BIRD-BANDING
A JOURNAL OF ORNITHOLOGICAL INVESTIGATION
VOL. XI OCTOBER, 1940 NO. 4

THE MIGRATION OF KENT ISLAND HERRING GULLS[1]

BY ALFRED O. GROSS

KENT ISLAND is one of a group known as Three Islands located in the Bay of Fundy about twelve miles southeast of Grand Manan, New Brunswick, Canada. It is nearly two miles long and varies from a quarter to a half mile in width. Much of its surface is covered with a dense growth of white spruce but a large portion of the southern end is barren and in places studded and strewn with the trunks of dead trees. There are also areas of swamps abounding in a luxuriant growth of grasses, iris, raspberries, alders and other shrubs which add to the diversity of the environment.

The island was named for John Kent, the original owner, who maintained a small farm there during the early part of the last century. Since Kent's day the island has not been inhabited by man and hence has more or less reverted to its original natural conditions providing an ideal nesting resort for thousands of gulls and hundreds of Eider Ducks, Black Guillemots, Leach's Petrels and other interesting sea birds. On nearby reefs and islands are flourishing colonies of Arctic Terns, Razor-billed Auks and Puffins. That the region is rich in bird life is revealed by the 275 species that have been listed for the Grand Manan Archipelago by Pettingill (1939).

In 1930 Mr. John Sterling Rockefeller of New York City bought the island in order to protect its bird life, especially the Eider Ducks. In 1935 Mr. Rockefeller generously presented the island to Bowdoin College under the conditions that a warden be maintained to protect the birds and a scientific station be established for students wishing to avail themselves of the unusual opportunities offered for study and research at this outpost island.

THE HERRING GULLS

Kent Island supports the largest colony of Herring Gulls on the Atlantic seaboard if not in America. It is difficult to estimate the numbers of such a large aggregation but a census of the nests made during the summer of 1940 by Mr. Frederick Crystal, gives us an index to the population of this Herring Gull metropolis.

Mr. Crystal divided the breeding area into convenient sized quadrates, marked by ropes, to reduce to a minimum errors arising from missing or duplicating nests in his counts. On the southern half of the island his census yielded a count of 10,966 nests. Of the nests containing eggs 34.2 per cent had a single egg, 38.6 per cent

[1] Contribution Number 7, Bowdoin-Kent Island Scientific Station, Kent Island, Bay of Fundy, New Brunswick, Canada.

Immature Herring Gull banded August 9, 1940 with B. S. band on the right leg and two black bands on the left leg.

two eggs and 27.3 per cent three eggs. Only two nests contained four eggs each.

The nests were found in a diversity of situations varying from open places along the beach or on top of huge bowlders, to those well concealed by a thick growth of grass and iris or among the dense spruces. In past years a few of the gulls have nested in the spruces well above the ground. Judging from the results of this census there are 11,000 pairs of gulls nesting on the southern end of the island. If we include those nesting on the northern end and the non-breeding birds and the young of the year there are at least 25,000 gulls on Kent Island during the height of the breeding season. One can well imagine the existing competition for food and it is not surprising that the Fundy fishermen have lodged their complaints against the thousands of gulls that raid their weirs and boats and even dare to snatch the bait from their trawl lines. Steps have been taken by the Canadian Government during the past two years to control the gull population as the United States Biological Survey has done on our own New England coast. Kent Island, fortunately, has been spared from this project in order that it may be used for scientific work.

This large colony, coupled with the facilities of the station, presents an unrivaled opportunity to make a detailed and comprehensive study of the species. This paper, however, will be limited primarily to a consideration of the migration of the Herring Gull based on the results of banding activities which were started in 1934.

According to the observations of Mr. Ernest Joy, warden of the station, the Herring Gulls appear in the vicinity of the island during the last week of February with great regularity; February 27, 1938, February 28, 1939 and February 27, 1940. They were seen to come on the island, first alighting in the spruces, on March 16, 1938, March 18, 1939 and March 18, 1940. On April 7, 1939 and April 10, 1940 he noted the first evidences of nest building and on May 9, 1939 and May 9, 1940 he saw the first mating act for those respective years. In 1939 he made observations on the time of egg laying and incubation of the first nests he found as follows:

Order of Laying	*Date of Laying*	*Date of Hatching*	*Incubation Period*
	NEST NUMBER ONE		
First egg	May 17	June 13	28
Second egg	May 19	June 15	28
Third egg	May 21	June 17	28
	NEST NUMBER TWO		
First egg	May 17	June 13	28
Second egg	May 19	June 15	28
Third egg	May 22	Sterile	—
	NEST NUMBER THREE		
First egg	May 25	June 24	31
Second egg	May 27	June 24	29
Third egg	May 29	June 25	28

In the case of the first two nests incubation, according to Mr. Joy, started on the day of the laying of the first egg making the

incubation period 28 days. In the case of nest number three the start of incubation was not observed, but apparently it did not begin until the third egg was laid. If this be true then the incubation period for this set of eggs is also uniformly 28 days.

In 1940 Mr. Joy found the first two Herring Gull nests of the season on May 10. The eggs of the first nest were laid on May 14, 16 and 18 and those of the second nest on May 15, 17 and 20. The eggs of these two nests hatched on June 15 and June 16 respectively. These records indicate that the first eggs may be expected the third week of May, but nesting and egg laying does not reach its peak until well into June. A few young may be banded the last of June but at Kent Island mass banding cannot be carried on to an advantage until the middle, preferably the latter part of July and August when the island is virtually alive with young.

Following is a summary of the numbers of birds banded at the Kent Island Station.

Person in Charge	*Year*	*Number of Gulls Banded*
B. Whitman	1934	2,248 (No adults)
John Crystal	1935	6,804 (50 adults)
John Crystal	1936	8,000 (400 adults)
Nahum Pillsbury	1937	4,851 (200 adults)
Charles S. Brand	1938	3,779 (720 adults)
Ivan Spear	1939	3,110 (110 adults)

Up to the end of the year 1939 we received 773 returns from the Biological Survey and only these have been included in the tables and maps accompanying this paper. Returns received since January 1, 1940 have been used where they are of special interest in cases of longevity, unusual distribution and returns to Kent Island. The 773 returns represent 3.29 per cent of the 23,434 individuals banded from 1934 to 1938 inclusive. In other words out of each 1,000 birds banded on Kent Island we may expect about 33 returns. The percentage of returns from the Kent Island birds is not as great as has been reported from certain smaller colonies where the percentages have been as great as 8 and 9 per cent of the total number banded.

Since 1937 the Kent Island Station has coöperated with the Gull Banding Project sponsored by the Linnaean Society of New York, by adding colored celluloid bands which greatly serve to facilitate field observation. The colors used on Kent Island gulls are as follows:

Year	*Young*	*Adults*
1937	A red celluloid band under the U. S. B. S. band.	A black band added to the other leg.
1938	A red celluloid band over the U. S. B. S. band.	A white band added to the other leg.
1939	A yellow band on the left leg and a black band over the U. S. B. S. band on the other leg.	A black band on the left leg and a black band over the U. S. B. S. band on the other leg.
1940	Two black bands on the left leg and a U. S. B. S. band on the right leg.	None banded.

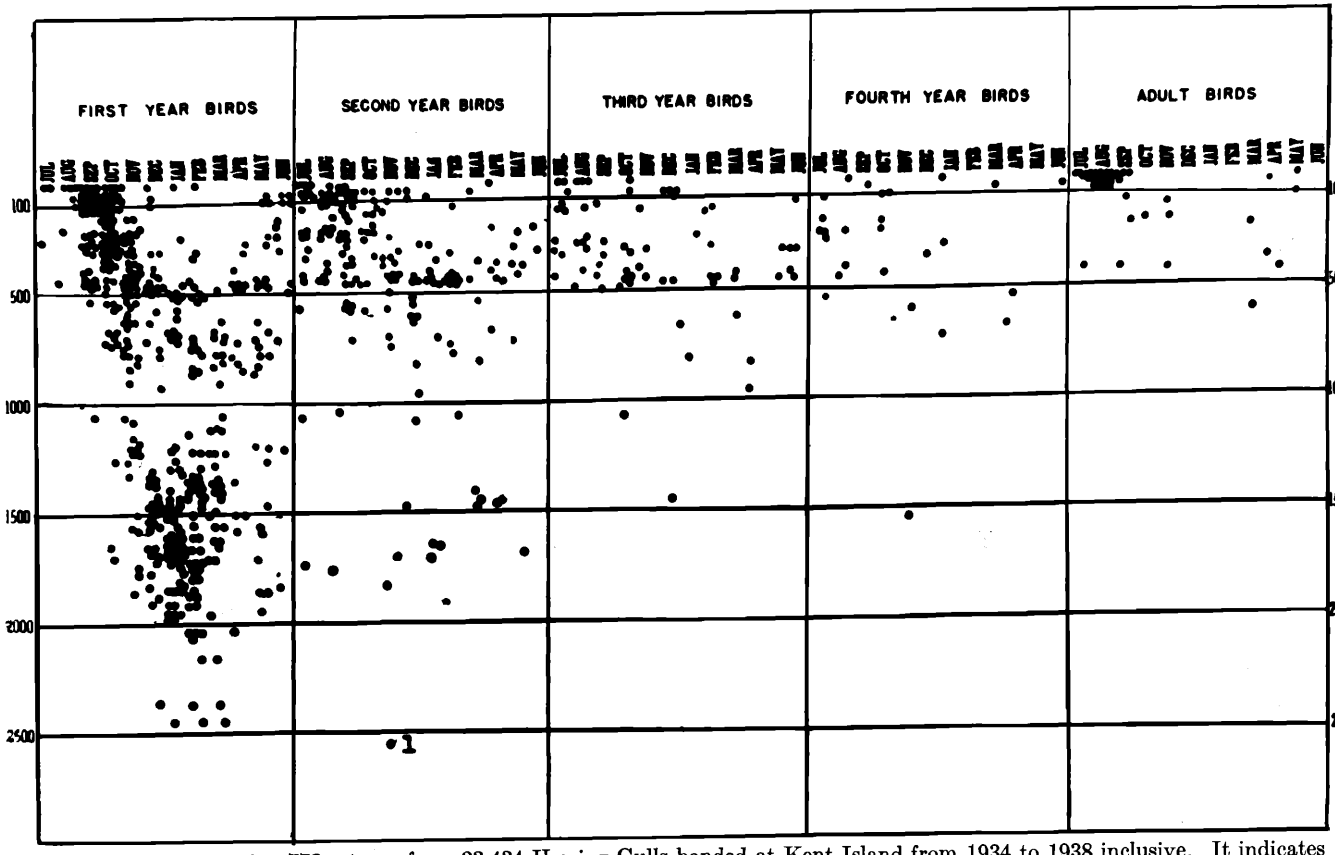


Chart representing 773 returns from 23,434 Herring Gulls banded at Kent Island from 1934 to 1938 inclusive. It indicates the distribution of first, second, third and fourth year birds and those over four years of age including birds banded as adults. It also shows the distribution of the recoveries by months and distances in miles from Kent Island. 1. A second year bird number 36-648130 which came aboard a ship at Lat. 46° 30′ N. Long. 14° W. in November 2,600 miles from Kent Island, off the limits of the Kent Island map of distribution.

