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PROCEEDINGS
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APRIL, 1935

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Remarks on the Origins of the Ratites and Penguins¹

BY WILLIAM K. GREGORY

I. THE RATITES: PRIMITIVE OR DEGENERATE?

According to what may be termed orthodox ornithology, as set forth in Newton's Dictionary of Birds (1893-'96), the ratite birds are the, in some respects, degenerate in others specialized descendants of proto-carinate ancestors, which at different times and in different places, while acquiring improved running powers, have at the same time suffered more or less degenerative changes in the organs of flight. Here would be included the damage to the barbicels of the flight feathers, the reduction of the great muscles of the wings, the reduction and loss of the keel on the sternum, and the reduction in size of the wing as a whole.

Dr. Percy Roycroft Lowe, as a result of his many-sided and intensive studies on the embryology, pterylography, myology, osteology and taxonomy of the ratite birds, summarized his work in a paper in the Proceedings of the Zoological Society (1928), in which he challenged this orthodox interpretation and came to the conclusion that the cumulative mass of evidence ". . . points overwhelmingly not to the fact of retrogression or degeneration [on the part of the ancestors of the ratites] but to a primitive arrest of development, which can only be explained on the hypothesis that as a group or phylum, they [the ancestral 'Struthiones'] failed at the very outset to attain to the full fruition of avian development. Thus it hardly matters to what structure or organ we turn but we are met with a condition of morphological

¹Read before the Society on May 8, 1934.

evolution which can only be described as either having proceeded not much beyond an embryonic or early stage in avian evolution or as being frankly reptilian."

"To use a somewhat hackneyed expression," he continues (p. 190), "we seem to be confronted with a series of 'living fossils' which present us with a picture of at least one phase of early avian life not far removed from the very earliest or dinosaurian."

A careful consideration of Dr. Lowe's papers, in the light of my own studies of the skeletons of fossil and recent vertebrates of all classes, has however led me to the conclusion that, as regards the origins of the ratites, the older ornithologists were essentially right and that Dr. Lowe's chief conclusions are largely erroneous.

According to Marsh (1880, p. 60) "the sternum in *Hesperornis* somewhat resembles in general form the corresponding bone in the genus *Uria* but in other respects is more like that in the *Ratitæ*. It is thin and weak, and entirely without a keel." Marsh's plates VII and VIII indicate that there was good evidence for the lack of a keel. *Hesperornis* has even been referred to in the literature of ornithology as "essentially an aquatic ostrich" and was once restored as if covered with emu-like feathers. But according to Heilmann (1927, p. 40) *Hesperornis* in the construction of its skull, pelvis, limbs and feet, is rather closely¹ allied with some of the existing carinate birds, especially the loons. That *Hesperornis* has been derived from flying birds is suggested also by the fact that its keelless sternum is associated with an obviously enfeebled condition of the humerus and an enormous hypertrophy and high specialization of the swimming hind limbs. If ever the marks of degeneration can be clearly read anywhere, it is in the case of the sliver-like humerus and nearly flat sternum of *Hesperornis*.

Nature, which has nearly wiped out the hind limbs of whales and all the limbs of typical snakes, assuredly would not find it difficult to reduce the keel on the sternum, if such a keel were present, in the ancestors of the ratites. Thus the absence of a keel on the sternum of adult ratites is in itself only negative evidence that they never had one.

But there is the positive evidence of embryology, upon which Dr. Lowe (1928, p. 236) leans heavily. The embryonic sternum of

¹But see also: Stolpe, Max. 1935, *Jour. of Ornith.*, 83, p. 115-128.

ratites so far as known does not possess a keel. Here Dr. Lowe still seems to believe that during development every individual "climbs its own ancestral tree" as the phrase goes. But most modern students of embryology will thoroughly agree with De Beer (1930) that it is precisely in the embryonic stages that new directions of evolution are frequently initiated, and that whether or not the embryo repeats its ancestral history must be discovered in each case without reference to assumed laws that are of doubtful applicability to the case in hand. Even in adult stages the presence or absence of a muscular crest on a bone is usually correlated with the strength and position of the muscles on either side of it. The absence of a sternal crest in the embryo ratite proves no more than that at present there are not sufficient stimuli for the crest to grow up. Nor does the fact that certain flightless carinates still retain a keel on the sternum prove anything about the absence of the keel in the ratites.

The sternal crest in carinate birds is formed from a separate bony center named the lophosteon, which according to Lowe (1928, pp. 236, 237) is characteristic of typical flying birds but does not exist in the struthionies. The sternum of the struthious birds is formed from a single pair of centers on either side of the midline and there are no traces in the embryo either of the lophosteon or of other accessory centers, named metosteon, urosteon and coracosteon. He compares the paired sternal plates of ratites with those inferred to have been present as cartilages in *Archaeornis* and concludes that "the struthious sternum represents at least one stage further in advance of the reptilian sternum, and its acquisition of only one pair of ossifying centers would have had the effect of rendering the breast-plate permanently concrete as a fulcrum for the attachment of the pectoral muscles. Yet its development apparently failed to go further and was only partially available for the full function of flight, the consequence being that with other contributory causes, such as the failure of the flight feathers to develop beyond a down-like phase, the group in question was condemned to a cursorial existence, in which their wings represented but a secondary adjunct to speed."

This reasoning appears to me to be a partly concealed *petitio principii*, since it is by no means proved either that the modern struthionies have been derived directly from running pro-aves with the flight

feathers arrested in a down-like stage of development, or that the ancestral birds lacked a median center of ossification in the sternum. For, as to the latter, Heilmann (1927) has adduced considerable evidence tending to show that this median crest and its center of ossification represent the primitive reptilian episternum or interclavicle. And Dr. Lowe has neglected to offer any evidence against this identification of the "lophosteon." It is strange, moreover, that he does not specifically face the question of the absence of the clavicles in ratites and their retention in *Archaeornis* as well as in typical flying birds. For the clavicles and interclavicles are present in all primitive reptiles and their absence in ratites unquestionably implies degenerative specializations in this region. The absence of the metasterna in *Aepyornis* instead of proving that this bird is primitive may be regarded as an incident in the extreme widening and shortening of the sternum in these excessively thick-legged, broad-chested birds. Even in *Struthio* the length of the sternum in an adult specimen recently dissected by my colleague, Mr. H. C. Raven, was only twenty-one per cent of the length of the body cavity, whereas in the accipitrine *Thrassaëtus* the sternal length was sixty-three per cent of that of the body cavity.

In Newton's Dictionary of Birds (1893-'96, p. 356) it was said, probably by Gadow, that the pre-coracoidal process of the coracoid of typical birds is "the remnant of an originally independent element, the Praecoracoid—a bone which is almost typically complete, although soon fused at either end with the Coracoid, in the Ostrich alone of Birds."

Fortunately Dr. Lowe has avoided this confusing attempt of earlier writers to identify the so-called precoracoid of the ostrich with the precoracoid of reptiles. He accepts Broom's evidence that this structure arises in the ten-day embryo as a downwardly directed process from the anterior border of the scapula. He, however, interprets the general morphology of the pectoral girdle of the ten-day embryo ostrich as a direct heritage from primitive reptiles, such as the pseudosuchians. This interpretation implies that when embryonic conditions happen to appear primitive they may be assumed to be so. But can the pectoral girdle of the ten-day ostrich embryo be truly primitive in the complete absence of paired clavicles and interclavicle, in the presence of the above described descending process of the scapula, in the replacement

of a true coracoid foramen by a large notch and in the sharp backward turning of the scapula across the ribs? These characters, on the other hand, are about what one might expect to find in the embryo of an ostrich, if earlier developmental stages are chiefly concerned with foreshadowing later ontogenetic stages rather than repeating phylogeny. The anterior expansion of the sternum in the ostrich may increase its usefulness as shield for the heart and other viscera. The vertical shortness of the coracoid in the ten-day ostrich embryo, regarded by Lowe as a point of special resemblance to primitive reptiles, may rather be due to the failure, at this stage, of the coracoid center to grow rapidly in the vertical direction. The long coracoid of the cursorial *Mesites*, cited by Lowe (p. 227) as proving that short coracoids are not the necessary result of running habits, seems to me to prove little or nothing as to the origin of the short coracoids in the ten-day ostrich embryo, since *Mesites* belongs to a widely different order, admittedly of carinate origin, in which the coracoids have either not yet become short, or may be long for quite different reasons.

If, on the contrary, the ratite birds are in essentials only degenerate long-limbed carinates, then the opening out of the coraco-scapular angle in ratites becomes intelligible as the result of several factors: including the shortening of the coracoids, the loss of the keel and the dwindling of the pectoralis secundus muscle. The end-to-end relations of the scapula and coracoid noted by Dr. Lowe as a point of resemblance to primitive reptilian conditions may thus be a mere convergence, like the formation of the false "precoracoid." Even in the Eocene *Diatryma*, whose skull offers decisive evidences against struthious affinities, the wings are vestigial and the tiny scapulo-coracoid has assumed a struthious appearance.

To me as a student of vertebrate skeletons it is difficult to conceive that *Rhea* can be anything else than what it has long been taken to be, namely, a bird which has inherited the "basic patents" of typical bird wings, but which cannot fly because of defective wing feathers and reduced pectoral muscles. But Dr. Lowe apparently asks us to believe that the very small pectoralis secundus muscle figured by him in the wing of the foetal *Rhea* is in a primitive, not reduced, condition.

Dr. Lowe's assumption that the ostrich and other ratites may have been derived from non-flying primitive birds rests partly on analogies

with the running dinosaurs and seems to leave out of account the fact that the most bird-like of all known dinosaurs, *Struthiomimus*, was much later in geologic time than the true birds *Archaeopteryx* and *Archaeornis*, and that *Struthiomimus* was terrestrial and cursorial while the far older birds were skimming or gliding types. *Struthiomimus* was in fact even younger than *Hesperornis*, *Ichthyornis* and their contemporaries, which proves that long before the close of the Cretaceous period true rhipiduran carinate birds had been produced and had had time to give rise on one hand to the excessively aquatic *Hesperornis* with its keelless sternum and vestigial humerus, and on the other hand to the strong flying, well-keeled *Ichthyornis*.

When we examine the enlarged manus of *Struthiomimus* and its allies we find that although wing-like in some respects the fingers were still distinct and there is no evidence of the fusion of parts of digits II and III, which complete fusion in the ostrich and other ratites is another mute evidence of derivation from a normal well-winged ancestor. Nor do we find in the running dinosaurs any evidence of the insertion of enlarged flight feathers on the back of the hand and arm, such as are definitely present in all birds from *Archaeopteryx* onward.

The later long-tailed running dinosaurs with their potentially wing-like arms may even afford misleading suggestions as to early stages of the origin of flight, and it should not be forgotten that they were not closely related to *Archaeopteryx*, a truly flying ancestral bird, which had presumably been derived from far older reptiles of Triassic age. The ratites, on the other hand, by all the reliable marks of the skeleton, were derivatives of true rhipiduran birds of a later stock than the early long-tailed Ornithurae and thus only convergently resembled the running dinosaurs.

There is one region of the skeleton of the ostrich, however, which at first sight appears to afford strong support for Dr. Lowe's claim that the ratites have been evolved from a very ancient avian stock, and that is the supposedly primitive characters of the palate, to which the name "Palæognathæ" alludes. It is commonly assumed that the conditions of the palate in the Palæognathæ, in which the pterygoids continue forward to meet the palatines without forming a "secondary" contact with the rostrum of the basisphenoid, is truly primitive. But in the lack of certain knowledge of the palates of *Archaeopteryx* and

the Cretaceous birds such an assumption is by no means beyond doubt. It is even conceivable that the palæognathous condition in the ratites may have arisen through the loss of an arrangement called schizognathism which is found in primitive carinate birds, and that the palæognathous arrangement may in some way be correlated with the prevailing herbivorous habits of the struthious birds, whereas the possibly more primitive schizognathos condition may be associated with more general feeding habits. In any case the presence of a so-called palæognathous palate does not in itself prove that the ratites are not derived from flying birds. The tinamous, which according to Beddard have a palæognathous palate, may also represent the first step in the evolution of ground-living struthious birds. At least it is certain that the palæognathous palate is already far removed from that of primitive reptiles, in the peculiarly short pterygoids which are widely separated from the midline.

The presence of a pygostyle in the ostrich, although it is in a somewhat degenerate condition, is good evidence of derivation from rhipiduran birds, in which the spreading tail acts as a break just before landing from a flight. It is also another indication of the derivation of the ostrich from birds that stood well above the grade of the poorly flying *Archaeopteryx*, in which the tail retained the primitive many-jointed condition of its reptilian ancestors.

2. THE PENGUINS: POST-REPTILIANS OR AQUATIC CARINATES?

The absence of a carina on the sternum in ratites is used by Dr. Lowe as a strong point against their derivation from carinate birds; but the presence of a carina in penguins, according to the same authority, is no evidence of carinate relationship. While this paradox might conceivably be true, the evidence that it is true seems defective at certain points.

Dr. Lowe bases his objection to the derivation of the penguins from birds with normal wings chiefly upon six classes of evidence: palæontological, embryological, pterylographical, osteological, myological, and geographic. On the palæontological side he has no difficulty in proving conclusively that the fossil penguins from the Miocene and even from the Eocene epochs were already true penguins with wings and feet differing only in minor details from those of existing forms. He concludes, therefore, that the penguins are birds of vast

antiquity. But here he strangely forgets the abundant evidence that many other existing orders of birds were already established by early Tertiary times, that the oldest known true birds from the Jurassic were probably more than one hundred million years older than the Tertiary penguins, and that there are vast lost intervals in the known history of the birds throughout the Upper Jurassic and through all the tens of millions of years of the Lower and Middle Cretaceous; that after a brief glimpse of the already diversified orders of the Upper Cretaceous, there is another huge gap of tens of millions of years to the time of the oldest well known penguins, those of the Miocene of the antarctic islands. Surely it is equivalent to an anachronism to treat Miocene penguins as birds of vast antiquity. In the human sense, well enough, but in comparison with both the well winged and the specialized aquatic birds of Upper Cretaceous times the Miocene penguins are mere parvenus, which have had scores of millions of years in which to become highly specialized for aquatic life.

It may be a lack of appreciation of the inconceivable vastness of geologic time that has so often led embryologists to expect the embryos of recent vertebrates to climb their own ancestral tree with the most obliging thoroughness. Dr. Lowe exhibits some beautiful preparations of the wings of embryo penguins, showing that they are nothing but embryo penguin wings and concludes that they never were anything else. Throughout his papers on ratites and penguins we see a touching faith that embryonic characters are primitive characters that hark back at least to the dawn of avian life. Thus the arrangement of the feathers on the wings of penguins may probably be derived, he shows, from the peculiar arrangement of the Anlagen of feathers in the early embryos of carinate birds; therefore, he implies, the penguin condition harks back to the dawn of avian life, as does that of the embryos of carinate birds. But to those who accept the modern viewpoint that many embryonic conditions are merely preparatory for adult conditions, that many later adult characters were initiated in embryonic changes, that many other adult characters have been reached through the retention and emphasis of embryonic conditions, with progressive delay in development of the old adult characters,—to such modernists the fact that adult penguin wings retain certain conditions found only in the embryos of carinate birds may be only an added item of evidence that penguins are to some extent infantilized or larvalized carinates.

Dr. Lowe's pterylographical evidence lies outside the proper province of a palæontologist, but I can not forbear the following remarks: first, that the presence of innumerable small scale-like feathers on the wings of penguins looks to me like a fairly clear example of a phenomenon that I have elsewhere called secondary polyisomerism, or hyperpolyisomerism, involving reduction of size differences or de-differentiation, together with great multiplication of the de-differentiated units. Second, the presence of what I should regard as much less specialized down feathers on the backs of the penguins is another point of resemblance to, and possible derivation from, the larval or nestling conditions of non-aquatic carinate birds.

As to the more significant osteological peculiarities of the penguins, Lowe stresses the supposed resemblance of the very short, almost separate metapodials of the penguins to the corresponding elements in the feet of the running dinosaur *Ceratosaurus*. But the enormous differences between penguins and carnivorous dinosaurs in the construction of the skull and backbone, and even in many features of the pectoral and pelvic limbs, together with the inconceivably great gap in time between the Upper Jurassic and the Lower Miocene, collectively indicate that whatever special resemblance there may be in respect to the relative length of the three metatarsals in the dinosaur and penguin is either fortuitous or convergent or both at once. When, however, we compare the short metatarsals of *Ceratosaurus* with the short metatarsals of penguins, we see that in the former the three metatarsals though closely appressed are still separate, while in the latter they are fused together at the top with mere foramina between them, except at the lower end where they diverge to form the base of the somewhat spreading digits. The main basis of the resemblances between the feet of *Ceratosaurus* and of the penguins lies in the fact that both are descendants, at very unequal distances from the starting-point, of primitive thecodont or aëtosaurian reptiles with a running tarsus of three appressed metatarsals (II, III, IV). In the earlier birds, however, as in *Archæopteryx*, these metatarsals became fused together to form a compressed running foot. In spite of the spreading character of the metatarsals in penguins, the three metatarsals still retain evidence of derivation from the fused metatarsals of normal birds.

The shortness and subequality of the metatarsals in penguins is evidently a habitus character associated, first, with their peculiar planti-

grade manner of sitting; second, with their great prowess in walking, hopping and pushing themselves along on their bellies. Hence I do not admit in the short metatarsals any evidence of separate derivation from primitive reptiles. The short metatarsals of *Ceratosaurus* and *Tyrannosaurus*, on the other hand, are associated with the great weight of these animals.

It is strange that the construction of the bony wing of a penguin is not at once apparent to Dr. Lowe as a paddle-like modification of a true complete wing. Surely it shows the fusion of the digits and other general characters of the wings of well-flying birds, whereas in the pectoral appendages even of the most bird-like dinosaurs the digits remain separate, as they did even in the primitive winged bird *Archæopteryx*. But for all its essentially bird-like heritage, the bony wing of the penguins is disguised by a paddle-like habitus which is convergent toward that of other aquatic vertebrates, especially in its general flatness and in the convexity of its preaxial border.

It is in the entire pectoral girdle, however, that the penguins retain the most convincing evidence of derivation from completely flying carinate birds. Here are essentially the same outstandingly avian characters of the sabre-like scapula, the well developed furcula, the elongate coracoids, the foramen triosseum, the well developed carina and the enormous sternum. With all this the penguins merely fly under water instead of in the air.

It is true, that, as Dr. Lowe states, the dorsal sutures separating the backbone from the opposite ilia remain open; but is this surprising in a thoroughly aquatic vertebrate?

The relations between the sacral region and the vertebrae, as shown by Professor J. E. von Boas, are not widely different from those seen in carinate birds. Assuredly the backbone as a whole is thoroughly bird-like in all its bewildering complexities and gives no hint of the derivation of penguins from near the base of the avian tree.

Finally, the penguins, like other rhipiduran birds, possess a true plough-share bone, a mute evidence of descent from birds with a normal bird-like tail.

When we turn to the architecture of the skull I find no special evidences of descent from the post-reptilian founders. The palate, as in many carinates, is of the schizognathous type.

On the side of geographic distribution, the penguins as a whole center around the Antarctic and the fact that a few of them, finding themselves in sub-tropical conditions, have managed to muddle through to the present time says little about the ability of their remote forebears to adapt themselves to the severity of antarctic conditions. Nor does the fact that the auks are not as specialized as the penguins tell us much, except possibly that the auks are younger.

It is also strange that in all his discussion of the penguins Dr. Lowe never mentions the numerous obvious analogies with cetaceans. There is the most convincing and extensive evidence that cetaceans were derived from normal hairy land mammals with well developed legs; but degeneration and specialization have played such havoc with both the embryonic and adult anatomy that whales are now heavily disguised in a thoroughly aquatic habitus and can no more walk on land than penguins can fly in the air. No doubt whales also have been distinct from all other mammals at least since the early Eocene but, for all that, they remain placental mammals just as the penguins remain rhipiduran carinate birds.

DISCUSSION

Following the presentation of Professor Gregory's critique, Mr. John H. Baker, President of the Linnæan Society, called upon Dr. Robert Cushman Murphy to discuss, from the special aspect of feather-structure, Dr. Lowe's theses regarding the Ratites and the Penguins. Dr. Murphy spoke as follows:

Dr. Lowe uses the feathers and the feather tracts of both ostrich-like birds and penguins to bolster up the same reasoning to which, as we have learned from Professor Gregory, he marshals the characters he finds in the skeleton, muscles and viscera of adult and embryonic birds.

For the objective matter presented by Dr. Lowe I have nothing but admiration. He has, indeed, made us all his debtors in digging out and recording a large number of significant details, of which his discovery regarding the relationships of the feathers on the post-axial border of the penguin wing is only one of several illuminating examples. With Dr. Lowe's interpretation of a number of his facts, however, I heartily disagree. It seems to me, indeed, that many of his

findings concerning feathers, their structure and development, point to a quite different conclusion from the one he draws, and that the feathers of both penguins and ostrich-like birds testify to the hypothesis of evolutionary origin that Professor Gregory has outlined upon the basis of deeper morphological details.

THE RATITES

In the first place, Dr. Lowe excludes the tinamous from the struthious birds and notes that among all he would call the latter, such as ostriches, moas, cassowaries, rheas, rocs, and *Apteryx*, the feathers are evenly spaced over the body of the bird, without showing the apteria which are so characteristic of most carinates. Furthermore, he shows that the barbs of the struthious feathers do not have effective barbicels, leaving the vanes in consequence loose and incapable of offering resistance to the air. Dr. Lowe regards both of these characteristics as ancestral and primitive. He believes that, in the case of the ostrich-like birds, feather evolution has not proceeded much beyond an embryonic or "early avian" stage. He devotes many pages of text and a beautiful series of figures to establishing his point that there is no evidence of degeneration in the feathers of the ostrich-like birds, although he admits a considerable variation among the several members of the group. He holds, in brief, that it is inconceivable that such a simple arrangement of feather parts, involving the absence of typical pennaceous structure, could have been derived in any way from the highly specialized feathers of true flying birds. The plumage of ostrich-like birds, according to Lowe, is marked by complete absence of the teleoptylic or final phase in feather evolution.

Now all of this is entirely acceptable, save for Dr. Lowe's interpretation. He fondly believes that what is simple is necessarily primitive, whereas examples are not lacking in nature of organs of thoroughly simple structure occurring at the latter or top end of long phylogenetic series, of which earlier stages exhibit greater complexity. It is not necessary to assume that the simple struthious feathers have resulted from a degenerative process involving a reversal, so to speak, of the phylogenetic sequence. The result may rather have been attained through the actual dropping out or cutting off of the final stage of feather development somewhere along the line of the ostrich's phylogeny. As Professor Gregory has inferred, evolutionary change per-

tains to embryonic organisms no less than to adults. Youthful animals, as in the case of the emperor and king penguins, are sometimes far more dissimilar than the same creatures will be after they have grown up. Distinctly new trends in evolution are, moreover, more likely to be constructed upon the basis of a larval or primitive character than upon that of a mature or final character. This principle is what de Beer has called "pushing the adult stage off the end of the ontogeny."

In view of what we know about the genetics of feathers, and especially in the light of mutant domestic strains of birds, such as the "silky fowl," it seems to me that the derivation of ostrich plumage from a once more consolidated and advanced type of feather should cause us no difficulty whatsoever. Through direct and unpredictable changes in the germ plasm, a chicken of the silky type, the feathers of which show similar peculiarities to those of the ostrich-like birds, may arise over night, as it were, in a single generation. The silky fowl is a mutant of considerable antiquity. Marco Polo saw it in Asia in the 13th century. In this strain of poultry all the contour feathers are down feathers, with delicate shafts and long barbs. The barbules, moreover, arise irregularly, a matter of which Dr. Lowe makes much in discussing the plumage of the ostrich. Furthermore, the barbules are either not provided with barbicels or else these are in very reduced number, in consequence of which the barbs do not cling together to form a vane, and the entire feather is fluffy.

Tegetmeier in 1867 described the silky strain under the name of "emu fowl." The science of genetics has of course seen almost all its development since his day, but he correctly spoke of the condition as an accidental variation of plumage which occasionally occurs and which may be perpetuated. He figured a typical feather and stated that the barbs, instead of being held together by hooked barbules so as to constitute a plane surface, are independent and distinct.

Certain other breeds of poultry, such as the Cochins and Brahmas, show cognate similarities. Their feathers sometimes exhibit two distinct kinds of barbules, namely, short hooked ones and long ones without hooks. There thus seems to be a complete discontinuity between the two sorts of barbules, which harmonizes with the theory that the long barbule is a mutational form of the more typical short barbule. In any event, the silky mutation has arisen many times in poultry of

sundry breeds. Its sporadic appearance is probably due to the necessity for chance mating of birds carrying the silky factor in heterozygous condition. Even if the mutation occurred anew, it could not become visible until two individuals carrying it should cross.

Among ratite birds, the rhea has remiges possessing numerous though small cilia, some of them ending in hook-like nodules which very closely resemble similar structures in the silky fowl. It is not without reason that various geneticists, including Davenport (1906, p. 55) have, by inference at least, recognized all struthious feathers, such as those of the ostrich, rhea, emu, cassowary, etc., as mutant forms of ordinary plumage, and this seems to me far more reasonable than Dr. Lowe's contention.

Under such circumstances, is it not curious that Dr. Lowe is willing to believe in the profound evolution of the struthious birds towards a strictly cursorial habit of life, and yet is unwilling to accept the to-be-expected mutational correlations, including degenerative modification of an originally "flying type" of fore limb, pectoral girdle, and feathers?¹

THE PENGUINS

Turning now to the penguins, Dr. Lowe finds again a uniform feather-coat, as in the ratites. He remarks that this same pterylographic arrangement is also common to the crested screamer, and notes that the latter, alone among the birds he would regard as carinate, shows in this respect the same primitive plan as do those he calls the primarily aquatic penguins, and the primarily terrestrial ostrich-like birds. The inference would seem to be that the screamer (*Palamedea*) represents the primarily volant ancestral type in a conveniently tripartite class of vertebrates.

Dr. Lowe goes on to say that he sees through his study of the penguin feather the outcome, not of a process of degeneration, but one of failure to develop. The barbules at the distal ends of the barbs of penguin contour feathers are, he holds, specialized pennal-down barbules. The arrangement of the wing feathers in the penguins may be said to be larval in character, with specialties superimposed.

¹See also: Stresemann, E., La Structure des Remiges chez quelques Raies physiologiquement apteres. *Alauda* IV (1932).

In the last conclusion Dr. Lowe and I meet on common ground, except that I would apply here the same general reasoning already given for the ostriches. Many penguin characters, including those of feathers, are doubtless to a certain extent larval, but this by no means precludes the likelihood that in earlier stages this same feather structure may have been succeeded by others which have since dropped away. I can not agree that penguin feathers are evidence that the birds have specialized directly from a primitive, non-flying, generalized ancestor.

Dr. Lowe has given us many interesting details regarding the peculiarities of penguin pterylosis. He finds for example that there are 300 feathers in a 25mm. square on the back of *Pygoscelis papua*. There are 100 or more putative remiges on the border of the emperor penguin's wing; no other bird has more than 42. There are no less than 38 successive rows of scale-like feathers between the pre- and post-axial borders of the emperor penguin's wing, which means something like 3,800 feathers on the dorsal surface of the forearm alone in this species. But Dr. Lowe speaks of all these numbers as the "primitive quantum," for which I believe we have not the slightest iota of evidence, while all the correlated probabilities are against it. Dr. Gregory has already spoken of the familiar phenomenon of multiplication of segments and parts, and it seems to me that in the numbers of penguin feathers we have a capital example of this genetic process. The peculiarity of the penguin's molt, and the length and nature of the horny sheath in which the feather grows, would likewise appear to have no suggestion of a primitive condition but rather to be correlated with the thickness of the insulating coat of blubber with which penguins are invested.

Dr. Lowe has discovered an extraordinarily interesting fact in the relationships of certain feathers on the upper and under surface of the penguin's wing, and one in which there is an important discrepancy between penguins and all typical flying birds. This relates to the positions of the hitherto unrecognized coverts and "quills" of penguins. It was pointed out long ago by Sundevall that the major and median under wing coverts in normal flying birds have their concave surfaces facing downwards, instead of upwards or against the quills, as do the rows of coverts anterior to them. Wray subsequently

explained this anomaly by demonstrating that in embryonic development the first two rows of under coverts arise on the outer side of the wing, and later, with the hypertrophied growth of the remiges, become shifted around to the inner or ventral side.

Now Dr. Lowe shows that the early embryonic condition persists in the adult penguin. In *Aptenodytes*, for example, there are four rows of marginal white feathers. Two of these rows are implanted above the actual edge of the wing and face downwards; the two immediately below the edge of the wing face upwards. The homologies permit Dr. Lowe to point out the first row of blue feathers on the dorsal surface as the hitherto unrecognized remiges. The feather arrangement along the hind edge of the penguin's wing is therefore persistently embryonic, but it does not follow that it is phylogenetically primitive. On the contrary, the condition is the one that would almost necessarily be restored with the reduction of large flight-quills to the size of undifferentiated coverts.

I am ready to hold with Dr. Lowe that the described feather relationship is larval or embryonic, and even that it may simulate the ultimate ancestral condition. Rather than representing a truly primitive stage, however, I should say that the position of the penguin's coverts merely indicates that a phylogenetically later stage once existed, and has since dropped out. If one knew penguins only by their wings, such a conclusion might not be justifiable, but it appears to be the only logical inference when taken in conjunction with the mass of other evidence.

It is, of course, entirely possible that the ancestors of penguins may have more or less lost the art of flight long before they took to pelagic life. Their center of dispersal was probably in an area corresponding with what we now call the Antarctic Continent, and this region has apparently been the most isolated portion of the earth's surface during a very great period of geologic time. It is likely, indeed, that it has been so long and so widely separated from the northern continents by water that it was never reached by terrestrial animals of any sort. Flying birds, however, could not be barred out. We may note, furthermore, that among birds reaching remote and safe insular areas, loss of flight is apt to occur. Therefore, without being far-fetched, we may picture the ancestral penguin as a bird that had given

up the air and had taken to the ground, or to littoral waters, acquiring during this phase something of the pedestrian and graviportal ability that still characterizes the group. It is worth noting here that Ameghino called the fossil *Cladornis* a "dry-land penguin." Now with the approach of periods of glaciation, such as have marked many different geological epochs and which, indeed, grip contemporary Antarctica, some of these flightless birds would have been forced to the sea for survival, producing the ancestors of the penguin order as we know it to-day. The beginnings of this trend were undoubtedly a long time ago, far longer than Dr. Lowe conceives, I judge, since he calls even mid-Tertiary birds "ancient." We can readily accept the morphological truths, which he points out with great thoroughness, correcting Wiman's error and proving that the fossil Miocene penguins were extremely closely related to the genera still in the world.

To conclude, I see in the penguin not a bird one stage removed from reptilian ancestry, and aquatic from the beginning of things, but rather, as advertised in its feathers and in all other parts of its make-up, a bird carrying the stigmata of three successive ancestral stages—first the flying, second the flightless, and third the supremely aquatic.

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How Many Birds Are Known?

BY ERNST MAYR

In the year 1735, just exactly 200 years ago, a work was published which was the starting point of modern zoological classification, namely the first edition of Linné's *Systema Naturae*. Binary nomenclature had not yet quite matured in this edition, and the 117 species, which Linné lists in his first attempt of a classification of birds, correspond rather to the genera of modern taxonomy than to the species. In the 10th edition of the "*Systema Naturae*" (1758), in which the binomial principle is employed consistently for the first time, Linné enumerates 554 species of birds (in 63 genera) as known to him at that time.

The subsequent 150 years were a period of intensive exploration and of keen interest in descriptive natural history. Great numbers of new species of birds were described every year. The end of this period of ornithological history is marked by the publication of Sharpe's "*Handlist*"* (1899-1909), a complete catalogue of all birds known at that time. The number of genera and species admitted by Sharpe in 1909 was 2,810 genera and 18,939 species. These figures were really more a guess than an actual count, since Sharpe did not always attempt to ascertain the validity of the counted species.

Sharpe was a faithful disciple of the principle of binomial nomenclature. He did not deny the facts of geographical variation and of intergradation between "species," he also admitted many advantages of the trinomial system. However he refused to adopt it for purely practical reasons. He thought it was too clumsy and once said in an argument with Dr. Hartert: "I cannot write three names on one label!" The general acceptance of the theory of evolution and the ever increasing number of descriptions of new kinds of birds made it more and more obvious that binomial nomenclature was no longer sufficient to express the relationships between geographical representatives and closely related forms. A boom for modern taxonomic work followed the acceptance of the trinomials, and during the past 30 years nearly all the genera of birds were revised with the help of the subspecies concept. The road was thus cleared for a modern list of birds. The monumental task of writing this list is being undertaken by James L.

**Handlist of the Genera and Species of Birds*, Vol. I-V, London 1899-1909.

Peters, Curator of Birds at the Museum of Comparative Zoölogy in Cambridge (Mass.). The first volume of this "Check-list of Birds of the World" was published in 1931, the second volume in 1934, with about 10 volumes to be published in the future. It is a work which deserves the highest praise for its thoroughness and reliability, and which has become the indispensable tool of every bird taxonomist.

A comparison between Sharpe's Handlist and Peters' Check-list reveals not only how many new birds have been discovered and described during the past 30 years, but also how much the new species concept has changed the arrangement of the known forms. A comparative table of the number of genera, species and subspecies admitted by Sharpe and by Peters will help to illustrate this point.

INCREASE IN THE NUMBER OF KNOWN BIRDS IN SEVERAL ORDERS

Name of Order	Sharpe (1899)		Sharpe (1909) ¹		Peters (1931, 1934)		
	genera	species	genera	species	genera	species	subsp.
Struthioniformes - - - -	1	4			1	1	6
Rheiformes - - - - -	1	3			2	2	6
Casuariformes - - - -	2	16	21	109	2	8	35
Apterygiformes - - - -	1	6			1	3	5
Tinamiformes - - - - -	9	73	9	79	9	51	118
Sphenisciformes - - - -	6	17	10	31	6	17	22
Gaviiformes - - - - -	1	5	2	8	1	4	8
Colymbiforms - - - - -	7	25	7	30	5	18	39
Procellariiformes - - - -	25	120	27	133	24	107	186
Pelecaniformes - - - - -	8	76	12	122	9	59	126
Ciconiiformes - - - - -	74	169	89	229	68	123	244
Anseriformes - - - - -	73	210	81	280	64	170	231
Falconiformes - - - - -	92	516	100	610	89	288	700
Galliformes - - - - -	95	476	102	616	94	277	830
Gruiformes - - - - -	85	302	86	359	81	205	481
Charadriiformes - - - -	138	411	158	509	124	315	602
	618	2,429	704	3,115	577	1,638	3,639

¹Count in the introduction to Vol. V of the Handlist; includes fossil birds.

Even a casual glance at these figures reveals two significant facts. One is, that the changes are very uneven; they are very small in some groups (mostly those with negligible geographical variation), while in other groups the number of known forms has almost doubled. The other outstanding fact is the general trend of development (within the taxonomic units). The number of genera has somewhat decreased,

the number of species has been reduced by more than a third, while the total number of forms has increased very substantially.

The two questions which we would like to answer in turn for the three taxonomic units, genus, species, and subspecies, are: How many are known to-day?, and : What will be their total number after all birds have been discovered and described?

GENERA.—Sharpe lists in 1909 (Handlist, vol. V, p. XXII) a total of 2,810 genera of birds. This number includes many genera of fossil birds, which I am leaving out of consideration in the present discussion. In the 16 orders of birds covered by the two first volumes of the "Check-list" Sharpe recognizes 704 genera, Peters only 577, a reduction of 127 (= 18.1%). This brings out very clearly the difference between the point of view of an old-fashioned genus-splitter and that of a modern taxonomist. In the non-passerine birds not yet treated by Peters (578 of Sharpe's genera) and in the Passerine birds (1,496 of Sharpe's genera) the reduction will be less. In fact, there will be quite an increase in the number of genera in some of the families, as for example in the *Tyrannidae* (32% according to Hellmayr) and in the *Meliphagidae*. Taking all the facts into consideration, I arrive at 2,600 as the total number of valid genera of recent birds known at the present time.

We can be reasonably sure that this figure will not be changed much by future discovery of new genera. According to Meise (Proceed. VIIIth Intern. Ornith. Congress) there have been described about 500 genera during the 14-year period from 1920 to 1933, but only 75 of these can be considered as valid according to the progressive taxonomic views. The majority of these newly recognized genera was not based on the discovery of strikingly new species, but rather on the removal of aberrant species from the genera in which they had been included in the past. Practically all families of birds have been revised in this manner, which makes me believe that the number of genera of birds will not materially be altered in the future; it will stay at about 2,600, the figure mentioned by me in the preceding paragraph.

SPECIES.—It has become increasingly clear during the past 30 years, that the definition and the extent of a species is very much a matter of personal opinion. Peters has more or less followed a middle course between two extremes. The one of these extremes demands

perfect intergradation between subspecies of a species (Ridgway, etc.), and the other merely geographical representation (Kleinschmidt). In the orders treated in the first two volumes of his "Check-list" Peters reduces the number of species from 3,115 (Sharpe, 1909) to 1,638, a reduction of 47.4%. An ardent follower of Kleinschmidt might slice off another 5-10% by combining some of Peters' species in the orders: Galliformes, Falconiformes, Ciconiiformes and Charadriiformes. However this seems inadvisable and not in the trend of our future species concept. The majority of the species in the orders already treated by Peters do not show a high degree of geographical variation. It can be predicted that the reduction in the number of species in many genera of Oscines (as compared with the figures in Sharpe, 1909) will by far surpass 50%. The total number of good species of birds will be slightly below 50% of the figure given by Sharpe in 1909 (18,939) namely 8,500. The stability of this figure will depend more on the future development of our species concept, than on the discovery of new species. The period of discoveries is definitely a matter of the past.

Meise (l.c.) has counted that about 140 (between 133 and 167) good species have been described during the past fourteen years, an average of 10 per year. I believe that less than this number remains undescribed and my reasons for this belief are the following: The majority of the species that were discovered in recent years were found on isolated islands and unexplored mountain ranges. Such areas are now rapidly disappearing. Not a single new species of bird has been found in North America during the past 40 years, and 7 expeditions in the last 10 years to New Guinea, supposedly one of the least known regions of the world, have found only 5 good new species. I therefore believe that the number of still undescribed species of birds is below 100.

SUBSPECIES.—The total number of species (our species and subspecies) known to Sharpe in 1909 was 18,939. This figure includes the species of fossil birds and the names of the species which were described after the publication of the first four volumes of the "Hand-list." In the orders treated in the first two volumes of Peters' "Check-list," Sharpe (1909) lists 3,115 forms, Peters, 3,639, an increase of 524 or only 16.8%. In the Passerine families the increase has undoubtedly been larger, but only in a few cases are modern revisions of whole families available which could be compared with Sharpe's figures.

In the *Tyrannidae*, Sharpe (1909) recognizes 87 genera and 617 species, while Hellmayr (1924) admits 115 genera (+38.6%), 362 species (-41.4%) and 757 subspecies, an increase of 22.7% in the total number of forms. Of the genus *Cisticola*, Sharpe, in 1903, lists 48 species, while Lynes in his recent monograph records 154 species and subspecies, an increase of 221%. Sharpe (1909) lists of non-Aethiopian Zosteropidae about 125. Stresemann in a recent review (1931) 205, an increase of 54%. Taking all groups into consideration I arrive for the now known number of forms at an average increase of 40-45% above Sharpe's figure of 1909. 45% of 19,000 = 8,540. *I therefore estimate the total number of species and subspecies of birds known at the present time at 27,000.*

Another way to arrive at the number of known birds, is to try to count how many valid forms were described since the publication of Sharpe's Handlist.

Meise in his report at the Oxford congress reported that about 4,500 subspecies had been described in the years from 1920 to 1933 of which he considered about 3,000 as valid. My estimate is that about 2,500 were described in the years 1909 to 1919, to which have to be added about 2,500 forms which were already known at Sharpe's times but were not recognized before our modern times of fine subspecies distinctions. Altogether we would also arrive at a figure of about 27,000 known birds.

But how many more subspecies remain to be discovered or to be described? One can unhesitatingly say that it depends entirely on the future development of the taxonomic viewpoint. There will be practically no limit to the number of subspecies, if such names are admitted as have been given by Oberholser, some Californian authors, and others to minutely differing populations. If, however, those subspecies are considered invalid that cannot be identified in at least 75% of the specimens, then a prediction is possible, on the basis of the activity of the past 14 years. During that period an average of 225 valid forms were described per year. There is no reason not to believe that an average of 200 valid new forms will be described during the coming 25 years, which would bring the number of known birds up to 32,000 in the year 1960. From then on the progress will be slower and I do not believe that the number of valid and recognizable species and subspecies of birds will ever reach 40,000.

Bernard Altum and the Territory Theory

BY ERNST MAYR

In 1920 Eliot Howard published a book, "Territory in Bird-life," which caused more discussions among ornithologists than any other recent publication. It has also been responsible in a high degree for the rapid spreading of a new method of bird-study: the life history of individual birds. For ten years or more it was generally believed among the English speaking ornithologists that Howard's theory was something entirely novel, but recently it has been shown that he had several forerunners (Mousley¹, Moffat², and others) who had made similar observations, but had not developed a detailed theory. It was Meise (1930, p. 52) who called attention to the fact that in Germany the essentials of Howard's theory were common knowledge of the field ornithologists. Bernard Altum had developed, as early as 1868, in great detail a territory concept which in some ways was even superior to that of Howard by largely avoiding generalizations concerning the occurrence of territory among birds. These ideas were published in a book called: "Der Vogel und sein Leben" (The Bird and his Life), which had a remarkable success in Germany, where seven editions were printed between 1868 and 1903.

Since this book is now out of print, it was suggested to me by several British ornithologists at the International Ornithological Congress at Oxford that I publish a translation. The idea was much encouraged by some of my American friends, and I finally undertook the work. Mrs. Margaret M. Nice and Mr. William Vogt were so kind as to check my translation, and I owe to them, as well as to Dr. Austin Rand, many helpful suggestions which I want to acknowledge with my sincere appreciation.

As an introduction, it may be opportune to say a few words about the author.

Johann Bernard Theodor Altum was born in Münster (Westfalia) on December 31, 1824. His father, a small artisan, instilled in his son a love for nature and gave him his first instructions in the collecting and study of birds. Altum entered a Catholic college in 1845 and four years later he became a priest in one of the Münster churches.

¹Auk, 1919, p. 339; and Auk, 1921, p. 321.

²1903, Irish Naturalist, XII, p. 152.

His great love for science, however, influenced him to continue his studies at the university, and in 1853 he went to Berlin to complete his work in zoology and philology. In 1855 he received his doctor's degree, and after having held an assistantship under Lichtenstein at the Zoological Museum, he returned to Münster where he obtained a teaching position.

In 1859 he became associate professor at the Münster university after giving a lecture on climatical varieties of animals. The subsequent ten years comprised his most active period of field ornithology, at the end of which he published his well-known book: "Der Vogel und sein Leben" (1868). The following year Altum was appointed professor of zoology at the forestry college at Eberswalde. In this position he became the father of economic ornithology. The results of his research on the interrelation between birds and insects are embodied in his three volume work "Forstzoologie," the "classic" of this field.

In the course of these investigations he came to the conclusion that it was futile to classify birds into beneficial and harmful species. He was, perhaps, the first conservationist to proclaim the protection of birds primarily on the basis of their aesthetic value (1881, etc.), a point of view which he defended vigorously at legislative meetings and scientific congresses against opponents who proclaimed the protection of birds merely on the basis of their economic importance.

Since this is not the place to list the many-sided activities of this gifted man, I will only mention that he was president of the German Ornithological Society for many years and his writings were popular all over Germany. More detailed information can be found in his obituaries². Altum died February 1, 1900, at the age of 76 years.

The first edition of "Birds and their Life" (Der Vogel und sein Leben) was published in 1868, originally more or less as an answer to A. Brehm's book with the same name (Das Leben der Vögel, 1861). Brehm had given a very sentimental and anthropomorphic picture of the bird's life, surmising that birds felt and thought very much like humans. Altum's principle, however, was, "animal non agit, agitur³."

¹Forstzoologie, 3 vol., 2nd ed., Berlin 1880.

²Ornith. Monatsber. 1900, p. 49-54; Schalow, Beitr. Vogelfauna Brandenburg. 1919, p. 555-569.

³Translated: An animal does not act, but is being acted upon, or more freely: An animal does not act by its own volition, but reacts to stimuli (drives).

a remarkably modern point of view. To support this theory he gathered one piece of evidence after another, and he also developed his territory theory in this connection.

The following translation is based on the sixth edition (1898) of Altum's work of which more copies are available than of any of the earlier editions. It is, however, a practically unaltered reprint of the first edition (1868) in those chapters in which we are particularly interested. The only real difference is the insertion on page 101 of a statement relating to the birds of prey. I have tried to follow the original as closely as possible which will account for some of the foreign sounding phrases.

Altum treats territory in his chapter on "Song," explaining that song not only coincides seasonally with the reproductive activities, but that it is a necessary and integral part of them. It serves to bring together the pairs and to fix the territory borders:

"/97/ The Fixing of the Territory Borders.

"It is impossible among a great many species of birds, for numerous pairs to nest close together, but individual pairs must settle at precisely fixed distances from each other. The reason for this necessity is the amount and kind of food they have to gather for themselves and their young, together with the methods by which they secure it. All the species of birds which have specialized diets and which, in searching for food—mostly animal matter—for themselves and their young, limit their wanderings to small areas, can not and ought not to settle close to other pairs because of the danger of starvation. They need a territory (*Brutrevier*) of a definite size, which varies according to the productivity of any given locality.

"In order to determine the daily food consumption of my caged Blue-throat (*Cyanosylvia*), I once counted the 'ant-eggs' I fed it, and discovered that it devoured during an average day about 1,200 of them in addition to eight meal-worms. Now let us suppose that even a smaller quantity, perhaps 1,000 insects of the same size, would have been sufficient, /p. 98/ and let us assume that the daily food of five young in the nest equals that of the two adults; such a pair of Blue-throats, with their young, would need under natural conditions about 4,000 insects of 'ant-egg' size each day. Other investigators have ar-

¹Figures refer to the pagination of the sixth edition.

rived at similar figures. All Warblers, Redstarts, the Nightingale, the Robin, the Hedge-sparrow, the Titmice, in short, all such birds, require a more or less similar quantity; and even most of the Finches and Buntings, though they are primarily seed-eaters, feed their young mostly with insects. They search for this almost incredible quantity of food, not at a distance, but in the immediate vicinity of the nest. Many insects, such as large and hard beetles, hairy caterpillars, and others, are, however, not fit for food, and it is only because numbers of insects are emerging every day that it is possible for the adult birds to satisfy themselves and their offspring. It is self-evident that a half dozen pairs of such similar species of birds cannot settle in the same immediate vicinity, for each pair must have its own territory if it is to avoid starvation or, at best, a very miserable existence.

"If a locality produces a great deal of food, the result of favorable soil, vegetation, and climatic conditions, the size of territories may be reduced to some extent. We call such localities excellent Warbler, Nightingale, etc., terrain, but even here territorial boundaries cannot be absent. It is not at all remarkable that for each species of bird the size of these necessary territories is adjusted to its exact ecological requirements and its specific food. While, for example, the Sea-eagle has a territory an hour's walk in diameter, a small wood lot is sufficient for the Woodpecker, and a single acre of brush for the Warbler. All this is well-balanced and well-contrived. Anyone who spends a bright morning during the breeding season in a country rich with birds can easily learn the size of the territories from the distances between the singing males; and it gives no little pleasure to be able to determine, in this manner, the number and approximate position of the nests of so many species and pairs of birds. One acquires, in this way, a clear insight into the economy and purposeful distribution of the whole.

"/p. 99/ Birds of different species, however, can establish their nests close together without the danger of a considerable scarcity of food, because they rarely compete with each other. Even though all of them, with their young, live on insects, the manner of securing them usually differs as well as the kind of insects on which they feed. While one species of birds catches flying imagos, another searches for animals crawling along the ground, a third gathers them from twigs and buds, a fourth and fifth get them from the cracks in the bark or even hack

open the wood, others combine several methods of capture or live chiefly on the insects peculiar to certain plants. Such species of birds either do not compete with one another or do so only to a slight degree. I observed several years ago a most remarkable instance of four different pairs of birds—a Redstart, a Wagtail, a Wren and a Blue-tit, all having their nests and eggs at the same time in the same beehive. Pairs of different species frequently nest close together. Several pairs of the same species, however, which live on the same kind of food and employ the same manner of securing it, cannot nest together; they must necessarily be separated by established boundaries.

“What separates them? It is, of course, natural that the most suitable localities will be the most sought by the species preferring them. Large numbers will gather in such places, overcrowding them, while other available territories would be empty if pairs were not kept apart by force. This force is used by a male as soon as another gets too close during the breeding season. The interloper is immediately attacked in the most violent manner, and driven to a distance that is determined by the size of the required territory. I shall discuss below, in more detail, this fighting between the males and therefore will not describe its purpose now.

“But many of my readers will ask what is the connection of song, the main subject of this chapter, with the question of territory? A bird must be able to perceive another bird in order to know of his presence. The majority of the above-mentioned birds, however, for example, all of our *Sylviae*, *Phylloscopi*, Reed-warblers, Larks, Kinglets, Titmice, etc., live in dense scrubs or thick luxurious vegetation /p. 100/. Since birds cannot detect each other by their olfactory sense, as mammals do, they must make themselves conspicuous in some other manner, i.e., by their mating call, their song. If birds were more or less mute, a too close approach would rarely be noticed by them, and even if it were noticed and the intruder driven the proper distance away, he could soon come back silently and unnoticed. As it is, however, since all birds sing jealously, this is not possible, for every time a bird approaches too closely, it is at once attacked again. They sing day after day, in the morning and the evening continuously, and by this song the boundaries of the territory are fixed. In fact, the real fight, the mutual attack of the males, is frequently begun while

they sing, and the song continues during the battle." [Discussion of this pp. 100,101, concluding in this sentence:] "The song, or mating call, is thus the necessary means for the required separation of the territories.

"Some species of birds, however, have no definite territories. On a single tower a hundred pairs of Jackdaws may nest, one Martin nest may be built on the side of another, and under the roof of a large house we can find dozens of nests of House Sparrows and Swifts. The arctic sea birds, Auks, Murres, Puffins, Gulls, and Terns, and also the Cormorants, Herons, Rooks, Starlings, and others nest more or less colonially, some of these in groups of many thousands.

"Birds of prey¹ of the same species usually nest far apart. But our charming Kestrel may have 10 or even 20 nests close to each other in the woods which adjoin his hunting ground, the wide open fields.² On the Werbellin Lake (near Berlin) 12 pairs of Ospreys had built their nests on a few old oaks, one of the trees holding even two occupied nests. The hunting territory included the above mentioned lake and a few smaller waters. A mutual restriction of the hunting territory and of the prey of the individual pairs was in this case impossible.

"/p. 102/ The above mentioned species differ in their way of living from those which maintain a strict territory by not searching for their food in the immediate vicinity of the nest, but rather in the wide sea or on a wide, open field. Or these species are omnivorous, as the House Sparrow, and will never be lacking in food for their young. These species, even those which belong anatomically to the Oscines, do not have a regular song, . . . but all of them have a specific mating call, so that the males are made aware of each other and may fight for the nesting place [the location of the nest], but definite larger distances are not necessary for them."

"/p. 128/ The Fight of the Males.

"We have learned in the important previous chapter [pp. 97-102, that the song and mating call of the male birds has among other things: not only the purpose of indicating from the distance to the females, (which react only to the voice of the males of their own species), their often rather hidden station, but it also serves in many species

¹The 1st edition does not contain the following 8 lines.—E.M.

²See also Jourdain, 1927, Brit. Birds XXI, p. 71, 100-103.—E.M.

as a mutual signal, to fix the distance of the nests and thus the required size of the territories /p. 129/, since males which happen to get too close to each other fight until one of the combatants has retreated to the required distance.

“This statement, however, does not hold good for all species of birds. As mentioned, those are not required to maintain a strict territory that fly far for their food (as Swallow, Swifts, Jackdaws, etc.,) or are omnivorous (as the House Sparrow), but nest sociably; yet among the individual males there is a great deal of fighting at the beginning of the breeding season. We also find these frequently furious fights in those species which move around with their young immediately after hatching, not being tied down to a restricted nesting place, to a territory which would exclusively support them (as, for example, many gallinaceous, marsh, and water birds). It is therefore clear that there must be a further necessity for these fights, in addition to the reason already given [competition for food supply].”

This ends the statements that refer directly to territory. Altum then adds, on pp. 129-132, some remarks on sexual selection, summarizing his opinion in the sentence:

/p. 132/ “In short even the expression ‘fighting of the males over females’ is false: The males fight to fix the size of the territory, little as they may realize the vital necessity of this, and also to select the healthiest individuals for reproduction, but for nothing else.”

THE DEFINITION OF TERRITORY.—Altum does not give a clear definition of *Brutrevier* (territory), but his descriptions make it quite clear what he had in mind. Howard, on the contrary, is rather vague, as has been pointed out by Messrs. Lack and others. He, also, not only neglects to define “territory,” but he extends this term to all phenomena of spatial occupancy (“landed proprietorship”) in birds. He says (1920, p. 55) “the process of territorial behaviour has been adjusted to meet the requirements of different species: the size of the territory, the period of its daily occupation, the purpose which it serves—these all depend upon manifold relationships and do not affect the principle.” This quotation reveals, in my opinion, the fundamental mistake in Howard’s entire concept. He combines under one term “territory” entirely independent and widely differing phenomena in bird life. Their only common factor is the occupation of space by

an individual bird. It is something entirely different if a Ruff, a Prairie Chicken, or a Bird of Paradise, always displays on the same spot, or if a guillemot, a tern, a cormorant, or some other colonial sea-bird defends its nest against trespassers, or if a Song Sparrow, a Reed Bunting, or some warbler actually establishes a territory. Because, as Mrs. Nice has pointed out:

"If the concept of 'territory' is to be significant, we must use the word with a definite meaning, . . . 'Territory' has been far too widely and loosely used and here even Howard has erred through over-enthusiasm. Territory cannot mean just the nest spot when the adults feed in common; this may be 'nest territory,' but is a very different matter from a territory in its strict sense to which the parents confine themselves during the breeding season. Again, the very essence of territory lies in its exclusiveness; if a bird's range is not defended, it is not a territory" (Nice, 1933, p.90). Mrs. Nice then continues to describe the essential characteristics of true territory. That Howard was too sweeping, and that he included phenomena in his territory concept, which really had little to do with it, was realized very soon after the publication of his "Territory in Bird Life." Jourdain points this out as early as 1921 in a review of Howard's book (*Ibis*, 1921, p. 324):

"We think a truer idea of Territory in Bird Life would be gained by eliminating the actual nesting site, which is, of course, a necessity in every case, and restricting the use of the word to the area embraced by the activities of the parents. We shall then find that in some groups all other individuals of the same species are rigidly driven off the whole territory, in others the idea is only present in a rudimentary form, and in a third class the association is of the closest kind and individual territory is unknown."

Much as there has been written on territory and many detailed descriptions as have been given, so far as I know, there has been no attempt to give a strict definition of the term. It is, however, very much needed in order to prevent generalizations on the subject. After much consideration, I propose the following formulation: "*Territory is an area occupied by one male of a species which it defends against intrusions of other males of the same species and in which it makes itself conspicuous.*"

An examination of this definition at once reveals a number of significant facts. First of all, I have omitted from the definition any

reference to the "purpose" of territory. The question whether the territory serves to guarantee the food supply for the young, as Altum thought, or whether it is merely the mating station, comparable to that of a Ruff or Bird of Paradise, is still undecided and of no importance for a descriptive definition. Secondly, I have not mentioned the female at all. This will appear wrong to many who recall cases of intolerance and spatial occupancy in the females of woodpeckers, shrikes, English robins, and other species. It seems to me, however, that the occupied space in these cases lacks the biological significance of true territory. Females which are intolerant between breeding seasons apparently belong always to species of highly unsocial character and fighting disposition. An individual that is always seen in the same place is not necessarily territorial. Birds hate to change routines just as much as humans (see Nice, 1933, p. 91). This also rules out those "winter-territories" in which the individuals show no intolerance. Nothing is said about season either, since there is still too little known about seasonal occupancy of territory. The evidence so far gathered points, however, to the probability that territory is in most species of birds connected with the breeding season. The means by which the male makes itself conspicuous are varying, and should not be included in the definition; they are song in the majority of the cases, but they may also be "instrumental music" (woodpeckers, Ruffed Grouse, etc.), displays, or simply sitting on a conspicuous branch.

The definition given above is purely tentative; it may prove useful, but it may also prove too general or, on the contrary, too exclusive. However, any term that is being used in a technical sense, as the term "territory" has been used during the last 15 years, should be accompanied by a strict definition.

OCURRENCE OF TERRITORY IN BIRDS.—Howard speaks about the occurrence of territory in very general terms. He never states definitely whether or not he considered territory a phenomenon occurring in all species of birds. In most cases he says simply, "males" do this or that to secure a territory ("each male," p. 73); on one occasion, however (1920, p. 21), he says, "in the case of many species the male inherits a disposition to secure a territory," thus definitely restricting the occurrence of territory to a limited number of species. He never states what species are not territorial. On the contrary, he tries to show

that a number of species are territorial, that would be considered as not strictly territorial by most ornithologists (Guillemot, p. 15; Martin, p. 20; Duck Hawk, p. 48; Ruff, p. 54; colonial birds, p. 200). Howard is more guarded in the statements he makes in a more recent publication (1929), and I understand that he has still more recently revised many of his original ideas. It has, of course, in the meantime been pointed out by other authors that true territory does not occur in all species of birds (Nicholson, Nice, and others), but it is interesting to see from the passages translated above how much Altum was aware of this fact.

SPACE OCCUPIED BY INDIVIDUAL BIRDS.—Although true territory is apparently restricted to a relatively small number of species, individual birds of other species may defend certain areas and show signs of territorial behavior. Such areas have been called territory by some authors, and have been entirely neglected by other authors. It might prove advantageous to undertake a classification of all types of such "territories" according to their biological significance. Three classifying principles suggest themselves at once: the significance of the occupied space in relation to mating, to food-supply (particularly for the bringing up of the young), and to the nest. I arrive at the following tentative classification.

Occupied space is:

- I. Mating station and feeding ground for young (Buntings, some warblers).—True territory.
- II. Mating station, but not feeding ground.
 - (a). Connected with nest (some swallows, *Ploceus philippinus*¹, *Zarhynchus*², Leach's Petrel, etc.).
 - (b). Not connected with nest (Ruff, many Tetraonidae, Paradisaeidae).
- III. Not mating station, but feeding ground (Males and females of certain species between breeding seasons).
- IV. Restricted to nest, no significance in regard to mating or feeding of young.
 - (a). Colonial species (sea birds, some swallows).
 - (b). Solitary species (House Sparrow, some finches).

¹All. 1931, Journ. Bombay Nat. Hist. Soc. 34, p. 1061.

²Chapman, 1928, Bull. Amer. Mus. N. Y., 58, p. 123-166.

THE SIGNIFICANCE OF TERRITORY.—The most debated aspect of territory in bird-life is its biological significance or "purpose." There was no doubt about this question in Altum's mind, as the above translated sections of his book show. According to him, territory exists only in order to safeguard the food supply for the successful rearing of the young. The opposite opinion, which has been pleaded particularly well by D. and L. Lack, maintains that the territory is simply the mating station of the male. "In fact, territory seems to be nothing more than an affair of the male bird, and its real significance seems to be that it provides him with a more or less prominent isolated headquarters, where he can sing or otherwise display" (Lack, 1933, p. 192). Mrs. Nice (1934, p. 290) has pointed out that matters are not quite as simple as that, and it may be worth while to give a short review of the arguments for and against the food theory of territory.

If the attraction of the female were the only purpose of territory, then we would expect the discontinuance of territorial behavior in the male as soon as mating has been accomplished successfully. This, however, does not seem to be the case, for there is no significant let-down in his pugnacity. A second fact which may be presented in defense of the food theory of territory is the fact that, at least in many species, the female joins with the male in territory fights. Why do they, if the territory is only a mating station?

Further evidence can be obtained by an ecological approach to the question.¹ One of the aims of the ecologist is the analysis and definition of the typical habitat of a given species of animal. This is called in technical language usually the "biotope" of the species (see Hesse, 1924, *Tiergeographie*, p. 141). I pointed out in 1926 (*Journ. f. Ornith.*, LXXIV, p. 620) that birds rarely have a homogeneous biotope, but rather a "feeding biotope," "nesting biotope," etc. This is particularly obvious in sea birds, which feed at sea and nest on cliffs or a sandbar, or in hawks, which nest in a piece of woodland and hunt in the adjoining fields. It surely is more than a coincidence that we have a strictly developed territory only in those species of birds in which the "feeding biotope" coincides with the "nesting biotope." The fact that the food for parents and young is being gathered from the area immediately around the nest is undoubtedly to some extent responsible for the forcefulness of territorial behavior in these species.

¹See also Melse, 1930, p. 59, etc.

More direct than the preceding arguments is another one: There is an actual shortage of insect food in years of particularly adverse weather. A catastrophe would be unavoidable in such years, if pairs of those species should settle too close to others that forage in the immediate nest vicinity. This argument has been set forth in detail by Mrs. Nice (1934, p. 290).

The points that were brought up against the food theory of territory, however, seem to carry more conviction. Notwithstanding Altum's assertion, there is quite a good deal of competition between insect-eating birds that live close together. I once found in a pasture a Field Sparrow (*Spizella pusilla*), a Blue-winged Warbler (*Vermivora pinus*) and a Northern Yellow-throat (*Geothlypis trichas brachidactyla*) nest within a few feet of each other in the same cluster of bushes. There was no apparent enmity, but still all three species probably fed their young the same kind of insects. As Mrs. Nice (1933, p. 97) has pointed out already, insect-eating birds rarely or never specialize to the extent that they would not compete with each other.

The intolerance of the male should be constantly increasing during the course of the breeding season, since the amount of food that is being needed is growing with the growth of its family. Experience, however, shows that the male of many territorial species becomes less conspicuous after the arrival of the female, and that the song intensity greatly diminishes after mating has taken place.

In some species (grebes, and other species with precocial young) the territory is even given up entirely after the hatching of the young. It is fought for and carefully defended at the beginning of the breeding season, but when the time comes at which it should be most needed, according to the food theory, the birds move away and feed in complete harmony with other families.

MATING WITHOUT TERRITORY.—Some recent authors have stated that the segregation of the males and the securing of a territory was an essential factor in the reproductive cycle and necessary for the bringing together of the pairs. This is, however, an incorrect generalization. There are, as stated above, a great many non-territorial species, in which the pairing is accomplished successfully without the complicated mechanism of territorial occupancy. Nicholson (1929, p. 23)

has shown that the mating among hawfinches (*Coccothraustes*) takes place in the flocks. The same seems to be true for the House Sparrow (*Passer domesticus*) and, according to my observation, for the Cedar Waxwing (*Bombycilla cedrorum*). Many auks (*Fratercula*, see Lockley, Brit. Birds, XXVII, p. 214, 218), ducks, and other sea birds arrive paired at their nesting sites. I have been watching House Sparrows and Cedar Waxwings during the critical period but I was never able to determine exactly how the mating (the bringing together of the partners) takes place. It is not yet known what factors are functioning in these species in the place of territory. This group of birds needs more work under the modern principles (study of marked individuals).

JEALOUSY AND TERRITORIALISM.—Altum (p. 132) denies that the males fight "for the possession of the females," and most modern authors are equally emphatic about this point. Nice (1933, p. 97) says, with reference to the Song Sparrow, "the males do *not* fight over the females; they fight for territory." This is apparently true for that species, but it should not be generalized. There is a good deal of evidence that (at least in some species of birds) acts of intolerance or even fights are equally or more induced by sexual jealousy than by the desire for territory. A similar opinion has been expressed by Nicholson (1929, p. 57):

"In all these instances we are also in the debatable land between performances incited by ownership of territory and those inspired by sexual emotion. My own experience does not enable me even to suggest how a line can be drawn between them. The possession of the female is so often fought out simultaneously with the possession of the territory that confusion is extremely difficult to avoid."

This reminds me of an observation made here at the American Museum of Natural History. The window ledges and roofs of the building are frequented by domestic pigeons, of which there are several pairs and a few single birds. Most of them are grayish and therefore difficult to distinguish, but in one pair the female is snow white and the male red-brown. I noticed that whenever the female was away feeding or looking for nesting sites (they apparently never did actually nest), the male freely associated with other birds and did not bother them, wherever he happened to be. The situation was, however, an entirely different one as soon as the female returned, for then he

fought and forced away from the ledge where he was every bird that approached him and his mate. This, I think, is a clear case of sexual jealousy, since the ledges on which these fights took place were neither the feeding ground of the birds nor their nesting site.

