

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. IV

OCTOBER, 1933

No. 4

THE MIGRATORY MOVEMENTS OF CERTAIN COLONIES OF HERRING GULLS

(*LARUS ARGENTATUS SMITHSONIANUS* COUES)
IN EASTERN NORTH AMERICA

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Introduction

UNTIL the last ten or fifteen years the migratory habits of Herring Gulls have been but little understood. Beyond the obvious facts of seasonal occurrence, arrival and departure dates, and normal limits of range of immature and adult birds, ordinary field observation has failed to contribute much knowledge. As recently as 1921 C. W. Townsend wrote:¹ "As the herring gull is found in summer as well as in winter to the south of the breeding range, it is difficult to set exact limits in time for the migrations;" and again, "The usual explanation given for the occurrence of the herring gull in summer south of its breeding grounds is that these birds are immature or, if adults, barren individuals."

As a result of extensive banding operations in recent years among many breeding gull colonies from the Great Lakes eastward, we shall soon be in a position to work out the details of their migratory traits with a high degree of accuracy. At the present writing it is highly probable, if not certain, that individual colonies (or groups of colonies) exhibit marked migratory peculiarities not shown by others, particularly in respect to the movements of first- and second-year birds. In general, immature gulls of the season make the longer flight to their winter territory, and those of the second year a much shorter one. It is believed that adults show little or no systematic migratory tendency except in the case of those colonies whose range is icebound in the winter. Recoveries from third- and fourth-year birds are not yet numerous enough to justify a confident statement of their habits. It is hoped that future

¹ A. C. Bent: *Life Hist. N. A. Gulls and Terns*. U. S. Nat. Mus. Bull. 113, 1921, p. 117.

banding work will determine the age at which Herring Gulls reach sexual maturity and answer the question implied by Townsend whether the adults occurring beyond the limits of their breeding range are sexually mature though unmated birds, or are in reality immature birds in quasi-adult plumage.

Systematic banding work among the newly established and rapidly growing rookeries in Essex County, Massachusetts, has already yielded enough data to throw new light on these questions and to indicate wholly unsuspected traits. The first part of the present paper records the results of five years' work among fledglings on certain islands near Beverly. A somewhat novel method of graphic analysis is presented, with the hope that other students will adopt it for making similar studies of their own chosen colonies. In the second part the idiosyncrasies of other gull colonies will be discussed briefly in order to emphasize certain characteristic peculiarities and to justify the highly speculative hypothesis to be proposed in the third, or concluding, part.

The salient features of this paper were communicated informally to the Nuttall Ornithological Club in February, 1932, but have been withheld deliberately from publication in order to secure more data. It is freely admitted that the conclusions here set forth are at best tentative and subject to modification in the light of future knowledge. If the writer succeeds in stimulating others to adopt the analytical methods herein proposed, and to extend their work to all the known colonies of Herring Gulls in North America, he is quite content to lay himself open to the charge of superficiality.

Before passing on to the main discussion, a brief review of the status of Herring Gulls along our Southern coast is given. Most authors of regional reports and local lists make little or no attempt to differentiate between immature and adult gulls. As an exception, Howell in "Florida Bird Life" (1932) affirms that the species occurs in Florida nearly throughout the year, being absent only during the summer months, although "non-breeding birds (chiefly immature) remain into the summer." According to Mr. Ludlow Griscom, the occurrence of adults at any season of the year along the Gulf Coast from the Mississippi southwestward is rare or casual, with their summer status gradually changing to uncommon northward, coastwise, as far as New Jersey. Mr. F. M. Weston writes that mature birds are common winter residents along the outer beaches near Pensacola, but "that all of my true summer observations have been immature birds."² Mr. Alexander Sprunt, Jr., states that the Herring Gull on the South Carolina coast is

without doubt the most abundant of their winter gulls, with adults occurring perhaps a little less frequently than the immatures.³ He also reports that they are quite common from the Carolina coasts south at least as far as Miami (lat. 25° 40').