This work and the publicity given the project has greatly increased interest in field observations. The results obtained from about a dozen selected colonies will be published by R. P. Allen and J. J. Hickey and hence only general reference will be made of the Kent Island sight recoveries in this paper.

The returns received from the Biological Survey have been presented in the Annual Reports of the Bowdoin Scientific Station and hence these voluminous records need not be repeated here.

It is desirable at this time to present a summary of the results to date and to analyze, as far as the records warrant, the migratory habits of this particular colony. It is hoped that similar reports will be issued on the banding activities at each of the other colonies where extensive work has been conducted. When this has been done we will be able to replace mere speculation by concrete facts in regard to the origins and distribution of populations and the migration of the species as a whole.

Through the courtesy of Mr. Frederick C. Lincoln of the Biological Survey I have obtained the records of 1,409 returns of Herring Gulls banded by H. C. Wilson and the late William I. Lyon in the Great Lakes region. These records of gulls which inhabit colonies in a very different section of the country from that represented by Kent Island will serve as an interesting comparison in the migratory habits of the two distinct populations.

The banding records provided by Mr. Wilson are chiefly of gulls banded on the Sister Islands, Wisconsin, but unfortunately for purposes of comparison the gulls banded by Mr. Lyon are from no less than 50 comparatively small colonies located over a rather wide range in Lakes Michigan, Superior and Huron. To present the returns of each small group separately would lead only to confusion to the reader and less satisfactory for generalizations of their migratory movements, hence all of the returns have been combined into one Great Lakes population of gulls. To simplify the plotting of the chart and map and the ascertaining of the distances of flight, a place located north of the Sister Islands, Lake Michigan, Wisconsin, where most of the gulls were banded, has been chosen as the arbitrary point of dispersal.

The returns of all of the larger colonies worked by Mr. Lyon have been plotted on separate maps and charts but, for the present at least, this detailed analysis does not warrant the space required to present them.

I am indebted to Nahum Pillsbury, Newton Gillett and C. T. Brown, students of my ornithology class, for assistance in compiling the records and in making the maps and charts used in this preliminary report.

DISPERSAL AND DISTANCES FLOWN BY HERRING GULLS

The large number of returns enable us to determine the distances flown by the gulls of different ages and to make a comparison of the

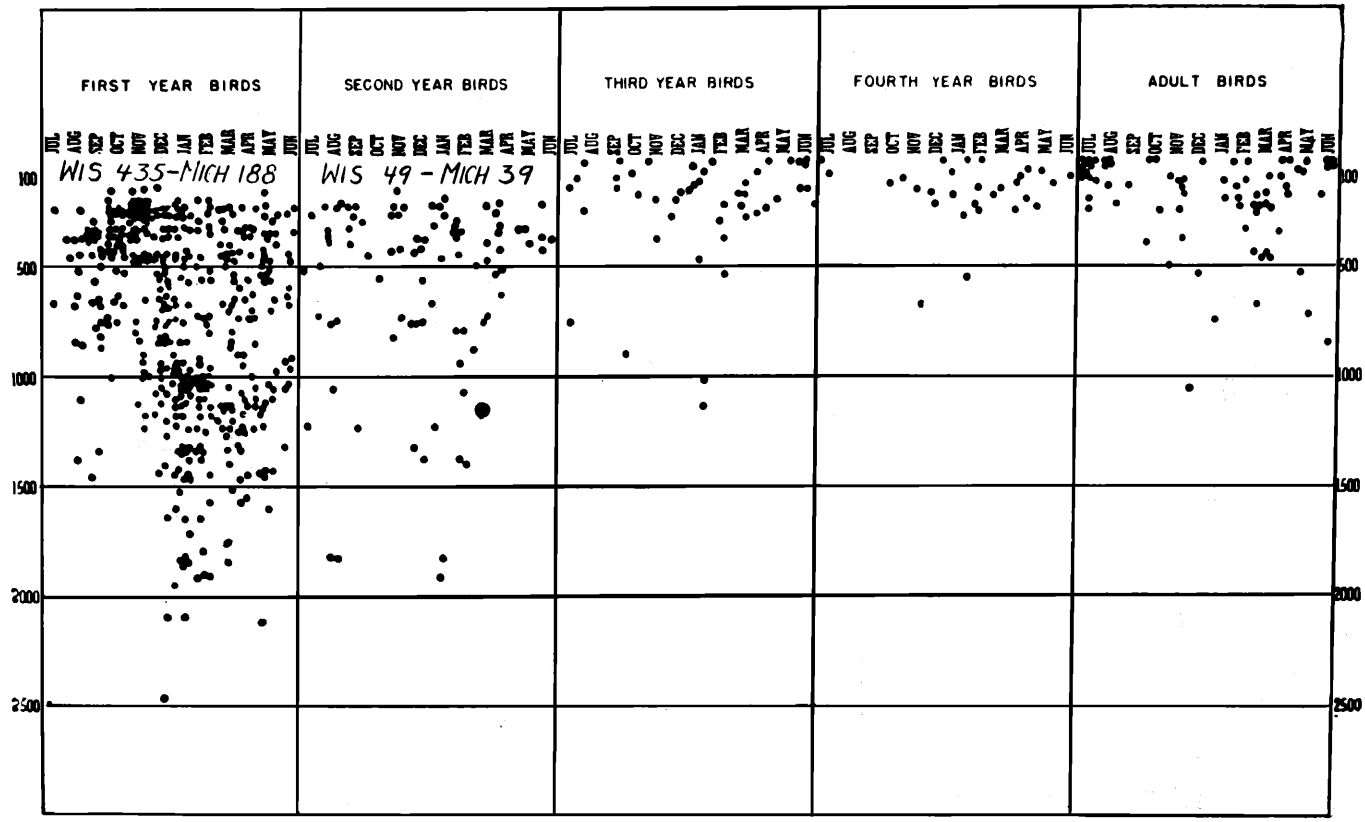


Chart representing 1,409 returns of Herring Gulls banded by Lyon and Wilson in the Great Lakes region. It indicates the distribution of the first, second, third and fourth year birds and those over four years, according to months when recovered and the distances flown from the region. The great mass of recoveries of the first and second year birds from Wisconsin and Michigan are indicated by numbers. Otherwise each recovery is represented by a dot.

gulls from Kent Island with that of the birds nesting in the Great Lakes region.

Even a casual glance at the charts on pages 133 and 135 will reveal that the mass of first year birds fly farther than the older birds but it is desirable to translate these records into definite arithmetical averages. In the following table are shown the mean distances of flight computed from the returns of the gulls from the two widely separated regions.

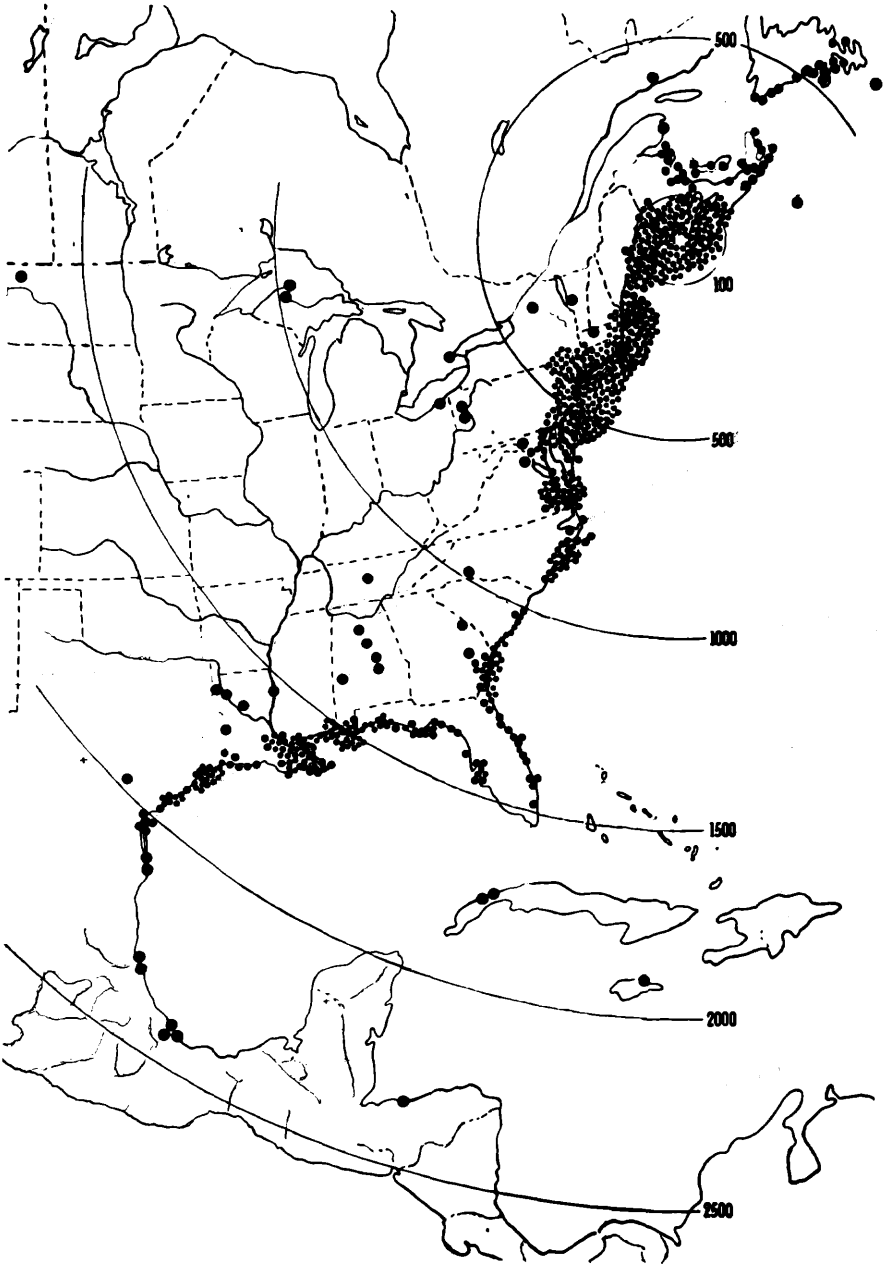
MEAN DISTANCE OF FLIGHT IN MILES

	Kent Island	*Great Lakes*
First Year Birds	861	431
Second Year Birds	435	322
Third Year Birds	290	219
Fourth Year Birds and over including birds banded as adults (breeding birds)	291	181

