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Charlie Urner with Oscar Eayre, his boatman, on one of his many observation trips at Barnegat.

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CHARLES ANDERSON URNER

1882 - 1938

By J. L. Edwards

The death of Charles A. Urner on June 22, 1938, terminated an unusually productive ornithological career and, in a sense, wrote *finis* to an era for New York field students. For Charlie, as he was known to countless friends, had for many years so profoundly influenced the development of local ornithology that he had come largely to dominate it.

The fact that he, who was one of the most modest of men, had so deeply affected the attitudes and interests of dozens of associates, is both a tribute to his personality and an indication of rare grouping of admirable qualities.

In the first place, everybody liked him. Those of us who knew him well, had for him a genuine affection. He possessed the twin gifts of understanding and humor to such a degree that, even now, sadness at his going is never free from pleasure at memory of him. One liked him at first meeting, and the longer one knew him, the more this feeling ripened.

He also had, to an unusual degree, a wide-ranging and imaginative mind that not only kept pace with the developing ideas of his associates, but often outstripped them. His native intellectual en-

dowment was strongly reinforced by an amazing knowledge that touched many fields of human activity. After years of association with him, one would still discover new subjects upon which he was unusually well informed.

Finally, he was as honest as a yardstick and critical both of his own efforts and those of others; yet his criticism carried such invariable appreciation and understanding—whether he was analyzing the New Deal or a hypothesis in bird behavior—that his advice was not only welcome but sought out. His leadership, which brought with it inspiration and guidance, is sorely missed by those who have the responsibility of carrying on.

Born in Elizabeth, New Jersey, on March 29, 1882, Charlie lived there, except for the period from 1900 to 1904 during which he attended the University of Wisconsin, until his death. He received his early education at the Pingry School in Elizabeth. After graduating from college he became associated with the Urner-Barry Company in New York City—an organization founded by his grandfather. He worked as a reporter for their publications, covering various produce markets, and in later years as Editor-in-chief of the *American Produce Review*. He was Vice-President of the Company at the time of his death.

From the days of childhood, Charlie was interested in birds and other phases of nature study. He was long an ardent hunter and spent many days on the Elizabeth meadows, then an unspoiled wide expanse of fresh and salt marshes dotted with ponds and rich with a varied bird population. On those marshes he acquired the fundamentals of knowledge of shore-birds and water fowl in general that were to make him an outstanding authority on those birds.

For a few years after his return to Elizabeth from college, he was strongly interested in botany. After his marriage in 1908 to Margaret English, who always encouraged his outdoor studies, this interest in the plants of the region was fostered by his father-in-law, who was keenly interested in botany and knew the local plants well. When his father-in-law died in 1910, Charlie's interests gradually

reverted to ornithology, and by 1916 he was actively engaged in recording observations on bird life in Union County. After a few years of intensive work in the Elizabeth region, Charlie began to make the acquaintance of other active field ornithologists, and in 1920 he joined the A. O. U. as an Associate. In 1921 he joined the Linnaean Society of New York. He later joined the Cooper Ornithological Club and for many years was a member of the Delaware Valley Ornithological Club. At the meetings of the latter he occasionally presented papers, and among its members he counted Julian K. Potter, J. Fletcher Street, and Dr. Witmer Stone as close friends. He was also actively connected with the New Jersey Audubon Society, and for some time was a member of its Board of Directors.

His association with the Linnaean Society undoubtedly gave Charlie more pleasure than anything else in an ornithological way. He became a regular attendant at its meetings, and practically all its more active members eventually shared with him the delights of birding on the Jersey coast. His early field reports were given with extreme modesty, but his excellent knowledge of the local birds was soon apparent and his outstanding ability as a field observer was quickly recognized by the Society. From 1924 to 1926 he served as Secretary, and from 1927 to 1929 and again from 1933 to 1935 he held the office of Vice-President. He was elected President in 1929 and held that office until 1931. During the few years in which he did not hold office, the Society took advantage of his wisdom and experience by electing him to the Council. The many occasions on which his firm printed the Society's *Proceedings* and *Transactions* were particularly happy ones for the Editor, who could thus rely on a sympathetic, intelligent and utterly reliable printer.

In 1931 he was made a Fellow in recognition of his distinguished services to the Society. In the meantime he had won recognition outside of the New York region. In 1933 he was elected a Member of the A. O. U., and he was for several years chairman of the Waterfowl Committee of the National Association of Audubon Societies.

Charlie always kept up his interest in the birds of Union County. The results of his observations up to 1927 were published by the Linnaean Society as an extremely detailed statistical study, which,

in the opinion of many, is the finest county list ever published. In 1919—an example of his leadership—he began a breeding bird census of two hundred and ten acres and he continued this annually until his death. He visited the marshes bordering Newark Bay regularly and kept a close watch on the ever changing conditions there. He never failed to rue the absence of a complete picture of the bird life of the county in colonial times.

This region near his home did not long remain his sole interest. In 1922 his family spent the summer at Point Pleasant in Ocean County on the New Jersey coast, and for several years thereafter they returned to that place in summer. Charlie spent week-ends there, and soon became intensely interested in the bird life of the coastal region. He now began the long series of trips to Barnegat Bay that were to prove so productive. Almost a hundred miles from his home in Elizabeth, this area was better known to Charlie than is their home region to many field workers. Beginning with the knowledge gained from early hunting trips in the vicinity of Waretown and Barnegat, and from summer exploration trips during his vacations at Point Pleasant, he gradually developed a detailed knowledge of the region. His interest in the bird life of the County led him to visit systematically all parts at all seasons of the year. For a long period he made monthly trips to Seaside Park, arriving there before dawn and walking down the ten mile peninsula to Barnegat Inlet, covering the ocean beach one way and the bay shore the other. Later he changed his routine to regular trips by boat around Barnegat Bay with Oscar Eayre, best informed of the Barnegat baymen, as his guide. His statistical studies of water-fowl were regularly sent to the U. S. Biological Survey and were of considerable assistance to that Bureau in the determination of open seasons and other regulations. After discontinuing these trips except for special occasions, such as the Christmas Census excursion, he began to make more frequent visits to the best shore-bird territory, usually covering Beach Haven Point, the Tuckerton meadows, and frequently points outside of Ocean County, such as Brigantine Island. This visit which was made almost every week throughout the year usually took place on a Sunday morning. Leaving home in time to be at Brigantine or Tuckerton at dawn, Charlie

would cover the other points on the way back and would return to Elizabeth by 1:30 P.M. in time for dinner with his family. The results of these excursions were published in his analyses of shore-bird flights in various numbers of *The Auk* and in reports of the occurrences of rare birds in the same journal. The story which they tell of the gradual increase in the numbers of shore-birds after the abolition of shooting was a source of immense satisfaction to Charlie—and, incidentally, the most important statistical evidence of that increase. But as Dowitchers and Curlew became common and as baymen began to urge the resumption of such hunting, he energetically maintained that no species of bird in North America today, dependent upon a small, single clutch of eggs and migrating in massed flocks over huge distances, could withstand the terrific pressure of modern gunning.

Charlie's enthusiasm in his pursuit of ornithological knowledge was unequalled among his associates. He was tireless in the field, often abandoning observations only when all of his companions had become too exhausted to maintain further interest. On a trip to Barnegat, starting from Elizabeth in the small hours of the morning with a group of active and frequently younger bird enthusiasts, he would lead the party at high speed through a long day of interesting sights, and then drive his car back at night, usually the only one awake in the party.

His famous "Big Day" trips in May were the envy and despair of every migration watcher along the coast. Over a period of years of experimentation he developed a route which would give maximum results in number of species seen in a day—a day of 24 hours all spent in the field. This route was rated at about 175 species under good conditions, and 185 was possible with ideal conditions. In the scheduled day, which was generally the Sunday nearest to the 18th of May, the participants would meet at the Urner home for midnight breakfast. Final arrangements would be made and the party would be off on a trip covering hundreds of miles with stops at such favored spots as Troy Meadows, Boonton, Lamington and Princeton, continuing across the Pine Barrens to Brigantine, where the last hours of daylight would be spent on the shore. At dusk the party would turn

towards home again, making a few stops for the night birds on the long trip back, and thus ending a field trip that only the seasoned bird enthusiast could appreciate fully.

In addition to his enjoyment of bird study as both sport and science, Charlie was keenly alive to its esthetic aspects. For over a decade he annually composed Christmas verses and sent them to an innumerable list of friends in the Linnaean Society and the D. V. O. C. These were greetings from Barnegat, from Crooked Creek, and from "The Plains" of the Jersey Pine Barrens, dedicated to June and to November, to the Pines, to the Salt Marsh and to "Blackie" hiding in the muddy shallows. For many years he carefully collected the impressions of shore-bird tracks, finally securing the imprint of all such birds as regularly visited New Jersey. These impressions he transferred to a concrete walk in his garden, and it was no little triumph when he at last took the print of an accidental American Avocet on the Newark mud-flats.

In the last few years Charlie had begun a survey of the bird life of New Jersey on a scale never before attempted. Through breeding bird censuses and mid-winter censuses taken at hundreds of points throughout the State by scores of observers, correlated with ecological data, he planned to build up a picture of the bird fauna of New Jersey that would be truly comprehensive. He fully realized the magnitude of the task and had plotted the methods to be used over a period of years. This work was largely carried out through the New Jersey Field Ornithologists' Club, a coalition of active field observers from the northern and southern parts of the State, which Charlie had helped organize. Among the projects was the preparation of large maps showing the known nesting stations for each species of bird that bred in the State. A number of these are now filed in the library of Princeton University.

More recently, when the number of active bird students in the section centering around Newark increased to the point where a new local organization was desired, Charlie's advice was sought and the first meeting was held at his home in Elizabeth. This group rapidly increased in numbers and under the name of "The Raritan and Passaic Valleys Ornithological Club" began to hold regular meetings in

Newark. From the beginning Charlie refused to hold office, but he could not avoid being the actual leader and in recognition of this fact the name of the organization was changed to the "Urner Ornithological Club" after his death.

Charlie Urner's friends among bird students were innumerable. At the Linnaean Society his reports on the latest observations at Newark Bay or Barnegat were usually the main feature of the field notes. Charlie always had something of interest and significance to report and was always interested in the reports of others. His primary interest in birds always remained an ecological one; bird behavior was a fascinating diversion about which, unhappily, he never had time to write. (It should be remembered that his vigorous ornithological career was merely recreation from an equally crowded business career.) He liked to discourse on the male Catbird in his garden and on the pair of Robins which nested in a neighborhood tree but held no territorial rights to the ground below it.

He saw the same things that less gifted observers also saw, yet his grasp of ornithology and its problems was such that he possessed a sure instinct for the significant phenomenon.

His absence from a Linnaean meeting occurred so rarely as to cause no little comment. This close association continued until his death, which was brought about by a heart attack suffered on his way home from the meeting of June 21st. Those who have participated in one of his Barnegat trips or have followed him through a "Big Day" will long remember the event. His uncanny ability to pick the right places to visit to see rarities, and his invariable accuracy of observation combined with his unfailing good humor and consideration for his companions, made him irreplaceable as a friend and leader.

Preliminary Notes on the Behavior and Ecology of the Eastern Willet[1]

By William Vogt

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In 1936, the period from May 23rd to June 20th, and in 1937, the period from May 1st to 9th, were devoted to a study of Willets *Catoptrophorus s. semipalmatus* (Gmelin), in the salt marshes near Fortescue, N. J. Though much more work remains to be done, it is believed that data of sufficient interest were gathered during the 204 hours of actual field work to justify the presentation of a preliminary report at this time. It should be emphasized, however, that all conclusions advanced are tentative, and that discussion and interpretation have been limited because the data presented are admittedly only a fraction of what further study will disclose. The paper is published now to make available such facts as were noted, and in the hope other observers—especially amateur bird students—will initiate comparable studies. The writer might remark, parenthetically, that in ten years of bird study no other field work even began to offer as much in excitement and satisfaction as did the hours devoted to outwitting, and trying to understand, these birds.

1. Awarded the Linnæan Prize for Ornithological Research in 1938.

Fortescue was chosen for the study because of the large number of Willets that nest conveniently near lodgings.

The habitat of the birds, extending many miles along the east side of Delaware Bay, is a broad expanse of salt marsh still, fortunately, for the most part unditched. Like other marshes of the region, it is dominated by large areas of cord grass (*Spartina patens*), cow grass (*S. alterniflora*), with interspersed patches of spike grass (*Distichlis spicata*), samphire (*Salicornia* sp.), narrow-leaved cattail (*Typha angustifolia*) and, in the marsh ponds, widgeon grass (*Ruppia maritima*). The marsh is cut, in many places, by tidal estuaries and is bounded, on the west, by the low dunes and sandy shores of Delaware Bay.

Avian associates of the Willets include Black Ducks (*Anas rubripes*); Black-crowned Night Herons (*Nycticorax n. hoactli*); Marsh Hawks (*Circus hudsonius*); King (*Rallus e. elegans*), Virginia (*R. l. limicola*), Clapper (*R. longirostris crepitans*), and Black Rails (*Creciscus jamaicensis stoddardi*); American and Fish Crows (*Corvus brachyrhynchos* and *C. ossifragus*); Red-wings (*Agelaius p. phoeniceus*); Meadowlarks (*Sturnella magna*); and Sharp-tailed (*Ammospiza c. caudacuta*) and Seaside (*A. m. maritima*) Sparrows. Migrating Snow Geese (*Chen hyperborea atlantica*) and Brant (*Branta bernicla hrota*) improve feeding conditions for the Willets (see Section X).

Concerning the behavior of the Willet, little is known. Recent studies of shore-birds by Huxley, Tinbergen, Pettingill, and others, and the flash-pattern of the wings (closely resembling that of *Chettusia gregaria*), interested the writer in making observations of this accessible, and strikingly marked, species. The older literature concerning the bird is summarized by Bent (1929). As this paper was being written, two more items appeared (Stone, 1937; Tomkins, 1938).

My thanks are due to the American Museum of Natural History for the loan of a mounted Willet, used in studying sexual behavior; to Dr. G. K. Noble for bibliographic assistance; to Mrs. Margaret Morse Nice, Dr. Ernst Mayr, Dr. N. Tinbergen, and Mr. D. S. Lehrman for criticism and suggestions; to Mr. Richard H. Pough and the Rev. Benjamin B. Brown, for much appreciated transportation; and

to Mr. A. D. Simmons for his superb photograph of a flying bird (Fig. I). The New Jersey Game Commission kindly granted essential permission to collect a small number of Willets; only one was taken.

I. Technique

The major part of the time used in field work was passed in blinds. Seventeen days were devoted, in 1936, primarily to one nest, within twenty feet of the blind. In 1937, studies were made from a blind the floor of which was six feet above the marsh; this elevation was most helpful and alone made possible the observations on which territorial findings are based. This year two pairs were closely, watched. Throughout the two periods the behavior of several score of birds was under superficial observation. The 1937 blind was situated between two marsh ponds where, the previous year's observations had demonstrated, Willets were likely to be present in numbers; it was erected early in April, before the return of the birds, and was so casually accepted by them that they constantly fed almost beneath its floor. The birds became so accustomed to my presence that often they would not flush as I passed to and from the blind.

Incubating birds, in 1936, were extremely shy, once they had been flushed. Although a large wooden tripod was left near a nest for three days, the addition of a small camera, before the observer entered the blind—distant about seventy feet—kept the bird from its nest during a long period, and it immediately flushed at the click of the shutter. This nest was not the one watched over a long period, though the blind had been in position about five days. It is doubtful whether a picture could have been secured without the remote control device. By contrast, Seaside Sparrows, feeding young, accepted the presence of the tripod and camera within a few moments, and permitted the taking of more than thirty pictures nearly as quickly as the threads could be pulled. In both cases there was equal disturbance of nesting cover.

Ordinarily, when the 1936 blind was entered, it was kept between the observer and the nest, and the incubating birds did not flush. The noise made by walking through the grass seemed not to disturb them.

In 1936 one attempt to mark individual birds was successful. Ordinary artists' oil colors were squeezed onto the edges of nests, after

the method reported by Johnson (1935); and one bird which, subsequently collected, proved to be a female, wore a conspicuous red smear on her breast.

A mounted Willet was used, as in earlier studies (Noble and Vogt, 1935), to test the reactions of birds in the field. Bausch and Lomb 7x35 binoculars, and a Leica camera were used. Plate I shows the distribution of territories, location of blinds, etc.

II. Methods of Sex Determination

So much of the paper is concerned with the relations between the sexes that methods of sexing these birds, which seem to exhibt no sexual dimorphism, should be explained at the outset. As a matter of fact, discrimination between the sexes proved surprisingly easy; the marked female collected had been provisionally identified as to sex days before she was shot. Size gives the first clue; though measurements of a series of skins in the collection of the American Museum of Natural History showed an overlapping, in the field the female frequently may be known by her larger size; surmises as to sex, based on size, were repeatedly checked against behavior in three pairs, and the sexes verified. This criterion, alone, however, is not entirely trustworthy since birds appear differently in various lights, and their bulk—as determined by compressed or expanded feathers—varies with the weather and the birds' emotional states.

Attacks, in defense of territory or mate, are by the male bird only, though the female will bluff occasionally; similarly, only the male responded—with an attack reaction—to the mounted bird. This attack reaction extended into the incubation season and the male could be depended on to fight the mount. When the male was incubating, as well as before incubation had begun, the female was tested with the mount—and never attacked.

The female is more sedentary in her habits than the male; she seems not so given to making wide flights, as he, and when feeding on the territory she often confines herself to a smaller area than does the male. The female of the 'east pair'—so-called from the relation of its territory to the blind—did most of her feeding on a space (see Plate I) of *S. patens* not over 100 feet square.

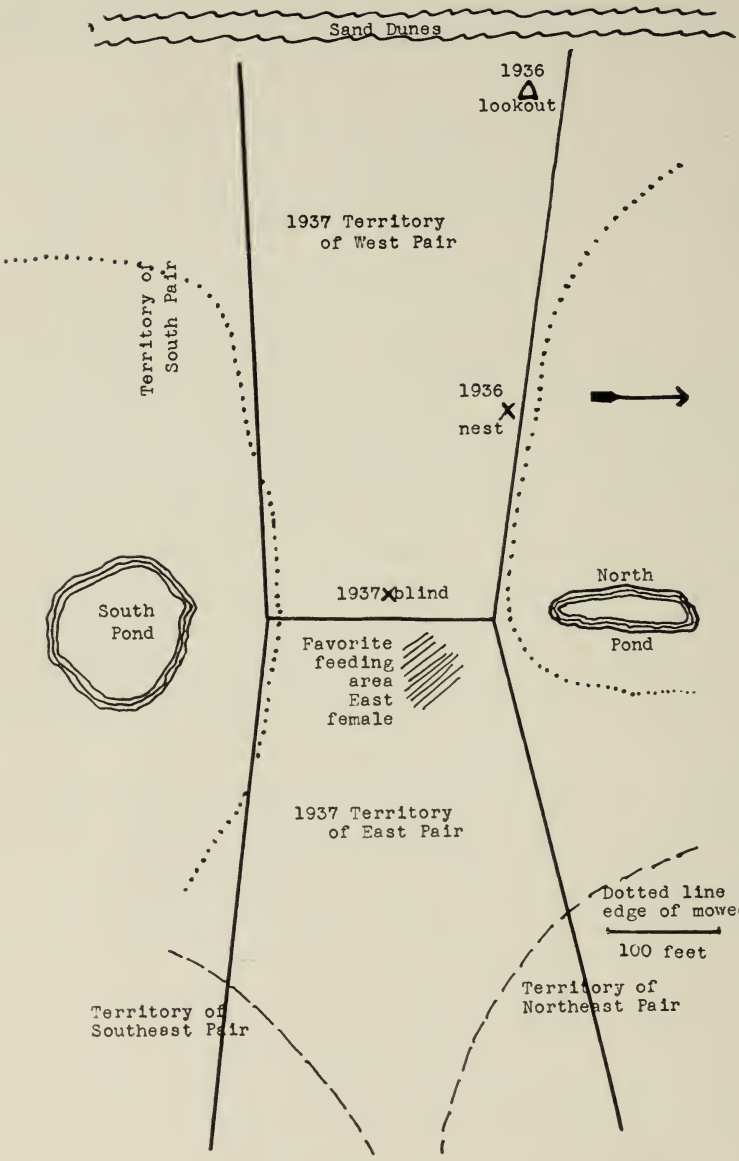

PLATE I. *Schematic representation of Willet breeding areas, distances estimated.*

The female is careless about territorial bounds, when feeding, and will sometimes trespass, unmolested. The male, on the other hand, is visibly uneasy when he trespasses, and, except at the beginning of the breeding cycle, he is usually driven off at once.

These differences were often observed in the pair whose female was collected, and they were repeatedly checked in 1937 by watching copulations, after I had reached a decision as to which sex was which.

These sex differences render it relatively easy, in markedly territorial birds like Willets, to follow the actions of individual birds; they are first assorted and separated by their innate drive to claim a territory and much of the time the observer need solve merely a two-bird puzzle.

III. Voice and Postures

"The real difficulty in the investigation and the recording of the behavior of higher animals," writes Konrad Lorenz (1935), "consists of the fact that the observer himself, as a subject, is so similar to the object of his observation, that a true objectivity cannot be achieved." In making the observations on which this paper is based, a deliberate effort was, at all times, made to subordinate the factor of human psychology and to reach conclusions, as far as possible, on the basis of cause and effect. Meaning is attributed to observed phenomena only when certain reactions have been observed to follow certain well-marked stimuli. The field student of bird behavior faces a problem much like that of the palaeontologist who finds a femur, humerus, and maxilla and with these attempts to approximate the whole animal. Rare, indeed, is the researcher who, like Mrs. Nice (1937), has fragments accumulated by almost daily observations over several years. Data comparable to hers are not available on any shore-bird, and the writer, with only two vacation periods on which to draw, does not suggest that he has found more than fragments—or that all of these fragments are susceptible of valid interpretation.

