "There are only a few scattered individuals on the other seven or eight large alcid rookeries between Battle Harbor and Port Manvers. North of Manvers occurs a barren stretch where none except the guillemot breed, until you reach the Button Islands in Hudson Strait."

In 1931 the Oxford University Exploration Club sent an expedition to Hudson Strait. Mr. D. H. S. Davis, Biologist on this Oxford University Hudson Strait Expedition, has the following to say regarding the murres on Akpatok Island. "There are two large colonies of Guillemots (Murres) on the island of Akpatok, one at the north and one at the south west end. Plenty of birds belonging to the Brunnich's species were seen and identified in the field, by the beak. No definite and certain instance of a common Guillemot was ascertained. The difficulties of landing at the colonies are great, and the other work prevented the problem from being followed up. The colonies contain very large numbers, probably running into hundreds of thousands or more."

Dr. Alfred O. Gross made a trip to northern Labrador and the Button Islands during the summer of 1935 and has sent the author the following information relative to murres seen there during the breeding season. "Brunnich's Murres were nesting on several of the islands in the vicinity of Hopedale on July 6th. On July 11th about fifty Murres were seen in a number of small flocks near the entrance of Grenfell Tickle and on July 14th about a dozen were seen in Gray Straits. July 15–18th Brünnich's Murres were present in large numbers at Port Burwell, Ungava Bay, where we collected five specimens. July 23rd, fifteen Murres were noted while we were crossing Grey Straits to the Button Islands and on July 29th I saw a large raft of them on the sea off Lacy Island of the Button Group. Brünnich's Murres undoubtedly breed in northern Labrador and on the Button Islands, but we were unable to find their nests. They probably breed on some of the large number of inaccessible cliffs. The gonads of the birds collected were very large, the testes averaging 10 x 30 mm. and the ovaries contained ova 4 to 10 mm. in diameter indicating the birds were sexually active at the time of our visit." From this statement, it seems to me rather doubtful if the Atlantic Murre breeds at all in northern Labrador or in the Button Islands. Considering the work of Austin, Davis, and Gross, the author has arbitrarily estimated the number of breeding Atlantic Murres for Newfoundland Labrador as 100.

10. I am greatly indebted to Mr. V. C. Wynne-Edwards for information on which to base an estimate of the number of breeding birds for these Newfoundland colonies. In a letter of Feburary 21, 1936, and one of March 2, 1936, he has informed me of his visit to these colonies in 1934. In regard to the colony at Cape St. Mary he says, "I do not think I should exaggerate if I said there were 5,000 pairs; there may have been two or three times that number. At Baccalieu Island there may have been about 1,000 pairs, possibly less—(Say 500–1500)."

Mr. Wynne-Edwards states that he knows of no other breeding colonies of Murres in Newfoundland but thinks there must be others. I have been able to secure no information concerning the existence of other breeding colonies of Murres in Newfoundland waters.

11. The estimate of the number of breeding birds for Funk Island is based upon information which Mr. Wynne-Edwards very kindly furnished me. He visited the island on the 29th of June, 1934. This estimate of 10,000 breeding pairs is very encouraging as it appears to indicate a distinct increase in the last fifty years. Lucas (1887: 135), "few Murres on Funk Island today—twenty years ago one boat took away eleven barrels of eggs on one trip. This year it is much to be doubted if aside from the Puffins there have been two barrel fulls laid on the island."

Lucas, speaking of his visit on the 29th of July, reported heavy persecution of all the birds.

12. A dozen pairs of Murres have been reported as breeding on the Bird Islands, off the northeast coast of Cape Breton Island, Nova Scotia (Can. Field-Naturalist 34 : 185). The author received a specimen from this part of Nova Scotia which was reported as *U. a. aalge*, but it proved to be of the other species. He believes that no breeding birds of either species are actually breeding there at present.

## THE POPULATION TREND DURING THE PAST 100 YEARS

There is no question but that the population of the Altantic Murre today is small remnant of that which existed 100 years ago. Audubon's descriptions of great colonies tell of places not used today (Labrador Journal). Mr. Frank Jones of Wolf Bay, who as a boy assisted Frazar (Frazar, 1887), told me of the great colonies of murres which nested in that vicinity when Frazar was there. He states that on one occasion they collected and blew many pails of eggs from the Cormorant cliffs at Cape Whittle. The murres were nesting there with the cormorants in great numbers. At that time and earlier schooner loads of eggs were collected from the region and sold in the Halifax markets. The slaughter of the adults at the nesting colonies for their feathers and for dog food was common practise.