The most important fact that is emphasized by these results is that the younger birds (non-breeding individuals) as a whole fly greater distances than do the older birds. This substantiates previous conclusions reached by Eaton (1933, 1934), Lincoln (1939) and others, that the younger birds tend to exhibit a stronger migratory instinct than do the older birds. This tendency for the younger birds to migrate greater distances is also borne out by the numerous reports of the preponderance of gulls of the first year plumage in the southern limits of the winter range. Furthermore, according to the sight records, the height of the migration wave of the Kent Island young birds reaches New York in November and December whereas the numbers of young gulls decrease and those of the adults increase after that date (Allen and Hickey).

While the gulls become more sedentary in their migratory habits when they reach the breeding age, most of them leave the vicinity of the nesting colony during the winter months, some of them for a distance of several hundred miles. One exceptional record was a five year bird number 35-551580 banded August 1, 1935 and recovered at Gulfport, Mississippi, on November 25, 1939, a flight of 1,550 miles. Few returns of adults have been received within a hundred miles of the nesting colony on Kent Island during the winter. Kent Island and the Bay of Fundy are never ice-bound, even the shores, because of the excessive tides, are free of ice, hence any migratory tendency of the adults cannot be attributed to ice-bound conditions. There is always a large winter population of Herring Gulls in the Bay and their number is greatly augmented by northern species such as the Glaucous and Iceland Gulls. It is highly probable that the majority of Herring Gulls found there at that time are representatives that have migrated from more northern colonies.

It is interesting to note that the mean distance of flight of the third year birds is practically the same as that of the older individuals. Sufficient records of adults have not been received to plot



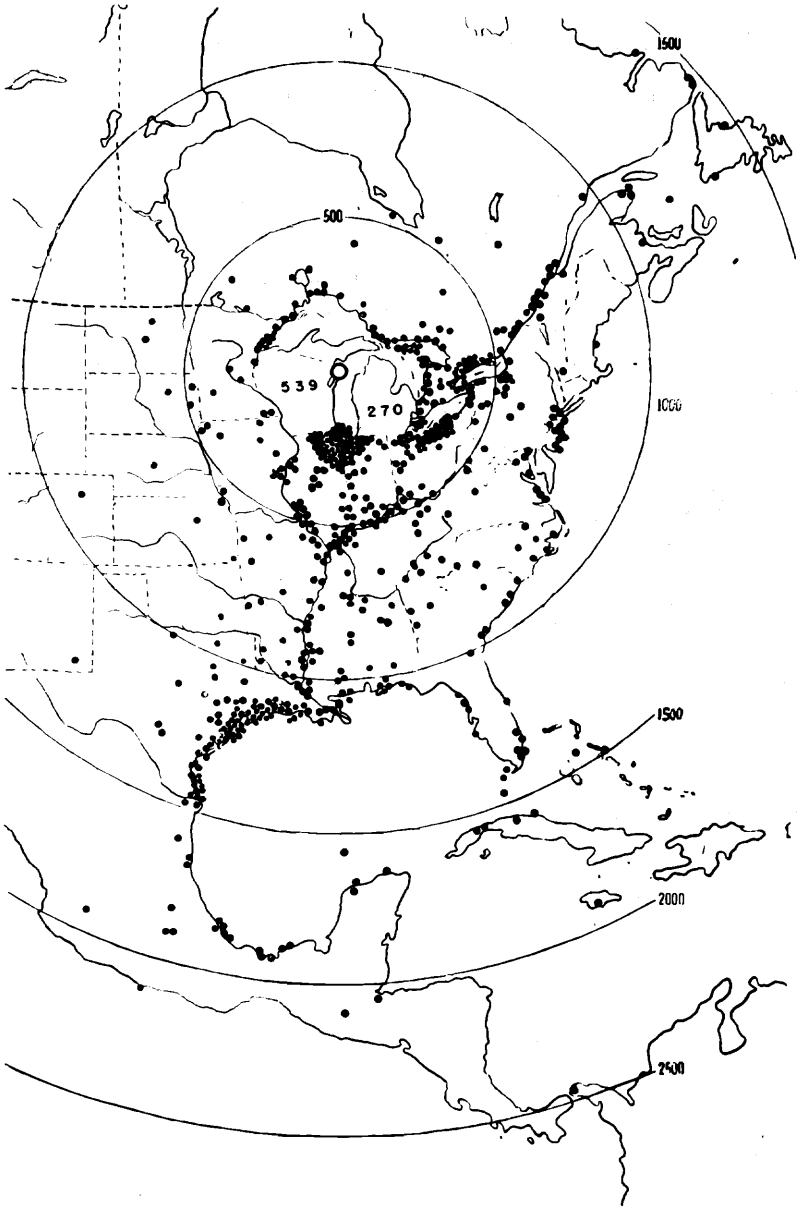
Map indicating the distribution of 773 returns of Herring Gulls banded at Kent Island. Air line distances from Kent Island are shown by circles. The position of Kent Island is indicated by the small white area in the center of the 100 mile circle. See text for interpretations.

accurately their winter range but the vast majority of them winter between Maine and the Carolinas.

If one examines the map showing the distribution of the Kent Island returns (page 137) it will be seen that there is a distinct tendency for the birds to adhere to the Atlantic coast line, only a comparatively few wander far from this migratory highway. This is to be expected when the food-eating habits of the birds are considered. It is well known that the chief food supply of these omnivorous feeders is to be found along the shore and dumps of the numerous coastal cities where great concentrations of the gulls are to be found. This adherence to the coastal line is greater than the plotting of the records indicate. So many returns are from certain regions such as New England and North Atlantic states that the dots could not be placed on the shore line where they rightfully belong. Individual dots rather than numbers for concentrations were used in order that the reader might better visualize their numbers and general distribution. Ferris (1940) has shown that Western Gulls banded at Haystack Rock, Oregon, remain close to the Pacific coast line.

The Kent Island birds maintain this tendency to cling to the coast all along the way to their southern limits of migration. Eaton has suggested that the gulls on reaching northern Florida fly across the peninsula at this point in order to reach the Gulf coast, but as far as the Kent Island gulls are concerned it is just as reasonable to suppose that they stick to the coast around the peninsula. No returns have been received from the interior of the state. Recent returns from southern Florida and not plotted on the map, serve to substantiate this supposition. A few continue from the end of Florida to Cuba and Jamaica and possibly across the Caribbean to Central America. This latter route is more definitely suggested in the case of the Great Lakes gulls. (See map, page 139). The evident tendency for the extension of the winter range to Central America may be developed by either of the two routes, one by way of Florida, Cuba and the Caribbean, and the other by the western coast line of the Gulf of Mexico. Distribution and migratory habits of the Herring Gull apparently are not static. Even the breeding range is being extended southward to the coast of Long Island, New York. Allen (1933); Helmuth (1940).

A further comparison of the distribution map of the Kent Island birds with that of the Great Lakes gulls is interesting. Evidently a more erratic dispersal of the Great Lakes birds takes place but nevertheless there is a distinct tendency for them to concentrate on the shores of the Great Lakes and the river courses such as the Saint Lawrence, Mississippi, Ohio and their tributaries. It should also be noted that the 539 returns indicated for Wisconsin and 270 for Michigan were chiefly from the shores of the lakes. Many of the gulls after following the larger streams, instead of retracing sheir flight, go overland to the Atlantic, even the mountains not terving as an effective barrier against such a dispersal.



Map indicating the distribution of 1,409 Herring Gulls banded in the Great Lakes region by Lyon and Wilson; an arbritrary point of dispersal, marked by circle, was chosen north of the Sister Islands where most of the birds were banded. The figures 539 and 270 to represent the numbers of returns from Wisconsin and Michigan respectively. Because of the concentration in certain places such as Chicago the dots could not be placed on the exact spot of recovery.

The gulls reaching the Gulf of Mexico via the Mississippi River route spread out fan wise along the coast of the gulf. The concentration is especially marked along the coast of Texas. It is obvious the course of migration is secondarily influenced by the available food supply and hence the inclination to follow river courses or shore lines of bodies of water.

The distinct movement up the Saint Lawrence to Labrador and Newfoundland may be explained by their tendency to cling to the shore lines of the lakes and to follow the river course, rather than by some hereditary tendency due to a different origin of their ancestral colonies. To test this latter supposition the returns of the more important of the fifty colonies where gulls were banded by Mr. Lyon, were plotted on separate maps. Only three colonies show a preponderance of returns from the Saint Lawrence route but the numbers in these cases are not significant. This movement is merely the usual northward dispersal of certain numbers, exhibited by all colonies but here accentuated by the series of lakes and large river along the northward course. A considerable number of Kent Island birds find their way to Newfoundland yet this does not provide a basis of conclusion that because they fly northward they represent individuals descended from a different population. In most instances this northward movement is merely a preliminary explosive dispersal to be followed later by a general southward movement as has been found to be true with other species notably the Black-crowned Night Heron.