In general the southwestern limit of normal winter range for adults would appear to lie between the mouth of the Mississippi and the west coast of Florida, and for immatures certainly as far southward as the mouth of the Rio Grande; whereas the southern limit of normal summer range of immature birds appears definitely to be north of Florida and probably north of Hatteras. As for adults in summer, it would seem to be abnormal for any considerable numbers to occur south of the limit of their breeding range in the Buzzards Bay region in southern Massachusetts. However, there are so many non-breeding birds in adult plumage in Long Island waters that New Jersey must be assigned as their normal summer limit. In any event, it is unwise to be didactic on the subject, if for no other reason than the surprising southward extension of breeding range of gulls during the past ten or fifteen years. Even the conservative Black-back (*Larus marinus*) has become a regular nesting bird on the New England coast as far south as Essex County, Massachusetts, during the last three or four years.⁴

PART I

The Essex County Colony

Description and Scope of Work

The discovery in 1928 of breeding Herring Gulls on certain rocky islands near the coast in Essex County, Massachusetts, has been previously recorded.⁵ As a result of the enthusiastic cooperation of Mr. William Gordon Means, whose work and boat were equally indispensable, systematic banding operations at these islands have been conducted annually since 1929. Thanks are due Messrs. A. G. Means, E. F. Williams, C. E. Moulton, and L. B. Fletcher, and Dr. J. B. May for assisting in the work on one or more occasions.

It is not known exactly when the gulls started to breed on these islands, but the writer has reason to suspect that they

² Francis M. Weston *in litt.*, Aug. 14, 1933.

³ Alexander Sprunt, Jr., *in litt.*, Aug. 7, 1933.

⁴ See *The Auk* XLVIII: 588, Oct., 1931.

⁵ *The Auk*, XLVIII: 588, Oct., 1931. *Bull. Essex County Ornithological Club*, 1931, p. 4.

first occupied Egg Rock, Manchester, as the pioneer rookery in 1926, or perhaps a year or two earlier. A rapid increase in the number of breeding pairs has occurred. In 1928 twenty nests were observed on Egg Rock; in 1929, over one hundred; subsequently the count has varied approximately from one hundred to one hundred and twenty nests. In 1929 one hundred juvenile birds were banded with difficulty on North Gooseberry Island, but the colony on South Gooseberry was considered too small to bother with. In 1931 one hundred juveniles were banded on North Gooseberry, and two hundred on South Gooseberry. This year forty birds were banded by Mr. Means on Eagle Island, a large rock about one mile southwest of the Gooseberries. This rock was not occupied in 1928 when the writer made a thorough survey of all the Essex County islands. It is probable that a few pairs bred there for the first time in 1932.

For the purposes of the present discussion no attempt will be made to differentiate the residents of the various islands into separate colonies. The overcrowding of the original site (Egg Rock) and the consequent occupation of adjacent islands is a good explanation for considering the group as a single colony, derived in all probability from the overcrowded stations along the Maine coast. A future study of the migration habits of numerous other North American colonies may throw some light on this question.

At the present writing, breeding Herring Gulls are confined to four small rocks or islands lying from one to three miles off shore and contained in a strip of water not over five miles long. No adult gulls have been banded. Our operations have been strictly confined to juveniles of the season. The earliest date of banding was June 21st and the latest, July 9th. An extreme irregularity of hatching dates has been noted each season, with juvenile gulls of all sizes in constant evidence.

Recoveries.

Excluding the banding done in the summer of 1933, the summary of our work is as follows:

<i>Year</i>	<i>Station</i>	<i>No. of Juvenile Gulls Banded</i>	<i>No. of Recoveries as of July 5, 1933</i>
1928	Egg Rock, Manchester	5	none
1929	" "	100	3
1929	North Gooseberry Id., Salem	100	5
1930	" "	100	6
1930	South Gooseberry Id., Salem	100	8
1930	Egg Rock, Manchester	100	6

1931	North Gooseberry Id., Salem	99	4
1931	South Gooseberry Id., Salem	200	8
1932	Egg Rock, Manchester	44	3
1932	North Gooseberry Id., Salem	100	8
1932	South Gooseberry Id., Salem	100	4
		<hr/>	<hr/>
		1048	55

Out of a total number of 1,048 banded birds, 55 recoveries have been reported by the Bureau of the Biological Survey. Without comparative data at hand, such a high percentage (5 per cent) is surprising and must indicate a very heavy mortality particularly among juvenile and immature gulls. The following detailed tabulation of recoveries shows that 10 out of the 55 recoveries (18.2 per cent) were juveniles less than two months old and found within five miles of the banding stations. An additional 34 (61.8 per cent) were less than one year old. The balance of 11 (20 per cent) were over one year old, and one was in its third year and two in their fourth year.