The fragments, in this case, are not fossils, but certain phenomena apprehended through the ear and through the eye. Since this attempt to gain an understanding of the biology and psychology of the Willet was limited by the hearing, observation, and interpretation of notes

and bodily behavior, it would seem logical to describe these calls and postures and give, so far as possible, their meaning.

While the Willets' vocabulary is large, the number of syllables is not, with the result that their language (if it deserves this name) seems to include many homonyms. It thus becomes difficult to attach definite significance to certain calls.

One note, however, leaves no doubt as to its valence. It is preceded by a slow *dik-ing* (see below) as a male approaches a female and seeks copulation. Its tempo is augmented until the bird is clicking faster than one can count—nearly as rapidly, indeed, as does the cicada (*Tibicen* sp.)—and continues until about the end of the sexual act. The call is loud and can be heard at distances estimated to exceed one-eighth mile. It was heard scores of times, when the male giving it was visible, only as a preamble or accompaniment to the sexual act. This is unquestionably the note recorded as *kuk-kuk* by J. T. Nichols (Bent, 1929). It might be named the *male copulation note*. The female was heard to give, during copulation, a grunting *ch-ch* note.

Another note closely associated with nesting and copulation is a throaty whistle, somewhat suggesting the whistle of the Pintail (*Dafila acuta tzitzihoa*), that was recorded in the field as *yoick-yoick* or *yoicker-yoick*. This was noted at the beginning of a search for a nesting site or scrape (V-2-37); by the male shortly before attempting copulation (V-3-37) and when copulation had been refused by the female (V-3-37); seemingly as an invitation to hunt a nest site (V-3-37); during scrape ceremony (VI-10-36), and by the female, who apparently used it to drive the male to his incubating duties (VI-8-36). It was frequently heard during the 1936 season but the fact that the blind was on the ground made it impossible to watch the birds at a distance; only further observations will narrow the meaning of the note.

A call that was described in my notes as a twitter or as the *Wren note* because of its resemblance to the song of a basso Long-billed Marsh Wren (*Telmatodytes palustris*) was recorded on four occasions: when defending the female from an intruding male—the twitter given by the bristling husband (V-1-37); by an undetermined member of the east pair to warn the male of the west pair not to tres-

pass, though the west female was feeding on the east territory (V-4-37); by the west male in calling the female to him from the east territory; and, on the next day, by the same male, in an apparent attempt to call the female, who failed to respond. Because this note was so successful in either driving or calling another bird, it might be called the *compulsion note.*

The justification for the interpretation of compulsion here may be shown by a quotation from my notes. On May 4, 1937, the west male had been driven from the territory of the east pair at 5:20 P.M.

5:25—Male flies to the west side of his territory and gives *pill-will-willet* call. Female feeding (still on east territory).

5:30—Male feeding toward blind. *Diks,* flies few feet south, calls *pill-will-willet.* Female not far from blind now.

5:40—Male flies west again, *pill-will-willeting.* His lady ignores him—and eats.

5:50—Male perched on jetsam to west, female eating well in east pair's territory.

5:51—Male flies to blind and lands, *pill-will-willeting.* His unwillingness to trespass farther is obvious.

(It should be explained that my blind, by happy accident, was on the boundary between the territories of the east and west pair. The latter, occupying the land used by the long-studied pair in 1936, received most attention in 1937.)

5:55—Male *pill-will-willets.* No response from female. Then he leans over (forward) and gives Wren note and she comes at once.

A simple note, given in a confusing variety of situations, is a staccato, reedy *dik,* often rapidly repeated, and not very loud. It was recorded as expressing emotion under the following circumstances: antecedent to copulation note; between series of Wren notes in threatening interloper; associated with *Terning* (see below) in mobbing; alone, when threatening interloper on territory; when excited by mounted bird on territory; when attacking Crow (*Corvus* sp.); when flushed from nest; when scolding the observer; and *sotto voce* —by incubating female—as male scales silently over the nest. *Diks* are also heard when, so far as I ascertained, they seem not to have any particular relation to an emotional state. The note is used by both sexes and repetitions were counted up to 188 times a minute. It is

usually associated with emotional stress and, judging by my observations, most frequently anger. On May 2, 1937, distant *diks* that sounded, to my ear, like all others, attracted the attention of every Willet in sight; the birds stopped feeding and stood, for a short period, with necks erect. This is the note recorded by Julian Potter as *"quip, quip, quip"* (Stone, 1937).

A wailing call that might be represented by the word *k-a-aty* (to be pronounced as is the feminine name) was frequently heard, and though its interpretation was not always clear to me, it rarely failed to call forth marked interest. Since it was given, interspersed with Terning (see below), by birds chased by dogs, and by mobbing birds, it is presumably associated with predators; however, it was also given by the west male as he flew off his territory to attack another Willet.

A note that suggested the sound made by ruffling a deck of cards was heard three times, near or at the nest, in 1936. On May 31 the male flew over the female, which I had just flushed from her nest, and uttered it; on June 6 the female gave the same note just before going to the nest; and the next day the male uttered it as he dropped near the nest; the female half rose from the eggs, then resumed incubation. What the note means to the birds is not clear to me.

On May 3, 1937, the west pair were prowling through long grass and the male uttered a chattering note—the only time I recorded it—that was apparently a means of maintaining contact with the female since, when she again came into sight, the note stopped. A similar action by Phalaropes has been reported (Tinbergen, 1935). This might be called the *contact note.*

This list of calls leaves to be described two that are, perhaps, most interesting of all because of the light they seem to cast upon the relationships and sociology of the birds.

The first of these—a strident *teee-eeer*—I immediately named, in the field, the Tern note because it was "very like the high pitched and thin Arctic" Tern (*Sterna paradisaea*) call; unlike the Avocet's (*Recurvirostra avosetta*) "gull-cry" (Makkink, 1936) it seems not to be specific for any predator—indeed, the most interesting thing about it is that, though it is at times evoked by predators, it is repeatedly

FIG. 2. *The male attacking the mount.*

FIG. 1. *Eastern Willet. Photo courtesy of Albert Dixon Simmons.*

given for no ascertainable cause. It is, however, like the gull-cry of the Avocet, seldom heard early in the breeding cycle, but common when eggs have been deposited.

In 1937 when, up to the time I was forced to abandon the study, I had been able to find no evidence of eggs, it was five times recorded on May 1, during a fight; once on May 3 during the first mobbing (see below—Section IX) of the year; twice on May 7, during—apparently pointless—mobbing; and once on May 8 as supposed east male attacked a Fish Crow. In 1936, when most of the birds had eggs from the time of my arrival on May 23rd, the Tern note was recorded on the 23rd, 25th, 26th, 28th, 30th, 31st, June 2nd, 3rd, 4th, 6th, 7th, 8th, 9th, 10th, 11th, 14th, 16th, 17th, 19th, and 20th—usually many times a day. During 1937, alive to the possible significance of the Terning, I carefully recorded all instances; in 1936, before its meaning and development had become significant, I unquestionably failed to record it in some instances. Therefore, it is obvious that as the nesting cycle developed this note played an increasingly important part in the behavior of the birds.

In early May, the first Terning was heard during fights, noted as especially vicious, but whether the call came from the attacker or the attacked, I could not determine. It was also heard when, later, I flushed birds from their nests, and it brought an angry group about my ears, from estimated distances of a quarter of a mile. It was frequently heard as predators—Crows and a domestic house cat—were mobbed. The gravity of its message to the birds was constantly apparent; time after time birds would jerk to attention at the note, and, usually, a number would congregate about the screaming bird and, with a semblance of hysteria, add to the racket. In early May, however, "ganging up" was exceptional. The most interesting functioning of this call will be discussed under Section IX.

The *pill-will-willet* call that has supposedly given this bird its name, naturally bridges the gap to a discussion of postures—well defined and often-repeated bodily movements—since it accompanies the most spectacular behavior of the Willet. The call itself is, by human standards, a rich, ringing, sweet and moving performance. It may be

heard, on calm days, at distances estimated to exceed, considerably, a half mile. While it may, for the Willets, be characterized by differentiating shades of tone, pitch, and emphasis, to my ears it was repeatedly the same *pill-will-willet* though given under a wide variety of circumstances. There is no question in my mind, after hearing it hundreds of times, that its most important function is territorial and that, in this usage, it is analogous with the songs of passerine species. It is given not only when attempting to secure territory (see Section VI) but as a warning when strange birds trespass on, or pass over, a territory, and in driving birds from a territory. It is also given, along with the Tern note, while mobbing; by the approaching bird in nest relief; before returning to a vacant nest with clutch; and when objecting to a human interloper. Tomkins (1938) reports it as "incessant at all hours . . . of the night." In my experience, nocturnal calls were rare; this may be true only of the portions of the breeding cycle before hatching of the eggs.

Its most striking—and probably significant—manifestation is in connection with a gesture I called, in my field notes, *Spottying* from its similarity to a performance I have watched in the Spotted Sandpiper (*Actitis macularia*). It is undoubtedly analogous to the Black-tailed Godwit's "ceremonial flight" (Huxley, 1926). In this act the male, rapidly and loudly calling *pill-will-willet* over and over again, would rise into the air and, with wings arched stiffly downward and moving in short, quick beats, fly in circles—occasionally out of sight over the marsh, when the performance would stimulate other birds to the same action; at times over the territory he was attempting to take from another male; frequently over the approximate bounds of his own territory. Flying in these circles, he would mount higher and higher, often until he nearly vanished. At times he would drop thirty or forty feet only to zoom upward again with a vigor and lightness it was difficult not to call ecstatic. The tips of the wings flicker like tongues of black and white flame and at extreme heights the ruptive pattern, as in the Nighthawk (*Chordeiles minor*), so breaks the wings that only the inner, dark areas are visible. Against an intense blue sky, or piled cumulus clouds, this display is as stirring a performance as I have ever seen in the bird world. This performance is more fully described in Vogt, 1938.

After flying about in circles of varying diameters, and for varying amounts of time, the male would begin to descend, often almost perpendicularly, often with wings barely moving as it rode the wind head-on, and with long legs drooping. The *pill-will-willeting* usually continued, unabated, until the male had dropped near to the ground; the final descent was noiseless.

Often—but not always—after the male had been Spottying for a time, the female would fly up and hover a few feet below him, also giving the *pill-will-willet* call; in her flight, voice and descent, I could never detect the wild vigor and abandon that seemingly possessed the male.

Comparable behavior has been noted in many shore-birds (Bent, 1927, 1929) and discussed in detail in the case of the Black-tailed Godwit (Huxley, 1926), and the Phalarope (Tinbergen, 1935). The former says, "The ceremonial flights of the Godwit and many other waders, such as the Redshank, Lapwing, Purple Sandpiper, Curlew, Snipe, etc., are similar to song in that they are prominent from afar, and stand often in some relation to territory, but (like the waders' territory itself) they appear not to be quite so specialized."

Certain differences in Willet behavior from that of species studied by Huxley and Tinbergen should, however, be noted. The Willet is a *highly territorial* bird and guards the boundaries of its demesne, through much of the breeding season, as vigilantly as does any passerine. In driving off interlopers the ceremonial flight is frequently used, probably at least till the end of incubation. It was also observed as an integral part of the actions of a *pair* that was trying to lop off a piece of the east pair's territory. These observations would seem to indicate that the ceremonial flight is definitely territorial in character.

That it in addition serves to unify the pair (Huxley, 1914) also seems very likely since the female so frequently participates in it; however, the ceremonial flight in the Willet often does not—though further observations may indicate it sometimes does—have anything to do with "desire for a sex partner" as in Phalaropes (Tinbergen,

1935). It is given over extended periods by mated pairs; on May 27th the male *of an incubating pair* did the ceremonial flight in chasing two birds that flew across his territory.

Hostility is displayed, in Willets as in other birds, by *bristling*—erection of the feathers in such a manner that the apparent size of the bird is increased. This is often accompanied by a longitudinal flattening of the body with the neck drawn in and the long bill extended as a prolongation of the body axis; this gives the bird such a striking resemblance to a huge snout-beetle (*Rhynchophora*) that, in my notes, I called the posture *Beetling*

Hostility is also shown by exaggerated strutting, similar to that I have seen in the Spotted Sandpiper (*Actitis macularia*). With head up, body erect, and breast thrust forward, the bird advances with exaggeratedly long steps that at once brought back old memories of the *cake-walk*. (At the time this was written I was not familiar with the application of the term to similar posturing of the Semipalmated Plover [Bent, 1929].)

At times, in the stress of battle, the Willet will lie down, much as does the Avocet (Makkink, 1936).

I cannot agree with this author's interpretation of such behavior as "disgust," which seems to carry a strongly anthropomorphic connotation. Rather, since such behavior suspends the fighting, it functions as a means of securing a truce. It seems possible it may derive from a temporary "inferiorism" (Allen, 1934) that, however, does not last; as is well known, a bird on its own territory commonly possesses a moral (or psychological) superiority over invaders of its own species.

Two tail-displays were noted. In the first, the sexual, the tail is narrowed and depressed. The gesture characterizes male birds that are seeking copulation and both sexes in nest-site hunting or scraping. Selous (1927) reports similar display in both sexes of courting Redshanks (*Totanus calidris*).

The intimidation tail-display differs from the sexual in that the tail is somewhat depressed, spread, and tilted sideways, with its upper surface extended before the opponent.

My experience agrees with that of Tomkins (1938) in finding no "broken wing" performance.

The various calls and postures will be referred to further in discussing courtship, territory, etc.

IV. Monogamy and Time of Pairing

Willets had been on their breeding grounds about two weeks before my arrival in 1937; Robert Haines and Philip C. Walton reported to Julian K. Potter that they had arrived by April 18. The population density is high—nearly eighty birds were present in one mobbing aggregation—and, despite vigorous territorial defense, the birds move about a good deal. For these reasons, I was unable to secure data on pairing. On several occasions, however, I watched territorial establishment, and in each case the acquisitive male was accompanied by a female. This would indicate that pairing takes place before territory assumption unless these birds had been evicted from their territory elsewhere, which seems extremely unlikely, in view of their territorial tenacity.

Females I was able to watch closely were repeatedly approached by males, early in May, which suggests that there is a surplus of this sex; that they had not yet found mates, but would later; or that they are polygamous.

On November 1, 1937, Alexander Sprunt, Jr., of Charleston, S. C., wrote me: "I will be interested to know whether you will run across any instances of more than one female using the same nest. It occurs locally, and I have records of several instances. Sometimes the multiple number of eggs is accepted, sometimes the interloping female's eggs are rolled out of the nest.

"Highest number of eggs in one nest found here has, to date, been eight." In the thirteen nests observed by the writer, the clutches ranged from one to four eggs. No instances of double-occupancy were observed. As is noted in Section VIII, there is a notable difference between New Jersey and southern coastal Willets in their flushing reactions, possibly the result of different ecological conditions. Whether double-occupancy of nests may also be correlated with a difference in nesting-cover is not known. In any case, these large clutches of eggs

suggest the possibility of parasitism—often, apparently, a habit that is rather casually assumed, as by some of the Ducks—or of polygamy. This last possibility I cannot believe to be very common because of the repeatedly observed preoccupation of known males both with their territories and their mates.

V. Sex Recognition

It is usually possible, on the territory, to recognize the sex of Willets under observation, as has been pointed out. Since the human observer can do this, it seems highly probable that the birds, themselves, are able to recognize sex without resorting to the trial-and-error method reported by Allen for Grouse (1934) and Whitman for Pigeons (1919). My conclusions on this point, as regards the Willet, tentatively agree with those of Makkink (1936) on the Avocet: ". . . the birds must be able to distinguish each others' sex already in the beginning of the meeting . . . by means of . . . characters which are too subtle for our discrimination." The possibility that individual birds were known, as individuals, to these unmated males, cannot be ignored in view of the reports of Whitman (1919) and Schjelderup-Ebbe (1935). This acquaintance seems less probable, however, in the case of wide-ranging, free birds that are not members of a flock nor, so far as could be determined, even possessed of a near-by territory, from which they might come to know the females subsequently approached. In early May, 1937, repeated approaches by males to a mated female were observed. As will be described below, at this period there was no perceptible territorial defense; when, early in the season, the male interloper pitched into the territory near its feeding owners, no difference in the behavior of these two birds toward the newcomer was perceptible. Yet, so far as could be seen, the approaching male was, for not even an instant, uncertain as to which was the female. Dropping from the air at a precipitous rate, he would land near the female, and begin moving toward her.

Tinbergen (1935) expressed the opinion that "the emotional state of the reacting bird had influence on its discrimination power." While, in the case of the Willets, there was no evidence of this, further observations may cast light on this interesting psychological problem.

VI. Defense of Female and Territory

The two causes of strife between Willets are discussed together because protection of the female as a defense-motive seems to be replaced by protection of the territory as a defense-motive in such a way that it is impossible to determine—at least without vastly more study, and an improved technique—where the first ends and the second begins. Certain it is, however, that as the breeding season progresses, one gives way to, or is masked by, the other. For example, during the first days of May the bird I called west male, made few attempts to protect his land, though he was valiant in repulsing males that approached his mate. Later his land was sacrosanct. (See Tinbergen, 1936. "By comparative observation we find in various species a great many different objects 'defended' against competitors. We conclude that an object is 'defended' when we see the fighting restricted to its vicinity. *It is well to emphasize that our knowledge of these objects is no hypothesis, but a fact.*")

Something about May Day morning, 1937, seemed to exert an aphrodisiac effect upon the birds, and attempts by wandering males—presumably unattached—to make off with attached females seemed especially frequent. A description of one of these encounters, translated out of my field short-hand, may illuminate the subject.

The west pair have been having their troubles with interlopers.

8:20 A.M.—As another male approaches from the north, west male twitters (=Wren note) warningly. Newcomer—*X*—answers. West male *pill-will-willets.* West female (which has been feeding, for some time) settles down as though asleep on nest, with legs folded underneath and her bill in scapulars. *X* approaches her, strutting (= cake-walk). West male *dik-diks* and comes closer. *X* works around to opposite side of west female until their relative positions are thus:

X west female west male

and threatens (?) with strutting approach. West female gets up, jumps clean over back of west male, so positions are:

X west male west female

West male rushes *X,* who retreats a few feet, and feeds. West female again settles down, as though to sleep, and west male moves off a score of feet to slightly elevated perch on heap of grass. Twitters from time to time.

Here the female was threatened—and defended—but no attempt was made to defend territory. The strange male was allowed to feed in peace—something that would not have occurred later. (The territorial bounds subsequently guarded by the west male so closely agreed with those of the bird I named the "white male" in 1936, that they suggested to me the possibility this was the same bird defending the same territory. Pettingill [1936] believes the same male Woodcock returns to the same territory.)

Another sexual defense, the same day:

1:41 P.M.—A presumptive male, vigorously *pill-will-willeting,* drops in near west female—which, twenty minutes before had been seen in inferior position in copulation. New male approaches her, and she and west male both go toward interloper with breasts thrust out, taking very long steps (= cake-walk). Newcomer stands ground until west male rushes in as though to attack and then flies off with the west male in pursuit.

On May 2 (5:50 A.M.) there was again defense of female but not of territory—probably by east male; the male drove an interloper from his mate but permitted him to feed near-by. In this instance the tail-tilting, noted above as a minatory gesture, was very noticeable.

The dominance of sexual defense (by which is meant defense of the female, as distinct from defense of territory) over territorial defense did not, however, exclude territorial defense to the degree that, subsequently, territorial defense seemed to make sexual defense unnecessary by preventing wandering males from approaching mated females. The response of the west male to a mounted bird, on May 2, was obviously territorial defense—since a dead mount cannot approach a female (see Fig. 2). It should be remembered that the previous day, the west male had defended its female but not territory; a half hour after the attack to be described, there was again pure sexual defense.

3:21 P.M.—The mounted bird, bent with body axis parallel to the earth, just west of blind [about fifty feet away]. The west pair come in to territory, from east. The female dropped by the blind, the male flew casually westward. Then it spied mount, rushed to within three feet, *diked* several times, and attacked vigorously. Pecked back of head from left side, jumped over it and hit from right, jumped on its back and hammered head more, then stood on back a few seconds as though puzzled. Jumped to earth, went around front, and pecked near eyes,

making feathers fly, until I rescued dummy. The male was loath to leave and it stayed within thirty-five feet as I picked up the mount. [At the time of this attack the mount was a considerable distance from the female. The sex of the mount is unknown.]

On May 4, the so-called southeast male exhibited what was apparently mere sexual defense—the interloper was permitted to feed near-by—; and the west male showed the same defense but this may have been because the conflict took place on the periphery of the territory where limits, and emotions aroused by them, were often vague.

From this time on, territorial defense became increasingly obvious and because strange males were not permitted within territorial bounds, clear sexual defense vanished. Interesting evidence of the strength of the territory-defense urge was experimentally shown.

An abortive attempt to trap the west male—defeated by the wind, if not by other factors—left me with a four foot square of white mosquito netting that for some days was permitted to lie in the middle of the territory. The west pair obviously eyed it with some suspicion at first, though they subsequently came to feed in its vicinity without apparently paying it attention. On May 5, at 5:00 P.M., the mount was placed in the center of the square of net. No birds were present on the west territory.

6:00—Male flies low over mount, *pill-will-willeting* and drops near-by. Feeds.

6:07—Female drops in, *pill-will-willeting*. Both feed toward mount; male outdistances female. He reaches square of mosquito net on which mount is placed and begins to walk around it. He does this several times, skirting net, then finally jumps at mount and strikes it with bill. Flutters back to ground. Does this four more times, carefully avoiding net, until he knocks mount over. Female, meanwhile, has come up and is standing close by. Now both birds walk slowly away, feeding.