EVOLUTION OF TERRITORY.—The wide occurrence of sexual jealousy among birds leads me to the belief that this is one of the fundamental motives in the behavior of birds. Territory has become in some species a means to assist the pairing and to facilitate the task of the male of guarding the female. In time, territory obtained in some species an added significance as a feeding station. The solution of the argument concerning the significance of territory is probably the following: *Territory was originally developed only in connection with the mating, but it has acquired in certain passerine species a secondary significance as the food providing area.*

It is Altum's merit to have been the first to point out the occurrence of territory among birds, and Howard's, to have revived the territory concept among the present generation and to have initiated a new school of life-history study, the study of bird individuals. What is now left to be done is a wide-spread study of territorial phenomena in all species of birds, and their ultimate classification and interpretation.

MOST IMPORTANT LITERATURE ON THE SUBJECT OF TERRITORY, CONTAINING REFERENCES TO MANY OTHER PAPERS

- ALTUM, Bernard, 1868, *Der Vogel und sein Leben* (1st ed.), 168 pp.
id., 1898, (6th ed.), 300 pp.
- HOWARD, H. Eliot, 1920, *Territory in Bird Life*, 308 pp.
id., 1929, *An Introduction to the Study of Bird Behaviour*, 136 pp.
- LACK, D., and L. LACK, 1933, *Territory Reviewed*, *Brit. Birds* XXVII, pp. 179-199.
- NICE, Margaret M., *The Theory of Territorialism and its Development, Fifty Years' Progress of American Ornithology*, pp. 89-100.
- NICHOLSON, E. M., 1929, *How Birds Live* (2nd ed.), 150 pp.

ADDITIONAL PAPERS THAT SHOULD BE STUDIED BY THOSE WHO ARE INTERESTED IN THE SUBJECT

1. BROCK, S. E., 1910, *The Willow Wrens of a Lothian Wood*, *Zoologist*, XIV, pp. 410-417.
2. FRIEDMANN, Herbert, 1933, *The size and measurement of territory in birds*, *Bird-Banding*, IV, pp. 41-45.

3. HARRISON, T. H., and John N. S. BUCHAN, 1934, A Field Study of the St. Kilda Wren, with especial Reference to its Numbers, Territory and Food Habits, *Journ. Animal Ecology*, III, pp. 133-145.
4. HOWARD, Eliot, 1935, Territory and Food, *Brit. Birds*, XXVIII, pp. 285-287.
5. JOURDAIN, F. C. R., 1921, "Territory in Bird Life" (review), *The Ibis*, pp. 322-324.
6. LASKEY, Mrs. F. C., 1933, A Territory and Mating Study of Mockingbirds, *The Migrant*, IV, pp. 29-35.
7. MEISE, W., 1930, Revierbesitz im Vogelleben, eine Umschau, *Mitt. Ver. sächs. Ornith.*, III, pp. 49-68.
8. NETHERSOLE-THOMPSON, D., 1934, Some Aspects of the Territory Theory, *Oologists Record*, XIV, pp. 15-23 (and continuations).
9. NICE, Margaret M., 1934, Les Oiseaux et le "Cantonnement," *Alauda*, sér. III, Vol. VI, pp. 275-297.
10. RYVES, Lt.-Col., and Mrs. B. H., 1934, The Breeding-Habits of the Corn-Bunting as observed in North Cornwall, *Brit. Birds*, XXVIII, pp. 2-26.
11. VENABLES, L. S. V., 1934, Notes on Territory in the Dartford Warbler, *Brit. Birds*, XXVIII, pp. 58-63.
12. VENABLES, L. S. V., and D. LACK, 1934, Territory in the Great Crested Grebe, *Brit. Birds*, XXVIII, pp. 191-198.

A Preliminary List of the Birds of Jones Beach, Long Island, N. Y.

BY WILLIAM VOGT

This list is published in response to so many requests that further delay seems inadvisable. Were it not that numerous visitors to Jones Beach had asked for it, the very obvious gaps in the information it contains would make the writer reluctant to present it until further field work had been possible. It is, however, in respect to the birds most characteristic of the area under consideration, that the list most nearly approaches definitiveness. Families such as the Wood Warblers and Sparrows are the ones concerning which data are lacking, and it is probable that less can be learned of their migrations, at Jones Beach, than elsewhere. Fresh water ducks, marsh birds, shore-birds, and marine birds of the littoral, are most thoroughly discussed, and it is these that attract the majority of bird students to Jones Beach.

The area covered by the records is the entire island, from Jones Inlet to Fire Island Inlet, and from the Atlantic Ocean to South Oyster and Great South Bays; this "strip," as it is known locally, is seventeen miles long and, at its widest point, three-quarters of a mile broad. Its total area is about 5,200 acres. The Jones Beach State Bird Sanctuary, from which comes the preponderance of the records, includes some 400 acres. Birds known to have occurred at the Sanctuary comprise 258 forms; the total list from the strip is 270 species and subspecies and one hybrid.

"Average" arrival and departure dates could not be determined in the mere three years of the writer's residence and it has been necessary, for this reason, to give extreme dates.

Mr. Ludlow Griscom, whose influence in increasing knowledge of the local region can scarcely be over-emphasized, has read the list and supplied many additional data. Before construction, in 1927, of the causeway from Wantagh, Jones Beach—like most other parts of the New York City region—was better known to him than to anyone else. He has, thus, been able to give a much appreciated perspective to the field observations of present-day students; his comments on the *Charadriiformes* have been especially illuminating. Concerning the "good old days" he writes, in part:

"When I first started to Jones Beach in 1910, I hired a rowboat at Amityville and rowed across the bay, steering by compass for the Gilgo Flats, where we would wade ashore. It was not until some years later that I was able to make arrangements with the Coast Guard station to put up there over night, and it was not until some years after that that telephone connections were sufficiently advanced, so that I could phone the Coast Guard station from New York and have them send a boat to Amityville to meet me. This accounts for the small number of trips per annum to the beach, and is also the reason why I and a few friends were the only members of the Linnæan Society who ever went there . . . Prior to the Great War the marshes were unditched and undrained, the swampy area between the Sanctuary pond and the Coast Guard station was twice as wide and deep as it is now, there was far more fresh water swamp, and there were real groves of pitch pine trees on the back side of this fresh water swamp, which have now completely disappeared. The cottage colony at Gilgo did not exist and the beach was a far lonelier, more remote, and more fascinating place than it now seems to me to be . . . In November and December I can still remember the great flocks of Scaup, Brant, Geese, and other water fowl that got up as we crossed the bay, and as we splashed ashore over the Gilgo Flats not a house, not a person was ever in sight . . .

"I hope you will manage to keep the Sanctuary going, as I don't know of a better place for one on the northeast Atlantic Coast."

Those who sit in comfort at the Sanctuary, and with the 24X glasses provided count twelve or fifteen species of waterfowl on the pond at a time, will be interested in another letter from Mr. Griscom, in which he says, in part:

"Since 1915 there has been a very great and marked increase in the rarer fresh water ducks in the whole of the northeastern Atlantic States . . . The active members of the Linnæan Society in those days saw the Green-winged Teal about once every five years [there were 400 at the Sanctuary in one flock in the fall of 1934]; they saw a Hooded Merganser, a Canvasback, or a Redhead about once every ten years, and even as late as 1921 no active member of the Linnæan Society had ever seen a Shoveller alive in the New York City region since 1900. Beginning with 1922 there was a marked and rapid increase of the rarer fresh-water ducks on Long Island, and each year on Jones Beach and the . . . Pond we began to see larger and larger numbers and a greater variety of species . . ."

The most assiduous visitors to Jones Beach of the present day are Messrs. Leo Breslau and Walter Sedwitz of New York; the latter has kindly read the list in manuscript and emended it with material from his extensive notes. Messrs. Warren F. Eaton and Joseph Hickey have also supplied data from their records, as has Dr. E. R. P. Janvrin. I should like to express my appreciation to them and to Mr. Fred

Holman whose accurate and thorough search for published records was of invaluable assistance.

Records ascribed to "Chichester" and the Dutcher and Braislin collections, were received from Mr. Griscom. "In the days when William Dutcher and Dr. William C. Braislin were studying the ornithology of Long Island," he writes, ". . . there was a well-known and intelligent bayman and professional game hunter by the name of Andrew Chichester, who knew the local game and water birds exceedingly well, and who sent the two gentlemen named all specimens of interest in the way of rare and unusual birds for their collections. He also forwarded to Dutcher his migration dates and records for the water birds in general. Both Dutcher and Braislin . . . regarded his observation and knowledge of these groups as entirely satisfactory. These records are all listed as 'Amityville,' as Chichester lived at Amityville, but his hunting and his observations were all done on Jones Beach from the point opposite Fire Island to and including the pond and the marshes which are now the center of the Sanctuary . . . Robert L. Peavey . . . formerly a member of the Linnæan Society often used to go out collecting with Chichester from Amityville, and he confirms in personal conversation to me the territory actually worked by Chichester."

A careful perusal of the list will suggest interesting problems to the philosophically inclined bird student. The annual appearance, often in numbers, of the Mockingbird and Arkansas Kingbird, and the regular occurrence of the Lark Sparrow, indicate that a revision of the current ideas of their movements may be necessary. The marked increase in numbers and species of fresh water ducks that are, undeniably, scarcer in the country as a whole, is probably not without significance. The writer feels, however, that to labor these points without considerably more data, is scarcely justifiable. They may, more properly, be reserved for thorough treatment in separate papers, or for inclusion in a more complete list at some future time.

In the matter of abbreviations, Dr. Chapman's handbook has been followed. P. R.=permanent resident; S. R.=summer resident; T. V.=transient visitant; W. V.=winter visitant. Birds marked with an asterisk are the ones that have not been definitely recorded on the Sanctuary proper.

Common Loon. *Gavia immer immer*.—Abundant T. V., common W. V., rare S. V. August 3, 1932 (Vogt), to June 24, 1923 (Griscom).

Red-throated Loon. *Gavia stellata*.—Uncommon T. V. and W. V. October 16, 1932 (Breslau, Sedwitz, and Lind), to May 30, 1925 (Griscom).

Holboell's Grebe. *Colymbus grisegena holboelli*.—Uncommon W. V. December 28, 1913 (Griscom), to May 2, 1932 (Vogt).

Horned Grebe. *Colymbus auritus*.—Abundant T. V., common W. V. September 18, 1932 (Vogt), to May 26, 1923 (Crosby and Griscom).

Pied-billed Grebe. *Podilymbus podiceps podiceps*.—Abundant T. V., rare W. V. July 24, 1927 (Griscom), to April 15, 1934 (Vogt).

Sooty Shearwater. *Puffinus griseus*.—Regular S. V. May 22, 1927 (Cleaves and Friedman), to October 16, 1932 (Breslau and Sedwitz).

Greater Shearwater. *Puffinus gravis*.—Regular S. V. May 26, 1934 (Breslau and Sedwitz), to October 20, 1932 (Vogt).

Cory's Shearwater. *Puffinus diomedea borealis*.—Irregular S. V. July, 1924 (Boulton), to August 28, 1924 (Griscom).

Wilson's Petrel. *Oceanites oceanicus*.—Rare S. V. July 23, 1933 (Sedwitz), to August 24, 1933 (Vogt). Common off shore.

Eastern Brown Pelican.* *Pelecanus occidentalis occidentalis*.—May 26, 1912 (Johnson and Griscom, Auk, XXIX, p. 389).

Gannet. *Moris bassana*.—T. V., common off shore. April 8, 1932 (Vogt), to May 30, 1926 (Eaton and Friedman); October 1, 1933 (Local Bird Club), to December 13, 1931 (Breslau, Lind and Sedwitz).

Double-crested Cormorant. *Phalacrocorax auritus auritus*.—Common T. V., rare S. V., casual W. V. April 8, 1932 (Vogt) to June 23, 1923 (Griscom); September 7, 1932 (Vogt), to December 1, 1931 (Breslau, Lind and Sedwitz); February 23, 1931, 100 flying east (Janvrin, Bird-Lore, XXXIII, p. 193).

European Cormorant. *Phalacrocorax carbo carbo*.—Rare visitant. May 27, 1923 (Crosby, Griscom, Janvrin and J. M. Johnson, Bird-Lore, XXV, p. 257); May 29, 1926 (Griscom); September 18, 1932 (Vogt, Bird-Lore, XXXIV, p. 396).

Great Blue Heron. *Ardea herodias herodias*.—Uncommon T. V. and S. V., and rare W. V.

American Egret. *Casmerodius albus egretta*.—Uncommon but regular S. V. April 25, 1934 (Vogt), to October 13, 1933 (Vogt, Bird-Lore, XXXV, p. 326).

Snowy Egret. *Egretta thula thula*.—Rare S. V. August 3, 1930 (Watson, Grossman and Most, Bird-Lore XXXII, p. 357), to September 9, 1933 (Vogt).

Louisiana Heron.* *Hydranassa tricolor ruficollis*.—Casual S. V. August 20, 1930 (Watson, et al., Bird-Lore, XXXII, p. 430).

Little Blue Heron. *Florida caerulea caerulea*.—T. V. and S. V., rare in spring, at times common in late summer. April 18, 1932 (Vogt), to May 27,

1923 (Crosby, Griscom, etc., Bird-Lore, XXV, p. 257); July 17, 1933 (Vogt), to September 30, 1934 (Breslau, Sedwitz and Wolfram).

Eastern Green Heron. *Butorides virescens virescens*.—Common S. R. April 11, 1931 (Heron, '32), to December 12, 1934 (Herholdt). The latter bird was seen almost daily, to this date, by various observers.

Black-crowned Night Heron. *Nycticorax nycticorax hoactli*.—Common T. V., uncommon S. V. and W. V.; may be found throughout the entire year.

Yellow-crowned Night Heron. *Nyctanassa violacea violacca*.—Rare T. V. March 19, 1933 (Harrower), to March 31, 1932 (Vogt); July 10, 1932 (Vogt, Bird-Lore, XXXIV, p. 338), to September 11, 1933 (Woodmere Academy Bird Club).

American Bittern. *Botaurus lentiginosus*.—Abundant T. V., rare W. V.; has bred, March 17, 1933 (Vogt), to June 14, 1914 (R. L. Peavey, Griscom, '23); July 12, 1933 (Vogt), to December 10, 1933 (Vogt); January 14, 1934 (Vogt). Nest, and five young, May 27, 1922 (Griscom).

Eastern Least Bittern. *Ixobrychus exilis exilis*.—Rare T. V. May have bred. May 15, 1932 (Vogt), to May 28, 1922 (Janvrin, Griscom, Crosby and J. M. Johnson).

Canada Goose. *Branta canadensis canadensis*.—Common W. V. Feral birds breed. October 12, 1934 (Vogt), to March 13, 1932 (Vogt).

American Brant. *Branta bernicla hrota*.—Common W. V., casual S. V. November 1, 1932 (Vogt), to May 29, 1926 (Griscom); August 1, 1933 (Hickey and Thomas, Bird-Lore, XXXV, p. 271).

Snow Goose. *Chen hyperborea subsp.*—Three records: November 4, 1934 (Matuszewski); November 15, 1896 (Chichester); November 18, 1934 (Vogt). It is probable that this bird is a regular T. V., though it is seldom recorded.

Blue Goose.* *Chen caerulescens*.—One record: one female collected, November 22, 1893 (Chichester), in Dutcher collection.

Common Mallard. *Anas platyrhynchos platyrhynchos*.—Common P. R. Breeds commonly and it may be that nesting birds are feral; there is, however, a marked increase in numbers in the winter, and Mallards banded at the Sanctuary have been recovered as far away as Ontario and Minnesota.

Black Duck. *Anas rubripes*.—Abundant W. V.; breeds regularly in small numbers. Both races occur but because of the difficulty in separating them in the field it is impossible to give exact dates. Red-legged Black Ducks have been banded from August 3, 1933, to March 29, 1934.

Gadwall. *Chaulelasmus streperus*.—Rare W. V. August 25, 1923 (Boulton, Carter, Griscom and Urner), to February 12, 1932 (Vogt).

European Widgeon. *Mareca penelope*.—Rare but regular T. V. October 7, 1934 (Vogt), to November 25, 1934 (Vogt); March 23, 1934 (Vogt), to April 29, 1934 (Vogt).

Baldpate. *Mareca americana*.—Common T. V. September 4, 1926 (Griscom), to December 10, 1933 (Vogt); January 1, 1934 (Vogt), to June 17, 1933 (Vogt, Bird-Lore XXXV, p. 271).

American Pintail. *Dafla acuta tzeitshoa*.—Abundant T. V. and rare W. V. August 26, 1923 (Griscom), to April 20, 1932 (Vogt).

European Teal. *Nettion crecca*.—Accidental visitant. April 9, 1933 (J. and R. Kuerzi, Vogt, Auk, L, p. 445); April 3, 1934 (Vogt).

Green-winged Teal. *Nettion carolinense*.—Common T. V. August 20, 1933 (Breslau and Sedwitz), to December 27, 1932 (Vogt); January 3, 1933 (Vogt), to May 13, 1934 (Vogt).

Blue-winged Teal. *Querquedula discors*.—Tolerably common T. V., rare S. V. July 4, 1932 (Vogt), to October 26, 1930 (Heron, '30); March 24 (Chichester), to June 26, 1934 (Vogt).

Shoveller. *Spatula clypeata*.—Rare T. V. October 25 (Chichester), to November 19, 1899 (Chichester)—specimens in Braislin collection; March 2, 1932 (Vogt).

Wood Duck. *Aix sponsa*.—Rare T. V. September 4, 1926 (Griscom, Abstract Proceedings Linnæan Society, Nos. 39-40, p. 15), to November 19, 1932 (Vogt).

Redhead. *Nyroca americana*.—Rare T. V. October 7, 1934 (Vogt), to November 26, 1933 (Vogt); February 10, 1932 (Vogt), to April 27, 1934 (Vogt).

Ring-necked Duck. *Nyroca collaris*.—Rare T. V. November 3, 1898 (Braislin collection) to December 12, 1932 (Vogt); January 24, 1934 (Vogt), to April 8, 1934 (Vogt).

Canvas-back. *Nyroca valisineria*.—Rare T. V. October 21, 1933 (Vogt), to December 26, 1930 (Vogt); February 11 (Chichester), to March 17, 1933 (Vogt).

Greater Scaup Duck. *Nyroca marila*.—Abundant T. V., common W. V., rare S. V. September 4, 1926 (Griscom, Abstract Proceedings Linnæan Society, Nos. 39-40, p. 15), to June 23, 1933 (Vogt).

Lesser Scaup Duck. *Nyroca affinis*.—Common T. V., uncommon W. V. September 18, 1932 (Vogt), to June 8, 1932 (Vogt, Bird-Lore, XXXIV, p. 271).

American Golden-eye. *Glaucionetta clangula americana*.—Rare W. V. November 12, 1911 (Griscom), to March 25, 1932 (Vogt).

Buffle-head. *Charitonetta albeola*.—Rare W. V. November 8, 1934 (Vogt), to February 19, 1932 (Vogt).

Old-squaw. *Clangula hyemalis*.—Uncommon W. V. November 15, 1931 (Breslau, Lind and Sedwitz), to April 29, 1933 (Vogt).

Eastern Harlequin Duck. *Histrionicus histrionicus histrionicus*.—One record: February 25, 1934 (Vogt). This bird, a female, observed at leisure within 100 yards.

King Eider.* *Somateria spectabilis*.—One record: November 13, 1899 (Braislin collection).

White-winged Scoter. *Melanitta deglandi*.—Common W. V., rare in summer. August 2, 1925 (Eaton), to May 29, 1921 (Griscom).

Suri Scoter. *Melanitta perspicillata*.—Common W. V. September 4, 1926 (Griscom), to May 31, 1925 (Eaton and Griscom).

American Scoter. *Oidemia americana*.—Uncommon W. V. September 1, 1923 (Griscom), to May 31, 1925 (Griscom and Eaton).

Ruddy Duck. *Erismatura jamaicensis rubida*.—Regular but uncommon T. V., casual S. V. October 7, 1934 (Vogt), to December 31, 1930 (Heron, —'30); February 8, 1932 (Vogt), to May 27, 1934 (Vogt). A pair present throughout summer of 1923 (Griscom).

Hooded Merganser. *Lophodytes cucullatus*.—Uncommon but regular T. V. July 29, 1934 (Vogt and Sedwitz), to November 26, 1933 (Vogt); March 23, 1934 (Vogt), to April 22, 1933 (Vogt).

American Merganser. *Mergus merganser americanus*.—Uncommon W. V. September 10, 1933 (Vogt); November 8, 1910 (Griscom), to April 24, 1933 (Vogt).

Red-breasted Merganser. *Mergus serrator*.—Common T. V., uncommon W. V. September 16, 1933 (Vogt), to June 5, 1932 (Vogt).

Eastern Goshawk. *Astur atricapillus atricapillus*.—One record: December 16, 1933 (Vogt).

Sharp-shinned Hawk. *Accipiter velox velox*.—Tolerably common T. V. April 18, 1932 (Vogt), to May 12, 1933 (Herholdt); August 27, 1933 (Vogt), to September 30, 1932 (Vogt).

Cooper's Hawk. *Accipiter cooperi*.—Tolerably common T. V., rare W. V. March 28, 1934 (Vogt), to April 29, 1934 (Vogt); September 11, 1933 (Woodmere Academy Bird Club), to November 17, 1934 (Vogt); January 3 and February 16, 1933 (Vogt).

Eastern Red-tailed Hawk. *Buteo borealis borealis*.—One record: October 9, 1932 (Vogt).

American Rough-legged Hawk. *Buteo lagopus sancti-johannis*.—Common W. V. October 12, 1934 (Vogt), to April 29, 1934 (Vogt).

Southern Bald Eagle. *Haliaeetus leucocephalus leucocephalus*.—Four records: May 19, 1934 (Vogt); August 27, 1924 (Griscom); October 30, 1934 (Herholdt); December 9, 1934 (Cruikshank and Murdock).

Marsh Hawk. *Circus hudsonius*.—Common permanent resident. Breeds.

Osprey. *Pandion haliaetus carolinensis*.—Common T. V. March 23, 1933 (Vogt), to May 28, 1922 (Griscom); August 4, 1933 (Vogt), to November 1, 1931 (Breslau, Lind and Sedwitz).

Black Gyr Falcon. *Falco rusticolus obsoletus*.—Casual visitant. October 13, 1934 (Vogt), to October 20, 1934 (Lane, Bird-Lore, Vol. XXXVI, p. 364). This bird was clearly seen by the above observers, and by Walter Sedwitz on October 14; there seems little doubt that the species was correctly identified.

Duck Hawk. *Falco peregrinus anatum*.—Common T. V., more numerous in the fall. April 29, 1934 (Vogt) to May 28, 1922 (Crosby, Griscom, Janvrin and J. M. Johnson, '23); September 2, 1934 (Vogt), to December 8, 1932 (Vogt).

Eastern Pigeon Hawk. *Falco columbarius columbarius*.—Common T. V., more numerous in the fall, rare W. V. July 27, 1924 (Griscom), to October 22, 1932 (Vogt); April 29, 1933 (Vogt), to May 21, 1933 (Vogt); February 2, 1930 (Heron, 1930); January 15, 1933 (Vogt).

Eastern Sparrow Hawk. *Falco sparverius sparverius*.—Common T. V., uncommon W. V. March 4, 1934 (Vogt), to April 24, 1933 (Vogt); July 30, 1933 (Vogt), to December 27, 1932 (Vogt). Many winter dates.

Eastern Bob-white. *Colinus virginianus virginianus*.—This species, introduced at the Sanctuary in the autumn of 1932, did not survive.

Pheasant. *Phasianus colchicus*.—This species, introduced in the fall of 1932, has flourished and is now widely distributed over the "strip."

Northern Clapper Rail. *Rallus longirostris crepitans*.—Common S. R. April 9, 1933 (Vogt), to September 5, 1932 (Vogt). Breeds. Before the marshes were drained to eradicate mosquitoes, far more abundant.

Virginia Rail. *Rallus limicola limicola*.—Common S. R. May 2, 1933 (Vogt), to September 7, 1932 (Vogt). Breeds.

Sora. *Porzana carolina*.—Uncommon T. V. May 5, 1933 (Vogt) to May 27, 1923 (Griscom); August 26, 1923 (Griscom), to October 7, 1932 (Vogt).

Yellow Rail.* *Coturnicops noveboracensis*.—One record: A bird killed at the Jones Beach water tower, September 10, 1932, and turned over to the American Museum of Natural History (Auk, L, p. 446).

Black Rail. *Creciscus jamaicensis stoddardi*.—Exact status unknown. May 3, 1933 (Vogt, Bird-Lore, XXXV, p. 211), to May 28, 1922 (Janvrin, Griscom, Crosby and J. M. Johnson); August 10, 1924 (Griscom), to September 29, 1934 (Matuszewski). Several spring records suggest that the bird may breed.

Purple Gallinule. *Ionornis martinica*.—One record: June 21, 1934 (Vogt, Auk, LI, p. 518).

American Coot. *Fulica americana americana*.—Common T. V. March 9, 1933 (Vogt), to May 30, 1926 (Eaton and Friedman); August 3, 1930 (Watson, Grossman and Most), to December 10, 1933 (Vogt).

Piping Plover. *Charadrius melodus*.—Common S. R. March 31, 1932 (Vogt), to September 9, 1933 (Vogt). Breeds.

Semipalmated Plover. *Charadrius semipalmatus*.—Abundant T. V. April 29, 1932 (Vogt), to June 27, 1930 (Thayer, Bird-Lore, XXXII, p. 357); July 9, 1932 (Vogt), to November 18, 1934 (Sedwitz).

Killdeer. *Oxyechus vociferus vociferus*.—Abundant T. V., and rare S. R. March 13, 1932 (Vogt), to November 17, 1934 (Vogt). Breeds.

Golden Plover. *Pluvialis dominica dominica*.—Not uncommon fall migrant. August 5, 1934 (Breslau and Sedwitz), to November 25, 1934 (Cruickshank).

Black-bellied Plover. *Squatarola squatarola*.—Common T. V. March 21, 1933 (Vogt), to July 1, 1934 (Vogt); July 12, 1933 (Vogt), to December 2, 1934 (Sedwitz, Breslau and Carleton). Uncommon prior to 1914 (Griscom).

Ruddy Turnstone. *Arenaria interpres morinella*.—Tolerably common T. V. May 9, 1933 (Vogt), to June 21, 1930 (Thayer, Bird-Lore, XXXII, p. 357); July 23, 1932 (Breslau, Sedwitz and Lind), to October 12, 1931 (Sedwitz). Rare transient prior to 1919 (Griscom).

Wilson's Snipe. *Capella delicata*.—Common T. V. March 31, 1932 (Vogt), to May 11, 1932 (Vogt); September 7, 1933 (Vogt), to December 28, 1913 (Griscom).

Long-billed Curlew.* *Numenius americanus americanus*.—One record: August 6, 1931 (Heron, '32).

Whimbrel.* *Phacopus phacopus phacopus*.—One record: September 4, 1912 (Miller, Auk, XXXII, p. 226).

Hudsonian Curlew. *Phacopus hudsonicus*.—Rare spring, common fall, transient. May 26, 1923 (Crosby and Griscom), to June 24, 1923 (Griscom, Boulton and Urner, Bird-Lore, XXV, p. 323); July 16, 1932 (Vogt), to October 10, 1929 (Kuerzi, Bird-Lore, XXXI, p. 408). Much less common twenty years ago (Griscom).

Upland Plover. *Bartramia longicauda*.—One record: August 26, 1934 (J. Kuerzi, Sedwitz, et al).

Spotted Sandpiper. *Actitis macularia*.—Common S. R. April 25, 1933 (Vogt), to September 22, 1932 (Vogt). Breeds.

Eastern Solitary Sandpiper. *Tringa solitaria solitaria*.—Uncommon T. V. May 21, 1932 (Vogt); July 24, 1927 (Griscom), to September 4, 1932 (Vogt).

Willet. *Catoptrophorus semipalmatus*. Rare spring, common fall, transient, May 30, 1925 (Griscom and Eaton); July 20, 1934 (Vogt), to September 9, 1934 (Cruickshank). No records for many years prior to 1925 (Griscom).

Greater Yellow-legs. *Totanus melanoleucus*.—Common T. V. March 29, 1934 (Vogt), to November 26, 1933 (Vogt). This bird is recorded daily throughout June and July and for this reason it is impossible to give specific migration dates indicating when the northward migration gives way to the southward.

Lesser Yellow-legs. *Totanus flavipes*.—T. V., rare in spring, common in fall. April 20, 1932 (Vogt), to May 23, 1933 (Vogt); June 18, 1933 (Sedwitz, Bird-Lore, XXXV, p. 271), to October 26, 1930 (Heron, 1930).

American Knot. *Calidris canutus rufus*.—Not uncommon T. V. May 6, 1934 (Vogt), to June 17, 1934 (Vogt); July 26, 1933 (Vogt), to September 23, 1933 (Vogt). Exceedingly rare prior to 1919 (Griscom).

Purple Sandpiper.* *Arquatella maritima*.—Two records: November 18, 1934 (Sedwitz, Carleton and Breslau); November 23, 1899 (Braislin collection).

Pectoral Sandpiper. *Pisobia melanotos*.—Common T. V. May 6, 1932 (Vogt), to June 14, 1931 (Sedwitz and Wolfram); July 14, 1932 (Vogt), to November 25, 1934 (Vogt).

White-rumped Sandpiper. *Pisobia fuscicollis*.—Tolerably common T. V. May 13, 1932 (Vogt), to June 26, 1934 (Vogt); July 24, 1927 (Griscom and Watson), to October 28, 1934 (Breslau, Sedwitz and Carleton). Unknown in spring prior to 1915 (Griscom).

Baird's Sandpiper. *Pisobia bairdi*.—Rare T. V. June 3, 1934 (Vogt), to June 14, 1931 (Sedwitz and Wolfram); August 25, 1923 (Griscom), to October 21, 1934 (Breslau, Matuszewski and Sedwitz).

Least Sandpiper. *Pisobia minutilla*.—Common T. V. May 1, 1933 (Vogt), to June 3, 1934 (Vogt); June 5, 1932 (Vogt), to November 18, 1934 (Sedwitz).

Curlew Sandpiper. *Erolia testacea*.—One record: August 7, 1932 (Herbert, Jaques, Vogt, Auk, L., p. 446).

Red-backed Sandpiper. *Pelidna alpina sakhalina*.—Tolerably common T. V. April 22, 1933 (J. Vogt), to July 2, 1934 (Moore); August 20, 1933 (Sedwitz), to December 2, 1934 (Vogt). Very rare spring, uncommon fall, migrant, prior to 1919—an event to see one (Griscom).

Eastern Dowitcher. *Limnodromus griseus griseus*.—Common T. V. May 9, 1933 (Vogt), to June 10, 1934 (Vogt); June 26, 1934 (Vogt), to September 13, 1932 (Vogt); June 18, 1933 (Sedwitz, Bird-Lore, XXXV, p. 271). Rare prior to 1922 (Griscom).

Long-billed Dowitcher. *Limnodromus griseus scolopaceus*.—Rare T. V. July 1, 1934 (Vogt), to September 9, 1932 (Vogt).

Stilt Sandpiper. *Micropalama himantopus*.—Tolerably common T. V. in fall. July 8, 1934 (Vogt), to September 13, 1932 (Vogt).

Semipalmated Sandpiper. *Ereunetes pusillus*.—Abundant T. V. May 3, 1933 (Vogt), to June 28, 1932 (Vogt); July 8, 1934 (Vogt), to November 18, 1934 (Breslau, Sedwitz and Carleton).

Western Sandpiper. *Ereunetes mauri*.—An increasingly common T. V. May 15, 1932 (Breslau, Sedwitz, and Lind), to June 18, 1933 (Sedwitz, Bird-Lore, XXXV, p. 271); July 23, 1932 (Breslau, Sedwitz and Lind), to November 1, 1932 (Breslau, Lind and Sedwitz, Bird-Lore XXXIV, p. 10).

Marbled Godwit. *Limosa fedoa*.—Rare T. V. August 1, 1932 (J. and R. Kuerzi, Vogt, Bird-Lore, XXXIV, p. 339), to September 22, 1934 (Breslau, Sedwitz, et al.).

Hudsonian Godwit. *Limosa haemastica*.—Rarer T. V. May 22, 1932 (Vogt, Bird-Lore, XXXIV, p. 271); October 28, 1934 (Sedwitz, Carleton and Breslau).

Sanderling. *Crocethia alba*.—Common T. V. April 22, 1933 (J. Vogt), to June 24, 1923 (Griscom, Boulton and Urner, Bird-Lore, XXV, p. 323); July 9, 1932 (Vogt), to November 26, 1933 (Vogt).

Red Phalarope. *Phalaropus fulicarius*.—Three records: May 28, 1934 (Vogt); May 30, 1925 (Eaton, Griscom and Johnson); 1 shot, November 28, 1888 (Dutcher collection).

Wilson's Phalarope. *Steganopus tricolor*.—Rare T. V. July 29, 1934 (Sedwitz), to September 9, 1934 (Breslau and Sedwitz).

Northern Phalarope. *Lobipes lobatus*.—Rare T. V. May 12, 1932 (J. Vogt), to May 30, 1925 (Griscom and Eaton); September 16, 1934 (Herbert and Vogt).

Pomarine Jaeger.* *Stercorarius pomarinus*.—Two records: July, 1924 (Boulton); a specimen in the Dutcher collection, shot in 1885.

Parasitic Jaeger. *Stercorarius parasiticus*.—Rare T. V. off shore. August 4, 1933 (Vogt), to November 9 (specimen in the Braislín collection).

Long-tailed Jaeger.* *Stercorarius longicaudus*.—One record: June 8, 1934 (Matuszewski, Bird-Lore, XXXVI, p. 242).

Glaucous Gull. *Larus hyperboreus*.—Uncommon, formerly accidental, W. V.; stragglers remained all summer after flight years (Griscom); July 24, 1927 (Griscom), to May 30, 1926 (Eaton).

Iceland Gull. *Larus leucopterus*.—Uncommon, formerly accidental, W. V. January 3, 1933 (Vogt), to May 28, 1922 (Crosby, Griscom, Janvrin and Johnson, '23).

Kumlien's Gull. *Larus leucopterus* x *Larus argentatus thayeri*.—One record: December 16, 1934 (Peterson and Vogt). This bird studied on the ice and in flight, with 6x, 8x and 24x binoculars, within 500 feet.

Great Black-backed Gull. *Larus marinus*.—Common W. V. August 14, 1932 (Vogt), to June 24, 1923 (Boulton, Griscom and Urner).

Herring Gull. *Larus argentatus smithsonianus*.—Common permanent resident, though not abundant in summer.

Ring-billed Gull. *Larus delawarensis*.—Common T. V., uncommon W. V., rare S. V.

Laughing Gull. *Larus atricilla*.—Uncommon T. V. May 4, 1932 (J. Vogt), to June 28, 1932 (Vogt); July 12, 1933 (Vogt), to November 18, 1934 (Sedwitz). Practically unknown years ago, disappearing in late 80's or early 90's (Griscom).

Bonaparte's Gull. *Larus philadelphia*.—Uncommon T. V. April 15, 1932 (Vogt), to June 3, 1934 (Vogt); September 11, 1930 (Breslau, Sedwitz and Grossman), to December 17, 1933 (Vogt).

Atlantic Kittiwake.* *Rissa tridactyla tridactyla*.—Rare W. V. December 27, 1913 (Griscom).

Gull-billed Tern.* *Gelochelidon nilotica aranea*.—One record: September 9, 1934 (Matuszewski, et al.).

Forster's Tern. *Sterna forsteri*.—Rare fall T. V. July 10, 1932 (Vogt), to November 17, 1933 (A. O. U. Field Trip).

Common Tern. *Sterna hirundo hirundo*.—Common S. R. May 14, 1933 (Vogt), to October 26, 1930 (Breslau, Sedwitz and Grossman). Breeds. Rare spring, uncommon fall, migrant from early 90's to 1919 (Griscom).

Arctic Tern. *Sterna paradisaea*.—Rare or casual S. V. July 19, 1933 (Vogt, Bird-Lore, XXXV, p. 271), to August 28, 1924 (Griscom).

Roseate Tern. *Sterna dougalli dougalli*.—Uncommon S. V. May breed. May 27, 1934 (Vogt), to September 2, 1923 (Carter and Griscom). Unknown from the late 80's to 1920 (Griscom).

Least Tern. *Sterna antillarum antillarum*.—Common S. R. May 2, 1933 (Vogt), to September 9, 1934 (Vogt). Breeds. May 23, 1920, first record in many years; bred in 1924 but not in 1925 (Griscom).

Black Tern. *Chlidonias nigra surinamensis*.—Irregular T. V., rare in spring, frequently common in fall. May 29, 1921 (Griscom and Johnson, Abstract Proceedings Linnæan Society, Nos. 33-36, p. 24); July 20, 1934 (Moore), to September 25, 1932 (Vogt).

American Caspian Tern. *Hydroprogne caspia imperator*.—Uncommon T. V., rare in spring. May 11, 1898 (Braislin collection); May 30, 1925 (Griscom, Johnson and Eaton, Auk, XLV, p. 497); August 15, 1926 (Friedman, Auk, XLV, p. 497), to October 12, 1934 (Sedwitz and Vogt).

Black Skimmer. *Rynchops nigra nigra*.—Uncommon S. V., rare S. R. May 6, 1893 (Dutcher collection) to October 2, 1932 (Vogt, Auk, L. p. 446). August 18, 1934 (downy young in Gilgo State Park, Auk, LI, p. 521).

Brünnich's Murre.* *Uria lomvia lomvia*.—Three records: November 22, 1901; December 30, 1901; March 2, 1902 (specimens in Braislin collection).

Dovekie. *Alle alle*.—Casual W. V. November 17, 1932 (Vogt), to January 12, 1934 (Vogt).

Eastern Mourning Dove. *Zenaidura macroura carolinensis*.—Common T. V. March 17, 1933 (Vogt), to April 15, 1934 (Vogt); August 5, 1932 (Vogt), to November 19, 1932 (Vogt).

Yellow-billed Cuckoo. *Coccyzus americanus americanus*.—Rare T. V. August 26, 1934 (Vogt), to September 17, 1933 (Vogt).

Black-billed Cuckoo. *Coccyzus erythrophthalmus*.—Rare T. V. June 4, 1933 (Vogt), to July 9, 1932 (Vogt); July 24, 1927 (Griscom), to September 11, 1933 (Woodmere Academy Bird Club).

Eastern Screech Owl. *Otus asio naevius*.—Rarer T. V. May 12, 1934 (Vogt), to May 27, 1934 (Vogt).

Snowy Owl. *Nyctea nyctea*.—Rare W. V. November 25, 1934 (Cruickshank), to March 25, 1935 (Vogt).

Long-eared Owl. *Asio wilsonianus*.—Rare W. V. December 27, 1913 (Griscom), to February 4, 1934 (Vogt).

Short-eared Owl. *Asio flammeus flammeus*.—Tolerably common T. V., rare permanent resident.

Eastern Nighthawk. *Chordeiles minor minor*.—Fairly common fall transient. August 29, 1932 (Vogt), to September 23, 1933 (Herholdt).

Chimney Swift. *Chaetura pelagica*.—Tolerably common T. V. May 9, 1934 (Vogt), to June 23, 1924 (Griscom); August 25, 1923 (Griscom), to September 18, 1932 (Vogt).

Ruby-throated Hummingbird. *Archilochus colubris*.—Uncommon T. V., rare in spring. May 15, 1932 (Vogt), to May 27, 1923 (J. M. Johnson); August 4, 1933 (Vogt), to September 23, 1934 (Vogt).

Eastern Belted Kingfisher. *Megaceryle alcyon alcyon*.—Common T. V. March 2, 1932 (Vogt), to May 27, 1933 (Vogt); July 26, 1933 (Vogt), to October 29, 1933 (Vogt).

Northern Flicker. *Colaptes auratus luteus*.—Abundant T. V., rare W. V. July 30, 1933 (Vogt), to May 8, 1932 (Vogt).

Red-headed Woodpecker. *Melanerpes erythrocephalus*.—A rare spring and common to rare fall transient. May 26, 1923 (Crosby and Griscom); August 27, 1933 (Vogt), to October 15, 1932 (Vogt).

Yellow-bellied Sapsucker. *Sphyrapicus varius varius*.—Two records: September 24, 1932 (Vogt); October 16, 1932 (Breslau, Sedwitz and Lind).

Eastern Hairy Woodpecker. *Dryobates villosus villosus*.—One record based on one wing found October 16, 1932 (Vogt).

Northern Downy Woodpecker. *Dryobates pubescens medianus*.—One bird heard May 13, 1933 (Vogt).

Kingbird. *Tyrannus tyrannus*.—Common T. V., uncommon S. R. May 5, 1932 (Vogt), to October 7, 1933 (Vogt). Breeds.

Arkansas Kingbird. *Tyrannus verticalis*.—Rare but regular fall transient. August 19, 1932 (Vogt, Auk, L, p. 446), to October 8, 1933 (Vogt, Bird-Lore, XXXV, p. 327).

Northern Crested Flycatcher. *Myiarchus crinitus boreus*.—Rare T. V. May 13, 1933 (Vogt).

Eastern Phoebe. *Sayornis phoebe*.—Common T. V. March 19, 1933 (Harrower), to May 6, 1934 (Vogt); September 22, 1932 (Vogt), to October 13, 1932 (Vogt).

Yellow-bellied Flycatcher.* *Empidonax flaviventris*.—One record: August 29, 1932 (Heron, '32).

Alder Flycatcher. *Empidonax trailli trailli*.—Uncommon (?) T. V. May 13, 1933 (Vogt); September 10, 1932 (Vogt), to September 22, 1933 (Vogt). *Empidonax* flycatchers are not uncommon on migration, but are here omitted, for the most part, because of the difficulty of identifying them in the field.

Least Flycatcher. *Empidonax minimus*.—Rare (?) T. V. May 6, 1932 (J. Vogt), to May 13, 1933 (Vogt); August 23, 1933 (Vogt).

Eastern Wood Peewee. *Mniotilta virens*.—Uncommon T. V. May 12, 1933 (Vogt), to May 31, 1925 (Griscom and Eaton); August 27, 1933 (Herbert), to September 7, 1932 (Vogt).

Olive-sided Flycatcher. *Nuttallornis mesoleucus*.—Rare fall transient. August 14, 1934 (Vogt and Matuszewski), to September 11, 1934 (Vogt).

Northern Horned Lark. *Otocoris alpestris alpestris*.—Abundant W. V. October 26, 1930 (Breslau, Sedwitz and Grossman), to March 18, 1934 (Vogt).

Prairie Horned Lark. *Otocoris alpestris praticola*.—One record: December 9, 1934 (Sedwitz, Carleton and Breslau).

Tree Swallow. *Iridoprocne bicolor*.—Abundant T. V., bred in 1932. March 14, 1933 (Vogt), to May 27, 1933 (Vogt); August 1, 1933 (Vogt), to November 26, 1933 (Vogt).

Bank Swallow. *Riparia riparia riparia*.—Abundant T. V., common S. R. April 29, 1932 (Vogt), to September 17, 1933 (Vogt). Breeds in dunes.

Rough-winged Swallow. *Stelgidopteryx ruficollis serripennis*.—Rare T. V. May 6, 1932 (Vogt), to May 15, 1932 (Vogt); August 1, 1932 (Vogt).

Barn Swallow. *Hirundo erythrogaster*.—Abundant T. V., common S. R. April 23, 1932 (Vogt), to November 26, 1933 (Vogt). Breeds.

Northern Cliff Swallow. *Petrochelidon albifrons albifrons*.—Rare T. V. May 6, 1934 (Vogt), to May 13, 1932 (Vogt); August 28, 1932 (Vogt), to September 23, 1933 (Vogt).

Purple Martin. *Progne subis subis*.—Tolerably common T. V. May 23, 1920 (Griscom), to May 30, 1925 (Griscom); August 4, 1932 (Watson), to September 11, 1932 (Vogt).

Northern Blue Jay. *Cyanocitta cristata cristata*.—Rare T. V. May 7, 1932 (Rich), to May 27, 1934 (Vogt).

Eastern Crow. *Corvus brachyrhynchos brachyrhynchos*.—Permanent resident, common in winter and rare in summer. Breeds.

Fish Crow. *Corvus ossifragus*.—Exact status unknown; tolerably common in spring when it may be identified by voice. January 3, 1932 (Breslau, Lind and Sedwitz), to May 30, 1925 (Eaton).

Black-capped Chickadee. *Penthestes atricapillus atricapillus*.—Uncommon T. V., rare W. V. September 7, 1932 (Vogt), to June 4, 1932 (Peterson).

White-breasted Nuthatch. *Sitta carolinensis carolinensis*.—Rare fall transient. September 9, 1933 (Vogt), to October 15, 1933 (Vogt).

Red-breasted Nuthatch. *Sitta canadensis*.—Uncommon T. V. May 6, 1934 (Vogt), to May 11, 1932 (Vogt); August 27, 1933 (Vogt), to November 5, 1933 (Vogt).

Brown Creeper. *Certhia familiaris americana*.—Common T. V. April 3, 1932 (Vogt), to May 6, 1934 (Vogt); September 13, 1932 (Vogt), to October 16, 1932 (Vogt).

Eastern House Wren. *Troglodytes aedon aedon*.—Rare T. V. May 6, 1934 (Vogt); August 22, 1932 (Vogt) to October 13, 1932 (Vogt).

Eastern Winter Wren. *Nannus hiemalis hiemalis*.—Uncommon T. V. September 11, 1934 (Vogt) to December 28, 1913 (Griscorn, G. W. Hubbell and N. F. Lenssen); April 22, 1932 (Vogt) to April 24, 1932 (Vogt).

Carolina Wren. *Thryothorus ludovicianus ludovicianus*.—Uncommon T. V. April 20, 1934 (Vogt); July 30, 1933 (Vogt) to October 20, 1933 (Terry).

Long-billed Marsh Wren. *Telmatodytes palustris palustris*.—Uncommon T. V. and S. R. April 24, 1932 (Vogt) to September 24, 1933 (Vogt). Several breeding colonies 25 years ago (Griscorn).

Short-billed Marsh Wren. *Cistothorus stellaris*.—Rare T. V. March 31, 1932 (Vogt and Peterson, Bird-Lore, XXXIV, p. 205) to April 4, 1932 (Heron, '32); July 23, 1933 (Sedwitz) to December 28, 1913 (Griscorn, Abstract Proceedings Linnaean Society, Nos. 26-27, p. 15.)

Eastern Mockingbird. *Mimus polyglottos polyglottos*.—Rare but regular T. V. April 20, 1934 (Vogt); August 20, 1933 (Chapman and Vogt) to October 15, 1932 (Vogt). Many immature birds have been observed in the fall.

Catbird. *Dumetella carolinensis*.—Abundant S. R., rare W. V. May 4, 1933 (Vogt) to December 27, 1932 (Vogt); February 7, 1932 throughout winter (Vogt). Breeds. A rare straggler up to 1922 (Griscorn).

Brown Thrasher. *Toxostoma rufum*.—Abundant S. R. March 20, 1934 (Herholdt) to October 15, 1932 (Vogt). Breeds.

Eastern Robin. *Turdus migratorius migratorius*.—Abundant T. V., rare W. V. July 19, 1933 (Vogt) to May 13, 1933 (Vogt).

Wood Thrush. *Hylocichla mustelina*. Uncommon T. V. May 6, 1934 (Vogt) to May 13, 1933 (Vogt); July 26, 1933 (Vogt) to September 5, 1931 (Breslau and Sedwitz).

Eastern Hermit Thrush. *Hylocichla guttata faroni*.—Common T. V. April 2, 1933 (Vogt) to May 7, 1932 (Vogt); September 30, 1932 (Vogt) to November 10, 1932 (Vogt).

Olive-backed Thrush. *Hylocichla ustulata steinsoni*.—Uncommon T. V. May 6, 1932 (Vogt) to May 26, 1923 (Crosby and Griscorn); September 24, 1933 (Vogt) to October 22, 1932 (Vogt).

Gray-cheeked Thrush. *Hylocichla minima eliciae*.—One record: A bird "beautifully seen", May 30, 1925 (Eaton, Griscorn and J. M. Johnson).

Veery. *Hylocichla fuscescens fuscescens*.—Uncommon T. V. May 8, 1932 (Vogt) to May 14, 1933 (Vogt); August 29, 1932 (Breslau) to October 15, 1932 (Vogt).

Eastern Bluebird. *Sialia sialis sialis*.—Rare T. V. March 17, 1932 (Vogt) to May 29, 1921 (Griscom and J. M. Johnson); November 3, 1934 (Mayr and Vogt)

Blue-gray Gnatcatcher. *Poliophtila caerulea caerulea*.—Rare T. V. September 5, 1931 (Breslau, Sedwitz and Weil, Bird-Lore, XXXIII, p. 406) to September 9, 1934 (Cruikshank).

Eastern Golden-crowned Kinglet. *Regulus satrapa satrapa*.—Common T. V. March 31, 1932 (Vogt) to April 21, 1932 (Vogt); September 25, 1932 (Vogt) to November 8, 1934 (Vogt).

Eastern Ruby-crowned Kinglet. *Corthylio calendula calendula*.—Tolerably common T. V. March 19, 1933 (Vogt) to May 21, 1932 (Vogt); October 14, 1934 (Breslau, Sedwitz, et al.)

American Pipit. *Anthus spinoletta rubescens*.—Uncommon W. V. October 12, 1931 (Breslau, Lind and Sedwitz) to January 21, 1934 (Breslau and Sedwitz).

Cedar Waxwing. *Bombyeilla cedrorum*.—Rare to common fall transient. August 13, 1932 (Vogt) to October 9, 1932 (Vogt).

Northern Shrike. *Lanius borealis borealis*.—Uncommon W. V. October 29, 1933 (Raymond) to January 2, 1931 (Heron, '30).

Migrant Shrike. *Lanius ludovicianus migrans*.—Uncommon T. V. August 20, 1930 (Watson, Bird-Lore, XXXII, p. 430) to September 21, 1931 (Heron, '32).

Starling. *Sturnus vulgaris vulgaris*.—Common T. V. and W. V. July 10, 1932 (Vogt) to June 19, 1932 (Vogt). Would have bred if nests had not been destroyed.

White-eyed Vireo. *Vireo griseus griseus*.—Two dates: May 7, 1932 (Vogt) and June 3, 1934 (Vogt).

Blue-headed Vireo. *Vireo solitarius solitarius*.—One date: May 13, 1933 (Vogt).

Red-eyed Vireo. *Vireo olivaceus*.—Common T. V. May 12, 1933 (Vogt) to May 29, 1932 (Vogt); September 9, 1934 (Vogt) to October 8, 1932 (Vogt).

Eastern Warbling Vireo. *Vireo gilvus gilvus*.—Two records: June 3, 1934 (Vogt); September 11, 1933 (Woodmere Academy Bird Club).

Black and White Warbler. *Mniotilta varia*.—Common T. V. April 20, 1934 (J. Vogt) to May 19, 1934 (Vogt); August 5, 1934 (Moore) to September 22, 1933 (Vogt).

Prothonotary Warbler. *Protonotaria citrea*.—One record: May 9, 1934 (J. Vogt).

Worm-eating Warbler. *Helmitheros vermivorus*.—Rare T. V. April 20, 1934 (Vogt) to May 14, 1933 (Vogt).

Blue-winged Warbler. *Vermivora pinus*.—Uncommon T. V. May 5, 1932 (Vogt) to May 13, 1933 (Vogt); August 27, 1933 (Vogt) to September 13, 1932 (Vogt).

- Tennessee Warbler. *Vermivora peregrina*.—One record: May 13, 1933 (Vogt).
- Orange-crowned Warbler. *Vermivora celata celata*.—One record: April 21, 1932 (Vogt and Prendergast).
- Nashville Warbler. *Vermivora ruficapilla ruficapilla*.—One record: September 24, 1933 (Vogt).
- Northern Parula Warbler. *Compsothlypis americana pusilla*.—Common T. V. May 5, 1932 (J. Vogt) to May 26, 1923 (Griscom); September 30, 1932 (Vogt) to October 8, 1932 (Vogt).
- Eastern Yellow Warbler. *Dendroica aestiva aestiva*.—Abundant S. R. April 30, 1933 (Vogt) to September 24, 1933 (Vogt). Breeds.
- Magnolia Warbler. *Dendroica magnolia*.—Common T. V. May 12, 1933 (Vogt) to June 3, 1934 (Vogt); September 25, 1932 (Vogt) to October 15, 1933 (Vogt).
- Cape May Warbler. *Dendroica tigrina*.—Rare T. V. May 18, 1934 (Vogt); September 10, 1932 (Vogt) to October 8, 1932 (Vogt).
- Black-throated Blue Warbler. *Dendroica caerulescens caerulescens*.—Common T. V. May 7, 1932 (Vogt) to May 14, 1933 (Vogt); September 7, 1932 (Vogt) to October 8, 1932 (Vogt).
- Myrtle Warbler. *Dendroica coronata*.—Abundant T. V., common W. V. August 25, 1932 (Vogt) to May 30, 1926 (Friedman).
- Black-throated Green Warbler. *Dendroica virens virens*.—Common T. V. May 4, 1932 (Vogt) to May 15, 1932 (Vogt); September 11, 1933 (Woodmere Academy Bird Club) to October 8, 1932 (Vogt).
- Blackburnian Warbler. *Dendroica fusca*.—Two records: May 19, 1933 (Vogt); September 24, 1933 (Vogt).
- Chestnut-sided Warbler. *Dendroica pensylvanica*.—Common T. V. in spring. May 7, 1932 (Vogt) to May 26, 1923 (Griscom); September 9, 1934 (Cruikshank).
- Bay-breasted Warbler. *Dendroica castanea*.—One record: September 9, 1934 (Cruikshank).
- Black-poll Warbler. *Dendroica striata*.—Common T. V. May 18, 1934 (Vogt) to June 5, 1932 (Vogt); October 7, 1932 (Vogt) to October 8, 1932 (Vogt).
- Northern Pine Warbler. *Dendroica pinus pinus*.—Tolerably common T. V. April 8, 1934 (Vogt) to May 12, 1933 (Vogt); September 17, 1933 (Vogt) to September 22, 1933 (Vogt).
- Prairie Warbler. *Dendroica discolor discolor*.—Common T. V. May 5, 1932 (J. Vogt) to May 24, 1914 (Griscom); September 5, 1932 (Vogt) to September 30, 1934 (Breslau, Sedwitz and Wolfram).
- Western Palm Warbler. *Dendroica palmarum palmarum*.—Uncommon T. V. in fall. September 11, 1932 (Vogt) to October 1, 1933 (Vogt).
- Yellow Palm Warbler. *Dendroica palmarum hypochrysea*.—Common T. V. April 15, 1933 (Vogt) to May 8, 1932 (Vogt); September 22, 1933 (Vogt) to November 13, 1932 (Vogt).

Oven-bird. *Seiurus aurocapillus*.—Rare T. V. Recorded only in fall. September 10, 1932 (Vogt) to October 7, 1932 (Vogt).

Northern Water-Thrush. *Seiurus noveboracensis noveboracensis*.—Common T. V. May 5, 1932 (J. Vogt) to May 21, 1934 (Vogt); July 30, 1932 (Vogt) to September 22, 1933 (Vogt).

Louisiana Water-Thrush. *Seiurus motacilla*.—One record: Bird heard May 8, 1932 (Vogt).

Connecticut Warbler.* *Oporornis agilis*.—Probably a tolerably common fall transient. September 10, 1932 (Vogt) to October 7, 1932 (Vogt, Auk, L, p. 446).

Northern Yellow-throat. *Geothlypis trichas brachidactyla*.—Abundant S. R. April 29, 1932 (Vogt) to December 8, 1932 (Vogt). Breeds.

Yellow-breasted Chat. *Icteria virens virens*.—Two records: May 26, 1923 (Crosby and Griscom); September 19, 1933 (Vogt).

Wilson's Warbler. *Wilsonia pusilla pusilla*.—Uncommon T. V. May 13, 1933 (Vogt); September 1, 1933 (Griscom) to September 30, 1932 (Vogt).

Canada Warbler. *Wilsonia canadensis*.—Uncommon T. V. May 13, 1933 (Vogt) to May 30, 1925 (Griscom); August 26, 1932 (Vogt) to September 10, 1932 (Vogt).

American Redstart. *Setophaga ruticilla*.—Common T. V. May 4, 1932 (Vogt) to May 30, 1925 (Griscom); August 5, 1932 (Vogt) to October 8, 1932 (Vogt).

House Sparrow. *Passer domesticus domesticus*.—Common W. V. September 2, 1933 (Vogt) to May 12, 1934 (Vogt). This bird has never attempted to nest on the Sanctuary except in Tree Swallow houses; when these nests were destroyed the birds disappeared.

Bobolink. *Dolichonyx oryzivorus*.—An abundant transient, less common in the spring. May 12, 1933 (Vogt) to May 13, 1934 (Vogt); August 12, 1933 (Vogt) to September 17, 1932 (Vogt).

Eastern Meadowlark. *Sturnella magna magna*.—Permanent resident; uncommon in winter. Breeds.

Yellow-headed Blackbird. *Xanthocephalus xanthocephalus*.—One record: September 1, 1932 (Helene Lunt, Auk, L, p. 446).

Eastern Red-wing. *Agelaius phoeniceus phoeniceus*.—Abundant S. R. and casual W. V. February 23, 1933 (Vogt) to August 29, 1933 (Vogt); December 27, 1932 (Vogt). Breeds.

Orchard Oriole. *Icterus spurius*.—One record: August 31, 1932 (Vogt).

Baltimore Oriole. *Icterus galbula*.—Common T. V. May 5, 1932 (J. Vogt) to May 20, 1934 (Vogt); September 7, 1932 (Vogt) to September 13, 1932 (Vogt).

Rusty Blackbird. *Euphagus carolinus*.—Uncommon T. V. April 2, 1933 (Vogt) to May 4, 1933 (Vogt); September 29, 1932 (Vogt) to November 18, 1934 (Vogt).

Purple Grackle. *Quiscalus quiscula quiscula*.—Rare T. V. May 12, 1934 (Vogt) to May 27, 1934 (Vogt), probably the same individual throughout this period.

Bronzed Grackle. *Quiscalus quiscula aeneus*.—Two records: December 27, 1932 (Vogt) and March 9, 1933 (Vogt).

Eastern Cowbird. *Molothrus ater ater*.—Tolerably common S. R. February 17, 1934 (Vogt) to September 22, 1932 (Vogt). Breeds.

Scarlet Tanager. *Piranga erythromelas*.—Rare spring transient. May 12, 1933 (Vogt) to May 14, 1933 (Vogt).

Rose-breasted Grosbeak. *Hedymeles ludovicianus*.—Uncommon T. V. May 12, 1934 (Vogt) to May 24, 1914 (Griscom); July 29, 1934 (Moore) to September 6, 1933 (Terry).

Indigo Bunting. *Passerina cyanea*.—Rare T. V. May 30, 1926 (Eaton and Friedman); October 8, 1932 (Vogt) to October 16, 1932 (Breslau, Sedwitz and Lind).

Eastern Purple Finch. *Carpodacus purpureus purpureus*.—Uncommon fall transient. August 27, 1933 (Vogt) to November 3, 1932 (Vogt).

Eastern Goldfinch. *Spinus tristis tristis*.—Common W. V. August 19, 1933 (Vogt) to June 14, 1933 (Vogt).

Red-eyed Towhee. *Pipilo erythrophthalmus erythrophthalmus*.—Common T. V., uncommon S. R. April 22, 1932 (Vogt) to October 22, 1932 (Vogt). Breeds.

Ipswich Sparrow. *Passerculus princeps*.—Uncommon W. V. October 13, 1932 (Vogt) to March 29, 1932 (Heron, '32). Formerly a common transient and regular W. V.—9 seen December 28, 1913 (Griscom).

Eastern Savannah Sparrow. *Passerculus sandwichensis savanna*.—Common T. V., uncommon to rare permanent resident. Breeds.

Eastern Henslow's Sparrow. *Passerherbulus henslowi susurrans*.—One record: May 7, 1932 (Vogt).

Acadian Sparrow. *Ammospiza caudacuta subvirgata*.—Uncommon T. V. May 26, 1923 (Crosby and Griscom) to May 29, 1926 (Griscom); September 24, 1933 (Vogt) to December 26, 1933 (Vogt, Bird-Lore, XXXV, p. 20). It is almost certain that systematic collecting would show this bird to be more common.

Sharp-tailed Sparrow. *Ammospiza caudacuta caudacuta*.—Not uncommon S. R. April 22, 1934 (Cobb) to November 8, 1910 (Griscom, La Dow and Wiegmann). Breeds. Formerly a very common S. R. (Griscom).

Northern Seaside Sparrow. *Ammospiza maritima maritima*.—Uncommon S. R., casual W. V. March 29, 1932 (Peterson) to November 8, 1910 (Griscom); throughout February, 1932 (Vogt). Breeds. Formerly a very common S. R. (Griscom).

Eastern Vesper Sparrow. *Poocetes gramineus gramineus*.—Uncommon T. V. April 15, 1932 (Vogt); August 21, 1932 (Vogt) to November 26, 1933 (Vogt).

Eastern Lark Sparrow. *Chondestes grammacus grammacus*.—Three records: August 5, 1934 (Sedwitz, Hickey, Vogt, *et al.*); August 21, 1932 (Vogt, Bird-Lore, XXXIV, p. 397); August 23, 1933 (Vogt).

Slate-colored Junco. *Junco hyemalis hyemalis*.—Common T. V., less common W. V. September 23, 1933 (Vogt) to April 26, 1932 (Vogt).

Eastern Tree Sparrow. *Spizella arborea arborea*.—Common W. V. October 12, 1934 (Cobb) to April 27, 1932 (Vogt).

Eastern Chipping Sparrow. *Spizella passerina passerina*.—Tolerably common T. V. April 8, 1934 (Vogt) to May 26, 1933 (Crosby and Griscom); August 26, 1923 (Griscom) to November 18, 1934 (Breslau, Sedwitz and Carleton).

Clay-colored Sparrow. *Spizella pallida*.—One record: September 30, 1934 (Breslau, Sedwitz, *et al.*).

Eastern Field Sparrow. *Spizella pusilla pusilla*.—Common T. V. March 28, 1932 (Vogt) to May 28, 1932 (Vogt); September 24, 1933 (Vogt) to November 5, 1933 (Vogt).

White-crowned Sparrow. *Zonotrichia leucophrys leucophrys*.—Tolerably common T. V. May 7, 1932 (Vogt) to May 27, 1933 (Vogt); October 7, 1934 (Vogt) to November 5, 1934 (Vogt).

White-throated Sparrow. *Zonotrichia albicollis*.—Abundant T. V., uncommon W. V. September 18, 1932 (Vogt) to May 18, 1933 (Vogt).

Eastern Fox Sparrow. *Passerella iliaca iliaca*.—Common T. V., uncommon W. V. November 13, 1932 (Vogt) to April 26, 1932 (Vogt).

Lincoln's Sparrow. *Melospiza lincolni lincolni*.—One record: May 7, 8, 1932 (Vogt).

Swamp Sparrow. *Melospiza georgiana*.—Uncommon T. V. March 3, 1932 (Vogt) to June 21, 1931 (Breslau and Sedwitz); September 29, 1932 (Vogt) to December 28, 1913 (Griscom). Formerly bred commonly (Griscom).

Eastern Song Sparrow. *Melospiza melodia melodia*.—Abundant P. R., though few of the breeding birds winter.

Lapland Longspur. *Calcarius lapponicus lapponicus*.—Irregular W. V. October 21, 1934 (Breslau, Sedwitz) to February 19, 1933 (Breslau, Sedwitz and Lind).

Eastern Snow Bunting. *Plectrophenax nivalis nivalis*.—Common W. V. November 1, 1931 (Breslau, Lind and Sedwitz) to March 31, 1932 (Vogt).

Some Mid-Nineteenth Century Records from Westbury, Long Island

BY JOHN F. MATUSZEWSKI, JR.

Through the courtesy of Mrs. J. L. Bertie of Old Westbury, I have examined and studied the bird specimens in the cabinet of her father, the late John D. Hicks, whose records, I believe, have never been published.

The collection was assembled during the period from 1860-84 and at the present time consists of seventy-three specimens, representing sixty-two species. According to Mrs. Bertie, her father collected one bird of each kind found near their home, and male and female, in some cases, where the sexes differed in plumage.

It is interesting to place the birds in this collection in the groups used by Griscom in his "Birds of the New York City Region". I found: Permanent Residents 10, Summer Residents 34, Winter Visitors 5, Irregular Winter Visitors 4, Regular Transients 7, Accidental Visitors 1, Extinct Species 1—Total 62.