Analysis of Recoveries.

In order to visualize the results more readily, a map (Fig. 1) has been prepared showing the location of the place where each bird was recovered. Open circles represent first-year birds, black dots represent second-year birds, and small open circles all others. A large circle centering on Salem, Massachusetts, represents the banding stations and the ten local juveniles recovered within a radius of five miles, and other first-year immatures recovered in the region of eastern Massachusetts.

Perhaps the first point which this map emphasizes is the strictly coastal character of the migration. With the exception of an inland recovery in South Carolina and one in Louisiana, not a single bird has been reported from fresh water. Another striking fact is the relatively large number of recoveries of first-year immatures along the Gulf Coast from Louisiana to the Rio Grande. It is still doubtful whether the absence of any recoveries in Mexico is of any significance. Immature Herring Gulls have been frequently observed as far south as Vera Cruz, and the Essex County colony may migrate beyond the limits of Texas. A third interesting point is the entire absence of any recovery northeast of Ipswich. The evidence is conclusive that there is no significant northward drift of first-year birds prior to the fall migration. It is also possible that mature gulls hatched in Essex County return to southern New England waters and remain there for the rest of their lives.

DETAILED RECORD OF RECOVERIES FROM THE ESSEX COUNTY COLONY

Banding Station, Essex County, Mass.	Date of Banding	Band No. of Recovery	Place of Recovery	Date of Recovery	Reference ^a	Age of Gull Recovered
Egg Rock, Manchester.....	6/21/29	387254	Staten Id., N. Y.	10/2/29	I	1st year
		387251	Quantico, Va.	1/17/30	K	"
		387214	Woods Hole, Mass.	3/31/30	FD	"
		A609054	Ferrisburgh, Fla.	2/3/30	FD	"
		A609016	Plensant Bay, Orleans, Mass.	5/31/30	FD	"
		A609032	Nantasket Beach, Mass.	3/18/31	FD	2d year
		A609034	North Plymouth, Mass.	2/4/32	FD	3d year
		A609086	Hingham, Mass.	12/30/32	FD	4th year
		A609268	Beverly, Mass.	8/4/30	FD	1st year (local)
		A609298	Eagle Id., Salem, Mass.	9/22/30	FD	"
South Gooseberry Id., Salem	6/21/30	A609217	Peach's Pt., Marblehead, Mass.	10/11/30	FD	"
		A609269	Ocean City, Md.	11/1/30	FD	"
		A609300	St. Dennis Id., Ia.	12/5/30	C	"
		A609297	Angel City, Fla.	12/15/30	C	"
		A609212	Marsh Id., Ia.	1/21/31	C	"
		A609291	South Chatham, Mass.	7/5/33	FD	4th "
		A609442	Marblehead, Mass.	8/29/30	FD	1st year (local)
		A609411	30 miles west of Columbia, S. C.	11/22/30	FD	"
		A609453	New Verde, Ia.	2/10/30	C	"
		A609413	Seadrift, Texas	3/25/31	K	"
Egg Rock, Manchester.....	7/2/30	A609480	Port Bolivar, Texas	3/22/31	FD	"
		A609434	Beach Haven, N. J.	1/1/32	FD	2d "
		A609102	Manchester, Mass.	7/20/30	FD	1st year (local)
		A609138	Beach Haven, N. J.	10/14/30	FD	"
		A609196	Berwick, Ia.	11/10/30	C	"
		A609189	Biloxi, Ia.	5/2/31	C	"
		A609191	Marblehead, Mass.	10/5/31	FD	2d "
		A609107	Magnolia, Mass.	5/24/32	FD	"
		A695002	Eagle Id., Salem, Mass.	8/10/31	FD	1st year (local)
		A695018	Galveston, Texas	2/10/32	FD	"
North Gooseberry Id., Salem	7/7/31	A695006	Neposset, Mass.	11/28/32	FD	"
		A695022	Nahant Beach, Mass.	3/28/33	I	2d "
		A695269	Banding Station.	7/28/31	FD	1st year (local)
		A695291	North Truro, Mass.	7/28/31	FD	"
		A695277	Beverly Farms, Mass.	9/5/31	FD	"
		A695279	Beverly Farms, Mass.	9/28/31	FD	"
		A695170	Aransas Bay, Texas	1/2/32	FD	"
		A695232	Aransas Pass, Texas	2/7/32	FD	"
		A695215	Beaufort, N. C.	11/25/32	S	"
		A695267	Seabright, N. J.	12/16/32	C	2d "
Egg Rock, Manchester.....	7/7/32	A695431	Manchester, Mass.	7/7/32	FD	1st year (local)
		A695426	Manchester, Mass.	7/16/32	FD	"
		A695421	Manchester, Mass.	8/18/33	FD	"
		A695327	Near Fairhaven, N. J.	10/13/32	FD	"
		A695387	Yehuso, Texas	1/5/33	FD	"
		A695378	Guthrie, Tex.	3/4/33	FD	"
		A695328	Bayville, Ia.	abt. 5/1/33	FD	"
		A695328	Beverly Farms, Mass.	8/9/32	FD	" (local)
		A674657	Windrop Beach, Mass.	8/29/32	FD	"
		A674610	Salem, Mass.	9/21/32	FD	"
South Gooseberry Id., Salem	7/9/32	A674657	Manchester, N. C.	9/21/32	FD	"
		A674694	Hamden, N. J.	9/28/32	FD	"
		A674685	Portsmouth, Mass.	11/8/32	FD	"
		A674685	Portsmouth, Mass.	11/12/32	S	"
		A674612	Portsmouth, Mass.	3/12/33	S	"
		A674603	Hillsboro, Ia.	1/20/34	S	"