Bryant (1861), reported the murre on the North Shore very common but rapidly diminishing.

Frazar (1887), who spent a summer in the Wolf Bay region about a half century after Audubon's time gives us an account of the conditions he found as well as the activities of the Halifax "eggers" which continued the destruction as long as there were birds to support them. After they ceased, the local fishermen and the Newfoundland fishermen continued the destruction on the diminished population. Most of the birds affected must have been Atlantic Murres since the Brünnich's Murre is naturally a cliff nester and has not been known to nest on the North Shore for a long period of years.[1] A part of Frazar's statement which gives a basis for estimating the probably population of breeding birds at that time is given as follows:

"The 'Halifax eggers' come in for a good share of the blame, and I can hardly feel but it is rightfully bestowed; however they can be held responsible for the destruction of but one species, namely the murre, for that was the only species they disturbed. Their method was this: a vessel of about forty tons would leave in the spring with say a dozen men besides the regular crew, for the breeding grounds, and on reaching there these extra hands were stationed about in pairs on every island where murres congregated in sufficient numbers. The first step was then to gather all the eggs that had already been laid and throw them into the sea, which was

[1] The Brünnich's Murre was discovered nesting again on the North Shore in July, 1938 at the St. Mary Islands.

necessary so that all the eggs which were retained for shipment might be fresh, and after that the eggs would be gathered regularly every morning, for the murre never deserts its chosen home and although its clutch is but one egg, still if that is taken from them they will continue to lay with the religious regularity of a hen. In about ten days these men will have gathered a sufficient load and the vessel, which during this interval has been laying in some convenient bay, is now prepared for the return trip. The first thing to do is to remove the hatches and to throw over the ballast, then the hold is covered to a depth of about three feet with the long soft moss found growing on most of the neighboring islands. After this is done the eggs are piled loose upon the top of this bed to the depth of about two and one half or three feet right over the whole hold and the vessel starts for home leaving the eggers behind to gather another load which is sure to be ready before her return. The second is generally her last trip but in successful seasons as many as three voyages have often been made. And when one considers that during the height of this egging business as many as four vessels are kept a-going, it is easy to see that a vast number of eggs were taken away. But to get a little nearer the exact figures, I will say that a good voyage was expected to turn out about fifty puncheons of eggs, and as there are about two and a half barrels in a puncheon and as each barrel holds fifty dozen eggs a little figuring will show, allowing nothing for eggs thrown away and those broken in gathering, that each trip a vessel made meant the destruction of at least six thousand two hundred fifty dozen murre eggs."

After studying the reproductive capacity of these birds during three summers spent on the North Shore, it is my belief that these Halifax "eggers" could not have harvested more than an average of four eggs per season for each pair of breeding birds, after counting out eggs thrown away and left behind. Thus, it is possible to estimate fairly definitely from these data what the murre population was when the egging was at its height, say eighty or one hundred years ago.

If the four schooners made a total of ten trips they carried in one season 750,000 eggs from the North Shore region. This would mean at four eggs per pair, 187,500 pair of birds, or a total of 375,000 murres breeding in the region. This, no doubt, represents a very conservative figure, since the collectors would not be likely to bother with small colonies on isolated islands. But as it stands, it represents approximately forty times the murre population which existed in the same region when the sanctuaries were started a little over a decade ago.

## ADDITIONAL NOTES ON CERTAIN BREEDING POPULATIONS

The reports of progress in the bird sanctuaries along the north shore of the Gulf of St. Lawrence by Harrison F. Lewis give very

accurate and interesting records of the progress of the breeding populations within these Sanctuaries during the past ten years. In the Canadian Field-Naturalist for April, 1931, he gives an historic statement regarding the beginning of this sanctuary system.

"In 1925, on recommendation of the Minister of the Interior, Canada established by Order-in-Council, under authority of the Migratory Birds Convention Act, ten sanctuaries for sea birds on the north shore of the Gulf of St. Lawrence. Each of these sanctuaries consisted of two or more islands conveniently situated for purposes of protection and already supplying nesting sites to large numbers of sea fowl, altogether with the adjacent waters. As soon as possible after the establishment of these sanctuaries each one was supplied with a part time warden who was a resident of the vicinity, and appropriate posters were put up at landing places and other suitable points about the periphery of each reserved land area to indicate to all comers that all hunting, gathering of eggs, or other molestation of wild birds was prohibited there."