Permanent Residents

- | | |
|-----------------|----------------------------|
| 1. Sparrow Hawk | 6. Field Sparrow |
| 2. Flicker | 7. Swamp Sparrow |
| 3. Blue Jay | 8. Carolina Wren |
| 4. Meadowlark | 9. White-breasted Nuthatch |
| 5. Goldfinch | 10. Chickadee |

Summer Residents

- | | |
|---------------------|----------------------------------|
| 1. Kingfisher | 13. Cliff Swallow |
| 2. Whip-poor-will | 14. Barn Swallow |
| 3. Nighthawk | 15. Sharp-tailed Sparrow |
| 4. Chimney Swift | 16. Seaside Sparrow |
| 5. Phoebe | 17. Chipping Sparrow |
| 6. Bobolink | 18. Towhee |
| 7. Cowbird | 19. Red-eyed Vireo |
| 8. Red-wing | 20. Yellow-throated Vireo |
| 9. Orchard Oriole | 21. Black and White Warbler |
| 10. Purple Grackle | 22. Parula Warbler |
| 11. Vesper Sparrow | 23. Chestnut-sided Warbler |
| 12. Scarlet Tanager | 24. Black-throated Green Warbler |

25. Prairie Warbler
26. Ovenbird
27. N. Yellow-throat
28. Redstart
29. Catbird

30. Brown Thrasher
31. House Wren
32. Wood Thrush
33. Robin
34. Bluebird

Winter Visitants

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Horned Lark 2. Tree Sparrow 3. Junco | <ol style="list-style-type: none"> 4. Myrtle Warbler 5. Golden-crowned Kinglet |
|---|--|

Irregular Winter Visitants

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Red Crossbill 2. White-winged Crossbill | <ol style="list-style-type: none"> 3. Redpoll 4. Northern Shrike |
|---|--|

Regular Transients

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Purple Finch 2. Fox Sparrow 3. Savannah Sparrow 4. Black-throated Blue Warbler | <ol style="list-style-type: none"> 5. Blackburnian Warbler 6. Black-poll Warbler 7. Hermit Thrush |
|--|--|

Accidental Visitants

1. Yellow-headed Blackbird

Extinct

1. Passenger Pigeon

I was quite surprised to find that in about seventy-five years, the bird life of Westbury has undergone little change, viz., the disappearance of the Cliff Swallow and Yellow-throated Vireo as probable breeders, and the introduction of Starling, Pheasant, and British Goldfinch.

Here follows a list of those birds in the collection which I consider uncommon in the Westbury locality inasmuch as I have recorded only one of them in six years' residence :

Passenger Pigeon.—Common migrant sixty years ago. I was quite thrilled to find a well-preserved mounted specimen of this extinct species.

Cliff Swallow.—Very probably a summer resident. Griscom says: "Not known to have nested since 1904", and Giraud, in "Birds of Long

Island: "On Long Island I am not aware that the Cliff Swallow has been known to breed."

Carolina Wren.—Uncommon summer resident. Mr. Henry Hicks of Westbury tells of collecting one near the barn about 1886, because it sang louder and was larger than the other wrens.

Yellow-throated Vireo.—Summer resident about 1860-84. Griscom in "Birds of New York City Region" says: "Formerly a common summer resident, now rapidly decreasing", and Giraud in his "Birds of Long Island": "With us the Vireo is tolerably common but not so plentiful as the White-eyed Vireo."

Yellow-headed Blackbird.—Accidental visitant. Although not mentioned by Griscom in his book, I have arbitrarily put this bird in the accidental list inasmuch as it has been reported from Jones Beach Bird Sanctuary (Abstract of the Linnaean Society, 1931-32; Bird-Lore, September-October 1934).

Redpoll.—Irregular winter visitant. I have never seen this species in six years' bird watching at Westbury.

Red Crossbill.—Irregular winter visitant. Although this species is in the irregular winter visitant group, it has been recorded by me and others at Westbury every year for the last four years.

White-winged Crossbill.—Irregular winter visitant. Griscom says in his "Birds of New York City Region": "Very rare and irregular winter visitant". He gives the dates of two Long Island invasions, 1899-1900, October, 1908, to February 28, 1909. The presence of this bird in the collection would seem to indicate that there was a White-winged Crossbill invasion on Long Island some time between 1860 to 1884.

It was a rare privilege for me to examine and study the birds in this well-mounted collection, and it was quite exciting to measure the various birds such as the Seaside, Savannah and Red Crossbill, in the hope that they might be the rarer subspecies.

The Ornithological Year 1932 in the New York City Region

BY WILLIAM VOGT

Nineteen thirty-two will long be remembered among bird students of the Atlantic coast as the year of the great Dovekie flight. From Canada to Cuba these diminutive Alcids were driven ashore, in incalculable numbers. The New York City region received its share and it is doubtful if any ornithological phenomenon of the past century has made as strong an impression on the general public as this; an extended account of the visitation has already been published (Murphy and Vogt, *Auk*, L, pp. 325-349) and nothing would be gained by repeating the story here.

Next to the Dovekie invasion in memorableness was one of the greatest shore-bird flights in many years. This will be considered in greater detail below.

JANUARY was the warmest on record, and the mean temperature of FEBRUARY was 4.7° above normal. With this mild weather may, undoubtedly, be correlated the presence of numerous ducks in such concentration places as Hempstead Lake, Jones Beach, Brookhaven, Croton Point and Tod's Neck. Pied-billed Grebes, Coots, Florida Gallinules, Catbirds, and Sharp-tailed and Seaside Sparrows "wintered over" with apparent success. At the January 26 meeting Mr. Urner reported that, following several days of mild weather, there had been indications that Black-crowned Night Herons, Canada Geese, Killdeer, Kingfishers, Grackles and Robins were migrating.

MARCH and APRIL reversed the meteorological tables with sub-normal temperatures. In mid-April Mr. J. T. Nichols reported: "conditions have been about normal . . . The various half-hardy birds seem to have lasted through to spring." (*Bird-Lore*, XXXIV, p. 204.) The most notable bird of the period was a Yellow-headed Blackbird at Flushing (*op. cit.*, p. 270).

MAY might with some justice be described as having had an ornithological explosion on the 6th, 7th and 8th. The great bulk of the month's migrants seemed to go through at that time and pursuers of the large list were heard to complain, on their other week-ends afield, that birds were not plentiful although there was another Warbler

wave on the 15th. Mr. Rich reports from Central Park, "an immense wave on the 7th. There were Warblers of many species both in the Ramble and the 110th Street section. The weather was dull and fairly warm after a night of rain that stopped before 5 A. M." The outer beaches, normally poor places to see these birds, had the most extensive Warbler flight in the writer's experience. There was a substantial flight of shore-birds, with "unusually large numbers of Lesser Yellow-legs" (Urner).

JUNE, as is unfortunately apt to be the case, saw a diminution of field activity on the part of the Society's members, and there was little in the way of breeding data reported. Mr. Baker reported that the Mourning Warbler had, apparently, deserted his farm in Dutchess County, but that to offset the loss of this species he had added, to his list of breeding birds, the Marsh Hawk. The Bronx County Bird Club made two excursions to the Catskills where, on Slide Mountain, they noted Nashville, Black-throated Blue, Black-throated Green, Blackburnian, Myrtle, Magnolia, Blackpoll and Canada Warblers; Yellow-bellied Sapsucker; Red-breasted Nuthatch; Winter Wren; Brown Creeper; Slate-colored Junco; White-throated Sparrow; Blue-headed and Red-eyed Vireos; Yellow-bellied Flycatcher; and Bicknell's, Olive-backed and Hermit Thrushes. On the 19th, Mr. Edwards recorded, at Troy Meadows, American Egrets, and the Little Blue, and Yellow-crowned Night Heron.

JULY and AUGUST failed to fulfill the promise of these birds, when the southern Heron flight fell far below what New Yorkers had come to expect. Their absence from the marshes was more than offset, however, by the large numbers of shore-birds referred to above. At the August 16 meeting, Mr. Urner reported "the largest flight of Dowitchers in his experience; that Knots had reached a new high this year; that Stilt Sandpipers had been numerous; that there appeared to be a decrease in the numbers of Pectoral Sandpipers; and that the Curlew flight had been good." In a letter, he subsequently wrote: "It surely has been a great shore-bird year. I counted up the 1932 shore-bird species that I know of as recorded from Long Island and New Jersey; there are 37, including the Eskimo Curlew (Murphy, Auk, L, p. 101). I do not count January Purple Sandpiper records. We lack only Long-billed Curlew and Oyster Catcher among the reasonable sea-

sonal probabilities . . . The New Jersey list is 34, of which I have seen 33 on the southward migration. There is a good record from south Jersey . . . of two Wilson's Plover." During this southward movement, 28 species were seen at Jones Beach State Bird Sanctuary. More specific comment on some of the birds will be found in the list, below. One of the most remarkable shore-birds of the migration was the Ruff (Urner, Auk, I., p. 101).

SEPTEMBER was hot and dry, as was OCTOBER until the middle of the month, when a deficiency of precipitation was relieved by five days of rain. The heat and drought may have been partially responsible for the retarded movement of waterfowl into the region. Black Skimmers were recorded several times (see below, and Bird-Lore, XXXIV, p. 396) and unusual numbers of Mockingbirds were seen on southern Long Island.

NOVEMBER had a cold wave (37° fall in 24 hours) on the 26th-27th, but aside from that did not have markedly low temperatures; DECEMBER was 4° above normal. It is undoubtedly partly because of this that the numbers of aquatic birds seen throughout the period were considerable. Clement weather does not explain, however, the presence, in sizeable flocks, of Shovellers, Ring-necks, and the allegedly diminishing Ruddy; nor does it explain the appearance of such westerners as Gadwall and, earlier in the fall, Arkansas Kingbirds and Lark Sparrows (Bird-Lore, XXXIV, pp. 396, 397). It is the writer's belief that the repeated recording of these birds can not be entirely attributed to increased ornithological activity. Their appearance in the northeast has paralleled the years of drought in the middle-west, and it does not seem unlikely that, with the destruction of their wonted haunts, they are seeking new ranges—at least migratory ranges.

The writer has made no attempt, in assembling the appended list, to compile all previously published data. Were this paper of more than local interest, it might seem advisable to repeat the records from Bird-Lore, the Auk, The Heron, etc. Since, however, it concerns the birds of a locality where these publications will remain as accessible as this Society's *Abstracts*, to repeat such printed records seems an unnecessary duplication. A word of appreciation should be inserted here of Mr. Urner's contribution of shore-bird data; and of Dr. R. C.

Murphy's August notes from Fire Island, a locality that is rarely visited by local students.

Gavia immer immer. Common Loon.—Long Beach, L. I., June 15 (Janvrin); Jones Beach, Aug. 3 (Vogt).

Colymbus auritus. Horned Grebe.—5, Oakwood Beach, May 21 (E. and M. Rich).

Podilymbus podiceps podiceps. Pied-billed Grebe.—Kensico, Jan. 10 (Farley, J. Kuerzi, etc.); Brookhaven, Jan. 17 (Matuszewski).

Puffinus griseus. Sooty Shearwater.—2, Jones Beach, Oct. 2, and 10 other Shearwaters whose species could not be definitely ascertained (Williams and Vogt).

Puffinus gravis. Greater Shearwater.—Jones Beach, Oct. 16, and Montauk, Nov. 6 (Local Bird Club).

Morus bassana. Gannet.—1, Pt. Pleasant, Jan. 31 (Breslau, Sedwitz and Lind); 10, Montauk, Feb. 1 (J. and R. Kuerzi); 1, Fire Island, Aug. 21 (Murphy); 30, Montauk, Nov. 30 (J. and R. Kuerzi, etc.).

Phalacrocorax carbo carbo. European Cormorant.—Eastern Long Island, May 22-28 (Helmuth).

Phalacrocorax auritus auritus. Double-crested Cormorant.—Fire Island, numerous dates from Aug. 20 to Aug. 29 (Murphy); 35, Tuckerton, Sept. 3 (Urner).

Casmerodius albus egretta. American Egret.—2, Eastern Long Island, May 7, 8 (Helmuth); 4, Troy Meadows, June 19 (Edwards). The summer flight lighter than during the preceding year.

Florida caerulea caerulea. Little Blue Heron.—An adult, closely observed, Jones Beach State Bird Sanctuary, Apr. 18 (J. and W. Vogt). The summer numbers of these birds were, like those of the above species, lower than during the preceding year.

Nycticorax nycticorax hoactli. Black-crowned Night Heron.—A flock, moving northward, Barnegat, Jan. 16 (Oscar Eayre).

Nyctanassa violacea violacea. Yellow-crowned Night Heron.—Ozone, May 3 (Local Bird Club); Troy Meadows, June 19 (Edwards); Jones Beach, Aug. 10 (Vogt).

Botaurus lentiginosus. American Bittern.—Jones Beach, Apr. 8 (Vogt).

Ixobrychus exilis exilis. Eastern Least Bittern.—Van Cortlandt Park, May 9 (Cruickshank).

Plegadis falcinellus falcinellus. Eastern Glossy Ibis.—Barnegat, May 1—closely observed (Edward and Urner, Auk, XLIX, p. 459).

Cygnus columbianus. Whistling Swan.—3, Croton Point, and 1, Tod's Neck, Mar. 11 (Kessler, J. and R. Kuerzi); Long Island, March 29 (Kuerzi); Barnegat, Apr. 10 and May 1 (Urner).

Branta canadensis canadensis. Common Canada Goose.—2, Van Cortlandt Park, Apr. 19 (L. N. Nichols).

Branta bernicla hrota. American Brant.—21, Riverdale, Jan. 4 (Cruickshank).

Chaulelasmus streperus. Gadwall.—Drake, Tod's Neck, Jan. 30 (J. and R. Kuerzi); 6, Brookhaven, Feb. 1 (J. and R. Kuerzi); pair, Tod's Neck, Apr. 1 (Kuerzi); Brookhaven, Nov. 20 (J. and R. Kuerzi, Breslau, Lind and Sedwitz).

Mareca penelope. European Widgeon.—One bird, that may have been feral, at the Bronx Botanical Gardens, most of March (Cruickshank); Tod's Neck, Apr. 1 (Kuerzi); Hempstead Reservoir, Nov. 13 (Breslau, etc.); Brookhaven, Nov. 20 (Kuerzi, Breslau, etc.); Hempstead, Dec. 27 (Matuszewski).

Mareca americana. Baldpate.—Oakwood, May 21 (Rich).

Dafila acuta tzitzihoa. American Pintail.—1, Tuckerton, Sept. 3 (Urner).

Nettion crecca. European Teal.—Troy Meadows, Apr. 3 (Edwards); same place, May 5 (Urner). Mr. Edwards reported the absence of the white crescent in front of the wing and the presence of the white stripe on the back; Hempstead Reservoir, Dec. 30 (J. and R. Kuerzi).

Nettion carolinense. Green-winged Teal.—15, Hempstead Reservoir, Jan. 9 (Matuszewski).

Querquedula discors. Blue-winged Teal.—2, Van Cortlandt Park, Mar. 19 (Cruickshank); Troy Meadows, May 8—"acting as though nesting, or about to"—(Urner); Jones Beach, July 4 and Aug. 14 (Vogt); 3, Tuckerton, Sept. 3 (Urner).

Spatula clypeata. Shoveller.—Hempstead Reservoir, Jan. 16 (Matuszewski); 9, Brookhaven, Feb. 1 (J. and R. Kuerzi); 3, Georgica Pond, Mar. 29 (Peterson, Wilcox, J. and R. Kuerzi); 2, Brookhaven, Nov. 6 (Local Bird Club): same place and observers, Nov. 20.

Aix sponsa. Wood Duck.—Barnegat, Jan. 17 (Edwards, etc.); 11 pair, Bronx Park, Feb. 28, and 16 birds, Van Cortlandt Park, Mar. 19 (Cruickshank).

Nyroca collaris. Ring-necked Duck.—Candlewood Lake, Conn., Jan. 14 (Farley); 18, Brookhaven, Feb. 1 (Kuerzi); Thompson Pond, Pine Plains, May 15 (Baker); Southampton, Nov. 20 (Kuerzi, etc.).

Nyroca valisineria. Canvas-back.—More than 300 at Croton Point, December through January; seen by numerous observers, including the Bronx County Bird Club.

Nyroca affinis. Lesser Scaup Duck.—Throughout spring and summer, at Jones Beach, until July 24 (Vogt).

Glaucionetta clangula americana. American Golden-eye.—2, Montauk, Apr. 30 (Janvrin); Oakwood, May 21 (Rich).

Clangula hyemalis. Old-squaw.—2, Oakwood Beach, May 30 and July 3 (Rich).

Melanitta deglandi. White-winged Scoter.—1 on bay, Fire Island, Aug. 15 (Murphy).

Erismatura jamaicensis rubida. Ruddy Duck.—Van Cortlandt Park, Jan. 26 (Cruickshank); Montauk, Feb. 1 (J. and R. Kuerzi); 8, Southampton, Mar. 29

(Kuerzi, etc.); 75, Brookhaven, Nov. 6 (Local Bird Club); 130, Southampton, Nov. 20 (Kuerzi, etc.).

Lophodytes cucullatus. Hooded Merganser.—8, Montauk, Jan. 3 (Walsh); Barnegat, Jan. 17 (Urner); 8, Brookhaven, Feb. 1 (J. and R. Kuerzi).

Cathartes aura septentrionalis. Turkey Vulture.—Prospect Park, Oct. 2 (Cruickshank).

Astur atricapillus atricapillus. Eastern Goshawk.—Westbury, Jan. 3 (Matuszewski).

Buteo platypterus platypterus. Broad-winged Hawk.—Bear Mt., Apr. 24 (Bronx County Bird Club).

Falco peregrinus anatum. Duck Hawk.—Inwood, Jan. 11 (Cruickshank).

Falco columbarius columbarius. Eastern Pigeon Hawk.—Bear Mt., Apr. 24 (Bronx County Bird Club); Central Park, Apr. 27 (Rich); Fire Island, Aug. 13, and 29 (Murphy).

Bonasa umbellus umbellus. Eastern Ruffed Grouse.—Slide Mt., June 12 (Farley, Kasso and Herbert).

Colinus virginianus virginianus. Eastern Bob-white.—A few on Fire Island, Aug. 30 (Murphy).

Lophortyx californica vallicola. Valley Quail.—Garden City, March 25 (J. T. Nichols). It was reported that this bird had been stocked on Long Island, but this has not been substantiated.

Rallus elegans elegans. King Rail.—Van Cortlandt Park, Apr. 20 (Cruickshank).

Rallus longirostris crepitans. Northern Clapper Rail.—Fresh tracks, Barnegat, Jan. 17 (Edwards, Kasso, R. Kuerzi).

Porzana carolina. Sora.—Van Cortlandt Park, May 9 (Cruickshank).

Gallinula chloropus cachinnans. Florida Gallinule.—Montauk, Jan. 3 (Walsh); Brookhaven, Jan. 17 (Matuszewski); Brookhaven, Mar. 29 (Kuerzi, etc.).

Fulica americana americana. American Coot.—5, Croton Pt., Jan. 10, 31, Feb. 1 (Bronx County Bird Club and numerous other observers).

Charadrius melodus. Piping Plover.—Jones Beach, Mar. 31 (Vogt).

Charadrius semipalmatus. Semipalmated Plover.—Carnarsie, Nov. 13 (Cruickshank).

Pluvialis dominica dominica. American Golden Plover.—Mr. Urner reports as follows: There were record numbers on the Newark Marshes, a few in late August; 5, Sept. 5; 125, Sept. 8; 225, Sept. 10; 250, Sept. 13; 300 Sept. 15; 300, Sept. 17. There were more birds of the year in late flocks, and more records than usual of scattered birds in southern New Jersey.

Squatarola squatarola. Black-bellied Plover.—Oakwood, May 4 (Janvrin); Newark, May 6 (Edwards).

Arenaria interpres morinella. Ruddy Turnstone.—Beach Haven, May 8 (Urner) ; 2, Montauk, Nov. 20 (Kuerzi, etc.).

Philohela minor. American Woodcock.—2 birds singing, Manahawkin Swamp, Barnegat, Jan. 17 (Eaton, J. and R. Kuerzi, Eayre).

Bartramia longicauda. Upland Plover.—Lamington, May 5 (Urner).

Catoptrophorus semipalmatus. Willet.—Eastern Long Island, May 15 (Hel-muth) ; Jones Beach, Aug. 6, 7, 14, 15 (Vogt) ; "principal movement in early September" (Urner).

Totanus melanoleucus. Greater Yellow-legs.—"The August-September flight below normal" (Urner).

Totanus flavipes. Lesser Yellow-legs.—Jones Beach, Apr. 20 (Vogt) ; the spring flight reported by Mr. Urner to be unusually heavy, with a "very heavy" September flight.

Arquatella maritima. Purple Sandpiper.—Long Beach, Jan. 19 (Breslau, Lind and Sedwitz).

Pisobia melanotos. Pectoral Sandpiper.—"The flight on Newark Meadows larger than usual" (Urner).

Pisobia bairdi. Baird's Sandpiper.—Jones Beach, Sept. 7, 9, 16 (Vogt) ; Sept. 10 (Eaton) ; Sept. 10-15 (Urner).

Erolia testacea. Curlew Sandpiper.—Jones Beach State Bird Sanctuary, Aug. 7 (Herbert, Farley, Kassoy, etc., Auk, L, p. 446). This bird, in full breeding plumage, was studied at leisure, within 200 feet.

Pelidna alpina sakhalina. Red-backed Sandpiper.—Beach Haven, May 8 (Urner) ; the first of the season at Beach Haven, Sept. 11 (Urner).

Limnodromus griseus scolopaceus. Long-billed Dowitcher.—Brigantine, Aug. 20 (Urner). The color on the belly, barring under tail, very long bill, large size and dark body color were noted.

Micropalama himantopus. Stilt Sandpiper.—Present at Jones Beach almost daily from July 14 to Sept. 13, with a maximum of 40 birds on Aug. 15 (Vogt) ; "constantly present up to Sept. 18, mostly at Newark and Tuckerton," last Oct. 12 (Urner).

Tryngites subruficollis. Buff-breasted Sandpiper.—Newark Meadows, Sept. 8 (Urner), 18 (Edwards, etc.), 19 (Kuerzis) ; Brigantine, Sept. 11 (Collins) ; Oakwood Beach, Sept. 27 (Davis, Shoemaker, Wiegmann).

Limosa fedoa. Marbled Godwit.—Jones Beach, Aug. 1 (J. and R. Kuerzi, Vogt) ; Brigantine, Aug. 20, 27, Sept. 3 ; Barnegat Inlet, Sept. 4 (Urner).

Philomachus pugnax. Ruff.—Tuckerton, Oct. 2 (Urner, Auk, L, p. 101).

Recurvirostra americana. Avocet.—2 adults and 1 immature, Newark Mea-dows, Sept. 15-Oct. 4 (Urner and many others. Probably remnant of a flock of 12 first seen Sept. 4 and mostly killed (anonymous letter to Urner).

Phalaropus fulicarius. Red Phalarope.—300, Tuckerton to Beach Haven, May 12 (Edwards and Urner).

Steganopus tricolor. Wilson's Phalarope.—2, Tuckerton, Sept. 3 (Urner); Brigantine, Sept. 3 (Eaton); Newark Meadows, to Oct. 8 (Urner, etc.).

Stercorarius pomarinus. Pomarine Jaeger.—N. Y. Harbor, Oct. 23 (Breslau, Sedwitz).

Larus hyperboreus. Glaucous Gull.—Jones Beach, Mar. 29 (Peterson and Vogt); Eastern Long Island, May 22 (Helmuth); "summered at Oakwood Beach" (Wiegmann).

Larus leucopterus. Iceland Gull.—Eastern Long Island, Mar. 29 (Kuerzi, etc.).

Larus marinus. Great Black-backed Gull.—Fire Island, Aug. 26 (Murphy).

Rissa tridactyla tridactyla. Atlantic Kittiwake.—Hudson River, May 4 (Urner); Montauk, Nov. 20 (Kuerzis, etc.).

Sterna forsteri. Forster's Tern.—3, Newark Meadows, Sept. 18 (Urner).

Sterna hirundo hirundo. Common Tern.—6, Lower New York Bay, Apr. 19 (Rich); same place, Apr. 24 (Chapin); "a hundred pair, apparently breeding," Long Beach, June 2 (L. N. Nichols, Crowell). Dr. R. C. Murphy recorded "few" from Fire Island, and "many" on only three days, during August; in view of the subsequent rapid increase on South Oyster and Great South Bays, these small numbers seem of interest.

Sterna antillarum antillarum. Least Tern.—"Apparently breeding," Long Beach, June 2 (L. N. Nichols, Crowell); Sheepshead, Oct. 9 (Cruikshank).

Hydroprogne caspia imperator. Caspian Tern.—Barnegat, May 1 (Urner); Eastern Long Island, May 6-13 (Helmuth).

Rynchops nigra nigra. Black Skimmer.—Jones Beach, May 14 (Vogt), June 5 (Vogt and Peterson), Sept. 7 (Peterson), Oct. 2 (Vogt). This last specimen was an immature bird that had been banded the previous spring at Avalon, N. J.

Alca torda. Razor-billed Auk.—80, Montauk, Jan. 3, and 50, Jan. 10 (Walsh); 18, Montauk, Feb. 1 (J. and R. Kuerzi); Montauk, Mar. 29 (Kuerzi, etc.); Jones Beach, 1 dead, May 8 (Rich and Vogt).

Uria lomvia lomvia. Brünnich's Murre.—Feb. 1 (J. and R. Kuerzi); Speonk, Dec. 8 (Wilcox); E. Moriches, Dec. 10 (Breslau); Jones Beach, 1 brought in dead, by a hunter, Dec. 30 (Vogt).

Alle alle. Dovekie.—An enormous flight of these birds in late November. For an extended account, see Auk, L, p. 325.

Cephus grylle grylle. Black Guillemot.—Manursing Island, Jan. 30 (J. and R. Kuerzi). Both of these observers were familiar with the bird in life.

Coccyzus erythrophthalmus. Black-billed Cuckoo.—Fire Island, 2, Aug. 13; 1, Aug. 16; 4, Aug. 29 (Murphy).

Tyto alba pratincola. Barn Owl.—Theodore Roosevelt H. S., Bronx, identified by George Hastings and reported by Cruikshank, and American Museum of Natural History (Nichols), both Mar. 31.

Otus asio naevius. Eastern Screech Owl.—Central Park, Apr. 30 (Cruikshank and Rich).

Bubo virginianus virginianus. Great Horned Owl.—2, Troy Meadows, May 8 (Urner).

Asio wilsonianus. Long-eared Owl.—Phelps Estate, Mar. 1 (L. N. Nichols).

Cryptoglaux acadica acadica. Saw-whet Owl.—At the Feb. 9 meeting the presence of this bird, from the third week in December at Tod's Neck, and at Pelham from January 1, was reported. They had been seen by numerous observers.

Antrostomus vociferus vociferus. Eastern Whip-poor-will.—Central Park, Apr. 29, May 6 (Rich).

Chordeiles minor minor. Eastern Nighthawk.—Central Park, Apr. 26 (Rich), May 6 (Cruickshank).

Chaetura pelagica. Chimney Swift.—Bronx, Apr. 23 (Kuerzis, etc.).

Melanerpes erythrocephalus. Red-headed Woodpecker.—Central Park, May 6 (Rich).

Sphyrapicus varius varius. Yellow-bellied Sapsucker.—Riverdale, Jan. 4 (Cruickshank); Slide Mt., June 12 (Farley, Kassoy and Herbert); 4, Scarsdale, Oct. 11 (Mrs. Fry).

Dryobates villosus villosus. Eastern Hairy Woodpecker.—Fire Island, Aug. 30 (Murphy).

Tyrannus tyrannus. Eastern Kingbird.—Bronx, Apr. 27 (Mr. and Mrs. Pember), reported by Hickey.

Myiarchus crinitus boreus. Northern Crested Flycatcher.—Bronx, Apr. 26 (Gibson); north end of Manhattan, compared with a Phoebe, Oct. 25 (L. N. Nichols); Fire Island, 6, Aug. 6; 2, Aug. 18; "few" on most other days in August (Murphy).

Empidonax flaviventris. Yellow-bellied Flycatcher.—Slide Mt., June 1. 2. (Hickey, Kuerzis and Herbert), 12 (Farley, Kassoy, Herbert).

Empidonax trailli trailli. Alder Flycatcher.—Fire Island, Aug. 13 (Murphy).

Empidonax minimus. Least Flycatcher.—Bronx, May 4 (Hickey).

Myiochanes virens. Eastern Wood Peewee.—Bronx, May 9 (Gibson, Hickey, Meyers); Fire Island, Aug. 13 (Murphy).

Nuttallornis mesoleucus. Olive-sided Flycatcher.—Central Park, May 9 (Mrs. Gutlohn); Fire Island, Aug. 13 (Murphy).

Iridoprocne bicolor. Tree Swallow.—Brookhaven, Jan. 17 (Matuszewski, Breslau, etc.); Oradell, Feb. 13 (Bowdish); Canarsie, Nov. 13 (Cruickshank).

Stelgidopteryx ruficollis serripennis. Rough-winged Swallow.—Van Cortlandt Park, Apr. 8 (Cruickshank).

Hirundo erythrogaster. Barn Swallow.—Troy Meadows, Apr. 4 (Edwards).

Progne subis subis. Purple Martin.—Central Park, Apr. 12 (Cruickshank), Aug. 7 (Mrs. Edge).

Cyanocitta cristata cristata. Northern Blue Jay.—Fire Island, Aug. 13 (Murphy).

Corvus corax principalis. Northern Raven.—2, Barnegat, Jan. 17 (Eaton, Cook, J. Kuerzi, Urner).

Corvus ossifragus. Fish Crow.—Central Park, Mar. 2 (Cruickshank).

Bacolophus bicolor. Tufted Titmouse.—Bronx Botanical Gardens, Feb. 14 (Hickey); Bronx Park, Mar. 5 (Cruickshank).

Sitta canadensis. Red-breasted Nuthatch.—Slide Mt., June 1, 2 (Farley, Kassoy, Herbert).

Certhia familiaris americana. Brown Creeper.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Tannus hiemalis hiemalis. Eastern Winter Wren.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert); Peach Lake, N. Y., June 19 (Coolidge, Farley, Kassoy).

Thryothorus ludovicianus ludovicianus. Carolina Wren.—Kings Park, Feb. 7 (Local Bird Club); Central Park, Apr. 25 (Holgate); eastern Long Island, May 8 (Helmuth); Elmhurst, Aug. 7, 8 (Mrs. Beals); almost daily throughout August, Fire Island (Murphy).

Telmatodytes palustris palustris. Long-billed Marsh Wren.—Fire Island, Aug. 6 (Murphy).

Cistothorus stellaris. Short-billed Marsh Wren.—Jones Beach, Mar. 31 (Peterson, Vogt).

Mimus polyglottos polyglottos. Eastern Mockingbird.—Verona, Apr. 10 (D. C. Reed, reported by Eaton); Beach Haven, May 8 (Urner); several, some singing, Jones Beach, Sept. 7-Oct. 15 (Vogt).

Dumetella carolinensis. Catbird.—Bronx, Apr. 30 (Meyers).

Toxostoma rufum. Brown Thrasher.—Bronx, Mar. 5 (Cruickshank), Apr. 30 (Hickey).

Hylocichla mustelina. Wood Thrush.—A bird banded as a fledgling at Huntington, June 17, 1926, trapped May 7, 1932, by Mrs. Beals, at Elmhurst.

Hylocichla guttata faxoni. Eastern Hermit Thrush.—Slide Mt., June 1, 2 (Hickey, J. and K. Kuerzi, Herbert), 12 (Farley, Kassoy, Herbert).

Hylocichla ustulata swainsoni. Olive-backed Thrush.—Slide Mt., June 1, 2 (Hickey, J. and R. Kuerzi, Herbert), 12 (Farley, Kassoy, Herbert).

Hylocichla minima minima. Bicknell's Thrush.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Poliophtila caerulea caerulea. Blue-gray Gnatcatcher.—Central Park, May 7 (Rich and Holgate).

Lanius borealis borealis. Northern Shrike.—Ozone Park, Oct. 16 (Local Bird Club).

Lanius ludovicianus migrans. Migrant Shrike.—Van Cortlandt Park, Jan. 7 (Cruickshank); Central Park, Apr. 6—"closely observed and field marks noted"—

(Carleton); Fire Island, Aug. 13 (Murphy); Barnegat, Aug. 27 (Edwards and Urner).

Vireo solitarius solitarius. Blue-headed Vireo.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Vireo olivaceus. Red-eyed Vireo.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Protonotaria citrea. Prothonotary Warbler.—Bronx, May 7 (Hickey).

Helmitheros vermivorus. Worm-eating Warbler.—Bronx, May 1 (Grafft).

Vermivora chrysoptera. Golden-winged Warbler.—First seen in Central Park, May 6 (Rich).

Vermivora pinus. Blue-winged Warbler.—Bronx, Apr. 30 (Meyers); nesting, Peach Lake, N. Y., June 19 (Coolidge, Farley, Kassoy).

Vermivora celata celata. Orange-crowned Warbler.—Mill Neck, Jan. 24 (Breslau, Lind, Sedwitz); Jones Beach, Apr. 21 (Vogt); Central Park, May 6 (Mayr and Watson); Prospect Park, Oct. 30 (Cruickshank).

Vermivora ruficapilla ruficapilla. Nashville Warbler.—Bronx, May 4 (Kessler); Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert) 12 (Farley, Kassoy, Herbert).

Dendroica magnolia. Magnolia Warbler.—Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert), 12 (Farley, Kassoy, Herbert).

Dendroica tigrina. Cape May Warbler.—Bronx, May 7 (Kuerzis).

Dendroica caerulescens caerulescens. Black-throated Blue Warbler.—Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert), 12 (Farley, Kassoy, Herbert).

Dendroica coronata. Myrtle Warbler.—Slide Mt., June 1, 2 (Kuerzis, Herbert, Hickey), 12 (Farley, Kassoy, Herbert).

Dendroica virens virens. Black-throated Green Warbler.—Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert), 12 (Farley, Kassoy, Herbert).

Dendroica cerulea. Cerulean Warbler.—11 pairs in the grounds of the Leake and Watts School, Tivoli, N. Y. (Hickey, at July 16 meeting).

Dendroica fusca. Blackburnian Warbler.—First seen in Central Park, May 6 (Rich); Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert), 12 (Farley, Kassoy, Herbert).

Dendroica pensylvanica. Chestnut-sided Warbler.—Sheepshead, Oct. 9 (Cruickshank).

Dendroica striata. Black-poll Warbler.—Bronx, May 7 (Hickey); Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Seiurus noveboracensis noveboracensis. Northern Water-Thrush.—Bronx Park, Oct. 30 (Cruickshank).

Oporornis agilis. Connecticut Warbler.—2, Jones Beach, Oct. 7 (Vogt).

Oporornis philadelphia. Mourning Warbler.—Central Park, May 19 (Rich).

Icteria virens virens. Yellow-breasted Chat.—Bronx, May 8 (Farley, Herbert, Hickey); Elmhurst, Aug. 11 (Mrs. Beals).

Wilsonia citrina. Hooded Warbler.—Bronx, May 1 (Bronx County Bird Club); Central Park, May 6 and 7 (Rich).

Wilsonia canadensis. Canada Warbler.—Slide Mt., June 1, 2 (Kuerzis, Hickey, Herbert), 12 (Farley, Kassoy, Herbert).

Icterus galbula. Baltimore Oriole.—2, Fire Island, Aug. 13 (Murphy).

Quiscalus quiscula quiscula. Purple Grackle.—Fire Island, Aug. 7, 16 (Murphy).

Richmondna cardinalis cardinalis. Eastern Cardinal.—Pair, Inwood Park, Nov. 5 (Helene Lunt); female, Dyckman St., Nov. 8 (Rich).

Carduelis carduelis. European Goldfinch.—Central Park, Sept. 24 (Holgate), Sept. 30 (Miss Lunt).

Acanthis linaria linaria. Common Redpoll.—2 males, singing, New Canaan, Apr. 24 (Mrs. Naumburg, Mayr).

Loxia curvirostra. Crossbill.—Westbury, Jan. 2 (Matuszewski); 3, Tod's Neck, Jan. 31 (Farley, Herbert, Kassoy); 3, same place, Apr. 1 (Kuerzis); eastern Long Island, Apr. 30, May 8 (Helmuth).

Pipilo erythrophthalmus erythrophthalmus. Red-eyed Towhee.—Bronx Park, Mar. 5 (Cruikshank).

Passerculus princeps. Ipswich Sparrow.—Jones Beach, Mar. 29 (Peterson); Canarsie, Nov. 6 (Cruikshank).

Ammodramus savannarum australis. Eastern Grasshopper Sparrow.—Central Park, May 2, 6 (Rich); Bronx, May 8 (Bronx County Bird Club).

Passerherbulus henslowi susurrans. Eastern Henslow's Sparrow.—Jones Beach, May 7 (Rich, Vogt).

Ammospiza caudacuta caudacuta. Sharp-tailed Sparrow.—Pelham, Feb. 4 (Cruikshank).

Chondestes grammacus grammacus. Eastern Lark Sparrow.—Jones Beach, Aug. 21 (Vogt).

Junco hyemalis hyemalis. Slate-colored Junco.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Spizella passerina passerina. Eastern Chipping Sparrow.—Central Park, Mar. 17 (Cruikshank).

Spizella pallida. Clay-colored Sparrow.—Beach Haven, May 8 (Urner, Edwards).

Zonotrichia leucophrys leucophrys. White-crowned Sparrow.—Inwood, Jan. 11 (Cruikshank).

Zonotrichia albicollis. White-throated Sparrow.—Slide Mt., June 1, 2 (Hickey, Kuerzis, Herbert), 12 (Farley, Kassoy, Herbert).

Melospiza lincolni lincolni. Lincoln's Sparrow.—Bronx, May 8 (Bronx County Bird Club) and Jones Beach, same day (Rich, Vogt); Scarsdale, Oct. 11 (Mrs. Fry).

Plectrophenax nivalis nivalis. Eastern Snow Bunting.—175, Jones Beach, Mar. 29 (Kuerzis, Matuszewski); Piermont, Oct. 27 (Janvrin).

The Ornithological Year 1933 in the New York City Region

Compiled by ERNST MAYR

Supplemented and Edited by JOHN F. and RICHARD G. KUERZI

Any attempt to reconstruct an ornithological year is bound to be colored by the personal field experience of the compiler which, in turn, is influenced by chance. The chief value of this compilation of field-notes is not, however, to be found in the editorial comments and write-up but rather in the notations under each species. These represent a careful selection and sifting of the data submitted to the Society and recorded elsewhere. Here the field notes of the meetings are brought into the open and all local bird observations reported elsewhere are gathered together. With the Ornithological Years already published, the current knowledge of local birds is brought up to date. Your editors have mulled over this mass of records and attempted to generalize some of the material and to call attention to some interesting comparisons, contrasts, facts and inferences. It cannot be too strongly urged upon others who are interested to go through the list of species and draw their own conclusions. It is here that the ultimate facts are to be found.

Those who have been clamoring for a more up-to-date local avifauna than is presently available have only to turn to the comments under a given species in each Ornithological Year since 1926, bring them together and add them to, or subtract them from what has already been written in the standard handbooks, local lists, etc. This new matter in conjunction with the old will necessarily comprise all the data that are at present available.

While some are of the belief that we are in a position to write *finis* on the type of field work we have been following and that we have pretty nearly exhausted the possibility of the "census by motor," still this attitude represents more a personal reaction rather than the probable fact. It is certain and demonstrable that each year brings fresh thrills and surprises even to the inveterate field-workers.

But be all this as it may, it is the feeling of your editors that as our knowledge of local ornithology becomes more perfect, the Ornithological Year should tend to be more complete and detailed rather than

to fray out. Nor are they impressed with the sameness of years or the "even tenor of ornithological ways." Superficially one year may resemble another but there are always differences—interesting departures—which can be found if one will but look or if necessary shift his angle of vision. Ornithology to many is a fascinating science but to a great many others it will ever remain the sport of kings.

The first weeks of the year were remarkably mild and open. During January the mean temperature of 40.2° was 9.3° above normal. In February several snows and some cold days gave a "feeling of winter" but temperature averages were still above normal. Fresh water remained open or nearly so and on places like Brookhaven where the birds are fed and cared for right through the year, fresh-water-fowl were present in great variety and abundance. A Pied-billed Grebe remained at least until January 8, and Coot were about in numbers well into winter. A Florida Gallinule at Mill Neck, January 8, is noteworthy. Over 40 Ruddy Ducks spent the entire winter at Southampton. Both American and European Widgeon—the former outnumbering the latter about 100 to 1—and Pintails wintered in large flocks. Numbers of Gadwalls and as many as fifteen Shovellers stayed on at Brookhaven well into January. A Blue-winged Teal that remained at Barnegat until February 26, is perhaps the most noteworthy of all. Large flocks of Green-winged Teal and among them several Europeans wintered on Hempstead Reservoir and as both could be seen to great advantage, they were quite a drawing card. In absence of severe weather, bay ducks were below par until fairly late in winter though 2,000 Golden-eyes at Montauk, January 1, and 6,000 off Atlantic Highlands, January 2, are notable. Scaup and other bay fowl were not about in numbers until late in winter.

In spite of the great southward invasion of Dovekies the preceding fall (see *Auk*, Vol. L, No. 3, July 1933, p. 325) there were less of them at Montauk during the winter than usual. Razor-bills were plentiful, as many as 50 being seen there on January 8.

Half-hardy landbirds were perhaps a more conspicuous part of the picture in January and February, and it is probable that because of mild weather, many of them survived. Blackbirds wintered in large numbers at Kissena and elsewhere. Owing to the presence of wintering flocks of Robins and Bluebirds, this was one of those years when it

was hard to allocate birds to their respective categories as "migrant" or "wintering." For example, 50 Robins at Mastic, January 1 to February 2, "bridge the gap between departure and arrival," and 9 Killdeer at Fort Totten, January 21, is another in-between date, most likely representing a successful wintering flock. Among many other half-hardy species, perhaps the most exotic touch is supplied by a well authenticated report of a wintering Yellow-breasted Chat which came to a feeding station in Forest Hills. A Great Horned Owl nesting on a ledge of rock on the Palisades is an interesting and somewhat unseasonable note. Two newly-hatched young were discovered on February 22, so that it seems reasonable to suppose that eggs were laid on or about the abnormally early date of January 22.

As early as February 5, a definite migration was observed on western Long Island, and on February 7, with a rising thermometer, 250 Robins appeared at Milltown, 6 were observed in Central Park, February 19, but none was seen at Orient until February 21, illustrating the amount of spread between two localities at or near the extremities of our region. One hundred and fifty Pintail, Jones Beach, February 16, were possibly arrivals. First Red-wings appeared at Speonk February 22, and Grackles arrived with their usual precision on the same date in several localities where they did not winter, but they were not evenly distributed until weeks later.

During March, temperatures ran only .3° above normal. There was a fair amount of cold and some snow. This was reflected in the birding, which was generally dull and uneventful. However, Ring-necked Ducks, which have lately been increasing in the East, appeared in unprecedented numbers in March and early April. They were observed in large flocks in New Jersey and Westchester and even larger numbers were reported from Brookhaven, L. I., where Ring-necks were formerly believed to be especially rare. At the extreme eastern end of Long Island this species is still a generally rare bird but in places like Brookhaven, on which we have no observations, except for very recent years, the birds occur regularly in numbers and occasionally, as this year, are positively abundant.

The flight of Fox Sparrows—often fast moving and only partly observed—was this year heavy and well marked. A few arrived in Central Park as early as February 26; a month later (March 25) 700

to 800 were reported from Franklin Lake, N. J., and on March 31, there were over 100 in Central Park. Perhaps correlated with their abundance in early spring, they remained about in numbers unusually late. For instance, there was a "small visitation" of them, April 25 (Central Park and the Battery) and on April 28, "there are still a few left in our area" (*Auk*, Vol. L, No. 3, July, 1933, p. 365). Turkey Vultures, March 18, at Poundridge, April 8, and 10, in northeastern Westchester seemed to have been in regular migration.

Migration of land-birds generally lagged during the month owing perhaps to unseasonable cold weather on the 11th, 19th-20th and a fall of snow and sleet on the 25th. Three days later a Hermit Thrush was heard singing in northeastern Westchester. "He sang twice with an interval of about 15 minutes between songs" (Halle), remarkable enough but all the more so in view of the fact that on the nesting grounds in Connecticut, there is no really dependable song until late in May.

April while a mere .7° above normal, had prevailing southeast winds. Precipitation was above normal. Winter faded off into an unusually wet, early spring. The last killing frost occurred on April 23. Key species like the Barn Swallow and Yellow Palm Warbler arrived April 4, and 6, respectively but were not common for some days later.

April 2, was quite a red letter day in the annals of local ornithology. One hundred Snow Geese were seen flying high over Troy Meadows, not the first record of this species at or near this locality and perhaps indicating its normal course of flight which seemingly is not coastwise in spring. Laughing Gulls arrived at Pelham, April 1, and Newark, April 2, Oakwood Beach, April 13, their early arrival perhaps connected with weather conditions. On the other hand, the species is consistently increasing and as consistently remaining later in fall. As a migratory species increases numerically in a given locality, it tends to arrive earlier and remain later possibly for the reason that in a large aggregation of birds there are just that many more apt to be hardy, enterprising, rugged individualists. On April 2 the Sora was found on the Newark Marshes and Purple Martins arrived at Manursing Island, breaking all records. Migrant Shrikes were recorded at Garden City and on the following day at Poundridge and Mastic.

A Whip-poor-will heard in the Barnegat Region, April 8, is perhaps a mere casual but it affords interesting possibilities for speculation since that is a species that is more often heard than seen and that might conceivably arrive earlier in spring than records indicate.

Late in the afternoon of April 9, 20 Canvas-backs and 1,000 Scaup were flying over the Palisades in a northwesterly direction—not upstream as one might expect. The European Teal was last heard of on Long Island on April 9, and Mr. J. T. Nichols calls attention to its appearance in Ohio on April 26, perhaps an indication of the direction of its flight.

Egrets and Little Blue Herons—both of which are beginning to be regular spring transients in small numbers—and 2 Louisiana Herons were found at Barnegat, April 16, and a Red-eyed Vireo in the Bronx on April 18, is extremely early. Weather charts afford no explanation of the occurrence of these species but they are presumably to be similarly explained.

“On April 21, two European Goldfinches were observed at Garden City, L. I., one in full song and one also carrying nesting material into a large, thick-foliaged Pine Tree. After two days, however, they were not seen again about this tree, though two were seen not far away on April 30, and May 5, and three birds on May 11 (J. T. Nichols). Reports indicate that several individuals were present in Garden City in April—whence they came and where and whether they nested remaining a mystery.” (Bird-Lore, “Season.”)

Two Bald Eagles, Lake Waccabuc, April 25; 1, April 27; 2, April 28; 1, April 29; and 1, April 30, were seemingly not repeats since all were flying in a northeasterly direction. The Hudson River wintering birds usually leave in February or March and the Waccabuc birds are perhaps those that came south early with hawk flights and were returning from more southerly latitudes than New York.

May was warm and wet; the mean temperature ran 62.8° which is 2.2° above normal and rainfall exceeded the average by 2.69 inches. As Mr. Griscom and others have shown in great detail all the possible variations of the May migration and as day to day data are largely unavailable, we will treat the May migration in more general terms, perhaps, than is customary. May birds were at first relatively scarce owing to a capricious thermometer which sank to 45° as late as May 8.

The big flight occurred May 11 to 15, perhaps reaching its peak on May 13, after which there was a comparatively rapid falling away. Six Black Terns in New York Harbor, May 14, and 2 or 3, May 15 are noteworthy. Egrets appeared May 17, at Jones Beach and May 27, at Easthampton.

While ornithologists continued to differ as to where it could possibly be coming from, the European Little Gull arrived in New York Harbor with distressing precision on May 7. When they (2, Oakwood Beach, August 5) left, the ornithologists were still deadlocked.

In June, temperatures soared; there was a heat wave from June 3, to 12, and rainfall began to dwindle. A Junco on June 5, in north-eastern Westchester "under the apple trees by my house" (Halle), was a timely reminder that not all early June Juncos are necessarily nesting.

There are two noteworthy breeding records for an outlying point in our area. The Herring Gull, which has been increasing and extending its range, was found nesting at Fisher's Island and Red-breasted Mergansers were reported in the same locality with young. The last may be just a casual but it is not the first breeding report and birds of this species are not infrequently met with in summer near New York. This very summer there are quite a number of records. The species "breeds very rarely on the coast of Massachusetts" (Forbush).

The Mockingbird—a species which "defies classification" but which is probably a rare resident on Long Island—was closely watched for days in June at Westbury but did not seem to nest. The fact that there are more observations of Mockers, occasionally in numbers, in fall and winter on Long Island may be merely the coincidence of more observers in the field at those seasons. A Yellow-throated Warbler was discovered in full song in some tall spruces at Sag Harbor, July 4, to 15. No evidence of nesting could be obtained and the bird was collected. A House Wren was watched feeding young in an abandoned Kingfisher's nest at Milltown—a double barreled breeding record. Pileated Woodpeckers were found nesting in Fahnestock Memorial Park in Putnam County which is perhaps the source of supply for areas even nearer New York, such as Lake Waccabuc.

The first part of July was comparatively cool but there were some "scorchers" later in the month, when the mercury soared to 100° and

for once, summer drought was not nearly so severe. A Hooded Merganser was present at Montauk July 9, to 24, on a fresh pond but seemingly a non-breeder. Ruffed Grouse were reported as increasing markedly in northeastern Westchester. Twenty-one Upland Plover seen near Floral Park, July 4, were presumably migrants. By the third week of July, Short-billed Marsh Wrens in full song were turning up in several localities in Westchester County and on Jones Beach where they certainly did not nest. The stop, look and listen type of breeding bird census is fortunately enough concluded by the end of June.

The early flight of Curlew and Dowitchers was light but that of Stilt Sandpipers was heavy—30, Jones Beach, July 23; 75, August 1. Toward the latter part of the month and during August, the ranks of the White Herons steadily grew. There were large flights of both Little Blue Herons and Egrets and with them more Snowy Herons than heretofore. Both the Egret and Little Blue remained well into October (Oct. 7, and 13, respectively), perhaps owing to mild weather but possibly as in the Laughing Gull, an incident of their increase. At any rate, this is the first time we have begun to better the old departure dates for this region. On the Newark marshes both herons and shore-birds were especially plentiful and in that rich and varied atmosphere both birds and bird enthusiasts waxed fat and lusty.

The August temperature averages were practically normal but rainfall was 4.88 above average. A tropical storm on August 23, which battered the coast and deluged the City for days primed the pump and to its none too gentle ministrations and those of another in mid-September may be traced practically all the rare birds seen in late summer around New York. The first storm spattered petrels far inland. The majority of them were Leach's or probably so but there are one or two well authenticated reports of the Wilson's, such as from along the Housatonic at Kent, Connecticut. Northern and Wilson's Phalaropes blew into the Newark meadows and incidentally the latter species was by no means rare there during September, 5 to 6 occasionally being in sight at once. When it is considered that this species is one that has increased—or apparently increased—within the experience of the present generation of field-workers, one cannot so conscientiously attribute it to more intense field activity. On the other

hand, this increase seems to parallel the presence of severe western drought.

The flight of Golden Plovers was light and their arrival at Newark and Easthampton coincided with the August storm; that of Black-bellies was heavy. There was a "good" flight of Greater Yellow-legs and a "large" flight of Lessers. Knots were relatively scarce in New Jersey but more than usually plentiful on Long Island. A heavy movement of Pectorals took place in mid-September both on Long Island and in New Jersey. As many as 175 White-rumps were noted at Newark, September 16, and a few days before, Westerns were present "in hundreds." These birds though not collected were certainly correctly identified by plumage characters, habits and voice. Is this increase actual or merely apparent? Running south from Cape Cod toward the Carolinas, the Western increases in regular progression; this year it was apparently a commoner bird in New Jersey than on Long Island. Near Charleston, it becomes common to abundant. It is probable that the species has always been less rare around New York than records indicate but it may well be that this year witnessed an unusually heavy flight. As many as 18 Baird's Sandpipers were noted at Easthampton, September 16.

Marbled Godwits were found at Brigantine August 23 (storm) and on September 2, or 3, 3 birds were seen to drop from a flock of 30 big shorebirds and were definitely identified as Marbled Godwits—the rest probably were. Hudsonian Godwits appeared on Long Island and in New Jersey in response to September storm warnings. The latter while generally considered one of our rarest shorebirds, is notwithstanding recorded almost annually near New York and occasionally, as this fall, in small numbers. It was not until October 29—when a Red Phalarope arrived on an arm of Kensico and thereby gave many a mere land-lubber the chance of a life-time to see all three phalaropes on land inside of a few weeks—that we were satisfied to regard the fall flight of shorebirds as largely a thing of the past. Caspian Terns were evidently more plentiful than is usual during this period.

Meanwhile (September 2, to October 8) Arkansas Kingbirds were continually turning up out at Jones Beach. They were thought to comprise at least 6 individuals though never more than 1 was seen at a time. Is it mere coincidence that Arkansas Kingbirds, Wilson's

Fhalaropes and other western shorebirds were unusually numerous in the East during the same autumn? Hooded Merganser, Jones Beach, September 16, 17, and Holboell's Grebe, Montauk, September 22, are notably early and it should here be recalled that the first species was present in July on Montauk Point.

The first part of October was mild and no heavy frost occurred until October 14, except in outlying areas. Small bird migration was as usual uneventful. A large flight of 400 Blue Jays was reported in Westchester, September 23, and on the following day 175 were seen in Central Park. Red-breasted Nuthatches literally swarmed in late September and early October. They were found along Riverside Drive and practically invaded the City Hall; 22 were counted in one hour at Easthampton, September 30. Quite a few, conveniently enough, remained about until the Christmas Census.

Spotted Sandpipers were noted at Baxter Inlet, Bronx, October 16, and Rye, October 19. A very late Chat is reported from Bronx Park, October 26. Tree Sparrows were about in numbers as early as October 14, and 16; and 50 White-crowned Sparrows from Easthampton to Montauk, October 14. A few Shrikes appeared in late October and November.

During November there were unseasonably cold periods as between the 11th and 16th. The early part of the month was uneventful. During A. O. U. week it turned cold and there was some snow. At 10.30 A. M., November 13, a flock of 200 to 250 Snow Geese passed over Flushing and half an hour later, 50 were seen at Far Rockaway. At 1 P. M., 125 were over Old Greenwich and there were reports of large flocks at Idlewild, Speonk, Peconic, Moriches Bay and Orient Point, that were evidently part of this heavy and spectacular drive. The birds were presumably Greater Snow Geese and their appearance over New York reputedly coincides with their departure from the St. Lawrence at about that time. Five Whistling Swans were seen to alight on Westchester Creek in New York City late in the afternoon of November 20—the first New York City record for many a day.

Lapland Longspurs were unusually plentiful during this period. First observed October 29, 12 were seen at Jones Beach, December 3, 25 at Montauk, December 17, and 35 on Newark Meadows, same date.

More snow and unseasonable cold in December, and by this time many northern birds, of which there had been vague rumors from down East, began to appear. Purple Sandpipers were far less rare than usual. King Eiders were seen in numbers up to 20 at Montauk. The Snowy Owl was recorded at Montauk, December 24, and White-winged Gulls were accumulating on a large City dump in the Bronx until on December 31, there were 5 Iceland and 2 Glaucous among the many hundreds of Herring Gulls. Evening Grosbeaks were noted November 4, and December 18, and White-winged Crossbills were present sporadically from November 30, to December 27. The first Pine Grosbeaks—a flock of 9—very obligingly arrived on December 24.

With northern birds on the way and half-hardy birds bravely withstanding the onslaughts of a Spartan Winter, the Christmas censuses around New York were the most exciting in years. Cape May with 96 tied its old rival the Bronx Region which was hampered by fog, but Barnegat was a close runner-up. More remarkable still, by combining all the species seen by all the census takers in the New York area, one reaches the impressive total of 154, apparently an all time high for winter—winter by the calendar if not by the birds.

Gavia immer immer. Common Loon.—2, Franklin Lake, Mar. 25 (Fry and Griffin); 300, Long Beach, April 11 (J. Mayer).

Gavia stellata. Red-throated Loon.—16, Tod's Neck, Nov. 3 (Cruikshank).

Colymbus griseogen holboelli. Holboell's Grebe.—35, Bayside, Feb. 5 (Breslau, Sedwitz); 35, Bayville, Mar. 5 (same observers); 2, Montauk, Sept. 22 (same observers).

Colymbus auritus. Horned Grebe.—2, Westport, Conn., Aug. 22 (Janvrin); 1, Rye, Sept. 6 (Cruikshank).

Podilymbus podiceps podiceps. Pied-billed Grebe.—1, Harbor Island, Jan. 1 (Cruikshank); 1, Brookhaven, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 5, Pompton Lake, Mar. 25 (Fry and Griffin); pair bred, Mecox Bay (Helmuth); presumably breeding, Mill Neck, May 22 (Breslau and Sedwitz).

Puffinus griseus. Sooty Shearwater.—3, Jones Beach, May 30 (Breslau, Sedwitz); 1, Jones Beach, June 13 (Vogt).

Puffinus gravis. Greater Shearwater.—2, Jones Beach, Oct. 1 (Breslau, Sedwitz).

Oceanodroma leucorhoa leucorhoa. Leach's Petrel.—Crystal Lake, Sullivan County, Aug. 25 (R. Scott); 2, Seaside Park, Aug. 25 (Rogers); 2, Shark River, Sept. 3 (P. B. Philipp). See also next species.

Oceanites oceanicus. Wilson's Petrel.—1, Jones Beach, July 23 (Breslau, Sedwitz); 1, Hudson River near Irvington-Piermont Ferry, Aug. 27 (A. Thomas); 1, Hudson near Dyckman Street Ferry, Aug. 27 (C. Staloff); Kent, Conn., Aug. 27 (R. Kuerzi). Some of these may refer to preceding species.

Moris bassana. Gannet.—40, Montauk, Jan. 1; 1, Sept. 22; 15, Dec. 24 (Breslau and Sedwitz); 1, Long Beach, Dec. 31 (Janvrin).

Phalacrocorax carbo carbo. European Cormorant.—Oakwood Beach, Oct. 6 (McGee, Walker, Wiegmann); 1, Montauk, Nov. 12 (Local Bird Club and Cruickshank). Helmuth reports that Cormorants are numerous in fall about Montauk peninsula, as many as 150 observable in mid-October; some of them belonging to this species.

Phalacrocorax auritus auritus. Double-crested Cormorant.—1, Newark Bay, Sept. 2 (J. Kuerzi, Mayr).

Ardea wurdemannii. Würdemann's Heron.—"Mr. Urner commented on his observation of an unusual heron on the Tuckerton Marshes. There were six points that made him certain that the bird was a Würdemann's Heron and not an albinistic specimen of the Great Blue: (1) The slightly larger size and different posture, (2) the entire head white, (3) the dirty white neck, (4) the light-colored mantle, (5) the large, very bright bill and (6) the tawny, not dark, color of the legs."

Casmerodius albus egretta. American Egret.—1, Barnegat, April 16 (Urner); 2, Jones Beach, May 17, 27, and 1, June 25 (Vogt and others); Delaware Water Gap, July 20 (Hickey); 5, Washington, N. J., Aug. 15 (Ethel Handlon); 18, Jones Beach, Aug. 12, and 27 (Woodmere Academy Bird Club, Vogt); 3, Mastic, Aug. 12 (J. T. Nichols); 1, Grassy Sprain, Aug. 17, to 29 (A. Thomas); 2, Bridgeport Air Field, Aug. 27 (Mr. and Mrs. Rich); 6 birds daily up to Sept. 24, 1 on Sept. 28, 1 on Oct. 6, 2 on Oct. 7, 1 on Oct. 9, 2 on Oct. 13, at Jones Beach (Vogt).

Egretta thula thula. Snowy Egret.—1, Jones Beach, Aug. 4 and 12 (Vogt); 2, same locality, Aug. 20 (Breslau, Sedwitz); 12, same locality, Sept. 16 (Matuszewski); 1, Easthampton, Aug. 25 (Helmuth); 1, Sagaponack, L. I., Sept. 23 (Breslau, Sedwitz); 10, Newark, Sept. 6; 12, Sept. 9; 9, Sept. 18 (Urner and others).

Hydranassa tricolor ruficollis. Louisiana Heron.—2, Barnegat, April 16 (Urner); 1, Easthampton, May 28 (Helmuth).

Florida caerulea caerulea. Little Blue Heron.—2, Barnegat, April 16 (Urner); 1, Jones Beach, April 19 (Vogt); 1, Easthampton, May 27, and 28 (Helmuth); 1, Easthampton, July 15 (Helmuth); 3, Oakwood Beach, July 29 (Wiegmann); 1, Montauk, Aug. 6 (L. N. Nichols); 56, Troy Meadows, Aug. 9 (Fry); 1, Easthampton, Sept. 20; 1, Kensico Lake, Oct. 7 (Brand and P. P. Kellogg).

Butorides virescens virescens. Eastern Green Heron.—Central Park, April 19 (Rich); Idlewild, Jamaica, Oct. 10 (J. Mayer); Bronx Region, Oct. 11 (P. Malley).

Nyctanassa violacea violacea. Yellow-crowned Night Heron.—Mattituck, this summer (Latham); Troy Meadows, Aug. 6 (Watson and others); 1, Jamaica Bay, Sept. 30 (Cruickshank).

Botaurus lentiginosus. American Bittern.—2, Shinnecock, Mar. 12 (Overton); 3, Staten Island, April 2 (Chapin); 1, Jones Beach, Dec. 1 (Scott).

Ixobrychus exilis exilis. Eastern Least Bittern.—1, Van Cortlandt, April 24 (Cruickshank); 5, Kissena Park, June 8 (A. L. Walker); breeds at Mill Neck (Breslau, Sedwitz).

Cygnus columbianus. Whistling Swan.—5 (2 adults and 3 cygnets) well observed, Baxter Inlet, Bronx County, Nov. 20 (J. and R. Kuerzi).

Branta canadensis canadensis. Canada Goose.—Idlewild, Jamaica Bay, Sept. 19 (J. Mayer).

Branta bernicla hrota. American Brant.—Gilgo, Aug. 1 (Hickey, Thomas); Shinnecock Bay, Sept. 16 (Helmuth); 500, same locality, Nov. 12 (Cruickshank); 300, Long Beach, Dec. 31 (Janvrin).

Branta leucopsis. Barnacle Goose.—1, probably feral, collected at Little Neck Creek, L. I., March 19 (Breslau, Sedwitz).

Chen hyperborea atlantica. Greater Snow Goose.—About 100 flying high over Troy Meadows, April 2 (Lind, C. K. Nichols; See Auk, L, No. 3, July 1933, page 52); 1 with Canada Geese flying over Freeport, April 18 (J. Terry); 200-250 flying over Hollywood Avenue, Flushing, at 10.30 A. M., Nov. 13 (Mrs. Standfast); 50, Far Rockaway Beach, 11 A. M., Nov. 13 (G. M. Cook and W. E. Saunders); 125 flying over Old Greenwich, 1 P. M., Nov. 13 (Margaret Brooks); 150, Idlewild Beach, Ozone, L. I., Nov. 14 (J. Mayer); 25, Peconic Bay, about Nov. 14 (Wilcox); 25, Speonk, about Nov. 15 (Wilcox); 250, in Moriches Bay at East Moriches, about Nov. 20 (Wilcox); large flight of Snow Geese at Orient Point this November, flocks of 150 to 700. Latham assumed these were Lesser Snow Geese though one collected proved to be a Greater, the form that is more common in New England according to Kennard (1927, Proc. New England Zool. Club) and the majority of observers.

Anas rubripes tristis. Common Black Duck.—Nest with eggs, Meadow Island, Fresh Kills, S. I., May (W. T. Davis); 4700, Troy Meadows, Oct. 28 (C. Brown); 2930, same locality, Nov. 7 (C. Brown).

Chaulelasmus streperus. Gadwall.—8, Brookhaven, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); Newark Bay, April 2 (Haulenbeek); 4, Brookhaven, Nov. 12 (Local Bird Club and Cruickshank).

Mareca penelope. European Widgeon.—1, Brookhaven, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 1, Hempstead, April 9 (J. Mayer); 1 drake, 3 possible ducks, Mecox, Sept. 21, 22 and 23 (Helmuth); drake and 2 ducks, Idlewild, Jamaica Bay, Oct. 5 (J. Mayer); 1 drake, Brookhaven, Nov. 19 (A. McBride); 1, Hempstead Reservoir, Nov. 26 (Mr. and Mrs. Rich); 5, Brookhaven, Dec. 25 (Breslau, Sedwitz).

Mareca sp. Hybrid Widgeon.—Avon, N. J., March 25 (Carter, Janvrin, Urner). "The forehead of this bird was cream colored as in the European Widgeon; the head a rich, rusty brown or tan, darker than the head of the European. Throat and breast as in drake American; back intermediate, darker than European; one side of bird typical American, the other in markings, shading and color typical of the European. Seen eventually at close range. From the distance, as first observed, in light which did not show the head color, it had a disconcerting way, as it wheeled about while feeding, of translating itself suddenly from one to the other Widgeon as judged by body markings" (Urner).

Mareca americana. Baldpate.—1 pair, Jones Beach, June 17 (Vogt).

Dafla acuta taitzihoa. American Pintail.—150, Jones Beach, Feb. 16 (Vogt).

Nettion crecca. European Teal.—Drake, Hempstead Reservoir, first seen Dec. 30, 1932 (J. and R. Kuerzi, see Auk, Vol. L, No. 4, p. 429); 1, same locality, Jan. 1 (Matuszewski); 2, same locality, Jan. 21 (Breslau, Sedwitz); 2, same locality, Jan. 22, and repeatedly thereafter until Mar. (Hickey, Matuszewski); 1, Jones Beach, April 9 (J. and R. Kuerzi, Vogt), invariably associating with Green-winged Teal, which wintered at Hempstead in numbers.