Under more accessible conditions, the mounted bird was, several times, attacked by males—though never by females. Territorial defense was seen, many times a day, over many days. So alert were the birds to trespass that a bird merely flying across a territory usually evoked a warning *pill-will-willet* call, this given by either the male or the female. As was pointed out above, no evidence was seen of territorial defense by females though, on a few occasions, they were seen to bluff interlopers, both in the presence of their fighting mates,

and in their mates' absence. The fighting often seemed to satisfy Selous's definition of formalization (1933) but at times it was a serious affair.

8:13 A.M., May 7, 1937—A strange pair (at least I do not know where they came from) drop near the west pair, south of the blind. *Pill-will-willets* are exchanged, then a stranger rushes the west male. The latter spars, exchanging wing blows (the clashing of the primaries could sometimes be heard) and then lies down. Beetles forward, attacks stranger, who grabs west male by base of bill and shakes him as they flop around. West male finally pulls loose, and does not continue fight. Newcomer, however—I suspect south male—walks slowly off. Females, during this, had not participated. West male shakes head from side to side as though bill hurt.

It has been pointed out, above, that the so-called spotty performance seems to be used in securing territory. When, in 1937, I took up my observations, the entire mowed strip of *Spartina patens,* east and west of the blind, seemed to be occupied by two pairs of birds whose territorial boundary lay just about at the blind. By the time I left, nine days later, the so-called northeast pair—utilizing the spotty performance—had carved a piece off the territory of the east pair. The pair seeking territory systematically utilized the ceremonial flight over the area they were trying to appropriate. Time and again, giving the *pill-will-willet* call, they dropped onto the desired land; and time and again they would be driven away—sometimes after an exchange of threatening postures—by the owner. As nearly as I could tell, they secured title to the land by the process of wearing down the owner's resistance over a period of several days. It is probable that had they sought the center of the territory, their efforts would have been vain; in the cases I observed, it was peripheral sections of territory that were lost to interlopers. Outlying portions of territory are apparently less vigorously defended: there seems to be a sort of territorial center of gravity, the distance from which proportionately reduces vigor of defense.

The east pair lost a sizable area, and the west pair a small piece —never very vigorously defended—to the south pair, whose holding included South Pond (Plate I) and but little mowed area. Then the northeast pair lopped another piece from the east pair, leaving them as little of the mowed strip as the southeast and northeast birds had.

As late as June 19, 1936, the spotty performance was noted, though the history of the calling birds was not known.

Another probable territorial act is the habitual use, by Willets, of the same position on the territory as what I called a "look-out"; this was more obvious during incubation than before it. It is very like the "Standplatz" of Herring Gulls (*Larus a. argentatus*) (Goethe, 1937). In 1936 both the male and the female under extended observation constantly—though not invariably—stood on a bare patch, where cattails formerly had grown, while the mate was on the nest. From here they would watch the territory, protest against passing birds, and, in the case of the male, initiate defense. This look-out was used so consistently, and from it there so often rang out the warning *pill-will-willet,* that I could not help regarding it as the catoptrophorine equivalent of the passerine song-perch. It was situated approximately half the length of the territory away from the nest.

It is apparent to the writer that fighting, in Willets, is: (1) in defense of the female, at a period when the territory is not invariably defended, and (2) in defense of the territory. This fighting was never observed when the birds were known to be away from their territories, as on the feeding grounds at the bay edge, but observations there were casual and, probably, inconclusive.

Unfortunately it was not possible to stay in the field, in 1936, long enough to study the relationship of young birds to the territory. No young were seen, none of the eggs under observation had hatched, and there was no perceptible change in behavior to suggest the presence of young in the tangled grasses. Willets, like other members of their family, are precocial; Tomkins (1938) reports that soon after hatching the birds apparently desert the nest by "at least a half mile"; furthermore, Arthur Wayne (Bent, 1929) is authority for the statement that the adults carry their young away from the nest. What, then, is the value of territory to the Willet?

Certain possible fallacies occur in discussions of territoriality (Makkink, 1936, expressing agreement with Huxley, 1925a) in shorebirds, namely the assumption that the bird "has plenty of suitable nest-sites at its disposition and needs therefore no territorial instinct. No

more does there exist any necessity for reservation of a territory for reasons of food; soon after the newly hatched are dried, the family leaves the nest-area and makes for the water, where the food is abundant." While these statements would probably be true in the case of the Northern Phalarope, it seems dubious whether they would be in the case of such species as the Avocet and Willet. The latter, certainly, is much less numerous than it was in its aboriginal circumstances, and it seems entirely possible that when its numbers were at their peak, nest-sites and food may have been at a premium. This assumption is given support, it would seem, by the reports of Dircksen (1932) who found that on Norderoog Island the European Oyster-catcher (*Haematopus ostralegus*) by its territoriality tended to keep its numbers low through the high mortality rate suffered by immature birds whose territorial boundaries did not permit access to mud-flats for feeding purposes. Information on territory, after hatching, and on care of the young, in Willets, is casual and inconclusive; it is possible that, like the Oyster-catchers, young Willets have a better chance of survival on ecologically superior areas. (Their concentration on mowed areas—see Section X—would, at least in southern New Jersey, suggest such a possibility). If young are *not* confined to the territory, of what value is it to the birds? Since the male defends the female before he defends the territory, it would scarcely seem necessary to develop the territorial urge as a means of sexual defense. Without more data than are now available, I find myself as much at a loss to interpret the territoriality of this shore-bird as have been observers of other species.

VII. Courtship and Copulation

Courtship in a limited sense—that is, as a series of acts directly connected with, and stimulating, copulation—is a simple affair in the Willet, and corresponds remarkably to that of the Redshank (*Totanus totanus*) (Huxley, 1912). The writer is not inclined to include with courtship such phenomena of behavior as sexual defense, territorial defense, and spottying or the ceremonial flight. While these are closely associated with the reproductive cycle, they seem not to be limited to preparation for the sexual act; they apparently bear as close a relationship to nesting and care of the young as to copulation itself. Con-

cerning such courtship as may precede formation of pairs, there are no data.

Courtship, then, appears to consist of calling and posturing for a brief period. In only one instance, out of many observed, did there seem to be any possibility that the female initiated courtship; in this case, she walked rapidly toward the male as he flew into the territory. In all other observations the male initiated the courtship, usually by walking slowly toward the female. He would then begin to utter the deliberate *dik-dik,* which became more rapid and reedy until it developed into the clicking, described above. As the male walked toward the female he depressed the closed tail (without tilting it) and as the speed of the *diks* increased he raised his wings over his back and began to wave them through a narrow arc. The rate of waving increased until it could be accurately called only a vibration; of course the female could plainly see the flickering, flame-like wing-tips. Selous (1927) reports the fluttering of wings above the male Redshank's back, antecedent to copulation. The Northern Phalaropes indulge in similar behavior (Tinbergen, 1935) as, Dr. Francis Harper tells me, does the Lesser Yellow-legs (*Totanus flavipes*).

In the majority of cases, the response of the female Willet to the clicking and wing-waving was simply to walk away a short distance. In all such cases observed, this gave the quietus to the male's invitation. He immediately closed his wings, and usually continued to feed—the principal occupation of the Willets.

When, however, the female was sexually responsive, she would stand rigid as the male approached, then slowly incline her body forward. When her tail had been tilted above the horizontal, the male would flutter lightly to her back and to the sound of his clicking the act would be completed.

As he approached, in at least one instance where the female was receptive, she *diked* with him, and during the act uttered a grunting *eh-eh* note. At other times the female's bill was seen to move though it was impossible to determine whether or not she was calling.

The copulation was usually terminated by the female tossing the male lightly over her head—apparently, at times, much to his disgust.

On one such occasion the male rushed her with a threatening bill; on another he attempted to avoid the tossing by grabbing her neck in his bill; and the third time he was observed to give expression to his unreadiness to cease copulation he held her neck, just behind the head, and when she tossed him over her head he tumbled her with him.

In most instances, copulation was followed by quiet feeding, the birds side by side on the territory.

Copulation was observed—though it was extremely rare—as late as June 11, 1936. This year Mr. Richard H. Pough reported that he witnessed one copulation that took place in the water of one of the salt marsh ponds; the female extended her neck and body along the water, apparently after the manner of the European Avocet (Makkink, 1936). At no time was an incomplete copulation, such as is reported for other shore-birds, observed; it seemed that when the impulse in the female was too low in intensity (Howard, 1929) she terminated the attempt by merely walking away.

The writer was first impelled to study the Willet through curiosity as to the biological significance of the Willet's striking wing-pattern, which is invisible when the bird is at rest, and most striking when it is in flight (Fig. 1). Here, it seemed, was a clear-cut problem. It is likely that a solution can be found only by experimental methods, in the field and in the laboratory; eventually it would seem desirable to isolate the factor of wing-pattern in relation to behavior, by staining or otherwise destroying it; and possibly to eliminate calls by destruction of membranes of the syrinx. But to do this requires more effective trapping methods than now exist. One can, however, surmise what the results of such experimentation would be.

The vibrating of the Willet's wing seems clearly to satisfy Lorenz' (1935) requirement of "improbability" as a criterion of a releaser impinging upon innate perceptory patterns; through long familiarity with the bird on migration, and through more than 200 hours' observation in the courtship, nest-hunting, and incubation phases of the breeding cycle, the vibration was noted by the writer only in association with spottying and copulation. In the former case, of course, the wings are held horizontal, and in the latter they approach the

vertical. While the physical equipment—and frequently, in spottying, the behavior—are shared by both sexes, in courtship the supposed "releasing action" of vibrating wings seems as purely masculine as is the penis in the Rhea (*Rhea americana*), and is probably comparable with copulatory organs (Huxley, 1921).

Willets fall more nearly in Lorenz' *Chromide* type than in the lizard or labyrinthine fish types in their sexual relations. Yet, except for male displeasure at the termination of copulation, never, in my experience, did "the threatening behavior and the display of these animals reveal themselves" (Lorenz, 1935). They certainly indulge in mutual display, but in this I could see nothing of antagonism, and I cannot help seriously questioning the validity of applying such Keyserling-like concepts of sexual antagonism to birds. In some species they may be justified; in the Willets, in which an equilibrium between the sexes appears to obtain, there seems no reason for establishing a "ranking order of the individual mates," and I could see no evidence such an order existed.

The possibility that the "sudden transformation of a grayish-brown bird into one predominantly black and white at the moment of taking to wing" (the words of Lorenz, 1937, but a perfect description of the Willet) "most probably is essential for the following or flocking together reaction of the fellow-member of the species," must not be overlooked. The visual cue here, however, is probably that of pattern, whereas in the ceremonial flight and courtship the visual cue is pattern plus wing-vibration.

VIII. Nesting and Nest Relief

It was impossible (vacations being limited) for the writer to remain in the field long enough in 1937 to witness actual nest construction, and determine incubation periods, or in 1936 to witness the emergence of young. The incubation period is given by Tomkins (1938) as twenty-one or twenty-two days. Obvious scraping or nest-site hunting (differentiation was impossible) was observed in 1937, however; thirteen nests were discovered in 1936, with eggs in all seen, from May 23 on; and the striking nest-relief ceremony was several times observed at close range.

Nest-site hunting (or scraping?) was observed on the first day of observations in 1937 (May 1).

9:25 A.M.—With loud *pill-will-willeting,* two birds come from the east and drop west of blind. There is some *dik-ing,* and the *yoicker-yoick* note . . . . Both tend to depress tail, displaying to one another. One pokes around clumps and even pokes in under them as though nest hunting. Then they fly up—or, rather, one does, and gives Spotty performance—and other bird flies up below it . . . . They come down together west of blind and are joined by a third bird that seems to drive them up. All fly to the bay's edge and disappear.

On the following day, these observations were made on the west pair.

9:36 A.M.—Number 2 (presumably the male) begins to sidle toward number 1 (presumably the female)—tail somewhat depressed. Goes into *patens* clump and bends over—feeding or nidification preparation—and suddenly backs away as though scared. Walks around clump, watching it, past number 1. Walking rapidly and apparently aimlessly about marsh . . . .

9:43 A.M.—Number 2 settles down in clump with movements that suggest nidification. No. 1 flies near. Slowly walks toward No. 2, who is sitting down and saying *yoicker-yoick.* No. 1 walks into clump and *appears* to walk over No. 2—as in nest relief. Walks out to east. No. 2 soon follows, and flies east, out of sight, followed at some distance by No. 1.

May 3, 1937, 12:55 P.M.—The male, judging by size, led hunt for nest and after passing through several *patens* clumps stopped at one until the female came up to him, whereupon he bounced out as though he had been stuck with a pin. Female stayed a little while, seemed to settle down, then came out. Male went on, skirting edge of several clumps, as though continuing to hunt. Then both perched on flotsam.

Two days later I noted, of the west male, that it seemed he could "scarcely go near a tuft of grass without exploring its possibilities. I'd guess he is much more concerned with a nest site than she." Whether or not this resulted from unequal development of the sexual cycle in these two birds, or is usual behavior, as Lorenz (1935) implies in the case of *Anatidae,* I did not determine.

Seven minutes later (9:45 A.M.) I wrote: Seems to be a good hunch. Male starts back toward female, walking rather rapidly, comes to *patens* tuft that has not been cut, sticks in his head, settles down, turns around with tail high, as though shaping nest, tries several positions, comes out on south side, shakes himself, and begins to feed nearby . . . . Meanwhile, female is feeding again.

FIG. 3. *An incubating Willet.*

FIG. 4. *The "white male" topples the mounted Willet. The wings are spread merely because the bird has just fluttered from the back of the falling mount; they were not displayed during the attack.*

Since, four days later, there is no sign of nesting at this site, and since the birds have meanwhile been investigating other clumps of grass, the above performance would seem to be nothing more conclusive than the scrape ceremony that is so generally indulged in by *Laro-Limicolines*. In 1936 the nest was built, and scraping-site hunting had been concluded, before my arrival. In 1937 I was forced to leave before the actual nest site had been determined. Therefore, the interpretation of this behavior must await further investigation. It seems noteworthy, however, that the sexual tail-display (Section III) is common both to scraping and pre-copulatory behavior; that this scraping took place on the same days as copulation; and that I regarded an exchange of places in the scrape as closely resembling nest-relief. That is, the female appeared to walk onto the back of the male, which darted out from beneath her. I regarded the observation as tentative, however, because of the distance of the birds from me.

The wide variety of nest sites utilized by the Willet is described in Bent (1929). Most of the nests seen by the writer were in dense *Spartina patens* near the ecotone at which this grass met *Spartina alterniflora* or *Typha angustifolia*. Though the observer stood directly over the nest, it was usually invisible because of the thick canopy of grass. The birds lay close—sometimes striking the observer's leg as they flushed—but never permitting the close approach said, by Alexander Sprunt, Jr., and Roger Tory Peterson, and by Tomkins (1938), to be characteristic of southern coastal birds nesting in exposed situations. It may be that the greater readiness of the New Jersey birds to flush is correlated with the efficient cover that so thoroughly conceals their eggs.

Incubation is by both sexes, and I was unable to determine that there is any regular on-and-off periodicity. This is also true of the Oyster-catcher (Dircksen, 1932). Some nights the male incubated, during others the female; birds flushed, at night, from the territory were probably the non-incubating owners. Identification was, of course, impossible in the darkness.

The nest-relief ceremony is an interesting performance that is far more beautiful, watched within a few yards, than my field notes indicate. The role of the sexes seemed to be identical.

June 9, 1936, 9:14 A.M.—Female flies over the nest from the east and drops at usual post (= lookout) at bay. Preens vigorously.

9:27 A.M.—Female comes sneaking along through grass, looking very small. I believe she has walked all the way (at least 100 yards). She nervously walks past north side of nest, pushes through grass on east, then comes into open between blind and nest. She walks up to it and seems to bend her body slightly forward, also bending legs so as to drop body lower. Male gives soft *yoicker-yoick* notes. Female answers with soft, then loud, *pill-will-willet* and male flies off. Female pushes onto nest with back to blind.

June 10, 1936, 12:56 P.M.—Female flies to west lookout. Walks from there, feeding at first, as she goes to nest, which she does not reach until 1:41. She is extremely cautious and after walking just east of nest, climbed out of furrow through which she had sneaked, and watched for a long time. Finally pushed through grass and walked along another furrow to south side of nest—that toward blind. When within four feet, one of the birds—I think the female—gave throaty *dik*. As she approached, both obviously made this sound. Male did not offer to leave nest. Female bent body forward, *diked* two or three times, then gave *pill-will-willet* twice. Walked onto nest, on top of male, who suddenly pushed out from beneath her and flew south. When couple of hundred feet away, gave *pill-will-willet* call.

When the blind was first put near this nest, it obviously made the birds extremely nervous and it seems likely that the method of leaving the nest, at relief, described for June 9, was abnormal in that the incubating bird departed so readily. Subsequent observations indicate that the second description given is more nearly normal and that the incubating bird leaves at the touch of the reliever's breast—not merely at the call. Lorenz (1935) states, without giving examples, that "all birds avoid dorsal contact as much as possible."

The birds were frequently away from the nest at the same time. Indeed, they usually abandoned the territory in the early morning, to resort to the edge of Delaware Bay, where they fed and bathed.

Behavior on the nest was not, so far as I could tell, noteworthy. Sometimes the incubating bird faced one way, sometimes another. While on the nest, the incubating birds at times gave the impression of being bored. They would poke their bills about in the grass, sometimes catching insects, and sometimes apparently getting nothing. Occasionally they would tug at grass-blades, as though to initiate play. They would also fidget with their eggs. Boredom is an admittedly questionable interpretation to place upon such behavior, but it resembled closely

similar behavior on the part of an incubating Marsh Hawk that not only seemed to the writer to be clearly bored, but that played with bits of dried grass by tossing them about. If this was not boredom, and play-relief, what was it?

IX. Social Behavior

One of the most interesting aspects of Willet behavior is its marked socialized character. Many species of Gulls and Terns—in the manner of passerines heckling an Owl—will mob an enemy, diving at it, spraying it with excrement, and even attacking. Some of the shore-birds (Bent and others), will repel invaders in much the same way.

The Willet, whose territorial intolerance has already been described, disregards all territorial boundaries when repulse of an enemy is involved. Dogs running through the nesting grounds, a common sight at Fortescue, are followed by a motley mob of screaming, darting Willets that join the group from long distances. This, then, would seem to be normal behavior for many species of this interesting family. One needs to see nothing more than the hasty retreat beat by Crows to surmise its effectiveness, for Willets.

But Willets go one step beyond most other members of their order. They form screaming mobs, repeat the frantic Tern note, gather in knots, and vaingloriously rise and fall (exactly as above a predator)—when no enemy exists to draw their fire. This is the more remarkable since, as Mr. J. J. Hickey reminds me, the birds are often solitary, on migration, or nearly so. Although one cannot be certain, when the Willets are at a distance, that there is no enemy, I have repeatedy witnessed this apparently pointless mobbing within a few yards of the blind—when I was sure no enemy was present. What set off this hysterical behavior, I could not even surmise.

This type of mobbing cannot, so far as I can tell, be differentiated from anti-predator mobbing, except that the predator draws the flock along with him, and the pointless mobbing ends with the birds casually dispersing, or dropping briefly to the ground in a loose flock. This up-flying seems to express none of the fear ascribed to Black-headed Gulls (*Larus ridibundus*) by Kirkman (1937) in his

discussion of their flocking. In the case of the Willets, the governing emotion is clearly excitement, with, perhaps, an infusion of anger.

The power of Willets, mobbing and Terning, to attract other Willets is very great. The mob excitement is pervasive and one observation indicated that a bird was drawn from its nest to join the mob—though usually incubating birds showed a complete disregard of the uproar. Non-incubating birds seem rarely, if ever, to ignore it.

Tinbergen (1931) has pointed out that, in the case of Common Terns (*Sterna h. hirundo*), there is no such sharp difference between social and individual life as Eliot Howard claims. Their social life does not suddenly develop into sexual life, as in the case of Howard's Buntings (1920), but during a certain length of time now one and now the other predominates. In the Willet, so far as my observations are concerned, the difference is even more marked. Here the sexual phase is characterized by much more obviously social behavior than are the pre- and post-breeding phases, and the social behavior—evoked in many territorial birds by the presence of enemies—*seems not to depend on any extra-specific animal as an agent.* Makkink (1936), recording "collective rising" in Avocets, throughout the breeding season, reaches the conclusion that, "The Avocet is a true social bird in which the inclination to gather never fully dies away." The Willet seems not to be a particularly social bird, but its gregariousness certainly increases during the breeding season.

Whether or not this apparently pointless behavior is a formalized version of opposition to predators, as Selous might have suggested, its utility is obvious; it unquestionably tends to unite the birds into the semblance of a colony, despite their fierce territoriality. Whether or not their united front is actually needed for defense, the unfailing effectiveness of the mobbing and Terning tends to keep the birds from scattering, and makes them constantly available for action.

It is significant—though scarcely unexpected—that the mobbing increased in frequency and intensity as the breeding season progressed. From a rare occurrence in early May, when the birds apparently did not yet have eggs, it became, after eggs had been laid, so commonplace I neglected to note instances, and thus lost an opportunity to study accurately its growth.

The power of mobbing birds assemble coöperators, gives striking support to Lorenz' (1935) generalization that: "Certain social-attack reactions of various birds are as compelling as the release of the reaction inducing the animal to join in the take-off" (a reaction, by the way, whose force this distinguished biologist seems to exaggerate). While I have never watched the mob emotion with sufficient care, as has Lorenz, to observe that its strength was proportional to the size of the mob, there seems no doubt that the social-attack reactions are among the strongest felt by Willets. Lorenz further postulates, concerning these reactions, "Perhaps they represent instinctive acts which are least depndent upon the physiological condition of the bird at the moment." How he discriminates, in wild birds, between physiological and psychological conditions, he does not say; without attempting to do this in the Willet, the writer should emphasize the increase in frequency of mobbing as the breeding season progressed.