Differences in migratory habits of different colonies of gulls may prove to be a clue to their origins but as yet this is speculative and the evidence thus far is not conclusive. I have been impressed with the similarity of the dispersal pattern of different colonies when sufficient records have been obtained.

Following are the records of the Kent Island gulls making the longest flights arranged in order of the greatest distances flown. These are air line distances measured from Kent Island to the place of recovery and do not represent the total distance flown during migration. Including their erratic wanderings the actual number of miles flown might well be doubled in certain instances.

Number	*Approximate Distance*	*Date When Banded*	*Date When Recovered*	*Place Where Recovered*
36-648130	2600	Aug. 13, 1936	Nov., 1937	Came aboard ship at Lat. 46° 30′ N., Long. 14° W.
34-543311	2450	Aug. 27, 1934	Jan. 19, 1935	Vera Cruz, Mexico
35-548147	2450	Aug. 1, 1935	Feb. 28, 1936	" " "
36-645761	2450	Aug. 3, 1936	Mar. 25, 1937	" " "
39-661270	2450	July 30, 1939	Jan. 10, 1940	" " "
B-624936	2375	July 25, 1934	Mar. 26, 1937	Tampico, Mexico
36-642179	2375	July 26, 1936	Feb. 7, 1937	" "
37-653151	2325	July 10, 1937	Dec. 24, 1937	Tela, Honduras
36-642232	2125	July 22, 1936	Feb. 28, 1937	Matamoros, Mexico

Two returns from Cuba and one from the Cayman Islands though not as distant as the records given above are of interest.

Number	*Approximate Distance*	*Date When Banded*	*Date When Recovered*	*Place Where Recovered*
37-655643	1750	July 20, 1937	Dec. 13, 1937	Habana, Cuba
38-670792	1750	Aug. 3, 1938	July, 1939	" "
34-516493	1900	Aug. 12, 1934	Nov. 7, 1934	Cayman Brac, Cayman Islands

The greatest distance flown by a Great Lakes gull is number A-682966 banded by H. C. Wilson at the Sister Islands, Wisconsin, on July 3, 1930 and recovered at Colon, Panama, on December 20, 1930, a flight by air line of approximately 2,490 miles. This and other returns taken in Central America (Cooke, 1940) extend the winter range as defined by the A.O.U. Check List of 1931.

For those interested in distribution the following returns of Herring Gulls banded in the Great Lakes and recovered at points beyond the southern United States boundary are given.

Number	*Place Where Banded*	*Place Where Recovered*
A-682966	Sister Islands, Wisconsin	Colon, Panama
36-663950	Fish Island, "	Tiquisate, Guatemala
36-664207	Hat Island, "	San Marcos, "
A-605179	Sister Islands, "	Rio Lagartos, Yucatan
A-682622	" " "	Progreso, "
A-682981	" " "	Mérida, "
A-638467	Mackinac County, Michigan	San Jeronimo, Mexico
B-670086	Gravelly Gull Island, "	Alvarado, V. C., "
B-669580	Little Gull Island, "	Chapala, "
BF-534407	Gravelly Gull Island, "	Mexico City, "
A-683016	Sister Islands, Wisconsin	Tabasco, "
A-683147	" " "	" "
B-623458	" " "	Puerto, "
37-640847	Fish Island, "	Vera Cruz, "
A-682314	Sister Islands, "	" " "
B-623154	" " "	" " "
C-624001	" " "	" " "
34-519833	" " "	" " "
B-669970	Gravelly Gull Island, Michigan	Tampico, "
36-660550	Gravel Island, Wisconsin	" "
34-520772	Sister Islands, "	Santa Teresa, "
C-624509	" " "	Hidalgo, "
B-669513	Little Gull Island, Michigan	Matamoros, "
C-624693	Sister Islands, Wisconsin	Gulf of Mexico, Lat. 22° 30′ N., Long. 90° 30′ W.
A-563173	Spider Island, "	Habana, Cuba
A-683115	Sister Islands, "	Isabelda, Sugua, Cuba
34-519638	" " "	Habana, Cuba
37-640525	Gravelly Gull Island, Michigan	Cardenas, "
C-624641	Sister Islands, Wisconsin	Kingston, Jamaica

The records above are of first year gulls excepting numbers C-624001 and 34-519833 from Vera Cruz, Mexico, and number C-624641 from Kingston, Jamaica, which are two-year old birds.

DIRECTION OF DISPERSAL OF KENT ISLAND GULLS

The general dispersal of the Kent Island gulls with regard to their movements northward or southward of the latitude of Kent Island is shown in the following condensed table.

Age	*Returns from places north of the latitude of Kent Island*	*Returns from places south of the latitude of Kent Island*	*Total Returns*
First Year Gulls	97	357	454
Second Year Gulls	39	140	179
Third Year Gulls	21	48	69
Fourth Year Gulls	8	18	26
Fifth Year and over and Gulls banded as adults	36	9	45
Total	201	572	773

The dispersal of the Kent Island gulls indicating the months of the year in which returns were obtained, the ages and the approximate distances flown are indicated in the more detailed table on p. 143.

It will be noted that the young fly greater distances northward as well as southward than do the adults. This chart also reveals that returns from points north of the latitude of Kent Island were obtained during the months August to December immediately following the breeding season. None were reported during January to March, which lends support to the supposition that the northward flight by certain individuals is followed later by a general movement to the southward where the concentration is greatest during the late winter.

GULLS RECOVERED AT KENT ISLAND

The recovery of 84 Herring Gulls, 42 banded as young, on Kent Island where they were originally banded is very significant in establishing the fact that many of them return to the colony where they were reared. It is especially worthy of note that out of all these recoveries on Kent Island only five were banded elsewhere, two on Sheep Island and three on Little Wood Island, islands so near Kent Island that their gulls can be considered a part of the same population. This condition obtains in spite of the fact that thousands of gulls have been banded throughout the region extending from St. Mary's Islands on the north shore of the Gulf of Saint Lawrence to Wicopesset Island, New York, as well as thousands of others banded in the Great Lakes of the Middle West. No greater evidence is needed to establish the fact that the major portion of the Kent Island gull population consists of birds reared in the same or nearby colonies. This is contrary to the belief that the young birds disperse widely to breed at other colonies and thus prevent excessive interbreeding. As yet I have received no reports of a gull banded on Kent Island as being recovered as a breeding bird at any other colony, although these might be expected.

Miles	First Year Gulls												Second Year Gulls											
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
701– 800	–	–	2	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
601– 700	–	–	6	2	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
501– 600	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
401– 500	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
301– 400	–	–	2	8	2	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	1	–	–
201– 300	–	–	5	6	5	–	–	–	–	2	–	1	–	1	–	3	–	–	–	–	–	–	–	–
101– 200	–	1	6	4	–	2	–	–	–	–	1	2	1	3	2	–	–	1	1	–	1	1	–	–
51– 100	–	1	5	6	–	–	–	–	–	–	–	2	4	1	3	2	1	1	–	–	–	–	–	–
0– 50	2	3	7	5	–	1	1	1	–	–	–	–	4	1	1	–	–	–	–	–	–	–	–	–
0– 50	–	–	4	2	–	–	–	–	–	–	1	–	1	–	2	–	1	–	–	–	–	–	–	–
51– 100	–	–	2	–	–	–	–	–	–	–	1	–	–	3	–	1	1	–	–	–	–	–	–	–
101– 500	1	2	1	14	21	12	7	7	1	6	7	5	9	11	18	6	10	5	7	10	2	4	5	2
501–1000	–	–	1	10	18	6	7	9	10	4	8	1	1	–	5	1	5	4	1	2	2	1	1	–
1001–1500	–	–	1	1	11	12	15	20	16	3	4	1	1	–	1	–	–	2	–	1	3	2	–	–
1501–2000	–	–	–	2	6	14	35	18	9	1	6	1	1	1	–	–	2	–	3	–	–	–	1	–
2001–2500	–	–	–	–	–	1	1	7	3	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2501–3000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
3001–3500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Total....	3	7	43	63	64	49	66	62	39	17	28	13	22	22	32	15	24	13	12	13	8	9	7	2

Miles	Third Year Gulls												Fourth Year Gulls												Fifth Year Gulls and Older and Gulls Banded as Adults											
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
701– 800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
601– 700	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
501– 600	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
401– 500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
301– 400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
201– 300	1	1	1	–	–	–	–	1	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
101– 200	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	1	–	–	–	–	–	1	–	2	–	–	–	–	1	–	–
51– 100	1	–	–	1	–	4	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	7	1	–	–	–	–	–	1	–	–	–
0– 50	2	3	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	1	17	4	–	–	–	–	–	–	1	–	–
0– 50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
51– 100	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
101– 500	3	6	5	6	4	2	1	5	2	–	2	4	4	3	–	3	–	1	1	–	–	–	–	–	1	–	2	1	1	–	–	–	1	2	–	–
501–1000	–	–	–	1	–	1	1	–	1	2	–	–	1	–	–	–	1	–	1	–	–	2	–	–	–	–	–	–	–	–	–	–	1	–	–	–
1001–1500	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1501–2000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2001–2500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2501–3000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3001–3500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total....	10	10	6	10	4	8	2	7	3	2	2	5	6	4	1	5	2	1	3	–	1	2	–	1	2	24	8	1	3	–	–	–	2	3	2	–

A summary of the Kent Island Herring Gull returns indicating the approximate distances flown north and south of Kent Island and the months in which the first, second, third, fourth and fifth year and older gulls were recovered.

On July 12, 1940 in company with Dr. Jackson, Director of the Isles of Shoals Biological Laboratory and members of his Station, I visited the gull colony on Duck Island off Portsmouth, New Hampshire, where large numbers of gulls have been banded each year. Although we made a special effort to discover banded individuals not one was observed, and none were seen by a banding party later in the season. It is obvious that casual visits of a few hours duration to a breeding colony may be misleading. It is essential that extensive trapping and observations over a long period of time be made to establish the fact concerning the origin of its breeding population.

At Kent Island our series of recoveries have been increased not only by trapping but also by the collecting of specimens in connection with other investigations on the Herring Gull.