Nettion carolinense. Green-winged Teal.—See closing comments under preceding species.

Querquedula discors. Blue-winged Teal.—1, Barnegat, up to Feb. 26 (Urner and others); 1, Jones Beach, Aug. 2 (J. Mayer); 2 pairs, Cross Pond, Westchester, Oct. 22 (Halle); Prospect Park, Oct. 26 (Cruickshank); 1, Van Cortlandt Park, Dec. 7 (Cruickshank).

Spatula clypeata. Shoveller.—15, Brookhaven, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 1 pair, Mill Neck, March 19 (Breslau, Sedwitz); 1 shot, Peconic Bay, Nov. 16; another shot, Moriches Bay, Nov. 28 (Wilcox).

Nyroca americana. Redhead.—2, Mecox Bay, Sept. 18 (Helmuth); 1, Hempstead Reservoir, Nov. 18 (Matuszewski).

Nyroca collaris. Ring-necked Duck.—25, Brookhaven, Feb. 26, and 100, same locality, March 12 (Breslau, Sedwitz); a flock of 55 to 60 resident on Cross Pond, Westchester, from March 10, 21 remaining on April 21 (Halle); another flock of 21 appeared on Titicus Reservoir, March 15, 10 of these departed on April 7 and the remaining 11 on April 20 (Ogburn); 45, Rye Lake, March 25 (Cook, J., and R. Kuerzi); 30, Rye Lake, April 2 (J. and R. Kuerzi and others); 16, Franklin Lake, April 2 (C. K. Nichols); 2, Jones Beach, April 15 (Vogt); several, Orange Reservoir, April 23 (Eaton); "most of 200", Boonton Reservoir, Nov. 11 (Edwards).

Nyroca valisineria. Canvas-back.—50, Flushing Bay, Jan. 2 (Breslau, Sedwitz); 20 flying west by northwest over the Palisades with 1000 Scaup, 5.44 P. M. to dark, April 9 (Cruickshank, Herbert, Hickey); 650, Hunts Point, Dec. 31 (Herbert, J. and R. Kuerzi).

Nyroca marila. Greater Scaup Duck.—See preceding species.

Glaucionetta clangula americana. American Golden-eye.—2000, Montauk, Jan. 1 (Breslau, Sedwitz); Pelham Bay, June 7 (Malley); 3, Rye Beach, Oct. 15 (Cruikshank).

Clangula hyemalis. Old-squaw.—2, Parsippany Lake, Oct. 29 (Edwards).

Somateria spectabilis. King Eider.—1, Montauk, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); immature male, Oyster Pond, Montauk, Sept. 30, and Oct. 1 (Helmuth); 21, Montauk Point, Dec. 24 (Breslau and Sedwitz).

Melanitta perspicillata. Surf Scoter.—10, Eaton's Point, L. I., Sept. 24 (Janvrin).

Erismatura jamaicensis rubida. Ruddy Duck.—40 to 50, Southampton, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 45, Southampton, March 12 (Breslau, Sedwitz); Boonton Reservoir, March 18 (Haulenbeek); 75, Southampton, Nov. 12 (J. and R. Kuerzi and others); 180, Southampton, Dec. 1 (Wilcox); 1, Piermont, Dec. 24 (Kessler, J. Kuerzi).

Lophodytes cucullatus. Hooded Merganser.—Poundridge, Westchester, irregularly present during the winter until March 30, no more than 3 birds seen at one time (Halle); North Salem, Westchester, regular during the winter after each thaw on the smaller lakes and ponds, fairly common in the middle two weeks of March, with a maximum of 5 seen at once, last seen March 31 (Ogburn); Jones Beach, April 8 (J. and R. Kuerzi); 1 female, on pond near the Ocean front, Montauk, July 9 to 24 (Cynthia Church); 1, Jones Beach, Sept. 16 and 17 (Vogt); 1, Prospect Park, Oct. 28 (Cruikshank); at least 20 on western Long Island, Nov. 26 (Sedwitz).

Mergus merganser americanus. American Merganser.—100, Franklin Lake, March 25 (Fry and Griffin).

Mergus serrator. Red-breasted Merganser.—Pair seen with small young, evidently nesting, Fishers Island (H. S. Ferguson); 7, Great South Bay, June 9 (Murphy, Vogt); 2, Long Beach, Aug. 31 (Janvrin); 2, Rye Beach, Sept. 7 (Cruikshank).

Cathartes aura septentrionalis. Turkey Vulture.—4, Poundridge, March 18 (Cook); 2, Dutchess County, April 8 (Cruikshank); 3, northeastern Westchester, April 8, 1, same locality, April 10, all 4 seemed to be migrating; 1 flying southeast over Kensico, April 13; 3, northeastern Westchester, April 22 (Halle); 1, Montauk, June 10 (Helmuth); 1, Montauk, Nov. 12 (Breslau, Cruikshank, Sedwitz).

Accipiter cooperi. Cooper's Hawk.—Breeding pair, Staten Island, apparently the first record for the Island (Chapin, Cleaves). Discovered about mid-April, the birds have been under intermittent observation since and on June 18, there were two downy, white young with wing quills showing, standing in the nest and exercising their wings. A parent hawk, probably the female, was standing on the rim of the nest evidently feeding the young. The nest was described as being about 40 feet from the ground in a tulip tree difficult to climb.

Buteo lineatus lineatus. Northern Red-shouldered Hawk.—1, Greenwood Cemetery, May 14 (Hix).

Buteo platypterus platypterus. Broad-winged Hawk.—4, Central Park, Sept. 22 (Sedwitz); 1 badly crippled, Van Cortlandt swamp, Dec. 7, 10, 17, and 24, carefully observed and reported in detail (Cruickshank).

Buteo lagopus s. johannis. American Rough-legged Hawk.—Jones Beach, April 2, and 9 (Vogt).

Haliaeetus leucocephalus subsp. Bald Eagle. The following birds were observed flying over Lake Waccabuc in an easterly direction: 2, April 25; 1, April 27; 2, April 28; 1, April 29; 1, April 30 (Ogburn); Montauk, Aug. 6 (L. N. Nichols); 1 immature, Montclair, Oct. 21, migrating south with Red-tailed and Red-shouldered Hawks (C. Brown).

Pandion haliaetus carolinensis. Osprey.—Poundridge, March 27 (Halle); 1, Southampton, Nov. 12 (Wilcox and many others).

Falco columbarius columbarius. Pigeon Hawk.—Prospect Park, April 18 (Cruickshank); Orient, Aug. 25 (Latham); 27 killed and thrown into the road, Mecox, Sept. 13 (Helmuth).

Bonasa umbellus umbellus. Eastern Ruffed Grouse.—Has increased markedly in northeastern Westchester in the past years. A short morning's stroll will now generally result in flushing four or five and the cocks are heard drumming very frequently, which was not the case formerly. Might almost be said to be abundant in the extensive woodland of the Port of Missing Men grounds (Ogburn).

Rallus elegans elegans. King Rail.—1 dead, Troy Meadows, Jan. 2 (Eaton); 1 heard, Kissena, L. I., May 21 (Breslau, Sedwitz); 1, Van Cortlandt, Dec. 24 (Cruickshank); 1, Baxter Inlet, Bronx, same date (R. Kuerzi and Matuszewski).

Rallus longirostris erepitanus. Northern Clapper Rail.—Uncommon east of the Hudson, arrived Jamaica Bay, April 5 (J. Mayer); Pelham, April 29 (Cruickshank); Baxter Inlet, Bronx, August 30 (Malley); 5, Rye, Oct. 14 (Cruickshank); 4, Baxter Inlet, Bronx, Nov. 1 (Malley).

Rallus limicola limicola. Virginia Rail.—1, Shinnecock Bay, Nov. 12 (Bronx County Bird Club and Wilcox); 1, Piermont, Nov. 26 (R. Kuerzi).

Porzana carolina. Sora.—1, Port Newark, April 2 (Haulenbeek).

Coturnicops noveboracensis. Yellow Rail.—Mecox Bay, Sept. 13. "A small bird like a stub-tailed Song Sparrow fluttered up from the grass . . . and bumped headlong into the stems of some boneset and fell to the ground but it scuttled off into the cat-tails before I could close my hand upon it" (Helmuth).

Creepus jamaicensis stoddardi. Black Rail.—1, Jones Beach, May 3 (Vogt).

Gallinula chloropus caehinnans. Florida Gallinule.—1, Mill Neck, Jan. 8 (Breslau, Sedwitz); heard, Speonk, April 29 (Wilcox); 1, Jamaica Bay Reservation, May 30 (Lind); 3, Fort Salonga, June 9 (Fry).

Fulica americana americana. American Coot.—26, Brookhaven, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr).

Charadrius semipalmatus. Semipalmated Plover.—2, Baxter Inlet, Bronx, Nov. 7 (Drescher, Kessler); 1, Beach Haven, Dec. 24 (C. K. Nichols).

Oxyechus vociferus vociferus. Killdeer.—9, Fort Totten, Jan. 21 (A. L. Walker); first nesting record, Speonk, June 25 (Wilcox).

Pluvialis dominica dominica. Golden Plover.—2 flocks, Brigantine, Aug. 20 (Eaton); Newark, Aug. 23 to Oct. 22, maximum 20, Sept. 20 (Urner); 2, Easthampton, Aug. 13 (Helmuth); Idlewild, Jamaica Bay, Aug. 21 (J. Mayer); 16, Easthampton, Aug. 24, and 15, Aug. 25 (Helmuth); 1, Idlewild, Jamaica, Sept. 14, and 2, Sept. 16 (J. Mayer); 1, Easthampton, Sept. 16 (Helmuth).

Squatarola squatarola. Black-bellied Plover.—Sheepshead Bay, Jan. 7 (Cruickshank); heavy flight, 350, Brigantine, Sept. 17 (Urner); 4, Rye, Nov. 25 (Cruickshank).

Arenaria interpres morinella. Ruddy Turnstone.—6, Rye Beach, Oct. 14 (Cruickshank); 1, Montauk Point, Nov. 12 (Bronx County Bird Club and Wilcox); 1, Barnegat, Nov. 18 (Urner).

Capella delicata. Wilson's Snipe.—1, Green Pond, N. J., July 30 (L. N. Nichols); 14, Easthampton, Sept. 16 (Helmuth).

Phaeopus hudsonicus. Hudsonian Curlew.—Several flocks, Jamaica Bay, Sept. 22 (Cruickshank); Baxter Creek, Sept. 26 (Malley); 2, Easthampton, Oct. 15 (Helmuth); Barnegat, July 2 to Sept. 17, maximum 250 on July 30 (Urner).

Phaeopus borealis. Eskimo Curlew.—“A friend of mine, an elderly man and former Supt. of Highways of Southampton town, called on me a few days ago and looked over my skins. He said that a neighbor of his at Wickapogue (between Mecox Bay and Southampton) heard an Eskimo Curlew on his lots on August 14 and 15. Mr. Downs said he also heard one there four or five years ago. His neighbor, Mr. Sayre, is 78 years old and has lived there on his farm all his life. Both Mr. Downs and Mr. Sayre used to hunt Fute or Dough birds many years ago, killing hundreds of them. Mr. Downs has seen as many as 1,000 in one flock. Mr. Sayre's farm is located at Flying Point, about one quarter mile west of Mecox Bay and was the best spot in that vicinity for these birds, no doubt one of the best on the Island. They always fed on these pasture lots with great numbers of Golden Plover, always choosing those lots with short grass where the cows were pastured. Downs said they seldom arrived before September 1. Flying Point is a very appropriate name for this rather narrow stretch of land as it was a regularly travelled highway for the migrating birds. Only last winter, on this same farm, one hunter killed two hundred geese.

“I was so enthused over the remote possibility of seeing and hearing one of these birds that I went down there on the 19th and Mr. Downs kindly showed me the lay of the land. Of course, conditions have changed in recent years. Instead of cow pastures, the land is now cultivated. The birds would only alight now on newly plowed ground or fields with the grain just sprouting out of the ground.

There was one field there with the grain just coming up and there were a few Golden Plover on it on the 19th. It was a little foggy with poor visibility so that we were unable to see a Hudsonian Curlew flying over but could hear it calling until it finally went into the west out of hearing. Downs immediately pronounced it a Jack Curlew which gave me a firmer belief that he really did know the difference between the call notes of the Fute and Jack Curlew. Downs said the Jack Curlew never alighted up on the fields and that the Fute never stayed down on the shore of the bay" (Extract from letter from LeRoy Wilcox to J. T. Nichols).

Bartramia longicauda. Upland Plover.—21, Floral Park, L. I., July 4, to 18 (Lind); 7, same locality, July 30 (Breslau, Sedwitz); Water Mill, Aug. 20 (Breslau, Sedwitz); Idlewild, July 28 to Aug. 30 (J. Mayer); maximum, 25, Newark Meadows, Aug. 9 (Urner).

Actitis macularia. Spotted Sandpiper.—Easthampton, Oct. 15 (Helmuth); Baxter Inlet, Bronx, Oct. 16 (Drescher, Kessler); Rye, Oct. 19 (Cruickshank).

Tringa solitaria solitaria. Eastern Solitary Sandpiper.—1, Hempstead Reservoir, Oct. 22 (Breslau, Sedwitz).

Catoptrophorus semipalmatus subsp. Willet.—Oakwood Beach, July 15 to Aug. 14 (Mr. and Mrs. Rich); Barnegat, July 30 to Sept. 17, maximum 30 on Aug. 15 (Urner).

Totanus melanoleucus. Greater Yellow-legs.—1, Newark, Mar. 31 (Urner); 2, Overpeck Creek, April 9 (Mr. and Mrs. Rich); 62, Pelham, April 29 (Cruickshank).

Totanus flavipes. Lesser Yellow-legs.—6, Bronx, in direct comparison with the preceding species, Nov. 1 (Malley).

Calidris canutus rufus. American Knot.—Relatively scarce south-bound in New Jersey but more than usually numerous on Long Island; the following data are supplied by Mr. Helmuth for Easthampton: 36, Aug. 19; 50, Aug. 29; 22, Sept. 16; 48, Sept. 22; 21, Sept. 23; 4, Oct. 14; 1, Saugatuck Shores, Conn., Oct. 29 (Farley, Herbert, Hickey, Thomas); maximum on New Jersey shore 40 on Aug. 6 (Urner).

Arquatella maritima. Purple Sandpiper.—4, Long Beach, Jan. 4, to 6 (B. C. Berliner); 2, Long Beach, Jan. 22 (Breslau, Sedwitz); 6, Montauk, Nov. 12 (Breslau, Sedwitz); 1, Montauk, Nov. 17 (R. Lind); 2, Barnegat, Nov. 18 (Cruickshank and others), and 2, Dec. 24 (Vogt); 9, Long Beach, Nov. 26 (Cruickshank and Local Bird Club).

Pisobia melanotos. Pectoral Sandpiper.—Heavy flight, "hundreds," Newark Sept. 17 (Herbert, J. and R. Kuczzi) and Sept. 18 (Urner); 100, Idlewild, Jamaica, Sept. 17 (Breslau, Sedwitz); 5, Jones Beach, Oct. 22 (Breslau, Sedwitz).

Pisobia fuscicollis. White-rumped Sandpiper.—3, Gilgo Beach, June 18 (Breslau, Sedwitz); large flight, Newark Meadows and New Jersey coast, Aug. 25 to Sept. 7, extreme dates July 2 to Nov. 11 (Urner); Rye, Nov. 4 (Cruickshank); 1, Baxter Creek, Bronx, Nov. 7 (Drescher, Kessler).

Pisobia bairdi. Baird's Sandpiper.—1, Easthampton, Aug. 23 (Helmuth); 7 records, Newark, Aug. 30 to Oct. 7 (Urner and others); 18, Easthampton, Sept. 16 (Helmuth); 1, Ozone, L. I., Sept. 17 (Breslau, Sedwitz); 1, Montauk, Sept. 22 (Breslau and Wolfram); 1, Jones Beach, Sept. 24 (Vogt).

Pelidna alpina sakhalina. Red-backed Sandpiper.—1, July 9, Brigantine (Urner); first of this fall, Brigantine, Aug. 18 (Loetscher); New Inlet, L. I., Aug. 20 (Breslau, Sedwitz); 4, Rye, Nov. 25 (Cruickshank); 50, Bronx, Oct. 25 to Nov. 8, and 1, Nov. 29 (Malley); many wintered on New Jersey coast (Urner).

Limnodromus griseus griseus. Eastern Dowitcher.—Gilgo Beach, June 18 (Breslau, Sedwitz); early fall flight as observed smaller in New Jersey than in recent years (Urner).

Limnodromus griseus scolopaceus. Long-billed Dowitcher.—3, Jones Beach, Aug. 26 (Vogt); 1, Brigantine, Aug. 27 (Edwards, Urner); 1, Newark, Sept. 9 and 30 (Urner); all are considered satisfactory, though sight records.

Micropalama himantopus. Stilt Sandpiper.—75, Jones Beach, Aug. 1 (Vogt, Hickey, Thomas); heavy flight in August, continuing into September and a few October on Newark marshes, maximum 60 (Urner).

Ereunetes pusillus. Semipalmated Sandpiper.—2, Baxter Inlet, Bronx, Nov. 21 (Drescher, Kessler); 1, Barnegat, Dec. 24 (C. K. Nichols).

Ereunetes maurii. Western Sandpiper.—Gilgo Beach, June 18 (Breslau, Sedwitz); 200, Easthampton, Aug. 29 (Helmuth); heavy flight during first two weeks of September, Newark—30 to 50, Sept. 2; 150, Sept. 9 (Edwards, Urner and others), and 500, Sept. 10 (Herbert, Hickey, Thomas).

Tryngites subruficollis. Buff-breasted Sandpiper.—Montauk, Aug. 7 (Helmuth); 1, Mecox Bay, Oct. 15 (Helmuth).

Limosa fedoa. Marbled Godwit.—1, Shinnecock Bay, July 30 (Helmuth); 1, Brigantine, Aug. 23 (Walsh); 1, Brigantine, Aug. 27 (Edwards, Urner); probably 30, but at least 3, Brigantine, Sept. 2 or 3 (Tatum).

Limosa haemastica. Hudsonian Godwit.—1, Ozone, L. I., Aug. 20 (Breslau, Sedwitz); Brigantine, Aug. 23 (Walsh); Idlewild, Jamaica, Aug. 26 (Breslau, Sedwitz); 1, Brigantine, Sept. 3 (Potter) and Sept. 10 (Tatum); 3, Mecox, Sept. 16 (Helmuth); 2, Newark, Sept. 17 (Herbert, J. and R. Kuerzi); 1, Sept. 18-30 (Urner and many others); 1, Sagaponack, L. I., Sept. 23 (Breslau, Sedwitz).

Crocethia alba. Sanderling.—1, Long Beach, Jan. 22 (Breslau, Sedwitz); 63, Barnegat, Dec. 24 (C. K. Nichols and others).

Phalaropus fulicarius. Red Phalarope.—1, off Barnegat, January (Oscar Eayre); 1, in half summer plumage, Gardiner's Bay, April 18, and 1 (collected) in full winter plumage, April 21 (Latham); 7, Long Beach, N. J., May 7 (Tatum); 2, Beach Haven to Brigantine, May 7 (Urner); 1, Kensico Reservoir just south of Armonk, Oct. 29, 30 and 31 (Farley, Herbert, Hickey, Thomas, J. and R. Kuerzi).

Steganopus tricolor. Wilson's Phalarope.—1, Brigantine, Aug. 18 (Loetscher); 1 to 6, Newark, Sept. 4 to 18 (Edwards, Urner and others).

Lobipes lobatus. Northern Phalarope.—12, Beach Haven and Brigantine, May 7 (Urner); 12, Long Beach, N. J., May 2 (Tatum); 1, Newark, Aug. 23 (Urner); 1, Brigantine, Aug. 25 (Urner); 15, Montauk, Sept. 2 and 3 (Breslau, Sedwitz); 1, Newark, Sept. 10 (Breslau, Sedwitz); 9, Easthampton, Sept. 15 (Helmuth); 5, Easthampton, Sept. 16 (Helmuth).

Stercorarius pomarinus. Pomarine Jaeger.—6, Montauk, Oct. 14 (Helmuth).

Stercorarius parasiticus. Parasitic Jaeger.—Long Island Sound off Port Jefferson, Aug. 31 (A. L. Walker).

Larus hyperboreus. Glaucous Gull.—1, Harmon, May 9 (Thurston); 1, Easthampton, May 28 (Helmuth); City Dump, Havemeyer Avenue, Bronx: 1, Dec. 16; 2, Dec. 31; 1, Harlem River at 155th Street, Dec. 30 (J. and R. Kuerzi).

Larus leucopterus. Iceland Gull.—1, Jones Beach, Jan. 2 (Hickey, Vogt); 1, same locality, Jan. 15 (Vogt); 1, Barnegat, Feb. 26 (Urner); 1, Jones Beach, Mar. 19 (Breslau, Sedwitz); 1, Barnegat, Mar. 26 (Carter, Janvrin, Urner); 1, Shinnecock Bay, Apr. 2 (Breslau, Sedwitz); City Dump, Havemeyer Avenue, Bronx: 1, Dec. 3; 3, Dec. 6; 1, Dec. 16; 5, Dec. 31 (J. and R. Kuerzi).

Larus marinus. Great Black-backed Gull.—100, Long Beach, Jan. 22 (Breslau, Sedwitz).

Larus argentatus smithsonianus. Herring Gull.—Found nesting at Fisher's Island in 1933 (Wilcox).

Larus kumlieni. Kumlien's Gull.—Immature nearing adult observed at close range in the air and on the ground, resembling Herring Gull in size, shape, stature and flight but pattern of tail and wings that of second year Iceland, wings with ashy gray primaries. In flight the bird appears to be a white-winged gull, bill and color of feet similar to that of Herring Gull's, City Dump, Havemeyer Avenue, Dec. 16 (J. and R. Kuerzi).

Larus atricilla. Laughing Gull.—Pelham Bay, April 1 (Malley); 1, Newark Bay, April 2 (Haulenbeck); 2, Oakwood Beach, April 13 (A. L. Walker, Dr. Wiegmann); 1, Central Park, May 17 (Carleton, Malley, Rich); 104 non-nesting birds in varied plumage, Piermont, June 25 (Farley, Herbert, Hickey, Phillips).

Larus philadelphia. Bonaparte's Gull.—350, Montauk, Jan. 1 (Breslau, Sedwitz); abundant, Montauk, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 225, Lower New York Bay, April 3 (Rich); 105, Fort Totten, Dec. 9 (Scott).

Larus minutus. Little Gull.—1 full adult, breeding plumage, Upper New York Bay, near Governor's Island, May 7 (Chapin) and May 8 (Rich); the following are the Staten Island records: Crooke's Point, July 27 (Chapin); 2, Oakwood, July 31 (Wiegmann) to Aug. 12 (Chapin) and 1, same locality, Aug. 27 (Chapin).

Rissa tridactyla tridactyla. Atlantic Kittiwake.—3, Montauk Point, Dec. 24 (Sedwitz, Breslau); 1, Coney Island, Dec. 29 (Cruickshank).

Sterna forsteri. Forster's Tern.—2, Idlewild, Jamaica, Aug. 26 (Breslau, Sedwitz); 3, Jones Beach, Aug. 27 (Breslau); 1, Jones Beach, Oct. 22 (same observer).

Sterna hirundo hirundo. Common Tern.—Colony, Great South Bay, with a few complete clutches, June 9 (Murphy and Vogt).

Sterna paradisaea. Arctic Tern.—1, Jones Beach, May 3 (Vogt); "what seems to be a satisfactory observation of two Arctic Terns at Jones Beach, July 19" (Vogt).

Hydroprogne caspia imperator. American Caspian Tern.—2, Mecox Bay, May 5 (Helmuth); 5, May 7; 1, Easthampton, May 28 (Helmuth); 1, Brigantine, Aug. 23 (Walsh); 6, Sept. 10 (Tatum); 5, Sept. 17 (same observer); 5, Mecox, Sept. 15; 2, Mecox, Sept. 16 (Helmuth); 1, Shinnecock, Sept. 22 (Breslau, Sedwitz); 1, Easthampton, Sept. 18 to Oct. 1 (Helmuth).

Chlidonias nigra surinamensis. Black Tern.—1, Boonton Reservoir, April 22 (Edwards); 6, Staten Island, May 14 (Chapin); 1 adult, 1 immature, Long Beach, July 2, and 9 (Janvrin); 1, Lido Beach, July 13 (Mrs. Beals); 300, New Inlet, Sept. 2 (Breslau, Sedwitz).

Rynchops nigra nigra. Black Skimmer.—5, Easthampton, Aug. 3 (Helmuth); 1, Moriches Inlet, Aug. 26 (Wilcox); 1, Idlewild, Jamaica, Aug. 26 (Breslau, Sedwitz); 1, New Inlet, Aug. 27 (Breslau, Sedwitz).

Alca torda. Razor-billed Auk.—6, Montauk, Jan. 1 (Breslau, Sedwitz); 45, Montauk, Jan. 8 (Carter, Hickey, J. and R. Kuerzi, Mayr); 1, Montauk, Nov. 12 (Local Bird Club and Cruickshank).

Uria lomvia lomvia. Brünnich's Murre.—1, Oakwood Beach, Jan. 22 (Rich).

Alle alle. Dovekie.—1, Montauk Point, Dec. 24 (Breslau, Sedwitz); 80, off Barnegat, January (Oscar Eayre).

Fratercula arctica arctica. Atlantic Puffin.—1, off Barnegat, January (Oscar Eayre).

Coccyzus americanus americanus. Yellow-billed Cuckoo.—1, Central Park, May 7 (Holgate); 1, Easthampton, Oct. 15 (Helmuth).

Tyto alba pratincola. Barn Owl.—Pair discovered nesting in the Bronx (Cruickshank, Kassoy); 1, Manursing Island, April 2 (Bronx County Bird Club); 1, Westhampton, Dec. 18 (Wilcox).

Bubo virginianus virginianus. Great Horned Owl.—Found nesting on ledge of Palisades, 2 newly hatched young, Feb. 22, eggs must have been laid about Jan. 22, young flew, April 9 (Cruickshank, Herbert); 1 resident at Trinity Lake, northeastern Westchester all spring (Halle, Ogburn).

Nyctea nyctea. Snowy Owl.—1, Montauk Point, Dec. 24 (Breslau, Sedwitz).

Asio wilsonianus. Long-eared Owl.—1, Garden City, Jan. 21 (Breslau, Sedwitz); 1, Central Park, Dec. 31 (Miss M. L. Johnson).

Asio flammeus flammeus. Short-eared Owl.—1, Troy Meadows, Oct. 8 (Staloff).

Cryptoglaux acadica acadica. Saw-whet Owl.—1 found dead outside American Museum, Oct. 21 (Carter); 1, Jamaica, Nov. 7 (Breslau, Sedwitz); 1, Alley Pond Bird Sanctuary, Nov. 17 to 26 (Scott); 1, Ozone, L. I., Nov. 26 (R. Lind).

Antrostomus vociferus vociferus. Eastern Whip-poor-will.—1, Barnegat, April 8 (Urner).

Chordeiles minor minor. Eastern Nighthawk.—Strong migration, 150 to 300 birds, Tivoli-on-Hudson, Aug. 20 (Hickey).

Ceophloeus pileatus abieticola. Northern Pileated Woodpecker.—Breeding, Fahnestock Memorial Park, Putnam County, May-June (Farley). Observed late May, Waccabuc Lake, Westchester County (Ogburn, Mayr).

Melanerpes erythrocephalus. Red-headed Woodpecker. — 1, University Heights, Bronx, Jan. 13 (Hickey); 3, Troy, N. J., Nov. 26 (C. Brown); 2, Caldwell, N. J., Dec. 24 (same observer).

Sphyrapicus varius varius. Yellow-bellied Sapsucker.—1 pair, Hollis Woods, L. I., Mar. 4 (McBride); 1, Atlantic Highlands, Mar. 25 (Fred Allen); 1, Chestnut Ridge, Dutchess County, May 14 (Baker); 1, Central Park, May 16 (Rich); 1, Greenwood Cemetery, May 20 (Hix); 1, Rye, Sept. 7 (Cruikshank).

Tyrannus tyrannus. Kingbird.—1, Greenwood Cemetery, April 22 (Cruikshank, Walker).

Tyrannus verticalis. Arkansas Kingbird.—Apparently at least 6 individuals at Jones Beach, Sept. 2, 22, 23, 29, 30, Oct. 6, 7, 8 (Vogt); Barnegat Light, Sept. 9 (Paff); 1, Idlewild, Jamaica, Sept. 14 (J. Mayer) and Sept. 17 (Breslau, Sedwitz); 1, Montauk, Sept. 20 (Helmuth).

Empidonax minimus. Least Flycatcher.—2 pairs, east of Northport, L. I., June 25 (Breslau, Sedwitz); 2 calling, Lloyd's Neck, L. I., June 26 (same observers).

Nuttallornis mesoleucus. Olive-sided Flycatcher.—1, Jones Beach, Aug. 26 (Vogt); Woodmere, Aug. 26 and Sept. 2 (Breslau, Sedwitz); Montauk, Sept. 22 (Breslau, Wolfram).

Otocoris alpestris praticola. Prairie Horned Lark.—3, Van Cortlandt Park, Nov. 7 (J. and R. Kuerzi).

Iridoprocne bicolor. Tree Swallow.—8 pairs nesting, Milltown, N. J., May 30 (P. L. Collins); 2, Central Park, Nov. 23 (Cruikshank); 5, Piermont marshes, Dec. 24 (J. Kuerzi).

Stelgidopteryx ruficollis serripennis. Rough-winged Swallow.—Mill Neck, April 16 (Sedwitz); 4 pairs breeding, Fire Place, L. I., June 3 (Wilcox).

Progne subis subis. Purple Martin.—1, Rye, April 2 (Oboiko and Bronx County Bird Club); Newton, N. J., April 9 (C. K. Nichols); 6, Manhattan Beach, Sept. 17 (Cruikshank).

Cyanocitta cristata cristata. Northern Blue Jay.—Large migration, more than 400 birds, White Plains, Sept. 22 (Cruikshank); 75, Central Park, Sept. 24 (Sedwitz).

Bacolophus bicolor. Tufted Titmouse.—2, Pelham Bay Park, Dec. 10, 17 and 24 (Hickey); locally plentiful, permanent resident at Sparkill, Rockland County (Kessler, J. Kuerzi).

Sitta canadensis. Red-breasted Nuthatch.—Very marked flight, late September to early October; observed near City Hall, Sept. 19 (Breslau, Sedwitz); 22 in one hour at Easthampton, Sept. 30 (Helmuth); Riverside Drive, Oct. 4 (Mayr).

Troglodytes aedon aedon. Eastern House Wren.—P. L. Collins reports a House Wren feeding young in an abandoned Kingfisher's nest in a sand-bank at Milltown, N. J.

Thryothorus ludovicianus ludovicianus. Carolina Wren.—2, Lake Waccabuc, April and May (Ogburn); Fort Salonga, L. I., June 9 (Mrs. Fry); 1, Fire Island, June 9 (Murphy, Vogt); 1, Orient Point, October to December (Latham).

Telmatodytes palustris palustris. Long-billed Marsh Wren.—1, Baychester Marshes, Jan. 15 (Hickey); 1, Prospect Park, Oct. 27 (Cruickshank); 5, Piermont Marshes, Dec. 24 (Kessler, J. Kuerzi).

Cistothorus stellaris. Short-billed Marsh Wren.—1 in song, Jones Beach, July 23 (Sedwitz); 1, Piermont Marshes, Nov. 26 (Bronx County Bird Club), and Dec. 24 (Kessler, J. Kuerzi).

Mimus polyglottos polyglottos. Eastern Mockingbird.—1, Montauk, Jan. 1 (Breslau, Sedwitz); 1 immature, Jones Beach, Aug. 20 (F. M. Chapman, Vogt); 3, Aug. 26; 1 singing, Sept. 2; also Sept. 12 and 13; 1, Sept. 22 and 23; and 2, 1 singing, Sept. 24, Jones Beach (Vogt); 1, Montauk, Aug. 27, and Sept. 2 (Breslau); 1, Montauk, Nov. 26 (Lind); and Dec. 24 (Breslau, Sedwitz); Westbury, June 11 (Woodmere Academy Bird Club and Matuszewski); 1, Easthampton, Aug. 5, and 1, Montauk, same date (Helmuth); Verona, N. J., 1 wintering; 3 or 4 present April 15—these were near where pair attempted to nest in 1932 (C. Hegemann).

Dumetella carolinensis. Catbird.—1, Jackson Heights, Jan. 22 (A. L. Walker); 1, Hudson shore near Dyckman Street, April 9, possibly wintered (Cruickshank, Herbert, Hickey); 1, Westbury, April 19 (Matuszewski); 1 Rye, Dec. 18 (Cruickshank).

Toxostoma rufum. Brown Thrasher.—1 in banding trap, Jones Beach, April 5 (Vogt); 1, Bronx Park, Dec. 2, to 24 (Cruickshank); 1 with disabled wing, Oradell, N. J., Dec. 14, to 30 (Bowdish).

Turdus migratorius migratorius. Eastern Robin.—50, Mastic, Jan. 1, to Feb. 2 (W. F. Nichols); 10 or 12 resident at Poundridge after Jan. 1, and a flock of 50 almost every day in a orchard at North Salem after Jan. 5 (Ogburn); 250, Milltown, N. J., Feb. 7, despite cold weather (P. L. Collins); 6, Central Park, Feb. 19 (Malley); first arrival, several, Orient, Feb. 21 (Latham).

Hylocichla guttata faxoni. Eastern Hermit Thrush.—Bronx Park, Feb. 17 (A. L. Walker); 1 "sang twice with an interval of about 15 minutes between songs," March 28, northeastern Westchester (Halle); Elmhurst, May 23 (Beals); 1, Pelham Bay, Dec. 3 (Bronx County Bird Club).

Hylocichla ustulata swainsoni. Olive-backed Thrush.—1, Elmhurst, June 1, to 3, and June 11 (Mrs. Beals).

Hylocichla minima minima. Bicknell's Thrush.—1, identification based on size and song, not collected, Elizabeth, May 17 (Urner).

Sialia sialis sialis. Eastern Bluebird.—Common throughout northeastern Westchester, during the winter (Ogburn); 1, Half Hollow Hills, L. I., Feb. 2 (Matuszewski).

Polioptila caerulea caerulea. Blue-gray Gnatcatcher.—1, Westbury, May 25 (Matuszewski); 1, Unionport, Bronx, Sept. 13 (Malley); 1, Easthampton, Sept. 23 (Helmuth).

Corthylio calendula calendula. Eastern Ruby-crowned Kinglet.—1, Alpine, N. J., May 30 (Bowdish); 1, Brookhaven, Nov. 12 (Bronx County Bird Club and Wilcox); 3, Grassy Sprain, Dec. 24 (Farley, Mellinger, Mayr); 2, Bernardsville, Dec. 26 (Cynthia Herbst).

Anthus spinoletta rubescens. American Pipit.—50, Van Cortlandt Park, Mar. 18 (Cruickshank).

Bombycilla cedrorum. Cedar Waxwing.—Orient, nest begun Aug. 12, complete set 5 eggs, Aug. 19; young in another nest about Sept. 2 (Latham); 1, Riverdale, Dec. 24 (Cruickshank).

Lanius borealis borealis. Northern Shrike.—1, Orient, Oct. 31 (Latham); 1, Kent, Conn., Nov. 4 (J. and R. Kuerzi); 2, Jamaica, Nov. 12 (Cruickshank and Local Bird Club); 1, Westbury, Dec. 31 (Matuszewski).

Lanius ludovicianus migrans. Migrant Shrike.—1, Garden City, April 2 (J. T. and D. G. Nichols); 1, Mastic, April 3 (J. T. Nichols); 1, carefully observed, Poundridge, April 3 (Halle); 1, singing, Jones Beach, Aug. 26 (Vogt); 2, Montauk, Aug. 27 (Sedwitz); 1, Bellmore, Oct. 29 (Local Bird Club, Cruickshank); 1, Hicksville, Dec. 3 (Breslau, Sedwitz).

Vireo solitarius solitarius. Blue-headed Vireo.—1, Poundridge, April 14 (Mayr); 1, Rye, Sept. 8 (Cruickshank).

Vireo olivaceus. Red-eyed Vireo.—1, Bronx Park, April 18 (Drescher, Gibson, Kessler); 1, Westwood, N. J., April 30 (L. N. Nichols); 1 singing, Bayside, Oct. 27 (Kritzler).

Vireo philadelphicus. Philadelphia Vireo.—1, Central Park, Sept. 21 (Sedwitz); 1, Elmhurst, Sept. 23, trapped and banded (Mrs. Beals).

Vireo gilvus gilvus. Eastern Warbling Vireo.—1 in song, Mill Neck, June 12 (Sedwitz).

Mniotilta varia. Black and White Warbler.—1, Rye, Nov. 4 (Cruickshank).

Protonotaria citrea. Prothonotary Warbler.—A male, very richly orange and other markings easily observed, Bronx Park, May 8 (Mrs. Hegemann, DeWitt C. Reid); 1, Bayside, Sept. 22 (McBride).

Helmitheros vermivorus. Worm-eating Warbler.—1, Easthampton, Sept. 22; 1, Mecox Bay, Sept. 22 (Helmuth).

Vermivora chrysoptera. Golden-winged Warbler.—1, Troy Meadows, April 30 (Lind); 1, Elmhurst, May 19 (Mrs. Beals).

Vermivora peregrina. Tennessee Warbler.—1, Easthampton, Sept. 30 (Helmuth).

Vermivora celata celata. Orange-crowned Warbler.—1, Bronx Park, May 6 (Gibson, Kessler); 1, Central Park, Sept. 21, and 24 (Sedwitz); 1, Montauk, Oct. 14 (Helmuth).

Dendroica tigrina. Cape May Warbler.—1 male, North Salem, Westchester, May 2 (Ogburn); 1, Kissena Park, L. I., May 14 (Breslau, Sedwitz); 5, Central Park, Sept. 21 (Sedwitz).

Dendroica virens virens. Black-throated Green Warbler.—1, Poundridge, April 25 (Halle).

Dendroica cerulea. Cerulean Warbler.—4, Annandale-on-Hudson, Dutchess County, June 15; 1 singing, same locality, Sept. 6 (Mrs. Fry).

Dendroica dominica dominica. Yellow-throated Warbler.—1, carefully observed, Grassy Sprain, May 28 (Sedwitz); 1 singing male, Sag Harbor, July 4, and collected July 15. "It was associating with a Parula Warbler and seemed to keep well up in the tops of the tall spruces." There was no evidence of nesting (Wilcox).

Dendroica pensylvanica. Chestnut-sided Warbler.—2 pairs, Mill Neck, June 12 (Sedwitz).

Dendroica castanea. Bay-breasted Warbler.—1, Elmhurst, Aug. 26 (Mrs. Beals).

Dendroica pinus pinus. Northern Pine Warbler.—1, Montauk, April 2 (Sedwitz); May 13, "found nest of Pine Warbler at Great Pond, only partly built. The female was carrying building material while the male kept up its singing and did not attempt to help in the building . . . I also found another Pine Warbler nest on May 11, at Speonk, in process of construction. It too was being built entirely by the female while the male followed the female in her search for material and kept up its singing but did not help in the building" (Wilcox); Prospect Park, Oct. 27 (Cruickshank).

Dendroica discolor discolor. Northern Prairie Warbler.—1 singing male, Great Notch, N. J., June 11 (Eaton); 5 in song, probably breeding birds, Milltown, N. J. (P. L. Collins).

Dendroica palmarum palmarum. Western Palm Warbler.—1, Westwood, N. J., April 30 (L. N. Nichols).

Dendroica palmarum hypochrysea. Yellow Palm Warbler.—1, Kissena Park, L. I., May 14 (Breslau, Sedwitz).

Oporornis formosus. Kentucky Warbler.—1 singing male, Greenport woods, late May. "I am quite certain that the species breeds in the Greenport woods, west of that village" (Latham).

Oporornis agilis. Connecticut Warbler.—1, Annandale-on-Hudson, Sept. 5 (Mrs. Delafield); 1, Central Park, Sept. 21 (Sedwitz); 1, Bronx Park, Oct. 6 (Cruikshank).

Oporornis philadelphia. Mourning Warbler.—1, Van Cortlandt Park, May 14 (Carleton); 1, Grassy Sprain Ridge, May 28 (Breslau, Sedwitz).

Geothlypis trichas brachidactyla. Northern Yellow-throat.—1, Piermont Marshes, Dec. 24 (Kessler, J. Kuerzi).

Icteria virens virens. Yellow-breasted Chat.—“A wintering Yellow-breasted Chat had been coming to the feeding station of William Sheehan at Forest Hills, L. I., for bread crumbs and suet since November (1932). It was identified by McBride on February 28, identification corroborated by W. Sedwitz and Leo Breslau of the Local Bird Club on March 5, and was also observed by A. L. Walker and A. L. Walker, Jr., on March 9” (Bird-Lore, “Season”); 1, Bronx Park, Oct. 26 (Malley).

Wilsonia citrina. Hooded Warbler.—1, Woodmere, May 7 (Sedwitz); 1, Greenwood Cemetery, May 6 (Hix); Elmhurst, May 13 (Mrs. Beals); 1, Woodmere Woods, May 21 (Breslau, Sedwitz); 1, Elmhurst, Sept. 22 (Mrs. Beals).

Wilsonia canadensis. Canada Warbler.—1, Elmhurst, June 3 (Mrs. Beals); 1 singing male, Great Notch, N. J., June 11 (Eaton).

Dolichonyx oryzivorus. Bobolink.—Breeding colony, Wantagh; another on Jones Beach (Breslau, Sedwitz).

Agelaius phoeniceus phoeniceus. Eastern Red-wing.—300, Kissena Park swamp during the entire winter (McBride); 7, first arrival, Orient, Feb. 22 (Latham).

Icterus spurius. Orchard Oriole.—1, Westwood, N. J., April 28 (reported to Rich); 1 adult with 2 young, Van Cortlandt Park, July 18 (L. N. Nichols).

Euphagus carolinus. Rusty Blackbird.—12, Kissena Park, Feb. 5 (Breslau, Sedwitz).

Quiscalus quiscula quiscula. Purple Grackle.—First arrival, Jamaica, Feb. 22 (J. Mayer); nest building, Van Cortlandt Park, Mar. 25 (Cruikshank).

Quiscalus quiscula aeneus. Bronzed Grackle.—Central Park, Jan. 15 (Carleton).

Richmondia cardinalis cardinalis. Eastern Cardinal.—10 males, 2 females, Atlantic Highlands, March 25. “These birds were seen alongside of Jersey Central Railroad tracks; extent of area about $\frac{1}{4}$ mile in Highlands, Waterwitch, toward Atlantic Highlands. No birds were present on March 23rd or 24th, only 1 male on the 26th and 27th. This is of interest in view of the apparent non-migratory habits of the Cardinal” (Fred Allen); 1, Bryant Park, April 25, and 28 (Mathews, L. N. Nichols); 1, Yonkers, May 2 (Mathews); possibly breeding, Eaton’s Neck, May 30, to June 28 (Woodmere Academy Bird Club and Matuszewski); 1, Creedwood, L. I., Oct. 28 (Kritzler); 1, Mill Neck, Nov. 21 (Lind-Staloff).

Passerina cyanea. Indigo Bunting.—1 pair, Mill Neck, June 11 (Sedwitz); 1, Central Park, Sept. 22 (Sedwitz).

Hesperiphona vespertina vespertina. Eastern Evening Grosbeak.—1 male, Arden, N. Y., Nov. 4 (Kritzler); 2 males, 1 female, Fort Washington Ave., Manhattan, Dec. 18 (Haddock).

Carpodacus purpureus purpureus. Eastern Purple Finch.—50, Matinecock, L. I., Feb. 5 (Breslau, Sedwitz): "Two small flocks (family groups?) seen at Easthampton from Aug. 13, onward" (Helmuth).

Picolia enucleator leucura. Pine Grosbeak.—9, Alpine, N. J., Dec. 24 (Kessler, J. Kuerzi); 7, Bernardsville, Dec. 15 (Cynthia Herbst).

Carduelis carduelis. European Goldfinch.—1, Bayside, March 18 (H. Bohn); "On April 21, two European Goldfinches were observed at Garden City, L. I., one in full song and one also carrying nesting material into a large, thick-foliaged pine tree. After two days, however, they were not seen again about this tree, though two were seen not far away on April 30, and May 5, and three birds on May 11 (J. T. Nichols). Reports indicate that several individuals were present in Garden City in April—whence they came, and where and whether they nested remaining a mystery" (Bird-Lore, "Season").

Acanthis linaria linaria. Common Redpoll.—1 singing, Port Washington, Dec. 23 (Mrs. Fry).

Spinus tristis tristis. Eastern Goldfinch.—"Found nest with young, July 25, Milltown, N. J., earliest record. Have a record of eggs on same date but never young birds" (P. L. Collins).

Loxia leucoptera. White-winged Crossbill.—20, Bayside, sporadically after Nov. 30 (Kritzler); 3, Riverdale, Dec. 24 (Cruickshank).

Pipilo erythrophthalmus erythrophthalmus. Red-eyed Towhee.—1, Woodmere, Jan. 5 (Woodmere Academy Bird Club); 1 banded, Flushing, Dec. 7, by McBride, was transferred to Alley Pond Bird Sanctuary and observed there to Jan. 2, 1934; 1, Oradell, N. J., Dec. 15, to 30 (Bowdish).

Passerculus princeps. Ipswich Sparrow.—1, Stamford, Conn., Dec. 22 (Cruickshank).

Passerculus sandwichensis savanna. Eastern Savannah Sparrow.—4 young, Jamaica Bay, May 30 (Lind).

Passerherbulus henslowi susurrans. Eastern Henslow's Sparrow.—2, Mastic, April 5 (Sedwitz); 1, Jamaica Bay, Oct. 4 (Cruickshank).

Ammospiza caudacuta subvirgata. Acadian Sparrow.—2, Jones Beach, Oct. 15; 15, Oct. 16; 1, Oct. 22 (Breslau, Sedwitz).

Ammospiza caudacuta caudacuta. Sharp-tailed Sparrow.—1, Jones Beach, Jan. 2 (Hickey); 1, Piermont, Nov. 26 (Bronx County Bird Club); 3, Baxter Inlet, Bronx, Dec. 3 (Bronx County Bird Club); 1, Baychester Marshes, Dec. 24 (Hickey, Thomas); 1, Baxter Inlet, Bronx, Dec. 24 (R. Kuerzi, Matuszewski).

Poocetes gramineus gramineus. Eastern Vesper Sparrow.—1, Franklin Lake, Mar. 25 (Fry and Griffin); 1, Van Cortlandt Park, Dec. 24 (Cruickshank).

Chondestes grammacus grammacus. Eastern Lark Sparrow.—1, Jones Beach, Aug. 23 (Vogt).

Junco hyemalis hyemalis. Slate-colored Junco.—An individual bird was observed in northeastern Westchester "under the apple trees by my house," June 5 (Halle).

Spizella arborea arborea. Eastern Tree Sparrow.—3, Lake Waccabuc, April 26 (Ogburn); Ozone Park, L. I., Oct. 14 (J. Mayer); White Plains, Oct. 16 (Brand).

Spizella passerina passerina. Eastern Chipping Sparrow.—1, Westbury, Mar. 30 (Matuszewski); 1, Van Cortlandt Park, Dec. 10, to 24 (Cruickshank).

Spizella pallida. Clay-colored Sparrow.—"Two sparrows, neither collected, were seen on a lawn at Southampton, beside the privet hedge, on Oct. 14, and identified as Clay-colored Sparrows. They had dark crowns with a pale central stripe, a wedge shaped facial blotch, and thin streaking from the angle of the bill; were Spizelline in habitus, decidedly *not* Chippies. I am quite familiar with *S. pallida*, having seen it in numbers in southern Texas, in early May" (Helmuth).

Zonotrichia leucophrys leucophrys. White-crowned Sparrow.—Elmsford, June 14 (Mrs. Fry); 50, Easthampton to Montauk, Oct. 14 (Helmuth).

Passerella iliaca iliaca. Fox Sparrow.—First observed, Central Park, Feb. 26; 100 on Mar. 31, followed by gradual decline, but on April 25, another small visitation; 6, Battery Park, April 25; April 28, "there are still a few left in our area" (Rich); 20, Van Cortlandt Park, Mar. 18 (Cruickshank); 700-800, Franklin Lake, Mar. 25 (Fry and Griffin).

Melospiza lincolni lincolni. Lincoln's Sparrow.—1, Bronx Park, Sept. 11 (Malley); 1, Montauk, Sept. 22 (Breslau, Wolfram).

Calcarius lapponicus lapponicus. Lapland Longspur.—3, Saugatuck Shores, Conn., Oct. 29 (Farley, Hickey, Herbert, Thomas); Orient, Nov. 5 (Latham); Van Cortlandt Park, Nov. 7 (J. and R. Kuerzi); 3, Mecox Bay, Nov. 12 (Bronx County Bird Club and Wilcox); 3, Montauk Point, Nov. 12 (Breslau, Sedwitz); 1, Bayville, Nov. 19 (Cruickshank and Local Bird Club); 6, Idlewild Beach, L. I., Nov. 26 (same observers); 1, Montauk, Nov. 26 (R. Lind); 1, Westbury, Nov. 26 (Matuszewski); 9 to 12, Jones Beach, Dec. 3 (Local Bird Club); 35, Newark Marshes, Dec. 17 (Urner); 1, Baychester Marshes, Dec. 24 (Hickey, Thomas).

Plectrophenax nivalis nivalis. Eastern Snow Bunting.—50, Troy, N. J., Mar. 10 (C. Brown).

Observations From Field and Study

Female Tanager Eating Her Eggs—In 1932 a female Scarlet Tanager (*Piranga erythromelas*) selected a site for her nest on a branch nine or ten feet from the ground and overhanging one of the main paths in the New York Botanical Gardens. The nest completed, she laid three eggs and sat on them about a week when, on the morning of June 13 as the writer approached, she was standing on the edge of the nest, pecking at something. As I reached the spot under the nest she flew to the ground carrying an egg in her bill. Following her quickly I could see she was eating it greedily and I was able to get within two or three feet of her, when she made a grab to carry it away. Since it was partly incubated, she flew away with the contents, leaving the shell on the ground about 75% intact. There were no more eggs in the nest and what happened to the other two I failed to discover. The pair of birds remained in the locality for several days and then left.—WILLIAM GIBSON.

Occurrence of Lesser Black-backed Gull (*Larus fuscus graellsii*) in Bronx County, New York City—On December 9, 1934, while visiting a very favorable locality for gulls, at the mouth of Westchester Creek in the east Bronx, we noticed a strange gull resting on a mud-flat with several hundred Herring Gulls. It was in this area during the previous winter that white-winged gulls occurred regularly in numbers.

At first glance, the bird appeared to be a black-backed gull but on closer observation, we realized that it was slightly smaller than the average Herring Gull, the back was a very deep slate gray, not black as in *L. marinus* and the legs and feet were a decided yellow color. The bird was a full adult as was evidenced by the color of the bill, a straw yellow with a conspicuous vermilion red mark about the terminal half of the lower mandible. When the gulls took flight, our bird followed them to the nearby ash dump to feed upon the garbage and refuse. Incidentally, the Greater Black-backed Gull has never been observed on the dump; it apparently does not feed upon garbage as do the Herring, Iceland and Glaucous Gulls.

We found, after a thorough examination of skins and literature at the American Museum that there are two species of gulls which fit the description of our bird. The Lesser Black-backed Gull of Europe (*Larus fuscus graellsii*) and the Southern Yellow-footed form of the Western Gull (*Larus occidentalis livens*). There is apparently no field mark by which these two birds can be distinguished.

However, as the Southern Yellow-footed Gull inhabits the Gulf of California, we feel that the time of year during which we saw our bird would exclude the possibility of this form. Furthermore, we are given to understand that land—in this case an entire continent—is a more formidable barrier to sea birds than water or even oceans. The Little Gull, for instance, has turned up quite a few times around New York in recent years.

We, therefore, feel justified in calling this gull *Larus fuscus graellsii*. We give it the name *graellsii*, for our bird had a deep slate-gray back rather than the

slaty back of the northern or Scandinavian race of the European Lesser Black-back (*Larus fuscus*).—JOHN and RICHARD KUERZI, New York City.

Notes from Beaverkill, Sullivan Co., N. Y.—Since there seems to be little or nothing known about the birds of the western foothills of the Catskill Mountains, it might be of value to record some of the observations made there during the spring of 1934. Although I stayed in Beaverkill (Trout Valley Farm) from May 15 to May 30, I observed practically no bird migration. Except for 1 Red-headed Woodpecker (May 19), 1 pair of White-crowned Sparrows (May 27), and 1 Black-poll Warbler (May 22), all species observed were apparent breeders. In the woods around Clear Lake I found the Blue-headed Vireo (*V. solitarius*) in at least two pairs, the Nashville Warbler, Black-throated Blue Warbler (common), Canada Warbler (common), Blackburnian Warbler (several), Black-capped Chickadee (1 pair), Magnolia Warbler (frequent), and Barred Owl. Around the farm I found 2 pairs of Purple Finches, several pairs of Cliff Swallows, Yellow-billed and Black-billed Cuckoo, Cedar Waxwing, and Savannah Sparrow, in addition to many common species. Grouse were fairly common in the woods, a nest with 11 eggs was found on May 24. Whether or not the Great Blue Heron (observed May 22) and Osprey (May 22) were nesting in the vicinity could not be ascertained. On an island in Beaverkill Creek 4 nests of Spotted Sandpipers were found in close proximity, also a small colony of Red-wings (8 pairs), which had placed all their nests in low pine trees, 1 nest of the Meadowlark, and 4 nests of Song Sparrows. Some species were curiously absent, as, for example, the Brown Thrasher (in the valley) and the Hermit Thrush (on Clear Lake). Altogether the nests of 22 species were found.—ERNST MAYR.

Two Rare Sight Records from Orient, Long Island—Ivory Gull (*Pagophila alba*).—This bird was observed on February 21, 1934, flying over the tide flats of Gardiner's Bay on the south shore of Long Beach—now Orient Beach Park. Numerous Herring Gulls, several Great Black-backed Gulls, and two Ring-billed Gulls were feeding and resting on the flats at the time. There is no question as to the identity of the species: the Ivory Gull was at times within thirty yards, and there was ample time to study it carefully. The individual was clear white, slightly larger than the Laughing Gull, and much smaller than the Iceland Gull, which has been observed and studied on various occasions in the Orient region.

The recently established state park prevented collecting this rare visitant and the gyrfalcon mentioned below. Both could have been secured with ordinary shooting ability. I regret that these unusual records can not be substantiated by actual specimens.

Black Gyrfalcon (*Falco rusticolus obsoletus*).—This straggler was seen on February 15, 1934, at the western extremity of the beach where the Ivory Gull was recorded, known as Long Beach Bar, east of the lighthouse. I was in a pit on the higher part of the beach, where the tern colony nests. It was about nine A.M. Heavy ice was on the bay on the north and along the shore on the south. The

rip at the end of the bar out to the lighthouse and beyond was open water where numbers of Golden-eyes, Old-squaws, Buffle-heads, Red-breasted Mergansers, White-winged and Surf Scoters were feeding. A lone Brant—a species rarely recorded in Orient—was standing on the point of the spit, apparently feeding on the rockweed, *Fucus*, exposed by the tide. I was watching flights of White-winged Scoters passing from the south, circling far out over the ice to the north, and returning to open water of Gardiner's Bay. It was while I had these scoters under observation that I saw two hawks approaching from the east. I recognized a stranger in the larger bird, which was flying low, about fifty feet above the beach. It apparently came in from Gardiner's Island, over Gardiner's Bay, as, probably, did the Duck Hawk, which evidently was accompanying it. (Most of the hawk and owl visitants to Orient in winter are from Gardiner's Island.) The large hawk came directly toward me descending to about six feet above the ground and passed forty feet north of me close to the ice, perhaps three feet below my level. It continued west past the lighthouse and on over the forested area of Shelter Island. A remarkable view was had of the bird from front, side, and rear, for the morning sun was clear. The Falcon was flying leisurely and apparently undisturbed by my presence. The Duck Hawk curved off, passing a hundred yards north, but continued with the stranger out of sight. After studying the size, shape, and markings in comparison with the Duck Hawk and from my knowledge of hawks of this region, I at once placed this bird as a gyrfalcon whose dark plumage would characterize it the form recorded above.—ROY LATHAM, Orient, L. I.

Report of the Secretary for 1932-1933

The Linnæan Society of New York has held, during the past year, 16 regular, and 4 informal summer, meetings. The average attendance at regular meetings has been: members, 32, guests, 54; summer meetings, members, 17, guests, 3.

The Annual Dinner of the Society was held at Schrafft's Restaurant, 2131 Broadway. The Annual Meeting, held as usual at the American Museum, was addressed by Dr. A. A. Allen on "The Ruffed Grouse." This meeting, with 180 present, was exceeded in popularity only by Mr. Howard Cleaves' lecture on the Pinchot trip, when more than 200 attended.

During the year the Society has been so unfortunate as to lose, by death, three members: Mr. Frank Edgar Johnson, Dr. Charles A. Leale, and Mr. John I. D. Bristol.

Several members have resigned, or been dropped for non-payment of dues, and the membership now stands: Honorary Members, 1; Fellows, 9; Non-Resident Members, 7; Resident Members, 137. Total, 154.

Since the chief interest of the Society continues to be ornithology, papers on this subject have preponderated. There were included one meeting on mammals, and several whose topic of discussion could best be described as a travelogue.

The speakers, and their subjects, were as follows:

March 8: The Ruffed Grouse, by Dr. A. A. Allen.

March 22: Field Observations of Gorillas and Chimpanzees, by Mr. Harry C. Raven.

April 12: The Study and Preparation of Skeletons, by Mr. S. Harmsted Chubb.

April 26: Symposium on Hawks and Owls, led by Mr. Warren F. Eaton.

May 10: Two XVIIIth Century Bird Lists, by Mr. L. N. Nichols.

May 24: Field Notes by Members.

October 11: Field Notes by Members.

October 25: Mountain and Seacoast in Ecuador, by Dr. Robert Cushman Murphy.

November 8: Motion Pictures of New Jersey Birds, by Mr. Beecher S. Bowdish.

November 22: Throughout the Length and Breadth of Indo-China, by Mr. T. Donald Carter.

December 13: Observations on the Nesting of Rare Eastern Warblers, by Mr. P. B. Philipp.

December 27: Discussions of Christmas Censuses by Members, and Bird Songs, by Mr. Albert R. Brand.

January 10: The Bird Life of Dutchess County, from the Records of Maunsell S. Crosby, by Ludlow Griscom.

January 24: Our Sandhill Crane, Spoonbill, Eared Grebe, and Trumpeter Swan, by Dr. Frank R. Oastler.

February 14: Progress Report Covering the First Three Years of the Ruffed Grouse Investigation, by Dr. Gardiner Bump.

February 28: With Pinchot to the South Seas, by Mr. Howard Cleaves.

This past year, as in the preceding one, field reports deposited with the Secretary have been woefully disproportionate to the amount of field work done. So little material has been turned in, that the Society's minutes give but little idea of the local ornithological situation. In this connection, the Secretary wishes to express to Mrs. Beals, and to Messrs. Hickey, Mayr and Rich, his gratitude for the complete and helpful migration data turned in by them.

The Society has continued its active interest in matters of conservation. Subscribing to the functions and purposes of the Hawk and Owl Society, it affiliated itself with that organization as a sustaining member. A resolution of opposition to rest days during the open season on waterfowl, was sent to the Biological Survey. Last year's action on the Alaskan Brown Bear Sanctuary on Admiralty Island was reaffirmed and an endorsing resolution sent to all members of Congress, the Senate, and the Biological Survey. Cooperating with those in charge of the Alley Pond Bird Sanctuary, Queens, the Society has encouraged the building of bird houses by the school children of Queens through the contribution of one of the prizes for a bird house contest; the houses to be placed in the Sanctuary.

Publication of Numbers 43-45 of the Abstract of Proceedings has been undertaken, and is being advanced as expeditiously as the combined efforts of President Eaton and those preparing the material can achieve.

Perhaps the most noteworthy event in the year's history of the Society was the establishment, under the leadership of Dr. Ernst Mayr, of a monthly seminar for the abstracting and discussion of current papers concerned with field ornithology. The formation of the seminar evoked a gratifying reception from the Society's members and it offers an obviously welcome opportunity for more technical discussions than are desirable or feasible in the regular meetings.

In closing, the Secretary wishes to express to many members of the Society—notably Messrs. Eaton, J. F. Kuerzi and Urner—his thanks for their unfailing cooperation during a year when demands upon his time have been unusually stringent, and to include in this report an appreciation of the thoughtful assistance of Miss Helen Gunz, of the American Museum staff, in handling often troublesome details in connection with securing speakers, and apprising the membership of the Society's activities.

WILLIAM VOGT, Secretary.

Report of the Secretary for 1933-1934

The Linnæan Society of New York has held, during the past year, 16 regular and 4 informal summer meetings, and 7 ornithological seminars. The average attendance at regular meetings has been: 35 members and 35 guests; at the summer meetings 22 members and 5 guests.

The Annual Dinner of the Society was held in the Flying Bird Hall of the Museum, and the Annual Meeting as usual immediately following in the Duplex Hall. The speaker of the evening was Dr. Herbert Friedmann from the U. S. National Museum in Washington, on Social Parasitism in Birds.

The following new officers were elected: President, Mr. John H. Baker; Vice-President, Mr. Charles A. Urner; Secretary, Dr. Ernst Mayr, and Treasurer, Dr. E. R. P. Janvrin.

During the year the Society has been so unfortunate as to lose by death, Mr. Harold Herrick, a Fellow and Founder of the Society, and three other members, Mr. E. Francis Hyde, Mr. C. A. Rundall, and Mr. N. C. Van Duyne.

Several members have resigned, or been dropped for non-payment of dues; 13 new members were elected, and Dr. Frank M. Chapman was elected a Fellow of the Society. The membership now stands: Honorary Member, 1; Fellows, 9; Non-Resident Members, 11; Resident Members, 134. Total, 155; about the same as last year.

Most of the papers read before the Society related to ornithology, since this is the field in which the majority of the members is particularly interested. There have been fewer travellogues than usual.

The speakers, and their subjects were as follows:

March 14, 1933, Social Parasitism in Birds, by Dr. Herbert Friedmann.

March 28, 1933, Winter Crow Roosts in Connecticut, by Mr. Robert P. Allen.

April 11, 1933, The Journey to the Home of the Cock-of-the-Rock, by Mr. Ernest G. Holt.

April 25, 1933, Spring in England, by Dr. Robert Cushman Murphy.

May 9, 1933, *Trails of a Naturalist in Santo Domingo*, by Mr. William G. Hassler.

May 23, 1933, *Field-notes by Members*.

October 10, 1933, *Bird Names and Their Curious History*, by Mr. Ernest Ingersoll.

October 24, 1933, *A Duck Replaced for Every Duck Killed*, by Mr. Newbold L. Herrick.

November 28, 1933, *Photographing Our Native Birds*, by Dr. Claude W. Leister.

December 12, 1933, *New York's Wild Life Resources*, by Mr. Lithgow Osborne.

January 2, 1934, *Symposium on the Christmas Census, 1933*.

January 9, 1934, *Bird Life in the West Indies*, by Mr. James Bond.

January 23, 1934, *The Distribution and Migrations of Certain Whales*, by Dr. Charles H. Townsend.

February 13, 1934, *Reflections on the Long Island Bird Fauna*, by Mr. John T. Nichols.

February 27, 1934, *The History of North America and its Faunas during Tertiary Times*, by Mr. Edwin H. Colbert.

March 13, 1934, *The Derivation of the Present North American Bird Fauna*, by Mr. Ludlow Griscom.

The year 1933-34 has been notable in the history of the Society for several reasons. The Society was one of the hosts at the 50th anniversary of the A. O. U., and members of the Society acted as guides on the various field-trips.

Thanks to the interest of the President, the Society took a very active part in conservation matters. Two meetings were devoted to these questions, and a special meeting was held in conjunction with the National Association of Audubon Societies and the Hawk and Owl Society. It was a matter of particular satisfaction to the members of the Linnæan Society that during the past year the President of the Society was elected Chairman of the Board of Directors of the National Association of Audubon Societies. The new affiliation resulted in closer cooperation between the organizations in various mat

ters, and in the appointment of various members of the Society to special committees of the National Association.

Conservation problems that were of special interest during the past year were the following: Regulations to stop the rapid decrease of ducks; the interference of the mosquito control work with conservation; the restoration of natural conditions in the parks of the New York City area; and others.

No Abstracts appeared during the past year, since some of the former Secretary's reports are not yet available, but Volume III of the Transactions was published by the Society, containing Ludlow Griscom's "Birds of Dutchess County," based on the notes on the late Maunsell S. Crosby.

An Ornithological Seminar for the review of recent ornithological literature and for informal discussions, was made an institution of the Society and met with unexpected success. There were 6 meetings with an average attendance of 22.

In conclusion it may be said that the steadily growing interest in the life-history and ecology of birds which makes itself felt throughout the world, has not failed to express itself in the activities of the members of the Society. One great hope for the coming year lies in this field.