X. Ecology and Conservation

Though no attempt was made, in the limited time available, to make an ecological study, certain interesting observations concerning distribution of the birds, feeding, and predation, were made.

Nowhere, on southern New Jersey's vast marshes, were the Willets found in greater abundance than about the village of Fortescue, with its swarming populations of dogs and cats. How effective these predators may be in restricting Willet numbers can only be surmised, but it was obvious that their presence makes life hectic for the birds, which are constantly being sent into an uproar by the mammals. The concentration of the birds within range of these beasts would seem inexplicable were it not for the fact that in the area where cats and dogs are most numerous, salt hay (*Spartina patens*) is annually cut. The birds, probing in the earth for much of their food, concentrate on the mowed areas and jealously guard such places against territorial invaders. That baymen burn over the marshes, thus destroying the matted grass cover, as a means of improving shore-bird shooting is well known. The birds concentrate on the stubble. The only place where I observed a Willet population comparable to that on mowed areas was at Egg Island, N. J., where wintering Brant, in the absence of eel-grass (*Zostera marina*), and Greater Snow Geese, function as

effectively, from the viewpoint of Willet ecology, in cropping the grasses, as does the modern mowing machine. It seems certain that the easier feeding provided by mowed areas creates a favorable environment for the birds; it may well be a factor of major importance in maintaining their numbers at a sufficiently high point to offset destruction of favorable environment elsewhere.

During my observations, by far the greater part of the birds' food was taken on the territory. Although they resorted frequently to the bay-shore, or to inland areas, much of their time was spent probing among the grass roots. When the water in the marsh ponds was at a favorable height, these areas were frequently visited. Some food was picked off the grass blades. Surface water on the marsh was much sought for feeding and drinking. The food resources in such areas have been studied by Cottam and Bourn (Vogt, 1937) and Nicol (1935).

Off-territory feeding, like other activities, was noticeably affected by the wind. May gales piled a real surf against the bay shore, and on such days the birds flew far inland, on the marsh, presumably to bathe, eat and drink along the marsh creeks. On windless days the birds rarely flew back on the marsh, except to join in mobbing; their extra-territorial activities were concentrated along the beach. High winds were obviously distasteful to the birds and put an end to most activities. No correlation of extra-territoriality with rise and fall of tides was observed, though something similar to this has been noted by others (Bent, 1927, 1929, Makkink, 1936, etc.).

No evidence was secured that any other species was a serious competitor of the Willets though a male Meadowlark that had just defended its territory against another Meadowlark rushed the west female and drove her a few yards by sheer bluff.

Though little direct evidence on the problem of predation was secured, the following predatory species were observed on the Willets' nesting grounds: domestic dog and cat; American and Fish Crow; Marsh Hawk; Black Snake (*Zamenis constrictor* L.) and Snapping Turtle (*Chelydra serpentina* L.). Of these, the domestic animals and

the two Crows drew most attacks from the Willets; the other three animals, so far as my observations went, were ignored. Of cours, it is entirely likely that after the hatching of the young the reactions toward predators changed.

Whatever the role of Red-wings and Sparrows may have been as competitors, it is clear that they served the Willets well as buffer-species. Their eggs and young were frequently observed in the possession of Crows, and the Red-wings, especially, were valiant allies in driving off the Corvids.

One Willet nest was known to have been destroyed by a farmer's plough, but there was no evidence of deliberate molestation of the birds by man. While the residents of Fortescue saw no sense in spending so much time with the birds (and therefore concluded it must be a governmental activity!) they apparently enjoyed seeing them about the village and probably would discourage deliberate molestation.

Whatever the role of the respective predators in the areas under observation, they are not disproportionately lethal. Willets abound on the marshes and, for a number of years at least, are said to be increasing. Mowing of salt hay undoubtedly creates more favorable conditions for the birds, and it would undoubtedly be good "management" practice to remove the stakes and poles that sparsely stud the marsh. Only once was one of these observed in use by a Willet, and Crows used them daily as they watched for nests.

One dire threat hangs over the birds—the New Jersey Mosquito Extermination Commission and the C.C.C., in this region wild-life enemy number one. The extent to which the birds depend on marshes for nesting cover and food has been indicated. Ditching of the marsh for mosquito control profoundly changes the vegetation, as can now be seen just north of Fortescue, and wipes out a high percentage of animal food (Vogt, 1937). It seems, therefore, probable that if the so-called "mosquito controllers" slash the surface of the marsh with their ditches, the high density of Willets, built up under favorable conditions, will be sharply reduced. It is even conceivable that this beautiful and interesting species may be exterminated in the area.

XI. SUMMARY

1. Observations on the breeding-season behavior and ecology of the Willet, acknowledged not to be exhaustive, are given.

2. Most of the observations were made from blinds; one female was marked and subsequently collected; a mounted bird was used to test reactions.

3. Methods by which the observer sexed the birds—size and behavior, checked against the marked bird and against copulatory positions—are described.

4. Ten distinct notes—male copulation, female copulation, compulsion, contact, Tern, and territorial, plus four whose meaning has not yet been delimited—are described.

5. The ceremonial flight, fight postures, and tail displays are described.

6. The belief is expressed that the birds are monogamous, and that they are usually paired before claiming territory.

7. The conclusion is advanced that Willets are able to recognize the sex of other Willets without resorting to trial-and-error methods.

8. The female appears to be defended by the male before he defends territory. At a later date the territory is vigorously defended, by the male, both against other males and the mounted bird. Photograph is shown (Fig. 2).

9. Courtship and copulation are described and the possible role of the flickering wings as a releaser (Lorenz, 1935) discussed.

10. Both sexes participate in nest-site hunting and incubation; no on-and-off incubation rhythm was perceptible. The nest-relief ceremony is described.

11. Typical Charadriiforme mobbing of predators is extended, in the Willet, to mobbing flights that are virtually identical—except that they are indulged in in the absence of predators.

12. Willet populations are noted as denser on marshes that have been cropped by man or Geese, and observations are given on feeding

and predators. Dangers to the birds, inherent in the mosquito-control work, are pointed out.

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Black-Crowned Night Heron Colonies On Long Island

By Robert P. Allen

Introductory

There is obvious value and interest in accurate information on the breeding distribution of the birds of any given locality. Data of this nature on colonial nesting species are more readily obtainable than for solitary nesters and may be assembled in advance of more complicated distributional material. Information on the breeding localities of the Black-crowned Night Heron (*Nycticorax n. hoactli*) in the New York City region has never been brought together and analyzed. The present paper treats localities occupied during recent years on Long Island. In New Jersey the mapping of heronries is in progress; data for the Hudson River valley are still incomplete.

At the present time there are three species of herons breeding on Long Island, the Black-crowned Night Heron, the Yellow-crowned Night Heron (*Nyctanassa violacea*) and the Eastern Green Heron (*Butorides v. virescens*). The last named may occupy nest sites within the breeding areas of the Black-crown and, in addition, may nest in isolated locations. No attempt has been made to map the breeding distribution of the Green Heron, although its occurrence in Black-crown heronries is indicated. The Yellow-crown is known as a nester in but one location on Long Island, and as it appears to have first nested on the Island in 1937, no study has been made as yet of the local habits of these particular pairs. Therefore, this paper will confine its discussion to the breeding distribution of the Black-crowned Night Heron in this area.

Griscom (1923) wrote as follows of the Black-crowned Night Heron:

> Long Island. Common summer resident, rare in winter. No large rookeries now known. In fact the nesting of the Night Heron is something of a mystery. The few small nesting colonies located do not account for the multitudes in every marsh on the Island.

This lack of information on the breeding of a common summer resident on such well-worked ground as Long Island creates an additional incentive for a census in this region.

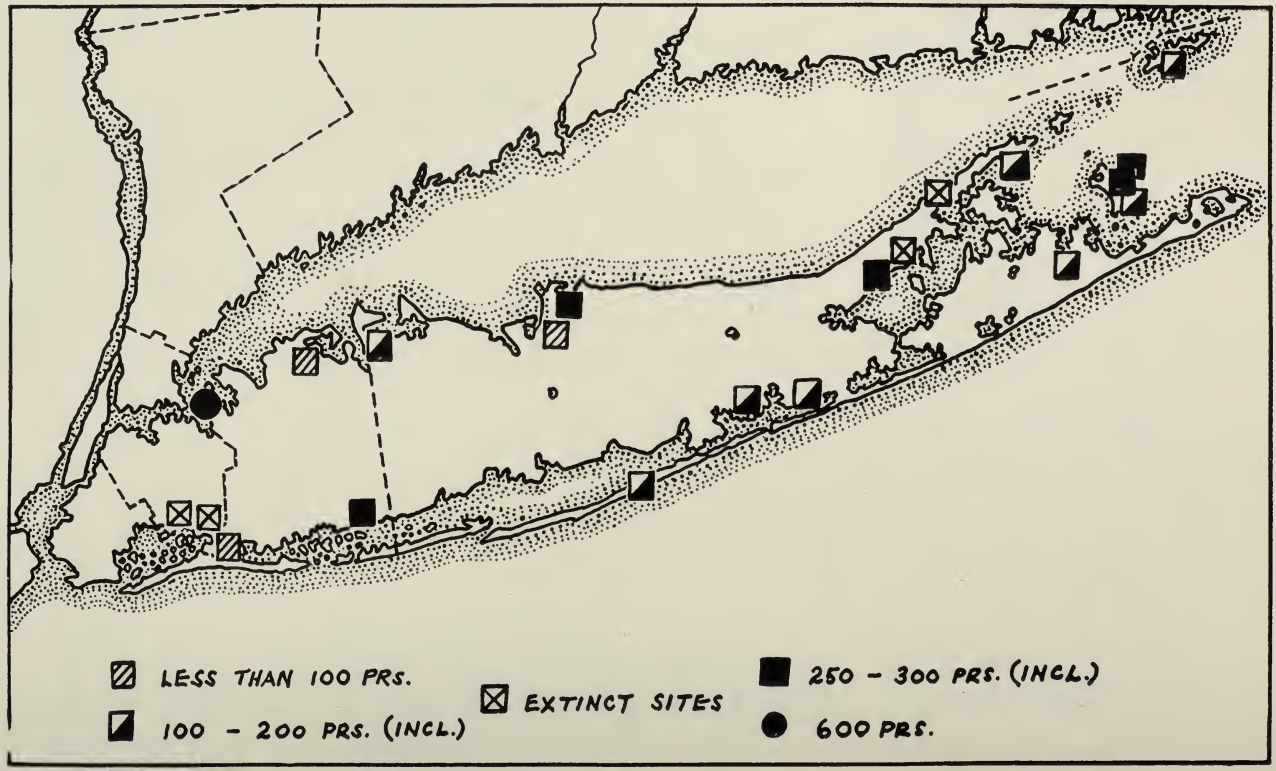
Further reasons for the census may be termed biological and conservational. Nicholson (1929), who reported on the exhaustive inquiry into the history and distribution of heronries in England and Wales, emphasized the biological importance of "satisfactory data regarding the numbers of animals in relation to space and time," and pointed out that a lack of such information may restrict and even prevent the progress of research. In addition, it has been apparent on Long Island, that many nesting sites have disappeared in recent years and others are currently threatened through one cause or another. An examination of these causes and a survey of the present status of heronries will therefore serve as a definite basis for a conservation program.

Acknowledgement is made of the assistance given by various coöperators, in reply to the original questionnaire mailed early in 1936, and to the correspondence and personal inquiry that has been carried on since. I am especially indebted to Messrs. LeRoy Wilcox, and Roy Latham, and also to Mrs. Marie V. Beals, Bernard P. Brennan, Allan D. Cruickshank, Dr. David E. Harrower, James Lane, Frederick P. Mangels, John Mayer, Dr. E. P. Maynard, Jr., C. K. McKeever, Robert Ralston, Walter Sedwitz, James W. Shapter, John Smigel, and Loring W. Turrell. Furthermore J. T. Nichols aided by giving the scientific names of various fishes reported with local and vernacular appellations. I am further indebted to James O. Stevenson for a critical reading of the manuscript.

Numbers

In 1935 there were twenty heronies on Long Island with a total Black-crown population of approximately 3,500 pairs. During 1936 and 1937 four of these heronries were destroyed and the total population apparently reduced to about 3,000 pairs. The average number of pairs per heronry (1937) is 188.3.

During the winter there may be many as 500 Night Herons in the New York City region (exclusive of New Jersey), and winter roosts have been recorded at eleven locations. The average number of Black-crowns in these winter roosts is 49.5.



MAP 1. *Location and Relative Size of Night Heron Colonies, New York City Region, 1935-1937.*

Known Age of Heronries

Of the twenty heronries on which information was obtained, the age of six is unknown. Records do not go back farther than fifty years in any case, and only four heronries have been known for that length of time. These are the three on Gardiner's Island and the former location near Cutchogue, the last having been occupied until 1936. Interest in these nesting places is of such recent date that the average period they have been known is only 22.2 years.

Nesting Environment

Choice of a suitable environment for nest building appears to lie with equal favor in three distinct habitats: Red Cedar (*Juniperus virginiana*), Swamp Maple (*Acer rubrum*), and mixed hardwood, chiefly oak (*Quercus* sp.). Only one nesting site was recorded in low bushes (*Salix* sp.). The areas in which cedar is the dominant tree growth are generally dry. The Swamp Maple habitat, on the other hand, is frequently wet. Where the trees selected are oak with other hardwoods—maple (*Acer rubrum*), gum (*Nyssa sylvatica*) beech (*Fagus* sp.), hickory (*Carya* sp.)—the ground is more often dry, but exceptions may depend on weather conditions.

The relative proximity of tidal estuaries, brackish and salt marshes, fresh-water ponds, creeks, marshes and other feeding grounds has not yet been studied in detail.

Food Habits

Observations of the food preferences of Black-crowns in fourteen heronries were reported. Fish were included in the diet of all of these birds, and species consumed included top minnows (*Fundulus heteroclitus*), four locations; eels (*Anguilla rostrata*), four locations; small herring (*Clupeidae*), three locations; sunfish (*Lepomis gibbosus*), shiners (*Menidia*), and billfish (*Tylosurus marinus*), one location each.

Mammals were taken by the herons of five colonies; rats (*Rattus* sp.) in one location, and mice (*Microtus p. pennsylvanicus*) in four locations.

Herons of three colonies fed on crabs (*Callinectes sapidus, Uca* sp.), and in one instance each, clams (*Venus mercenaria*) and mussels (*Mytilus edulis*) were taken.

In two locations algae were given to young herons, and in a single instance a Night Heron was observed carrying a Garter Snake (*Thamnophis* sp.) into the colony.

Proximity of Other Species

Green Herons were recorded as nesting in six of the heronries, and doubtless were overlooked in other areas. In two colonies Woodcock (*Philohela minor*) were found nesting, and in two others, the Long-eared Owl (*Asio wilsonianus*).

Other birds of special interest in their relation to the Night Heron were mentioned as occurring (not necessarily nesting) in certain of the heronries. The figure after each name below indicates the number of heronries where the species was particularly noted.

Green Heron (*Butorides v. virescens*)—(8)
Great Blue Heron (*Ardea h. herodias*)—(3)
Yellow-crowned Night Heron (*Nyctanassa violacea*)—(3)
American Egret (*Casmerodius albus egretta*)—(1)
Little Blue Heron (*Florida c. caerulea*)—(1)
Fish Crow (*Corvus ossifragus*)—(2)
Eastern Crow (*Corvus b. brachyrhynchos*)—(2)
Northern Blue Jay (*Cyanocitta c. cristata*)—(2)
Cooper's Hawk (*Accipiter cooperi*)—(2)
Osprey (*Pandion haliaëtus carolinensis*)—(1)

Natural Predators

The following birds and mammals were reported as natural predators, or possible predators, of the nesting Black-crowns:

Fish Crow (*Corvus ossifragus*)
Eastern Crow (*Corvus b. brachyrhynchos*)
Northern Blue Jay (*Cyanocitta c. cristata*)
Cooper's Hawk (*Accipiter cooperi*)
Osprey (*Pandion haliaëtus carolinensis*)
Herring Gull (*Larus argentatus smithsonianus*)
Gray Squirrel (*Sciurus carolinensis*)
Eastern Red Fox (*Vulpes fulva*)
House Cat (introduced) (*Felis domestica*)

Eggs appear to be taken chiefly by crows, and the two species (*ossifragus* and *b. brachyrhynchos*) native to the Island are evidently the Night Herons' most consistent predators. The writer has watched *brachyrhynchos* take Night Heron eggs on several occasions. The operation is very efficient, the contents of an entire clutch of four disappearing in almost as many seconds. Usually the eggs are replaced and the writer has concluded that on Long Island, crow predation is by no means a threat to the nesting success of the Black-crown.

Wilcox and Mayer listed the Fish Crow as a species that takes eggs, and Wilcox also included the Eastern Crow. Latham recorded the taking of young and eggs by crows (sp.). Jays were mentioned by Mayer as taking eggs in the small colonies near Rosedale and Idlewild. Latham reported the Cooper's Hawk taking young from the nest and Ospreys harrying adult Herons, though actual damage by the Osprey is to be questioned.

Mayer reported the destruction of eggs by a Gray Squirrel in one instance only. Latham stated the foxes take young from the ground and from low trees. Sedwitz suggested that house cats may take young, apparently from the ground and from low nests, but has not observed predation from this source.

Herring Gulls and owls may take young birds and the former are frequently observed flying low over nesting colonies when eggs are most numerous. However, no evidence of predation is recorded.

Causes of Desertion and Depletion

There are three general causes for the breaking up or reduction of Long Island heronries: (1) land development, (2) human persecution, (3) natural calamities. Of these, the most serious and, unfortunately, the most frequent cause is land development. This is reported as follows, the figures after each item indicating the number of examples cited:

Cutting (both clearing and lumbering)	4
Drainage	3
Real estate projects	3
Farming operations	1

Human persecution is at present less serious a hazard than the destruction of habitat. Four examples of shooting were given, one of these at a fish hatchery near the heronry. In two instances the cause of reduction in numbers was given as the disturbing effect of human intruders.

Natural causes—severe storms and accumulation of old nests—were held responsible for the reduction of one colony and the desertion of another.

Significant Dates

Replies to the questionnaire indicated the following dates with relation to the Black-crown on Long Island:

Average date of earliest arrival, March 12.
Date of average arrival, March 22.
Average date of first occupied nests, April 17.
Average date of first eggs, April 19.
Average date of first young on the wing, June 25.

Discussion

This report should be regarded as a preliminary one. Although the numbers of nesting birds given represent the most complete information available, one can be certain the data are incomplete. It is equally true that a vast number of other extremely interesting facts are still unknown about our local herons. If, as seems likely, the present Night Heron population is rather precipitously declining, it will be well to determine whether or not this decline is ultimately checked. It is of course not uncommon for a colonial species similar to the Black-crown to show considerable variations in censuses of this type. In reporting somewhat similar counts of Rooks (*Corvus frugilegus*) in the Oxford District, the Nicholsons (1930) listed 101 rookeries as present in 1928. Three years later, 17 had disappeared, 15 additional ones had been recorded (2 of them of considerable age), 36 colonies had increased and 47 diminished (Alexander, 1933).

Careful data are still needed on local numbers of non-breeding birds. Some of these are more or less undetectable in the heronries themselves; others are said to be present in small groups in the parks of New York City: at Inwood and at Pelham Bay Park. Whenever

new colonies are discovered, observers are urged to learn from natives in the locality the approximate time the colony has been in existence and any changes which are known to have taken place in its history.

Summary and Conclusions

Approximately 3,500 pairs of Black-crowned Night Herons nested on Long Island in 1935, while only 3,000 appear to have been present two years later. This reduction amounted to 14.2%. Against this, one may contrast the 3,600 to 4,000 estimated by Nicholson (1929) for the Common Heron (*Ardea cinerea*) in England and Wales. The twenty Long Island colonies ranged from 600 to 4 pairs and averaged 188.3. The 210 English colonies ranged from one to more than 100 birds and averaged sixteen birds per colony. Mention might also be made of the size of colonies of Rooks (*Corvus frugilegus*) which, on the Wirral Peninsula averaged 63.1 nests per rookery, with the highest as 425, and a resultant density of twenty-one nests per square mile [excluding areas of towns] (Marples, 1932). On the Wirral Peninsula, Marples reports a distinct tendency for rookeries, when numerous, to be situated one mile apart, and he suggests that this may be due to the presence of communal "nesting territories" near the rookery. Mitchell (1938), investigating rooks in Denbighshire, did not find this same tendency to space rookeries a mile apart. He suggests that preference for rookery sites may be influenced by proximity to water and by altitude, there being no nests above 600 feet. No suggestion of this is contained in the *British Birds'* census of heronries (Nicholson, 1929), but it should at least add to the interest of mapping the feeding ranges of Black-crowned Night Herons here on Long Island.

The table see pages 52-53 is given as a general summary. It will be noted that sixteen heronries remain on Long Island (1938) and that for the most part the status of all but five of these is either uncertain or unfavorable. Those with some certainty of survival are located in parks or private estates (King's Point Park, Strong's Neck, Gardiners Island). One heronry (West Neck, Huntington) has decreased, although established in a private park.