As a matter of record, a census of the sea bird populations nesting within these sanctuaries was taken in 1925, and again in 1930 and 1935. Lewis (1931), has given the results of these counts for 1925 and 1930. The figures for the 1935 census for the murre were given in a paper read at the 1935 Ottawa meeting of the A. O. U. as 12,192 for the sanctuaries.

Townsend (1918 : 111–116), describes a visit to a murre colony off Coacoacho Bay where murres were nesting with cormorants. He estimated the murre population when he visited the island at 2,000 birds nesting very closely together. He says, "We counted 100 murre eggs in a space of 10 feet square." Dr. Lewis has identified the island described by Townsend as Outer Island, also called Beacon Island (lat. 50° 9′ N., long. 60° 18′ W.) It is the outermost island in the Wolf Bay Sanctuary, and is referred to in the Pilot Guide as "Outer Islet."

Regarding the progress of the murre colony since Townsend's visit, Dr. Lewis wrote me on April 9, 1936, as follows:

"Some calamity, probably a series of several raids must have overtaken the colony of Murres and Double-Crested Cormorants on Outer Island between 1915 and 1921. For many years after I began to visit that region annually, only great Black-backed Gulls and possibly an occasional pair of Razor-billed Auks nested on Outer Island. In the past three or four years Double-crested Cormorants have resumed nesting there. On July 2, 1935, I found on this island 114 nests of Double-crested Cormorants, 25 nests of Great Black-backed Gulls, and 2 nesting pairs of Razor-billed Auks. Very likely the Murre will eventually return to the island to join their preferred companions, the Double-crested Cormorants."

The size of one of the largest breeding colonies on the north shore is shown by the following quotation from Lewis (1934). Writing in the Canadian Field Naturalist, he says:

"The population of the colony of this species on a rock in Fog Island Bird Sanctuary, which was recorded as 2,586 breeding birds in 1930, was estimated at 2,800 breeding birds on July 19, 1931, when an exact count of eggs was impossible, because most of the young had hatched and were running about. On July 6, 1932, I counted 1,866 eggs and 3 young birds of this species in this colony, indicating a population of 3,758 breeding birds. Shortly before the middle of June, 1933, the

colony was robbed of all eggs laid up to that date, but on June 21, of that year I counted in it 1,786 eggs, representing 3,572 breeding birds. It is highly probable that many adults in the colony were not represented by eggs on the last-mentioned date, because of the short time that had elapsed since the robbery, and that the actual population of the colony was therefore greater than the number stated."

On July 2, 1935, Dr. Lewis counted 1,996 murre eggs in this colony, showing a breeding population of 3,992 on that date.

When Frazar worked at Wolf Bay in 1884 (Frazar, 1887), murres were nesting in large numbers among the cormorants on the cliff at Lake Island. I visited this location in 1930, 1931 and 1934. No murres were nesting there at that time, nor, for a number of years before that time, I was told.

Murre Rock, off Mutton Bay, on the north shore, is no longer used as a breeding location by the Atlantic Murre.

## MIGRATION AND WINTER RANGE

*Daily Migration.*—The difficulties to be overcome in studying the movements of birds at sea have been next to insurmountable. Few naturalists have had the opportunity to observe widely, or the familiarity with the birds and their ecological relationships, to grasp the whole picture. A few valuable local studies have been made, and fewer important considerations to the general movements of birds at sea. Returns from banded birds have in more recent years been of great value in leading to a better understanding of these problems.

Regarding the migration of murres, one of the important early studies of local movements of birds was made in the vicinity of Monterey, California, by Loomis (1895–1896), who made extensive daily observations of sea birds passing that part of the coast. He says, (1896: 20):

"The passage of California Murres were especially interesting, for they furnished additional proof that the movements witnessed in June and July were truly migratory ones. Some days large wedge shaped flocks in frequent succession would be passing down the coast, in the same manner as south-bound migrants, on other days the majority would be heading northward, or more rarely, as many would be going in one direction as the opposite. In summer, however, the path of flight invariably led to the south.

"From the outset a large proportion of the murres seen had the side of the head and neck, the throat and foreneck brown—a state of plumage the books describe as peculiar to the season of reproduction."