The Secretary wishes to express to many members of the Society his thanks for their cooperation during the past year, and to express also his gratitude to Miss Helen Gunz and other members of the Museum staff for their assistance in handling troublesome details of the business of the Society.

ERNST MAYR, Secretary.

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Breeding Bird Data Wanted

There are very limited data available concerning the various phases of the life-history of the breeding birds of the New York Region. The Linnæan Society of New York is attempting to collect such data in preparation for a new edition of the "Birds of the New York City Region."

Your assistance in this enterprise is solicited. Will you please take careful notes on all birds' nests discovered by you during the 1935 breeding season and send them to the Linnæan Society of New York, American Museum of Natural History.

Information should be in the following form:

Killdeer; Englewood, N. J.

May 19, 1935, nest with 4 eggs

or

Hooded Warbler; Greenwood Lake, N. J.

June 21, 1935, nest with 5 half grown young

June 26, 1935, young leaving nest

It is particularly important to determine
 the exact incubation period
 the fledging time
 the survival rate (if a number of nests are observed)
 and to secure information on the participation of
 sexes in
 nest-building
 incubation
 feeding of young

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[The name of the regular publication of the Linnaean Society of New York beginning with Nos. 45 and 46 was changed from "Abstract of the Proceedings . . ." to "Proceedings of the Linnaean Society of New York."]



WARREN FRANCIS EATON
1900....1936

WARREN FRANCIS EATON

1900 - 1936

WARREN FRANCIS EATON, ex-president of the Linnæan Society of New York, and one of the most forceful and vigorous workers of his generation in the cause of bird conservation, passed away at Mountainside Hospital, Montclair, N. J., on February 16, 1936.

Born in the town of Weston, Mass., the son of Mr. and Mrs. Charles Eaton, he manifested at a tender age an interest in nature and especially in birds. Much of his spare time and recreation as a child, as a pupil in school, and as a student at Harvard, from which he was graduated in 1922, was devoted to a study of bird life.

Possessed of a strong constitution and a wiry physique, he was able to indulge to a full his love for the outdoors and for all natural sciences. The wild trails of the Green Mountains he often explored and he contributed substantially while still a student in college to the knowledge of the bird life of that region. He revelled in the ornithological associations life at Cambridge permitted and he there became an active member of the Nuttall Ornithological Club, serving as its secretary.

From New England he came to New York, entering the cotton goods business. But his heart and his paramount interest were with the birds in their struggle to hold place before man's progressive occupancy of the country. His was not a maudlin sentiment—rather a most masculine interest in the fate of the losers in the struggle to survive. This is well shown by his early and sustained interest in the Hawks and the Owls—predators all, preying upon other forms of life in their effort to sustain themselves. But the friendlessness of these much-harried bird forms and the growing danger of their extermination led Mr. Eaton to assert his natural aggressiveness and to push himself to the front as their protector and champion.

Warren Eaton gloried in the birds of prey, his adoration amounting almost to an obsession. He was the prime mover and organizer of the Hawk and Owl Society and he threw his energies into the fight even though many friends of the predatory birds felt their cause lost. Long odds against him never daunted Warren Eaton. As president of the Hawk and Owl Society and later as head of the Hawk and

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Owl protection work of the National Association of Audubon Societies, he carried his fight into the enemies' camp and he won, and was ever winning for himself and his cause, wider recognition and respect among game officials and sportsmen's organizations.

Then death overtook him. Cut off in the full bloom of his vigorous manhood—he was but 35 years old—his loss was a tragic blow, not only to his family and friends, but to the great cause of conservation in general and to the future of our predatory birds in particular.

Warren Eaton was a veritable dynamo, constantly creating energy and a will to do; a prodigious worker and a resourceful general. His labors in behalf of the Linnaean Society of New York, which he joined in 1924, have contributed definitely to the growth and interest in the organization. He served for a number of years as a member of its council, also as secretary, vice-president and president. It was Mr. Eaton who initiated the monthly summer meetings, so interesting to the active field workers of the Society.

Mr. Eaton's contribution to the knowledge of the bird life of his adopted state, New Jersey, was already considerable at the time of his death. His historical survey of the Birds of Essex and Hudson Counties, which he finished shortly before his fatal illness and which is published herewith, gives proof of his enthusiasm, his willingness to search right into the city doorsteps and wastebaskets for the facts of bird distribution, and the intensity of his search of the literature for knowledge of the past. He was an avid reader. He had just started a similar study of the birds of Passaic County, N. J., and he had identified himself with various state organizations formed to gather greater knowledge of the birds of the state—the New Jersey Ornithological Society, which he founded, and the New Jersey Field Ornithologists Club, with which he affiliated.

It is rare indeed that nature, in the strange intricacies of her ways in planting within us humans the seeds of our contrasting attributes, bestows upon any individual such an unusual combination of superlative enthusiasm for a cause and such outstanding ability effectively to labor in its behalf. In the passing of Warren Eaton the cause of conservation and the pastime of field ornithology have lost an aggressive leader, with a potential for constantly expanding achievement. The members of the Linnaean Society of New York have lost a treasured and a stimulating companionship.—C. A. U.

PROCEEDINGS
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No. 47

A List of the Birds of Essex Co. and of Hudson Co., N. J.
With Especial Reference to City Growth and
Bird Population

By WARREN F. EATON

The excellent papers published in the Abstract of Proceedings of the Linnæan Society, "The Observations of the Late E. P. Bicknell at Riverdale, Fifty Years Ago" by Ludlow Griscom, "The Birds of the Greater Bronx Region" by John F. Kuerzi and the "Birds of the Union County Region" by C. A. Urner, have served as inspiration for this paper. Whereas Mr. Griscom's article was largely a summary of the results of Mr. Bicknell's observations and Mr. Urner's was practically his own alone, this list is a combination of records by the writer from 1925 to September, 1935, with the field data of numerous observers in the areas considered. In 1930 the Montclair Bird Club compiled a mimeographed list of 271 species, entitled "Preliminary list of the birds of the Essex County Region," which has been largely drawn upon for Essex County records. I am greatly indebted to the following persons, chiefly members of the Montclair Bird Club or of the Linnæan Society for their notes and to a less extent to others mentioned in the text itself: Messrs. James L. Edwards (J. L. E.), Charles A. Urner (C. A. U.), Robert Clausen (R. C.), R. F. Haulenbeek (R. F. H.), R. H. Howland (R. H. H.), William Rusling (W. R.), E. I. Stearns, Jr. (E. S.), Louis S. Kohler (L. S. K.), Lester L. Walsh (L. L. W.), Floyd Wolfarth (F. W.), Evarts Loomis (E. L.), O. P. Medsger (O. P. M.), Edward Chaliff (E. C.), E. S. Marks (E. S. M.) and to Mrs.

C. S. Hegeman (Mrs. C. S. H.) and Mrs. Laura W. Abbott (Mrs. L. W. A.). * Dr. James P. Chapin also, kindly put at my disposal the few notes of the late W. de W. Miller on birds of these two counties.

Thanks are due Miss Eleanor Herrick for the opportunity of quoting from her grandfather's diary (Mr. Harold Herrick, late member of the Linnæan Society), and the well-known papers of Dr. Witmer Stone, the "Birds of New Jersey" (1909), Mr. C. A. Urner, "The Birds of Union County" and Mr. Ludlow Griscom's "Birds of the New York City Region" have served as sources.

My personal observations have been distributed in both counties and over all the months of the year as follows:

FIELD TRIPS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Essex - - -	33	34	31	48	51	52	35	32	26	39	27	36
Hudson - - -	6	3	3	4	4	11	10	4	3	4	3	1
	<u>39</u>	<u>37</u>	<u>29</u>	<u>46</u>	<u>49</u>	<u>57</u>	<u>38</u>	<u>35</u>	<u>29</u>	<u>43</u>	<u>30</u>	<u>37</u>

These all represent trips of considerable length in the field from an hour or so, to full days, chiefly on foot in the most desirable places. In addition, I have made many scattering observations by train or ferry in my daily commuting through the two counties, across the Hackensack Meadows and the Hudson River to New York. I have also not counted as trips the numerous short observations of a few moments duration in the vicinity of my residence in Upper Montclair. Except for limited vacations or absences I have seen some interesting bird or other nearly every day of the year in the region considered. My friends have been most indefatigable in reporting notable finds or unusual observations. Literature published has been consulted, museum collections checked, and old residents interviewed in the hope of adding to the total knowledge of this area. In the annotated list I have excluded records of adjacent Union, Bergen, Morris and Passaic Counties, confining the records strictly to the counties considered although a number of species are thereby eliminated. It is admitted that this definition is an artificial one, but as the survey is not ecological but distributional, I have let it go at that; for a study of the Palisades,

*Initials are those used in the annotated list.

the Passaic Valley and the Hackensack Valley or the Watchung Mountains, of which the two counties are a part, would carry us far afield.

The chief factor underlying my concept of the paper is the effect of human population upon the wild bird-life. To understand this, remember that the total area of Hudson is 43 square miles, of Essex 127 square miles, while the population in 1930 (since increased) was Hudson 691,000 and Essex 832,300, a total of 1,523,300 in an area of 170 square miles or an average density of 9,495 per square mile. Forty years earlier the density was only one-third or 3,124 per square mile. Such a tremendous growth has had a rapid and very adverse effect upon the bird-life (for comparative population and area figures, see table I).

TABLE I
Population (From World Almanac)
New Jersey
7,154 Square Miles

1790	- - - - -	184,000	1870	- - - - -	906,000
1800	- - - - -	211,000	1880	- - - - -	1,131,000
1810	- - - - -	246,000	1890	- - - - -	1,444,000
1820	- - - - -	278,000	1900	- - - - -	1,884,000
1830	- - - - -	321,000	1910	- - - - -	2,537,000
1840	- - - - -	373,000	1920	- - - - -	3,156,000
1850	- - - - -	490,000	1930	- - - - -	4,041,000
1860	- - - - -	672,000			

	Essex	Hudson	Union		Bergen	Passaic	Morris
	127	43	103		237	196	475
Year	sq. mi.	sq. mi.	sq. mi.	Year	sq. mi.	sq. mi.	sq. mi.
1890	- - 256,000	275,000	72,000	1890	- - 47,000	105,000	54,000
1900	- - 359,000	386,000	99,000	1900	- - 78,000	155,000	65,000
1910	- - 513,000	537,000	140,000	1910	- - 138,000	216,000	75,000
1920	- - 652,000	629,000	200,000	1920	- - 211,000	259,000	83,000
1930	- - 832,307	691,000	305,000	1930	- - 365,000	302,000	110,000

People Per Square Mile

New Jersey	- - - - -	565	Bergen	- - - - -	1,600
Union	- - - - -	3,000	Passaic	- - - - -	1,500
Hudson	- - - - -	16,000	Morris	- - - - -	230
Essex	- - - - -	6,600			
Hudson-Essex	- - 170 square miles		Population 1930	- - - -	1,523,000
Average per square mile in 1890	- 3,124		Average per sq. mi. in 1930	-	8,960

Other considerations are at once evident from any road map—that Hudson County is very largely surrounded by water, in fact con-

tains a large proportion of tide water area, and that the Hackensack River meadow portion west of Bergen Hill is very sparsely peopled. Essex County contains a smaller portion of water surface on Newark Bay and the Passaic River, but west of the second Watchung Ridge is a considerable block of land in the Great Piece Meadow-Hatfield Swamp section of the Passaic Valley which is unsettled. There is also a considerable portion of park land in the South Mountain Reservation, of "waste" land at Port Newark and of farm land in the Caldwell-Livingston area. It is probably a safe guess that in one hundred of the 170 square miles the population therefore approximates 14,000 persons to the mile. The large cities of Newark, Jersey City, East Orange, Hoboken, Bayonne, Weehawken, Kearney, etc., would seem to preclude any great variety of bird-life.

It is well to bear in mind that Hudson County is bounded on the east for its whole extent (13 miles) by the Hudson River and Upper New York Bay, and on the west by Newark Bay and the Passaic River, being cut in two and bounded also by the Hackensack River, both wide, tidal streams now navigable for large ships. Three-quarters of Newark Bay and more than half of New York Bay from St. George, S. I., north, is within our area. About half of the primitive Hackensack Marsh and the Newark-Elizabeth Meadows are included. Half the route of the New York-Staten Island Ferry passes through Hudson County which includes also Ellis and Bedloe's (Statue of Liberty) Islands, Robbins Reef, and such interesting areas as Snake and Little Snake Hills, and the Secaucus cedar swamps. Reverting back to primitive days, it is obvious that here the combination of salt water and rocky islands, tidal marsh and wooded islands, brackish cedar swamp and wet meadow, high and heavily wooded ridges, three big rivers, numerous creeks and clear upland brooks, fresh water swamps of great extent and large sections of trap rock ridges over 400 feet in height combined to make ideal conditions for concentration of bird-life. Furthermore, the latitude is such that it is almost the junction point of the Transition and Carolinian wild-life zones and also the theoretical junction point of the streams of bird migration following Long Island from east to west, the Hudson north to south, the Hackensack Valley and the Watchung ridge.

In early days all the tidal bays were abundantly stocked with fish, shellfish and sea food of all sorts and the hills with forest foods, such as mast, berries, fruits and the like. Diversity of environment meant diversity and concentration of bird life. Remnants of the once great wild-life population remain and a certain bit of historical data assists in reconstructing the past. The Golden Plover still follow their ancestral routes to the Newark Meadows, the fresh-water ducks still use the Hackensack flyway, the salt-water species still migrate on the Hudson and winter in New York Bay, the hawks still move northward along the Watchung ridge in spring and the flocks of land birds seek resting places where once were fine wooded areas harboring the countless thousands of the wild or Passenger Pigeons. Only remnants of the above remain but still they are most interest-compelling; the full truth we shall never know. Quite conceivably the Purple Sandpiper wintered on the rocky shores of the Kill van Kull, or the Oystercatcher summered at Caven Point, the eagle nested in the tall trees of the Palisades, mergansers in the cedar swamps of the meadows, the Pileated Woodpecker on the wooded slope of the trap-rock ridges, the Labrador Duck fed on the sea foods of Robbins Reef, the Great Auk swam in and out of the narrows in New York Bay. Probably the great swans fed in white flocks on Newark Bay just as they do today on the Chesapeake, the Skimmers on the ponds of the Newark Marshes as now at Brigantine Beach, and the Golden Eagle pursued wild game on Bergen Hill as it wandered over from the highlands of the Hudson. Undoubtedly, the Wild Turkey feasted in the oak woods, the Clapper and King Rails clamored on the salt and fresh marshes, the Red-tailed Hawk raised its young on the crest of Snake Hill. Possibly a few Pinnated Grouse once existed on the open dryer meadow or in the piedmont country east of the first mountain, the Carolina Parakeet once wandered about in its erratic course or the American Egret may have reached its northernmost nesting ground in the stand of bald cypress trees whose stumps may still be seen along the sluggish stream (Frank Creek today), tributary to the Passaic not far from the present Manhattan transfer. Most of these word pictures are conjecture but enough evidence can be quoted to furnish confirmation of the vast changes that have taken place.

The following passages are taken from published works and fragmentary as they are certainly stir the imagination:

"All the way to Newark (9 miles) is a very flat, marshy country, intersected with rivers, many cedar swamps, abounding with mosquitoes, which bit our legs, and hands exceedingly; where they fix they will continue sucking our blood if not disturbed, till they swell four times their ordinary size, when they absolutely fall off and burst from their fullness. At two miles we cross a large cedar swamp; at three miles we intersect the road leading to Bergen, a Dutch town, half a mile on our right; at five miles we cross Hackensack (at Dow's ferry), at six we cross Passaic River (coaches and all) in a scowl, by means of pulling a rope fastened to the opposite side" (about 1780).¹

"Nature had furnished the country with all sorts of wild beasts and fowl, which gave them their food and much of their clothing. Fat venison, turkeys, geese, heath-hens, cranes, swans, ducks, pigeons and the like."²

"Formerly the passage from Powles hook to Bergen was through a slough; but it is now a fine smooth road. The rivers, Hackensack and Passaic were, until about 15 years ago passed in flats at ferries" (1807).³

Practically but sketchily, the geography of today may be described from an ornithological point of view as follows:

HUDSON COUNTY

Almost completely built up on Bergen Hill and east; along Hudson, Hackensack and Passaic Rivers, Newark and New York Bays, various water birds may be observed, especially in migration. There are various spots where a residuum of land bird life may always be found, Castle Point (Hoboken), Black Tom, Caven Point, Droyer's Point, etc., all areas now very much despoiled. North Hudson Park, and to a lesser extent City Park and Hudson County Parks, Bayonne, and Westside Park, Jersey City, contain a better representation but the only spots which can even remotely be described as interesting birding are the Snake Hill area on the meadows, the Arlington Cemetery area in West Hudson and the Secaucus and New Durham-Fairview areas of the Hackensack Meadows. North Hudson and Westside Parks and the Arlington Cemetery localities are like Central Park in New York City, excellent for May and September migrations. The

¹Old Roads From the Heart of New York by Sarah Comstock, N. Y., 1917. P. 140.

²P. 170 from Denton's Brief Description.

³From "The Picture of New York; or the Traveller's Guide, etc., 1807." P. 14.

marsh area at Secaucus "airport" has been at times very excellent for shorebird migrants, and the swamp near Fairview as well as the former spot still contain a few fresh water swamp breeders such as the gallinules and rails. The ponds beside the Erie railroad at Croxton near Snake Hill, and the marshes at New Durham and Secaucus are well worth visits at all seasons.

ESSEX COUNTY

After recognizing the marvelous facilities for all sorts of shorebirds, gulls, herons, ducks, hawks and owls at the Port Newark section of the Newark-Elizabeth Marshes as the best single place in Essex County (and from 1928 to 1933 in the New York region), for real rarities, it is well to glance at the map of the western edge of the county. Here, along the Passaic River from Singac to Chatham, are a number of connecting marsh areas which offer exceptional variety—the Great Piece Meadows, Swinefield Bridge, Pine Brook, Hatfield Swamp, and Dickinson's Neck. In these areas are ducks in migration, hawks and owls nesting, migrants and winter residents of all kinds, a distinct touch of the Carolinian zone and above all a most interesting and comparatively wild terrain. The Montclair area, so-called, contains a considerable percentage of high, wooded trap-rock (over 400 ft.) on the first and second mountains, cut by the Peckman River at Verona and sliced into sections on the east by the second and third rivers (the latter known as the Notch Brook or Yantacaw River). Of the parks, the best is the big wooded region of the Orange Reservation, drained to the south by the north branch of the Rahway River and the next best, the first river area now called Branch Brook Park in Newark. Here, for migrants and summer residents, is what Central Park was thirty years ago, a very fine land bird study area. Other parks are smaller but better still than similar Hudson County areas—Weequahic (Newark), Verona Lake (Verona), Grover Cleveland Park (Caldwell), Nishuane, Anderson and Mountainside Parks (Montclair), and Yantacaw Park (Nutley). Another feature must not be overlooked, the fresh water pond or reservoir areas; chief of these for productive records is the East Orange or Commonwealth Watershed Reservoir south of South Orange Avenue in Livingston, which is a bird sanctuary, the Orange Reservoir in the Reservation, the Cedar

Grove Reservoir, Verona Lake and Oakes Pond where fresh water ducks, or marsh birds may be found at times.

To glance at these geographic areas from an ecological point of view and boiling them to their minimum, we may summarize as follows:• (See map.)

	<u>Typical Native Bird</u>
I. Salt Water - - - - -	Herring Gull
II. Salt Water Marsh - - - - -	Sharp-tailed Sparrow
III. Brackish Marsh - - - - -	Long-billed Marsh Wren
IV. Piedmont Upland chiefly Sandstone -	Robin
V. Traprock Upland - - - - -	Chewink
VI. Passaic Valley Fresh Water Lowland	Tufted Titmouse

The botany of II and III has been summarized under the title "The Vegetation of the Hackensack Marsh, a typical American Fen" by J. W. Harshberger and V. A. Burns⁵ and may be checked readily. It is sufficient to say that the most generally distributed plants are *Phragmites communis*, *Typha angustifolia* and *T. latifolia*, and *Spartina* grasses (*Glabra* var. *pilosa* and *G. patens*).

Typical of the piedmont upland are the Red Maple (*Acer rubrum*), Tupelo (*Nyssa sylvatica*), Sassafras (*S. sassafras*), and the Sweet Gum (*Liquidambar styraciflua*). On the trap-rock upland, trees are chiefly oak in character, the Chestnut (*prinus*), Red (*rubra*), White (*alba*), and Black (*velutina*) species being interspersed with Tulip Poplars (*Liriodendron tulipifera*) and Beech (*Fagus Americana*). Along the Passaic River valley the Red Birch (*Betula nigra*), the Swamp White Oak (*plantanoides*), Pin Oak (*palustris*), the Elm (*Ulmus americana*) and Hornbeam (*Carpinus Carolina*) are also typical. The Chestnut (*Castanea dentata*) was formerly one of the best trees of the upland, now destroyed by blight except for various small root-shoots, and the elm blight bids fair to do the same in exterminating this fine tree (*Ulmus americana*).

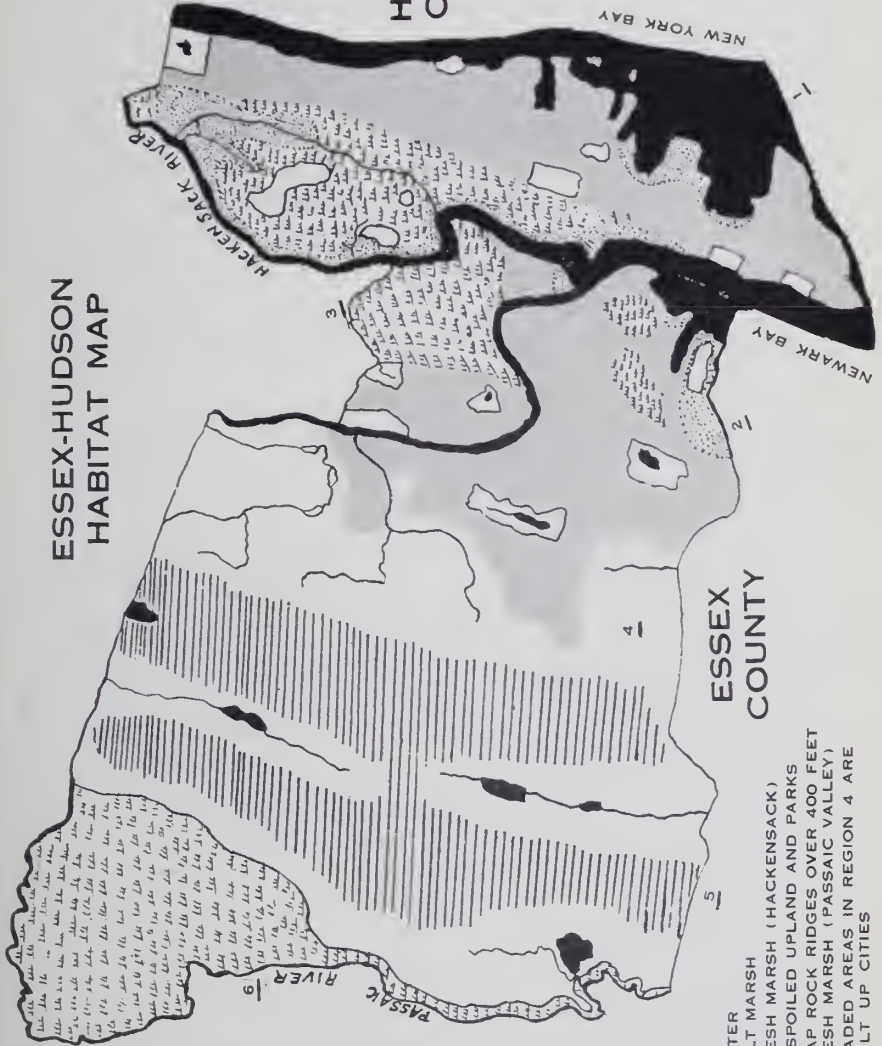
Historically there is considerable of value to compile from Hudson County. Messrs. E. S. Marks, L. S. Kohler and O. P. Medsger have

⁴See Table VII.

⁵May 1919, Vol. IX, Part 1, Trans. of Wagner Free Inst. of Science of Philadelphia

ESSEX-HUDSON HABITAT MAP

HUDSON
COUNTY



ESSEX
COUNTY

- 1 WATER
 - 2 SALT MARSH
 - 3 FRESH MARSH (HACKENSACK)
 - 4 UNSPOILED UPLAND AND PARKS
 - 5 TRAP ROCK RIDGES OVER 400 FEET
 - 6 FRESH MARSH (PASSAIC VALLEY)
- SHADED AREAS IN REGION 4 ARE
BUILT UP CITIES

worked this region for many years (1905 and ff.) and have kindly supplied a great detail of local material. Years ago Snake Hill was much more heavily wooded than today, the Secaucus cedar swamps and the tangle to the west of the Secaucus County road were much more suited to a variety of breeding species. The large cedar swamps south of Kingsland Creek were destroyed during the Civil War. The Arlington Ridge, including the present Arlington Cemetery and Schuyler's Woods (now gone), were fruitful nesting and migration areas up to about fifteen years ago. The Bergen Hill area, however, was destroyed much further back (before 1880) as described in fragments taken from Shaw's History of Essex and Hudson Counties (1884) as follows: P. 1300—^o:

Mr. Andrew Anderson, first postmaster, West Hoboken, N. J., says:

"This region, in later years, was my gunning ground. I found here partridges, quail, woodcock, snipes, etc. Rabbits were plenty."

P. 1295/6^e—UNION TOWNSHIP:

Coons, rabbits and squirrels common.

"One would think nothing of shooting 2 or 3 high-olders at a shot off a dog-wood tree. These birds with robins and wild pigeons, were plentiful in Dickies' woods and about Price's property. 'I have known,' is the remark of an old resident, 'the gunners to shoot 5 or 6 dozen robins in a short time'; I have myself shot 28 or 29 wild pigeons before breakfast. The river region was a resort too, for game; Michael Carley, who died in his eighty-second year about 22 years ago (1862) had a taste for the sport of gunning and made it a source of profit. His sons were excellent hunters too . . . and were fond of gunning on the land for pigeons and robins; basketfuls of these birds were sold by them in the city market. Father was more partial to the river. He used to fetch plenty of ducks home. Occasionally he had the luck to get a wild goose."

P. 1286/1287^e:

Mentions moose, deer and elk in old days.

NORTH BERGEN

"Along the Hackensack the reports of fowling-pieces were frequent. Game there in certain seasons was abundant."

J. Frazier Kinzie ". . . appear the robin, owls and wren, with blackbirds, blue-birds and meadowlarks."

^oShaw's History of Essex and Hudson Counties.

Conrad Rapp . . . "gained many a partridge. He found the quail without difficulty. 'I have seen him,' remarks a neighbor, 'come in with 15 squirrels and other game . . . made his living out of this pursuit for many years.'"

Snipe shooting on the meadows⁷ and duck and rail shooting continue after a fashion to the present day. Specimens may be found in many a saloon or club attesting to the local nimrod's skill. An entertaining reference to Snake Hill is in Frank Forester's account of the "Dunkerdoe" or bittern which he obviously confused with the Night Heron or Quawk which formerly perhaps nested on Snake Hill. On an old print of the meadows I ran across a picture of the cedar swamps and Snake Hill wooded to the water's edge probably with great trees like those at Inwood on the north end of Manhattan Island.

From 1898 to 1910, Mr. R. S. Lemmon, then living in Englewood, testifies he found excellent shooting on the lower Overpeck and Hackensack from Englewood to Fairview. On the brackish area of the salt marsh and along these streams, snipe were shot from about March 10 till May, with the best flight about April 15 and as late as April 22 one year. One bag numbered twenty birds in a four hour afternoon. Woodcock were found on the uplands and Quail prior to 1903 and 1904 but the former were rather rare and the latter soon disappeared. It was the flight shooting of snipe, rail and ducks that attracted the active gunners to the meadows. In the fall, the rail flights usually reached a maximum Sept. 15-18 when, with a big tide, it was sometimes possible to get 40 up to 70 birds in a day, chiefly Soras, rarely Virginias and regularly a few King Rail. The fall duck shooting was chiefly teal (Blue-wing), Blacks and Mallards in September, followed by a few diving ducks after northeast storms later in the fall; the best flocks of geese, Scaup and Pintail passed north in spring. Raptorial birds were often noted. In the springs, 1898 to 1899, eagles were frequently seen; the Osprey nested till 1898 on the Overpeck and in some winters 4 or 5 "great white owls" appeared with the usual wintering Red-tails and Rough-legs.

⁷See Aug., 1932, p. 34 and 35. The Sink-hole by R. S. Lemmon. **Field and Stream.**

For Essex County there is even more material available. Frank Forester apparently lived in Belleville for a time as he says of the Green-winged Teal:⁸

"In the spring of 1846, a couple of these birds haunted a small reedy island in front of my house on the Passaic till May 29."

He then complains they were frightened away by "rough-necks" from the neighboring town of Newark. Old-timers now living still tell of the beauties of the Passaic River in this locality before it was polluted and when there was still fine fishing to be had from small boat or river bank.

The late Harry Trippett, of Montclair, in the eighties and nineties did considerable nesting and field work in what we now describe as the Montclair region. On February 21, 1931, I called on him at his house and now summarize our conversation from my notes: In those days, the thick woods came unbroken to Upper Mountain Avenue, Montclair; below were farms with fields of clover, wheat, rye and hay, where the farmers alternated their crops. Along Toney's Brook where Edgemont Park now is, Bobolinks and Meadowlarks were formerly abundant breeders. He felt practically all birds were (1931) less common, especially such as the Baltimore Oriole and the Scarlet Tanager. The eggs of the latter were used in exchange and he recalled taking as many as twenty in an afternoon, obtained along the first Watchung Ridge which were later traded for a loon egg on a basis of 25 to 1. In the summer breeding season he and a companion by diligent search recorded 107 species of which 93 nested. He had local specimens of the Barn Owl, Broad-winged, Red-shouldered, Pigeon and Sharp-shinned Hawks. The first was taken from a barn in Bloomfield near the cemetery where they were formerly found regularly. He had not found the Barred Owl nesting in Montclair but did find one in West Caldwell inhabiting a nest which had been used by a Crow the year before, after renovating by adding a few sticks. The only Red-tailed Hawk nests were two, found on the second Watchung Ridge in Caldwell, about 1890 or before. He told a story of a Ruffed Grouse nest located by his brother which he visited but even when standing at the base of the tree where it was he could not locate the

⁸American Game, 1873, p. 245.

setting bird as it sat close on its eggs and did not flush until approached within five paces. He said Screech Owls were formerly common in the apple trees and could be traced by pellets, but now all the old trees are gone.

One of the best posted of the local hunters was the late Peter Speer, born in Little Falls, N. J., September 8, 1836 (d. 1935) who moved to his home on Upper Mountain Avenue, Montclair Heights, in 1854. His Dutch farmhouse (built cir. 1735) had been the home of his great grandfather and his grandfather, together with all the land thereabouts, which was called Speertown. His father ran a farm with 15 teams of horses and raised corn, wheat, oats, rye and buckwheat. Decrease of the growth of these crops, and excessive and illegal shooting have been the great factors in destroying Quail which were formerly plentiful. Mr. Speer started hunting at the age of twelve and stated that before the Erie Railroad was put through (about 1870), the hills were never burned over and Ruffed Grouse were very abundant on the ridges. It was possible to shoot ten grouse in a day but later they became wilder and he shot his last bird in the fall about 1920. The yearly fires which burn the undergrowth on the ridges, killed the plants which supplied berries and food for the birds and destroyed their cover. He has whipped hundreds of trout from the Notch Brook which was a famous trout stream and which formerly had a much greater volume of water than now, fed by the springs "in the lots." In the meadow along this brook he would think nothing of getting a dozen Woodcock in a day at the start of the local shooting season commencing about July 4. The large owls used to be common and he had shot many. He commented on the former abundance of Towhees, Flickers, Meadowlarks, and especially of Blackbirds which would go over in flocks two or three miles long. The flocks of Robins "would darken the sky" and he and his brother once shot forty in a short time. Bank and Barn Swallows used to be common but he apparently did not know the Eave Swallow; "chimbly swallers" are less common also and the Purple Martin used to visit boxes here and in Little Falls. He spoke of House Wrens eating green worms from the grape vines and rose bushes and on being asked about Whip-poor-wills stated that they used to stay all summer and would sing so loudly and commonly

at night it was sometimes difficult to sleep. His remarks on the Passenger Pigeon follow:—saw very few himself, none after 1870 but they appeared in bunches flying low over the ridge in spring and in fall. His father and grandfather baited them with buckwheat and would catch them in nets, several hundred sometimes in a day when they were abundant. They had a special basket to keep them in and the birds were then sold alive at pigeon shoots. Mr. Speer participated in the last such shoot in Montclair at a place called Harrison Park. The pigeons disappeared very suddenly and were never confused by him with the Mourning Dove which also used to be more common than now. He recalled the more rapid flight of the larger bird but claimed he could usually shoot one or two from a bunch as they migrated over.

In his excellent stories of the hunting field, Frank Forester (Henry W. Herbert) describes a snipe shooting trip in the spring to the Great Piece Meadows where these birds were most numerous and could be seen and heard in their "bleating" flight performance. Peter Speer spoke of the abundance of snipe and Woodcock there also and claimed that at the time of the full moon he and three others got 67 or 68 Woodcock in one day. Frank Forester⁹ writes:

"Once many years since sporting in the heavy thorn-brakes around Pine Brook in New Jersey, I found them (Ruffed Grouse) and we had great sport, bagging eight brace of Ruffed Grouse over points in addition to some eighteen or twenty brace quail."

This swamp area extended well up the Passaic River to Chatham Bridge and the following interesting comments are taken from Harold Herrick (Linnæan Society paper, November 2, 1878) published in *Forest and Stream*:¹⁰

"*Wilson's Snipe* breed yearly on the Chatham meadows.

"I have an egg taken from a set found there, and Mr. Dickinson takes young often and last spring got a family of four in the down."

"*Woodcock* Mr. Dickinson's is the best swamp on the river and 120 fine birds were killed in it July 4, 1878."

All Grouse, Quail and summer snipe here are now gone; the flight of Woodcock is trifling in comparison and transient snipe are few.

⁹American Game, p. 295, 1873.

¹⁰Forest and Stream XII, 1879, p. 165.

Although the area considered was probably once more easily divided between Transition and Carolinian Faunal areas than today, there are some tracings possible. The isolated occurrences of Solitary Vireo, Nashville Warbler, White-throated Sparrow and the like in summer are indicative. The Red-tailed Hawk, Golden-winged Warbler, Black-throated Green Warbler, Cliff Swallow, Pileated Woodpecker, and Wilson's Snipe have distinctly northern associations. The Yellow-billed Cuckoo, the Bobolink, the Alder Flycatcher, the Savanna Sparrow, the Tree Swallow, Cedar Waxwing and Prairie Horned Lark are near their southern limit as breeders. Conversely, the Carolinian associations are present but very much more evident. We have the Cardinal, Mockingbird, Titmouse, Carolina Wren, Orchard Oriole, Blue-winged Warbler well toward their northern limit. The occasional Blue Grosbeak, Prothonotary and Yellow-throated Warblers, Acadian Flycatcher, Turkey Buzzard, Seaside Sparrow, Clapper Rail, Blue-grey Gnatcatcher and Carolina Chickadee are near their northern limits even as stragglers. Among the birds with southern affiliations, which regularly get further north in the Carolinian belt are Barn Owl, Fish Crow, Purple Grackle, Rough-winged Swallow, White-eyed Vireo, Worm-eating and Hooded Warblers, Louisiana Water-thrush and Yellow-breasted Chat, all of which either occur now or have regularly occurred in our area as normally common breeders. It is interesting to contemplate that the complex ecological changes brought about by man and civilization have adversely affected most of the above listed species with northern and southern affiliations. As these birds as a whole are not near the center of their abundance it is a reasonable expectation that such would be the case. The Cardinal and Tufted Titmouse, Hooded Warbler, and Purple Grackle, Savanna Sparrow and the Tree Swallow seem to be the only species now at or near the peak of abundance or expansion. Records of some indeed are now only historical associations, like the Dickcissel, the Snipe, Red-tailed Hawk and Cliff Swallow; it is indeed likely that such species as Summer Tanager, Red-bellied Woodpecker, Bewick's Wren, and others once were present in some numbers at the apex of their northern cyclic expansion. This statement is not mere idle theory as there is evidence in other localities to back it up. I have neglected to touch also on the water birds or on

the northern wanderings of breeders like the Forster's Tern or Yellow-crowned Night Heron whose past history is somewhat obscure.

Perhaps the clearest way to show the comparative abundance of breeders is by a table, two of which are submitted. The total figures represent actual counts in breeding season, not pairs or nests, so allowance must be made to some extent to make relative not absolute comparisons.

Table II—Montclair Region (chiefly Essex County), 7 years, 1929-1935, incl.

Table III—Hudson County, 6 years, 1930-1935, incl.

The conclusion of these figures is that although once Hudson County no doubt had the same total summer list as Essex, yet for the years considered, 33 summer birds have been eliminated. In addition also, it is obvious that the introduced species in Hudson County especially, to a less extent in Essex, are forcing out the native species as shown here:

	Native	Introduced
Hudson - - - - -	37.3%*	62.7%
Essex - - - - -	74.3%	25.7%

*Based on per cent of total counts.

On an arbitrary scale a further classification brings these points out further.

	Essex		Hudson	
	Native	Introduced	Native	Introduced
Very abundant - - - - -	1	2	0	1
Abundant - - - - -	1	0	0	0
Very common - - - - -	17	1**	0	1
Common - - - - -	17	0	7	1**
Uncommon - - - - -	18	0	10	0
Rare - - - - -	8	1	8	0
Very rare - - - - -	17	0	21	1
Occasional (once only) - - - - -	9	0	9	0
Totals - - - - -	88	4	55	4
	92		59	

**Rock Dove.

The first question which comes to mind therefore is "Which are the species which are the first to go?" What little concrete evidence can be produced is submitted herewith (Table IV). As Hudson County has been "civilized," reaching its present density of population some

TABLE II

Breeding Season Counts, Relative Abundance, Montclair Region Only
(7 Years, 1929-1935 Inclusive; 92 Species, 13,756 Individuals)

	Per Cent	Total In- dividuals		Total In- dividuals
<i>Very abundant</i> —3				
Robin - - - - -	16.94	2,330	Kingfisher - - - - -	32
House Sparrow - - - - -	12.70	1,748	Least Flycatcher - - - - -	30
Starling - - - - -	9.60	1,317	Bob-white - - - - -	29
<i>Abundant</i> —1			Sparrow Hawk - - - - -	28
Song Sparrow - - - - -	5.40	746	Tufted Titmouse - - - - -	27
<i>Very Common</i> —18			Redstart - - - - -	26
Towhee - - - - -	3.50	481	Worm-eating Warbler - - - - -	26
Rock Dove, est. - - - - -	3.30	452	Yellow-breasted Chat - - - - -	26
Purple Grackle - - - - -	3.03	417	Screech Owl - - - - -	25
Wood Thrush - - - - -	2.93	403	Warbling Vireo - - - - -	24
Catbird - - - - -	2.81	387	<i>Rare</i> —9	
House Wren - - - - -	2.80	380	Bluebird - - - - -	18
Blue Jay - - - - -	2.54	349	Yellow-billed Cuckoo - - - - -	16
Northern Yellow- throat - - - - -	2.45	337	Hairy Woodpecker - - - - -	15
Red-eyed Vireo - - - - -	2.30	318	Grasshopper Sparrow - - - - -	15
Chipping Sparrow - - - - -	2.00	276	Swamp Sparrow - - - - -	12
Northern Flicker - - - - -	1.96	270	Pheasant - - - - -	12
Red-wing - - - - -	1.70	239	American Woodcock - - - - -	12
Mourning Dove - - - - -	1.60	213	Black and White Warbler - - - - -	12
American Crow - - - - -	1.39	192	Hooded Warbler - - - - -	12
Ovenbird - - - - -	1.39	191	<i>Very rare</i> —17	
Cowbird - - - - -	1.13	158	Orchard Oriole - - - - -	9
Field Sparrow - - - - -	1.05	144	Alder Flycatcher - - - - -	7
Indigo Bunting - - - - -	....	132	Fish Crow - - - - -	7
<i>Common</i> —17			Virginia Rail - - - - -	6
Baltimore Oriole - - - - -		117	Black-crowned Night Heron - - - - -	5
Scarlet Tanager - - - - -		109	Sharp-shinned Hawk - - - - -	5
Chestnut-sided Warbler - - - - -		109	Green Heron - - - - -	4
Rose-breasted Grosbeak - - - - -		107	Red-shouldered Hawk - - - - -	4
Wood Pewee - - - - -		105	Louisiana Water Thrush - - - - -	4
Brown Thrasher - - - - -		104	Long-billed Marsh Wren - - - - -	4
Yellow Warbler - - - - -		103	Cooper's Hawk - - - - -	3
Chimney Swift - - - - -		102	Ruby-throated Hummingbird - - - - -	3
Barn Swallow - - - - -		98	Rough-winged Swallow - - - - -	3
Goldfinch - - - - -		85	Sora - - - - -	2
Downy Woodpecker - - - - -		75	Great Horned Owl - - - - -	2
Crested Flycatcher - - - - -		71	White-eyed Vireo - - - - -	2
Blue-winged Warbler - - - - -		63	Prairie Warbler - - - - -	2
Killdeer - - - - -		57	<i>Occasional (only once)</i> —9	
Cedar Waxwing - - - - -		56	Barred Owl	
Meadowlark - - - - -		55	Black-billed Cuckoo	
White-breasted Nuthatch - - - - -		51	Nighthawk	
<i>Uncommon</i> —18			Whip-poor-will	
Kingbird - - - - -		48	Nashville Warbler	
Yellow-throated Vireo - - - - -		47	Canada Warbler	
Cardinal - - - - -		47	White-throated Sparrow	
Veery - - - - -		44	Carolina Wren	
Vesper Sparrow - - - - -		41	Black-throated Green Warbler	
Phoebe - - - - -		36	TOTALS	
Spotted Sandpiper - - - - -		35	1929 1930 1931 1932 1933 1934 1935	
Black-capped Chickadee - - - - -		35	71 65 64 71 69 74 72	

TABLE III

Hudson County Breeding Season Counts—Relative Abundance
(Six Years, 1930-1935, 59 Species, 6,041 Individuals)

	Per Cent	Total In- dividuals		Total In- dividuals
<i>Very abundant</i> —1			<i>Very rare</i> —22	
House Sparrow - - - -	45.3	2,736	Sparrow Hawk - - - - -	8
<i>Very common</i> —1			House Wren - - - - -	8
Starling - - - -	12.7	769	Virginia Rail - - - - -	7
<i>Common</i> —8			Kingbird - - - - -	7
Eastern Red-wing -	5.96	360	Bobolink - - - - -	7
Long-billed Marsh Wren - - - -	5.94	359	Veery - - - - -	6
Swamp Sparrow -	5.74	347	Mourning Dove - - - - -	5
Song Sparrow - -	5.39	326	Field Sparrow - - - - -	5
Rock Dove, est. -	4.67	[282]	Black-billed Cuckoo - - - - -	5
Robin - - - -	3.89	235	Redstart - - - - -	4
Northern Yellow- throat - - - -	2.92	176	Marsh Hawk - - - - -	4
Black Duck - - -	1.77	107	Pheasant - - - - -	4
<i>Uncommon</i> —10			Towhee - - - - -	4
Purple Grackle - -	1.14	69	Green Heron - - - - -	4
Killdeer - - - -	-	56	Red-eyed Vireo - - - - -	4
Sharp-tailed Sparrow - - - -	-	34	Least Bittern - - - - -	4
Fish Crow - - - -	-	32	Rough-winged Swallow - - - -	3
Florida Gallinule - - - - -	-	24	American Bittern - - - - -	3
Indigo Bunting - - - - -	-	24	Chipping Sparrow - - - - -	2
Yellow Warbler - - - - -	-	19	Least Flycatcher - - - - -	2
Flicker - - - - -	-	18	Cedar Waxwing - - - - -	2
Catbird - - - - -	-	17	Baltimore Oriole - - - - -	2
Spotted Sandpiper - - - - -	-	17	<i>Occasional (once only)</i> —9	
<i>Rare</i> —8			Ruby-throated Hummingbird	
Meadowlark - - - - -	-	16	Wood Pewee	
Blue Jay - - - - -	-	16	Crested Flycatcher	
Crow - - - - -	-	16	Cowbird	
Barn Swallow - - - - -	-	14	Wood Thrush	
Black-crowned Night Heron -	-	12	Yellow-billed Cuckoo	
Chimney Swift - - - - -	-	11	Grasshopper Sparrow	
Brown Thrasher - - - - -	-	10	Cliff Swallow	
Goldfinch - - - - -	-	10	White-throated Sparrow	
			(Herring and Laughing Gulls ex- cluded.)	

thirty to thirty-five years earlier than eastern Essex and as complete disappearance of most species from the latter county is only starting, the comparison is entertaining. Due to the past records kept by Messrs. Marks, Kohler and Medsger in Arlington, etc., an area with only local or sentimental interest, we have a record, faulty as it may be, to show the fading out of species unable to stand change of environment or "civilization." Historically, the first to go were probably the Heath Hen (if ever present), the Wild Turkey, Passenger Pigeon, the Pileated Woodpecker, the Bald Eagle, the Osprey, Great Blue

Heron, Night Heron, the Ruffed Grouse, the Red-tailed Hawk, the Purple Martin, perhaps a few Carolinian species no longer present (Note Cardinal in Hudson County) and the large owls. These were followed in recent times by the marsh birds as their habitats have been destroyed, such as the Least Bittern, Pied-billed Grebe, Coot, rails, etc. (in Hudson County the extent of marsh has preserved a few Virginia Rails, Bitterns and Gallinules), and then by the next smaller birds and birds of prey, e.g. Red-shouldered Hawk, Crow, Green Heron, the game birds, Woodcock, Bob-white, and lastly by the less favored or adaptable passerine species. The Red-headed Woodpecker is notably unable to withstand competition of the Starling; the swallows, Cedar Waxwing, Whip-poor-will, many flycatchers, the Bluebird, several of the Carolinian species (Blue-winged Warbler, Carolina Wren, Chat, Titmouse) have disappeared from Hudson and are going from East Essex, to be followed by warblers, vireos and even by members of the sparrow family which are comparatively successful in reproducing themselves. The Screech Owl, Chimney Swift, Night-hawk, Sparrow Hawk, Grackle, Blue Jay, Robin, Catbird and Song Sparrow seem to be able to adapt themselves with a measure of efficiency to denser population and introduced competition. The present breeding possibilities of Essex County today are about 103 species total, for besides those listed (in summer) from the Montclair region (92) there are found at Port Newark the Seaside, Sharp-tailed and Savannah Sparrows, the Bobolink, Marsh Hawk and the Short-eared Owl, and in the Passaic Valley or on the second ridge, Short-billed Marsh Wren, the Black, Wood and Mallard Ducks and Broad-winged Hawk. Historically we know considerable about the destruction of marsh areas in Essex County. The best fresh water marsh environment described by Abbott¹¹ at Newark lasted only to about 1908; the remnant was destroyed both on fresh and salt marsh about 1916 with the creation of Port Newark. In West Essex, Long Meadow was filled in for the creation of the Caldwell Airport in 1929, and the wonderful Hatfield area was "improved" and destroyed (by drainage) in 1932. Areas of woods suited to a few of the larger raptors still persist in West Essex along the Passaic and on the two Watchung Ridges. Of

¹¹ Auk, 1907, p. 1-11.

course all the above relates to nesting species only: Several of these areas are still unexcelled for migrants, waders, ducks and birds of all sorts.

Another means of study was undertaken on a small scale and the results are summarized herewith, i.e., the density of bird population in given areas. I soon found that whether I counted birds in Hoboken, Jersey City, Newark, East Orange, or Montclair in the settled areas, the total population was relatively stable. As the native birds found conditions unbearable, the introduced species filled the gaps—and quite densely. As many sparrows, pigeons, Starlings, Robins, and Song Sparrows were to be found as there were food or nesting sites and these were considerable and quite uniform. I then concentrated on native species.

CITY CONDITIONS—PARKS AND LIMITED OPEN SPACES

NUMBER OF NATIVE BIRDS (INDIVIDUALS) PER HOUR

HUDSON		ESSEX	
Jersey City	- - - - - 24	Newark	- - - - - 73
Harrison and Kearney	- - - - - 28	Montclair	- - - - - 137

These figures are then the measure of deterioration of environment in and about the city parks. It is quite possible as time goes on that Anderson Park, Montclair, now a very good place for Robins, Catbirds, etc., will one day be as desolate and barren as Greenville or some of the Bayonne parks. It is just a question of degree.

To give another feature of a numerical study, a considerable amount of time has been spent in counting the number of individuals of native birds recorded per hour on foot in relatively stable, and, so to speak, the best of present natural conditions in the county. In the environment previously entitled "V," trap-rock upland characterized by oaks, tulip tree, poplar, beech, etc., where the Towhee is the most common bird, the total is 104, quite below the best record (for the park area) and then again lower than general mixed fields and woods giving a figure of 116 at Great Notch and 112 at Caldwell. These figures represent respectively environments "IV" and "VI," referred to above, with Robin and Tufted Titmouse respectively as typical birds. For Hudson County, the chief area studied is number "III" the habitat of fresh marsh in which the characteristic bird is the Long-billed Marsh Wren

giving an average per walk hour of native birds 62. There is little doubt that this is a lower figure than formerly, as the typical *Phragmites* which is more abundantly distributed today than the cattails, is hardly the best of breeding territory. Before diking and draining, the density of bird population here was considerably greater for the Red-wings, and wrens are much more common in the wetter portions today.

The considerable records in *Bird-Lore* over a period of years make possible another tabulation which in itself (Table V) shows simply and clearly the preponderance of roughly a dozen species in making up the winter population. In the earlier censuses the relative proportion of the species is very different from the later. The Starling has increased out of all proportion to every other bird (excluding House Sparrow; census counts previously omitted these), so that today 47% of the total individuals are of this species while in the early years the figure 35% was more nearly representative. The several gulls also are more abundant than formerly but how much we cannot guess. In general, the less frequently seen species today bear a smaller ratio to the sum total than formerly which is just a means of saying that the species most efficient in adapting themselves to our changing environment are increasing relatively as well as absolutely. I believe that in just the past few years our wintering crows are on the decrease but otherwise they have been able to compete successfully with their environment.

The annotated list contains extreme dates of migration so far as available but none of the average figures listed in Mr. Urner's paper. It was thought better to show the average spring arrival figures by a table (VI) of some of the key species, perhaps fifty in number, selected from the different groupings in Mr. Griscom's "Birds of the New York Region." Such dates obtained from 6-15 years representative arrival figures averaged, is readily comparable with other localities in other states. In comparing these with Union County, I may say that in general our region shows a lag of a day or two which would be reasonable but that in some of the West Essex records it was apparent that some migrants tend to appear in the Caldwell area before they are seen in the Elizabeth or Montclair regions. That this is not an

anomaly, one has only to glance at the map to see the possibility of birds arriving from the south via the Upper Passaic Valley working north from say Trenton, Princeton, etc., west of the long and curving Watchung Ridge. Not enough data are at hand, however, to prove this entertaining hypothesis. No complete fall averages have been given, not through lack of general interest, but chiefly because of lack of data. A few such, however, are listed below for comparison.

Northern Water-Thrush	- - - - -	August	10
Red-breasted Nuthatch	- - - - -	September	5
Connecticut Warbler	- - - - -	"	15
Prairie Warbler	- - - - -	"	15
Black-poll Warbler	- - - - -	"	16
Palm Warbler	- - - - -	"	18
White-throated Sparrow	- - - - -	"	18
Lincoln's Sparrow	- - - - -	"	22
Junco	- - - - -	"	25
Winter Wren	- - - - -	"	26
Brown Creeper	- - - - -	"	27
Broad-winged Hawk	- - - - -	"	27
Golden-crowned Kinglet	- - - - -	"	30
Solitary Vireo	- - - - -	"	30
Fox Sparrow	- - - - -	October	21
Tree Sparrow	- - - - -	November	2
Rough-legged Hawk	- - - - -	"	2

Generally speaking, the fall data are much less regular than in spring, e.g. only one Essex County Olive-sided Flycatcher record is at hand compared to a series from Union County, while the exact converse is true of the Prairie Warbler, which at Montclair is a reasonably common fall migrant. Why the average date of the Tree Sparrow is some ten days behind Mr. Urner's records is a puzzle when most of the other common species show an earlier or similar arrival date in Essex County.

The fall migration is very much a mystery to many of the uninitiated who tend to cover the spring flight thoroughly but not that in fall. The shorebird flight starts at Port Newark the last week in June most years, is under way by July 4 pretty consistently and in full swing a week later with a half dozen species. It continues active well into October and in some seasons a number remain into Novem-

ber. August is the best month of the year along Newark Bay but the early duck flight starts in September and depends to a large degree upon the precipitation on the meadows. In some seasons the birds pass right through, at other times may be seen readily in large flocks if the proper places are visited early in the morning at proper tides. A word must be said about the extraordinary post-breeding heron flight which has frequently concentrated these species in the same general area near Newark Bay where the shorebirds are seen. The now historic concentration in the locust grove beside Bound Creek in Essex County is capably described by Mr. Urner as follows:

"During the summer of 1930 frequent trips to Newark Meadows permitted the recording of the rise and fall of the White Heron movement and some facts of possible interest concerning roosting habits. The first recorded Little Blue Heron reached Newark Meadows about July 10th. The number increased quite rapidly after that date, reaching 102 by July 31st and 145 by August 7th (one blue adult on that date carried a band on the right leg). The peak was reached August 30th when 247 white and 6 adult birds were counted and the number held up well until the first days of September, after which there was a rapid decline. Only 86 went to roost on Sept. 13th, 11 on Sept. 21st and but 1 on Sept. 28th.

"The season's first Egret in Northern New Jersey was on July 5th; the highest number on Newark Meadows was reached on August 16th (41 birds) and the latest record was on Sept. 28th.

"From August 13th to Sept. 21st on twelve separate evenings I checked the herons as they lit in the locust grove on Newark Meadows. There were apparently several factors affecting the time of arrival at the roost:—(1) time of sunset; (2) light conditions, cloudy or clear; (3) lateness of season (probably temperature); (4) distance from the roost the birds were feeding; (5) the state of the tide at bedtime as it affected feeding conditions. There was a tendency, though not uniform for the birds to roost earlier as the days shortened. On the darkest, cloudiest evening all were at roost before sunset and on the clearest evening, with moon, the majority went to roost after sunset. But this relation of time of roosting to sky conditions was not constant, in fact the average time of roosting on clear evenings was 25 minutes before sunset while the average time of roosting on very dark evenings was 18 minutes before sunset, indicating that other indefinable factors had an influence. The distance from the roost was of only minor importance since the Little Blues roosting in the locust grove, as far as I could determine, all spent their days on the surrounding salt marsh and were rarely over a mile or two from the grove. It seemed certain that the birds roosted earlier in relation to sunset as the season advanced, a tendency possibly due to lower temperatures and a desire to seek the shelter of the grove. Feeding conditions seemed to have an influence on the time of roosting. The birds lived chiefly

upon grasshoppers and salt water minnows or other forms of aquatic life. Many, each day, left the grasshopper infested salt meadows for the mud flats as these were exposed by the falling tides. If the flats were just uncovering at roosting time the tendency was to tarry and arrive at the roost later than under other tide conditions.

"A clear indication of the effect of light conditions upon the roosting instinct, independent of sun time, was observed on August 17th when a very heavy thunder-cloud darkened the sky at 4.30 p.m. As the darkness deepened herons began to fly to the grove. Some 20 had arrived when the cloud parted and these all left the grove as the sun shone forth again.

"The Egrets, when alighting, mixed with the Little Blue Herons, but later segregated and roosted, well spaced, in the taller trees.

"The locust grove for over two months, served as a heron roost 24 hours a day, for the Black-crowned Night Herons roosted there throughout the hours of daylight, flying out a few at a time as the white birds came in for the night."²²

At other seasons as in 1934, the southern heron concentration may be almost lacking.

Another feature of the meadows is the concentration of roosting birds which from my notes of September 5, 1929, may be of interest to quote verbatim:

"As I returned toward the airport I saw vast clouds of birds settling in the dusk among the reeds between the roadway from the Holland tubes to Newark and the Lehigh tracks. On going over I flushed between 5,000 and 10,000 birds. I have no accurate manner of estimating this number but there were more than I ever saw at once before. As they flew up they made a dull roar—at least 4 flocks of great size and hundreds of scattering. They were chiefly Red-wings and Grackles with Starlings, Tree Swallows and a few Bobolinks, probably also Cowbirds and Barn Swallows but I identified none of these as it was too dark. There may well have been twice my estimate and I know I have the Tree Swallows too low but I try to be conservative:

Red-wing	- - - - -	3,000
Starling	- - - - -	1,000
Tree Swallow	- - - - -	500
Grackle	- - - - -	2,000
Bobolink	- - - - -	3

²²Quoted from Cassin, Vol. XXVIII, 1929-30. Southern Herons in New Jersey by Charles A. Urner.

On several occasions as described by Mr. Urner even larger flocks have been seen as they prepared to bed for the night in the *Phragmites* of this locality.

Mr. T. M. Trippe¹³ describes an immense flight of Tree Swallows near Newark about 1867 in October just before a long northeast rain storm followed by sharp frosts. He stated that tens of thousands were in sight at any moment for an hour. The evolutions of these birds are at times nothing short of marvelous as hundreds of birds as if moved by common impulse veer, now here, now there, in rapid ranks. Such a performance was seen in Branch Brook Park about sunset September 23, 1934. In the declining light, the air appeared filled with dust or little motes, probably some form of small gnat, but for no apparent reason the birds in pursuit would swarm in flight close to the ground, backs shining, white bellies gleaming, and suddenly mount into the air in a swirling mass. They then started eastward and I decided were gone to roost on the meadows when, as if attracted back by some magic electrical power, they would circle overhead with confused twitterings, feeding and hawking about, only to repeat the process several times, so that it was almost dark before they finally disappeared. I could not believe that the gnats were flying so erratically but rather that the swallows were driven by some spur of play or instinctive discipline which caused them to dash now high, now low, in pursuit of their evening meals.

The flocking of Starlings has so often been studied and described that I shall only cite a little of interest on these birds. The roosts on the meadows are at times wholly or in great part of this species and for several years there has been a most interesting one in the neighborhood of Montclair Avenue and Essex Street, Montclair. Starting around the first of July with a nucleus of Robins and Starlings, it attracts Grackles and ever increasing number of Starlings, so that for several years it has been a public nuisance and extreme methods of control have been resorted to by the police. Persistent shooting of birds with the killing of hundreds tends to break up the roost after a time but it is a noisy affair at best. On July 16, 1934, a visit indicated that three-quarters of the birds were Starlings, the balance Robins and

¹³American Nature, 1874, p. 346.

a few Grackles, but the flock had been reduced by shooting to only about a thousand birds.

The warbler flight so eagerly studied each spring in Central Park passes our area in the same way but never in as concentrated a form. Only every other year or so is the opportunity provided at Montclair for the big, easily observed concentrations. Branch Brook Park and several Hudson County parks, notably North Hudson Park and the Arlington Cemetery are favored localities because the birds must concentrate of necessity. A number of rare species have resulted from these waves at Branch Brook and continued observation such as that of Mr. R. F. Haulenbeek will reveal much the same conditions as in New York following a proper combination of warmer weather, a change in temperature or a fog.

A single special flight is that of loons observed at Montclair Heights in the spring of 1930. Starting with the first record on the Reservoir on April 16 scattering birds were seen until May 1 when "geese" were reported—at least twelve seen going over by one observer as he walked to the train at the station near my home. A few moments revealed they were loons, a flock of three and a single bird additional. On the fifth, I saw six birds and on the seventh one, particularly noting that it flew with bill wide open. On May 9 conditions appeared to be so good that I took time before departing for New York to look the flight over. The birds were silent, flying northwest from the direction of Newark Bay, rising gradually so they passed about thirty feet over the tree tops on the ridge. At this point they seemed to head more west than north. Some came singly, others in bunches up to ten, a total in only a few minutes, of 42. Of thirteen I watched carefully one after another, all had their bills wide open. It was a bright, rather warm day, but whether this is done because of the heat or due to their need for oxygen in laboring flight like a panting dog, I do not know. No more were seen that season nor later except a single bird flying east May 29, 1932, a rather unusual date. Other years the loon has been absent or rare which makes this influx the more strange. My home is so situated that it is on a good migration route. For example on July 8, 1929, I was astonished to see six Great Blue Herons migrating in stately parade north along the ridge, a wandering from the

south along the same route used by myriads of crows, hawks, and other birds in years past.

These crow and hawk flights have been the joy of some of the local gunners for many years. Mr. T. M. Trippe¹⁴ describes a flight of at least a thousand hawks which occurred in early May after a long northeast storm with heavy rain. The Red-tailed, Sharp-shinned, Cooper's and Broad-winged Hawks were the most common and one Golden Eagle was recorded as seen. Mr. K. V. S. Howland¹⁵ reports on the migration at Montclair, stating it began in late March and that he had shot Red-tailed, Red-shouldered, Broad-winged, Marsh, Cooper's, Sharp-shinned and Sparrow Hawks and Ospreys. On April 18, 1893, thirty-seven hawks chiefly Broad-winged and Sharp-shinned were shot from three blinds. Mr. Harry Trippett told me of seeing numerous Pigeon and Broad-winged Hawks in migration and reported five kinds in the air together on one occasion. He said that one afternoon Peter Speer and others killed 84 hawks in three hours and that they more than filled a bushel basket. As to the Golden Eagle they were said to have been seen on several occasions, less often than the Bald Eagle it is true, but once or twice migrating in pairs. He recorded the crow flights as starting in late February and March along the line of the ridge. He said that after the main flights there would be scattered flocks of birds which traveled alone, composed of partly crippled or diseased birds which were kept from the main flights.

Peter Speer, on being consulted, was the mightiest hunter of them all; he shot with several companions chiefly for sport and had killed vast numbers of crows and hawks of various kinds. He gave March 1 as the usual start of the crow flight and had shot for market, obtaining about fifteen cents each if fresh, shipping to New York by the barrel. By such means he made over \$50.00 one spring, enough to keep him in shells for some time—until this practice was stopped by the Audubon Society. The breast plumage of the crow was then used in making feather capes for women and the wings were used on hats. The hawks were valueless unless the skins were tanned but he would not take the trouble to do this as they had to be free from smell also. Hawk flights were often on warm days so that the birds

¹⁴American Nature, 1874, p. 346.

¹⁵Forest and Stream, 1893, p. 513.

rose in the air and circled but the crows were dependent on a certain wind so they could fly along the ridge at an acute angle making use of the crosswise currents. His brother shot a Golden Eagle back of the Normal School about 1870 and he spoke of another that was shot in Great Notch and mounted, describing the golden feathers on the neck and stating it was smaller than the Bald Eagle. He claimed that roup or some disease which closed their eyes killed off "millions" of crows but that even though blind they flew north instinctively to fall prey to his willing gun.

My first experience of hawk flights came in 1929. On April 20 the Montclair Bird Club at Verona Lake reported an Osprey and about 75 Broad-winged Hawks. A few days later I saw one of the latter and on searching the hill on April 28 ran across a blind made of a fallen tree and a few boughs and containing the bodies of about 20 crows, thirteen Broad-wings, a Cooper's Hawk and five Sharp-shins all quite fresh. There was also a long deceased Red-shouldered Hawk. On March 19, 1930, shooting was heard and the following day I picked up the remains of nine crows, a male Marsh Hawk and a Red-shoulder. Shortly afterwards the shooting was stopped by the game warden at the request of the New Jersey Audubon Society and has not been continued. A few flights of hawks have been noted, however, and details are given below of April 19, 1930; April 26, 1931, and April 23, 1932. No flight has been recorded 1933-1935 inc. beyond scattering birds. The Broad-winged has been by far the most common, followed by the Osprey but apparently the Sharp-shin is much less common than formerly. It is often difficult to tell the falcons or smaller *Accipiters* but in general the figures are accurate.

	April 19, 1930 2-4 P.M.	April 26, 1931 6:35-7:46 P.M.	April 23, 1932
Hawks - - - - -	44	47	23
Broad-winged Hawk - - - - -	20	18	15
Osprey - - - - -	11	19	4
Duck Hawk - - - - -	3	1	2
Marsh Hawk - - - - -	2	1	1
Pigeon Hawk - - - - -	2	1	1
Sharp-shinned Hawk - - - - -	1	x	x
Cooper's Hawk - - - - -	4	x	x
Sparrow Hawk - - - - -	x	1	x
? Falcon - - - - -	x	3	x
Buzzard - - - - -	1	x	x
Unidentified - - - - -	x	3	x

On April 20, 1930, a Sharp-shin, two Sparrow Hawks and a falcon were noted but the flight was over. In 1931 the migration was accompanied by movements of crows, Mourning Doves and a blackbird, and in 1932 by seven crows, all of which flew like the hawks low over the trees.