Chief cause of desertion and depletion of Long Island heronries is land development. Recent losses have been at an average rate of two heronries each year.[1]

1. The East Moriches and Westhampton heronries were deserted in 1938.

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Table I
DATA ON TWENTY LONG ISLAND HERONRIES

Approximate Location	Estimated Number of Breeding Pairs	Known Occupancy	Stability	Habitat	Remarks	Authority
1. Great Neck (King's Point Park)	600	Unknown (1934–Beals)	Slight decrease 1936 to 1937 (Cruickshank)	Chiefly Swamp Maple	In park area with police protection. Status favorable.	Marie V. Beals Allan D. Cruickshank
2. Setauket (Strong's Neck)	300	"many years" (1924–Turrell)	Probably no recent change	Red Cedar	On private estate. Status favorable	Loring W. Turrell LeRoy Wilcox
3. Mattituck	300	Twenty years	May have increased recently due to influx of birds from deserted heronry near-by	Red Cedar and oak in dry woods near creek	Status uncertain	Roy Latham LeRoy Wilcox
4. Gardiner's Island (a)	300	Fifty years	No recent change	Ancient Swamp Maple	On private estate. Status favorable	Roy Latham
5. Massapequa (Nassau Shores)	300	Since 1934 (Previously ½ mile west)	Decrease from 1937 to 1938 by approximately 100 pairs	Chiefly Red Cedar, also Wild Cherry, honeysuckle, Catbriar, Poison Ivy. Dry woods surrounded by ditched marsh (brackish)	On property owned by real estate company. Status insecure. Greatly disturbed by general public	F. P. Mangels R. P. Allen
6. Cutchogue	(300)	Fifty years (to 1936)	Destroyed by cutting (1936)	Oak and hickory	Extinct (1936)	Roy Latham
7. Gardiner's Island (b)	250	Fifty years	No recent change	Swampy area in low bushes 2-3 ft. above water	On private estate. Status favorable	Roy Latham
8. Orient	200	Twenty-five years	Has shown decrease due to cutting	Red Cedar, pine and oak	Colony has moved 6 times in 25 years. Started with 3 pairs in 1913 and reached 250 pairs by 1918	Roy Latham LeRoy Wilcox

Approximate Location	Estimated Number of Breeding Pairs	Known Occupancy	Stability	Habitat	Remarks	Authority
9. Gardiner's Island (c)	200	Fifty years	No recent change	Swamp maple	On private estate. Status favorable	Roy Latham
10. Southold (Mill Creek)	(200)	Fifty years	Destroyed 1937 by cutting	Gum, maple and oak in dry woods	Extinct (1937)	Roy Latham
11. Westhampton	150	6 years, previously one mile west	1932: 1-2 pairs 1934: 25 pairs 1935: 150 pairs	Red cedar, Swamp Maple and oak	Season 1936-37 colony "shot out" by nearby land owners. Approximately 5 pairs, raised young	LeRoy Wilcox
12. Huntington (West Neck)	100	Unknown	Apparent decrease in 1938	Dry hardwoods	On private estate. Status should be favorable	C. K. McKeever
13. East Moriches	100	4-5 years	No change in last two years or so		Formed by herons from deserted Speonk colony (?). Also, possibly from colony at Westhampton	LeRoy Wilcox
14. Patchogue	100				On outer strip of ocean beach. Not visited	LeRoy Wilcox
15. Easthampton	100				Reported by local game warden. Not visited	LeRoy Wilcox
16. Rosedale	(15)	3 years	Destroyed 1936 by cutting and drainage	Swamp Maple and oak	Extinct (1936)	John Mayer
17. Idlewild	(5)	8 years			Extinct (1936)	John Mayer
18. Woodmere Area	5 +	17 years	May shift locally	Oak, beech and gum	Residential area. Status uncertain	Dr. David E. Harrower Theo. Pettit
19. Mill Neck	4	5 years		Oak	Status not known	Walter Sedwitz
20. Stony Brook	4				Status not known	Gilbert Raynor (Wilcox)

General Notes

Birds on an Atlantic Crossing.—It is amazing how little exact knowledge on the distribution of the pelagic birds of the North Atlantic was available until very recently. The paper by Wynne-Edwards: On the habits and distribution of birds on the North Atlantic (*Proc. Bost. Soc. Nat. Hist.*, 40, No. 4, pp. 233-346, 1935) is the most notable publication on the subject and has provided a solid basis for all further work. Still, there are a great many gaps to be filled and it seems worthwhile to publish the following material.

My westward crossing to New York, July 28-August 5, was my ninth Atlantic crossing, but the first one favorable to the study of sea-birds. All but one of my previous crossings had been done on fast boats, and it seems impossible to make satisfactory sea-bird observations on steamers which do much more than 20 knots. I might furthermore mention, that the third-class decks near the bow of the boat are by far the most advantageous position for observations, since pelagic birds tend to fly away from the steamer, and furthermore, since the vibration at the rear of the ship makes the use of glasses very difficult.

The "Deutschland" (22,000 tons, speed 19-20 knots) sailed from Hamburg on July 28, 1938, and called at Cobh (Ireland) on the evening of July 30th, after an ornithologically uneventful passage through the Channel and the Irish Sea. Since I was principally interested in pelagic birds, I did not start systematic observations until July 31, when we had left Ireland well behind. I might say that no birds followed in the wake of the liner during the whole trip (except in coastal waters).

July 31.—(Noon position: 51° 03′ N., 17° 13′ W.) Clear, slight winds. 9:00-10:00 A.M., several Greater Shearwaters, at about 51° 10′ N., and 15° 50′ W.; 3:00-3:30 P.M., 4 Fulmars; 7:45 P.M.-8:10 P.M., 1 Fulmar, 6 Greater Shearwaters, 5 Arctic Terns.

August 1.—(Noon position: 49° 32′ N., 29° 34′ W.) Clear, absolutely calm. At 7:45 A.M., a flock of at least 30 Greater Shearwaters with a school of Porpoises (Blackfish) at about 49° 44′ N.,

27° 30′ W.; between 8:20 A.M. and 8:55 A.M., 28 Greater Shearwaters, 2 Cory's Shearwaters, 6 Fulmars, 2 Skuas flying high in the far distance; 9:10 A.M.-9:45 A.M., about 42 Greater Shearwaters, 6 Cory's Shearwaters, 2 Fulmars, flock of 7 Jaegers; 11:00 A.M.-11:30 A.M., 9 Greater Shearwaters, 1 Cory's; 2:00 P.M.-3:00 P.M., 83 Greater Shearwaters (75 in one flock), 2 Cory's, 2 Fulmars; 4:00 P.M.-5:15 P.M., 49 Greater Shearwaters, 9 Cory's, 2 shore-birds; 6:50 P.M.-7:30 P.M., 11 Greater Shearwaters, 2 Cory's.

August 2.—(Noon position: 46° 28′ N., 40° 52′ W.) Clear, very light wind. 8:30-9:30 A.M., not a single sea-bird seen; 11-45-12:00, no sea-birds seen; 2:00-3:00 P.M., 22 Leach's Petrels, 1 Skua; 5:15-6:00 P.M., 3 Leach's Petrels; 7:15-8:00 P.M., 10 Leach's Petrels. Not one Shearwater all day.

August 3.—(Noon position: 43° 04′ N., 51° 25′ W.) Heavy fog with warm south wind; visibility at times very bad. 7:30-8:00 A.M., 4 Greater Shearwaters, Leach's Petrels not visible in fog; 8:30-9:30 A.M., 2 Leach's Petrels, 3 Greater Shearwaters; 9:37 A.M., 1 shore-bird (? Phalarope); 1:00-2:15 P.M., 24 Leach's Petrels; 3:33 P.M., 1 Tree Swallow; 3:39-5:45 P.M., 40 Leach's Petrels, 1 Skua, 3 Cory's Shearwaters (40° 50′ N., 53° 30′ W.), 3 Puffins (?, seen against the light, identification quite uncertain); 7:30-8:00 P.M., a few Leach's Petrels, 4 Shearwaters (apparently Cory's, but light poor).

August 4.—(Noon position: 41° 55′ N., 62° 24′ W.) Light southerly winds, visibility fair, occasional fogs. 9:13-10:45 A.M., 16 Leach's Petrels; 2:00-3:00 P.M., 54 Leach's Petrels, 1 Shearwater, 1 Puffin (?).

August 5.—(At noon off Long Island; ship docks at 9:00 P.M.) Heavy fog most of the day. The fog prevented systematic observations. In heavy fog near Fire Island Lightship a large flock of Shearwaters (unidentified); in lower New York Bay numerous Wilson's Petrels.

Discussion of the Species

Greater Shearwater (*Puffinus gravis*): With a little experience this species can be identified at considerable distances. In fact, during the entire trip no bird that was seen in fair light and within reason-

able distance of the ship escaped unidentified. On the calm days, particularly on August 1st, large numbers were sitting on the water, one raft comprising at least 75 birds. No migration movements were observed. Wynne-Edward's statement that "schools of whales or porpoises almost invariably have an attendant flock of Hagdowns" seems exaggerated. Of four such schools observed on this trip, only one was accompanied by Shearwaters. I was interested to see on July 31st a number of birds in the area west of Ireland which was left vacant on Wynne-Edwards' map (p. 254, l. c.).

Sooty Shearwater (*Puffinus griseus*): Not a single individual was seen, which is not surprising, since it was very foggy in the offshore zone where the species is most frequently encountered.

Cory's Shearwater (*Puffinus kuhlii*): I am restricting myself to the points where I disagree with Wynne-Edwards. In additions to the field characters listed by W.-E. (l. c., p. 265, plate 3), I found the yellow bill quite noticeable whenever the birds came closer to the ship. At distances of less than 50 yards, the white tips of the longest upper tail-coverts also became visible, although never forming the conspicuous band of *gravis*. In habits I found quite a bit of difference between the two species. In the calm weather which prevailed during most of my trip, the birds were forced to use their wings extensively, instead of gliding as they do in strong winds. The wing beat of *kuhlii* is considerably slower than the rather labored flapping of *gravis*. In fact, I picked the few *kuhlii* with the naked eye out of the *gravis* flocks and the check-up with glass invariably confirmed the correctness of the identification. In my experience *gravis* also hugs the water more closely than *kuhlii*, and of the birds that went so high that they rose above the horizon, all except one were *kuhlii*. The *kuhlii* also tended to come closer to the steamer. Although they were much in the minority, every Shearwater (and there must have been half a dozen or more) that came closer than 50 yards to the steamer, was a *kuhlii*. Of distributional interest is the fact that I found both species mixed during almost the entire trip. There is probably a larger zone of overlapping than realized by W.-E. (p. 265).

Fulmar (*Fulmarus glacialis glacialis*): This is my first summer crossing of the Atlantic on which I have seen Fulmars. The two de-

grees by which the Ireland route is further north than the usual Channel route, probably accounts for this. The southern limit of distribution at this season is near the 50th parallel, as shown by W.-E. on his map (p. 277). Our boat with its 19½ knots speed was too fast for the Fulmars to follow very far in the wake, particularly in view of the light wind.

Leach's Petrel (*Oceanodroma leucorhoa*): For days, I was trying to separate the Leach's and Wilson's Petrels, but all petrels looked alike; it was not until the last day of the trip that I realized that every single petrel seen by me August 2nd-August 4th was a Leach's Petrel. Wilson's apparently rarely go so far north, an observation also made by W.-E. The number of these birds in certain parts of the ocean is tremendous. On August 3rd and August 4th there were 5-15 petrels per square mile of ocean. I do not believe that these are all non-breeding birds, nor could they have been through with breeding at this early date. But do nesting birds feed so far out in the ocean? Remarkable was the rather sudden appearance of this species in the afternoon of August 2nd, when the vessel was about 500 miles from the nearest land. Since Leach's Petrels are much less conspicuous than Shearwaters, it is certain that many were overlooked. Great care was taken not to count the same bird twice. This was facilitated by the fact that the speed of the boat was just a little faster than that of the birds.

Wilson's Petrel (*Oceanites oceanicus*): None was seen until the outer New York Bay was reached where the species was quite numerous.

Phalaropes: On two occasions shore-birds were seen on the high seas, in both cases probably Phalaropes, although poor light prevented a real identification. At 49° 00′ N., 31° 35′ W., two birds were observed (one of the few mid-Atlantic records), and at 43° 30′ N., 50° 20′ W., a single bird. No big clouds of Phalaropes were observed, as I have encountered them on other trips.

Jaegers: A flock of seven birds, flying fairly high, was seen at 49° 41′ N., 28° 20′ W. Although the birds were too far for specific

identification, I am fairly certain that they did not have a very long tail. They probably were Parasitic Jaegers (*Stercorarius parasiticus*).

Skua (*Catharacta skua*): On August 1st, two were seen at 49° 47′ N., 27° 34′ W., another single on August 2nd, at 46° 08′ N., 42° 05′ W. In both cases they were not associated with other birds.

Arctic Tern (*Sterna paradisaea*): A flock of five birds was seen on July 31st, at about 50° 30′ N., 21° 20′ W. They were flying almost directly southward and may have come from Iceland, which is just north of the point of observation. The fall migration of this species begins about July 25th (Wynne-Edwards, l. c., p. 327).

Tree Swallow (*Iridoprocne bicolor*): A single bird tried to alight on the steamer on August 3rd, at 42° 56′ N., 52° 58′ W., just about south of Cape Race and about 240 miles away from the nearest land.

The steady south wind and the earliness of the season were undoubtedly the reason why more land birds were not observed. In September, particularly after strong west winds, I have encountered American land birds amazingly far out at sea.

Ernst Mayr.

A Probable Eared Grebe on Long Island.—On reaching the strand at Long Beach, Nassau County, Long Island, N. Y., on the morning of January 9th, 1938, my attention was attracted to a very dark-colored grebe actively diving near the shore. Walking towards it, I met my fellow member of the Linnaean Society, Mr. Walter Sedwitz, who had also discovered the bird and was photographing it.

The grebe was about forty feet from the beach, the sun was shining brightly and there was very little surf, so that we could observe the bird carefully through 8X binoculars, and compare it with several Horned Grebes near-by. It was of approximately the same size as a Horned Grebe, but lacked the sharply-contrasting white throat, fore-neck and under parts, and the dark crown, back of the neck and upper parts, of *Colymbus auritus*—the underparts in this individual being a dirty gray color, which gradually merged into the dark coloring above. What particularly impressed us, however, was

the shape of the bird's bill, which was compressed from above downward near its base, producing a profile which, compared with that of a Horned Grebe, was similar (in miniature) to that of a Red-throated Loon (*Gavia stellata*) as compared with a Common Loon's (*Gavia i. immer*). The bird did not behave like an 'oiled' individual, as it was swimming and diving actively and shaking its head nervously from side to side at frequent intervals.

Mr. Sedwitz and I discussed the question of identification for some time and finally decided that the Eared Grebe (*Colymbus nigricollis*) was the most likely possibility. On returning home, the writer consulted various books on European birds and birds of the Pacific Coast of North America and the following day examined skins and mounted specimens of the Eared Grebe in the American Museum of Natural History. He finally concluded that the bird we had observed was, without question, an Eared Grebe (on account of its size and shape of the bill) and, in all probability, an individual of the European race (*C. n. nigricollis*), as in that subspecies there is apparently even less contrast in color between the under and upper parts in the winter plumage than there is in the Eared Grebe of western North America (*C. n. californicus*).

It remains to be stated that, on January 16th, Mr. Sedwitz and I saw (presumably) the same individual in the same locality, and the writer, later in the day, observed the bird in flight—noting white wing-patches, apparently in the secondary feathers. Enlargements of photographs taken by Mr. Sedwitz on January 9th, while not very satisfactory, nevertheless showed the very dark appearance of the bird, and, to a slight extent, the characteristic shape of its bill.

C. n. nigricollis does not nest in northern Europe but has recently extended its range as far west as Ireland. There are winter records from Madeira, the Canary Islands and the Azores.

Inasmuch as the western Eared Grebe has never been observed on the Atlantic Coast of North America, and the European subspecies has never been recorded from any part of the North American continent, Mr. Sedwitz and I feel that our observation is of considerable interest.

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E. R. P. Janvrin, M.D.

A Flight of Red Phalaropes (*Phalaropus fulicarius*) **on Long Island, N. Y.**—On April 28, 1937, Mr. Sven Raven and the writer were rather fortunate in witnessing perhaps the largest flight of these birds to be seen by any bird students on Long Island. No doubt other flights just as large or larger have occurred in the past but with no ornithologists present to witness them. Ludlow Griscom (1923) stated that there were a scant twenty records of its occurrence on Long Island.

On the night of April 27 the tail-end of a gale swept the Atlantic seaboard. Winds of 60 mile-an-hour velocity were registered in New York City early on the morning of the 28th. It rained nearly all day on April 27 with strong southeast wind changing to moderate southwest on the morning of the 28th.

We arrived at West Bay Bridge at Westhampton Beach about 8:30 A.M. and immediately saw numbers of Phalaropes flying east and many swimming in the bay. Birds were in the air almost continuously, those arriving from the west alighting in the water, while others in the water were getting up and flying east. It was foggy and visibility was only a few hundred feet. The main flight had already passed, according to Mr. Timothy Robinson who has the boats at the West Bay Bridge for fishing parties. He estimated 2,000 had already passed in the early morning. The big majority were Reds with only a small sprinkling of Northerns (*Lobipes lobatus*) interspersed among them. I estimated that we observed between 300 to 400 Reds after 8:30 A.M. They were in all plumages from full winter to nearly full breeding plumage with all intermediate phases. One was picked up on the bridge, apparently stunned by hitting the wires. They were exceedingly tame and would allow approach to within five or six feet in some instances. Some were swimming almost within

arm's reach of a row boat in which a party was fishing. At 10 A.M. I collected a female in breeding plumage, the length 229 mm., wing 136 mm., tail 65 mm., iris black and weight 49.7 grams. Also collected one male, length 222 mm., wing 129 mm., tail 63 mm., iris black and weight 45.0 grams.

They had two call notes but the common note was *tweep, tweep.* They were eating live jelly-fish (*Cyanea capillata*) in the water as well as dead ones left up on shore by the receding tide. They would swiftly circle several times around the jelly-fish in the water and then proceed to feed upon it. If the jelly-fish was too deep they would be forced to go down half way under water but none were actually seen to dive. They were not in close, compact flocks but were scattered individuals; in fact they did not seem to tolerate others near them and were continually fighting while feeding. If one Phalarope noticed another feeding nearby it would swiftly swim up to the feeding bird, crouching low in the water with bill extended. The aggressor would get hold of the feeding bird and then there would ensue a short tussle until one was driven away. The usual food of this species appears to be *crustacea,* smaller *mollusca* and insects (Witherby, 1920-24), and from a casual examination of the literature I believe that this is the first time *fulicarius* is recorded as feeding on jelly-fish.

As the day advanced they began to thin out more and more and in the afternoon many were sleeping on shore, standing on one foot with bill under wing, while others were sleeping out on the water. None was seen at Moriches Inlet on the morning of April 28, but two were standing in the road just west of Moriches Coast Guard Station. Many species were migrating east all during the morning; some of these noted were 10 Common Tern (*Sterna h. hirundo*), 2 Caspian Tern (*Hydroprogne caspia imperator*), 7 Laughing Gull (*Larus atricilla*), 200 Brant (*Branta bernicla hrota*), and 500 Cormorant (*Phalacrocorax a. auritus*). On the 28th at 11 A. M. a single Red Phalarope was in a fresh water pond at Speonk, one mile north of Moriches Bay, and two were in the creek just south of this pond.

As the birds seemed so tame and were feeding entirely on jelly-fish I thought it would be a good opportunity to attempt trapping some. So after getting together some pieces of wire netting I went back in

the afternoon to try out the trap. The birds were not nearly so numerous but were still feeding on shore. I used one-quarter inch mesh two feet high for the sides and two inch mesh for the top. The trap was about four feet wide and six feet long, with the front left entirely open, The trap was placed on the shore line and about a dozen jelly-fish placed inside. I had my doubts whether they would venture near it but did finally succeed after two hours in trapping four and catching two others with a scoop net. These latter were caught as they were swimming near shore and by crouching down behind grass I quickly reached out with the net and caught them. One capture in the trap was rather unusual in that one Phalarope flying along shore came to the trap, saw jelly-fish inside, alighted on top of the trap and squeezed down through the two inch mesh to the inside of the trap. As they went into the trap I had to run quickly up to it with a scoop net to retrieve them otherwise they would quickly turn around and fly right out. The weights on those banded averaged 44.2 grams and were as follows:

Band No.	36-206510—One-half breeding plumage - - - - -	Weight	43.5	grams
"	"	36-206511— " " " - - - - -	"	43.1	"
"	"	36-206512—Winter plumage - - - - - - - - -	"	43.7	"
"	"	" —Caught again one-half hour later			
"	"	36-206513—Winter plumage	"	43.0	"
"	"	36-206514—Three-fourths breeding plumage - - -	"	45.6	"
"	"	36-206515—Winter plumage - - - - - - - - -	"	38.0	"

After weighing the birds in my car they were released and would just run around on the floor of the car, not attempting to fly up against the windows as most birds would. Mr. Lincoln of the Biological Survey informed me that only about five Red Phalaropes had been banded before. It was quite a thrill handling these handsome little birds, wondering where their journeys would take them.

On April 29 at daylight, about 4:30 A.M., it was slightly foggy with light west wind. There were six Reds at West Bay Bridge, one dead in the beach road near Roger's Beach, one live on ocean beach at Roger's 100 feet from the surf in the drift. It was calling on the ground and when flying, the characteristic *tweep, tweep*. There were six in Quantuck Bay, six in Moriches Bay, one-half mile west of

West Bay Bridge, and four at Moriches Inlet. Also picked up one dead in the road one-half mile east of Moriches Coast Guard Station. This was a female, length 8.75 inches, wing 5.44 inches, tail 2.75 inches, iris black and weight 36.5 grams. I did not observe a single Phalarope on the ocean on either the 27th or 28th.