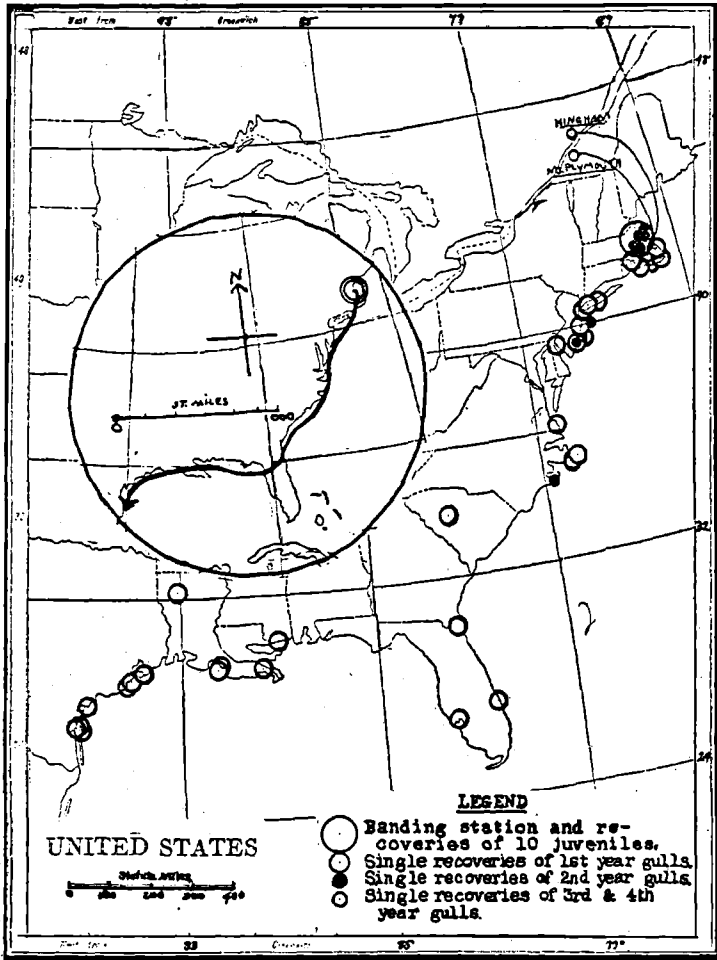


Figure 1. Map showing Recoveries from the Essex County Colonies of Herring Gulls. Insert: The "Migration Characteristic" of first-year birds from the same colonies.