In the following tables are the records of Herring Gulls which were banded and recovered on Kent Island.

BANDED AS ADULTS (42)

RECOVERED ONE YEAR AFTER BANDING

Number	*Date of Banding*	*Date of Recovery*	*Remarks*
35-556653	Aug. 27, 1935	July 12, 1936	Found dead, recently killed
35-556736	Aug. 27, 1935	Aug. 16, 1936	Sick but breeding
35-556764	Aug. 27, 1935	Aug. 16, 1936	Sick but breeding
35-557223	July 31, 1938	Aug., 1939	Trapped and released
35-557917	July 25, 1936	Aug. 27, 1937	Caught and rebanded with No. 37-657148
35-557970	July 25, 1936	Aug. 27, 1937	Caught and rebanded with No. 37-657162
37-657591	Aug. 27, 1937	Aug. 24, 1938	Trapped and released
38-672181	Aug. 12, 1938	Aug., 1939	Trapped and released
39-661532	Aug. 8, 1939	July 19, 1940	Collected, Male
39-661534	Aug. 8, 1939	July 14, 1940	Collected, Male
39-661559	Aug. 25, 1939	Aug. 12, 1940	Collected, Male
39-661600	Aug. 26, 1939	July 19, 1940	Collected, Male

RECOVERED TWO YEARS AFTER BANDING

35-557213	July 22, 1938	July 14, 1940	Collected, Male
35-557226	July 31, 1938	July 10, 1940	Shot
35-557247	Aug. 2, 1938	Aug. 16, 1940	Collected, Male
35-557944	July 25, 1936	Aug. 9, 1938	Trapped and released
35-557947	July 25, 1936	Aug. 5, 1938	Trapped and released
35-557965	July 25, 1936	Aug. 8, 1938	Trapped and released
38-670085	Aug. 13, 1938	Aug. 7, 1940	Collected, Female
38-670604	Aug. 4, 1938	Aug. 18, 1940	Collected, Male
38-670369	Aug. 13, 1938	July 15, 1940	Collected, Female
38-672197	Aug. 12, 1938	Aug. 21, 1940	Collected, Female
38-672534	Aug. 14, 1938	July 17, 1940	Collected, Female
38-670610	Aug. 4, 1938	July 12, 1940	Shot
38-670634	Aug. 4, 1938	July 14, 1940	Collected, Male
38-670643	Aug. 5, 1938	July 11, 1940	Shot
38-672043	Aug. 5, 1938	July 12, 1940	Shot
38-672111	Aug. 5, 1938	Aug. 9, 1940	Found dead, recently died
38-672181	Aug. 12, 1938	Aug. 22, 1940	Trapped
38-672368	Aug. 27, 1938	Aug. 5, 1940	Collected, Male

BANDED AS ADULTS (42) (Continued)

RECOVERED THREE YEARS AFTER BANDING

Number	*Date of Banding*	*Date of Recovery*	*Remarks*
35-556647	Aug. 27, 1935	Aug. 5, 1938	Captured and released
35-556682	Aug. 27, 1935	Aug. 27, 1938	Captured and released
35-556748	Aug. 27, 1935	Aug. 8, 1938	Captured and released
35-556790	Aug. 27, 1935	Aug. 27, 1938	Captured and released
37-657106	Aug. 27, 1937	Aug. 6, 1940	Collected, Male (See No. 35-556005)
37-657123	Aug. 27, 1937	Aug. 4, 1940	Collected, Male
37-657172	Aug. 27, 1937	July 23, 1940	Found dead
37-657180	Aug. 27, 1937	July 18, 1940	Collected, Male
37-657197	Aug. 27, 1937	July 17, 1940	Collected, Male
37-657588	Aug. 27, 1937	July 5, 1940	Shot

RECOVERED FOUR YEARS AFTER BANDING

35-556096	Aug. 26, 1935	Aug., 1939	Trapped and released

RECOVERED FIVE YEARS AFTER BANDING

35-556800	Aug. 27, 1935	June 18, 1940	Found dead but recently killed

BANDED AS YOUNG (42)[1]

ONE YEAR BIRD

Number	*Date of Banding*	*Date of Recovery*	*Remarks*
35-551546	Aug. 1, 1935	Jan. 15, 1936	Shot by hunter

TWO YEAR BIRDS

37-654185	July 12, 1937	July 25, 1938	Found dead
37-654209	July 12, 1937	July 5, 1938	Found dead
37-657955	July 17, 1938	June 14, 1940	Found dead
38-669660	July 28, 1938	June 18, 1940	Found dead
38-670772	Aug. 3, 1938	June 14, 1940	Found dead
39-660453	July 27, 1939	July 21, 1940	Collected

THREE YEAR BIRDS

35-556005	Aug. 26, 1935	Aug. 27, 1937	Caught and rebanded with No. 37-657106
35-556028	Aug. 26, 1935	Aug. 27, 1937	Caught and rebanded with No. 37-657191
35-556056	Aug. 26, 1935	Aug. 27, 1937	Caught and rebanded with No. 37-657119
35-654058	July 12, 1937	June 20, 1940	Found dead
37-654298	July 12, 1937	June 18, 1940	Found dead
37-655736	July 20, 1937	June 14, 1940	Found dead
37-656099	July 20, 1937	June 18, 1940	Found dead

FOUR YEAR BIRDS

35-549958	July 22, 1935	July 10, 1938	Found dead
35-552982	July 30, 1935	July 31, 1938	Trapped and released
35-556015	Aug. 26, 1935	Aug. 15, 1938	Trapped and released
35-556037	Aug. 26, 1935	Aug. 2, 1938	Trapped and released
36-642256	July 26, 1936	Aug., 1939	Trapped and released
36-642390	July 26, 1936	June 18, 1940	Found dead
36-642760	July 26, 1936	June 18, 1940	Found dead
36-642970	July 26, 1936	Aug., 1939	Trapped and released
36-643046	July 26, 1936	June 20, 1940	Found dead

[1] In the computations of age, a first year bird is considered as one recovered any time between the date of hatching and July first of the following year. The ages of the older gulls are ascertained in a similar manner.

BANDED AS YOUNG (42) (Continued)

Number	*Date of Banding*	*Date of Recovery*	*Remarks*
		FIVE YEAR BIRDS	
B-624734	July 31, 1934	Aug. 10, 1938	Trapped and released
35-549606	July 22, 1935	Aug., 1939	Trapped and released
35-550713	Aug. 10, 1935	June 26, 1940	Shot
35-551488	Aug. 1, 1935	Aug., 1939	Trapped and released
35-556261	Aug. 27, 1935	Aug., 1939	Trapped and released
36-643309	July 26, 1936	July 17, 1940	Collected, Male
		SIX YEAR BIRDS	
B-614284	July 21, 1934	Aug., 1939	Trapped and released
B-624620	July 22, 1934	June 18, 1940	Found dead
34-542212	Aug. 12, 1934	June 18, 1940	Found dead
35-548388	Aug. 1, 1935	Aug. 6, 1940	Collected, Male
35-552638	July 29, 1935	July 24, 1940	Shot
35-555630	Aug. 25, 1935	Aug. 8, 1940	Collected, Female
35-555682	Aug. 25, 1935	July 16, 1940	Collected, Male
35-556082	Aug. 26, 1935	Aug. 8, 1940	Collected, Male
		SEVEN YEAR BIRDS	
B-624793	July 22, 1934	Aug. 7, 1940	Collected, Male
34-516051	July 25, 1934	July 20, 1940	Trapped
34-542689	Aug. 13, 1934	Aug. 9, 1940	Found dead
34-543548	Aug. 27, 1934	Aug. 4, 1940	Collected, Male
34-543456	Aug. 27, 1934	Aug. 6, 1940	Collected, Male

The above list of 42 recoveries of Herring Gulls banded as young, does not include those which apparently had not migrated. For example during the season 1940, we found 18 birds which had been banded during the previous season of 1939, but judging from the decayed condition of the remains it was obvious they had perished during the preceding autumn and had never succeeded in getting away from the colony.

From 1937 to 1939 inclusive, in coöperation with the Gull Banding Project the gulls have been marked with colored celluloid bands in addition to the U. S. Biological Survey bands to facilitate sight observations. A special effort has been made to note these birds on Kent Island. It is of course impossible to avoid duplication where observations are made over a period of several months, but taking this into account we have made very conservative estimates. During the summer, June 15 to September 1, we saw no less than fifty individuals marked in 1937, twenty banded as young and eight as adults in 1938 and fifteen as adults and two as young in 1939 were noted as sight records. Many others banded previous to 1937 with aluminum bands only, were seen during the course of the summer. Banded gulls were noted at sea during trips to and from Kent Island. Local observers reported seeing gulls marked with colored bands at Eastport, Lubec and Grand Manan. It is of passing interest to note that of the birds trapped and collected only two birds had lost one or more bands which they were expected to be wearing, thus proving the permanence of the celluloid.

Of particular importance is four birds, presumably females, banded as immatures in 1937, which were observed from a blind to be nesting. This serves as direct evidence that fourth year birds (third season after hatching in third nuptial plumage) breed. Although second and third year birds are present at the colony during the breeding season we have no proof by banding that the Herring Gull breeds before they are in their third nuptial plumage. However, James Blunt collected two Herring Gulls, not banded, which presumably were three year birds in the typical second nuptial plumage as described by Dwight (1901) and Allen-Hickey (1940). These birds were probably breeding since the testes were fully developed, the weights and measurements being equal to those of individuals known to be breeding. The records of the two birds are as follows:

Date Collected	*Weight of Bird*	*Right Testis*		*Left Testis*	
		Measurements	*Weights*	*Measurements*	*Weights*
July 3, 1940	1091 grams	7.5 x 5.5 mm.	100 mg.	12 x 7.5 mm.	300 mg.
July 8, 1940	1100 grams	6 x 5 mm.	100 mg.	10 x 6.5 mm.	200 mg.

A few individuals in the first nuptial plumage are also to be seen at the colony during the breeding season. However, the breeding gulls discourage the presence of these younger birds and it is not an uncommon experience to see these dusky visitors violently driven away from the nesting area.