This type of movement described by Loomis has more recently been studied by English observers, (Hartley, 1935) and (Alexander, 1936), who conclude that these are movements to and from the feeding grounds. The reasons for the latter belief are explained by Alexander, (1936: 298–299), who says:

"In the early years of my observations I assumed that when I saw large numbers of Red-throated Divers (sometimes over 100 in ten or fifteen minutes), or flock after flock of Scoters flying steadily in one direction for a hour or more, it must

be part of a long distance migration. But recently I have changed my mind and now I agree with Mr. Hartley's view that these flights are local movements. At Dungeness, as in Cornwall, they vary considerably from day to day; but at Dungeness, in contrast to the Cornish observations, they also vary in direction. Thus, sometimes I have seen a large south-westerly flight in the morning, and then later in the day—sometimes even before midday—the main direction is changed and dozens may be seen going in the opposite direction, north-east. At other times the movement gradually peters out, partly because numbers come to rest on the sea close to Dungeness point.

"The tentative conclusions I have reached are that these movements may be partly related to wind, but (about Dungeness at any rate) still more to tide or currents. The currents in the straits of Dover are, as well known, very strong and rather complex. It would seem that during the night the birds may get carried up or down channel until they are outside their normal feeding-grounds; accordingly from dawn onwards, they fly south-westward again (or north-east, as the case may be). Sometimes with the change of tide, they then are carried too far the other way, and so they fly back again. It looks as though they tend to fly right across their feeding grounds, so as to begin again at the far end. This applied especially to the Divers and Guillemots (*Uria aalge*) whose feeding grounds include a considerable zone of water to east and west of Dungeness, and the part of the channel opposite the point. It is all the more noteworthy, therefore, that when a strong movement is proceeding, there are usually as many Scoters of both species (*Oidemia nigra and O. fusca*) participating in it as there are Divers or Auks."

If we are to consider the ecological community as important in determining the feeding range of the seabirds as shown by the reports of some workers (Hagerup, 1926: 127–151) and Wynne-Edwards (1935B: 239–242) we should remember that many of the breeding sites of the murre are located within the inshore community (as described by Wynne-Edwards, for example) which is, or may be, a considerable distance to landward from the feeding community of which the murre is a typical example. How far from the nesting colony murres travel for food is unknown, but I have already stated that certain colonies appear to be feeding their young largely on one species of fish while other colonies are specializing in the capture of another species of fish. It appears from my notes that in general it was the smaller colonies which were noticeable in having a diet largely restricted to the fish species *Stechalus punctatus*. This fish is, I believe, one of the inland community, and shows that the nesting birds do some fishing within the inshore community. I have never been certain, however, that I was observing a murre actually seeking food in the vicinity of the nesting islands. There are many reports of them coming in from many miles out at sea toward the nesting islands. One of these by Dall (1902: 329–331), states:

"When the Harriman Expedition visited Bogoslof on the evening of July 8, 1899, flocks of murres on their way to the islands began to pass the ship while we were still twenty five or thirty miles away. . . . The fog was thick all the way."

Wynne-Edwards, and others (Brit. Bds.: 1926) in discussing the Gannets which belong to the same ecological community as the murres, have shown that the chief feeding place of birds from Bonaventure is in the Mingan Passage and the waters around the

west point of Anticosti, between sixty and one hundred miles from home. I doubt if the murre makes trips for food of such long distance. Yet their movements in search of food must at times show considerable likeness to a migratory movement. The conclusions by Alexander (1936), are the more convincing when we note that such movements of birds are more pronounced in stormy weather than at other times.

*Fall Migration.*—Murres move away from the breeding ground as soon as they have definitely given up an attempt to nest because of failure, or if successful, as soon as the young bird takes to the water. Thus, the breeding colonies in the vicinity of the North Shore of the Gulf of St. Lawrence rapidly become depopulated during the last days of July and the first days of August. The migration is not a mass one but a gradual movement out to sea.