The data are too limited to justify any generalization on this score. About all that can be said is that not a single recovery, even of the eleven second-year or older birds, has occurred north of Massachusetts. Another interesting point to consider is whether the main line of migration crosses the Florida Peninsula rather than follows the coast-line. A glance at the map suggests the possibility that the Essex County birds do not follow the coastline, but cross Florida at about the latitude of Tampa (lat. 28°). The common occurrence of immature gulls as far south as Miami has already been alluded to, but possibly they may prove referable to other colonies possessing other migratory traits.

Another fact of probable significance to be noted from this map is the complete absence of recoveries of second-year or older birds from places south of Hatteras (lat. 35°). The data for third-year and older birds are, of course, inconclusive, but it should be noticed that each of the three recoveries in this category occurred within forty miles of the banding station. Considering that mature gulls are reported common in winter as far south as Pensacola at least, it seems rather curious that all recoveries from the Essex County colony from North Carolina southward should be immature birds. Unless subsequent work shows the present data to have been misleading, we may accept as a working hypothesis that the adult gull population of the South Atlantic States is derived from other breeding colonies possessing different migratory traits. The plausibility of such an idea is strengthened by certain facts to be brought out in a subsequent installment of this paper.

In order to give due consideration to the time element in the Herring Gull migration, a graph (Fig. 2) has been constructed, using the age of the bird and the distance from banding station as the two salient coordinates. In Figure 2 the horizontal line, or abscissa, represents the time-scale, with each month of the year marked off and extending for three years. In order to economize space, the time-scale for second and subsequent years has been reduced by one half, and the recoveries of the third- and fourth-year birds are plotted in together. The fourth year recoveries are indicated by an open circle with an included cross. Nestlings are assumed to be hatched on July 1st and hence become one year old in the following June. The vertical line, or ordinate, represents distance in miles from the banding station to the place of recovery, that portion of the line above the abscissa representing distances to the northeast of the banding station and that portion below as south of the station. Air-line distances are computed along the coast

to Hatteras, thence to Jacksonville, Florida, and thence to New Orleans. Thus a recovery in Delaware would be measured by a true air-line distance; a recovery in South Carolina by air-line to Hatteras and thence to the place of recovery, and so on.

By this means, a black dot on the graph indicates the age of a recovered bird in years, months, and days, as well as the distance from the banding station and, roughly, the direction. In order to indicate probable and hypothetical *normal* limits of range for the immature gulls up to and including their fourth year, the areas have been appropriately outlined and shaded. The margins of the shaded areas bounded by solid black lines may be accepted as *highly* probable, while those bounded by broken line as probable, uncertain, or hypothetical.

This graph is peculiarly illuminating as it suggests with unmistakable clearness a probable picture of the migrating habits of first-year birds from this particular colony of Herring Gulls. The juveniles of the season remain in the vicinity of the rookery for at least two and probably three months after hatching. The southward drift of the more precocious birds appears to begin early in September and is well under way by October 1st. Two recoveries are noted from the vicinity of Hatteras prior to this date. The vanguard reaches the Gulf Coast by November. A leisurely drift southwestward continues throughout November and December to an apparent centre of concentration between Galveston and the Rio Grande. If we may accept the seven recoveries in March, April, and May as valid evidence, there is a strong likelihood that the northward flight does not begin until early April. A recovery at Bayville, Long Island (200 miles south) "found dead about May 1st", and another at Pleasant Bay, Orleans, Massachusetts, "found dead on May 31st," strongly suggest the return of the migrants to the North Atlantic States early in May and to Massachusetts waters by June 1st.

Before proceeding to a discussion of the movements of second- and third-year immatures and adults, it is appropriate to mention certain points of interest in connection with this portion of the diagram. There are at least two and possibly three recoveries which are open to suspicion on the ground of being erratic. On November 12th, B674685 was found at Gloucester, Massachusetts, "sick and exhausted". We are justified in assuming that this bird was left behind, rather than accepting the date as normal for healthy stragglers. Thus, until evidence to the contrary is secured, we may assign mid-October as the period when the last birds of the season have left the cold waters of Massachusetts Bay. The