In the following table are the weights of the birds and the weights and measurements of the gonads of Herring Gulls collected by James Blunt for his problem on thyroid glands during the season of 1940. The data for banding and recovery may be obtained by referring to the numbers in the lists of Kent Island recoveries.

	MALES					
		Testes				
		Right		*Left*		
Number	*Weight of Bird*	*Measurements*	*Weight*	*Measurements*	*Weight*	
37-657588	1138 grams	6 x 5 mm.	100 mg.	7 x 5.8 mm.	100 mg.	
38-670643	1121 "	7.9 x 3.5 mm.	100 "	8 x 4.9 mm.	100 "	
38-670610	1168 "	7 x 5 mm.	90 "	8 x 6.5 mm.	110 "	
35-555682	1060 "	11 x 7.9 mm.	300 "	14 x 9 mm.	700 "	
35-557213	1197 "	5.5 x 4 mm.	100 "	8 x 5 mm.	100 "	
36-643309	1185 "	6 x 4 mm.	100 "	8.2 x 6.5 mm.	100 "	
37-657180	1230 "	11 x 5.6 mm.	250 "	9.8 x 6.5 mm.	150 "	
37-657197	1260 "	9.8 x 8.5 mm.	100 "	9.8 x 6.5 mm.	100 "	
38-670604	1400 "	8 x 6.5 mm.	150 "	4.5 x 6.8 mm.	150 "	
38-670634	1293 "	8.5 x 3.9 mm.	100 "	8.5 x 5.7 mm.	110 "	
39-661532	1174 "	6.5 x 4.5 mm.	100 "	7 x 6 mm.	150 "	
39-661600	1069 "	7 x 16 mm.	150 "	11 x 7 mm.	250 "	
34-543548	1174 "	6.3 x 3.1 mm.	45 "	6.8 x 4.6 mm.	75 "	
37-657123	1088 "	7.1 x 4 mm.	60 "	7.8 x 5 mm.	90 "	
38-672368	1148 "	6 x 3.7 mm.	95 "	6 x 5 mm.	70 "	
34-543456	1198 "	6 x 3.2 mm.	40 "	6.9 x 4.2 mm.	70 "	
35-548388	962 "	4.7 x 3.1 mm.	30 "	6 x 4 mm.	60 "	
37-657106	1125 "	7.2 x 3 mm.	39 "	7 x 5.2 mm.	52 "	
B-624793	1040 "	4.8 x 6.2 mm.	32 "	7.8 x 5 mm.	50 "	
35-557247	1065 "	6 x 4.3 mm.	45 "	6.9 x 5.3 mm.	70 "	
36-649105[1]	1105 "	5 x 2.1 mm.	10 "	5.8 x 2.2 mm.	15 "	
39-661559	1052 "	5.5 x 3.1 mm.	35 "	6.7 x 4.2 mm.	55 "	

[1] 36-649105 was a young bird of the year.

FEMALES

Number	*Weight of Bird*	*Ovary Measurements*	*Weight*	*Measurements of Three Largest Ova*
-550713	000 grams	19.7 x 12 mm.	650 mg.	4.0, 3.5, 3.2 mm.
-672043	882 "	21.5 x 10 mm.	475 "	2.9, 2.8, 2.8 mm.
8-670369	908 "	19.5 x 6 mm.	290 "	2.8, 2.2, 2.0 mm.
38-672534	899 "	19 x 14 mm.	500 "	3.0, 2.8, 2.5 mm.
35-555630	880 "	13.2 x 5 mm.	230 "	Ova less than 1 mm.
38-672197	823 "	—	200 "	2.9, 2.8, 2.5 mm.

LONGEVITY

Herring Gulls have been known to live for long periods of time in captivity. Brown (1928) reports a captive gull which lived from June 1, 1917 to July 3, 1924, dying at the age of seven years. Ritchie (1935) gives an account of a gull which was maimed when first found: one wing shot off at the wrist and one eye which was partly blind, that lived for 39 years. There are numerous cases on record which attest to the unusual longevity among captive birds but perhaps the most remarkable record is the captive gull "Kaiser", a bird wing-tipped in 1889 and kept as a pet until 1935 when it died at the ripe age of 49 years. He was survived by a mate of 45 years and three descendants more than 30 years of age (Pearson, 1935). "Kaiser's" mate laid eggs every year from 1893 to 1934 inclusive; during the last two years a nest was built but no eggs were laid. (Nice, 1936.) It is extraordinary that this individual laid eggs for a period of 42 years. The above cases are of captive birds which do not meet with the various hardships and vicissitudes of life endured by birds leading a normal existence. However, a Herring Gull familiarly known as "Gull Dick" and readily recognizable was observed by Captain Edward Fogarty of the Brenton Reef Lightship and frequently reported on by Mackay (1893, '94, '95, '96 and '98), returned each year for a period of 24 seasons. "Gull Dick" establishes a record in America for longevity for a Herring Gull living a normal life under natural conditions.

BANDING RECORDS OF LONGEVITY

In Europe there are several banding records of Herring Gulls which have attained or exceeded a life span of twenty years. E. Shuz reports a gull banded July 5, 1910 and recovered April 22, 1933 at the age of 23 years. Later (1936), he reports Herring Gulls almost 25, and 26 years. (Reviews by Nice.) In America, Cooke (1937), reports on 13 banded individuals, one of which was 5, eight were 6, three were 7, and one was 8 years old. The banding records of Lyon and Wilson who have banded gulls on various islands in the Great Lakes over a considerable period of time provide a good index to the

probable span of life of the Herring Gull. The ages of the 1409 returns are as follows:

One Year Birds	1073	Seven Year Birds	13
Two Year Birds	175	Eight Year Birds	13
Three Year Birds	48	Nine Year Birds	4
Four Year Birds	29	Ten Year Birds	4
Five Year Birds	26	Twleve Year Bird	1
Six Year Birds	22	Fourteen Year Bird	1

The above records indicate the great mortality among Herring Gulls during the first year. A visit to any large colony at the end of the breeding season reveals that many die even before leaving the nesting place. Many more perish in the few succeeding months and before they have traveled 500 miles from the nesting colony. The factors involved in this great death rate other than accidents and those killed by enemies may be the lack of an adequate food supply, adverse weather conditions and a weakened state during the post juvenal moult, all of which tend to lower the resistance of the birds to exposure and especially to parasites and disease. Furthermore young gulls which have not learned the lessons of self preservation are less wary and are more apt to meet with disaster than are the adults. After three seasons when the birds reach maturity the number of returns is fairly constant in proportion to the number of birds that has been banded until the eighth year when there is a sudden drop in the number of returns. This drop may be accentuated when a larger number of records become available. If this proves to be true it would indicate that the expected span of life of the Herring Gull is about eight years. Some individuals live for a much longer time as previously cited and as shown in the following lists of birds. In another ten years of accumulated records we shall be able to obtain a more precise determination of the probable length of life to be attained by the Herring Gull.

Assuming that the Herring Gull lives for eight years or five years as a breeding bird, then in a colony of 1,000 birds it would mean that 200 new individuals must be added each year to maintain its population. A colony of 1,000 birds produce at least a thousand young each year which means 800 may die and only 200 need to survive to maintain the breeding population. Hence the great mortality of the young that we have noted need not be alarming, indeed it is well that many of them perish otherwise we would witness an over population of the species which already prevails in many of our colonies calling for measures of control.

Since the birds of five or more years of age are of special interest in connection with the longevity of the Herring Gull it is desirable to give the record of each individual. The records listed below are of birds which were banded as young or juvenals by Lyon and Wilson on islands located in the Great Lakes region. In the computations of age a first year bird is considered as one recovered at

any time between the date of hatching and July first of the following year. The ages of the older gulls are ascertained in a similar manner. For example a gull banded as a young in 1935 and taken before July 1, 1940 is considered as a five year bird but if it were recovered after July 1, 1940 it is listed as a six year gull.

FIVE YEAR BIRDS

Number	*Date When Banded*	*Place Where Banded*	*Date of Recovery*	*Place of Recovery*
B-612748	July 3, 1931	Sister Islands, Wis.	July, 1935	Hat Island, Wis.
336214	July 9, 1926	" " "	Feb. 3, 1931	Gideon, "
706301	July 2, 1928	Gravelly Gull Id., Mich.	Sept. 1, 1932	St. Martin's, "
564687	July 7, 1927	Little Gull Island, "	Jan. 27, 1932	Two Rivers, "
708396	July 6, 1929	" " " "	Apr. 20, 1934	Lake Geneva, "
336011	July 7, 1925	Sister Islands, Wis.	May 15, 1930	Jacksonport, "
703123	July 8, 1929	" " "	July 17, 1933	Washington Id., Wis.
C-624016	June 28, 1933	" " "	July 26, 1937	" " "
565209	July 8, 1927	Gravelly Gull Id., Mich.	Dec. 19, 1932	" " "
706003	July 2, 1928	" " " "	July 8, 1932	Cana Island, "
564650	July 7, 1927	Little Gull Island, "	June 29, 1932	Hat Island, "
706485	July 3, 1928	" " " "	Feb. 22, 1933	Holland, Mich.
B-607801	July 18, 1931	Hat Island, Wis.	July 20, 1935	Mackinac Co., Mich.
A-679354	July 11, 1930	Mackinac Co., Mich.	June 10, 1935	Alpena, "
B-607071	July 9, 1931	Gravelly Gull Id., "	Feb. 6, 1936	Muskegon, "
C-624007	June 28, 1933	Ephraim, Wis.	May 12, 1938	Munising, "
A-638196	July 11, 1930	Mackinac Co., Mich.	July, 1934	McHenry Co., Ill.
B-607379	July 11, 1931	Little Gull Island, "	Nov. 24, 1935	Joliet, "
565769	July 9, 1927	Snake Island, "	Mar. 30, 1932	Bourbonnais, "
A-564545	July 2, 1933	" " "	Mar. 3, 1938	Rochester, Ind.
B-607690	Nov. 10, 1931	Naubinway, "	Feb. 22, 1936	Marblehead, Ohio
A-679236	July 11, 1930	Mackinac Co., "	Oct. 1, 1934	Conneaut, "
566632	July 15, 1927	Little Gull Island, "	Mar. 30, 1932	Lake Lynn, Penn.
377982	July 14, 1926	Hog Island, Wis.	Dec. 1, 1930	Lake Arthur, La.
A-563799	July 2, 1933	Gravelly Gull Id., Mich.	July 1, 1937	Seul Choix Point, Gulliver, Mich.
B-613153	July 3, 1931	Sister Islands, Wis.	July, 1935	Sister Islands, Wis.