Returns from banded birds taken during September and October are few, but these with my own observations of the movements of adult birds and published records lead me to believe that there is a movement of birds from the breeding colonies in the Cape Whittle region and perhaps somewhat to the westward, toward the Atlantic through the Straits of Belle Isle. The presence or absence of a plentiful supply of food in certain regions of the Gulf affects the movements of adjacent nesting populations, witness the presence of old and young birds each August in the vicinity of Mingan (Lewis, personal communication) and Gannets feeding in this locality (Wynne-Edwards, 1935A), showing attractiveness of this feeding area. If these murres seen at Mingan are from Anticosti Island breeding colonies as seems likely, they too I believe, eventually if not at once move toward the Straits and find their winter quarters in that vast area of water which forms the Grand Banks, or the continental shelf east and south from Newfoundland toward Nova Scotia. Several sight records of adult murres with small young have been reported passing eastward through the Strait during August, the time when the season's crop of young is leaving the nesting islands. These young birds are about one quarter of the size of their adult parents when they leave the colonies.

## RETURNS FROM BANDED BIRDS

Through the courtesy of the National Parks Bureau of the Department of Mines and Resources of Canada and the Bureau of Biological Survey at Washington, D. C., I have the return records for 27 murres banded as young birds in the nesting colonies between the years of 1923 and 1937. All of these birds were reared in colonies on the North Shore and most of them in the vicinity of Cape Whittle where they were banded by Dr. Lewis and the author.

The records of their whereabouts in succeeding months gives a very good picture of the yearly range for the North Shore breeding population (see map, Plate 1). All of these birds were banded

before the middle of August but none were recaptured until November. Of the six November records, two were taken on the North Shore near the same latitude in which they were banded and four had already reached eastern and southern Newfoundland waters in the vicinity of which their normal winter range lies. Of the two birds still remaining on the North Shore, one was taken to the west at Mingan, a distance of approximately 200 miles and the other from Wolf Bay was taken less than 100 miles east at St. Augustine.

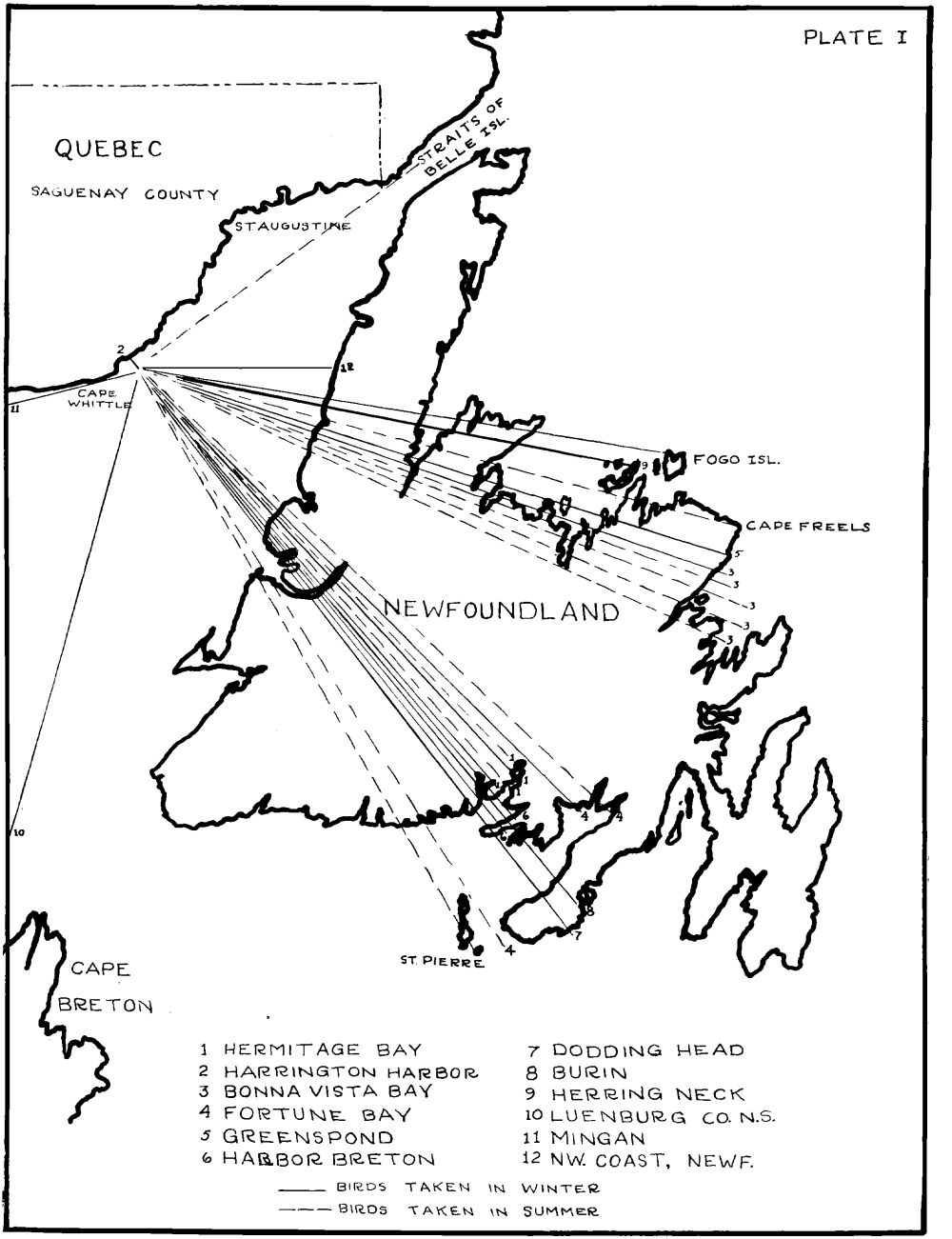
Of the remaining ten banded juveniles taken during the winter months, December, January and February, nine were in Newfoundland waters, except one taken at St. Pierre, and one off the east coast of Nova Scotia. The points of recapture for these winter records indicate a definite wintering area south and east of Newfoundland. The recovery data for ten birds banded as adults (data not on map) in the same breeding colonies indicate that they winter more to the east of Newfoundland but in the same waters there as the young. I do not know where the birds belonging to Newfoundland breeding colonies spend their winter but presumably in or near the same general region as the more northern breeding birds.