second abnormal recovery is 387251, "killed" at Quantico, Virginia, on January 17th. Lacking further information, we are uncertain whether the bird was a weakened laggard or whether Cape Hatteras represents the northern limit of normal winter range for first-year birds. It may well be that the former interpretation is correct, owing to the fact that only one recovery has been reported from a station north of Jacksonville, Florida, between November 15th and May 1st. Owing to the relative density of midwinter recoveries near Galveston, Texas, it seems logical to assume that the normal midwinter range of first-year birds from this colony centers near that point, and to assign the northern coasts of Florida as the normal northerly limit. The third suspicious recovery is A609189, "found" at Biloxi, Mississippi, on May 2d. In view of the Long Island recovery on May 1st, it seems likely that the Biloxi bird has been accidentally delayed, perhaps by weakness or injury. Once again, until more evidence is accumulated, we shall tentatively reject the significance of this recovery.

In this connection it is well to bear in mind the obvious fact that the reported date of recovery may not coincide closely with the date of death. Hence, the line, or curve, of early recoveries representing the vanguard of the migration is far more significant than the curve of the stragglers which may have been delayed by injury or found weeks after death. Hence, at this early stage in the investigation we must consider any generalizations as merely probable deductions drawn from incomplete evidence.

The migration curve of immature second-year birds as represented by eight recoveries is strikingly different. Between July 1st and November 1st a single recovery has been reported, but none south of Massachusetts. On October 5th a bird was found at Marblehead (about six miles from Egg Rock, where it was hatched). The latest fall date for a Massachusetts recovery is November 28th at Neponset. This bird had a broken wing and was badly emaciated. As a normal "late date" it is of little significance. Between November 28th and March 18th no recovery has been reported north of Seabright, New Jersey. The southerly limit of the second-year migration appears at this writing to be Beaufort, North Carolina, (A695215 on November 25th).

Although a dogmatic statement based on eight recoveries must be avoided, the writer does not hesitate to accept the implications of this portion of the diagram as probable. In general, it may well turn out that immature second-year birds

from the Essex County colony habitually depart from the Boston region sometime between October 1st and December 1st to their winter resorts along the Atlantic Coast between New Jersey and Florida, and return to the vicinity of their birth-place in March and April. On the mathematical law of chances, we are justified in assigning Hatteras as their centre of winter dispersal and in asserting that the Gulf Coast is probably beyond their normal limit of range.⁷ We may well consider that the second-year birds have acquired a degree of hardihood which obviates the necessity of their wintering in the semitropical waters of the Gulf.

Of the movements of third- and fourth-year birds, we must withhold judgment. The only third-year recovery (A609034) at North Plymouth, Massachusetts, February 4th is in mid-winter. The two fourth-year recoveries (A609086 at Hingham, Massachusetts, December 30th, and A609291 at South Chatham, Massachusetts, July 5th) show midwinter and mid-summer records, each within eighty miles of the banding stations. At best, these records suggest that no important southern migration occurs among gulls from this colony after the second year.

In summary, it may be stated that gulls of the season from the Essex County colony normally winter along the Gulf Coast with the centre of concentration near Galveston (average date of arrival about December 1st, average date of departure about April 1st), and return to Massachusetts for the second summer (estimated average date of arrival May 15th). It is probable that the second-year gulls winter along the Atlantic Coast from New Jersey to Florida, with a centre of dispersal at Cape Hatteras (estimated average dates: departure from Massachusetts October 15 (?), arrival at winter territory November 1 (?), spring departure—no evidence. It is a reasonably intelligent guess that third-year and adult gulls do not migrate in the usual sense of the word.

(To be continued)

⁷ It is conceivable that the eight recoveries might fall into a pattern which in no way resembles the true normal pattern of distribution, but it is very unlikely. If we mark *at random*, by some mechanical method that eliminates the possibility of deliberate selection, eight shot-holes on the pattern from a shotgun, the chances are that our marks will give us a pretty fair idea of the real pattern even if we are in entire ignorance of the location of the rest of the holes. If the locus of the marks is roughly circular in shape, we should be justified in thinking that the target was perpendicular to the trajectory. If the marks form a long and narrow pattern, we should assume quite rightly that the plane of the target was tilted away from perpendicularity. Thus, possessing only limited knowledge, we are permitted by the law of chances to deduce the *probable* truth.