SIX YEAR BIRDS

564686	July 7, 1927	Little Gull Island, Mich.	Feb. 15, 1933	Port Frank, Ont.
566788	July 2, 1928	Gravelly Gull Id., "	June 24, 1934	Norwood, Mich.
458910	July 5, 1927	Sister Islands, Wis.	July 6, 1932	Manassing, "
A-682389	July 1, 1930	" " "	July 6, 1935	Washington Id., Wis.
564238	July 5, 1927	" " "	Nov. 30, 1932	Davis, "
701851	June 21, 1928	" " "	Feb. 1, 1934	Green Bay, "
701770	June 21, 1928	" " "	Apr. 14, 1934	Grany Island, "
568693	May 7, 1927	" " "	Apr. 22, 1933	Sturgeon Bay, "
A-679642	July 11, 1930	Goose Island, Mich.	July, 1935	S. Haven, Mich.
201809	June 21, 1928	Sister Islands, Wis.	Aug. 14, 1933	G. " "
565165	July 7, 1927	Little Gull Island, Mich.	Nov. 22, 1932	Hart, "
458318	July 14, 1926	" " " "	July 10, 1931	Naubinway, "
707929	July 13, 1928	Mackinac Co., "	July, 1933	Marquette, "
A-637778	July 7, 1930	Gravelly Gull Id., "	Mar. 5, 1936	Glenn, "
B-623270	June 24, 1932	Ephraim, Wis.	Sept. 10, 1937	Muskegon L., Mich.
A-679663	Sept. 28, 1930	Naubinway, Wis.	Oct. 27, 1935	Two Harbors, Minn.
A-679651	Sept. 16, 1930	" "	Mar. 1, 1936	Chicago, Ill.
B-676623	June 29, 1932	Hat Island, "	Feb. 11, 1938	G. Marais, Minn.
707823	July 9, 1928	Taquemanisu Id., Mich.	Apr. 9, 1934	Clifford, Ont.
568664	July 5, 1927	Sister Islands, Wis.	Jan. 7, 1933	Freestone P., Va.
701760	June 21, 1928	" " "	Mar. 3, 1934	Rutherford, N. C.
564813	July 7, 1927	Little Gull Island, Mich.	May 7, 1933	Holland, Mich.

SEVEN YEAR BIRDS

564051	July 4, 1927	Hat Island, Wis.	June 28, 1934	Sister Islands, Wis.
654921	July 7, 1927	Little Gull Island, Mich.	Nov. 28, 1933	Lowell, Mich.
564683	July 7, 1927	" " " "	July 17, 1933	Menominee, Mich.
708487	July 6, 1929	" " " "	Aug. 7, 1935	Gladstone, "
564517	July 6, 1927	Gravel Island, Wis.	Aug. 9, 1933	Ingallston, "
336260	July 9, 1926	Sister Islands, Wis.	Aug. 4, 1932	Cedar R., "
568848	July 5, 1927	" " "	June 20, 1934	Sister Islands, Wis.
458905	July 5, 1927	" " "	Mar. 1, 1934	Youngstown, N. Y.
564997	July 8, 1927	Gravelly Gull Id., Mich.	May 14, 1934	Nantyglo, Penn.
458126	July 14, 1926	Little Gull Island, "	Dec., 1932	Oswego, N. Y.
377296	July 8, 1926	Hat Island, Wis.	Nov. 2, 1932	Kueka, " "
565321	July 8, 1927	Gravelly Gull Id., Mich.	May 23, 1934	Brooklyn, N. Y.
B-613478	July 6, 1931	Ephraim, Wis.	Mar. 30, 1938	Tudington, Mich.

EIGHT YEAR BIRDS

Number	*Date When Banded*	*Place Where Banded*	*Date of Recovery*	*Place of Recovery*
B-623709	June 24, 1925	Sister Islands, Wis.	Oct. 12, 1932	Sister Islands, Wis.
236153	June 25, 1924	" " "	July 8, 1931	Egg Harbor, Mich.
B-623055	June 24, 1925	" " "	Oct. 12, 1932	Sister Islands, Wis.
377240	July 8, 1926	Hat Island, "	June 24, 1934	Spider Island, "
564703	July 7, 1927	Hog Island, "	Feb. 11, 1935	Wayland, Mich.
458113	July 14, 1926	Little Green Id., Mich.	July 13, 1933	Frankfort, "
566935	July 2, 1928	Gravelly Gull Id., "	Nov. 2, 1935	Marquette, "
336040	July 6, 1925	Sister Islands, Wis.	Aug. 9, 1932	Arthur B., "
706536	July 3, 1928	Little Gull Island, Mich.	Mar. 16, 1936	N. Chicago, Ill.
BC-565433	July 9, 1927	Snake Island, "	Jan. 27, 1935	Waukegan, "
B-623430	June 24, 1925	Sister Islands, Wis.	Dec. 14, 1932	Greenville, Miss.
B-623278	June 24, 1925	" " "	Sept. 12, 1932	Sister Islands, Wis.
A-682818	July 3, 1930	Hat Island, "	Dec. 28, 1937	Holland, Mich.

NINE YEAR BIRDS

458240	July 14, 1926	Little Gull Island, Mich.	Mar. 17, 1935	Seven M. Pt., Mich.
566753	July 14, 1927	Hat Island, "	Apr. 17, 1936	Jenison, "
458197	July 15, 1926	Escanaba, "	Apr. 10, 1935	Negassnee, "
336079	July 6, 1925	Sister Islands, Wis.	Nov. 28, 1933	Toronto, Ontario

TEN YEAR BIRDS

320195	July 20, 1924	Spider Island, Mich.	Nov. 15, 1933	Mackinac Co., Mich.
706843	June 21, 1928	St. Martin's Sch., Mich.	June 21, 1928	Huron Park, "
565223	July 8, 1927	Gravelly Gull Id., "	Mar. 22, 1937	Pleasant Hill, Ill.
565760	July 9, 1927	Snake Island, "	Mar., 1937	Wellington, Ont.

TWELVE YEAR BIRD

377292	Apr. 8, 1926	Green Bay, Wis.	Mar. 22, 1938	Woodstock, Ill.

FOURTEEN YEAR BIRD

320089	July 18, 1924	Jack Island, Wis.	July 18, 1937	Ford River, Mich.

As a result of the Kent Island banding operations we have received 747 returns up to January 1, 1940 which are distributed by ages as follows:

First Year Birds	454	Fourth Year Birds	26
Second Year Birds	179	Fifth Year Birds	16
Third Year Birds	69	Sixth Year Birds	3

An examination of the chart on page 133 and the list of returns above reveals that there is also a great mortality among the first year birds at Kent Island. When compared with the second year birds it is not as great as that exhibited by the Great Lakes birds even when considered in the proportion to the numbers banded. The relatively larger percentage of birds of breeding age is due in part to the trapping and collecting of adults at Kent Island.

Sufficient time has not elapsed to make a comparison of the expected span of life attained by the Kent Island breeding gulls with those of the Great Lakes region.

The following returns of five seven-year old birds have been received from gulls banded at Kent Island, Bay of Fundy, New Brunswick, Canada, where banding operations were started during

the summer of 1934. Records obtained since January 1, 1940 are also included.

FIVE YEAR BIRDS

Number	*Date When Banded*	*Place Where Banded*	*Date of Recovery*	*Place of Recovery*
34-628178	July 30, 1934	Kent Island, N.B.	Jan. 2, 1939	Norfolk, Va.
35-556096	Aug. 26, 1935	" " "	Aug., 1939	Kent Island, N.B.
35-549606	July 22, 1935	" " "	Aug., 1939	" " "
35-551488	Aug. 1, 1935	" " "	Aug., 1939	" " "
35-556261	Aug. 27, 1935	" " "	Aug., 1939	" " "
35-550713	Aug. 10, 1935	" " "	June 26, 1940	" " "
35-556800	Aug. 27, 1935	" " "	June 18, 1940	" " "
B-624734	July 21, 1934	" " "	Aug. 10, 1938	" " "
35-549724	July 22, 1935	" " "	July 18, 1939	W. Dover, N. S.
35-551835	Aug. 1, 1935	" " "	Aug. 5, 1939	Fire Island, N. Y.
35-551580	Aug. 1, 1935	" " "	Nov. 25, 1939	Gulfport, Miss.
35-555732	Aug. 25, 1935	" " "	Jan. 18, 1940	Brooklyn, N. Y.
35-548782	Aug. 1, 1935	" " "	Jan. 23, 1940	Fort Pierce, Fla.
35-556676	Aug. 26, 1935	" " "	Nov. 16, 1939	Brooklyn, N. Y.
35-550307	Aug. 10, 1935	" " "	Nov. 24, 1939	Borden, P. E. I.
35-549367	July 22, 1935	" " "	Dec. 13, 1939	F. Raleigh, N. C.
36-643309	July 26, 1936	" " "	July 17, 1940	Kent Island, N.B.