Eleven birds banded as juveniles were taken during the first breeding season after their hatching in their winter range and three were taken during the second breeding season after their birth in the winter range. Thus, it seems certain that these birds do not breed before they are three years of age if that soon. I have no record of any bird banded as a juvenile having been retaken at or near the breeding colonies.

RETURN RECORDS OF ATLANTIC MURRES BANDED AS JUVENILES ON THE NORTH SHORE OF THE GULF OF ST. LAWRENCE

| *Number* | *Place Banded* | *Date* | *Place Recovered* | *Date* |
|---|---|---|---|---|
| 34-632134 | Cape Whittle Region | 7/30/34 | Fogo Island, Newfoundland | 11/10/34 |
| — | Cape Whittle Region | 8/12/23 | Hermitage Bay, Newfoundland | 7/ 9/25 |
| B-619130 | Cape Whittle Region | 7/25/34 | Hermitage Bay, Newfoundland | 11/13/34 |
| 5597 | Cape Whittle Region | 8/12/23 | Hermitage Bay, Newfoundland | 6/ 9/25 |
| 201439 | Cape Whittle Region | 8/10/26 | Hermitage Bay, Newfoundland | 2/ 8/27 |
| — | Cape Whittle Region | 8/ 9/28 | Straits of Belle Isle | 6/15/29 |
| B-619266 | Cape Whittle Region | 8/ 4/34 | Bonna Vista Bay, Newfoundland | 7/12/35 |
| — | Cape Whittle Region | 8/12/23 | Bonna Vista Bay, Newfoundland | 6/ 2/24 |
| 34-632017 | Cape Whittle Region | 8/ 4/34 | Bonna Vista Bay, Newfoundland | 6/20/36 |
| — | Cape Whittle Region | 7/27/35 | Bonna Vista Bay, Newfoundland | 6/10/36 |
| B-619062 | Cape Whittle Region | 8/ 6/31 | St. Augustine, Saguenay County | 11/14/31 |
| 34-632044 | Cape Whittle Region | 8/ 4/34 | Fortune Bay, Newfoundland | 12/ 1/34 |
| B-619138 | Cape Whittle Region | 7/25/34 | Fortune Bay, Newfoundland | 6/ 5/35 |
| B-619319 | Cape Whittle Region | 7/29/34 | Fortune Bay, Newfoundland | 6/ 7/35 |
| 34-632054 | Cape Whittle Region | 8/ 4/34 | St. Pierre (French) | 7/ 6/35 |
| 201449 | Cape Whittle Region | 8/10/26 | Harrington Harbor, Saguenay County, Quebec | 11/20/26 |
| 5598 | Cape Whittle Region | 8/12/23 | Greenspond, Newfoundland | 11/13/25 |
| 301442 | Cape Whittle Region | 8/ 4/26 | Harbor Bretton, Newfoundland | 1/ –/27 |
| 228944 | Cape Whittle Region | 8/11/26 | Harbor Bretton, Newfoundland | 1/ 4/27 |
| 34-632109 | Cape Whittle Region | 7/30/34 | Dodding Head, Newfoundland | 2/ 9/35 |
| B-619338 | Cape Whittle Region | 7/29/34 | Burin, Newfoundland | 2/ 1/35 |
| B-619277 | Cape Whittle Region | 8/ 4/34 | Herring Neck, Newfoundland | 1/29/35 |
| 34-632053 | Cape Whittle Region | 8/ 4/34 | Braggs Island, Newfoundland | 1/17/35 |
| B-619266 | Cape Whittle Region | 8/ 4/34 | Cape Freels, Newfoundland | 7/10/35 |
| 228947 | Cape Whittle Region | 8/11/26 | Lunenburg County, Nova Scotia | 12/14/26 |
| 201442 | Cape Whittle Region | 8/10/26 | North West Coast, Newfoundland | 12/18/26 |
| 531665 | Cape Whittle Region | 7/ 8/28 | Mingan, Saguenay County, Quebec | 11/ 4/28 |