On April 30 a single Red was seen in a small fresh water pond at Flanders. On May 1 there was a single bird left at West Bay Bridge. Also found two dead there. On May 7 a single bird in winter plumage was in Lake Agawam, a fresh pond at Southampton. This latter bird was apparently the last straggler of the big flight of April in the area which I covered. Smaller numbers were reported from western Long Island: two at Jones Beach on April 25th (Cobb, 1938), nine Reds and seven Northerns at the same place on May 1st (Urner, 1937) and four more Reds there on May 9th (Cobb, 1938). A similarly large flight of Red Phalaropes, during a northeast storm, was observed by Messrs. Urner and Edwards in the Barnegat Region on May 12, 1932 (Urner, 1932).

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LeRoy Wilcox.

Notes on a Captive Kumlien's Gull (*Larus kumlieni*).—In August, 1936, a wretched looking specimen of this disputed species was captured alive at Jones Beach, N. Y., by Messrs. K. Browning, R. A. Herbert, I. Kassoy, J. F. Kuerzi, and the writer. The receded webbing on the bird's left foot and the completely worn-off ends of the primaries suggested that the bird had been unable to fly for some

time. Despite its unprepossessing appearance, the captive was given to the New York Zoölogical Park where, under the capable care of Curator Crandall and Keeper Atkins, it rapidly regained health.

In May, 1938, this bird accidentally and irreparably injured itself and had to be killed. This unfortunate circumstance thus cut short the most interesting part of its sequence of plumages. In summarizing those which I witnessed, it is necessary to point out that these occurred largely under artificial conditions:

(1) First nuptial plumage. When captured this bird possessed a generally dirty white plumage with light brown streakings. The head was streaked slightly more heavily and this gave the bird something of a masked appearance. The tail was barred with brownish. Because the bird may have been in a weakened condition for many months before its capture, it is possible that it failed to molt any feathers during the spring and that its feathers in August, 1936, were those of the first winter plumage.

(2) Second winter plumage. According to Mr. Atkins this was assumed in October, 1936. (I made no notes until November.) The bird's scapulars, interscapulars and wing-coverts now became pearl gray while the secondaries and tertials became grayish with a tinge of brownish. The primaries, which we now saw for the first time, were gray with light outer margins to the webbing (c. f. Forbush, 1925: "first four primaries dark brownish-gray, darkest on outer webs"). The tail became much whiter with a slight barring which graduated to more heavy barring at the end of the tail feathers. The rump was now white, the underparts scarcely changed: grayish with considerable brown mottling. There was no noticeable change on the head. The complete effect was of a bird one-third adult, two-thirds immature.

(3) Second nuptial plumage. According to Dwight (1906) the body plumage is more or less renewed. A study of the bird in May, 1937, revealed no noticeable changes. Fairly complete sketches had been made during the winter and the more prominent feathers of immaturity had been committed to memory.

(4) Third winter plumage. This had been completely assumed when I next saw the bird on November 7, 1937. It was still present on March 19, 1938. The tertials and scapulars now became entirely gray except for white tips to a few feathers. The new primaries were gray and white, being somewhat similar in pattern but darker than those of an adult figured (No. 225) in Dwight's monograph (1926, p. 374). The tail was now entirely white except for some small, obscure mottling on three central tail feathers. The underparts were still a mottled gray and white. The streakings on the head appeared to be slighter but were still darkish around the eye, much as when the bird was discovered at Jones Beach.

There was very little change in the coloration of the soft parts during the period of study. The legs were always pink, the toe nails always black. Detailed notes on the bill were not taken until November, 1936, when the specimen had acquired its second winter plumage. The upper mandible was then a dirty yellow for the two-thirds nearer the base; the other third was a black or brownish black with a tiny spot of yellow at the tip. The lower mandible contained less of the dirty yellow—about one-quarter—which was situated at the base; the other three-quarters, except for a tiny spot at the tip, were black or brownish black. These two dark areas on the mandibles gradually contracted as the bird grew older; after nineteen months, they were still dark and were confined to about one-quarter of the bill.

The molts summarized above indicate that this bird acquired the second winter plumage much as predicted by Dwight (1906). The fact that it failed to assume an adult plumage after the second post nuptial molt is a condition that does not occur "except perhaps in a very few cases" (Dwight, 1906, p. 39).

I have been unable to find any description in the literature of the voice of either Kumlien's Gull or of Iceland Gull (*Larus leucopterus*). The captive bird was generally silent and, being a stranger in a cage of many species, quite naturally seemed to occupy a low position in the peck order of its companions. I heard only two notes: (1) a "cuk-cuk-cuk-cuk" similar to that which I have heard adult Herring Gulls (*Larus argentatus smithsonianus*) give as they flew over while I was in their nesting colony; the *kumlieni* note was slightly

shriller and very difficult to transpose into words; (2) a single-noted, shrill squeal—quite unlike that of any Herring Gull I have so far heard.

The skin of this bird was presented by Mr. L. S. Crandall, curator of birds at the Zoölogical Park, to the American Museum of Natural History where it was sexed as a female and given No. 448,094 in the study collection. Dr. Ernst Mayr has kindly assisted me in identifying various parts of this bird's topography.

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Joseph J. Hickey.

Black Terns Sitting on Telegraph Wires.—In *The Auk,* vol. 55, p. 529, Alexander Sprunt, Jr., records Black Terns (*Chlidonias nigra surinamensis*) sitting on telegraph wires. At Brigantine, N. J., the same behavior was observed by the writer on September 9th and 10th, 1936. The birds gathered at dusk and sat on telegraph wires, occasionally catching insects on the wing. Whether they roosted there all night was undetermined, but they were observed sitting there when it became dark.

O. K. Stephenson, Jr.

Approximate Incubation Period of the Florida Gallinule.—During the course of studies on the breeding bird population of Van Cortlandt Park swamp, New York City, by members of the Sialis Bird Club in 1937, the following numbers of eggs were noted in a

nest of the Florida Gallinule (*Gallinula chloropus cachinnans*): May 29—six eggs; May 31—eight eggs; June 3—eleven; June 10—eleven; June 19—eleven; June 21—ten; June 23—nest empty.

It is evident that this bird laid one egg a day to complete the clutch on June 3rd; and unless the nest was robbed by a predator, it would appear that the period of incubation was between eighteen and twenty days.

Forbush (1925) writes that the incubation period of the Florida Gallinule is "unknown, probably variable and about 22-25 days." The same author (*l.c.*) gives 23-25 days for the Purple Gallinule (*Ionornis martinica*) and adds that the period of the American Coot (*Fulica a. americana*) is "said to be about 27 days." Witherby (1923) writes that the incubation period of the Moor Hen (*Gallinula ch. chloropus*) is "variable; usually 20-22 days but Kelso records 15-17 and once 28 days (last probably abnormal)." The same author gives 21-23 days for the European Coot (*Fulica a. atra*).

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Robert G. Kramer.

Hoarding Behavior of the Red-headed Woodpecker.—In October, 1937, Robert Kramer and the writer watched a Red-headed Woodpecker (*Melanerpes erythrocephalus*) at Pelham Bay Park, New York City, carrying acorns from a Black Oak (*Quercus velutina*) into an American Elm (*Ulmus americana*). A visit in November revealed 91 acorns, all without their cups, stored in crevices in the bark of elms and oaks, as well as in natural holes of near-by telephone poles. In December most of these acorns were found pierced and empty.

Bailey (1878) records this species as storing over 100 grasshoppers (*Orthoptera*) in a large crack in a fence and later eating them. Merriam (1878) says that the occurrence of the Red-headed Woodpecker in upper New York in winter depends upon the beech nut crop, enough of which may stay on the trees to form an ample food supply. This woodpecker, as Forbush (1927) points out, appears to partake of the food most readily accessible. It is known to

be a tyrant, attacking squirrels in particular. In some of these cases it may be that the birds are defending a stored cache of food against other nut-eating animals. The fact that this species eats whatever it stores seems to support the hypothesis of a "food territory" rather than a general dislike of squirrels as the basic cause of such attacking behavior.

Because so many writers, like the Lacks (1933), have deprecated the significance of food in relation to territory as Howard conceived it in 1920, more careful field observations of Red-headed Woodpeckers in the future may create an additional classification of territory which was not set forth by Mayr (1935). The writer would be interested in communicating with any ornithologists who possess actual observations of these birds returning to their caches or any other additional information on this interesting subject.

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O. K. Stephenson, Jr.

A Long Island Bird Roost.—In the last two winters during my daily travels about Nassau and Suffolk Counties, Long Island, N. Y., I became increasingly conscious of a large Starling (*Sturnus v. vulgaris*) and Blackbird (*Icteridae*) roost somewhere on Long Island. Each morning and evening, no matter where I happened to be between Lynbrook and Center Moriches, points approximately fifty miles apart, I could see groups of Starlings and occasionally scattered Blackbirds heading towards what appeared to be one common goal.

On the afternoon of February 14, 1938, Mr. and Mrs. R. P. Allen, J. J. Hickey, my wife and I set out to locate this roost. We eventually located the chosen spot in some *phragmites* beds of the Heckscher

State Park. Not only were immense numbers of Starlings coming into this area but also thousands of Blackbirds of several species which are seldom reported in winter by the numerous field observers in this region. Subsequent observations led me to estimate that during February there were approximately 150,000 Starlings and over 15,000 mixed Blackbirds, chiefly Grackles (*Quiscalus quiscula* subsp.), using this roost every night. I have been unable to determine where all these Blackbirds are in the daytime. Careful checking with a score of active field observers on Long Island shows that they consider it a lucky day to see even a small flock of Grackles in Nassau and Suffolk Counties during the mid-winter; or especially Red-wings (*Agelaius p. phoeniceus*), Rusty Blackbirds (*Euphagus carolinus*) and Cowbirds (*Molothrus a. ater*), all of which were represented in this roost. A week before the discovery of this relatively large roost, I had reported an observation of 250 Grackles flying east of Heckscher State Park at dawn as an unusual sight for Long Island, to be correlated with the extremely mild and open winter.

This roost has been occupied for over five years, according to local fishermen and oystermen, and until this current winter it was only in use until Christmas time. It was originally pointed out to the many people who attended the last A. O. U. meeting in New York and who participated in a field trip to this area at that time.

As Roebuck (1934) and others have stated elsewhere, the Starlings going to a roost make their trips in a series of hops. Generally, the big flights that came in to Heckscher Park were from an easterly direction. This roost drained Starlings from thirty miles to the west and from at least twenty miles to the east. This distance matches the longest authenticated flight line reported for the same species in Great Britain by Marples (1934). Since Long Island averages about twenty miles in width over this stretch, we may safely say that 1,000 square miles were affected. If my estimates for both area and the numbers of roosting birds are correct, this section of Long Island may be expected to *average* 150 Starlings a day per square mile.

The period of these birds' arrival at the roost was rather short and extremely spectacular. In February the first birds appeared around

five o'clock, and the last birds settled an hour later. More than three-quarters of all the birds dropped into the *phragmites* within twenty minutes' time. The entire incident of arrival constituted a sight that is not easily forgotten.

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Allan D. Cruickshank.

A Few Warbler Observations.—During the last two summers at The Audubon Nature Camp in Muscongus Bay, Maine, I have had an unusual opportunity to obtain intimate daily observations of a great many birds. I herewith present a few unrelated facts about six of our local warblers that have been thoroughly substantiated. The incubation periods of these species have been checked and as far as I am able to ascertain two of these (those of the Parula Warbler and Black-throated Green Warbler) may be new to ornithology.

Myrtle Warbler	12 days
Magnolia Warbler	12-13 days
Bay-breasted Warbler	13 days
Yellow Warbler	11 days
Parula Warbler	11 days
Black-throated Green Warbler	12 days

On our island all of these birds except the Yellow Warbler nest in spruce and it is interesting to note that in every case checked to date each of the spruce nesting birds has selected a spot where an overhanging branch forms a close canopy right over the nest, not alone concealing it but acting also as a protector from the hot summer's sun. These spruce nesting warblers seem unable to stand direct sun rays for any length of time. In photographing them I had to be exceedingly careful for, if the canopy was tied aside for more than five or ten consecutive minutes, the incubating bird would invariably open its mouth wide, close its eyes, droop its head to one side and appear to be fainting. Once the canopy was lowered, however, and the bird shaded, she soon raised her head, opened her eyes and regained her normal alert appearance.

In all of the six species of warblers both male and female took turns in feeding the young. Generally the female took care of most of this work but under abnormal conditions in the presence of man

the male, apparently the bolder, shouldered the greater part of the duty. In all cases, however, these warblers seemed to have little profound fear of man for during my studies I have had both sexes of all except the Yellow Warbler feed young which I held in my hand.

After periods varying from nine to fourteen days, the young left the nest and apparently once they moved more than a few feet from their natal cradle never voluntarily returned, even though they were present for a week and were being fed in the territory of their parents.

In all of these six warblers injury feigning was observed at one time or the other. There seemed to be no set rule for this performance. Some pairs, in spite of numerous disturbances put on no act whatsoever. In some cases only the female performed, in others only the male, and in still others both birds of the disturbed pair. Regardless of species the complete injury feigning act, as far as I could make out, was essentially the same; the disturbed bird tumbling off the nesting limb, fluttering with seeming helplessness downward from one branch to the other with wide spread tail and fluttering wings and finally dragging itself along the ground with rigid wing extended.

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Allan D. Cruickshank.

Colonial Birds on Long Island, 1938.—As a supplement to the report of R. P. Allen published elsewhere in this issue of the *Proceedings,* the following 1938 nesting counts and estimates for pairs of various colonial birds on Long Island may be interesting.

	Cartwright Island	Reeves Island	Dana's Island	Ram Island	Three Mile Harb.	Orient State Park	Moriches Inlet (west side)	Gilgo Island
Herring Gull - -	30-40						1	
Common Tern - -	600	500	15	about 250	25	(50)	75	a few
Roseate Tern - -	100			?				
Least Tern - - -								a few
Black Skimmer - -							about 6	at least 15
Osprey - - - - -	18			about 5		21		

I understood the Superintendent of the park at Orient to say that only about 50 pairs of Common Terns nested there this year. In addition to nesting pairs of Skimmers there have been many more non-breeding adults present in the colonies than in any previous season. The highest counts were 68 at Moriches Inlet and 90 at Gilgo Island (R.P.A.). The latter count included 20 young of the year.

LeRoy Wilcox, Speonk, N. Y.

Report of the Field Work Committee, 1936-37

By J. J. Hickey, *Chairman*

At a Linnæan Society meeting on October 14, 1919, Dr. Frank M. Chapman proposed that a detailed account be prepared of the birds of our area. A Local Avifauna Committee thereupon began bringing up to date the necessary data. Eventually, its task was taken over by Ludlow Griscom of the American Museum's staff, and the *Birds of the New York City Region* was ultimately published in 1923. The Committee, manned by a varying personnel, continued in existence, its duties gradually restricted to an evaluation of the sight records of rare birds reported locally. On March 17, 1936, the Council of the Society unanimously agreed to coordinate the observations of local migration watchers, as far as possible, by the appointment of a Field Work Committee. The purposes of this Committee were stated by the Council to be as follows:

(1) To encourage and conduct constructive field work in the New York City region.

(2) To promote discussion of local faunal problems at meetings of the Society.

(3) To assist the Editor in securing papers by members for the *Proceedings,* and especially to stimulate competition for the annual Linnaean prize for amateur ornithological research.

The Committee ultimately was composed of R. P. Allen, J. L. Edwards, F. P. Mangels, R. T. Peterson, Walter Sedwitz, C. A. Urner, William Vogt, and the writer.

Because, for half a century regional bird lists have occupied the chief attention of local bird clubs, the Committee gave its early attention to a review of this subject.

Since these lists have so long been simply efforts to summarize and to bring up to date all the available data about distribution and migration, any deviation in their purpose merits the careful consideration of every local natural history society and bird club. The vast changes which man has wrought upon the bird population of the New

York City region have been ably summarized by Griscom (op. cit., pp. 48-52). Such changes in America have been so marked in the past twenty years that more than one student has been led to conjecture on the *exact* status of various species in their primitive state. "What would the present-day New England naturalist give," writes G. M. Allen (1928), "if he might have an accurate picture of conditions here three hundred years ago!" However much we may rue this lack of information about the distant past, it is a remarkable fact that we do not possess an *exact* portrait of local bird life of fifty years ago or even of today, for while we have some concept of the Starlings (*Sturnus v. vulgaris*) which appear to have displaced the Red-headed Woodpeckers (*Melanerpes erythrocephalus*), even that hypothesis is open to objection. At the same time, we do not know what caused the disappearance of the Dickcissel (*Spiza americana*), the Acadian Flycatcher (*Empidonax virescens*), the White-eyed Vireo (*Vireo g. griseus*), or the Kentucky Warbler (*Oporornis formosus*) in certain parts of our region. Did those birds of these species, which disappeared, leave voids or blank environmental niches as their numbers decreased? Is their change in status the result of some cyclic disease? Was their decrease correlated with a lowering of their survival ratio, with an increase in their competitors or predators, or with a subtle change in their habitat? With equal helplessness we can also ask ourselves just how much of these birds' habitats did exist fifty years ago, what was the exact character of the environment, what were the other birds which nested there, and how widespread in our region did each habitat exist?

The changing purpose back of the regional bird list is succinctly stated in the recently published *Bird Studies at Old Cape May*: "The primary object in the preparation of the present work has been to furnish, for the purposes of future comparison, as accurate a picture as possible of the bird life of Cape May during the decade, 1920-30, with an account of the changes that have taken place in the years that have followed" (Stone, 1937). On can pertinently ask, in any region just how accurate a picture of local bird life is it possible to obtain? This quite obviously depends on the size of the area and the man power obtainable. Observe how Ontario, with apparently less observers, is fifty times larger than New Jersey. If we consider that the quanti-

tative picture of local bird life is an important one, it may be said that no complete regional list has yet been published. Some very interesting progress along these lines has already been made in the Middle West, and the results, when ultimately published, should make for some fascinating comparisons. That our interest in the exact status of every species has been steadily rising since early ornithological times is demonstrated by the breaking point to which such generalities as "common" and "rare" as applied to a species are carried in one of the more recent regional bird books (Bagg and Eliot, 1937):

accidental
casual
rare
  more or less rare
  rather rare
  very rare
  unusually rare
chance
possible
not unusual
occasional
local
  somewhat local
  rather local
  very local
  unusually local
uncommon
  rather uncommon
  generally uncommon
  more or less uncommon
  not really uncommon
irregular
  occasionally irregular
  somewhat irregular
  rather irregular
  highly irregular
sporadic
somewhat erratic
common
  sometimes common
  locally common
  unevenly common
  irregularly common
  hardly common
  rather common
  fairly common
  generally common
  quite common
  very common
abundant
  locally abundant
  sometimes abundant
  almost abundant

What is needed today is not an elaboration of such indefinite terms, but *actual figures* which will indicate the *exact changes,* if any, in a species' status from year to year and from decade to decade, according to whether the data are for breeding birds or for migrants. As Nicholson (1932) writes, no "universal and reasonably stable standard of numbers" seems to have reached general acceptance among bird students, and "Up to the middle of the twentieth century at least, it seems likely to remain one of the most pressing interests of ornithology."

The study of number of birds has always attracted migration watchers in a curiously vague sort of way. The more striking changes like those connected with market gunning and the millinery trade were

universally noticed. Other changes in bird life—which are equally important—have also been taking place, but the reasons still remain a mystery. As breeding species Chestnut-sided Warblers (*Dendroica pensylvanica*) and Nashville Warblers (*Vermivora r. ruficapilla*) have steadily increased in numbers in the past fifty years. Is this due to the fact that both species utilize a habitat—young forest before the canopy closes—which has become extensive during the same period? Has the abandonment of farm lands been the reason? Answers to these questions depend on the surveys which were made of these environmental types half a century ago. So far as I know, none have ever been published. There are indeed no actual figures available to show what the numbers of these warblers were in 1890, in 1910, and in 1930. Are these two birds subject to a cycle? Were their numbers once decimated by a plague? Was some competitive factor moved from what was once a balanced population? Have they stopped increasing, and if so, when and why?

The Pileated Woodpecker (*Ceophloeus pileatus abieticola*) was once popularly regarded as a species of the primitive wilderness and even as late as 1937 its disappearance was attributed by some ornithologists to the spread of civilization. Has the phenomenal increase of this bird in the last twenty years been due to an adjustment wherein the Pileated has "become reconciled to some contact with civilization" (Griscom, 1923)? We are left with an unsatisfactory answer, for no clear record of this species was left in the eighteenth century when the bird might conceivably have been particularly numerous and actually present in the immediate vicinity of farms in the Northeast. That habitat "selection" may depend on the numbers of an animal, was shown in an admirable example quoted by Elton (1936, p. 145). The African Buffalo (*Bos caffer*) once lived out in the open grassland and fed by day. In 1890 it was almost wiped out by an epidemic of rinderpest, and for many years after, the few remaining animals fed at night and retired to forests and dense swamps during the day. Since 1910 these animals have increased and appear to have regained their old habits.

It must be obvious that the study of the birds of one's local region will always be incomplete unless particular attention is given to the

numbers of all species and deliberate studies are also carried out of their environment. Various systems concerning the former have been proposed. The simplest of these is the daily list, an illustration of which is found in *The Birds of Dutchess County, New York* (Griscom, 1933). If we wished to compare the bird population of May, 1939, with that illustrated by a trip given in detail for May 23, 1929, all kinds of annoying factors would weaken our comparisons: (1) we probably would not know the exact "big day route complete"; (2) we might vary in the number of hours afield . . . and be entirely unaware of this; (3) we might have express highways and super motor cars reducing to an absolute minimum our traveling time around the country; (4) we might be slow of foot, and walk only a fraction of the mileage covered by our predecessors; (5) we might have very adverse or extremely favorable weather for observation; and (6) even if we did count every single bird identified, we still would not know the numbers of birds which Griscom and R. J. Eaton saw fit to record only as "common." Then too, comparisons based on a single day's observations contain well known inconsistencies, and even some averages may weaken under the personal equation. Quite a number of field workers on the Atlantic coast would hesitate to match their average efficiency in recording birds against that of a renowned migration watcher like Mr. Griscom.