The weather on April 26, 1931, is worth special attention in comparison with the note given above by Trippe. I had taken a ride to Little Falls in a terrific downpour of rain and walked home via the Cedar Grove Reservoir. "By this time the last black cloud from the various showers was just east of me over the ridge and the sun was breaking through the west. The wind was strong from the west, quite blustery and getting stronger. I saw my first hawk, a Broad-wing, at about 6:35 D. S. T. and then watched carefully until after dark at

TABLE IV
HUDSON COUNTY

Last Breeding—(Records at Arlington unless otherwise shown)

1878 (before) Cardinal (Jersey City)	1920 Green Heron
1907 Cedar Waxwing	Yellow-billed Cuckoo
Blue-winged Warbler	Phoebe
1910 Woodcock	Yellow Warbler
Nighthawk (Jersey City)	Yellow-breasted Chat
1911 Yellow-throated Vireo	1925 Red-headed Woodpecker
1912 Ovenbird	1928 Kingbird
1913 Bluebird	Goldfinch
Crested Flycatcher (Secaucus)	Field Sparrow
1915 Red-shouldered Hawk	Redstart
1916 Carolina Wren	Thrasher
1917 Titmouse	Bob-white
1919 Crow	1930 Hummingbird
Chipping Sparrow	1931 Wood Thrush
Scarlet Tanager	1933 Cliff Swallow (Secaucus)
Black and White Warbler	

ESSEX COUNTY

Last Breeding Records

1878 Wilson's Snipe	1928 Red-tailed Hawk
1905 Purple Martin	Florida Gallinule
1907 Coot	1929 Cliff Swallow
1908 Pied-billed Grebe	1932 Least Bittern
1926 Bank Swallow	Sora Rail
1927 Ruffed Grouse	

7:50 D. S. T. There were never more than three in sight at once and generally these would be either Broad-wings or Ospreys. The wind was due west and the birds were flying at about a 60 degree angle

TABLE V

Winter Records Taken from 39 Bird Lore Censuses 1913-1934 Inclusive
(Essex County)

Relative Abundance	Per Cent	Total Individuals	Relative Frequency	Total Times Listed
Starling - - - -	39.4	19,942	Tree Sparrow - - - -	39
House Sparrow - -	14.0	7,072	Song Sparrow - - - -	38
Crow - - - -	11.9	5,613	Starling - - - -	37
Herring Gull - - -	6.01	3,090	House Sparrow - - - -	37
Tree Sparrow - - -	5.9	2,983	Slate-colored Junco - - - -	36
Junco - - - -	3.33	1,686	Blue Jay - - - -	35
Bonaparte's Gull -	2.56	1,298	Crow - - - -	34
Bl.-cap Chickadee -	1.96	995	White-breasted Nuthatch - - - -	33
Blue Jay - - - -	1.87	947	Black-capped Chickadee - - - -	32
Song Sparrow - - -	1.66	838	White-throated Sparrow - - - -	31
White-throated Sparrow - - - -	1.36	691	Brown Creeper - - - -	28
Black Duck* - - -	1.04	525	Goldfinch - - - -	28
White-breasted Nuthatch - - - -	-	432	Tufted Titmouse - - - -	20
Goldfinch - - - -	-	412	Golden-crowned Kinglet - - - -	19
Tufted Titmouse - - - -	-	371	Red-shouldered Hawk - - - -	18
Red-wing - - - -	-	363	Red-tail Hawk - - - -	18
Horned Lark - - - -	-	344	Hairy Woodpecker - - - -	17
Rusty Blackbird - - - -	-	340	Sparrow Hawk - - - -	15
Downy Woodpecker - - - -	-	301	Robin - - - -	15
Crow Blackbird** - - - -	-	208	Red-headed Woodpecker - - - -	13
Meadowlark - - - -	-	205	Black Duck - - - -	13
Ring-billed Gull - - - -	-	187	Winter Wren - - - -	11
Golden-crowned Kinglet - - - -	-	129	Bluebird - - - -	11
Purple Finch - - - -	-	111	Cardinal - - - -	11
Brown Creeper - - - -	-	104	Kingfisher - - - -	11
Myrtle Warbler - - - -	-	88	Myrtle Warbler - - - -	10
Robin - - - -	-	73	Swamp Sparrow - - - -	10
Pine Siskin - - - -	-	72	Pheasant - - - -	10
Red-headed Woodpecker - - - -	-	70	Purple Finch - - - -	9
Hairy Woodpecker - - - -	-	65	Field Sparrow - - - -	9
Cardinal - - - -	-	63	Flicker - - - -	9
Bluebird - - - -	-	56	Herring Gull - - - -	9
Pheasant - - - -	-	53	Marsh Hawk - - - -	9
Field Sparrow - - - -	-	52	Fox Sparrow - - - -	8
Red-tailed Hawk - - - -	-	49	Pine Siskin - - - -	8
Snow Bunting - - - -	-	47	Meadowlark - - - -	8
Swamp Sparrow - - - -	-	45	Hermit Thrush - - - -	8
American Merganser - - - -	-	41	Horned Lark - - - -	7
Sparrow Hawk - - - -	-	38	Ring-billed Gull - - - -	7
Red-shouldered Hawk - - - -	-	37	Screech Owl - - - -	5
Winter Wren - - - -	-	29		
Savannah Sparrow - - - -	-	28		

*Includes Red-legged.

**Includes both species of Grackles.

Also Recorded in Winter

Rough-legged Hawk
 Long-eared Owl
 Cedar Waxwing
 Red-breasted Nuthatch
 Mourning Dove
 Sharp-shinned Hawk
 Cooper's Hawk
 Mallard
 Great Blue Heron
 Horned Grebe
 Pintail
 Black-crowned Night Heron
 Wilson's Snipe
 Killdeer
 Short-eared Owl
 Barred Owl
 Great Horned Owl
 Yellow-bellied Sapsucker
 Cowbird
 Redpoll
 Chipping Sparrow
 Northern Shrike
 Orange-crowned Warbler
 Pipit
 Carolina Wren
 Towhee

Also Recorded in Winter

Catbird
 Pine Grosbeak
 Red Crossbill
 Mockingbird
 Evening Grosbeak
 Goshawk
 Red-breasted Merganser
 Scaup (both species)
 Vesper Sparrow
 Saw-whet Owl
 Ruby-crowned Kinglet
 Quail
 Snowy Owl
 Lapland Longspur
 House Wren
 Arctic Three-toed Woodpecker
 Iceland Gull
 Glaucous Gull
 Black-backed Gull
 Brunnich's Murre
 American Golden-eye
 Duck Hawk
 Bald Eagle
 Dovekie
 Razor-billed Auk
 White-winged Crossbill
 Grand Total - - - - - 103

across it and parallel to the crest of the hill so that they were able to soar for a while across it but had to circle occasionally to get height or to change direction. Their actions were interesting. The Ospreys traveled in twos and threes and seemed to circle more than the others. I heard them calling twice. The Broad-wings would soar straight for a while then recover direction and continue and the falcons almost always seemed to be swooping down toward the trees at an angle. I believe they must rise and then coast down wind more rapidly than the others. They would go at least twice as fast as the larger hawks and would be over often on folded wings like a shot, making them hard to identify. The single Marsh Hawk was flying due north right overhead. The falcons, doves and some of the Broad-wings would be just over the trees, others of the Broad-wings very high up. Where do these birds spend the night? I did not see one *Accipiter*! I noticed the last Osprey at 7:27, Broad-wing at 7:35, and falcon at 7:43. With the increased wind the temperature fell considerably. I believe the crows were just local birds which were using the wind to fly on, as

they seemed to have no special direction, but I think the doves were migrating north along the ridge also."

In 1932 the wind was southwesterly and rather strong, the day clear, sunshiny and warm, an ideal day for a flight. The hawks flew both directly along over the ridge or circled and even went to the east of the house a few times.

It has been possible due to circumstances to get only fragments of the crow flights which appear later than the dates given by Trippett or Speer and my notes are quoted as follows:

"March 6, 1931—Crow flight along ridge. Fair day, wind light and near ground, stronger higher up as was blowing clouds rapidly from northwest. First noted 7:00 A.M. a great grey smoky cloud (snow flurry) which darkened sky. Instead of flying north along ridge into cloud crows became perturbed and 100 or so circled about together. There were always 10 to 100 in air at once going Still flying at 8:00 A.M. mostly on further side of ridge but Edwards who saw flight about 7 at Watchung Avenue and from the train said they were generally distributed as far east as West Arlington and mostly flying at height of about 1,000 feet or more. Had stopped by 8:30. None the next day. Estimated 6,000 to 10,000 crows today.

"March 18—Clear and fair with a light northwest wind. Counted crows on hill about 8 A.M.

2 Minutes	- - - - -	55
2 Minutes	- - - - -	51
1 Minute	- - - - -	36
—		—
Total—5 Minutes	- - - - -	142

I did not notice the flight till just as I was about to catch the train so have not the faintest idea how many there were.

"March 19—½ hour only 30.

"March 14, 1932—In 15 minutes between 7:15 and 7:30 I counted 103 crows flying north over the ridge, quite high, some almost out of sight, never more than 7 in sight at once. Overcast and chilly wind, light and just south of west. Flight continued only a short time.

"March 22, 1934—Noted 14 crows flying north along ridge today.

"April 1—338 noted in small groups flying rather high 8:20 to 9:10. Ground wind, light and south. Wind higher up northwest and stronger. rather rapidly at actual rate of 550 in 5 minutes as I watched through window.

"March 3, 1935—Counted 227 flying at rate of about 20 a minute in early morning. They approached the ridge from the east and south flying rather high but heading almost due north at the Heights. Wind northwest but light increasing later in day."

That the weather has a secondary influence on these flights there can be no doubt. As with the hawks the northwest wind at least higher up is a prerequisite.

That birds are quick to respond to environment is well evidenced by the partial, at times almost complete, draining of the Cedar Grove Reservoir due to drought. In a comparatively short time this area,

TABLE VI

*Spring Arrival Calendar—(Average Arrivals of Representative Species)
Essex County Only*

Feb. 26—Purple Grackle	May 3—Baltimore Oriole
Mar. 1—Bluebird	Catbird
Mar. 4—Red-wing	May 5—Chestnut-sided Warbler
Mar. 11—Fish Crow	Prairie Warbler
Mar. 12—Cowbird	Crested Flycatcher
Phoebe	May 6—Kingbird
Mar. 15—Woodcock	May 7—Rose-breasted Grosbeak
April 4—Hermit Thrush	Blackburnian Warbler
April 6—Ruby-crowned Kinglet	Scarlet Tanager
April 9—Chipping Sparrow	May 8—Magnolia Warbler
Yellow Palm Warbler	Black-billed Cuckoo
April 11—Yellow-bellied Sapsucker	May 9—Bobolink
April 13—Osprey	May 10—Red-eyed Vireo
April 17—Barn Swallow	May 11—Indigo Bunting
April 20—Towhee	May 12—White-crowned Sparrow
April 21—Brown Thrasher	Nighthawk
April 24—House Wren	Gray-cheeked Thrush
Broad-winged Hawk	Olive-backed Thrush
April 26—Black and White Warbler	May 13—Wood Pewee
Chimney Swift	May 20—Yellow-bellied Flycatcher
April 27—Green Heron	May 21—Olive-sided Flycatcher
Solitary Vireo	May 24—Mourning Warbler
Black-thr. Green Warbler	May 25—Alder Flycatcher
April 29—Whip-poor-will	
April 30—Yellow Warbler	50 (6-15 year average)
May 2—Ovenbird	1906-1931
Wood Thrush	

usually a resort of Kingfisher, Spotties, an occasional Killdeer or duck in season, was visited in 1929 also by Little Blue and Green Herons, both species of Yellow-legs, Least, Semipalmated and Solitary Sandpipers, Semipalmated Plover, and a Turkey Buzzard in search of the dead fish. Several of the above are the only records for the Montclair region in many years.

Fully as entertaining as the study of a limited local area is the attempt to locate the nests of our now rare and fast decreasing local raptors. The location of a Cooper's or a Sharp-shin or a local Red-shoulder Hawk or Barred Owl nest becomes an outstanding feature of the season, something to point out a year or two later or to visit often when the young are still about. Many a sad tale can be told of birds destroyed or nests deserted. My most enjoyable recent pleasure was finding in a few minutes, nests of Red-shoulder and Sparrow Hawk both with young, and seeing a Sharp-shin nearby in June not half a mile from the busy Pompton Turnpike.

In conclusion, the Essex County list stands at 283 forms and the Hudson County list at 235 forms; total 297 forms. That a few more will be added is certain. We still have a large number of possibilities such as Red-throated Loon, two scoters, European Teal, Snow Goose, Brant, Purple Gallinule, Little Black Rail, Swallow-tailed Kite, Philadelphia Vireo, Swainson's Hawk, either of the Brown-capped Chickadees, Bewick's Wren, Gray Kingbird, Arkansas Kingbird, Raven, Summer Tanager, and Cerulean Warbler which have been seen recently nearby or reported on questioned authority, not to mention some of the rarer accidentals. It is this that keeps up local systematic field work, perhaps this that prevents the banding or life history studies we ought to make. A fruitful source of added records is open to the student of old histories or rare books of travel in the early days of this part of our state. I must beg to differ with many who would exclude certain old or sight or even questioned records for experience shows that the authors of books even of a few years ago may err by leaning backwards. The status in "Birds of the New York Region" of the Forster's Tern, the Artic Three-toed Woodpecker, the Snowy Egret, the Nonpareil and the White Gyr Falcon are much to the point as all such species are established today after only a few years study.

It is just as much an error to omit a reasonable, unsupported record which may later be proved or supplemented as to include it in a list like this, for there will always be some who insist on making up their own minds anyway. I have tried to be sane throughout and to place the facts and authority before you, judge as you will.

TABLE VII

Excluding Introduced Species, Ten Most Typical Breeding Species as Nearly as Possible from Latest Breeding Counts

AREA 2

Salt Marsh (Brackish)

- | | |
|---------------------------|----------------------|
| 1. Long-billed Marsh Wren | 6. Swamp Sparrow |
| 2. Song Sparrow | 7. Killdeer |
| 3. Sharp-tailed Sparrow | 8. Spotted Sandpiper |
| 4. Red-wing | 9. Savannah Sparrow |
| 5. Meadowlark | 10. Bobolink |

AREA 3

Fresh Marsh of Newark-Hackensack
Meadows

- | | |
|---------------------------|-----------------------|
| 1. Swamp Sparrow | 6. Killdeer |
| 2. Long-billed Marsh Wren | 7. Fish Crow |
| 3. Song Sparrow | 8. Indigo Bunting |
| 4. Red-wing | 9. Yellow Warbler |
| 5. Northern Yellow-throat | 10. Florida Gallinule |

AREA 4

Upland

- | | |
|---------------------|----------------------------|
| 1. Robin | 6. Catbird |
| 2. Song Sparrow | 7. Blue Jay |
| 3. Chipping Sparrow | 8. Flicker |
| 4. House Wren | 9. Purple Grackle |
| 5. Wood Thrush | 10. Northern Yellow-throat |

AREA 5

Traprock Ridge Over 400 Feet

- | | |
|---------------------------|---------------------------|
| 1. Towhee | 6. Crow |
| 2. Robin | 7. Blue Jay |
| 3. Red-eyed Vireo | 8. Wood Thrush |
| 4. Ovenbird | 9. Chestnut-sided Warbler |
| 5. Northern Yellow-throat | 10. House Wren |

AREA 6

Passaic Valley Lowland

- | | |
|------------------|---------------------------|
| 1. Red-wing | 6. Yellow Warbler |
| 2. Song Sparrow | 7. Crow |
| 3. Swamp Sparrow | 8. Long-billed Marsh Wren |
| 4. Barn Swallow | 9. Northern Yellow-throat |
| 5. Robin | 10. Tufted Titmouse |

ANNOTATED LIST

(E=Essex County; H=Hudson County. Unless otherwise noted records are by the author.)

Loon (*Gavia immer immer*)

Uncommon transient.

E—Regular on Cedar Grove Reservoir; Nov. 24, 1932; April 3, 1931 to May 29, 1932. An unusual flight May 1 to 9 in 1930, over 60 birds, Montclair.

Holboell's Grebe (*Colymbus grisegena holboelli*)

Usually rare transient or winter visitant.

E—A few shot on the Passaic below Summit (H. H. Hann 1905, Stone, p. 39); Port Newark, March 3, 1929 (J. L. E.) to April 8, 1934 (R. F. H.); one on Newark Bay in breeding plumage July 8, 1934 (W. F. E. and G. C. Rose). Some seasons, as in 1934, flights occur in February and March.

Horned Grebe (*Colymbus auritus*)

Rare transient and winter visitant.

E—Port Newark, at times common on Bay, rare inland; Nov. 11, 1930, Montclair, to April 23, 1911, Branch Brook Park (L. S. K.).

H—Occasional on Passaic and Hackensack Rivers; Feb. 12, 1934, Hackensack River (L. S. K.) to April 18, 1934, Croxton Pond.

Pied-billed Grebe (*Podilymbus podiceps podiceps*)

Not common transient; formerly bred.

E—Not common transient, especially on Verona Lake and Cedar Grove Reservoir; April 5, 1925 (Mrs. C. S. H.) to April 17, 1927 (J. L. E.); Sept. 10, 1925 (Mrs. C. S. H.) to Nov. 23, 1930 (J. L. E.); Feb. 15, 1934, one caught in ice at Port Newark (L. S. K.). At Port Newark, now a migrant, formerly bred to 1908; on May 30, 1906, in spot now destroyed, Hann, Callender, and Abbott found 5 nests (Stone, p. 40).

H—Observed several times at swamp at foot of Bergen Hill in Jersey City about 1901 (Eugene Smith, Linnaean Abstract, 1900-1902, p. 16). Rare fall migrant, chiefly seen in Croxton Pond; Aug. 17, 1932 (J. L. E.) to Oct. 13, 1928.

Leach's Petrel (*Oceanodroma leucorhoa*)

H—One record at Hoboken, Nov. 3, 1861 (W. Cooper, Griscom, p. 85).

Wilson's Petrel (*Oceanites oceanicus*)

Rare summer visitant to New York Bay.

H—June 14, 1934 to Aug. 21, 1934, extreme dates; seen also 1910, 1913, 1914, 1915, chiefly August (all L. S. K.); Sept. 6, 1907 (Chapin).

Gannet (*Sula leucogaster leucogaster*)

Rare transient.

H—Newark Bay, Oct. 1, 1930 (C. A. U.) only record; seen near C. R. R. bridge, probably in both Hudson and Union Counties.

Double-crested Cormorant (*Phalacrocorax auritus auritus*)

Rare transient.

E—Two records at Port Newark: May 20, 1928 (C. A. U.), and Sept. 2, 1932 (J. Kuerzi and E. Mayr).

Great Blue Heron (*Ardea herodias herodias*)

Uncommon transient, rare in summer.

E—March 31, 1928 (W. R.) to May 11, 1913 (L. S. K.); June 16, 1929, June 20, 1912 (L. S. K.), July 4, 1935 (Knobloch) to Jan. 22, 1928.

H—Uncommon but regular migrant on meadows, April 8, 1927 (E. S. M.) to May 23, 1928 (L. S. K.); July 1, 1914 (E. S. M.) to Sept. 16, 1933.

American Egret (*Casmerodius albus egretta*)

Sometimes common summer visitant at Port Newark.

E—July 6, 1929 (C. C. Dauterman) to Oct. 1, 1933.

H—Rare summer visitant; July 7, 1935, Secaucus (J. L. E., R. T. Peterson, R. C., and W. F. E.) to Aug. 4, 1933, Snake Hill (J. L. E.)

Snowy Heron (*Egretta thula thula*)

Rare summer visitant.

E—Port Newark, July 23, 1933 (L. L. W.) to Sept. 3, 1930; Sept. 6 to 18, 1932, max. 12 (C. A. U., Proceedings of Linnaean Society, 1934, p. 84).

Louisiana Heron (*Hydranassa tricolor ruficollis*)

The rarest summer visitant heron.

E—July 26, 1933 (W. Kessler) to Aug. 25, 1930 (J. Kuerzi).

Little Blue Heron (*Florida caerulea caerulea*)

Regular, sometimes abundant, summer visitant.

E—July 3, 1933 (C. Brown) to Sept. 21, 1930 (R. C.).

H—Records in 1907 and 1923 (E. S. M.).

Green Heron (*Butorides virescens virescens*)

Not common summer resident.

E—April 13, 1927 (Montclair Bird Club) to Oct. 13, 1930 (Mrs. C. S. H.); nest and eggs, May 16, 1929 (W. R.) to June 30, 1893 (DeCoursey Cleveland).

H—Formerly bred, to 1920 (E. S. M.); May 15, 1927 to Aug. 12, 1928, Arlington (E. S. M.); Aug. 19, 1899, Greenville (Miller); July 2, 1929, Bellman's Creek (L. S. K.).

Black-crowned Night Heron (*Nycticorax nycticorax hoactli*)

Summer visitant; formerly bred.

E—Less common in summer than in spring and fall; present in summer but no recent nests; April 5, 1929 (E. S.) to Dec. 22, 1929 (J. L. E.); one bird Feb. 6, 1931 (Mrs. C. S. H.).

H—Formerly bred, Arlington (O. P. M.); July 7, 1935, Secaucus, to Dec. 24, 1929.

Yellow-crowned Night Heron (*Nyctanassa violacea violacea*)

Uncommon summer visitant, usually in immature plumage.

E—July 15, 1931 (C. A. U.) to Sept. 25, 1927, Port Newark (J. L. E.); Sept. 23, 1934, Branch Brook Park.

American Bittern (*Botaurus lentiginosus*)

Rare summer resident and transient.

E—March 25, 1928 (C. A. U.) to Dec. 21, 1930 (J. L. E.). Nest and eggs May 13, 1928 (E. S.).

H—Formerly bred, probably still does. One captured alive in airshaft in Jersey City, April 24, 1935 (H. Brady); April 14, 1935, May 11, 1931, one dead on meadows (L. S. K.); June 21, 1912 (L. S. K.); July 1, 1914, Arlington (E. S. M.) to Aug. 13, 1933.

Least Bittern (*Ixobrychus exilis exilis*)

Migrant and formerly a rare breeder.

E—May 15, 1934 (L. S. K.); nest and eggs May 19, 1929, Long Meadow (W. R.). At Port Newark bred up to 1916; May 30 to June 17, 1906, nests found by Hann and Callender (Stone, p. 100); migrants, July 23, 1933 to Sept. 12, 1934, when one with wounded wing was picked up in Belleville (B. S. Bowdish).

H—Probably breeds still in county; May 13, 1931, Croxton Pond and May 23, 1928, Saw Mill Creek (L. S. K.) to July 7, 1935 and a few September records when rail shooting (R. S. Lemmon).

Mute Swan (*Sthenelides olor*)

Introduced.

E—Two records: Oct. 15, 1932 (J. L. E.) and Dec. 15, 1929 (C. A. U.); captive birds released on Verona Lake, 1932, and Edgemont Lake, 1935.

H—Feb. 7, 1925, C. R. R. N. J. ferry, probably this species (C. A. U. and W. F. E.).

Whistling Swan (*Cygnus columbianus*)

Rare migrant.

H—De Vries (1639-42) reported swans on New York Bay with ducks and geese. (Eaton "Birds of New York.")

Canada Goose (*Branta canadensis canadensis*)

Uncommon transient, spring and fall.

E—Late March, 1922 (V. E. Gorman) to May 3, 1923 (Mrs. C. S. H.); Nov. 15, 1931 (Mrs. Fry) to early December (L. S. K.).

H—Nov. 21, 1920 (O. P. M.); more common in spring (R. S. Lemmon); De Vries (1639-42) recorded on New York Bay (Eaton "Birds of New York"); formerly in North Bergen ("History of Hudson County," Shaw) and formerly common transient at Arlington (Paulson); April 14, 1935 flock of 56 flying north at Fairview.

Mallard (*Anas platyrhynchos platyrhynchos*)

Migrant and rare breeder.

E—Migrant and rare breeder, at least formerly in Hatfield Swamp; March 1, 1935 (W. R.) to Dec. 26, 1931; fall arrival at Newark, Aug. 2, 1933 (C. A. U.) and Aug. 17, 1929; feral birds from Verona Lake now casual in summer and fall.

H—Recorded, Newark Bay (C. A. U.); reported formerly, rather late in fall (R. S. Lemmon, *Field and Stream*, Aug. 1932, p. 34).

Red-legged Black Duck (*Anas rubripes rubripes*)

Winter visitant.

E—March 1, 1935, Hatfield (W. R.); common in winter on Newark Bay; several records of birds seen or collected, Sept. 14 to Nov. 4, 1913 (L. S. K.)

Black Duck (*Anas rubripes tristis*)

Permanent resident and common transient.

E—Breeds and winters irregularly; the most common duck, but rare in Montclair region; May 13, 1928, nest and eggs, Caldwell (E. S.).

H—Permanent resident and regular breeder, but less often seen in winter on Hackensack; formerly more common but local increase at North Hudson Park; at times abundant on Newark Bay. Brood of young, June 3, 1932, North Hudson Park; Oct. 15, 1914, flock of 10, D. L. & W. ferry (L. S. K.).

Gadwall (*Chaulelasmus streperus*)

Rare migrant.

E—April 2, 1933 (R. F. H.) at Port Newark (Proceedings of Linnaean Society, 1934, p. 85).

European Widgeon (*Mareca penelope*)

Rare migrant.

E—One record at Port Newark, Jan. 6, 1929 (C. A. U.)

Baldpate (*Mareca americana*)

E—Few records on Newark Bay, March 1, 1935 (W. R.) to March 17, 1929 (C. A. U.); Sept. 9, 1928 and Oct. 7, 1934.

H—One record, March 21, 1931, Croxton Pond (J. L. E. and W. F. E.). Several records on upper Hackensack meadows (R. S. Lemmon).

Pintail (*Dafila acuta tsitzihoa*)

Regular transient, occasionally common in spring.

E—July 4, 1929 (C. A. U.) to Dec. 24, 1933; Feb. 4, 1928 (W. R.) to May 15, 1931 (C. A. U.).

H—March 28, 1934 (L. S. K.).

Green-winged Teal (*Nettion carolinense*)

Uncommon transient.

E—March 1, 1935 (W. R.) to May 29, 1846 (H. W. Herbert); Port Newark, Sept. 15, 1928 (J. Kuerzi) to Dec. 18, 1927 (C. A. U.).

H—One shot on Passaic at Arlington, 1904, by R. Belden (E. S. M.); also reported formerly (R. S. Lemmon) in *Field and Stream*, August, 1932, p. 34.

Blue-winged Teal (*Querquedula discors*)

Uncommon transient.

E—March 15, 1931 (C. A. U.) to May 11, 1928 (E. S.); Sept. 3, 1928 to Oct. 12, 1932 (J. L. E.).

H—One shot by Cyrus Belden, Arlington (E. S. M.), also reported in *Field and Stream*, August, 1932, p. 34; used to be common by Sept. 1 (R. S. Lemmon).

Shoveller (*Spatula clypeata*)

Rare.

E—Port Newark, Aug. 26, 1929 (R. C.) to Nov. 4, 1928 (C. A. U.).

Wood Duck (*Aix sponsa*)

Rare breeder.

E—Rare breeder in Caldwell area (at least formerly), March 1, 1935 (W. R.) to Dec. 24, 1932 (E. Pontecorvo).

H—Specimen in Paterson Museum reputedly shot on Hackensack meadows in September, 1822. R. T. Morris records it in winter on the Hackensack meadows (*Forest and Stream*, 1888); a few records (R. S. Lemmon). Not recorded by Medsger.

Redhead (*Nyroca americana*)

Rare migrant.

E—Feb. 11 to March 31, 1928 (E. S. and W. R.); Oct. 23, 1932 (Loomis).

H—Sometimes seen after northeast storms (R. S. Lemmon).

Ring-necked Duck (*Nyroca collaris*)

Occasional on reservoir; apparently increasing in spring.

E—March 25, 1933 (J. L. E.) to April 23, 1933.

Canvasback (*Nyroca valisineria*)

Not common.

E—Only 4 records—Cedar Grove Res., Nov. 9 and 16, 1930 (J. L. E. and W. F. E.); Port Newark, Feb. 12, 1928 (J. L. E.) and Feb. 15, 1934 (L. S. K.).

H—Reported formerly (*Field and Stream*, August, 1932, p. 34—R. S. Lemmon).

Greater Scaup (*Nyroca marila*)

Common migrant and winter visitant.

E—March 15, 1931 (C. A. U.) to May 9, 1931; Cedar Grove Res. (Montclair Bird Club).

H—Scaup (Sp.) common on New York and Newark Bays in fall and winter; Jan. 8, 1933 to March 16, 1927.

Lesser Scaup (*Nyroca affinis*)

E—Newark Bay, Oct. 31, 1920 to May 29, 1921 (C. A. U., "Birds of Union County"); June 17, 1906 (Hann and Callender, Auk, 1907).

American Goldeneye (*Glaucionetta clangula americana*)

Not common except at times in winter on Newark and New York Bays.

E—Dec. 23, 1927 (J. L. E.) to April 4, 1930 (J. L. E.).

H—Jan. 8, 1933, Black Tom.

Bufflehead (*Charitonetta albeola*)

Rare migrant.

E—Nov. 1, 1931 to Nov. 21, 1926 (J. L. E.); March 20, 1932 (J. L. E., W. F. E., Chaliff).

H—A few (R. S. Lemmon).

Old Squaw (*Clangula hyemalis*)

Rare winter visitant.

E—Feb. 15, 1934, Newark Bay (L. S. K.); April 16, 1930, Cedar Grove Res. (J. L. E.); Nov. 18, 1928 (J. L. E.) to Nov. 21, 1931 (Mrs. C. S. H.).

H—Taken in winter off Robbins Reef. Seen in taxidermist's shop by W. Rusling. Also, Oct. 22, 1913, Hoboken (L. S. K.).

Harlequin Duck (*Histrionicus histrionicus histrionicus*)

H—On Sept. 7, 1913, keeper of light at Ellis Island exhibited to L. S. K. skin of this bird which he claimed was killed hitting light.

White-winged Scoter (*Melanitta deglandi*)

Uncommon migrant.

H—From Erie ferry, Dec. 3, 1933, only record.

Ruddy Duck (*Erismatura jamaicensis rubida*)

Rare and decreasing.

E—April 23, 1915 (R. H. H.); Nov. 4, 1930 (J. L. E.) to Nov. 18, 1922 (Mrs. C. S. H.).

H—Recorded (R. S. Lemmon).

Hooded Merganser (*Lophodytes cucullatus*)

Uncommon migrant.

E—Not common; March 24, 1935; March 31, 1928, Caldwell area (E. S. and W. R.); and March 20, 1932, East Orange Watershed (W. F. E., J. L. E., and E. Chaliff).

American Merganser (*Mergus merganser americanus*)

Common migrant, sometimes winters.

E and H—On Newark Bay and inland on the Passic, Commonwealth, Cedar Grove Reservoir, etc.; winters some years, but more common in March; Nov. 24, 1932 to April 13, 1929 (W. R.).

Red-breasted Merganser (*Mergus serrator*)

Common migrant, sometimes winters.

E—Newark Bay, Commonwealth and Cedar Grove Reservoirs and Passaic River (winter); Oct. 23, 1932 to May 20, 1920 (J. L. E.).

H—Hackensack River, April 8, 1933.

Turkey Vulture (*Cathartes aura septentrionalis*)

Rare in east, uncommon in west of county.

E—March 25, 1922 (Mrs. C. S. H.) to May 16, 1932; Aug. 18, 1929 to Oct. 27, 1929 (W. R.).

H—Sept. 7, 1913, Secaucus, one found dead (L. S. K.).

Eastern Goshawk (*Astur atricapillus atricapillus*)

Rare winter visitor.

E—Dec. 6, 1934 (Mrs. C. S. H.); Dec. 13, 1896 (coll. by W. E. D. Scott) to March 13, 1928 (E. S.); only 7 records.

Sharp-shinned Hawk (*Accipiter velox velox*)

Permanent resident.

E—Permanent resident, rare as a breeder, not common in winter, but regular though decreasing migrant in numbers, spring and fall; May 11, 1928, nest and eggs (E. S.).

H—Regular migrant, rare in winter and probably formerly permanent resident; Sept. 6, 1925 (E. S. M.); January, 1929 (E. S. M.); Jan. 1, 1910, Westside Park (L. S. K.) to May 17, 1915 (E. S. M.).

Cooper's Hawk (*Accipiter cooperi*)

Permanent resident.

E—Permanent resident; rare in winter and uncommon breeder; nest and eggs, May 25, 1927 (W. R.).

H—Rare transient, probably formerly a permanent resident; Oct. 1, 1921 to April 18, 1916 and May 21, 1921, Arlington (E. S. M.).

Eastern Red-tailed Hawk (*Buteo borealis borealis*)

Winter visitant.

E—Formerly a resident, now only common as winter visitant. Last breeding record, nest and eggs, Caldwell, April 2, 1928 (W. R.). Only four nesting records, including set of eggs April 20, 1895, Short Hills, collected by De Courcey Cleveland in Hallinan collection, Paterson Museum; July 10, 1908 (L. S. K.); Sept. 5, 1922 (W. de W. Miller) to April 12, 1931.

H—Winter visitant on meadows, Oct. 15, 1921 to May 25, 1913 (E. S. M.)

Northern Red-shouldered Hawk (*Buteo lineatus lineatus*)

Permanent resident.

E—Formerly common breeder, now rare; rare in winter; Feb. 11, 1934 to Dec. 26, 1931; nest and eggs, March 29, 1928 (W. R.).

H—Formerly permanent resident, last probable breeding, 1915; now migrant; Sept. 12, 1914 to May 12, 1921 (E. S. M.); one dead, Dec. 26, 1925 (E. S. M.).

Broad-winged Hawk (*Buteo platypterus platypterus*)
Migrant.

E—At times common migrant, rare in summer; April 15, 1934 to Sept. 27, 1930 and 1931.

H—Uncommon migrant; Sept. 20, 1910 (L. S. K.) and Sept. 20, 1921 (E. S. M.); April 23, 1922, Arlington (E. S. M.).

American Rough-legged Hawk (*Buteo lagopus s. johannis*)
Migrant and winter visitant.

E—Not common; Nov. 2, 1930 to Feb. 7, 1925.

H—Regular, sometimes common, in migration and winter on meadows; Oct. 19, 1934 to April 14, 1935.

Golden Eagle (*Aquila chrysaetos canadensis*)
Rare migrant.

E—Several records and reported specimens all old but one; May, 1865 (T. M. Trippe, *American Nature*, 1874, p. 346); Nov. 25, 1934, one seen along Passaic meadows near Dickinson's Neck (E. Chaliff).

Southern Bald Eagle (*Haliaeetus leucocephalus leucocephalus*)
Rare migrant.

E—Now rare, formerly seen more often in migration; Oct. 7, 1928 (J. L. E.) to April 26, 1930 (J. Q. Adams).

Marsh Hawk (*Circus hudsonius*)
Permanent resident.

E—Permanent resident, regular at Port Newark, rare elsewhere except as a migrant.

H—Rare permanent resident on Hackensack meadows; more common in spring and fall as migrant.

Osprey (*Pandion haliaetus carolinensis*)
Migrant; occasional in summer.

E—April 1, 1928 (J. L. E.) and April 1, 1935 to Oct. 9, 1932; uncommon in summer but not known to breed.

H—Now rare transient; formerly regular migrant along Passaic at Arlington (C. E. Paulson); April 24, 1929; Aug. 16, 1898, Newark Bay (W. de W. Miller) to Oct. 22, 1933 [nest on Overpeck in Bergen County to 1898, R. S. Lemmon].

Duck Hawk (*Falco peregrinus anatum*)
Migrant.

E—Uncommon migrant, rare in winter; Sept. 3, 1928 to May 11, 1929 (J. L. E.).

H—Nov. 11, 1931 (J. L. E.) to Nov. 23, 1928; March 28, 1934 (L. S. K.) to May 17, 1920. (E. S. M.).

Eastern Pigeon Hawk (*Falco columbarius columbarius*)
Migrant.

E—Less often seen than preceding species; April 4, 1909 (R. H. H.) to May 11, 1912 (L. S. K.); July 21, 1935 (L. L. W. and R. T. Peterson) to Sept. 29, 1928.

H—Medsger reports one taken in heneoop, Arlington; Sept. 13, 1931, Secaucus (J. L. E.) to Oct. 23, 1915, Westside Park (L. S. K.).

Eastern Sparrow Hawk (*Falco sparverius sparverius*)
Permanent resident.

E—Uncommon breeder and permanent resident; nest and young, June 15, 1910 (L. S. K.).

H—Very rare breeder and permanent resident.

Ruffed Grouse (*Bonasa umbellus umbellus*)
Extirpated.

E—No longer found; last records, Caldwell, March 11, 1927 (E. S.); Montclair, Feb. 1, 1928 (Mrs. Abbott); Orange, Feb. 15, 1925 (C. A. U.).

H—Formerly in North Bergen township, before 1887 ("History of Hudson County"). [In Bergen County east of Englewood till about 1910, R. S. Lemmon.]

European Partridge (*Perdix perdix perdix*)
Introduced but extirpated.

E—Introduced in West Caldwell, bred, but killed off a few years ago (1932), (former Warden, Fred Hall).

Eastern Bob-white (*Colinus virginianus virginianus*)

Uncommon permanent resident and decreasing despite artificial plantings.

E—Two records at Port Newark, fall 1934 (L. S. K.). So far as now known a rare breeder in only one or two places. Last record (Orange region), Dec. 24, 1932 (Chaliff); Montclair, July 7, 1929, until stocked April, 1935, by the Montclair Bird Club.

H—Formerly bred in West Hoboken and North Bergen ("History of Hudson County"), formerly bred at Arlington; last record July 16, 1928 (E. S. M.).

Florida Bob-white (*Colinus virginianus floridanus*)
Introduced; now extirpated.

E—Specimen taken by Herrick at Chatham (now in Springfield, Mass., Museum) probably Dickenson's Neck, Nov. 26, 1871, indicates their planting many years ago.

Ring-necked Pheasant (*Phasianus colchicus torquatus*)
Permanent resident—introduced 1897

E—Permanent resident and rare breeder; June 8, 1927, nest and 14 eggs (W. R.).

H—Very rare permanent resident; still breeds at Arlington; nest and eggs, May 1, 1920 (E. S. M.).

Whooping Crane (*Grus americana*)

H—De Vries (1639-1642) reports with swans, ducks and geese on New York Bay (Eaton's "Birds of New York").

King Rail (*Rallus elegans*)

Formerly bred, rare migrant.

E—Nest down river from Summit, 1895 (Littlejohn, Stone, p. 110); May 13, 1928 (E. S.) and May 13, 1923 (Mrs. C. S. H.)

H—A few records in fall (R. S. Lemmon.)

Northern Clapper Rail (*Rallus longirostris crepitans*)

Rare breeder and migrant.

E—Port Newark, formerly bred; no recent records except as migrants until June, 1935, when this species became re-established on the only piece of undrained marsh suitable (C. A. U.).

H—1901, observed by Eugene Smith in March at foot of Bergen Hill, Jersey City (Linnaean Abstract, 1900-1902, p. 16).

Virginia Rail (*Rallus limicola limicola*)

Rare breeder.

E—April 23, 1929 (W. R.) to Sept. 24, 1933; now rare breeder; nest and eggs, May 17, 1927 (W. R.)

H—Formerly bred, Arlington to 1927 (E. S. M.); rare fall migrant when rail shooting (R. S. Lemmon). Still breeds on meadows, March 26, 1927 to July 29, 1931.

Sora Rail (*Parzana carolina*)

Formerly rare breeder.

E—April 2, 1933 (R. F. H.) to Sept. 24, 1933 (W. F. E. and J. L. E.); nest and eggs, May 15, 1929 (W. R.).

H—Arlington, probably a former breeder to June 28, 1919 (E. S. M.); Greenville, Aug. 19, 1899 (Miller); Saw Mill Creek, May 23, 1928 (L. S. K.); May 6, 1920 (E. S. M.) to Oct. 22, 1933; Fairview; formerly abundant in fall flights (R. S. Lemmon); may still breed in meadows but no recent proof.

Yellow Rail (*Coturnicops noveboracensis*)

E and H—Herrick reports 4 to 5 specimens shot on meadows near Dickinson's place; 2 specimens in collection labeled "about 1875" (Linnaean Society meeting, Nov. 2, 1878) (*Forest and Stream*, XII, 1879, p. 165); a female in Herrick's collection now in Springfield Museum, dated Sept. 17, 1877, Madison, N. J.

Florida Gallinule (*Gallinula chloropus cachinnans*)

Migrant.

E—Now extirpated as a summer resident at least in its former haunts at Long meadow and Port Newark; nest and eggs, May 16, 1926 (W. R.) to July

1, 1905 (Abbot, Hann, and Callender, *Auk*, 1907, p. 1-11); April 26, 1929 (W. R.) to Sept. 20, 1931 (J. L. E.).

H—Formerly bred in Kearney (O. P. M.); still breeds at Secaucus, Croxton Ponds, and Fairview, June, 1922 (Griscom) to Oct. 11, 1931 (M. Rich); specimen in hotel at Homestead.

Coot (*Fulica americana americana*)

Rare migrant.

E—Now a rare transient to Nov. 13, 1932 (Loomis); formerly bred at Port Newark; nest, May 30, 1907 (Abbot, *Auk* 1907, p. 436).

H—April 26, 1933, Croxton (J. L. E.) to May 12, 1920 (E. S. M.); Oct. 28, 1905 (E. S. M.); 1901, observed by Eugene Smith in marshy spot at foot of Bergen Hill, Jersey City (Linnaean Abstract, 1900-1902, p. 16).

Piping Plover (*Charadrius melodus*)

Rare migrant.

E—April 4, 1930 (R. C.) to May 20, 1928 (C. A. U.); Aug. 10, 1927 (C. A. U.).

Semipalmated Plover (*Charadrius semipalmatus*)

Common migrant.

E—Rare inland; second shorebird in abundance at Port Newark; May 12, 1934 (C. A. U.) to May 31, 1930 and 1931 (J. L. E. and C. A. U.); June 27, 1933 (C. A. U.) to Oct. 23, 1932.

H—May to June 17, 1932, at Secaucus (M. Rich); July 26, 1931 to Aug. 13, 1933.

Killdeer (*Oxyechus vociferus vociferus*)

Permanent resident.

E—Permanent resident, rare in winter; has increased in last 25 years; Feb. 10, 1935 (D. Wilson); Jan. 15, 1933; Dec. 28, 1931 (L. S. K.); Jan. 1, 1935; young able to run, May 4, 1930. Migrants, July 3, 1931 (C. A. U.)

H—Regular summer resident at suitable places; March 6, 1910 (L. S. K.) to Oct. 8, 1919 (E. S. M.).

Golden Plover (*Pluvialis dominica dominica*)

Irregular migrant.

E—At times frequent transient in fall at Port Newark, Aug. 23, 1933 to Nov. 12, 1932 (C. A. U.).

H—One reported shot on Hackensack meadows (L. S. K., *The Oologist*, February, 1931, No. 525, p. 25); Sept. 13, 1931, several seen (by J. L. E., Herbert and Kassoy) at Secaucus.

Black-bellied Plover (*Squatarola squatarola*)

Common transient, one winter record.

E—Port Newark, May 8 to June 8, 1929; July 27, 1930 (J. L. E.) to Nov. 18, 1928 and Jan. 6, 1935 (C. A. U.).

H—Secaucus, Sept. 13, 1931 (J. L. E., R. Herbert, and I. Kassoy).

Ruddy Turnstone (*Arenaria interpres morinella*)

Uncommon migration.

E—Port Newark, not common, Aug. 22, 1928 to Oct. 6, 1929 (C. A. U.).

H—Secaucus, Aug. 11, 1932 (W. F. E. and J. L. E.) and Aug. 14, 1932 (J. L. E.).

Woodcock (*Philohela minor*)

Breeds.

E—Feb. 27, 1930 (W. R.) to Nov. 28, 1929; nest and young, May 11, 1929 (W. R.); young, May 12, 1934 (D. Wilson).

H—Formerly found in West Hoboken and nested in Arlington to about 1910 (O. P. M.); seen May 11, 1927 (E. S. M.); March 26, 1927 to Nov. 15, 1920 (O. P. M.).

Wilson's Snipe (*Capella delicata*)

Irregular migrant.

E—Formerly abundant on Great Piece Meadows and formerly bred on Dick-inson's Neck, March 25, 1928 (E. S.) to May 7, 1935 (L. S. K.) and May 26, 1910 (L. S. K.) at Bloomfield; Sept. 3, 1928 to Dec. 2, 1928 (C. A. U.); also Feb. 11, 1934; Feb. 10, 1935 (D. Wilson) and Feb. 17, 1935 (W. F. E. and J. L. E.), all at Bloomfield.

H—Much less common than formerly; recorded in West Hoboken; March 26, 1927 to April 11, 1920 (E. S. M.); formerly shot commonly in fall and spring, March 10-April 30 (R. S. Lemmon). Specimens in hotel at Homestead.

Hudsonian Curlew (*Phaeopus hudsonicus*)

Rare migrant

E—Port Newark, July 23, 1930 (C. A. U.) to Aug. 29, 1927 (J. L. E.).

Upland Plover (*Bartramia longicauda*)

Migrant

E—Port Newark, July 11, 1928 (C. A. U.) to Sept. 25, 1927 (J. L. E.). Specimen in Herrick collection labeled Passaic meadows, September, 1871.

Spotted Sandpiper (*Actitis macularia*)

Breeds.

E—Common migrant and breeder; April 20, 1930 (W. R.) to Sept. 25, 1932; nest, June 12, 1906, with 3 young and 1 unbroken egg (L. S. K.)

H—Occurs in suitable localities; formerly bred in Arlington (O. P. M.); May 6, 1929 to Sept. 17, 1927 (E. S. M.).

Eastern Solitary Sandpiper (*Tringa solitaria solitaria*)

Common migrant.

E—Regular migrant inland; less common at Port Newark; April 28, 1929 to May 31, 1934 (L. S. K.); July 11, 1934 (C. A. U.) to Sept. 30, 1933 (C. A. U.).

H—Regular in fall at Secaucus, July 16, 1932 to Oct. 30, 1931 (J. L. E.).

Willet (subsp.?) (*Catoptrophorus semipalmatus*) [*semipalmatus* or *insinatus*]
Uncommon migrant.

E—Port Newark, May 15, 1934 (L. S. K.); July 21 to Sept. 29, 1929 (C. A. U.); no collected specimens from our area.

Greater Yellow-legs (*Totanus melanoleucus*)
Common migrant.

E—Rare inland; common at Port Newark, March 31, 1933 (C. A. U.) to May 30, 1931; June 27, 1933 (C. A. U.) to Nov. 30, 1933 (C. A. U.).

H—Regular transient (Griscom, "Birds of New York City Region"); May 9, 1920 (E. S. M.) to May 30, 1934; also fall.

Lesser Yellow-legs (*Totanus flavipes*)
Abundant fall migrant; rare spring migrant.

E—Rare inland and in spring; abundant in fall at Port Newark; April 30, 1931 to May 13, 1934 (C. A. U.); June 27, 1933 (C. A. U.) to Nov. 5, 1932 (C. A. U.).

H—Very rare in spring (Griscom, "Birds of New York City Region"); second fall migrant in abundance at Secaucus; July 8, 1934 to Sept. 10, 1935.

American Knot (*Calidris canutus rufus*)
Rare migrant.

E—Port Newark, May 30 and 31, 1930 (J. L. E.); Aug. 17, 1930 (Herbert) to Oct. 1, 1933.

Pectoral Sandpiper (*Pisobia melanotos*)
Common migrant.

E—Port Newark, July 14, 1932 and July 14, 1934 (C. A. U.) to Nov. 6, 1934 (C. A. U.).

H—Fourth shorebird migrant in numbers at Secaucus; July 16, 1932 to Aug. 11, 1932.

White-rumped Sandpiper (*Pisobia fuscicollis*)
Common migrant at times.

E—Port Newark, May 30, 1930 and 1931 (J. L. E.); July 2, 1933 (C. A. U.) to Nov. 11, 1933 (C. A. U.).

H—Probably occurs at Secaucus; no positive record.

Baird's Sandpiper (*Pisobia bairdi*)
Rare migrant.

E—Port Newark, 7 records in 1933, Aug. 30 (C. A. U.) to Oct. 7 (Breslau and Sedwitz).

Least Sandpiper (*Pisobia minutilla*)
Common migrant.

E—April 20, 1929 (Wolfarth) to May 31, 1930 (C. A. U.); June 23, 1934 (C. A. U.) to Nov. 4, 1933 (C. A. U.).

H—Third migrant shorebird in abundance at Secaucus; May 27, 1930, Harrison; July 7, 1935 to Sept. 10, 1935, Secaucus.

Red-backed Sandpiper (*Pelidna alpina sakhalina*)

Common migrant.

E—Port Newark, Oct. 1, 1933 to Nov. 30, 1933 (C. A. U.); occurs in spring but no county records at hand.

Eastern Dowitcher (*Limnodromus griseus griseus*)

Common migrant.

E—Port Newark, May 7, 1935 (L. S. K.) to May 30, 1930 (C. A. U.); June 21, 1935 (C. A. U.) to Oct. 29, 1933 (C. A. U.).

H—Secaucus, July 26, 1931, flock of 15.

Long-billed Dowitcher (*Limnodromus griseus scolopaceus*)

Very rare and no collected specimens.

E—Port Newark, Sept. 9 to 30, 1933, several sight records (C. A. U.).

Stilt Sandpiper (*Micropalama himantopus*)

More common migrant than formerly supposed.

E—Port Newark, July 7, 1934 (C. A. U.) to Oct. 12, 1934 (G. Rebell).

H—Secaucus, Sept. 5, 1931 (J. L. E.).

Semipalmated Sandpiper (*Ereunetes pusillus*)

Most abundant shorebird; some recent decrease.

E—May 12, 1929 (J. L. E.) to May 31, 1930 (C. A. U.); July 7, 1931 to Nov. 9, 1930 (L. L. W.).

H—Commonest migrant at Secaucus; May 27, 1934, Harrison, to June 17, 1932, Secaucus (M. Rich); July 16, 1932 to Sept. 10, 1935.

Western Sandpiper (*Ereunetes maurii*)

At times common migrant; more frequently identified than formerly.

E—Port Newark, July 14, 1934 (C. A. U.) to Oct. 17, 1934 (L. S. K.).

H—Regular transient at Secaucus; July 26, 1931 to Aug. 30, 1931 (J. L. E.).

Buff-breasted Sandpiper (*Tryngites subruficollis*)

Very rare migrant, but recorded nearly every fall.

E—Port Newark, Sept. 6, 1931 (I. Kassoy and R. Herbert) to Oct. 9, 1932 (J. L. E.).

Marbled Godwit (*Limosa fedoa*)

Very rare migrant.

E—Port Newark, Aug. 22 to Sept. 1, 1928 (J. L. E.); Sept. 15 and 18, 1929 (Herbert, Hickey, and Kassoy).

Hudsonian Godwit (*Limosa haemastica*)

Very rare.

E—Port Newark, July 3, 1925, in breeding plumage (C. A. U.); Aug. 31 (R. Friedman) to Oct. 13, 1928 (J. L. E.).

Ruff (*Philomachus pugnax*)

H—A specimen in the Jersey City Museum may have been taken in the county but positive data are lacking.

Sanderling (*Crocethia alba*)

Not common migrant.

E—Port Newark, May 14, 1935 (L. S. K.); July 22 to Oct. 22, 1928 (C.A.U.).

H—Specimen in collection of mounted birds at Secaucus reported shot in vicinity.

Avocet (*Recurvirostra americana*)

E—Port Newark, 1932. Three birds seen by many observers, Sept. 15 to Oct. 4, reported as remnant of flock of 12 (C. A. U.).

Red Phalarope (*Phalaropus fulicarius*)

Rare migrant.

E—Port Newark, one record, May 12, 1934 (C. A. U.).

H—Dr. Abbot (1868) records one shot on the Hackensack, June 27, 1863 (Stone, p. 117).

Wilson's Phalarope (*Steganopus tricolor*)

Rare but seen more frequently than formerly.

E—Port Newark, Sept. 1, 1930 (C. A. U.) to Oct. 8, 1932 (C. A. U.); only one spring record, May 12, 1934 (C. A. U.).

H—Secaucus, Sept. 13, 1931 (J. L. E., R. Herbert, and I. Kassoy).

Northern Phalarope (*Lobipes lobatus*)

Rare migrant.

E—Port Newark, Aug. 23, 1933 (C. A. U.); Aug. 27 and Sept. 15, 1929 (R. Herbert); Sept. 10, 1933 (Hickey); Sept. 18, 1934 (J. L. E. and J. R. Kuerzi, *Bird-Lore*, p. 370, Vol. XXXVI).

Pomarine Jaeger (*Stercorarius pomarinus*)

E—H. Herrick writes (*Forest and Stream*, XII, 1879, p. 165, paper read before Linnaean Society, Nov. 2, 1878) "Will Dickinson shot an immature specimen of the genus *Stercorarius* probably *pomatorhinus* (now *pomarinus*) in a freshet on meadows after a storm in October, 1876."

H—This species also reported in New York Harbor, Oct. 23, 1932, by Breslau and Sedwitz (Proceedings of Linnaean Society, Abstract, May, 1934, p. 69).

Glaucous Gull (*Larus hyperboreus*)

Rare winter visitant.

E—I, at Port Newark, Feb. 5, 1928 (C. A. U.).

H—Several killed on lower Hudson (Chapman); more common from Ferries than Iceland Gull: Nov. 21, 1928 to May 4, 1933 (J. L. E.) from Erie Ferry.

Iceland Gull (*Larus leucopterus*)

Irregular winter visitant.

E—Frequent records at mouth of Bound Creek, Newark Bay, Jan. 15, 1922 to April 10, 1927 (C. A. U.).

H—Rare on Hudson River; Erie Ferry, Dec. 9, 1933 to Jan. 19, 1935 (J. L. E.).

Kumlien's Gull (var. *Larus leucopterus* x *Larus argentatus thayeri*)

H—Jan. 2, 1935, Staten Island ferry near Governor's Island (Peterson and Allen).

Great Black-backed Gull (*Larus marinus*)

Winter visitant—chiefly in very cold weather; much more common than before, winter 1934-1935.

E—Port Newark, Jan. 23, 1925 to March 5, 1923 (C. A. U.).

H—More common on Hudson-Erie Ferry; Dec. 2, 1915, Ellis Island (L. S. K.) to March 5, 1932, Erie Ferry.

Herring Gull (*Larus argentatus smithsonianus*)

Abundant except in summer.

E—At Port Newark and on lower Passaic River abundant in fall and winter, less so in spring; generally absent in early summer; July 23, 1933 to May 30, 1931; inland, Nov. 29, 1931 and 1934 to May 21, 1929 (W. R.); but more regular, Dec. 22, 1929 (E. S. and W. R.) to April 5, 1931.

H—Abundant on Hudson, September to April, inclusive; immatures or non-breeding birds less commonly seen from ferries, May to August; formerly less common. W. deW. Miller extreme old dates, Oct. 27, 1898 to May 11, 1901; none in summer. Full adult birds last noted April 29, 1930, and first noted July 3, 1935, Erie Ferry. Rather irregular on Hackensack and Passaic Rivers except in summer when birds in any plumage are rare. Their habits and sight frequency are governed by the tide.

Ring-billed Gull (*Larus delawarensis*)

Irregularly common, fall, winter and spring.

E—Port Newark, sometimes more abundant than formerly in fall and winter; not seen inland except one record at Weequahic Park; July 6, 1935 (J. L. E.) to May 30, 1931; various June records (C. A. U.).

H—Rather rare on Hudson but more common on Newark Bay and Hackensack River; Sept. 11 to June 8, 1931.

Laughing Gull (*Larus atricilla*)

Locally abundant summer and fall.

E—Port Newark, abundant in late summer, July 16, 1931 to December; rare in spring, April 2, 1933 (Haulenbeek) to June 8, 1929.

H—Common in fall on Hudson after 1921; formerly on Passaic (E. S. M.), less often in spring; April 22 to June 8, 1931. First re-established spring observa-

tion, May 7, 1922 (W. deW. Miller). Average fall Hudson River last date, Nov. 21 (9 years); July 5, 1932 to Nov. 30, 1935.

Bonaparte's Gull (*Larus philadelphia*)

Irregularly common or abundant.

E—Port Newark, irregular, sometimes common to abundant; July 30, 1932 to May 30, 1930 (C. A. U.).

H—On Hudson more irregular than other gulls, at times unseen; often abundant in December and January; July 26, 1934 (L. S. K.) to May 6, 1929 (J. P. Chapin). On Hackensack, Nov. 3 to April 18, 1934.

Little Gull (*Larus minutus*)

E—Port Newark, one bird with Bonaparte's Gulls, May 12, 1929 (J. L. E., W. F. E., and J. Thompson, Auk, Vol. XLVI, No. 3); also seen May 14 (C.A.U.).

H—New York Bay, May 7 and 8, 1933 (Chapin and Rich); May 6, 1929 (J. P. Chapin, Auk, Vol. XLVI, No. 43). Seen west of Governor's Island from Staten Island Ferry, probably same bird as Essex County record; seen both times with adult Bonaparte's Gulls.

Atlantic Kittiwake (*Rissa tridactyla tridactyla*)

H—Hudson River, May 4, year not recorded (C. A. U.).

Gull-billed Tern (*Gelochelidon nilotica aranea*)

H—L. S. Kohler reports on Sept. 7, 1913—"light house keeper at Ellis Island exhibited specimens of two terns killed by hitting light in late August; I believe they were later mounted by Hofman in Brooklyn."

Forster's Tern (*Sterna forsteri*)

Irregular migrant.

E and H—Newark Bay, seen irregularly in fall 1925, 1928, 1929, 1930, 1932, 1934, 1935; Aug. 18, 1929 to Nov. 2, 1930 (C. A. U.).

Common Tern (*Sterna hirundo hirundo*)

E—Newark Bay, regular migrant spring and fall but rare in spring; Aug. 4, 1927 (J. L. E.) and 1935 to Sept. 18, 1932.

H—Frequent on Hudson River; most common late August; April 19, 1932 (M. Rich); May 14, 1929; July 29 to Oct. 22, 1922, from C. R. R. of N. J. Ferry (W. deW. Miller).

Roseate Tern (*Sterna dougalli dougalli*)

Rare migrant.

E—Port Newark, one record only, Sept. 21, 1924 (C. A. U.).

Least Tern (*Sterna antillarum antillarum*)

Rare migrant.

E—Three records only; May 15, 1929 (R. F. H.); Aug. 5, 1933 (L. L. W.); Aug. 7, 1933 (R. Herbert and C. Farley).

Caspian Tern (*Hydroprogne caspia imperator*)

Rare migrant.

E—Port Newark, one record, May 20, 1928 (J. L. E.).

H—Bedloe's Island, N. Y. Bay, 2 seen Oct. 9, 1934 (L. S. K.).

Black Tern (*Chlidonias nigra surinamensis*)

E—Branch Brook Park, May 10, 1916 (L. S. K.); Port Newark, May 25, 1930 (J. L. E.) and May 29, 1932 (C. A. U.); Aug. 4, 1927 (J. L. E.) to Oct. 6, 1906 (W. deW. Miller).

H—Common on Hudson some years in late August and September; July 26, 1934 (L. S. K.) to Sept. 21, 1925 (W. de W. Miller).

Black Skimmer (*Rynchops nigra nigra*)

E—Port Newark, one record, Aug. 29, 1928 (C. A. U.).

Razor-billed Auk (*Alca torda*)

Rare migrant.

H—Two from Central R. R. of N. J. ferry, Dec. 5, 1926 (C. A. U.).

Brunnich's Murre (*Uria lomvia lomvia*)

Rare migrant.

E—Orange Reservoir, Dec. 24, 1899 (Babson; see Stone, p. 45).

H—On Jan. 14, 1929, C. A. U. saw one from the Central Railroad of N. J. ferry on the Hudson, and on Jan. 16 probably the same bird from the Erie ferry (W. F. E.).

Dovekie (*Alle alle*)

Accidental visitant.

E—Flight, blown in by storm, Nov. 19 and 20, 1932; live specimens picked up in Glen Ridge, Caldwell (Carrington Howard); Bloomfield, 3 (W. A. Young), specimen sent to American Museum; at least one bird released alive in Newark Bay (W. F. E.).

H—One seen from Central R. R. of N. J. ferry on Hudson, Nov. 20, 1932 (C. A. U.).

Rock-dove (*Columba livia livia*)

Feral.

E—Common permanent resident.

H—Common permanent resident.

Eastern Mourning Dove (*Zenaidura macroura carolinensis*)

Permanent resident.

E—Permanent resident, less common in winter; has probably increased in last 25 years; nest and eggs, March 20, 1921 (O. P. M.) to July 8, 1934, young in nest; earliest spring arrival, Feb. 28, 1933 (Mrs. Greene).

H—Still a summer resident; April 8, 1935 to July 26, 1931.

Passenger Pigeon (*Ectopistes migratorius*)

Extinct.

E—Formerly an abundant migrant (see text).

H—Formerly in Union township (Shaw's "History of Hudson County").

Carolina Paroquet (*Conuropsis carolinensis carolinensis*)

Believed extinct.

E—Albert Emmet Hedden, father-in-law of Harry Peck Havell of East Orange, reported that Carolina Paroquets appeared in his father's orchard in the "eighteen fifties." They did considerable damage to the apples, picking out the seeds, and were regarded as destructive pests. They flew about in little flocks and were seen during several hot summers.

Yellow-billed Cuckoo (*Coccyzus americanus americanus*)

Not common breeder.

E—May 12, 1912 (L. S. K.) to Oct. 13, 1924 (Mrs. C. S. H.); not common breeder; nest and 3 eggs, June 2, 1907 (L. S. K.).

H—May 6, 1929 to Oct. 8, 1919 (E. S. M.); formerly bred to 1920, Arlington (E. S. M.); nest and eggs, July 7, 1912, Kearney (L. S. K.).

Black-billed Cuckoo (*Coccyzus erythrophthalmus*)

Not common breeder.

E—May 11, 1897, G. H. Swezey (specimen in Newark Museum); May 11, 1929 to Oct. 2, 1931 (J. L. E.); not common breeder; nest and eggs, May 21, 1928 (E. S.).

H—May 11, 1927 (E. S. M.) to Sept. 17, 1933; Arlington, formerly bred to 1919 (E. S. M.); nest in trees along Sawmill Creek, 1930 (J. L. E.).

Barn Owl (*Tyto alba pratincola*)

Still breeds rarely.

E—Bred and raised 2 young in St. Paul's Church, Newark, 1934 (W. E. Dillon); formerly bred up to 1920. Now appears to be chiefly a wanderer; March 12, 1935 to May 20, 1929 (W. R.); Oct. 14, 1932 to Nov. 30, 1928 (W. R.).

H—Two records at Arlington Cemetery; Oct. 30, 1932 and Oct. 28, 1933. Akhurst (1878) reports as seen frequently about Snake Hill (E. P. Bicknell, Bulletin, Nuttall Ornithological Club III, 1878, p. 132).

Eastern Screech Owl (*Otus asio naevius*)

Permanent resident.

E—Generally distributed permanent resident; often heard but rarely seen; nest, April, 1905 (L. S. K.); young, May 7, 1928 (E. S.) to June 28, 1933, just able to fly.

H—Permanent resident, 1929 (O. P. M.); Aug. 2, 1910, Arlington Cemetery (L. S. K.). "Aug. 17, 1913—one dropped to deck of Str. Monmouth near Robbins Reef to rest in its flight from Greenville to Brooklyn. It quickly took flight at being approached and soon made the Brooklyn side of the Bay—red phase" (L. S. Kohler).

Great-horned Owl (*Bubo virginianus virginianus*)

Permanent resident.

E—Permanent resident, formerly bred; may still now; rare, most often seen in winter; nest, March 4, 1903 (Callender); last summer records, July 2, 1917 (R. H. H.) and June 10, 1934.

Snowy Owl (*Nyctea nyctea*)

Rare in winter.

E—Rare, except in winters of big flights; recorded three winters in last 20. Nov. 12, 1926 to April 1, 1922 (C. A. U.).

H—One record on Hackensack meadows (R. H. H.).

American Hawk-owl (*Surnia ulula caparoch*)

E—Specimen in Dickinson collection reported by Larue K. Holmes in 1904 as taken on the property.

Northern Barred Owl (*Strix varia varia*)

Permanent resident.

E—Permanent resident, less common than formerly; one egg, March 1, 1935 (E. S.); full clutch, March 29, 1929 (L. S. K.) to April 8, 1907 (F. Merriam).

H—Winter only; one in a hemlock tree at Arlington, Jan. 26 to March 10, 1925 (E. S. M.); Jan. 1, 1910, Westside Park (L. S. K.).

Short-eared Owl (*Asio flammeus flammeus*)

Permanent resident.

E—Maximum 11 on Jan. 27, 1935; rare resident on Newark meadows; often seen in winter. One picked up dead in Branch Brook Park, Dec. 6, 1931, and remains of one killed in Hatfield Swamp found Jan. 3, 1935 (Wolfarth).

H—Winters on meadows and migrates; no summer records; Oct. 30, 1932 to March 13, 1931.

Long-eared Owl (*Asio wilsonianus*)

Uncommon in winter; rare breeder.