PLATE I


QUEBEC
SAGUENAY COUNTY
ST. AUGUSTINE
STRAITS OF BELLE ISL.
CAPE WHITTLE
FOGO ISL.
CAPE FREELS
NEWFOUNDLAND
ST. PIERRE
CAPE BRETON
1 HERMITAGE BAY
2 HARRINGTON HARBOR
3 BONNA VISTA BAY
4 FORTUNE BAY
5 GREENSPOND
6 HARBOR BRETON
7 DODDING HEAD
8 BURIN
9 HERRING NECK
10 LUENBURG CO. N.S.
11 MINGAN
12 NW. COAST, NEWF.
BIRDS TAKEN IN WINTER
BIRDS TAKEN IN SUMMER

## THE WINTER RANGE

One difficulty in obtaining general information regarding the winter range of the Atlantic Murre is that most of those who have observed murres have not distinguished between the Atlantic Murre and the Brünnich's Murre and cannot be relied upon to do so correctly. Banded birds provide the best records available, for, with these there is no question about the species involved. Lewis (letter, 1931) said, "Of such recoveries in winter or late fall I have twelve from Newfoundland, of which four are in November, two in December, two in January, three in February, and one in March. Most of these are from eastern and southeastern Newfoundland."

Besides the above records, Dr. Lewis reported three returns from Nova Scotia. In this connection it must be remembered that three recoveries from the Nova Scotia region against twelve from Newfoundland waters does not indicate the relative concentration of the birds. In Newfoundland there has been until recently no law against shooting during the winter season, consequently many more birds are shot and bands which may be collected are sent to Ottawa without fear of prosecution. In Nova Scotia, however, it is unlawful to shoot birds during the winter, and so any banded murre recovered is not nearly so likely to be reported. Because of this condition it may be that the three records from Nova Scotia do not show the same index to the total population as do those reported from Newfoundland.

During the latter part of December, 1932, and the first part of January, 1933, I made a trip to the Tusket Islands off the southeast coast of Nova Scotia to look for the Atlantic Murre on its wintering grounds (Johnson, 1934). While living on Spectacle Island some ten miles from the main land, short trips were made with lobster fishermen to the surrounding waters, but no Atlantic Murres were observed. The Brünnich's Murre was present, but not in great numbers. I was told that the form for which I was looking was only seen in times of storms which would blow the birds in from several miles out to sea. But the weather remained extremely mild while I was in the vicinity, and I could not be sure that the fishermen who claimed to know the two kinds of murres had really distinguished between them.

It is naturally surprising to one who reads about the breeding colonies of the murre that the birds can seem so scarce when they go out to sea. These people have little conception of the vastness of the water area which is available for these birds when they scatter. Wynne-Edwards (1935B : 330), gives some sight records which indicate the extent of the Grand Banks which provides a fishing ground for these birds. He says:

"On June 5 two Atlantic Murres were seen eighty miles off Cape Race, and the same day another, believed to have been this species (it is sometimes very

difficult to distinguish it from Brünnich's), near the edge of the Grand Bank, 150 miles from land. On June 9 one was certainly identified in longitude 13° 45', 130 miles west-southwest of the nearest point on the Irish coast."