Few bird students seem to be aware of the various indices which have been proposed as estimates of bird populations. Periodic and thorough censuses of tracts of known acreage, which began with Burns in 1901, have always remained the most exact method yet devised: personal equations are here usually reduced to a minimum, the study areas are often identifiable in later years, and the observations can be repeated at sufficient intervals so that weather conditions of any particular day do not modify the count (see Cooke, 1916; Cooke, 1923; Hicks, 1935). This method involves an enormous amount of time, as Lack (1937) has pointed out, and it generally discourages all but the most persistent observers from repeating the census on the same tract over a period of years.

Birds can, however, be censused in units of time afield, as well as by acreage. Grinnell and Storer (1924) were the first to do this

by counting birds per hour. Here in the East, environmental types are rather small, and the half-hour count suggested later by Dice (1930) seems more applicable. When such counts are carried out by a large number of observers in a relatively large area such as the New York City region, the inevitably great differences in observational efficiency may make for some confusion. In parks, observers who consistently follow recognized and well marked trails can work out interesting data over a period of years; these trails can be measured and a ratio of linear density calculated. The New York City region is now a place where most environmental types have no extensive acreage. Most observers here will find it difficult to walk for a solid half hour through a single habitat, but by constant experimentation and frequent discussion at its meetings, members of the Linnæan Society can ultimately agree upon a system of recording their birds in the field, whether their observations take place on Long Island, in New Jersey, or in the Hudson River Valley. For those who would like to read the various suggestions which have emanated from other regions, Lack's recent summary of the subject (1937) offers a stimulating and comprehensive bibliography. Attention can also be directed with profit to Saunders' interesting cruises in the Alleghany State Park (1936).

If the next regional list for the New York City area is to present a *real* picture of local bird life, those observers contributing to the report will be quite familiar with a list of local habitats which the Society considers worthy of study. The following environmental types are herewith presented with suggested indicator species as aids in an intensive analysis of our breeding bird population . . . and in the hope that an additional insight into our locally wintering species will also be obtained.

*Ocean Beach	Piping Plover Common Tern	Least Tern
Other Beaches	Spotted Sandpiper	Killdeer

*The indicator species listed here for forest succession are taken almost verbatim from L. E. Hicks (1935) and from A. A. Saunders (1936).

SAND DUNES

Bayberry	Northern Yellow-throat	Kingbird
Pitch Pine	Pine Warbler	
High Artificial Fill	Least Tern	Common Tern
	Piping Plover	
Holly	Kingbird	Cedar Waxwing

SALT MARSH

Spartina alterniflora	Seaside Sparrow	Clapper Rail
Spartina patens	Clapper Rail	Sharp-tailed Sparrow
	Meadowlark	Willet
	Black Duck	
Juncus gerardia	Black Rail	

UNCULTIVATED FIELDS

Dry	Grasshopper Sparrow	Bobolink
Wet	Henslow's Sparrow	

FIELDS WITH BEGINNINGS OF FOREST

Cedar
Pine
Oak Scrub
Locust-Blackberry
Sassafras
Blueberry-Azalea

While these should be separately studied at first, it should be kept in mind that birds are usually not interested in the species of trees but are apparently more concerned with the density of vegetation, the singing perches it affords, the nesting sites it offers, and the amount of protection given them from predators.

SPROUTS AND SEEDLINGS 1-10 FEET HIGH*

Indigo Bunting	Field Sparrow
Towhee	Chestnut-sided Warbler

SECOND GROWTH 10-20 FEET HIGH (Forest crown converges, humus begins)*

4 birds above now replaced:
Red-eyed Vireo
Ovenbird
Rose-breasted Grosbeak
Least Flycatcher, etc.

SECOND GROWTH 20-30 FEET HIGH. (Temporary species of plants have disappeared by this time; herbaceous plants have developed on the forest floor.):

In addition to the above birds, the following now appear:

Ruffed Grouse	Blue Jay
Scarlet Tanager	

SECOND GROWTH 30-50 FEET HIGH. (Smaller trees now shaded out.)

SECOND GROWTH 50-65 FEET HIGH. (Many dead trees now present.)

Rose-breasted Grosbeak drops out
Many new species now come in:

Wood Thrush	Veery
Hairy Woodpecker	Downy Woodpecker
Crow	

MATURE FOREST 65-90 FEET HIGH.* (Numerous old stumps and logs. Considerable undergrowth shades out the herbaceous plants of the forest floor.)

Robin, Grouse, Chickadee	disappear	Wood Pewee, White-breasted Nuthatch, Hooded Warbler (perhaps)	appear for the first time

*The indicator species listed here for forest succession are taken almost verbatim from L. E. Hicks (1935) and from A. A. Saunders (1936).

These stages of succession will be found in varying degrees in:

Cedar	Pitch Pine
White Pine	Oak-Hickory
Maple-Beech	Hemlock

Further modifications:

Alleghanian Swamps (red maples)
Canadian Swamps (balsam and spruce)

Other Climax Types

Prairie (Hempstead Plain)
Bogs { sphagnum
{ coastal plain
Rolling Moors (Montauk Point)

Disclimax Types. (Disturbance communities held in condition chiefly by man's activities.)

Farm Lands
Pastures
Crops
Fallow Fields
Orchards
Lawns and Buildings
City Parks
Golf Courses
Forest Subjected to Fire
Bird Sanctuaries
Reservoir Plantations

Break down all open habitats according to presence of hedge rows, singing perches.

The most vigorous efforts to compile an exact picture of local bird life have been led by the late C. A. Urner, under whose direction each breeding species of New Jersey was separately mapped. In order to begin the development of a comparable picture for Long Island and the Hudson River Valley, a questionnaire was sent out by the Committee. This asked members to report on various species and the results will be given later (see report of this Committee for 1937-38 by R. P. Allen).

An effort was made by the Committee to draw up a list of all fresh-water marshes in the region, along with their breeders. Some excellent data on this were contributed by John Mayer for western Long Island, but the remaining parts of the region are still unmapped. A well organized census here could ultimately be completed of such birds as the Pied-billed Grebe (*Podilymbus p. podiceps*), American Bittern (*Botaurus lentiginosus*), Least Bittern (*Ixobrychus e. exilis*), King Rail (*Rallus e. elegans*), Virginia Rail (*Rallus l. limicola*), Sora Rail (*Porzana carolina*), Florida Gallinule (*Gallinula chloropus cachinnans*), and American Coot (*Fulica a. americana*)—all of which breed in this restricted type of habitat.

Population studies were freely discussed at meetings, but only two were undertaken by members of the Society. The late C. A. Urner made his seventeenth annual census of 210 acres of mixed environments in Union County, N. J.; J. J. Hickey began a census of 40 acres on a wooded slope in Westchester County, N. Y.

The Committee has stood ready at all times to advise members interested in pursuing life history studies. This valuable phase of field ornithology can never, in our opinion, be easily pursued by the many business men in the Society whose time afield is sharply confined to week-ends. Two projects were, however, started: one by William Vogt on a colony of Willets (*Catoptrophorus s. semipalmatus*) at Fortescue, N. J.., and another by R. P. Allen and F. P. Mangels on a colony of Black-crowned Night Herons (*Nycticorax n. hoactli*) at Massapequa, N. Y. These ambitious undertakings should not close the eyes of others in our region to the great possibilities of simple bird-watching involving the application of one's reading to intensive observation over a single week-end of a single phase of the breeding biology of our commonest birds.

ACKNOWLEDGEMENTS. I wish to acknowledge my great appreciation of the ready coöperative spirit of the members of the Field Work Committee on many occasions; they have also carefully checked the suggestions, given in this report, for local habitats worthy of further study. I am greatly indebted to Miss Margaret Brooks and Mr. James O. Stevenson for their editorial criticisms of this manuscript, and to the former for her aid in typing. The Committee itself owes much to President Vogt and the Council of the Society for much needed encouragement and financial assistance. The enormous enthusiasm of Robert P. Allen and his constant readiness to take on responsibilities have made the chairman's task a relatively light one and have done much to give the committee its present momentum and drive.

SUMMARY. The Field Work Committee represents an effort to encourage constructive field observations of the birds of the New York City Region. It hopes to do this by promoting discussions of local problems at meetings of the Society; by offering a working circulating library to members unable to buy, or otherwise consult, the interesting and extensive periodical literature of ornithology; by stand-

ing ready to assist with bibliographic and other kinds of help members interested in pursuing special studies; by summarizing local knowledge through the medium of questionnaires; and by gradually building up a detailed picture of the numbers of local birds in relationship to their present environment. The importance of this latter project to the ornithologists who will study this region in the future can scarcely be estimated. Its completion rests upon the mapping of every breeding species, analyses of many complex environmental types, and adaption of adequate methods of counting the numbers of local birds.

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Report of the Field Work Committee, 1937-38

By Robert P. Allen, *Chairman*

For a second year the Field Work Committee has continued its efforts to encourage constructive field work, promote discussion of local faunal problems and stimulate projects and papers by members of the Society. These purposes have been furthered by means of additional questionnaires, by personal contact and correspondence and through the inclusion of field work meetings in the program schedule of regular meetings. This last item is discussed in the Report of the Secretary for this same period. The present report will endeavor to outline the main points that have resulted from personal contact, correspondence and the four separate inquiries sent out by the Committee to date.

An examination of these results will demonstate at once that little original work has been inspired by the Committee's efforts. At best, we have succeeded in compiling such information for Long Island and the Hudson River Valley as reposed in the note-books of the Society's membership, relating for the most part to breeding bird distribution and to a few miscellaneous items of inquiry. However, this compilation is a definite basis for purposeful field work in the future. It should be mentioned that far more progress has been made in New Jersey by way of accurately mapping the breeding bird distribution than in these other sections of the New York City region. Full credit is given the late Charles A. Urner for his leadership and ability to organize, plan and conduct the amazingly comprehensive field work necessary to achieve the results obtained in New Jersey. The program of the New Jersey Field Ornithological Club should be an encouragement and inspiration to those who spend their hours afield in the Hudson River Valley and on Long Island, fertile areas that are still, to a considerable degree, *terra incognita* from the viewpoint of modern field ornithology[1]

An important result of the collective inquries is an indication—in detail—of the gaps that must be filled by field workers during suc-

[1]Mapping of the breeding bird distribution of Long Island, and studies of the plant ecology have been carried on independently by LeRoy Wilcox, of Speonk. These studies, relating chiefly to the eastern portion of the Island, are still in progress.

ceeding years. For example, Release No. 3 (April 1937) requested data on the incubation periods of twenty-seven species of birds. Approximate data on five of these were found in the literature; no data whatever could be located for the remaining twenty-two, which are as follows:

King Rail (*Rallus e. elegans*)
Piping Plover (*Charadrius melodus*)
Eastern Willet (*Catoptrophorus s. semipalmatus*)
Black Skimmer (*Rynchops n. nigra*)
Rough-winged Swallow (*Stelgidopteryx ruficollis serripennis*)
Tufted Titmouse (*Baeolophus bicolor*)
White-breasted Nuthatch (*Sitta c. carolinensis*)
Brown Creeper (*Certhia familiaris americana*)
Eastern Winter Wren (*Nannus h. hiemalis*)
Blue-gray Gnatcatcher (*Polioptila c. caerulea*)
Northern Parula Warbler (*Compsothlypis americana pusilla*)[2]
Black-throated Blue Warbler (*Dendroica c. caerulescens*)
Black-throated Green Warbler (*Dendroica v. virens*)[2]
Northern Pine Warbler (*Dendroica p. pinus*)
Kentucky Warbler (*Oporornis formosus*)
Hooded Warbler (*Wilsonia citrina*)
Canada Warbler (*Wilsonia canadensis*)
Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*)
Eastern Grasshopper Sparrow (*Ammodramus savannarum australis*)
Eastern Henslows Sparrow (*Passerherbulus henslowi susurrans*)
Sharp-tailed Sparrow (*Ammospiza c. caudacuta*)
Northern Seaside Sparrow (*Ammospiza m. maritima*)

Vague and incomplete information is recorded in the literature on the following species:

Sparrow Hawk (*Falco s. sparverius*)
Virginia Rail (*Rallus l. limicola*)
Florida Gallinule (*Gallinula chloropus cachinnans*)
American Bittern (*Botaurus lentiginosus*)
Least Bittern (*Ixobrychus e. exilis*)

Here, then, is significant field work waiting to be done!

The spare time required of one proposing to take a breeding bird census or population count, has proved a distinct handicap to many who have desired to start such a project. The censuses of Messrs.

[2]See note by Allan D. Cruickshank on page 70.

Urner and Hickey have been continued, and the population of a fresh-water marsh has been studied by a group working in Van Cortlandt Park, Messrs. Feigin, Gell-Mann, Karsch, Kramer, Lehrman, Norse and Stephenson. In the course of this undertaking fledging Red-wings (*Agelaius p. phoeniceus*) were marked with colored celluloid bands so as to indicate the sector of the marsh in which they were hatched, as a basis for additional inquiries into the habits of that species. Another interesting census was conducted in Inwood Park by Henry Karsch, Jr. These reports were subsequently published in *Bird-Lore* (Hickey, 1937).

Preliminary studies of the behavior of the Willet (*Catoptrophorus s. semipalmatus*) were completed by William Vogt[3], who carried on his research at Fortescue, N. Y. Similar research with the Black-crowned Night Heron (*Nyticorax n. hoactli*) as the subject, was continued for a second season by Messrs. Allen and Mangels, who presented a preliminary report of their findings to the A. O. U. Convention at Charleston during November. Although no new projects of this nature were begun during the year, discussion at meetings has revealed an added interest in bird behavior, and the technique of modern behavior studies is becoming more generally understood and appreciated by the members. The publication, by the Society, of Mrs. Nice's outstanding paper on the Song Sparrow (*Melospiza melodia*), provided a marked incentive in this direction. Once again, however, the Society's amateur students found it difficult to spend enough time in the field during the critical breeding season. Early morning work on species that have territories close to one's home can solve this problem. Every bird in North America, except the Song Sparrow, awaits a searching examination into its behavior, local distribution, survival, ecology, etc., to which that species has been subjected by Mrs. Nice. It should be pointed out that in the light of present-day trends further projects in any way comparable to the work of Mrs. Nice remain largely for the amateur to undertake in such free time as may be at his disposal. It should not be difficult for a typical 'nine-to-five' office worker to find at least 100 hours during a breeding season that can be devoted to a single species. This Com-

[3]Mr. Vogt's paper on the behavior of the Willet has been awarded the Linnæan Prize as the best example of ornithological research submitted by an amateur or by a professional working in his spare time during the year 1937-38.—Ed.

mittee has, as one of its chief purposes, the encouragement of such projects, and is ready at all times to give advice and other assistance.

As an experiment in the large-scale use of colored bands that may be recognized on sight, the Field Work Committee proposed to C. L. Whittle, the Editor of *Bird-Banding*, a coöperative Herring Gull project, involving the use of celluloid bands. Mr. Whittle's enthusiastic response, and the subsequent coöperation of many individuals in the Northeastern Bird-Banding Association, the U. S. Biological Survey, the Bowdoin Scientific Station, La Société Provancher d'Histoire Naturelle du Canada, the Lands, Parks and Forest Branch of the Department of Mines and Resources of Canada, and the National Association of Audubon Societies, have made possible the inauguration of a study of the Herring Gull (*Larus argentatus smithsonianus*) that employs for the first time definite combinations of colored celluloid bands. During the 1937 season, young Gulls were banded at nine stations from the Gulf of St. Lawrence to Block Island Sound, to the total of 6,140. Combinations were arranged to indicate the natal origin of each bird so marked. Obviously, if these combinations can be identified readily in the field, a host of new data will be accumulated on winter distribution, plumage changes, exact breeding age, family grouping, return to natal area in the breeding season, etc. It should be remarked that the Herring Gull was chosen because of its abundance, and the ease with which large numbers may be observed during migration.

By the close of the present year, it is apparent that sight recoveries of Herring Gulls banded with color combinations are entirely feasible. In the New York City region alone, banded Gulls from each of the nine stations have been frequently and satisfactorily identified. A total of over 180 individual sight records have been accepted as *bona fide* for our region. Details of this project are reported from time to time in *Bird-Banding* and references to these articles will be found at the end of this report.

The initial release, mailed by the Committee early in 1936, was overly enthusiastic in attempting to cover a large field comprehensively. There were four sections, one each on Distribution, Ecology, Population Densities, and Life History Studies. Responses were quite

naturally limited almost entirely to the first section on Distribution, and confined chiefly to the items on colonial species. A fairly satisfactory series of maps, showing the breeding distribution of seven colonial species on Long Island and in the lower Hudson River Valley has resulted, and the maps accompanying this report have been prepared from these data. Except for scattered information, no mapping is yet possible for the following:

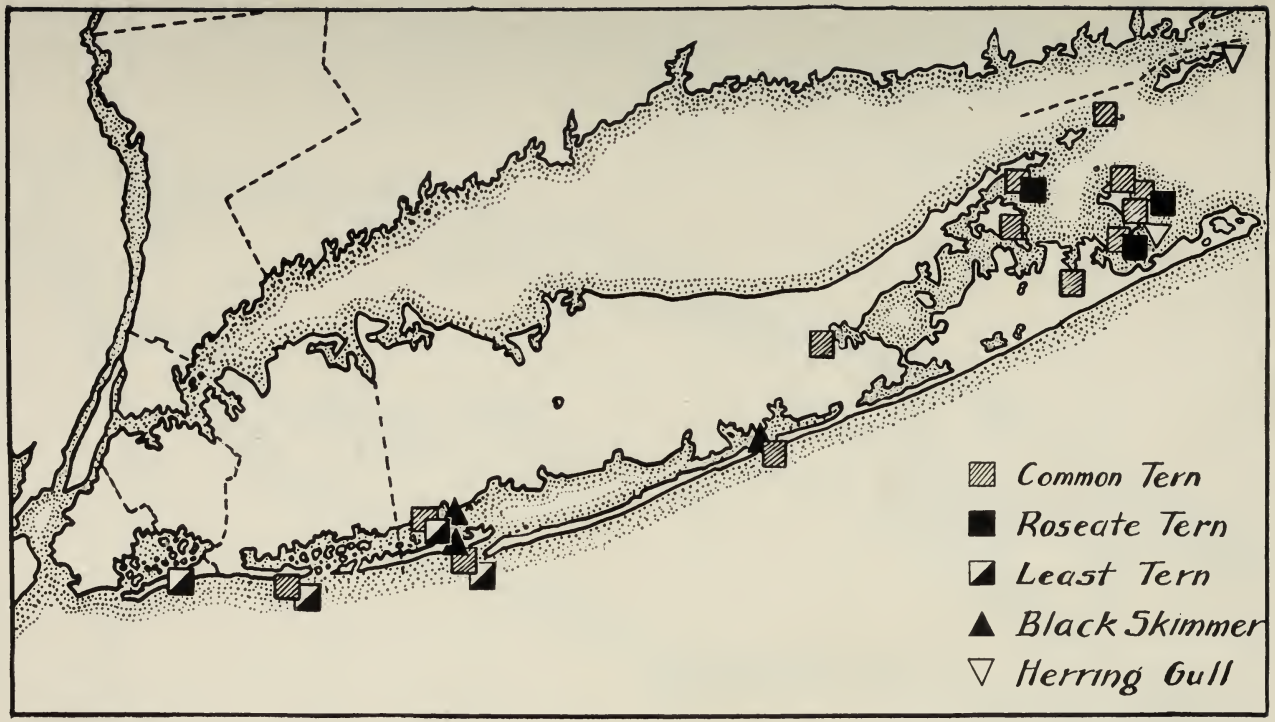
Turkey Vulture (*Cathartes aura septentrionalis*)
Kentucky Warbler (*Oporornis formosus*)
Acadian Flycatcher (*Empidonax virescens*)
Warbling Vireo (*Vireo g. gilvus*)
Yellow-throated Vireo (*Vireo flavifrons*)
White-eyed Vireo (*Vireo g. griseus*)
Red-headed Woodpecker (*Melanerpes erythrocephalus*)

Incomplete data on the breeding distribution of Hawks and Owls (except Sparrow Hawk (*Falco s. sparverius*) and Screech Owl (*Otus asio naevius*) do not justify mapping at this time. Only meager lists of fresh-water marshes have been obtained, and mapping must be postponed until more complete information is available.