E—No positive breeding evidence until nest with sitting bird found March 18, 1935 (W. R.); winters; most common in February; Dec. 19, 1919 (R. F. H.) to April 22, 1911 (R. H. H.).

H—Winter visitant, formerly more common at Arlington; Roost of 12, Feb. 29, 1920 (O. P. M.); Nov. 12, 1922 (E. S. M.) to March 21, 1920 (E. S. M.).

Saw-whet Owl (*Cryptoglaux acadica acadica*)

Rare winter visitant.

E—Nov. 9, 1929 (B. S. Bowdish) to Feb. 25, 1929 (W. R.).

H—Winter only, 1910 (O. P. M.); Jan. 13, 1922 and Feb. 17, and March 10, 1906 (E. S. M.).

Eastern Whip-poor-will (*Antrostomus vociferus vociferus*)

Common migrant; rare breeder.

E—Regular migrant, formerly common summer resident; now very rare and almost extinct as a breeder; L. S. K. found 2 sets of eggs in 1906 and one in 1909 in West Orange; April 28, 1929 (C. A. U.) to Sept. 23, 1928.

H—Arlington, May 10, 1927 (E. S. M.).

Eastern Night-hawk (*Chordeiles minor minor*)

Common migrant; breeds locally.

E—Common migrant, local breeder in city areas, especially Newark; May 10, 1930 to Oct. 15, 1928 (E. S.).

H—May 10, 1928 to May 31, 1915 (E. S. M.); nest and two young on roof of Mengel Box Factory, Jersey City, July 9, 1910 (L. S. K.); Sept. 15, 1914 (E. S. M.) to Oct. 10, 1914, Westside Park (L. S. K.).

Chimney Swift (*Chaetura pelagica*)

Summer resident.

E—Common summer resident, less so than formerly; April 3, 1926 (W. R.) to Oct. 8, 1896, collected by W. E. D. Scott (Urner, "Birds of Union County") and Oct. 26, 1935 (M. Solomon); May 22, 1934, nest started; 4 eggs, June 3, 1934 (W. R.).

H—Uncommon summer resident; May 14, 1916 (E. S. M.) to Oct. 11, 1914 (E. S. M.).

Ruby-throated Hummingbird (*Archilochus colubris*)

Very rare summer resident.

E—Very rare summer resident, less common than formerly; May 5, 1924 (R. F. H.) to Sept. 28, 1930 (Mrs. C. S. H.); nest, May 11, 1912; eggs, May 25, at Montclair Heights (L. S. K.); nest and eggs, May 27, 1894 to July 17, 1893, Short Hills (De Coursey Cleveland, Hallinan collection in Paterson Museum).

H—Formerly bred to 1930, nest, Arlington (O. P. M.); May 14, 1924 to May 28, 1927 (E. S. M.).

Belted Kingfisher (*Megasceryle alcyon alcyon*)

Resident.

E—A not uncommon resident, less common in winter but regular when any open fresh water persists; March 11, 1928 (E. S.) to Dec. 6, 1931; nest and eggs, June 9, 1928 (E. S.).

H—Formerly bred, Arlington (O. P. M.); uncommon migrant; March 25, 1929 to Sept. 30, 1934.

Northern Flicker (*Colaptes auratus luteus*)

Permanent resident.

E—Often quite rare in winter; nest, April 23, 1928 (E. S.); migrant at Port Newark, Sept. 24, 1933.

H—Rare in winter, formerly bred; Arlington, to 1919 (E. S. M.); Woodcliff, 1931; common migrant, March 30, 1935; nest, May 17, 1911, Westside Park (L. S. K.).

Northern Pileated Woodpecker (*Ceophloeus pileatus abieticola*)

E—Recent workings near Verona Lake, 1915 (Fleischer—Linn. Abs. No. 27, p. 40). A bird picked up dead, shot in neck and fresh, Feb. 22, 1929, in Essex County Reservation (E. C.).

Red-bellied Woodpecker (*Centurus carolinus*)

E—Herrick reports Dickinson took one specimen. (Linn. paper, Nov. 2, 1878, *Forest and Stream*, XII, 1879, p. 165). Reported in Belleville swamp in 1927 (F. W.) and an excellent view of a ♂ bird in company with Red-headed Woodpeckers seen by J. L. Edwards and William Rusling at Pine Brook, Jan. 25, 1936.

Red-headed Woodpecker (*Melanerpes erythrocephalus*)

E—Irrregular permanent resident. Some years absent as a wintering bird or as a breeder. Once common in Passaic Valley west of the hills, chiefly in river lowlands. Nest and eggs, June 7, 1928 (E.S.). Rarer than formerly in east part of county.

H—Formerly bred, to 1925, at Arlington (O. P. M.); April 1, 1920 to Oct. 25, 1908, Secaucus (L. S. K.). Last record as migrant, May 13, 1929 (E. S. M.); formerly regular.

Yellow-bellied Sapsucker (*Sphyrapicus varius varius*)

Transient and winter visitant.

E—Regular in spring and fall; irregular in winter, but half a dozen records in December, January or February; April 3, 1930 (Mrs. C. S. H.) to May 7, 1927 (W. R.); Aug. 9, 1933 (L. S. K.); Sept. 21, 1928 (W. R.) to Nov. 6, 1927 (Mrs. C. S. H.).

H—April 22, 1917 (E. S. M.); Oct. 12, 1872 (collected by Herrick) to Oct. 14, 1933.

Eastern Hairy Woodpecker (*Dryobates villosus villosus*)

Resident.

E—Rare permanent resident except in east of county. Present in Branch Brook Park, Jan. 15, 1928 (R. F. H.); June 18, 1927, young seen (E.S.).

H—Arlington, three records by Marks: Jan. 1, 1918; March 18, 1925; April 4, 1924. Westside Park, Oct. 24, 1909 (L. S. K.).

Northern Downy Woodpecker (*Dryobates pubescens medianus*)

Resident.

E—Common permanent resident, more often seen in winter. Nest and eggs, May 19, 1928 (W. R.).

H—Permanent resident to 1919 (E. S. M.); no longer breeds: winters, Sept. 30, 1934 to February.

Red-cockaded Woodpecker (*Dryobates borealis*)

H—Specimen taken in Hoboken (in collection of G. N. Lawrence) some time before 1866 (Stone, p. 180).

Arctic Three-toed Woodpecker (*Picoides arcticus*)

E—One bird, Upper Montclair, Feb. 10 and 11, 1926 (R. H. H.).

Eastern Kingbird (*Tyrannus tyrannus*)

Summer resident.

E—Uncommon and rarer than formerly; May 1, 1927 to Sept. 25, 1919 (Mrs. C. S. H.). Nest and eggs, May 28, 1927 (W. R.).

H—Still breeds in county; Arlington to 1928 (E. S. M.); May 9, 1915 (E. S. M.) to Aug. 8, 1931 (J. L. E. and C. A. U.).

Northern Crested Flycatcher (*Myiarchus crinitus boreus*)

Summer resident.

E—Common, formerly (1873, Trippe) rare; April 29, 1927 (R. F. H.) to Sept. 13, 1924 (Montclair Bird Club). Nest and eggs, June 2, 1927 (W. R.).

H—Formerly bred, Arlington (O. P. M.), June 15, 1913, Secaucus (L. S. K.) to May 20, 1916 (E. S. M.) and May 27, 1934.

Eastern Phoebe (*Sayornis phoebe*)

Summer resident.

E—Common transient; uncommon summer resident; once in winter, Feb. 9, 1929 (W. R.). March 2, 1930 (W. R.) and 1935 (E. S.) to Oct. 15, 1933. Nest and eggs, April 14, 1928 (W. R.) to July 8, 1932 (E. S.).

H—Formerly bred, Arlington, 1920 (E. S. M.); March 11, 1929 to Oct. 24, 1909 (L. S. K.).

Yellow-bellied Flycatcher (*Empidonax flaviventris*)

Uncommon spring and fall migrant.

E—May 16, 1914 (Mrs. C. S. H.) to June 11, 1934 (L. S. K.); Sept. 8, 1910 (L. S. K.).

H—May 23, 1920 (E. S. M.).

Acadian Flycatcher (*Empidonax virescens*)

Now accidental visitant.

E—Once undoubtedly a rare summer resident; Orange, May 30, 1896 (collected by Herrick). Only a few recent records of value, as most sight records are not satisfactory; June 8 and July 1, 1934, heard and seen (L. S. K.); Montclair, Sept. 1, 1932 (W. R.) to Sept. 10, 1898. (Specimen taken in West Orange, in Dwight coll., Urner, Birds of Union Co.) Nest with 1 young and 1 added egg, Bloomfield, July 4, 1871 (H. Herrick).

Alder Flycatcher (*Empidonax trailli trailli*)

E—Rare summer resident; May 11, 1929 (W. R.) to July 20, 1930. Completed nest, no eggs on June 12, 1932 (later destroyed); June 21, 1934, three nests with eggs, and July 12, 1934, with young (L. S. K.).

H—May 9, 1932 (L. S. K.) to May 30, 1913 (E. S. M.) (sight records only); Sept. 8, 1890 and Sept. 26, 1889 (Dwight coll. from Statue of Liberty, Griscom, "Birds of New York City Region").

Least Flycatcher (*Empidonax minimus*)

E—Uncommon summer resident, formerly more numerous; April 27, 1930 to Sept. 23, 1928. Nest and eggs, June 10, 1927 (W. R.).

H—Arlington, May 14, 1927 (E. S. M.) to May 21, 1925 (E. S. M.) and July 26, 1931.

Eastern Wood Pewee (*Myiochanes virens*)

E—Common, May 6, 1922 (Mrs. C. S. H.) to Oct. 4, 1931.

H—Formerly bred, Arlington (O. P. M.); May 21, 1911 (L. S. K.) to Sept. 17, 1933.

Olive-sided Flycatcher (*Nuttallornis mesoleucus*)

Rare spring and fall migrant.

E—May 10, 1928 (W. R.) to June 6, 1928 (E. S.) and Aug. 25, 1910 (R. H. H.).

Northern Horned Lark (*Otocoris alpestris alpestris*)

Winter visitant.

E—Common at Port Newark, rare elsewhere; Oct. 18, 1931 to March 17, 1929.

H—Winters; Oct. 22, 1933 (J. L. E.) to March 12, 1935 (L. S. K.).

Prairie Horned Lark (*Otocoris alpestris praticola*)

E—Only two positive records before 1934: with Horned Lark at Port Newark, Feb. 8, 1930 (R. F. H.); one bird with Horned Larks in Orange Reservation, Feb. 23, 1920 (C. A. U.); Feb. 19, 1935 (Mrs. Fry and L. S. K.); migrating flock, Bloomfield, March 4, 1934; recorded twice in June at Newark Airport, June, 1934 (C. A. U. and Gerbert Rebell).

Tree Swallow (*Iridoprocne bicolor*)

Abundant transient.

E—A rare summer resident in Caldwell area only; March 15, 1926 (W. R.) to June 10, 1912 and scattered individuals to July (L. S. K.); migrants, July 9, 1932 to Nov. 6, 1928. Nest, May 17, 1927 (W. R.).

H—Frequently common in June, but no nesting data (E. S. M.). Roosts commonly in marshes (F. M. Chapman); March 18, 1905 to June 15, 1913 (E. S. M.), July 4, 1914 (E. S. M.) to Dec. 24, 1919 (R. C. Caskey, *Bird-Lore*, 1920, p. 28).

Bank Swallow (*Riparia riparia riparia*)

Rare transient.

E—Formerly a rare summer resident in Montclair and Caldwell areas; now only a transient in the county; April 21, 1922 (Barbour) to Sept. 9, 1928 (J. L. E.). Nest and 5 eggs, June 14, 1926 (W. R.) in Peckman Valley.

H—May 10, 1934 (L. S. K.); Aug. 9, 1913 (L. S. K.) to Aug. 30, 1931 (J. L. E.).

Rough-winged Swallow (*Stelgidopteryx ruficollis serripennis*)

Very rare summer resident.

E—Local summer resident, formerly more common; not common as transient; April 8, 1933 to July 31, 1927 (J. L. E.). Nest, May 7, 1932, Two Bridges.

H—Possibly once bred, Arlington, but no proof (E. S. M.). Nesting in old iron works, Secaucus, 1933 and 1934 (L. S. K.); May 10, 1934 (L. S. K.) to Aug. 9, 1913 (L. S. K.).

Barn Swallow (*Hirundo erythrogaster*)

Summer resident.

E—April 10, 1926 (Mrs. C. S. H.) to Oct. 22, 1927 (Crowell); less common than formerly. Nest, May 4, 1928 (W. R.).

H—Formerly bred, to 1919 (E. S. M.); April 26, 1916 (E. S. M.) to Oct. 14, 1928 (E. S. M.).

Northern Cliff Swallow (*Petrochelidon albifrons albifrons*)

Rare transient.

E—Formerly bred, to 1929, at Caldwell; April 15, 1930 (W. R.) to Aug. 24, 1930. Nests, May 10, 1929 (W. R.).

H—Former transient, may have once bred (O. P. M.); June 10, 1933, Secaucus, nesting in old iron works (L. S. K.); April 26, 1916 (E. S. M.); July 20, 1917 (E. S. M.) to Aug. 26, 1921 (E. S. M.).

Purple Martin (*Progne subis subis*)

E—Now rare transient; formerly bred, to 1905, Montclair (R. H. H.); May 12, 1913, Bloomfield (L. S. K.) to Aug. 29, 1912, Newark meadows (L. S. K.).

Northern Blue Jay (*Cyanocitta cristata cristata*)

Permanent resident.

E—Very common breeder; sometimes abundant in migration. Nest and eggs, May 13, 1927 (E. S.); Port Newark, migrant, Sept. 24, 1933.

H—Common transient. Rare permanent resident; more common than formerly (O. P. M.).

Eastern Crow (*Corvus brachyrhynchos brachyrhynchos*)

Resident.

E—Very common summer resident west of first mountain; less common to the east; abundant migrant in great flights in spring; regular but less common than formerly in winter. Nest and 2 eggs, March 3, 1928 (E. S.).

H—Permanent resident, less common than formerly (Paulson). Bred to 1919 at Arlington; migrants, most common March and October (E. S. M.).

Fish Crow (*Corvus ossifragus*)

Summer resident and migrant.

E—Rare at all seasons but more often found as migrant. Very rare summer resident; formerly regular at Brookdale. No winter records; Feb. 12, 1927 (E. S.) to Aug. 12, 1911 (L. S. K.). Has nested at Port Newark (C. A. U.).

H—Uncommon, formerly bred along Passaic River at Arlington (O. P. M.); March 12, 1935 to Nov. 20, 1934 (L. S. K.); still breeds at Secaucus.

Black-capped Chickadee (*Penthestes atricapillus atricapillus*)

Permanent resident.

E—Uncommon in summer; common migrant and abundant winter resident. Nest, April 20, 1903 (L. S. K.); nest and eggs, April 21, 1928 (E. S.).

H—Formerly bred; winters; Sept. 30, 1934 to Jan. 25, 1922 (E. S. M.).

Carolina Chickadee (*Penthestes carolinensis carolinensis*)

E—Mr. R. F. Haulenbeek is confident of 2 sight records in Branch Brook Park, March 16, 1928 and March 28, 1933. (No collected specimens as yet north of Raritan, however).

Tufted Titmouse (*Baeolophus bicolor*)

Permanent resident.

E—Rare and local resident east of first mountain; more often seen in winter; common to abundant locally, west; unusually common winter 1934-1935. Nest, May 13, 1928 (W. R.).

H—Formerly found to 1917 (O. P. M.); Arlington, March 3, 1935; Oct. 18, 1914 (L. S. K.) to April 4, 1916 (E. S. M.).

White-breasted Nuthatch (*Sitta carolinensis carolinensis*)

Permanent resident.

E—Common permanent resident. Nest, April 15, 1928 (E. S.).

H—Former permanent resident, recently bred (E. S. M.); winter visitant; Oct. 22, 1933 to spring.

Red-breasted Nuthatch (*Sitta canadensis*)

E—Irregular migrant and winter visitant; Aug. 28, 1896 (W. E. D. Scott) to May 30, 1924 (J. L. E.).

H—Migrant; Oct. 12, 1911 (E. S. M.) to Dec. 6, 1912 (L. S. K.); May 16, 1928 (E. S. M.).

Brown Creeper (*Certhia familiaris americana*)

E—Common migrant, uncommon in winter; Sept. 28, 1930 to May 4, 1924 (M. B. C.).

H—Winter visitant and migrant; Oct. 11, 1914 (E. S. M.) to April 29, 1916 (E. S. M.).

Eastern House Wren (*Troglodytes aedon aedon*)

E—Very common summer resident, probably more so than formerly; April 18, 1922 (R. H. H.) and 1931 to Oct. 14, 1923 (R. H. H.). Two winter records at Brookdale, Jan. 3, 1931 (R. C.), and Hatfield, March 2, 1935 (E. S.). Nest, May 4, 1929 (W. R.).

H—Very rare summer resident; formerly North Bergen; still at North Hudson Park, in 1932 and Secaucus, 1935; Westside Park, May 21, 1911 (L. S. K.).

Eastern Winter Wren (*Nannus hiemalis hiemalis*)

E—Common migrant; not rare in winter; Sept. 18, 1932 (R. C.) to April 23, 1929.

H—Oct. 29, 1913, Westside Park (L. S. K.) to Feb. 28, 1913 (E. S. M.).

Carolina Wren (*Thryothorus ludovicianus ludovicianus*)

Rare and irregular.

E—Very irregular permanent resident; may be seen at any time; breeds rarely if ever. Temporarily killed off by winters 1917-18 and 1933-34. Only record in 1934, Nov. 13 (W. R.) at Caldwell.

H—Formerly bred on Snake Hill, to 1917 (O. P. M.); formerly at Arlington, to June 28, 1919 (E. S. M.).

Long-Billed Marsh Wren (*Telmatodytes palustris palustris*)

E—Locally common summer resident; May 1, 1928 (E. S.) to Oct. 7, 1928 (J. L. E.). Nest, May 15, 1929 (W. R.). Nests and eggs, May 22-30, 1912 (L. S. K.).

H—Common summer resident on meadows; April 27, 1932 (E. S. M.) to Aug. 19, 1899 (W. de W. Miller). Nest and eggs, June 26, 1932; 55 nests, June 21, 1912 (L. S. K.) and 4 nests, June 18, 1910 (L. S. K.); June 12, 1869, 3 nests, 2 with 4, 1 with 3 eggs (H. Herrick), to July 7, 1935, nest with 4 eggs (R. T. Peterson).

Short-billed Marsh Wren (*Cistothorus stellaris*)

E—Very rare and local summer resident in Caldwell area; May 2, 1913 (L. S. K.) to Oct. 21, 1934. Nest, May 19, 1929 (W. R.).

Eastern Mockingbird (*Mimus polyglottos polyglottos*)

E—Irrregular at all seasons; more often recorded in December, January and February. Nest and pair at Verona, April, 1932 (Miss Hornfeck); recorded 1930, 1932 and 1933 (by M. B. C.) and Feb., 1935 (Miss Hornfeck).

H—March 3, 1935, one seen, Hudson County Park, Bayonne.

Catbird (*Dumetella carolinensis*)

Summer resident; rare in winter.

E—Very common; April 21, 1929 (W. R.) to Nov. 1, 1931. In winter, Feb. 17 to 23, 1931, and Feb. 11, 1933 (Mrs. Geo. Taylor and others), Montclair. Nest, May 15, 1928 (E. S.).

H—Uncommon summer resident; April 30, 1918 (E. S. M.) to Sept. 30, 1934, and Jan. 10, 1918 (E. S. M.).

Brown Thrasher (*Toxostoma rufum*)

Summer resident; rare in winter.

E—Common summer resident; more often recorded in winter than preceding; April 9, 1929 to Dec. 12, 1929 (Mrs. Alice M. Cox). Winter of 1922-23 (Montclair Bird Club). One record, Jan., 1931 (P. S. Howe), Short Hills, and Jan. 8, 1930 (Mrs. Alice M. Cox), Montclair. Nest and eggs, May 20, 1934.

H—Summer resident at Arlington to 1928 (E. S. M.); April 26, 1916 (E. S. M.) to Dec. 7, 1917 (E. S. M.).

Eastern Robin (*Turdus migratorius migratorius*)

Permanent resident.

E—Very abundant summer resident; not common but regular in winter. Nests April 6, 1929 (W. R.) to July 22, 1933.

H—Permanent resident; common in summer, less common in winter; arrival, March 3, 1935, Hudson County Park, Bayonne. Nest, 2 young, 1 egg, April 24, 1921, Arlington (E. S. M.) to May 29, 1869; nest and 4 eggs, Weehawken (H. Herrick).

Northern Varied Thrush (*Ictoreus naevius meruloides*)

H—One taken at Hoboken, Dec., 1851, by G. N. Lawrence (Stone, p. 315).

Wood Thrush (*Hylocichla mustelina*)

E—Very common; April 21, 1929 (W. R.) to Oct. 20, 1924 (Mrs. L. E. W. Abbot). Nest and eggs, May 16, 1926 (W. R.) to July 4, 1871 (H. Herrick).

H—Formerly summer resident at Arlington to 1931 (O. P. M.); May 6, 1920 (E. S. M.) to fall; May 18, 1905. Nest and 4 eggs, Arlington (L. S. K.) to May 29, 1870, nest and 4 eggs, Weehawken (H. Herrick).

Eastern Hermit Thrush (*Hylocichla guttata faxoni*)

Transient and winter resident.

E—Abundant migrant; less common but regular in winter; Aug. 26, 1896 (W. E. D. Scott) to May 1, 1912 (L. S. K.).

H—Common migrant; Sept. 20, 1914 (E. S. M.) to Nov. 11, 1927 (E. S. M.); March 20, 1921 (E. S. M.) to May 17, 1916 (E. S. M.).

Olive-backed Thrush (*Hylocichla ustulata swainsoni*)

Common transient.

E—May 4, 1924 (R. F. H.) to May 31, 1924 (M. B. C.); Aug. 31, 1932 (W. R.) to Oct. 20, 1896 (W. E. D. Scott).

H—May 11, 1927 (E. S. M.) to May 28, 1931.

Gray-checked Thrush (*Hylocichla minima aliciae*)

Common transient.

E—May 8, 1927 (J. L. E.) to June 1, 1930 (Mrs. C. S. H.); Sept. 13, 1924 (M. B. C.) to Oct. 20, 1896 (W. E. D. Scott).

H—May 18, 1913 (L. S. K.) to May 28, 1931; no fall data.

Bicknell's Thrush (*Hylocichla minima minima*)

Migrant.

E—Probably more common than records indicate as little collecting is done; May 10, 1934 (R. F. H.), small size compared closely with Olive-back; one banded, May 24, 1923 (R. H. H.); Sept. 29 to Oct. 15, 1896, six (collected by W. E. D. Scott, see *Auk* XLV, No. 2, p. 225); also Oct. 10, 1915 (C. B. Isham).

Veery (*Hylocichla fuscescens fuscescens*)

Summer resident and transient.

E—Uncommon and local; April 28, 1929 to Oct. 18, 1929 (Mrs. C. S. H.). Nest and eggs, May 28, 1927 (E. S.).

H—Formerly bred at Arlington; still at Secaucus, 1935; April 26, 1916 (E. S. M.) to May 28, 1927 (E. S. M.); Oct. 10, 1915 (E. S. M.); May 26, 1869 and May 29, 1870, nest and 3 eggs, Weehawken (H. Herrick).

Eastern Bluebird (*Sialia sialis sialis*)

Permanent resident.

E—Resident; common in migration; now rare but formerly common breeder; not common in winter. Nest and 3 two-day old young, April 8, 1906 (L. S. K.) to May 2, 1928, nest and eggs (E.S.).

H—Formerly bred, North Bergen and Arlington, to 1913 (E. S. M.); winter, 1914, 1915 and 1927; March 11, 1905 (E. S. M.) to Aug. 9, 1913 (E. S. M.).

Blue-gray Gnatcatcher (*Polioptilo caeruleo caerulea*)

E—Four records, chiefly in Branch Brook Park; April 11, 1928 (R. F. H.); Aug. 21, 1934 (Rebell, *Bird-Lore*, 1934, p. 370); Sept. 25, 1925 (Loomis); also reported by Mrs. M. L. Cox.

Eastern Golden-crowned Kinglet (*Regulus satrapo satrapa*)

E—Common transient and less common winter resident; Sept. 25, 1932 to May 11, 1929 (W. R.).

H—Transient; less common in winter; Oct. 19, 1915 (E. S. M.) to April 27, 1922 (E. S. M.).

Eastern Ruby-crowned Kinglet (*Corthylio colendula calendula*)

Common, sometimes abundant, transient.

E—Sept. 15, 1930 (Mrs. C. S. H.) to May 11, 1929 (W. R.); three winter records in Caldwell area, 1928 and 1929; one in Montclair, 1924.

H—Migrant; Oct. 24, 1909 (L. S. K.); March 19 to May 6, 1905 (E. S. M.).

American Pipit (*Anthus spinoletta rubescens*)

Common transient, especially on the meadows.

E—Rare in winter; Sept. 18, 1932 to Dec. 23, 1928; winter; March 14, 1931 (F. W.) to May 8, 1927.

H—An abundant transient, rare in winter (1932); Oct. 2, 1930 to Oct. 29, 1872 (H. Herrick); March 17, 1900 (W. de W. Miller).

Cedar Waxwing (*Bombycillo cedrorum*)

Common resident.

E—Uncommon summer resident and irregular permanent resident, at times quite abundant as migrant. Nest in May, 1904, at Bloomfield (L. S. K.).

H—Formerly bred (O. P. M.) to 1907 (E. S. M.); April 21, 1925 (E. S. M.) to Nov. 14, 1908 (L. S. K.); winter, Jersey City (O. P. M.).

Northern Shrike (*Lanius borealis borealis*)

Irregular winter visitant.

E—Nov. 11, 1930 to Feb. 20, 1906 (R. H. H.).

H—Jan. 2, 1922 (E. S. M.) and Nov. 12, 1913, Kearney (L. S. K.).

Migrant Shrike (*Lanius ludovicianus migrans*)

Accidental visitant.

E—Rare; Aug. 23, 1911 (L. S. K.) and Aug. 26, 1933, at Montclair Heights (L. S. K. and W. F. E.).

H—One record: Aug. 25, 1911, Westside Park, Jersey City (L. S. K.).

Starling (*Sturnus vulgaris*)

Abundant resident

E—Very abundant; most numerous in flocks in late summer, fall and winter. Nest, March 24, 1929. Arrived Bloomfield, spring 1903 (L. S. K.); first seen Montclair, Oct. 25, 1904 (R. H. H.).

H—Now abundant permanent resident; first recorded at Greenville, Jersey City, Jan. 13, 1900. Probably bred there, June 3, 1901 (W. de W. Miller). First recorded, Arlington, Nov. 25, 1905 (E. S. M.).

White-eyed Vireo (*Vireo griseus griseus*)

Summer resident.

E—Very rare and local; April 29, 1929 (W. R.) to Sept. 25, 1932 (J. L. E.). Nest and 4 eggs at Orange, July 5, 1877 (collected by H. Herrick).

H—Formerly rather common breeder (O. P. M.); May 1, 1928 (E. S. M.) to Sept. 19, 1914 (E. S. M.).

Yellow-throated Vireo (*Vireo flavifrons*)

E—Uncommon; formerly more frequent. May 5, 1929 to Sept. 13, 1924 (Montclair Bird Club). Nest and eggs, June 9, 1928 (E. S.).

H—Formerly bred (O. P. M.). Nest and eggs in maple at Kearney, May 21, 1905 (L. S. K.) to Aug. 9, 1913 (L. S. K.).

Solitary vireo (*Vireo solitarius solitarius*)

Common transient.

E—One nest record for South Orange (A. R. Dugmore, *Bird-Homes*, p. 119; pub. 1900); April 13, 1923 (R. F. H.) to May 20, 1934; Sept. 18, 1932 (R. C.) to Oct. 22, 1916 (C. H. Rogers).

H—April 27, 1922 (E. S. M.) to May 18, 1907 (E. S. M.); Oct. 14, 1928 (E. S. M.) to Oct. 29, 1921, Arlington (E. S. M.).

Red-eyed Vireo (*Vireo olivaceus*)

Summer resident.

E—Very common; April 30, 1930 (W. R.) to Oct. 10, 1926. Nest and eggs, May 26, 1910 (L. S. K.) to July 4, 1871, with 1 Cowbird egg (H. Herrick).

H—Summer resident (1932). Formerly bred at Arlington to 1919 (E. S. M.); May 9, 1915 (E. S. M.) to Aug. 23, 1919 (E. S. M.).

Eastern Warbling Vireo (*Vireo gilvus gilvus*)

Summer resident.

E—Uncommon and local; April 29, 1927 (R. F. H.) to Sept. 13, 1924 (Montclair Bird Club). Nest, June 3, 1926 (W. R.).

H—Formerly rare breeder (O. P. M.); May 21, 1911, Westside Park (L. S. K.).

Black and White Warbler (*Mniotilta varia*)

Summer resident and transient.

E—Rare summer resident in western part of county; April 18, 1933 (F. W.) to Sept. 28, 1930. Nest and eggs, May 23, 1926 (W. R.).

H—Formerly bred, to 1919 (E. S. M.); April 29, 1916 (E. S. M.) to Oct. 10, 1915 (E. S. M.).

Prothonotary Warbler (*Protonotaria citrea*)

E—Very rare spring migrant. One breeding record a few feet over line in Morris County (Quattlebaum); May 2, 1928 (R. F. H.) to June 6, 1925 (J. L. E.).

Worm-eating Warbler (*Helmitheros vermivorus*)

Summer resident and transient.

E—Uncommon summer resident on ridges; May 4, 1930 (J. Q. Adams) to Aug. 25, 1924 (Miss L. Morris). Nest, June 17, 1927 (W. R.).

H—Migrant, May 4, 1927 (E. S. M.).

Golden-winged Warbler (*Vermivora chrysoptera*)

E—Uncommon migrant; rare breeder, Cedar Grove and Caldwell; May 2, 1935 (L. S. K.) to May 31, 1924 (Montclair Bird Club); June 13, 1934 (L. S. K.). Nest and young, July 4, 1933 (L. S. K.); Aug. 25, 1924 (Mrs. C. S. H.) to Sept. 28, 1929 (W. R.).

H—Reported as migrant (O. P. M.); no record (E. S. M.).

Brewster's Warbler (*Vermivora leucobronchialis*)

E—Very rare migrant; May 11, 1883, Orange (C. B. Riker, *Auk*, 1885, p. 378).

Lawrence's Warbler (*Vermivora lawrencei*)

E—Very rare migrant; May 20, 1928 (J. L. E.).

H—One record, Hoboken, Sept., 1876 (D. B. Dickinson, Stone, p. 270).

Blue-winged Warbler (*Vermivora pinus*)

Summer resident.

E—Common; April 25, 1921 (R. F. H.) to Sept. 23, 1928. Nest and egg, May 23, 1926 (W. R.).

H—Transient; formerly bred, 1907 (E. S. M.); May 1, 1920 (E. S. M.) to May 28, 1927 (E. S. M.).

Tennessee Warbler (*Vermivora peregrina*)

Transient.

E—Rare; fairly common some years as in fall of 1910 (R. H. H.); May 13, 1928 (E. S.) to June 1, 1924 (R. F. H.); Sept. 30, 1934 to Oct. 9, 1932.

Orange-crowned Warbler (*Vermivora celata celata*)

E—Four records only; April 14, 1898 (S. Van Rensselaer, Griscom, p. 319); May 19, 1927 (Griscom); Oct. 2, 1894 (S. Van Rensselaer, Griscom, p. 319); Dec. 25 and 26, 1920 (R. F. H., *Bird-Lore*, 1921, p. 14).

H—Hoboken, May, 1865 (C. S. Galbraith collection, Griscom, p. 319).

Nashville Warbler (*Vermivora ruficapilla ruficapilla*)

Not common migrant.

E—April 28, 1935 to May 29, 1932 and June 11, 1932, a singing male; Sept. 30, 1930 (Mrs. C. S. H.) to Oct. 9, 1932; a probable migrant, July 23, 1933.

H—Reported (O. P. M.); no record (E. S. M.).

Northern Parula Warbler (*Compsothlypis americana pusilla*)

Common transient.

E—April 23, 1916 (C. H. Rogers) to May 23, 1932; Sept. 28, 1930 to Oct. 14, 1896 (W. E. D. Scott).

H—May 1, 1920 (E. S. M.) to May 30, 1913 (E. S. M.); Sept. 20, 1914 (E. S. M.) to Oct. 1, 1914 (L. S. K.).

Eastern Yellow Warbler (*Dendroica aestiva aestiva*)

Summer resident.

E—Common; April 27, 1921 (R. F. H.) to Oct. 12, 1923 (Montclair Bird Club). Nest and eggs, May 10, 1911 (L. S. K.) to May 30, 1907 (L. S. K.).

H—Summer resident; formerly more common; formerly bred at Arlington (Paulson); to 1920 (E. S. M.); May 1, 1920 (E. S. M.) to fall. Nest with 2 eggs at Weehawken, May 26, 1869 (H. Herrick).

Magnolia Warbler (*Dendroica magnolia*)

Common transient.

E—May 2, 1920 (R. F. H.) to May 31, 1924 (Montclair Bird Club); Aug. 30, 1932 (W. R.) to Sept. 28, 1930.

H—May 1, 1920 (E. S. M.) to May 16, 1928 (E. S. M.); Aug. 26, 1925 (E. S. M.) to Oct. 1, 1914 (L. S. K.).

Cape May Warbler (*Dendroica tigrina*)

Rare transient; probably more common in fall than spring.

E—May 7, 1924 (Mrs. C. S. H.) to May 20, 1926 (Mrs. L. E. W. Abbot); Aug. 31, 1932 (W. R.) to Oct. 6, 1929 (R. F. H.).

H—Reported (O. P. M.); no record (E. S. M.).

Black-throated Blue Warbler (*Dendroica caerulescens caerulescens*)

Common transient.

E—April 29, 1929 (W. R.) to May 20, 1934; Oct. 1, 1928 to Oct. 16, 1896 (W. E. D. Scott).

H—May 7, 1927 (E. S. M.) to May 21, 1911 (L. S. K.); Sept. 14, 1924 (E. S. M.).

Myrtle Warbler (*Dendroica coronata*)

Abundant transient.

E—Usually regular, although not common in winter; Sept. 29, 1931 to May 16, 1931.

H—Migrant; April 4, 1924 (E. S. M.) to May 27, 1920 (E. S. M.); Oct. 1, 1914 (L. S. K.) to Dec. 3, 1917 (E. S. M.).

Black-throated Green Warbler (*Dendroica virens virens*)

Common transient.

E—Formerly probably rare breeder in Orange Reservation, 1928 (Urner Birds of Union County); April 23, 1927 (J. L. E.) and 1929 (R. F. H.) to May 30, 1931, and June 9, 1935; July 25, 1934 (L. S. K.); Sept. 18, 1932 (R. C.) to Oct. 12, 1923 (Montclair Bird Club).

H—May 1 to 27, 1920 (E. S. M.); Aug. 30, 1927 to Oct. 12, 1925 (E. S. M.).

Blackburnian Warbler (*Dendroica fusca*)

Common transient in spring; rare in fall.

E—April 19, 1929 (F. W.); April 23, 1927 (R. F. H.) to May 25, 1929 (W. R.); Aug. 30, 1932 (W. R.) to Sept. 15, 1923 (Mrs. C. S. H.).

H—May 11 to 22, 1927 (E. S. M.).

Yellow-throated Warbler (*Dendroica dominica dominica*)

Rare in spring.

E—Two records; May 1, 1928, Newark (J. H. Burnett and E. G. Loomis).
May 15, 1928, Orange Reservation (C. A. U.).

Chestnut-sided Warbler (*Dendroica pensylvanica*)

Common summer resident.

E—April 27, 1935 to September. Partly completed nest, May 10, 1912 (L. S. K.); nest, May 21, 1927 (E. S.).

H—Migrant; formerly bred (O. P. M.); May 1, 1920 (E. S. M.) to May 17, 1916 (E. S. M.).

Bay-breasted Warbler (*Dendroica castanea*)

Transient.

E—Not common, but abundant for three days in 1916 (Mrs. C. S. H.); May 1, 1920 (F. W.) to May 29, 1927 (Montclair Bird Club); Aug. 21, 1896 (W. E. D. Scott) to Aug. 25, 1928 (Mrs. C. S. H.).

H—May 14, 1916 (E. S. M.) and May 17, 1920 (E. S. M.).

Black-poll Warbler (*Dendroica striata*)

Transient.

E—Abundant; May 4, 1930 (W. R.) to June 7, 1934 (L. S. K.); July 11, 1930 (R. H. H.) a singing bird; Aug. 31, 1932 (W. R.) to Nov. 5, 1932.

H—Common; May 8, 1921 (E. S. M.) to June 3, 1932; September and early October (O. P. M.).

Northern Pine Warbler (*Dendroica pinus pinus*)

Uncommon migrant.

E—April 2, 1933 to May 6, 1927 (W. R.); Sept. 29, 1896 (W. E. D. Scott).

H—Reported (O. P. M.); no record (E. S. M.); May 11, 1910, Kearney (L. S. K.).

Northern Prairie Warbler (*Dendroica discolor discolor*)

Not uncommon migrant.

E—Regular; April 27, 1935 to May 24, 1927 (E. S.); Aug. 27, 1933 to Oct. 8, 1932.

H—May 8, 1921 (E. S. M.); May 14, 1922 (O. P. M.) to May 28, 1927 (E. S. M.).

Western Palm Warbler (*Dendroica palmarum palmarum*)

Rare in spring; often abundant in fall.

E—April 23, 1926 (W. R.) to May 11, 1929 (W. R.); Sept. 10, 1923 (Mrs. C. S. H.) to Nov. 2, 1930.

H—Sept. 30, 1934 to Oct. 22, 1921 (E. S. M.).

Yellow Palm Warbler (*Dendroica palmarum hypochrysea*)

Common transient.

E—April 5, 1921 (R. F. H.) to May 8, 1927 (E. S.); Oct. 7, 1928 to Nov. 10, 1928.

H—April 16, 1925 (E. S. M.) to May 12, 1917 (E. S. M.); Sept. 14, 1924 (E. S. M.) to Oct. 30, 1932.

Ovenbird (*Sciurus aurocapillus*)

Summer resident.

E—Very common on trap rock ridges; April 27, 1925 (Loomis) to Nov. 20, 1924 (Mrs. C. S. H.). Completed nest, May 11, 1913 (L. S. K.).

H—Formerly bred (O. P. M.); to June 2, 1912, nest at Arlington (L. S. K.); now migrant; May 1, 1920 (E. S. M.) to May 31, 1925 (E. S. M.); Aug. 23, 1919 (E. S. M.).

Northern Water-Thrush (*Sciurus nozeboracensis nozeboracensis*)

Common transient.

E—April 27, 1929 (R. F. H.) to May 30, 1929; Aug. 2, 1930 to Sept. 29, 1929 (W. R.).

H—May 11, 1922 (E. S. M.) and May 12, 1920 (E. S. M.); Aug. 13, 1933, Secaucus.

Louisiana Water-Thrush (*Sciurus motacilla*)

Summer resident.

E—Very rare; April 7, 1929 (Montclair Bird Club) to Sept. 23, 1928. Nest and eggs, May 1, 1927 (W. R.).

H—Migrant (O. P. M.); July 21, 1912, Westside Park (L. S. K.).

Kentucky Warbler (*Oporornis formosus*)

E—Only six records, all in spring; May 8, 1911 (R. H. H.) to May 30, 1935.

Connecticut Warbler (*Oporornis agilis*)

Rare migrant in spring; more common in fall.

E—May 11, 1920 (R. F. H.); Aug. 26, 1896 (W. E. D. Scott) to Sept. 28, 1929 (W. R.).

H—Aug. 26, 1933, Homestead (L. S. K.).

Mourning Warbler (*Oporornis philadelphia*)

Uncommon migrant in spring. No records in fall.

E—May 11, 1929 (W. R.) to June 4, 1934 (D. Wilson).

H—Recorded (O. P. M.).

Northern Yellow-Throat (*Geothlypis trichas brachidactyla*)

Very common summer resident and transient.

E—Lingers until early winter on occasion; April 26, 1928 (R. F. H.) to Nov. 24, 1927 (J. L. E.). Nest and eggs, May 15, 1927 (W. R.).

H—Common breeder; May 11, 1916 (E. S. M.) to Sept. 30, 1934.

Yellow-breasted Chat (*Icteria virens virens*)

Summer resident.

E—Rare and local; less common than formerly; April 30, 1922 (R. F. H.) to July. Nest, June 15, 1926 (W. R.).

H—Formerly a common breeder (O. P. M.); to 1920 (E. S. M.). Nest and eggs at Homestead, June 18, 1915 (L. S. K.); May 21, 1911 (L. S. K.) to Aug. 23, 1919 (E. S. M.).

Hooded Warbler (*Wilsonia citrina*)

Uncommon and local summer resident.

E—Probably more common than formerly; May 2, 1928 (Mrs. C. S. H.) to Sept. 28, 1929 (W. R.). Nest and young, June 25, 1933 (W. R.).

H—May 11 and 14, 1927 (E. S. M.); June 30, 1914, Westside Park (L. S. K.). Probably formerly bred as H. Herrick records nest at Fort Lee, June 3, 1872.

Wilson's Warbler (*Wilsonia pusilla pusilla*)

Transient.

E—Not common; May 10, 1922 (Miss L. Morris) to June 7, 1934 (L. S. K.); Aug. 27, 1933 to Sept. 23, 1928.

H—May 20, 1922 (E. S. M.).

Canada Warbler (*Wilsonia canadensis*)

Common transient.

E—May 6, 1928 (R. F. H.) to May 30, 1929; Aug. 2, 1934 (L. S. K.) to Oct. 2, 1926 (W. R.).

H—May 11, 1927 (E. S. M.) to May 28, 1931; Sept. 10, 1935 (Fr. E. Goellner).

Redstart (*Setophaga ruticilla*)

Uncommon summer resident on trap rock ridges.

E—Migrants; April 29, 1920 to June 5, 1927 (R. F. H.). Nest, May 20, 1908 (L. S. K.) to June 11, 1927; nest and eggs (W. R.). Fall migrants, Sept. 2, 1928 to Oct. 13, 1896 (W. E. D. Scott).

H—Formerly bred, to 1928, at Arlington (E. S. M.). Nest and 4 eggs, June 4, 1911 (L. S. K.); May 11, 1927 (E. S. M.) to Oct. 10, 1915 (E. S. M.).

House Sparrow (*Passer domesticus domesticus*)

Very abundant resident.

E—First recorded at Chatham about 1868 (Dickinson); first recorded, Caldwell, 1870; East Orange, 1874 or earlier (H. B. Bailey). (See "The English Sparrow in North America" by C. H. Merriam, 1889.) Perhaps less common than formerly, but now more generally distributed. Nests chiefly April, May and June. First nest of record, May, 1874, Orange (H. Herrick).

H—Most abundant breeder and permanent resident.

Bobolink (*Dolichonyx oryzivorus*)

Common transient and local summer resident.

E—Formerly abundant breeder (Trippet); now rare. Nest and eggs, June 9, 1928 (E. S.); May 6, 1928 (R. F. H.) to Sept. 13, 1931.

H—May 7, 1921 (E. S. M.) to Sept. 17, 1933. Formerly regular breeder on meadows, to 1920 (E. S. M.); May still breed, 1930 (O. P. M.); migrants appear early in July.

Eastern Meadowlark (*Sturnella magna magna*)

Resident.

E—Locally common summer resident; formerly abundant where now absent

(Trippet); abundant at Port Newark as a permanent resident. Migrants, March 10, 1929 to Dec. 15, 1931 (L. S. K.). Nest and eggs, May 11, 1927 (W. R.).

H—Permanent resident near Snake Hill; otherwise less common than formerly; Arlington, bred to 1919; March 26, 1916 (E. S. M.) to Jan. 1, 1915 (E. S. M.); winter.

Eastern Red-Wing (*Agelaius phoeniceus phoeniceus*)

Common summer resident; locally abundant; rare in winter; abundant migrant.

E—March 1, 1930 (F. W.) to Jan. 5, 1932 (L. S. K.). Nest and eggs, May 17, 1927 (E. S.).

H—Regular breeder; common migrant; rare in winter; Jan. 6, 1923 (E. S. M.) and Jan. 10, 1925 (E. S. M.); Feb. 21, 1933 (L. S. K.) to Dec. 7, 1929.

Orchard Oriole (*Icterus spurius*)

Uncommon summer resident.

E—May 4, 1929 (W. R.) to July 11, 1932. Nest and young, May 30, 1904 (L. S. K.) to June 24, 1928 (E. S.).

H—Arlington, formerly heard and seen singing and probably bred (O. P. M.); June 9, 1905 (E. S. M.).

Baltimore Oriole (*Icterus galbula*)

Summer resident.

E—Still common, but far less than formerly (Trippet); April 26, 1925 (R. F. H.) to Sept. 23, 1928. Nest, June 11, 1926 (W. R.).

H—Arlington; formerly regular breeder, now rare; probably still breeds (O. P. M.); 1933; May 8, 1915 (E. S. M.) to fall.

Rusty Blackbird (*Euphagus carolinus*)

Common transient, rare in winter.

E—Feb. 27, 1933 (L. L. W.) to May 13, 1934; Oct. 1, 1928 to Dec. 24, 1932 (J. L. E. and W. R.).

H—Oct. 14, 1933, North Hudson Park, to Nov. 11, 1914 (E. S. M.).

Purple Grackle (*Quiscalus quiscula quiscula*)

Resident.

E—Abundant breeder and transient; occasional in winter; Feb. 14, 1932 (Mrs. C. S. H.) to Nov. 18, 1896 (collected by W. E. D. Scott—"Birds of Union County," Urner). About the December, January and early February records there is doubt as to the subspecific identification. Nest, April 30, 1928 (E. S.).

H—Regular migrant and summer resident; March 3, 1935 to Nov. 29, 1931; uncommon in December, January and February, but subspecies not determined positively.

Bronzed Grackle (*Quiscalus quiscula aeneus*)

Transient and winter visitant.

E—Common migrant; often abundant; probably more common in winter than preceding; March 10, 1929 to March 27, 1929 (W. R.); Oct. 13, 1929 to Dec. 13, 1931.

H—No positive records but probably most winter birds are of this species.

Eastern Cowbird (*Molothrus ater ater*)

Transient and very common summer resident.

E—Often abundant in migration; March 6, 1926 (W. R.) to Dec. 24, 1933 (F. W.); egg, May 2, 1928 (W. R.); young able to fly, June 8, 1929 to July 4, 1871 (H. Herrick).

H—Formerly bred (O. P. M.); common transient; Feb. 25, 1926 (E. S. M.) to Nov. 11, 1934.

Scarlet Tanager (*Piranga erythromelas*)

Summer resident.

E—Common; formerly more so on oak ridges (Trippet); May 2, 1925 (R. F. H.) to Sept. 28, 1930. Nest and eggs, June 5, 1870 (Herrick); nest and young about week old, July 18, 1909 (L. S. K.).

H—Formerly bred (O. P. M.) and to 1919 (E. S. M.); May 11, 1927 (L. S. K.) to Aug. 2, 1913 (L. S. K.).

Eastern Cardinal (*Richmondia cardinalis cardinalis*)

E—Not common permanent resident but increasing; at northern limit of its breeding range; found in certain localities about the Orange Reservation, Montclair and Essex Fells, etc. Nest, May 18, 1933 (F. W.).

H—Akhurst reports years ago (1878) pair breeding near Jersey City (Bicknell, Bull. N. O. C. III, 1878, p. 132); rare; April 11, 1915 (E. S. M.), and Jan. 26, 1920, at Arlington (O. P. M.).

Rose-breasted Grosbeak (*Hedymeles ludovicianus*)

Summer resident.

E—Locally common; April 30, 1934 (L. S. K.) to Oct. 9, 1932 (Mr. and Mrs. Theo. Edison); Dec. 4, 1932 (Mrs. G. G. Fry). Nest, June 10, 1927 (W. R.).

H—Formerly bred (O. P. M.); May 11 and 14, 1927 (E. S. M.); specimen in hotel at Homestead.

Eastern Blue Grosbeak (*Guiraca caerulea caerulea*)

E—May 11, 1935 (Mrs. Scott Bailey) and May 15, 1932 (Mrs. C. S. H.) in garden in Montclair.

H—Several individuals noticed in a single day in spring by Mr. Akhurst near Snake Hill before 1878 (E. P. Bicknell in Bull. N. O. C. III, 1878, p. 132); one seen at Arlington (O. P. M.) about September, 1925.

Indigo Bunting (*Passerina cyanea*)

Very common summer resident.

E—May 7, 1926 (R. F. H.) to Oct. 9, 1932.

H—May 6, 1928 (E. S. M.) to Aug. 2, 1913 (L. S. K.); summer resident (nest) on Snake Hill, 1933.

Dickcissel (*Spiza americana*)

H—In 1851 common summer resident at Hoboken (Auk, 1891, p. 395). This species has peculiarly disappeared.

Eastern Evening Grosbeak (*Hesperiphona vespertina vespertina*)

Winter visitant, rare or irregular.

E—Recorded as follows: Probable record, Nov. 17, 1923 (Montclair Bird Club) Verona; Dec. 31, 1929 (W. R.), Caldwell; Jan. 16, 1927 (C. A. U.), and Jan. 26, 1930 (C. A. U.) in Orange Reservation; March 14, 1920 (Mrs. C. S. H.) at Verona.

H—Jan. 26 to Feb. 23, 1920, at Arlington (O. P. M. and G. A. King).

Eastern Purple Finch (*Carpodacus purpureus purpureus*)

E—Common transient; locally common about feeding stations in winter; sometimes practically absent at this season; Sept. 29, 1931 to May 12, 1928 (Mrs. C. S. H.).

H—Oct. 14, 1933, North Hudson Park.

Canadian Pine Grosbeak (*Pinicola enucleator leucura*)

Irregular and sometimes common winter visitant.

E—Dec. 22, 1929 to Feb. 16, 1930 (C. A. U.); also autumn 1884 (Trippet), and Dec. 25, 1903 (V. E. Gorman and F. T. Morrison, *Bird-Lore*, January-February 1904 census).

H—Abundant at Weehawken, Oct., 1836 to March, 1837 (Ward—Trans. N. Y. Acad. Sci., IV, p. 5); Dec. 20, 1913, Snake Hill (spec. coll. by L. S. K.).

European Goldfinch (*Carduelis carduelis*)

E—Dec. 3, 1911 at West Orange, and Jan. 4, 1913 at Caldwell (L. S. K.).

H—Introduced at Hoboken in 1878 (Eaton, "Birds of New York," p. 281, Vol. 2). Last record, May 23, 1907, at Arlington (E. S. M.).

Redpoll (*Acanthis linaria linaria*)

Irregular winter visitant; at times common.

E—Dec. 20, 1926 (R. F. H.) to March 14, 1934 (L. S. K.).

H—Arlington, Feb. 23, 1920 (O. P. M.) to March 8, 1908 (L. S. K.).

Northern Pine Siskin (*Spinus pinus pinus*)

Irregular transient and uncommon winter visitant.

E—Oct. 21, 1928 to May 20, 1923 (R. F. H.).

H—Dec. 10, 1911 (L. S. K.) to March 10, 1917, Westside Park (L. S. K.).

Goldfinch (*Spinus tristis tristis*)

Common permanent resident; sometimes scarce in winter.

E—Migrants at Newark meadows, Aug. 21, 1932 to May 30, 1931, and winter. Nest, July 26, 1926 (W. R.).

H—Permanent resident; formerly bred at Arlington to 1928 (E. S. M.).

Red Crossbill (*Loxia curvirostra pusilla*)

Very irregular transient and winter visitant.

E—Oct. 17, 1896 (W. E. D. Scott) to April 10, 1925 (Mrs. C. S. H.); very common winter 1899-1900 (A. R. Dugmore).

H—Recorded in winter at Arlington (O. P. M.).

White-winged Crossbill (*Loxia leucoptera*)

E—Recorded only in winter of 1899-1900 when it was reported as common with preceding species (Babson and Dugmore,—Stone, p. 224).

Red-eyed Towhee (*Pipilo erythrophthalmus erythrophthalmus*)

Summer resident.

E—Very common as breeder and transient; a few winter records, especially in December; April 14, 1929 to Dec. 26, 1928 (R. F. H.); winter 1922 and 1923. Nest and eggs, May 8, 1932 (Paulson).

H—April 16, 1927 to Dec. 28, 1924 at Arlington (E. S. M.); formerly bred to 1922 (E. S. M.).

Ipswich Sparrow (*Passerculus princeps*)

E—Jan. 25, 1934 (L. S. K.) at Port Newark.

Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*)

E—Common migrant; resident on Newark marshes; March 11, 1928 (E. S.) to June 5, 1917 (R. H. H.); Oct. 26, 1930, and Jan. 18, 1931 in Montclair region.

H—Spring and fall transient; may winter; April 8, 1933 at North Hudson Park; Sept. 30, 1934 to Dec. 23, 1929.

Eastern Grasshopper Sparrow (*Ammodramus savannarum australis*)

Rare and local breeder.

E—March 20, 1894, West Orange—specimen taken by Van Rensselaer in Dwight collection—to Oct. 18, 1931 (W. F. E., J. L. E. and C. A. U.). Nest and eggs, May 30, 1927 (E. S.) to July 4, 1871 (H. Herrick). Juvenile taken, July 19, 1898 (Van Rensselaer).

H—Formerly bred at Arlington to June 15, 1913 (E. S. M.); one bird in song, Secaucus, Aug. 8, 1931 (C. A. U. and J. L. E.).

Eastern Henslow's Sparrow (*Passerherbulus henslowi susurrans*)

E—Three records—May 5, 1928, May 11, 1935 (E. S.); specimen taken by Herrick recorded from Chatham, N. J., without data (probably Dickinson's Neck).

Acadian Sparrow (*Ammodramus caudacuta subvirgata*)

Rare transient; probably to be found more often by careful search.

E—Recorded at Port Newark on Sept. 30, 1929 (R. T. Peterson).

H—One seen in marsh along Hackensack near Snake Hill, May 30, 1934.

Sharp-tailed Sparrow (*Ammodramus caudacuta caudacuta*)

Summer resident.

E—Much less common than formerly at Port Newark; April 30, 1935 (L. S. K.) to Oct. 23, 1932. Juvenile, Aug. 17, 1930.

H—Formerly bred at Kearney prior to fill (O. P. M.); still breeds along the Hackensack in Jersey City (1935); June 6, 1896 to Aug. 19, 1899, at Greenville, Jersey City (W. de W. Miller).

Nelson's Sparrow? (*Ammodramus caudacuta nelsoni*)

E—Record of a Sharp-tailed sparrow reported by Thurber (Stone, p. 233) as being taken on the Passaic River below Chatham, might have been this species, owing to its inland distribution.

Northern Seaside Sparrow (*Ammospiza maritima maritima*)

E—A few pairs still occur on edge of Newark Bay at Port Newark; April 30, 1934 (L. S. K.); April 30, 1931 to Oct. 2, 1934 (L. S. K.).

H—Formerly present at Greenville, June 6, 1896 to Aug. 19, 1899 (W. de W. Miller).

Eastern Vesper Sparrow (*Pooecetes gramineus gramineus*)

E—Local and uncommon summer resident; March 30, 1929 (Montclair Bird Club) to Dec. 26, 1921 (Robert Barbour). Nest and 4 eggs, May 10, 1878 (Herrick). Nest, June 1, 1927 (E. S.).

H—Transient; not common; April 10, 1920 (E. S. M.) and April 12, 1922 at Arlington (E. S. M.); Oct. 14, 1933 at North Hudson Park.

Eastern Lark Sparrow (*Chondestes grammacus grammacus*)

E—One seen (C. A. U) on the Union County side of Bound Creek, might have just crossed the line, Oct. 28, 1928 (C. A. U.); one picked up dead, Sept. 19, 1934 (L. S. K.).

Slate-colored Junco (*Junco hyemalis hyemalis*)

E—Abundant winter visitant and migrant; Sept. 25, 1932 (J. L. E.) to May 5, 1931.

H—Abundant migrant and common winter visitant; Oct. 14, 1933 to May 5, 1928 (E. S. M.).

Eastern Tree Sparrow (*Spizella arborea arborea*)

Abundant migrant and winter visitant.

E—Oct. 30, 1930 (Mrs. C. S. H.) to April 25, 1926 (J. L. E.).

H—Oct. 30, 1927 (E. S. M.) and Oct. 30, 1932 to April 18, 1920 (E. S. M.).

Eastern Chipping Sparrow (*Spizella passerina passerina*)

Very common summer resident, may occur in winter.

E—March 31, 1929 (W. R.) to Dec. 24, 1923 (Barbour), and Jan. 4, 1935 (W. R.). Nest and eggs, May 18, 1928 (E. S.).

H—Formerly bred at Arlington (O. P. M.); to 1919 (E. S. M.); March 26, 1926 (E. S. M.) to Oct. 14, 1933 at North Hudson Park. Nests, May 29, 1870, 1, 2 eggs, 1, 2 young, 1 egg, at Weehawken (H. Herrick).

Eastern Field Sparrow (*Spizella pusilla pusilla*)

Resident.

E—Very common summer resident; less numerous in winter; nest, May 15, 1927 (W. R.).

H—Arlington, formerly bred (O. P. M.); to 1928 (E. S. M.); still breeds in North Hudson Park, April 14, 1935 to Oct. 14, 1933; winter 1916 and 1921 (E. S. M.).

White-crowned Sparrow (*Zonotrichia leucophrys leucophrys*)

Uncommon but regular migrant; more often seen in fall than spring.

E—April 20, 1928 (E. S.) to May 21, 1927 (Loomis); Oct. 18, 1931 to Oct. 26, 1930.

H—Uncommon migrant; May 14, 1920 (E. S. M.) and May 19, 1915, at Arlington (E. S. M.); Oct. 20, 1911, Arlington (E. S. M.), and Oct. 14, 1933, North Hudson Park.

White-throated Sparrow (*Zonotrichia albicollis*)

Abundant transient; common in winter; accidental in summer.

E—Sept. 7, 1932 (W. R.) to May 26, 1910 (L. S. K.); July 14 to 31, 1923, an immature bird of this species seen, captured and banded (R. H. H.). In 1933, Mrs. C. S. Hegeman had a pair of birds which lingered into June, one being seen into July. There is a set of eggs in the Hallinan collection in Paterson Museum, marked as taken in Short Hills, June 5, 1894, but there may be some error about the locality.

H—Oct. 14, 1933 to May 28, 1927 (E. S. M.); a singing male in Secaucus cedar swamp carefully observed July 7, 1935 (J. L. E., R. T. Peterson, R. C. and W. F. E.).

Eastern Fox Sparrow (*Passerella iliaca iliaca*)

Common transient, rare and sometimes absent in winter.

E—Earliest spring migrant, Feb. 27, 1935, Montclair (Mrs. C. S. H.); Oct. 20, 1929 (J. L. E.) to April 30, 1934 (L. S. K.).

H—Oct. 22, 1933 to Dec. 10, 1917 (E. S. M.); March 3, 1935 to April 8, 1933; also winter (E. S. M.); 1920 and 1921, at Arlington.

Lincoln's Sparrow (*Melospiza lincolni lincolni*)

Rare but regular migrant.

E—May 2, 1928 (Loomis) to May 13, 1923 (R. F. H.); Sept. 6, 1934 (L. S. K.) and Sept. 24, 1896 (collected by W. E. D. Scott) to Oct. 6, 1923 (R. H. H.).

Swamp Sparrow (*Melospiza georgiana*)

Abundant summer resident in suitable localities; rare elsewhere except as a migrant and uncommon in winter.

E—Nest and eggs, May 15, 1929 (W. R.).

H—Arlington, March 22, 1924 (E. S. M.) to Nov. 29, 1931; winter, Jan. 7, 1932, Feb. 9, 1920 (E. S. M.), etc.

Eastern Song Sparrow (*Melospiza melodia melodia*)

Permanent resident.

E—Abundant breeder; less common in winter. Nest and eggs, April 30, 1928 (E. S.).

H—Common summer resident and even breeds in Hoboken. Nest and 3 eggs, May 22, 1869, Bull's Ferry (H. Herrick).

Lapland Longspur (*Calcarius lapponicus lapponicus*)

Irregular migrant and winter visitant on marshes.

E—Nov. 14, 1926 (C. A. U.) to March 22, 1922 (W. de W. Miller).

H—Recorded at Bayonne, March 3, 1935, and Feb. 22, 1933, both times with flock of Horned Larks in City Park.

Eastern Snow Bunting (*Plectrophenax nivalis nivalis*)

E—Rare winter visitant except on Newark marshes; Nov. 2, 1930 (J. L. E.) to Feb. 19, 1905 (L. S. K.).

Shorebirds on the North and Central New Jersey Coast

By CHARLES A. URNER

Persistent combing of the salt marshes, mud flats, shallows and beaches of the New Jersey coast from Newark Bay to Brigantine during 1932, 1933, and 1934 yielded sight records of a total of 38 species and subspecies, bringing the 7-year total to 39.

The writer continued, through 1932, 1933 and 1934, the compilation of numbers of individuals of each species seen on field trips over this area of the New Jersey Coast by observers trained in correct identification of shorebirds. He has added to his own counts the totals observed by Julian K. Potter and certain other members of Delaware Valley Ornithological Club, James L. Edwards, Warren F. Eaton, Charles K. Nichols, Lester L. Walsh, C. D. Brown and other members of Linnæan Society of New York. The results have been summarized by the same method used in the four preceding years [see *Auk*, 1929, p. 314; 1930, p. 424; 1931, p. 418; 1932, p. 470].

NUMBER OF LOCALITY COUNTS

	North Migration			South Migration		
	1932	1933	1934	1932	1933	1934
Newark Meadows - - - - -	12	11	4	55	57	49
Manasquan River - - - - -	6	10	3	9	12	13
Seaside Park - - - - -	7	6	2	3	8	11
Barnegat Inlet - - - - -	2	1	1	12	3	14
Barnegat Marshes - - - - -	1	4	4	10	6	13
Beach Haven Inlet - - - - -	6	5	4	15	15	31
Tuckerton Marshes - - - - -	4	7	5	21	15	24
Brigantine and Absecon - - - - -	6	8	11	23	34	13
Totals - - - - -	44	52	34	148	150	168

THE DISTRIBUTION OF TRIPS ON WHICH ANY SHOREBIRDS WERE SEEN

	North Migration			South Migration		
	1932	1933	1934	1932-33	1933-34	1934-35
February - - - - -	—	9	—	2	1	4
March - - - - -	2	12	7	39	26	28
April - - - - -	18	16	14	33	41	48
May - - - - -	22	13	13	27	30	30
June - - - - -	2	2	—	22	15	16
July - - - - -	—	—	—	17	15	10
August - - - - -	—	—	—	5	7	18
September - - - - -	—	—	—	3	10	5
October - - - - -	—	—	—	—	5	—
November - - - - -	—	—	—	—	—	—
December - - - - -	—	—	—	—	—	—
January - - - - -	—	—	—	—	—	—
February - - - - -	—	—	—	—	—	—
Totals - - - - -	44	52	34	148	150	168

The number and seasonal distribution of trips and localities covered has varied more or less so that the totals are not exactly comparable. But an even more important variable factor than number of trips has been the feeding conditions of the areas covered. This has had great influence during the summer on the number of birds stopping and tarrying on areas such as Newark Meadows and Barnegat Marshes and this variation must be considered in comparing one year with another, the totals of those species preferring fresh or brackish muddy shallows and marshes.

1932—Summer and fall conditions were more favorable than in the two previous years with more fresh water ponds on the Newark fill and the various brackish marshes.

1933—Summer and fall conditions were still more favorable on Newark fill near the Airport where, because of shortage of funds, no ditches were dug or dikes repaired by the Mosquito Commission and where the brackish sewage-polluted waters of Bound Creek flooded a large section of the fill every high tide, leaving ideal shallow ponds for shore-bird feeding. On other areas of the fill shallow rain water ponds were a great attraction, and there was considerable bare ground or ground covered only with low growths, furnishing good feeding conditions.

1934—On Newark Meadows ditching and dike repair, coupled with protracted mid-summer drought, dried the excellent feeding grounds of former years near the Airport, and *Phragmites* spread over more of the bare ground making the site less attractive to shorebirds. South of Bound Creek, toward Elizabeth, the unfilled but very dry marsh was burned over in places and over it all grasshoppers and insects abounded. Here, in spite of some extension of the *Phragmites* patches, several species, chiefly Lesser Yellow-legs and Upland Plover, were present in numbers and there was enough water in some of the ponds to attract a fair variety of species. However, except for a few species there was less accumulating of migrants than usual on Newark Meadows and conditions were decidedly less favorable for holding the smaller species, which must have gone elsewhere. Many congregated on a piece of salt marsh along Raritan River, being filled in by the usual sand-sucking method. The dryness of Newark Meadows

explains much of the drop in the totals for Lesser Yellow-legs and Semipalmated Sandpiper. Conditions farther south in the area were quite favorable.