Bailey (1927 : 16), in discussing the distribution of murres on their winter range in southeastern Alaska says:

"They are generally distributed during the winter months, according to food supply, and are to be found in numbers one week only to be scarce the next. When the herring and other small fish school, hundreds of Murres are sure to be in attendance."

In conclusion, it may be said that the winter range of the Atlantic Murre in North America is in the main the waters of the Grand Banks east and southeast of Newfoundland and extending southward toward central and southeastern Nova Scotia. If this bird ever was common in winter along the New England coast as reported by Allen (1864 : 91), that is no longer the case.

The movement of the Atlantic Murre to the location of its nesting colonies in spring appears to be affected to a considerable extent by the weather conditions. If the ice disappears early the birds may be expected to arrive on the rocks at the nesting island early. If the ice remains until late the birds will be delayed in their arrival. Generally they may be expected to arrive in the vicinity of Cape Whittle between April 10th and the 20th. Mr. Fred Osborne, lighthouse keeper at the St. Mary Islands, has given me the following records of arrival dates: for 1935, April 26; for 1936, April 11; for 1938, April 20.

## SUMMARY

The total breeding population of the Atlantic Murre (*Uria aalge aalge*) in North America is approximately 60,626 as shown by a breeding colony census.

The known breeding range now extends from Nunarsuk Island, Labrador southward to Cape St. Mary on southern Newfoundland, and from Funk Island in the east to Bonaventure Island, Gaspé County, the most western location in the breeding range.

A study of the reproductive capacity of the murre compared with the record of the number of eggs harvested by the "Halifax eggers" who collected eggs for the Boston market 80 to 100 years ago indicates that the murre population at that time was about forty times as great as that which existed when the Canadian Government created the sanctuaries on the North Shore.

Banding records have given a fairly good picture of the murres' migration and winter range. Some interesting facts in this connection are: the eastern and southern banks of Newfoundland form the center of the wintering area for both adults and immature. Breeding birds with their 3-weeks old young leave the nest islands at once and move out to sea in July and August. (These young weigh about 25 per cent of the adult weight). Breeding adults return to

the nest islands about the middle of April. Young birds do not breed before they are three years old and remain on the wintering areas during the first and second breeding seasons following their hatching.

Return records for ten adults indicate that they are concentrated more in the northeastern part of the winter area as used by juveniles.

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## PROGRESS REPORT ON THE COOPERATIVE GULL SURVEY

By R. P. ALLEN and J. J. HICKEY

IT is with considerable pleasure that we can announce the completion of the essential ground work of this project by bird-banders. Over a three year period 22,381 Herring Gulls have been marked with celluloid bands, many of them under exceptionally trying conditions. Their numbers by colonies follow:

| | *1937* | *1938* | *1939* | *Banders* |
|---|---|---|---|---|
| Razades Id., P. Q..... | 727 | 800 | 780 | La Société Provancher d'Histoire Naturelle (Dr. D. A. Déry) |
| St. Mary Id., P. Q..... | 505 | 175 | 423 | Dr. Harrison F. Lewis, Canadian National Parks |
| Bonaventure Id., P. Q..... | 100 | — | — | William M. Duval |
| Kent Id., N. B. (imm.)... | 2250 | 3059 | 2900 | Bowdoin Scientific Expedition |
| (adults)... | 100 | 720 | — | (Dr. A. O. Gross) |
| Duck Id., Me..... | — | 285 | 463 | Darrell Mann and John H. Storer |
| Muscongus Bay, Me..... | 683 | 1491 | 1512 | Audubon Nature Camp (A. D. Cruickshank) |
| Heron Id., Me..... | 700 | — | — | Stanley W. Hyde, N.E.B.B.A. |
| Isles of Shoals, N. H..... | 500 | 788 | 1000 | Edwin A. Mason and A. O. Shelley, N.E.B.B.A. |
| Penikese Id., Mass..... | 500 | 500 | 600 | Laurence B. Fletcher, N.E.B.B.A. |
| Wicopesset Id., N. Y..... | 75 | 492 | — | Wilfred C. O'Brien, N.A.A.S. |
| Four Brothers Id., N. Y... | — | 209 | 44 | Messrs. Cutler, Glidden, Eldred and Perkins |
| (Totals) | 6140 | 8519 | 7722 | |