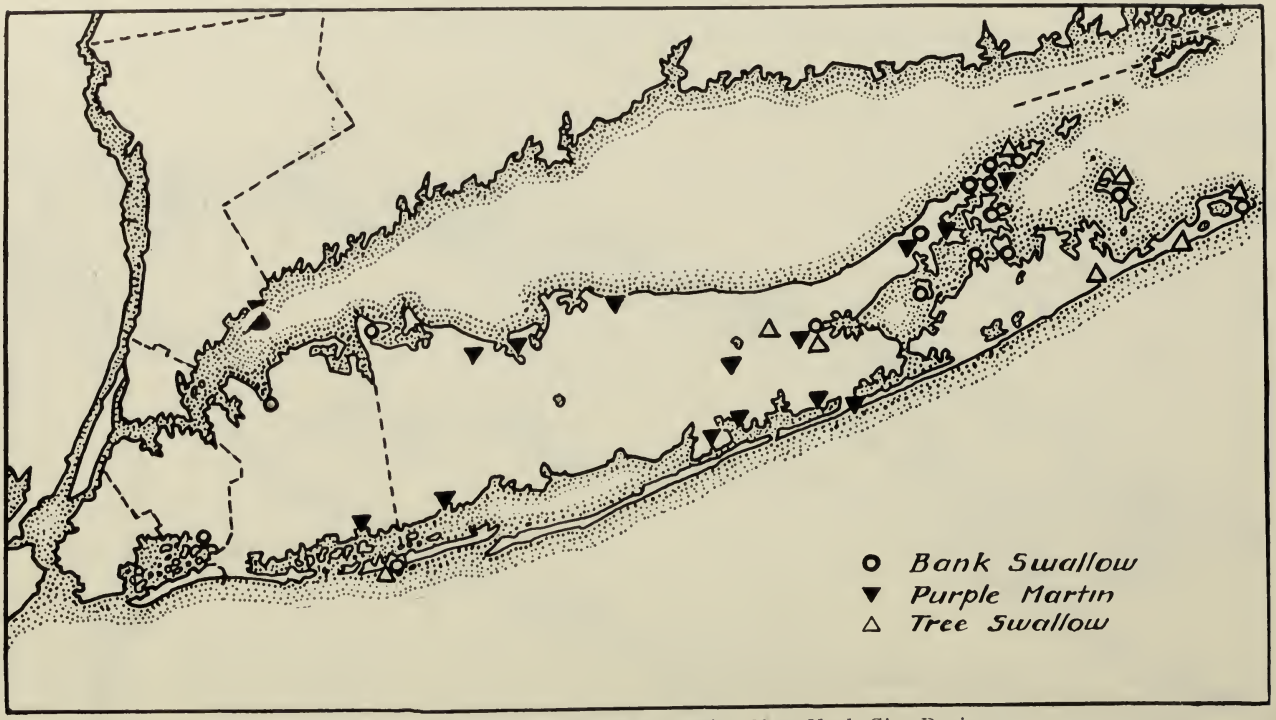
Suggestions in this first release with regard to population and life history studies may not be expected to bring about immediate results, but doubtless will show returns over a long period. In fact, this release, although perhaps too inclusive to be entirely practical, may prove to have been wholly appropriate in reviewing the major phases of field ornithology that will, in all likelihood, occupy students of the New York City region for a generation to come.

Release No. 2 (April 13, 1937) requested data on the arrival, etc., of twenty-one *key species,* selected chiefly because of their grouping as migrants, their abundance and the general ability of field students to observe them locally. The main purpose of this inquiry was to encourage the recording of more significant migration data, particularly as a basis for including only outstanding and significant reports in "The Ornithological Year," changes in which have been recommended by the Field Work Committee.

Observers were asked to supply, wherever possible, dates giving (1) when such birds first arrived, (2) when they became common, (3) when they became abundant and (4) when such migrants de-



MAP 2. *Location of Seabird Colonies, New York City Region, 1937.*



Map 3. *Location of Swallow and Martin Colonies, New York City Region, 1937.*

parted. Dates were also asked (5) when certain local breeders arrived on their nesting territories and (6) when such birds became common.

The following species were included in this inquiry:

Grackle (*Quiscalus* subsp.)
Fox Sparrow (*Passerella i. iliaca*)
Phoebe (*Sayornis phoebe*)
Greater Yellow-legs (*Totanus melanoleucus*)
Chipping Sparrow (*Spizella p. passerina*)
Ruby-crowned Kinglet (*Corthylio c. calendula*)
Towhee (*Pipilo e. erythrophthalmus*)
Barn Swallow (*Hirundo erythrogaster*)
Brown Thrasher (*Toxostoma rufum*)
Chimney Swift (*Chaetura pelagica*)
Yellow Warbler (*Dendroica a. aestiva*)
House Wren (*Troglodytes a. aëdon*)
Baltimore Oriole (*Icterus galbula*)
Kingbird (*Tyrannus tyrannus*)
Parula Warbler (*Compsothlypis americana pusilla*)
Ovenbird (*Seiurus aurocapillus*)
Bobolink (*Dolichonyx oryzivorus*)
Black-poll Warbler (*Dendroica striata*)
Wood Pewee (*Myiochanes virens*)
Piping Plover (*Charadrius melodus*)
Ring-necked Plover (*Charadrius semipalmatus*)

Replies to this inquiry were decidedly disappointing in point of numbers, although the few returned contained much data of value and interest. That ornithologists in other regions have long assembled migration data with regard to its utmost significance is demonstrated by a copy of this questionnaire which the Committee sent to J. Murray Speirs of the Royal Ontario Museum of Zoölogy. Mr. Speirs not only was able to fill in most of the blanks in our inquiry from his personal notes, but wrote us, "Similar dates are available for most of these species for the Toronto region, but are based on about 15,000 daily lists compiled by a number of observers during the past fifty years." This inquiry parallels a similar and more ambitious project initiated by the Linnaean Society during the '20's and carried on for a number of years under the vigorous leadership of Ludlow Griscom, John F. Kuerzi, the late Warren F. Eaton, and Charles A. Urner. This undertaking tended to prove that birds preferred week-ends as the

period of maximum abundance (!), but, viewed in a broader light, the data compiled at the time represent a veritable mine of information which still awaits analysis and summarization.

Release No. 3 (April, 1937) concerned incubation periods, as already mentioned earlier in this report. Release No. 4 (April, 1937) included a preliminary map of the breeding distribution of colonial nesting birds on Long Island. A list of these colonies was appended, with an estimate of numbers, when available, of pairs in each colony. This material constituted the results, in part, of Release No. 1, and was sent out by the Committee in order to correct and amplify these new data obtained through the initial inquiry. The maps in this report include additional information returned as a result of this last release. Also included are more recent data on distribution turned in to the Committee up to the date of publication. Unquestionably, the accompanying maps will be incomplete in certain instances and incorrect in others. We will appreciate the full coöperation of all those who can offer corrections. It is hoped that the publication of similar maps for these and additional species will be possible from time to time as a record of the changing bird life of our region.

The Committee is grateful to many persons, members of the Society and of other groups, who have assisted us in a variety of ways during the past year, especially to Mr. Charles L. Whittle for launching the Coöperative Gull Survey in *Bird-Banding,* to Mr. Frederick C. Lincoln who arranged for the purchase of so many celluloid bands by the Biological Survey and to our many banding associates in Canada and in the north-east.

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Report of the Secretary of the Linnaean Society of New York For 1936-1937

The Linnaean Society of New York held, during the past year, 15 regular and 4 informal meetings. Five ornithological seminars were also conducted. The average attendance at the regular meetings was: Members 32, guests 31.

The Annual Dinner of the Society was held on March 10, 1936, in the Flying Bird Hall of the Museum, with the Annual Meeting immediately following. The speaker was Dr. George M. Sutton who in a talk entitled "A Winter with the Eskimos" told of the year he recently spent studying the bird life of Southampton Island in Hudson Bay.

At the annual meeting the following officers were elected:— President, Mr. William Vogt; Vice President, Mr. Joseph J. Hickey; Secretary, Mr. Charles K. Nichols; Recording Secretary, Mr. Richard G. Kuerzi; Treasurer, Dr. Clement B. P. Cobb; Editor, Dr. Ernst Mayr.

During the year Mr. Kuerzi found it necessary to resign as Recording Secretary as he had removed from the City. Mr. Walter Sedwitz was named to fill the unexpired them.

It is with deep regret that the Society records the loss by death of one of its outstanding members, Dr. Frank R. Oastler. Hardly a year has passed but that Dr. Oastler generously gave his time to address the Society on some recent bird trip and to show some of his unrivaled photography.

The Membership of the Society as now comprised is:—Honorary Member: 1, Fellows: 10, Resident Members: 147, Non-resident Members: 19, a total of 177, a moderate increase.

The speakers and their subjects for the year's meetings were as follows:—

March 10, 1936—A Winter with the Eskimos, Dr. George M. Sutton.

March 24, 1936—Bird Life of the Western National Parks, C. A. Harwell.

April 14, 1936—Current Problems in Local Ornithology, Joseph J. Hickey.

April 28, 1936—Ornithological Notes from the Gobi, Dr. Walter Granger.

May 12, 1936—In the South Seas on the Zaca, Dr. James P. Chapin.

May 26, 1936—Field Notes and Current Migration Data.

October 13, 1936—Summer Notes.

November 18, 1936—The Role of Predation in Nature, Richard H. Pough.

November 28, 1936—Notes on the Behavior of Black-crowned Night Herons, Frederick Mangels and Robert P. Allen.

December 8, 1936—The Biological Significance of Bird Sound, Albert R. Brand.

December 29, 1936—Discussion of the Christmas Census.

January 12, 1937—Plant Associations of the New York Area, Dr. H. K. Svenson.

January 26, 1937—Summer Birding on the Maine Coast, Roger Tory Peterson.

February 9, 1937—Natural History of the Hempstead Plains, Henry Hicks.

February 23, 1937—Some Studies of the Social Habits of Snakes, Dr. Harry J. Clausen.

During the year a plan has been put into effect whereby recent magazines and reports relating to Ornithology are made available at the meetings of the Society and may be borrowed by the members.

The Secretary wishes to take this opportunity to express his appreciation to the other officers of the Society for the assistance they have given him in the preparation of the program for the year.

Respectfully submitted,

C. K. Nichols, *Secretary.*

Report of the Secretary of the Linnaean Society of New York For 1937-938

In planning the program schedule of the past year an attempt was made to recognize all phases of interest within the membership of the Society. Exactly one half of the sixteen regular meetings were given over to travelogues; the other half to field ornithology meetings. Field notes were reported at all of the regular meetings, as well as at the four summer meetings. The travelogues were sufficiently varied as to locale to have a general appeal, and the bird life of the following regions was discussed at these particular meetings: Florida, Texas, Panama, the Gaspé, and the eastern Congo. Two such papers were of a general nature. The field ornithology meetings were a new departure. By having two or three short papers in an evening, it was possible to cover a variety of subjects. Altogether, fourteen papers were given at the eight meetings; four on field identification of special groups; two on methods of censusing bird populations; two on bird behavior; two on distribution and numbers of birds in specific localities, and four reviews of recent papers. Including travelogues, twenty-two papers were given during the year, almost all of them by members of the Society. The papers presented were as follows:

Field Identification and Display of Study Skins

1.	Identification of May Rarities	R. T. Peterson	April 27
2.	Identification of Fall Rarities	A. D. Cruickshank	October 19
3.	Identification of Pelagic Species	L. L. Walsh	November 23
4.	Identification of the Finches	R. T. Peterson	January 25

Methods of Censusing Bird Populations

1.	Methods of Censusing Bird Populations	J. J. Hickey	April 27
2.	Some Remarks on Bird Census Methods	C. A. Urner	May 25

Bird Behavior

1.	Territorial Behavior of the Song Sparrow (lantern slides)	Mrs. M. M. Nice	March 23
2.	Behavior of the Willet	William Vogt	December 28

Distribution and Numbers in Specific Localities

1.	Known Distribution of Colonial Birds on Long Island	R. P. Allen	April 27
2.	The Increase and Decrease of Certain Birds in the Northeastern States	Ludlow Griscom	February 27

Reviews of Important Papers

1.	Huxley on Courtship	D. S. Lehrman	May 25
2.	Joseph Dixon's "Territorial Habits of the Golden Eagle"	R. H. Pough	October 19
3.	Recent Papers on the Herring Gull	Dr. Ernst Mayr	November 23
4.	Recognition of Eggs by Birds	F. P. Mangels	January 25

Illustrated Travelogues

1.	Moving Pictures of Florida Birds	L. L. Walsh	April 13
2.	Hunting for Bird Colonies from Maine to the West Indies	Dr. T. G. Pearson	May 11
3.	Birding in Panama	Dr. D. E. Harrower	October 5
4.	Bird Habitats of Coastal Texas	R. P. Allen	November 9
5.	An Evening of Florida Bird Life	Messrs. Allen, Cobb, Peterson, Sedwitz, Urner and others.	December 14
6.	Moving Pictures		
	a. Our Vanishing Wildlife	(U. S. Biol. Sur.)	January 11
	b. Falconry	(R. L. Meredith)	
7.	Experiences on the Gaspé Peninsula	A. D. Cruickshank	February 8
8.	To the Eastern Congo in 1937	Dr. James P. Chapin	March 8

Informal Meetings

1.	Field Notes by Members	June 15
2.	" " " "	July 20
3.	" " " "	August 17
4.	" " " "	September 21

In addition to Dr. Chapin's talk at the Annual Meeting on March 8th, the minutes of the first meeting of the Society were read by the first recording secretary, Ernest Ingersoll. At the same meeting, the first award of the Linnaean Prize for Amateur Ornithological Research was presented to William Vogt for his paper on "The Behavior of the Willet."

In spite of the considerable amount of time given by the Chair to field notes, the Council has felt that these have been on the whole rather uninteresting, due largely to the failure of many of those reporting to acquaint themselves sufficiently with the status of birds in the New York City region. Nevertheless, the demand for time in which to report field notes has necessitated a revision of the original plan of having three short papers given at field ornithological meetings, there being insufficient time for discussion. At some of the recent meetings, the field notes were limited to a single subject, viz. bird roosts, and only two papers were given. This allowed a full thirty minutes for informal discussion. This last was accomplished by setting a time limit

on each phase of the program, an innovation that has much to recommend it, so long as the interest and vitality of the program itself is not sacrificed. Commuters found the 9:30 adjournments a definite boon.

No doubt further adjustments and experiments will be necessary in the immediate future, if we are to keep pace with varied and changing interests in the wide field of ornithology. The mere fact that there is in the membership of the Society at this time a variety of special interests and a demand from each group that their favorite be given its proper recognition, appeals to the Secretary as an excellent indication of the Society's vigor and health in spite of its having reached its sixtieth milestone.

The Council feels that while we would like to see our organization a body devoted to the scientific pursuit of natural history, there is no educational group in the New York City region that can adequately meet the varied demands of amateur bird students. In other words, the Society faces the necessity of providing inspiration and encouragement to each of the many different types of bird students.

In the past there has been considerable delay in publishing both *Proceedings* and *Transactions* of the Society, due chiefly to the fact that no one person has been designated to act as editor. This situation has been greatly improved through the conscientious labors of Dr. Ernst Mayr, who is now responsible for publications. The *Proceedings* have now virtually been brought up to date and publications may be expected on schedule. The *Transactions* have been notably improved, with resultant comments of a highly favorable nature. During the past year, Vol. IV of the *Transactions* was published, containing Part I of Mrs. Margaret M. Nice's "Studies in the Life History of the Song Sparrow."

The Library—a recent experiment—has been continued and amplified. Its purpose is to make current ornithological periodicals and important books available to members of the Society on a free loan basis. Samuel C. Harriot, who was appointed Libarian by the President, has given much of his time to this project and in addition has donated a majority of subscriptions to the various publications. Mr. Rich presented many volumes of *The Auk*. An average of over 10 persons per meeting have borrowed books and periodicals. This service to our mem-

bers has been so generally applauded that a definite place for it must now be considered in the Society's budget. Members who wish to donate books or funds with which to make purchases should communicate with Mr. Harriot.

Field work has been carried out on an increasingly high plane. A Field Work Committee has held numerous meetings and sponsored various projects and inquiries. The Coöperative Gull Project—one of these activities—has attracted wide attention.

The real life blood of any organization is its membership, and the direct and personal interest of this membership in the organization itself is certainly reflected in the attendance records. Since last March there have as usual been sixteen formal and four informal meetings. The average attendance of resident members during the past year was thirty-six at formal meetings, a gain of about 20% over last year. At informal meetings, a similar gain was recorded for resident members. Visitors have fallen off in attendance at formal meetings, probably due to a lack of travelogues appealing to outsiders totally uninterested in bird study. Total attendance of members and guests at formal meetings averaged sixty-four and at informal meetings, twenty-six. Both figures represent gains in the neighborhood of 20% over last year.

During the year the Society lost one member by death and two others by resignation. There were eighteen new members elected.

To summarize, the current membership stands at 184, which is made up as follows:

Fellows	10
Honorary members	1
Resident members	154
Non-resident members	19

This total figure shows an encouraging gain, there being on the list eighteen more members than there were two years ago, and thirty-nine more than a decade ago. It is very likely that a resident membership of two hundred persons would be sufficient to enable the Society to carry out adequately the lecture, library, mapping and publication services which it is now attempting to extend to the membership.

Respectfully submitted,

Robert P. Allen, *Secretary*.

Officers, Council and Committees of The Linnaean Society of New York

OFFICERS 1938-39

President - Joseph J. Hickey
Vice-President - - - - - - - - - - - - - - - - - Charles K. Nichols
Secretary - Robert P. Allen
Treasurer - - - - - - - - - - - - - - - - - - - Allan D. Cruickshank
Editor - Ernst Mayr
Recording Secretary - - - - - - - - - - - - - - - - Alfred E. Eynon

COUNCIL 1938-39

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Allan D. Cruickshank — Ernst Mayr
Alfred E. Eynon — Charles K. Nichols

Term Expires 1939

T. Donald Carter — Roger T. Peterson — Edward B. Lang

Term Expires 1940

James L. Edwards — Richard H. Pough — Allen M. Thomas

Term Expires 1941

E. R. P. Janvrin — (Charles A. Urner) — William Vogt

FIELD WORK COMMITTEE 1938-39

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James L. Edwards — Roger T. Peterson — Alfred E. Eynon
(Charles A. Urner) — Frederick P. Mangels
William Vogt

EDITORIAL COMMITTEE 1938-39

Ernst Mayr, *Chairman*

Miss Margaret Brooks — William Vogt
Daniel S. Lehrman — Charles K. Nichols

THE LINNAEAN SOCIETY
OF NEW YORK

1878 1938

FOUNDED MARCH 7th, 1878

by

H. B. Bailey
Franklin Benner
E. P. Bicknell
John Burroughs
Harold Herrick
Dr. Frederick H. Hoadley
Ernest Ingersoll
Newbold T. Lawrence
Dr. C. Hart Merriam
William C. Osborn

Presidents

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George B. Sennett, 1887-89
Joel A. Allen, 1889-97
Frank M. Chapman, Sc.D., 1897-99
Jonathan Dwight, M.D., 1899-1921
Walter Granger, 1921-22
John T. Nichols, 1922-25
E. R. P. Janvrin, M.D., 1925-27
Ludlow Griscom, 1927-28
James P. Chapin, Ph.D., 1928-29
Charles A. Urner, 1929-31
Warren F. Eaton, 1931-33
John H. Baker, 1933-35
William Vogt, 1935-37
Joseph J. Hickey, 1937-39

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Jonathan Dwight, M.D., 1897-99
William Dutcher, 1899-1903, '06-10
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Walter Granger, 1904-06, '19-21
Clinton G. Abbott, 1910-14
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John T. Nichols, 1921-22
Ludlow Griscom, 1922-23
James P. Chapin, Ph.D., 1923-24
E. R. P. Janvrin, M.D., 1924-25
L. Nelson Nichols, 1925-27
Charles A. Urner, 1927-29, '33-35
Samuel H. Chubb, 1929-31
T. Donald Carter, 1931-33
Joseph J. Hickey, 1935-37
Charles K. Nichols, 1937-39

Secretaries

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Clarence H. Eagle, 1880-82
L. S. Foster, 1882-86
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Arthur H. Howell, 1892-94
Walter Granger, 1894-1904
Clinton G. Abbott, 1904-10
Francis Harper, 1910-12
Ludlow Griscom, 1912-15
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E. R. P. Janvrin, M.D., 1920-22
James P. Chapin, Ph.D., 1922-23
T. Donald Carter, 1923-24, '30-31
Charles A. Urner, 1924-26
Warren F. Eaton, 1926-28
John F. Kuerzi, 1928-30
William Vogt, 1931-33
Ernst Mayr, Ph.D., 1933-35
Charles K. Nichols, 1935-37
Robert P. Allen, 1937-39

Recording Secretaries

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Allan D. Cruickshank, 1935-36
Richard G. Kuerzi, 1936
Walter Sedwitz, 1936-38
Alfred E. Eynon, 1938-39

Treasurers

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Lewis B. Woodruff, 1901-21
T. Gilbert Pearson, Ll.D., 1921-25
John H. Baker, 1925-29
Maunsell S. Crosby, 1929-31
E. R. P. Janvrin, M.D., 1931-35
C. B. P. Cobb, M.D., 1935-38
Allan D. Cruickshank, 1938-39

Editor

Ernst Mayr, Ph.D., 1934-39

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Linnaean Prize for Ornithological Research

In an effort to promote a more constructive pursuit of bird-study among its members, the Linnaean Society of New York announces a prize of Twenty-five Dollars to be known as the Linnaean Prize for Ornithological Research. Papers submitted must embody the results of original research not previously published and not undertaken in the course of professional duties. The prize will be awarded each year at the Annual Meeting of the Society.

Conditions:

(1) Eligibility. Membership in good standing of the Linnaean Society of New York for at least one year prior to submission of the manuscript.

(2) Date. Papers are to be submitted on or prior to February 1 of the respective year to the Secretary of the Society.

(3) Papers. Manuscripts shall be typewritten, in English, ready for publication, and shall be accompanied by all necessary tables, drawings, diagrams, graphs and photographs.

(4) Award. A committee of judges shall be appointed by the President of the Society to make preliminary recommendations to the Council whose ratification and decision shall in all cases be considered final. The Council shall reserve the right to amend conditions of the award whenever it deems necessary, and it may withhold the prize in any year where the papers submitted do not prove sufficiently noteworthy.

(5) Publication. The Society reserves the right to prior publication of the successful paper but such publication shall not be considered binding upon the Society.

(6) Whenever and wherever published, the paper awarded the prize shall be accompanied by the statement, "Awarded the 19... Linnaean Prize for Ornithological Research by the Linnaean Society of New York."