SIX YEAR BIRDS

B-624620	July 22, 1934	Kent Island, N.B.	June 18, 1940	Kent Island, N. B.
B-614284	July 21, 1934	" " "	Aug., 1939	" " "
34-628471	Aug. 17, 1934	" " "	Oct. 7, 1939	E. Boston, Mass.
34-542212	Aug. 12, 1934	" " "	June 18, 1940	Kent Island, N.B.
35-548388	Aug. 1, 1935	" " "	Aug. 6, 1940	" " "
35-552638	July 29, 1935	" " "	July 24, 1940	" " "
35-555630	Aug. 25, 1935	" " "	Aug. 8, 1940	" " "
35-555682	Aug. 25, 1935	" " "	July 16, 1940	" " "
35-556082	Aug. 26, 1935	" " "	Aug. 8, 1940	" " "
35-556005	Aug. 26, 1935	" " "	Aug. 6, 1940	" " "

(35-556005 changed to 37-657106 on Aug. 27, 1937)

SEVEN YEAR BIRDS

B-624793	July 22, 1934	Kent Island, N.B.	Aug. 7, 1940	Kent Island, N.B.
34-516051	July 25, 1934	" " "	July 20, 1940	" " "
34-542689	Aug. 13, 1934	" " "	Aug. 9, 1940	" " "
34-543548	Aug. 27, 1934	" " "	Aug. 4, 1940	" " "
34-543456	Aug. 27, 1934	" " "	Aug. 6, 1940	" " "

SUMMARY

1. Kent Island supports a population of about 25,000 Herring Gulls.

2. The summer resident gulls arrive in the vicinity of the island during the last week of February, first visit the island in March and the first birds start nest building the second week of May. The height of the nesting season is in June and large numbers of young are available for banding, in July and August.

3. The incubation period of the Herring Gull is 28 days.

4. Incubation may start when the first egg is laid or it may be delayed until the set is completed.

5. The 773 Kent Island gull returns received from the Biological

Survey represent 3.29 per cent of the 23,434 birds banded from 1934 to 1938 inclusive.

6. There is a general explosive dispersal, most marked in the young birds, at the end of the breeding season.

7. Fewer Kent Island birds go northward than in a southerly direction.

8. The northward migration is followed later by a general southerly flight.

9. The young birds fly farther and exhibit a greater migratory instinct than shown by the adults.

10. The Kent Island birds in general cling to the Atlantic coast line and those of the Great Lakes, though to a lesser degree, follow the shores of the lakes and river courses.

11. The banding returns have extended the winter range as defined by the 1931 A.O.U. Check List.

12. The extension of the range to Central America may take place by two routes one via Florida, Cuba and the Caribbean or by the more usual course around the coast of the Gulf of Mexico. These courses are shared by both the Kent Island and Great Lakes gulls.

13. A large number of Herring Gulls hatched on Kent Island return to the colony to breed. As yet no returns of gulls banded at other colonies, except five birds banded as immatures on nearby islands essentially a part of the same population have been taken on Kent Island and no Kent Island gulls have as yet been observed as breeding elsewhere.

14. The Herring Gull breeds the third season after hatching (third nuptial plumage) when it is a fourth year bird. Indirect evidence indicates a few may breed as third year birds, when in their second nuptial plumage but no banding records have been obtained to substantiate this fact.

15. The Kent Island gull population comprises a number of non-breeding birds of all ages.

16. Few Kent Island gulls remain in the vicinity of the colony in winter although large numbers of Herring Gulls, probably representatives of northern colonies, are found in the Bay of Fundy at that season.

17. The mortality is greatest among the younger birds.

18. The expected span of life of a Herring Gull which has attained the breeding age is about eight years. It may prove to be longer when more records of longevity are available. The record age of a Herring Gull kept in captivity is 45 years. The record age attained by a banded gull is 26 years, in the series of records under consideration it is fourteen years.

19. Assuming that the average span of life of breeding gulls is eight years, or five years as a breeding individual, only 20 birds per 100 need be added each year to maintain the population of the colony.

REFERENCES

ALLEN, R. P. 1933. Breeding Range of the Herring Gull Extended. *Auk*, 50 : 433–434.

ALLEN, R. P. and J. J. HICKEY. 1940. Progress Report on the Coöperative Gull Survey. *Bird-Banding*, 11 : 17–20.

BENT, A. C. 1921. Life Histories of North American Gulls and Terns. *Bull. 113, U. S. Nat. Museum.*

BENT, A. C. and MANTON COPELAND. 1927. Notes on Florida Birds. *Auk*, 44 : 371–386.

BROWN, C. E. 1928. Longevity of Birds in Captivity. *Auk*, 45 : 345–348.

COOKE, M. T. 1937. Some Longevity Records of Wild Birds. *Bird-Banding*, 8 : 52–65.

1940. Winter Range of the Herring Gull. *Auk*, 57 : 250–251.

CORRINGTON, J. D. 1922. The Winter Birds of Biloxi Mississippi Region. *Auk*, 39 : 530–556.

EATON, R. J. 1933. The Migratory Movements of Certain Colonies of Herring Gulls (*Larus argentatus smithsonianus* Coues) in Eastern North America. *Bird-Banding*, 4 : 165–176; 5 : 1–19, 70–84.

DWIGHT, J. 1901. The Sequence of Moults and Plumages of the Laridae (Gulls and Terns). *Auk*, 18 : 49–63.

FERRIS, R. W. 1940. Eight Years of Banding of Western Gulls. Condor, 42 : 189–197.

FORD, E. R. 1938. Notes from the Rio Grande Valley. *Auk*, 55 : 132–134.

GOETHE, F. 1937. Beobachtungen zur Biologie der Silbermöwe (*Larus a. argentatus* Pontopp.) auf der Vogelinsel Memmertsand. *Jour. für Ornithologie*, 85 : 1–119.

HELMUTH, W. T. 1940. The Herring Gull on Long Island. *Bull. Univ. State of N. Y.*, 26 : 256–257, 259.

HICKEY, J. J. 1937. Progress Report of the 1937 Herring Gull Study. *Bird-Banding*, 8 : 126.

HICKEY, J. J. and R. P. ALLEN. 1938. First Sight-Recoveries of Marked Herring Gulls. *Bird-Banding*, 9 : 51–54.

LINCOLN, F. C. 1924. Banding Gulls in Lake Michigan. *Wilson Bull.*, 31 : 38–41.

1926. Banding Gulls and Terns in Lake Michigan 1924 and 1925. *Wilson Bull., 33* : 240–244.

1928. The Migration of Young North American Herring Gulls. *Auk*, 45: 49–59.

1939. The Individual vs. the species in Migration Studies. *Auk*, 56 : 250–254.

1939. The Migration of American Birds. 189 pp.

MACKAY, G. H. 1892. Habits of the American Herring Gull (*Larus argentatus smithsonianus*) in New England. *Auk*, 9 : 221–228.

1893. *Larus argentatus smithsonianus*. *Auk*, 10 : 76.

1894. Further Notes on the Gull "Dick." *Auk*, 11 : 73.

1895. "Gull Dick" again. *Auk*, 12 : 76.

1896. "Gull Dick" again. *Auk*, 13 : 78.

1898. "Gull Dick." *Auk*, 15 : 49–50.

1925. Breeding of the Herring Gull (*Larus argentatus*) in Massachusetts. *Auk*, 42 : 517–518.

NICE, M. M. 1936. For How Many Years Will Birds Lay Eggs? *Bird-Banding*, 7 : 175–176.

PEARSON, T. G. 1935. A Herring Gull of Great Age. *Bird Lore*, 37 : 412–413.

PETTINGILL, O. S., JR. 1939. The Bird Life of the Grand Manan Archipelago. *Proc. Nova Scotian Institute of Science*, 19 : 293–372.

RITCHIE, J. 1935. Great Age of Herring Gull. *Scottish Naturalist*, May–June, 1935. Note in *Auk*, 52 : 342.

SCOTT, W. E. D. 1888. A Summary of Observations on the Birds of the Gulf Coast of Florida. *Auk*, 5 : 373–384.

SCHÜZ, E. 1936. Longevity of Herring Gulls (*Larus argentatus*). *Vogelzug*, 7 : 68–78. Note in *Bird-Banding*, 9 : 206.

STRONG, R. M. 1914. On the Habits and Behavior of the Herring Gull, *Larus argentatus* Pont. *Auk*, 31 : 22–49, 178–199; 40 : 609–621.
THIENEMANN, J. 1924. The Migrations of the Herring Gull and Lesser Black-backed Gull: Results of the Marking Method. *British Birds*, 18 : 34–44.
THOMSON, A. L. 1924. The Migration of the Herring Gull and Lesser Black-backed Gull. Results of the Marking Method. *British Birds*, 18 :
TINBERGEN, N. 1936. Zur Sociologie der Silbermöwe, *Larus a. argentatus* Pont. *Beitr. Fortpflanzungsbiologie der Vogel*, 12 : 89–96.
WILLIAMS, G. G. 1938. Notes on Waterbirds of the Upper Texas Coast. *Auk*, 55 : 62–70.
WILSON, H. C. 1926. Work with the Gulls on the Sister Islands in Lake Michigan. *Wilson Bull.*, 32 : 248.

Bowdoin College, Brunswick, Maine.

SOME ASPECTS OF INDIVIDUAL DISTRIBUTION IN THE CAPE COD TERN COLONIES[1]

BY OLIVER L. AUSTIN, M.D.

FOR the past decade, personnel from the Austin Ornithological Research Station has made each nesting season a detailed and fairly comprehensive study of the colonies of terns nesting on Cape Cod, Massachusetts. These are composed of three species, Common (*Sterna hirundo*), Roseate (*Sterna dougalli*) and Arctic (*Sterna paradisaea*) which breed together, the proportion of each species varying on the several nesting sites. It is with the conjoined nesting of these three species this article deals, due consideration being given always to the variations in behaviour which these species exhibit. In this interim of ten years, ending with 1939, there have been banded 25,375 adults and 132,567 chicks. 10,919 banded birds have returned. This work appears to show that:

> THE TERN COLONIES ON CAPE COD FORM A DISTINCT, CONCRETE GROUP WHICH IS SELF-SUSTAINING AND FREE FROM ASSOCIATION WITH OTHER GROUPS DURING THE NESTING SEASON.

Within a circle of a 25 mile radius are the colonies of nesting terns which we think of as the Cape Cod group (see map). They are scattered over the Cape, from Provincetown at the tip, along the ocean front on the east side to the Cape Cod canal on the south, and along the bay side on the west as far as Plymouth. Their locations and sizes have been described in preceding papers; some are large, others very small.

Other colonies of nesting terns begin in contiguity with the Cape group and extend to the north and the south along the Atlantic seaboard. Aside from a few birds of the year, no tern banded on the Cape has been recovered to the north; and only one known to be from a northern site taken on the Cape. Immediately to the south is a cluster of tern colonies centered around Martha's Vineyard.

[1] Contribution number 35 by the Austin Ornithological Research Station.