The numbers of species and subspecies recorded during the three years follow:

	1932	1933	1934
Northbound - - - - -	24	26	27
Southbound - - - - -	34	33	36
Totals - - - - -	37	34	36

From the three years' records the following observations are pertinent:

Charadrius melodus. Piping Plover.—Extreme dates, Mar. 17 to Nov. 6. Some increase. Good north flight Mar. 16, 1933, and, due to colder spring possibly, April 8, 1934. High counts, southbound, July 16, 2 and 17 respectively.

Charadrius semipalmatus. Semipalmated Plover.—Extreme dates April 4 to June 4; July 7 to Dec. 24. Principal movements, northbound, May 7 to 28; southbound, Aug. 4 to Sept. 3. High counts, northbound, May 18, 7 and 20; southbound, Aug. 6, Sept. 3 and Aug. 12.

Pagolla w. wilsonia. Wilson's Plover.—One record, Sept. 15, 1934, by Julian K. Potter at Brigantine.

Oxyechus v. vociferus. Killdeer.—Present all year. High counts, northbound, May 18, Feb. 26 and May 13; southbound, July 9, 12 and 7.

Pluzialis d. dominica. American Golden Plover.—Totals for 1932 were a new high for recent years; sharp decrease since. First spring record for Newark Meadows, May 30, 1933. Extreme dates, fall, Aug. 20 to Dec. 4; principal movements middle two weeks in September. High counts, southbound, Sept. 15, 20 and 8.

Squatarola squatarola. Black-bellied Plover.—Present most of year in some numbers; sometimes all year. Principal movement north, May 7 to 28; south Aug. 13 to Oct. 15, occasionally late. High counts, northbound, May 18, 28, and 20; southbound, Oct. 2, Sept. 17 and Nov. 4.

Arenaria interpres morinella. Ruddy Turnstone.—Extreme dates, northbound, May 7 to June 4; southbound, July 23 to Dec. 2. Principal movement, northbound, May 14 to 28; southbound, Aug. 7 to Sept. 3. High counts, northbound, May 18, 28 and 20; southbound, Aug. 20, 25 and 12.

Philohela minor. American Woodcock.—Scattered records, only on coast. Extreme date, Feb. 26 to Nov. 12.

Capella delicata. Wilson's Snipe.—Extreme dates: Feb. 26 to May 16; Sept. 2 to Dec. 24. Principal movements not conclusively shown. High counts, northbound, April 17, 1, and 28; southbound, Oct. 2, Sept. 24 and Oct. 14.

Phaeopus hudsonicus. Hudsonian Curlew.—Probably some further increase. Extreme dates, northbound, April 29 to May 27; southbound, July 2 to Sept. 17. Principal movements, northbound, May 7 to 27; southbound, July 21 to Sept. 3. High counts, northbound, May 18, 14 and 16; southbound, July 23, 30 and 21.

Bartramia longicauda. Upland Plover.—Some increase indicated. Spring data inconclusive. Principal movement south, Aug. 1 to 30; latest, Sept. 9. High counts, Aug. 14, 15 and 11.

Actitis macularia. Spotted Sandpiper.—Extreme dates: May 5 to Oct. 1. Principal southbound movement, July 14 to Sept. 3. High counts, southbound, July 16, Aug. 16 and Aug. 18.

Tringa s. solitaria. Eastern Solitary Sandpiper.—Coastal records scattered, but becoming more frequent. Extreme dates: northbound, May 1 to 18; southbound, July 11 to Oct. 14.

Catoptrophorus semipalmatus, subsp.? Willet.—Numbers very variable from year to year. Spring records few, May 7 to 21. All evidence indicates that summer birds are moving south. Extreme dates, July 10 to Oct. 14. Principal movement Aug. 15 to Sept. 8. High counts, Sept. 3, Aug. 15 and Aug. 25.

RANKING OF SHOREBIRDS ON NEW JERSEY COAST AND SALT MARSHES Spring Flight of 1932

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Semipalmated Sandpiper - - - - -	1	13	4,000	11,454
Semipalmated Plover - - - - -	2	12	4,000	6,443
Black-bellied Plover - - - - -	3	9	2,000	2,786
Eastern Dowitcher - - - - -	4	8	1,500	1,971
Least Sandpiper - - - - -	5	7	1,500	2,150
Greater Yellow-legs - - - - -	6	18	100	435
Ruddy Turnstone - - - - -	7	7	500	1,212
Sanderling - - - - -	8	6	160	495
Hudsonian Curlew - - - - -	9	4	400	580
Killdeer - - - - -	10	16	6	55
Spotted Sandpiper - - - - -	11	9	10	44
Piping Plover - - - - -	12	7	20	42
Red Phalarope - - - - -	13	1	300	327
American Knot - - - - -	14	4	100	185
Red-backed Sandpiper - - - - -	15	6	25	40
Lesser Yellow-legs - - - - -	16	5	10	23
Solitary Sandpiper - - - - -	17	5	3	12
Wilson's Snipe - - - - -	18	4	6	18
American Woodcock - - - - -	19	3	3	5
Hudsonian Godwit - - - - -	20	1	2	2
White-rumped Sandpiper - - - - -	21	1	2	2
Western Sandpiper - - - - -	22	1	1	1
Northern Phalarope - - - - -	23	1	1	1
Wilson's Phalarope - - - - -	24	1	1	1

Totanus melanoleucus. Greater Yellow-legs.—Possibly some but no pronounced recent increase. Extreme dates, northbound, March 25 to June 24; southbound, June 27 to Dec. 2. Principal movement, northbound, April 23 to May 18; southbound, July 30 to Oct. 2. High counts, northbound, May 7, April 29, May 5; southbound, Aug. 13, Sept. 2 and Sept. 29.

Totanus flavipes. Lesser Yellow-legs.—Numbers seen and tarrying vary widely with feeding conditions on Newark Meadows. Probably gradual continued increase. Extreme dates, northbound, scattered few May 1 to 18 but record num-

RANKING OF SHOREBIRDS ON NEW JERSEY COAST
AND SALT MARSHES
Southbound Flight of 1932

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Semipalmated Sandpiper	1	86	2,700	27,651
Lesser Yellow-legs	2	88	800	6,745
Eastern Dowitcher	3	56	2,450	9,436
Sanderling	4	56	1,000	8,795
Least Sandpiper	5	84	400	2,295
Semipalmated Plover	6	78	300	4,860
American Knot	7	32	790	2,907
Pectoral Sandpiper	8	59	125	954
Black-bellied Plover	9	64	75	935
Greater Yellow-legs	10	66	75	847
Killdeer	11	85	40	570
American Golden Plover	12	30	300	2,175
Hudsonian Curlew	13	24	350	2,140
Spotted Sandpiper	14	70	25	418
Red-backed Sandpiper	15	26	100	802
Ruddy Turnstone	16	39	75	407
Stilt Sandpiper	17	44	30	264
Western Sandpiper	18	45	25	218
Willet	19	20	32	90
Piping Plover	20	24	20	160
Upland Plover	21	14	25	110
White-rumped Sandpiper	22	24	8	57
Wilson's Snipe	23	10	10	35
Avocet	24	7	3	21
Wilson's Phalarope	25	9	2	10
Buff-breasted Sandpiper	26	9	1	9
American Woodcock	27	4	3	6
Marbled Godwit	28	5	2	6
Red Phalarope	29	1	6	6
Solitary Sandpiper	30	7	1	7
Baird's Sandpiper	31	2	1	2
Purple Sandpiper	32	1	2	2
Ruff	33	1	2	2
Long-billed Dowitcher	34	1	1	1
Northern Phalarope	35	1	1	1

bers with maximum of 24, May 12, spring of 1934, which may be indicative of a broader migration route as numbers increase; southbound June 26 to Nov. 12. Principal movements, southbound, July 13 to Oct. 1. High counts, southbound, July 28, July 19 and Aug. 30. Usually two main movements with peaks in July and September, though August movement at times quite heavy.

Calidris canutus rufus. American Knot.—Wide variation in numbers seen from year to year but 1934 totals encouraging. Extreme dates, northbound, May 7 to June 4; southbound, July 16 to Jan. 13. Principal movements, northbound, May 16 to 28; southbound, July 23 to Aug. 18. High counts, northbound, May 18, 28 and 21; southbound, Aug. 1, Aug. 6 and July 28.

Arquatella maritima. Purple Sandpiper.—Some recent increase in scattered winter records, probably due to increasing number of artificial rock jetties which furnish food supply. Extreme dates, Nov. 18 to April 7.

Pisobia melanotos. Pectoral Sandpiper.—Probably some increase. Spring records few, May 7 to 16. Extreme dates, southbound, July 10 to Nov. 12. Prin-

RANKING OF SHOREBIRDS ON NEW JERSEY COAST
AND SALT MARSHES
Spring Flight of 1933

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Semipalmated Sandpiper - - - - -	1	12	2,500	10,979
Black-bellied Plover - - - - -	2	17	600	2,244
Eastern Dowitcher - - - - -	3	11	5,000	6,909
Least Sandpiper - - - - -	4	12	700	1,691
Semipalmated Plover - - - - -	5	12	500	1,973
Red-backed Sandpiper - - - - -	6	15	500	906
Ruddy Turnstone - - - - -	7	9	700	2,520
Sanderling - - - - -	8	13	400	1,024
Greater Yellow-legs - - - - -	9	22	79	443
Killdeer - - - - -	10	25	20	156
American Knot - - - - -	11	8	250	670
Piping Plover - - - - -	12	9	39	123
Hudsonian Curlew - - - - -	13	5	150	276
Spotted Sandpiper - - - - -	14	10	10	42
White-rumped Sandpiper - - - - -	15	8	15	64
American Woodcock - - - - -	16	11	6	40
Northern Phalarope - - - - -	17	2	24	34
Wilson's Snipe - - - - -	18	7	3	14
Western Sandpiper - - - - -	19	3	5	7
Red Phalarope - - - - -	20	1	9	9
Willet - - - - -	21	4	2	6
Upland Plover - - - - -	22	2	3	5
Solitary Sandpiper - - - - -	23	2	1	2
Lesser Yellow-legs - - - - -	24	1	1	1
Pectoral Sandpiper - - - - -	25	1	1	1
American Golden Plover - - - - -	26	1	1	1

cipal movements variable; southbound, July 23 to Oct. 1. High counts, southbound, Sept. 15, Sept. 17 and Aug. 18.

Pisobia fuscicollis. White-rumped Sandpiper.—Numbers vary widely year to year. Extreme dates, northbound, May 6 to 30; southbound, July 14 to Nov. 12. Principal movements, northbound, May 7 to 27; southbound, Aug. 30 to Oct. 15. High counts, northbound, May 8, 21 and 27; southbound, Sept. 28, 10 and 16.

Pisobia bairdi. Baird's Sandpiper.—No spring records. Southbound records show a slight average increase. Extreme dates, Aug. 18 to Oct. 7. Principal movements, Sept. 8 to Oct. 7. High counts, Sept. 10, 30 and 8.

RANKING OF SHOREBIRDS ON NEW JERSEY COAST
AND SALT MARSHES
Southbound Flight of 1933

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Semipalmated Sandpiper	1	72	4,000	52,146
Lesser Yellow-legs	2	70	700	12,445
Semipalmated Plover	3	67	500	5,318
Eastern Dowitcher	4	61	500	3,116
Least Sandpiper	5	65	400	3,439
Sanderling	6	46	500	6,567
Greater Yellow-legs	7	74	150	1,328
Black-bellied Plover	8	59	350	1,530
Western Sandpiper	9	48	500	1,121
Pectoral Sandpiper	10	56	300	1,663
Killdeer	11	80	50	964
Red-backed Sandpiper	12	31	324	2,469
White-rumped Sandpiper	13	41	200	894
Stilt Sandpiper	14	45	60	716
Spotted Sandpiper	15	55	25	296
Hudsonian Curlew	16	19	250	888
Ruddy Turnstone	17	21	34	387
American Golden Plover	18	23	32	143
American Knot	19	25	25	173
Upland Plover	20	21	30	143
Willet	21	17	30	205
Piping Plover	22	20	10	107
Wilson's Snipe	23	21	6	31
Wilson's Phalarope	24	19	6	33
Solitary Sandpiper	25	12	2	20
Hudsonian Godwit	26	10	2	11
Purple Sandpiper	27	4	5	10
Baird's Sandpiper	28	7	2	9
Marbled Godwit	29	4	4	7
Northern Phalarope	30	6	2	7
Long-billed Dowitcher	31	5	1	5
Buff-breasted Sandpiper	32	2	1	2
American Woodcock	33	1	1	1

Pisobia minutilla. Least Sandpiper.—Extreme dates, northbound, April 28 to June 4; southbound, June 23 to Nov. 4. Principal movements, northbound, April 29 to May 25; southbound, July 2 to Sept. 22. High counts, northbound, May 18, 7 and 12; southbound, July 13, 15 and 14. Sometimes fairly large September movement.

Erolia testacea. Curlew Sandpiper.—One seen in flight Oct. 28, 1934; swung close several times and passed at varying levels with mixed flocks. Bird very light below, whiter than Red-backs, fairly dark above with distinct wing stripe but not as prominent as Red-backs; clear white rump and long evenly curved bill. Note definitely different from either White-rump or Red-back. Size comparison in conformity.

Pelidna alpina sakhalina. Red-backed Sandpiper.—Increasing winter resident from Beach Haven south up to extreme cold winter of 1933-34, since which the northern limit of wintering flocks has moved slightly south again. Extreme dates, July 9 to June 4, principally Sept. 30 to Feb. 12; few July and August often in

RANKING OF SHOREBIRDS ON NEW JERSEY COAST
AND SALT MARSHES
Spring Flight of 1934

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Eastern Dowitcher - - - - -	1	11	1,000	2,296
Semipalmated Sandpiper - - - - -	2	11	800	2,418
Black-bellied Plover - - - - -	3	12	800	1,843
Least Sandpiper - - - - -	4	8	250	538
Greater Yellow-legs - - - - -	5	16	100	346
Red-backed Sandpiper - - - - -	6	14	100	383
Semipalmated Plover - - - - -	7	10	200	488
Ruddy Turnstone - - - - -	8	5	150	451
Piping Plover - - - - -	9	13	28	153
Sanderling - - - - -	10	10	50	258
Hudsonian Curlew - - - - -	11	5	200	295
Killdeer - - - - -	12	16	10	56
American Knot - - - - -	13	5	50	112
Spotted Sandpiper - - - - -	14	7	20	51
Lesser Yellow-legs - - - - -	15	4	25	31
American Woodcock - - - - -	16	5	3	7
White-rumped Sandpiper - - - - -	17	4	10	18
Solitary Sandpiper - - - - -	18	4	8	21
Wilson's Snipe - - - - -	19	2	2	4
Pectoral Sandpiper - - - - -	20	2	1	2
Red Phalarope - - - - -	21	1	2	2
Upland Plover - - - - -	22	1	1	1
Western Sandpiper - - - - -	23	1	1	1
Purple Sandpiper - - - - -	24	1	1	1
Stilt Sandpiper - - - - -	25	1	1	1
Wilson's Phalarope - - - - -	26	1	1	1

breeding plumage. Might include stray Dunlins but not identified. High counts, northbound, May 15, Feb. 12 and April 29; southbound, Oct. 16, Dec. 24 and Nov. 25.

Limnodromus g. griseus. Eastern Dowitcher.—Numbers vary but gains of recent years fairly sustained though rate of increase has slowed. Extreme dates, northbound, April 28 to June 18; southbound, June 30 to Nov. 4. Principal movements, northbound, April 29 to May 21; southbound, July 7 to Aug. 25. High counts, northbound, May 18, 7 and 20; southbound, July 10, 16 and 28.

RANKING OF SHOREBIRDS ON NEW JERSEY COAST
AND SALT MARSHES
Southbound Flight of 1934

	Rank	Times Seen	Largest No. on 1 Locality Trip	Total No. All Trips
Semipalmated Sandpiper	1	65	4,000	15,575
Eastern Dowitcher	2	45	1,200	5,435
Lesser Yellow-legs	3	62	400	5,249
Semipalmated Plover	4	63	350	4,426
Sanderling	5	40	500	4,232
Least Sandpiper	6	50	250	1,382
Killdeer	7	75	55	777
Pectoral Sandpiper	8	45	350	1,146
Black-bellied Plover	9	57	150	1,097
Red-backed Sandpiper	10	27	500	1,812
American Knot	11	20	1,000	3,258
Greater Yellow-legs	12	60	60	701
Hudsonian Curlew	13	19	960	2,896
Western Sandpiper	14	33	100	301
Spotted Sandpiper	15	45	30	315
Ruddy Turnstone	16	28	50	273
Piping Plover	17	25	50	296
Willet	18	30	35	162
Upland Plover	19	19	55	163
Stilt Sandpiper	20	20	30	94
Solitary Sandpiper	21	20	7	36
American Golden Plover	22	7	40	60
White-rumped Sandpiper	23	14	10	34
Wilson's Snipe	24	11	6	27
American Woodcock	25	5	3	7
Wilson's Phalarope	26	3	4	6
Marbled Godwit	27	7	1	7
Long-billed Dowitcher	28	5	1	5
Purple Sandpiper	29	2	3	4
Baird's Sandpiper	30	3	1	3
Buff-breasted Sandpiper	31	3	1	3
Northern Phalarope	32	1	1	1
Red Phalarope	33	1	1	1
Hudsonian Godwit	34	1	1	1
Wilson's Plover	35	1	1	1
Curlew Sandpiper	36	1	1	1

Limnodromus g. scolopaceus. Long-billed Dowitcher.—Probably not as rare as the scarcity of records indicates. No spring identifications. Scattered fall records, Aug. 18 to Nov. 4 based on sight and note identification only.

Micropalma himantopus. Stilt Sandpiper.—One spring record May 12, 1934. Extreme dates, southbound, July 7 to Oct. 12. Principal movements, July 19 to Sept. 30. High counts, Aug. 21, Sept. 2 and Aug. 5.

Ereunetes pusillus. Semipalmated Sandpiper.—Decrease in 1934 records probably due to poorer feeding conditions though some evidence of fewer birds in recent years. Extreme dates, northbound, April 29 to June 18; southbound, July 2 to Jan. 16. Principal movements, northbound, May 7 to June 4; southbound, July 15 to Sept. 30. High counts, northbound, May 18, 21 and 16; southbound, July 31, July 30 and Aug. 26.

Ereunetes maurii. Western Sandpiper.—Extreme dates, northbound, May 7 to 25; southbound, July 4 to Dec. 26. Principal movements, northbound, May 7 to 25; southbound, averaging later than Semipalmated, July 16 to Sept. 16. High counts, northbound, May 25, 7 and 12; southbound, Aug. 28, Sept. 11 and Sept. 16.

Tryngites subruficollis. Buff-breasted Sandpiper.—No spring records. Extreme scattered dates, southbound, Aug. 30 to Oct. 9.

Limosa fedoa. Marbled Godwit.—No spring records. Extreme scattered dates, southbound, Aug. 5 to Sept. 10. High counts, Aug. 20, Sept. 10 and Aug. 5.

Limosa haemastica. Hudsonian Godwit.—Spring records, May 15 and 16; southbound, Aug. 23 to Sept. 30, chiefly Sept. 8 to 30. High counts Sept. 17 and 8.

Philomachus pugnax. Ruff.—One record, 2 birds on Tuckerton Marsh, Oct. 2, 1932.

Crocethia alba. Sanderling.—Winters in small numbers usually, though frozen out some years. Extreme dates, July 2 to June 4. Principal movements, northbound, May 8 to 28; southbound, July 22 to Sept. 17. High counts, northbound, May 8, 14 and 20; southbound, July 29, July 30 and Aug. 25.

Recurvirostra americana. Avocet.—The three birds seen by many observers on Newark Meadows, Sept. 16 to Oct. 4, 1932, were, according to an anonymous communication, the remnant of a flock of 12 birds first seen at Bay Pond, Sept. 4, one being in breeding plumage, all of which were probably illegally killed except the three in question, one of which was wounded.

Phalaropus fulicarius. Red Phalarope.—Spring records increasing; seen each of the three years. Extreme dates, May 7 to 15. One fall record, Aug. 18, 1934, at Beach Haven.

Steganopus tricolor. Wilson's Phalarope.—Records increasing. Seen May 18, 1932, and May 12, 1934. Fall dates more frequent. Extreme dates, Aug. 5 to Oct. 8, chiefly Sept. 3 to Oct. 8. High counts, Sept. 3, Aug. 30 and Aug. 8.

Lobipes lobatus. Northern Phalarope.—Extreme dates, northbound, May 7 to 28; southbound, Aug. 23 to Sept. 18, chiefly Sept. 8 to 18. High counts, Sept. 8, Aug. 23 and Sept. 18.

In the accompanying tables the species have been ranked by averaging the ranking in three particulars: (1) number of times seen; (2) largest number seen in one locality on one day, and (3) totals of numbers recorded on all trips, the latter total of course representing considerable duplication since the same individuals are counted more than once in the case of those species which linger for some time in favorable feeding haunts. This duplication is most marked in the fall in species such as Semipalmated Sandpiper, Lesser Yellow-legs, Dowitcher, Least Sandpiper and Semipalmated Plover, and improves the showing of these in comparison with birds which are seen merely passing on migration. Moreover, trips were not made every day and the main flight of some species may have been witnessed one year and missed the next.

Because of the variable repetitive factor and other factors mentioned no single year's counts can be considered certainly comparable either between different species the same year or between the same species different years. However, the data of a series of years will offer indications, in a general way, of any marked change in the status of the various shorebird species on the New Jersey coast.

The observed trend toward more wintering shorebirds, especially Red-backed Sandpiper and Black-bellied Plover on that section of the Jersey coast covered during the several years of mild winters ending with 1932-3 was checked by the colder winters of 1933-4 and 1934-5 when fewer birds were recorded through January and early February. However, even when early February is cold and the birds move south there is evidence of a later February influx as the weather moderates. Several species have recently been recorded at new late dates, the trend being toward a longer season as numbers increase.

Twenty-nine species, including 9 of the 15 in the "rare" or "very rare" groups, were seen in October; 21 species in November; 14 in December; 8 in January and 6 in February. Those seen after October follow:

- Piping Plover—Nov.
- Semipalmated Plover—Nov., Dec.
- Killdeer—Nov., Dec., Jan., Feb.
- Golden Plover—Nov., Dec.
- Black-bellied Plover—Nov., Dec., Jan., Feb.
- Ruddy Turnstone—Nov., Dec.
- Woodcock—Nov.

Wilson's Snipe—Nov., Dec., Jan., Feb.
 Greater Yellow-legs—Nov., Dec.
 Lesser Yellow-legs—Nov.
 American Knot—Nov., Dec., Jan.
 Purple Sandpiper—Nov., Dec., Jan., Feb.
 Pectoral Sandpiper—Nov.
 White-rumped Sandpiper—Nov.
 Least Sandpiper—Nov., Dec.
 Red-backed Sandpiper—Nov., Dec., Jan., Feb.
 Dowitcher—Nov.
 Long-billed Dowitcher—Nov.
 Semipalmated Sandpiper—Nov., Dec., Jan.
 Western Sandpiper—Nov., Dec.
 Sanderling—Nov., Dec., Jan., Feb.

Summarizing the southbound flight of the past 7 years and averaging the rankings of each year, we get the following order :

ABUNDANT OR VERY COMMON

- | | |
|---------------------------|----------------------|
| 1. Semipalmated Sandpiper | 4. Eastern Dowitcher |
| 2. Lesser Yellow-legs | 5. Sanderling |
| 3. Semipalmated Plover | 6. Least Sandpiper |

COMMON

- | | |
|-------------------------|--------------------------|
| 7. Killdeer | 12. American Knot |
| 8. Black-bellied Plover | 13. Red-backed Sandpiper |
| 9. Greater Yellow-legs | 14. Spotted Sandpiper |
| 10. Hudsonian Curlew | 15. Ruddy Turnstone |
| 11. Pectoral Sandpiper | 16. Western Sandpiper |

IRREGULARLY AND LOCALLY TOLERABLY COMMON

- | | |
|----------------------------|-------------------------|
| 17. American Golden Plover | 21. Willet |
| 18. Piping Plover | 22. Upland Plover |
| 19. White-rumped Sandpiper | 23. Wilson's Snipe |
| 20. Stilt Sandpiper | 24. Solitary Sandpiper* |

RARE

- | | |
|------------------------|-----------------------------|
| 25. Purple Sandpiper | 29. American Woodcock* |
| 26. Marbled Godwit | 30. Northern Phalarope |
| 27. Wilson's Phalarope | 31. Buff-breasted Sandpiper |
| 28. Baird's Sandpiper | 32. Hudsonian Godwit |

VERY RARE

- | | |
|----------------------------|-----------------------------|
| 33. Long-billed Dowitcher† | 36. American Oyster-catcher |
| 34. Red Phalarope | 37. Ruff |
| 35. Avocet | 38. Wilson's Plover |
| 39. Curlew Sandpiper | |

*Status along north and central Jersey coast only.

†Probably so ranked because of usual failure positively to identify.

The past seven years field work in New Jersey indicate, on the whole, reasonable law observance in those areas of chief concentration of shorebirds, and some average increase in the total number of shorebirds under protection. However, most species have become so tame that even a short reopening of the season, considering the number of hunters and the concentration of birds in relatively few localities, would undo in a few days the reconstruction of several years and put a number of species, now fighting their way back, again in a precarious position.

The Half-Hardy Birds That Wintered Through 1933-1934 In the New York City Region

BY WALTER SEDWITZ

A winter unprecedented for cold was that of 1933-1934. A glance over the New York Meteorological Monthly Summary shows that the average temperature for the month of February was 20°F. The lowest reading ever recorded by the New York Weather Bureau was on the 9th of February, 1934, when the mercury fell to -14°F. During this month snow was widespread and storms were frequent. Rivers, bays, lakes, creeks and ocean fronts were ice covered and ice clogged. If our bird population, usually denoted as half-hardy, could survive the weather then we had something worth while to record. It was found to be of interest at the present as well as valuable data to the future, to record the species of half-hardy birds and under what conditions they survived the winter. That these birds survived the cold wave which lasted over a month is a credit to their hardiness and adaptability under abnormal conditions. The hardy land and sea birds perished by the hundreds during this period of cold, while most land birds of all kinds became very scarce. It is, therefore, a very good list that my correspondents have helped me to compile, little different from a list that one might collect during a less severe winter.

It will be noticed that in the above preamble I refer to the winter and February quite as if one were the same as the other. In the beginning of my compilation I was rather sure that the birds seen between the date December 15th and February 15th would be the ones that would be regarded as winter birds of the half-hardy type. But in looking over my material I saw how wrong I was. Except for a three day cold wave during the last days of 1933, December and January were quite mild months, and many times my present list of species were noted. However, when the famous cold wave of February, 1934, clamped down, most of these species disappeared completely. It was found, therefore, to be more accurate to include in my list only those species noted during February. But here again I found a little confusion, for notwithstanding the severity of February, the latter part of the month found a slight influx of migration from the south. It was found justifiable to exclude certain species that could hardly

have wintered. To be exact in the matter of dates I stretched my period of winter from January 28th to March 3rd, 1934.

A few facts about the weather might give a better idea of what conditions were like in the days of February. Right after Christmas, as mentioned before, temperatures dropped to -0°F. , -3°F. , -6°F. , on the 28th, 29th, and the 30th of December. However, these three days, while a foretaste of the later days to come, quickly let up and January was more or less mild and open. But on January 30, 1934, the thermometer registered 5°F. , which was followed by readings of 4°F. on the third, 5°F. on the sixth, -7°F. on the eighth, -14°F. on the ninth (low record), -2°F. on the tenth, 3°F. on the fourteenth, 9°F. on the sixteenth, seventeenth and twentieth, 10°F. on the twenty-first, 10°F. on the twenty-third, 6°F. on the twenty-fourth, 9°F. on the twenty-fifth, 9°F. on the twenty-seventh, 7°F. on the twenty-eighth, and 15°F. on the first of March. After this sub-normal spell of weather, temperatures became reasonably normal again.

But low temperatures were not alone as a force to test the endurance of our half-hardy species, for along with the low temperatures came snow storms frequent and severe. The end of December brought 10 inches of snow, which disappeared completely during January. On the 1st of February, 10 inches of snow fell and this fall covered the ground until the 19th when 5 inches more covered the country; on the 20th, 3 inches more were recorded. On the 25th of February 4 inches of snow fell with 7 inches more on the 26th. At that time 14 inches of snow were packed hard on the ground in New York City, which meant tremendous drifts and banks in the wind swept open country. On the 2nd of March, 9 inches of snow still covered the ground.

Concerning open water, little was noted about New York and Long Island. Every lake was frozen tight; Long Island Sound was frozen a half mile from each shore; the bays on southern Long Island were as solid as dry land, with only a few inlets connecting to the ocean open. The Hudson River was partially frozen over and ice-clogged completely as was New York harbor. The few places that did remain open for some time were the fresh water streams that ran into the salt water estuaries. Ice cakes floated in the ocean at many points and soupy formations of ice were seen to be forming in the ocean all along

the shores. Fresh water fowl fled the ice bound ponds and lakes for the only open water, the ocean and sound. Land birds came to gardens, sanctuaries, garbage dumps, sewers, swamps and farm-yards. It was a critical time in the lives of our half-hardy birds.

In general the low temperatures are less injurious to our half-hardy birds than snow and sleet. For as long as these birds can find food and shelter they are fairly sure of surviving. But bring on hail, sleet or snow, any one of which would cover most of the natural food supply, and the birds weaken off and die unless they seek sanctuaries where food is always present. Low temperatures and the lack of food is an optimum condition for the destruction of our half-hardy species. It is quite probable that our northern visitants can endure much longer these mortal conditions without food; but our half-hardy birds lack that extra stored up energy and must feed regularly or else move on. Conditions for our-half-hardy species are far from ideal around New York or else the bulk of these same species would winter in this region instead of migrating hundreds of miles to the south. We can, therefore, describe a half-hardy species as a bird wintering north of its normal range in winter, and which unlike some of the "softer" species (Chat, Oriole, Yellow-throat, etc.) is more or less regularly recorded from year to year long after the southward migration has been concluded.

In all 31 species were recorded—a notable list for such a winter. Most of the species listed in normal winters would be seed, berry, and fruit eaters. But under the stress of cold and snow they seek human agencies for a surer supply of food and a more adequate shelter from the storms. However, in my listing I try to give all the information passed on to me concerning place, time, food, shelter and terrain.

Phalacrocorax auritus auritus. Double-crested Cormorant.—1, Coney Island, Feb. 11 (Breslau, Cruickshank, etc.). Flying southwestward, this bird was probably in migration to a less rigorous climate. Food no doubt was obtainable notwithstanding the ice on the rivers, bays, etc. It probably had attempted to winter on some fish weirs on the south shore of Long Island.

Nycticorax nycticorax hoactli. Black-crowned Night Heron.—Several, Maspes, Feb. 18th (Breslau, etc.). Wintering in a group of pines surrounding a large estate. These herons must have found food very scarce in the usual place as Great South Bay was completely frozen over. However, food in the tidal creeks

and sewers no doubt helped to forestall any damages to these birds. Four successfully survived February, Idlewild Beach (Mayer).

Aix sponsa. Wood Duck.—A female in weakened condition almost captured, Westbury, Feb. 10 (Matuszewski). Probably a late bird, frozen out of its lake or pond and unable to find food to support itself, it flew in an almost exhausted condition around the nursery. It probably died or fell prey to cats, dogs, or hawks about.

Nyroca collaris. Ring-necked Duck.—9, Cross River, Westchester County, Feb. 12 (J. F. and R. G. Kuerzi). The rapid increase of this formerly rare species about New York City has been one of the most gratifying ornithological phenomena of the last decade. In favored localities like the great Reservoirs of Westchester, the species frequently winters where spillways manage to keep the waters open. Though data are lacking as to whether or not Ring-necks remained throughout the month of February, it is interesting to learn of their presence in an area where the mercury hovered somewhere around 25° below zero.

Nyroca affinis. Lesser Scaup Duck.—2, Coney Island, Feb. 17 (Cruickshank). In a flock of Greater Scaup, these more southern relatives were noted. Probably, like the Wood Duck, they were frozen out of fresh water, but more fortunate in their habits the Lesser Scaups came down to the ocean and were able to obtain food to sustain life. The two birds were seen with Greater Scaup, Scoter, Oldsquaw, and Golden-eye.

Butea platypterus platypterus. Broad-winged Hawk.—Badly crippled bird, Van Cortlandt Park, discovered Dec. 7, 1933 (Cruickshank), was still present Feb. 7, 1934 (W. J. Norse). This unfortunate bird was barely able to fly. It sustained itself chiefly by remaining close to a garbage dump and apparently did not survive the winter.

Rallus elegans elegans. King Rail.—1, Baxter Creek Marshes, Dec. 23 (R. G. Kuerzi and J. F. Matuszewski). This individual was heard calling during the Christmas Census. On March 6 it was found dead but apparently fresh (Malley). It therefore wintered at least into February, but in all likelihood found the food frozen over that had been available up to that time. Open tidal creeks supplied the food area, but like almost everything else, finally froze over.

Capella delicata. Wilson's Snipe.—5, Alley Pond Sanctuary, Feb. 2 (Queens County Bird Club); 2, Van Cortlandt Park Swamp, Feb. 22 (Cruickshank); 1, Eastport, L. I., Feb. 28 (Wilcox); 2, near Wantagh, on a mud bank next to the open water, March 3 (Hickey). The numbers of this snipe seen indicate more than just bare survival. Their mobility must have played a large part in their survival, seeking unfrozen patches of mud banks where the tidal forces opened the water ways.

Zenaidura macroura carolinensis. Eastern Mourning Dove.—6, Speonk, Feb. 4, 15 on Feb. 28 (Wilcox); 10, Westbury, stayed all winter (Matuszewski); 7, Mt. Sinai, all winter (G. P. Helme). The tree nursery at Westbury, the duck farms at Speonk, and the swamp at Mt. Sinai, all formed excellent wintering spots

for these half-hardy birds. Shelter was abundant, and food was plentiful, with house along with their shrubbery, crumbs, and a little natural food, all helped to pull these Doves through the arduous month.

Megasceryle alcyon alcyon. Eastern Belted Kingfisher.—1, New Rochelle, Feb. 12 (Marc C. Rich); 1, Bronx Park, Feb. 21 (Malley); 1, Fort Schuyler, March 3 (Hickey). It must have been a trial for this species to live in a region such as ours was when almost every patch of water was frozen solid. But being quite adaptable to conditions as they came, the bird came down to the coastline and proceeded to live on the salt and brackish water fish. Except for two small areas in the duck pond at the Zoo there was no open water in Bronx Park on the 21st. Here Malley had practically daily observation and it is therefore highly probable that his bird was a wanderer from either the Hudson, the Harlem or the East River, or Long Island Sound.

Colaptes auratus luteus. Northern Flicker.—1, Flushing, Feb. 4 (McBride); 5, Pound Ridge, Feb. 22 (Colvin Farley); a few, Mt. Sinai, Feb. 2, 12, 22 (Helme). The sheltered spots around and near habitations seemed to be the favorite wintering places for this hardy woodpecker. When the landscape looks cold and wintry, it is always a surprise to put up one or more of these "Golden Wings," with their summery colorings. Still they manage to find enough food in the berries, insect eggs, cocoons, and suet at feeding stations to last out the winter.

Sayornis phoebe. Eastern Phoebe.—1, Plainfield, Feb. 4, 5 (F. Clement Scott). This is not the first winter report of a Phoebe and the other record is at the same locality, in the winter of 1912-1913 (Linnaean Abstracts No. 24-25, page 139).

Sitta canadensis. Red-breasted Nuthatch.—1, Alley Pond Sanctuary, all winter until March 3 (Queens County Bird Club): 1, wintered in the New York Botanical Gardens by remaining close to a feeding station, where visitors placed seeds, nuts and crumbs on boulders or on the ground; this individual as well as the Chickadees frequently lit on the heads or shoulders of his hosts and obtained his food directly from their hands (Gibson and others); 1, Westbury, Feb. 11 (Matuszewski). Whether this bird may be classed as a half-hardy one is a point of discussion, but reacting to the cold waves just as surely as a Hermit Thrush, this northern species disappears in the cold winter with few exceptions.

Nannus hiemalis hiemalis. Eastern Winter Wren.—1, Oakland Lake, Queens County (Sheehan). This lone winter record of this uncommon winter resident is rather good, considering that so many residential birds were found dead as a result of the weather. Loving the tangles and swamps as it does, it would seem a not unusual bird to find in this region in the winter; however, it is rarely recorded in that season. The tangled sheltering spots around Oakland Lake with its swampy and rocky terrain is an ideal wintering place for such a bird.

Thryothorus ludovicianus ludovicianus. Carolina Wren.—On the Palisades, N. J., in greatly reduced numbers (R. A. Herbert); completely wiped out in the New Jersey pine barrens (C. A. Urner); increase noted at Milltown, N. J. (P.

L. Collins). A clean sweep of destruction was noted on Long Island up to the present time. At Orient a bird present in a garden the previous October survived until late February only to be killed by a cat (Latham). G. P. Helme reported one at Orient and Mt. Sinai respectively. In each case the birds were noted at feeding stations. The Carolina Wren had been on a great increase up until the cold winter of 1933-1934. The winter dealt a great blow to this species, and the birds that did not come to the feeding stations must have migrated or died.

Mimus polyglottos polyglottos. Eastern Mockingbird.—1, Saugatuck, Conn., Feb. 3 (Margaret Brooks); Riverhead, all winter on Main St. in the village (Latham); 1, Whitestone, L. I., Feb. 5th and 7th (Mrs. Beals and Reska). The Mocker always calls to mind the deep south, but the extreme cold of 1933-1934's winter dispelled all ideas about this bird's lack of hardiness, for the above three records speak for themselves. Smart and resourceful, never too shy to come to a feeding station in a time of need, it is little wonder that it outlasted the winter.

Dumetella carolinensis. Catbird.—1, Montauk, Feb. 12 (Queens County Bird Club). This lone record, at the wild Montauk Point, is not unexpected, for the many miles of tangled, brushy country might afford shelter to a few dozen of these half-hardy birds. With the abundance of berries and seeds and shelter, the Catbird was in no way put out as were many birds in less wild country where most underbrush is cut out and shelter, therefore, practically absent.

Turdus migratorius migratorius. Eastern Robin.—2, Rye Pond, Feb. 12 (W. F. Dresher); a few birds, Orient, February (Latham); East Moriches, some all through February (Wilcox); 1 found freshly dead, Bronx Park, Feb. 8 (Gibson); Miller Place, all winter in a swamp (G. P. Helme); Alley Pond Sanctuary, all winter (Queens County Bird Club). Robin populations in winter are very irregular, appearing and disappearing, without warning. They seem to prefer the wilder situations to the places where they breed during the warmer time of the year. Being in winter a tree and bush feeder rather than a ground feeder, it was easier to see how they withstood the storms and snow-covered ground.

Hylocichla guttata faxoni. Eastern Hermit Thrush.—1, Forest Hills, Feb. 20 (Queens County Bird Club); 1, Rye Pond, Feb. 12 (Dresher); 1, Mt. Sinai, Feb. 2 (Geo. P. Helme). A surprise, after so many hardy birds deserted the region, was to find this thrush still with us. A bird of the thickets in winter, it still had enough stamina to last that cold wave, and find enough food to keep it alive, a difficult task for ground feeders. Its winter berry eating habit saved its life.

Sialia sialis sialis. Eastern Bluebird.—10, Pound Ridge, in a cedar full of berries, Feb. 22 (Colvin Farley); 1, Bronx Region, February (Allen W. Thomas); Mt. Sinai, dead birds after the storm of Feb. 2; 7 or 8 in a cedar swamp, originally, but only 2 survived the winter (Geo. P. Helme); 200, Rye Pond, Feb. 12 (Dresher). Many individuals of this species evidently suffered and died from the hazardous weather of February.

Dendroica coronata. Myrtle Warbler.—100, Rye Pond, Feb. 12 (Dresher); a few, Wading River, Feb. 18 (Queens County Bird Club); a few Montauk, Feb. 12 (Queens County Bird Club); a few, Jones Beach, Feb. 15 (Breslau and others). Usually a common winter resident, the cold drove these warblers south, to become almost completely absent in this region. The species is therefore placed on the list because the bulk of the birds fled, leaving only a few in the region in February. They always prefer in winter the places where the bayberry is the thickest, but the cold dealt severely with these little birds, even with this plant in large masses in our territory.

Agelaius phoeniceus phoeniceus. Eastern Red-wing.—20, Van Cortlandt Swamp, Feb. 22 (Cruikshank); 13, Kissina Park, wintered through February (McBride). Only in the swamps that had warm water outlets, as were the two where the birds were seen, did the Red-wing find conditions suitable for wintering. A little open water must have been a great help during those cold days of February.

Euphagus carolinus. Rusty Blackbird.—1, Southhold, L. I., Feb. 8th (Latham).

Quiscalus quiscula acneus. Bronzed Grackle.—1, Van Cortlandt Swamp, Feb. 22 (Cruikshank).

Molothrus ater ater. Eastern Cowbird.—Speonk, Feb. 4, after the first great snowstorm 50 were scratching and picking about in the duck pens there, 29 still present Feb. 20 (Wilcox); Mt. Sinai, Feb. 9, birds were on lawn in front of house (Geo. P. Helme); 50, Westbury, Feb. 4 (Matuszewski). Keeping close to house and farm where food was plentiful, and clearings frequent, this canny bird outlived the cold in fine shape.

Richmondia cardinalis cardinalis. Eastern Cardinal.—1, Creedmore, L. I., Feb. 10 and 11 and (A. and R. Borden). A lone bird that had been around the spot all year and probably fed in and around the houses in that section of Queens where food was plentiful enough at all times. Another individual may have wintered at Eaton's Neck, where observation is infrequent and where it was seen by Matuszewski in July, 1933 and July 10, 1934.

Pipilo erythrophthalmus erythrophthalmus. Red-eyed Towhee.—1, Alley Pond Sanctuary, all through the winter (Queens County Bird Club). This bird was captured in some other part of Queens and transferred to the Sanctuary where it was seen up to March 2nd. Mt. Sinai, in a catbriar up until the first storm in February (Geo. P. Helme). Each winter we find records of a few of these birds which seem hardy enough to withstand any cold, but which barely find enough food to sustain themselves, especially if snow covers the ground.

Pooecetes gramineus gramineus. Eastern Vesper Sparrow.—1, Westbury, Feb. 4 (Matuszewski). In the sheltered nursery, full of groves and sheltered by tangles, this rare winter resident found sufficient protection and food for wintering.

Spizella pusilla pusilla. Eastern Field Sparrow.—Mt. Sinai, all winter, came to feed at the feeding station and came through the winter fine (Geo. P. Helme);

Westbury, in the shrubbery around the farm house, Feb. 4 and 11; Speonk, Feb. 9, the coldest day of the year (-15°F.) (Wilcox). This species wintered with ease, keeping close to the farms and houses in the terrain in which it was found.

Zonotrichia albicollis. White-throated Sparrow.—Orient, all winter (Latham); Lawrence, L. I., in a bushy hedge surrounding a house. A few of these birds probably survived the rigors of the weather by keeping close to houses and the accompanying food.

Passerella iliaca iliaca. Eastern Fox Sparrow.—1, Botanical Gardens, Bronx, fed at the feeding station daily throughout January and February (Gibson, Malley and others). On Feb. 3 at 10:30 A.M. when the temperature was 10°F. , it was singing sotto voce from its perch high near the top of a hemlock. There are no records at hand of this species surviving the winter of 1933-1934 without the help of man.

Melospiza georgiana. Swamp Sparrow.—A few, Kissina Park, in swampy woods, Feb. 4 (Queens County Bird Club); 12, Van Cortlandt Park, Feb. 22 (Cruikshank); 1, Speonk, in a swampy inlet, Feb. 9 and 20. It is curious that around New York the same swamps that held Red-wings also had Swamp Sparrows. Why more of these sparrows do not winter is a mystery, for there is plenty of territory around New York suited for its wintering, but even in mild winters only a few are noted.

Observations From Field and Study

A Surprising Encounter—This is a tale of heroic self defense with a happy ending that merits place in the annals of rodent history. I was driving one bright morning in the late summer of 1935, about the Brigantine golf course on the watch for shorebirds. A hunting Marsh Hawk of the year attracted my attention. It had just lit upon a fairway and I idly turned my glass upon it to see whether or not it wore a band. It was not far distant and in plain view with the sunlight playing full on its rich plumage. I saw it suddenly ruffle its neck feathers, and assume an attitude of defense. Looking closely I beheld before it on the ground a mouse. I wish I could have identified the species to give credit where credit is due. The mouse also had assumed a belligerent pose, facing its giant foe, and in the ensuing almost unbelievable scenes proved to be a real, though cautious aggressor. The hawk advanced a step or two watchfully; the mouse lunged at its throat, actually clearing the ground as it sprang to attack. The hawk seemed uncertain what to do. This was apparently an unprecedented experience. It retreated a step, whereupon the mouse turned tail and ran. But cover was far off and it had gone barely two feet before the hawk started in pursuit, hopping along with a half sidewise gait and flapping its wings. It seemed to jump squarely upon the mouse. But the little creature turned just in time, squirmed loose and again faced the hawk. Again it crouched and again and again it sprang at the throat of its towering enemy. Once more the hawk seemed taken aback and uncertain. It stepped clear and again the mouse attempted a wise retreat. But the hawk knew what to do when a mouse scurries to hide. It raised itself from the ground and attempted to snatch its prey. However, the mouse was an apt scholar,—it was learning fast. Again it slipped from the hawk's talons and again it faced its adversary. I did not count the number of times these scenes were re-enacted. It was a long hard fought battle across the close mowed ground. Eventually the mouse gained the sanctuary of a hedge of bayberry bushes and disappeared. The hawk inquisitively followed it in and when I ran to the hedge to observe the finale of this absorbing drama I found the hawk so deeply involved in the hedge in its search for its late opponent that I almost caught it before it could free itself and fly away.—CHARLES A. URNER.

Bird Mental Capacity—I was especially interested in the summer of 1935 in a family of Robins that nested in an apple tree in the back yard of my home. The female disappeared shortly after the four young were hatched and the male attempted to bring up the family. A protracted dry spell made earth worms scarce and hard to secure, and the Robin was forced to resort to a medium sized grub which seemed quite abundant in the turf beneath the nesting tree—probably the grub of the Japanese beetle. As the young grew the male bird had to work extremely hard to provide sufficient food. I marveled at its endurance, at the little rest and at the modest share of the food procured that it ate itself. I noticed that, with the smaller units of food, it would try to secure two or sometimes three before flying to the nest, but when the hunting was poor it would frequently feed a single grub after a fruitless search of over two minutes for the

second. One young died and was carried from the nest by the parent. The parent would always wait to carry away excrement after the young had eaten, except, and I consider this significant, when only one small grub was fed. Then, frequently, it flew from the nest promptly and with nothing in its bill.

When hunting was poor under the apple tree the male would leave the yard for an adjacent athletic field where the clipped turf offered a large feeding ground. Many nesting Robins hunted grubs there, apparently without definite allotment of territory and with little dispute. The field was also used by many English Sparrows, Starlings and a pair of Chipping Sparrows. Looking out over my back fence across the green of the field I was interested to watch the activities of a Starling which was feeding a brood of full grown young, following after. The Starling would sit on a post overlooking the field. It paid no attention to the English Sparrows or Chipping Sparrows. Their feeding activities intrigued it not one whit. But each time a Robin would stop, look or listen and start to dig for a grub the Starling was at its side, would drive it away and procure the located food for its own young. When more than one Robin stopped and started to dig at the same moment the Starling was greatly agitated. It would run from one to another and occasionally it did little but cause confusion, and nobody ate.

In this Starling's activities we have something very like intelligence. The species has been associated with American Robins only a comparatively few years. The American Robin usually eats earth worms, which Starlings do not specialize on. Yet this Starling discovered that the Robins were at that time eating the same food it was after, that the sparrows were not and that it could save itself much labor and get more grubs merely by sitting on a post and letting the Robins locate the grubs for it. This Starling's activities for a week must have kept the Robin nestlings hungry. However, the Starling stopped feeding earlier in the evening than the Robins and the latter had at least a brief respite from its pilfering.—CHARLES A. URNER.

The Ornithological Year 1934 in the New York City Region

By JOSEPH J. HICKEY

The chief function of "The Ornithological Year," it was agreed at a Linnæan seminar some time ago, is the preservation of data for the future author of the next *Birds of the New York City Region*. To that end about eight hundred records are herewith presented. In rough terms around 23 per cent of these cover summer or fall rarities and interesting maxima; about 15 per cent are accounted for by spring rarities and maxima, and another 14 per cent by winter rarities and maxima. Only 9 per cent are made up by breeding records. The remainder are what appear to be unseasonable migration dates: 6 per cent early spring, 8 per cent late spring, 10 per cent early fall and 15 per cent late fall data.

During the year about 310 species and subspecies were reported in this region, five of this number being sight records of birds for which we have no locally collected specimens. Six or seven other varieties were also reported from the area north of us or from near-by points on the New Jersey shore. The total number of observers contributing data to the summary was about 120—an increase of 85 per cent over the first tabulation inaugurated by the Society in 1926. Perhaps the chief usefulness of these annual summaries lies in the fixing of responsibility for tracking down records made by the 95 per cent of New York bird students who do not keep note-books. It seemed rather senseless to us to drag out of busy people much data that we knew would inevitably be preserved. On the other hand, local observers who do not dignify their field work with careful and complete note-taking must be contacted at some time or another. The most difficult task has been the evaluation of notes generously sent to the compiler by bird students whom he knew only by name. In several cases we have quoted all the details of an observation so that the reader might judge the record himself.

Notwithstanding many meteorological averages that closely approximated normal, the year 1934 was phenomenal for several extraordinary features. There was severe cold and much snow late in winter, intense heat in early summer, a cool and rainy late summer and a mild, dry autumn. Most waterfowl were eventually reported in

fairly good numbers. Brant were apparently recovering from their discouraging low in 1933, but the Redhead was definitely in a precarious spot. Gulls and terns were noted in unusually large numbers. Shorebirds were much the same as in 1933. The phenomenal heron incursions of other years were not repeated but small, satisfying numbers of each species did come north. Raptors showed a slight increase.

During the year Hempstead Lake, Brookhaven, Montauk and Barnegat received chief attention in the search for winter birds. Jones Beach remained prominent for its ducks and shorebirds, and Mill Neck and Troy Meadows remained the best rail swamps. The Ramble in Central Park, the Botanical Gardens in The Bronx, Troy Meadows in New Jersey and Kissena Park on Long Island shared the warbler spotlight while Oakwood Beach on Staten Island, Brigantine and Beach Haven on the Jersey shore all remained much the same as did the Tuckerton marshes. The great mud flats near the Newark Airport finally succumbed to the tenacity of the New Jersey Mosquito Commission. Practically all the waders were, however, recorded on the burnt meadows and about the ponds toward Elizabethport. New causeways on the outer strip at Jones Beach made accessible a superb tidal flat at Oak Island Beach and apparently increased the possibilities for seeing Longspurs and Buntings. The artificially created Parsippany Lake received more attention and produced some unique inland water bird records for New Jersey. New York City parks continued to support a flora remarkable for its general propensities to grow downward rather than upward. A new bird sanctuary was begun in Central Park and the Alley Pond sanctuary in Queens was continued. Elsewhere in the city most of the ruthless damage done to shrubbery abated. The magnificent warbler vegetation of Van Cortlandt Park disappeared for the most part in 1933. Although most of it was effectively ditched last spring, the unique cat-tail swamp there managed to support a pair of Least Bittern whose home life remained throughout the summer a precarious exposure to the sticks and stones of Yosians and similar so-called naturalists who were anxious to "scare 'em up."

Although 1933 closed with a snow storm and a terrific cold snap (-6°), *January* was relatively mild and unspectacular. Since 1927 this month has had each year a mean temperature above normal. Once

again the same half-hardy species lingered. Longspurs began gradually to thin out along the coast where they had been generally distributed at the close of 1933. The white-winged gull invasion remained one of the best in the last ten years. Similar hold-overs from the fall were the Purple Sandpipers on the shore at Montauk and on the Lido Breakwater at Long Beach. Although northern finches were numerous in New England and although practically all these species were reported here in December, January records of this group consisted chiefly of casuals or stragglers. Just to the north of us, however, where only infrequent observation occurs in the rural communities, several large flocks of Evening Grosbeaks were noted. In the Boston region Harlequin Ducks appeared in December and an unusual flight of *Alcidae* was concentrated along the coast. To the south of us around Philadelphia Goshawks, White-winged Crossbills, Evening Grosbeaks were observed in numbers. In our region the Grosbeaks were noted as above, the *Alcidae* only casually, the Crossbills only as stragglers and the Goshawks not at all. On the twentieth a lone Harlequin appeared at Montauk. Fresh water ducks were present in much the same numbers as in the last few years. European Teals at Hempstead Lake, Wood Ducks in the Bronx, European Widgeon and the like were all noted. This rather heterogeneous picture of the New York Region and the Atlantic Seaboard was the opening act of one of the most amazing winters we have had in recent years.

On the twenty-eighth of January the thermometer registered 57° . In the ensuing eighteen hours the mercury dropped 52° and some never-to-be-forgotten weather followed. *February* had a mean temperature of 19.8° , the lowest February on record. As the ponds and lakes froze over, heavy snows blanketed the countryside for the entire month. Whereas the snowfall in January (0.2 inches) was the third lowest on record, that of February (30.1 inches, three times normal), was the greatest in forty years. When a mercury reading of -14° on February 9 broke the all-time low for New York City, readings of -20 to -30 were common on the coast and in the rural sections of the region. By this time practically every body of water here was solid except a few channels, some inlets and the ocean itself. Freshwater ducks, like the Hooded and American Mergansers, took to salt water.

Long Island Sound almost froze over as far east as the Connecticut River. Near Fort Schuyler, Scaup piled up into a dense mass estimated at 50,000. Exhausted birds were picked up on nearby beaches.

Around New York City emergency measures provided food for hundreds (or thousands) of ducks that might have starved to death. In Bronx Park 7 Green-winged Teal, 6 Pintail, 18 Wood Ducks, 7 Baldpate and a Hooded Merganser all survived by mingling with the clipped fowl (Drescher). At Coney Island an ice pack of several hundred feet crunched against the beach, while the whole bay between Rockaway Point and Manhattan Beach was one impassable jam. Here thousands of Scoters were too far out to be identified; those close-in twice showed the same unusual ratio:—about four Surfs to each White-winged, with only a scattering of American Scoters. Kittiwakes, small flocks of American Mergansers and Canvas-backs, both Eiders and both Cormorants were all seen along the usually barren shore from Coney Island to Manhattan (Cruickshank and others). In the Barnegat area ducks that elected to remain were living on the vegetation and shellfish adhering to the stone jetties. These included many Scaup and Scoters, Black Ducks, Canvas-backs and an odd Redhead (Urner). Barnegat Bay did not open until the 15th or 16th of March while Shinnecock and Mecox out on Long Island were frozen until the 18th of March. Only the canals there between the bridges at Quogue and Westhampton Beach remained free of ice. In the tiny open spot at Westhampton on March 2 were 10 Canada Geese, 200 Black Ducks, 3,000 Scaup, 2 Redheads, 50 Canvas-backs, 12 Pintails, 25 Golden-eyes, 15 American Mergansers, 50 Red-breasted Mergansers, 15 Holboell's Grebes and 5 Horned Grebes (Wilcox). Here the water fowl were fed corn and the mortality was small.

The terrific cold spell froze over Lake Ontario about February 11th—the first time this had happened in about sixty years. On the 12th Holboell's Grebes appeared in Lake Cayuga and, when this body of water froze over a few days later, Grebes were being picked up dead or alive and carried to the university there by towns-people and farmers [*vide* Miss A. M. Heydweiller]. In New Jersey the first Grebe movement reported was a Holboell's found alive on the hill behind Princeton on the 18th (Rogers). Of a trip to Montauk on the

22nd, Leo Breslau writes: "The first sight as I stepped from the train was that of 14 Holboell's Grebes just alive enough to waddle in the town street. Mr. King . . . told me of hundreds of dead Grebes, a flock of 12 Dovekies on February 21, a few Auks and Murres on the 22nd A.M. (before I arrived) flying over the town. . . . I counted 225 dead Holboell's Grebes—their frozen bodies all over Montauk, but concentrated on the ocean beaches . . . 350 dead Horned Grebes all concentrated on the sound side. Many Grebes were seen alive but in the most weakened condition that I have ever observed: 150 Holboell's, 300 Horned Grebes." Up at Westbury on the Rhode Island—Massachusetts line, Ames found enough dead Grebes strewn along the beach to have filled a dump cart (*vide* Peterson). This dispersal of Holboell's Grebes was apparently due to the extraordinary ice conditions inland. The birds scattered southward along the New Jersey coast and were noted in large numbers both inland and on the shore of New England. The mortality due to starvation, ice, or oil, must have been terrific. (See also *Bird-Lore*, v. 36, no. 3, May-June, 1934, pp. 178-80.) The climax of the winter occurred near the end of the month when lone Harlequins scattered along the coast down to the Manasquan and the Shark River in New Jersey after a N. W. gale of 51 M. P. H. and a near occurrence (6°) of more sub-zero temperatures. All February records of half-hardy species have been omitted from the annotated list appended and the reader may study the effects of the winter on these birds in the paper prepared by Walter Sedwitz elsewhere in the Proceedings.

March provided a mean temperature that was practically normal. The snowfall was, however, the greatest in any March since 1917—a total of 8.5 inches. Out on eastern Long Island, snow remained on the ground until the 14th and in some spots even until the 20th. The result was an anomalous migration which seems almost weird in retrospect. Land birds were late in arriving but not unprecedentedly so. The first migrant in Central Park was the Fox Sparrow (March 2 as against February 26th last year and snow 9 inches deep). In The Bronx Grackles appeared on the 3rd and became common on the 18th; Robins were first seen on the 7th but did not become common until April 1st. During this very time the relentlessness of the winter had

not relaxed its grip along the coast. Barnegat Bay still had some ice on the 17th but Shinnecock and Mecox had only a few open spots on the 25th.

At Montauk on the 3rd 80,000 Scoters were estimated to be present. Some 10,000 of these were identified as White-wingeds, about 1,000 were Americans and only 500 were Surfs—a ratio little typical of normal conditions at the Point and suggesting that the birds came from Long Island Sound or the coasts of New England.

It is practically impossible to form any estimate of how many ducks perished during the winter. The biggest numbers of dead were found around the beginning of the month, but few observers kept notes on conditions at that time. The following counts cover (1) about two miles of beach at Montauk on Feb. 13 (Bohn), (2) on March 4th (Farley) and (3) on the 18th (Hickey); (4) four miles of beach south of Seaside Park on the 17th and (5) two miles of beach near Beach Haven Inlet, plus a small section of salt marsh south of Beach Haven (Rogers and Urner):

	(1)	(2)	(3)	(4)	(5)
Common Loon - - - - -	—	1	1	2	1
Holboell's Grebe - - - - -	—	18	7	33	2
Horned Grebe - - - - -	—	6	5	12	2
Razor-billed Auk - - - - -	1	—	—	—	—
Brunnich's Murre - - - - -	1	—	1	—	—
Dovekie - - - - -	—	—	—	4	—
Black Duck - - - - -	—	—	—	4	13
Canvas-back - - - - -	—	—	—	—	4
	(1)	(2)	(3)	(4)	(5)
Scaup - - - - -	—	1	3	1	—
Redhead - - - - -	—	—	—	—	1
American Golden-eye - - - - -	—	—	1	—	1
Old-squaw - - - - -	—	2	—	—	—
White-winged Scoter - - - - -	185	1-2 doz.	28	7	1
Surf Scoter - - - - -	1	—	1	3	1
American Scoter - - - - -	3	sev.	5	—	—
Red-breasted Merganser - - - - -	1	1	2	—	—
Great Black-backed Gull - - - - -	1	—	—	—	—
Herring Gull - - - - -	1	sev.	sev.	20	5
Ring-billed Gull - - - - -	—	—	—	1	—
Starling - - - - -	—	—	—	—	1
House Sparrow - - - - -	—	—	—	—	1

On February 22 Breslau estimated about 400 dead Scoters along the entire shore line at Montauk. Of course a small per cent of the above counts represents the normal numbers of dead birds one always

finds on our beaches. Many specimens were brought home from Montauk, destroying the accuracy of any cumulative count. Autopsies performed by Dr. W. H. Wiegmann on two such birds from the Point disclosed the following: the entire stomach contents of a Greater Scaup contained nothing but thirteen pebbles; that of a White-winged Scoter contained nothing but ten pebbles. Both birds were but slightly polluted with oil.

By *April* spring was but a week or so late. The last killing frost, March 29, was recorded 13 days ahead of normal. The maximum temperature of the month, 75° on April 2nd, helped finally to clear the bays and ponds of ice. By the middle of the month land migrants were at last arriving in normal fashion. It was 34° on the 28th and six successive nights of fog, rain and adverse winds following the 29th checked all movements of warblers and kindred species.

May opened with local breeders slowly coming into Litchfield County and a complete drouth of migratory bird life around New York City. On the fifth (when a major wave was occurring around Philadelphia) the vacuum here was beginning to crack. A spectacular wave followed on the 6th when, with few exceptions, most of the species of Group I arrived in a striking wave distributed over western Long Island, New York City, and northeastern New Jersey. Practically all the birds in Groups II and III were recorded in the region but always in confused varieties or combinations which differed widely at each migration station. This wave was less pronounced northward in Westchester County and absent entirely in Litchfield County where the first wave did not occur until the tenth. It seems useless to amplify on the remainder of the month. The land bird migration in Central Park seems to have followed the group arrivals noted by Griscom in 1919. In this same locality one observer reported flights on the 10th, 20th and 21st; another on the 16th, 18th and 21st. When such contradictory conclusions are reached by two men after daily observation in the same area, it will be seen how relatively large is the human factor in migration summaries of this sort. In passing one cannot refrain from mentioning one of the quaintest notes of the month. On the 20th along the Hackensack River in New Jersey, Messrs. C. K. Nichols and Walsh checked off in a short time no less than 35 species in a single tree. Like

the story of F. E. Watson chasing an auk, this type of sport is so nearly unique that it deserves permanent record.

Shorebirds, whose early flights of the last few years have coincided with their recent tendencies to linger here in winter, did not come through until well into May. Heavy movements of these birds were observed from the 15th to the 20th but several species (Knot, White-rumped) did not reach their maximums on Long Island until late in *June*. Just at the time when observation is most infrequent on the coast some shorebirds may have come through with such rapidity as almost to escape notice. That the Knot flight was missed on Long Island is indicated by the New Jersey counts which showed a May 21 peak. Most of the breeding records [e.g. Veery in Ocean County, Clapper Rail in The Bronx] were purely of local interest. The appearance, however, of 3 Black Skimmers on Great South Bay on the 18th heralded one of the most satisfying events of the year. Scattering birds were observed for some time subsequently on Great South Bay, and finally on August 18th a nest containing young was found by Vogt in Gilgo State Park (*Auk*, v. 51, no. 4, p. 521, Oct., 1934). This constitutes the second breeding record in modern times for Long Island and New York State. On June 21, almost six years to the very day after a similar bird had been found in Central Park, a Purple Gallinule was discovered in the mosquito ditches at the Jones Beach Bird Sanctuary. A thunder storm on the 19th was accompanied by a south-easter whose maximum velocity was 38 miles per hour in New York City. This may have been the cause of this southern visitor's occurrence on Long Island. It is interesting to note, however, that the species was recorded in Cape May County on May 28 and along the Delaware River in Pennsylvania on June 15 (*Auk*, v. 51, no. 4, Oct., 1934).

Shorebirds remained well into June and even into *July*. In the past there has always been a definite break between the northbound and southbound migrations of each of these species in our region. Today with a few species this margin has almost vanished. J. L. Edwards agrees with Wm. Vogt that waders summered here in 1934 and C. A. Urner believes that this condition will become more pronounced in certain species as shorebirds (and observers) increase. J. T. Nichols, how-

ever, holds out the hypothesis that daily observation will continue to show a lapse between departure and arrival on each species. In 1934 practically daily observation was obtained by only one observer for the critical period under discussion. This was by Mayer at Idlewild Beach at the western end of Long Island. His interesting results appear in detail in the annotated list appended.

By *August* it was apparent that the southern heron flight was very light. On Long Island, American Egrets seem to have outnumbered the Little Blues by about four to one while Snowy Egrets were about half as common as the latter. There was, on the other hand, a fair sized number of Yellow-crowned Night Herons reported. Despite high temperatures which made August the hottest on record but one, the mud flats and beaches received dozens of observers each week-end. Where a decade ago a mere handful of enthusiasts made the awkward boat trip each summer to Oak Island or Jones Beach, crowded motor cars now raced over wide causeways to these favored localities. A proportional increase in "rarities" has inevitably resulted. In the face of this, a comparative analysis of the early water bird migration on Long Island seems almost futile. A summary of the New Jersey shorebird flight by C. A. Urner appears elsewhere in this publication.

September was notable chiefly for a severe wind and rain storm, the result of a near-by hurricane. The rain on the 8th was 4.92 inches, the greatest of the year for a twenty-four hour period; the wind on this day did not attain any marked velocity until 6 P.M. but at its height, sixty-five miles an hour (north), was not only the greatest noted here during the year, but also the greatest ever recorded in September by the local weather bureau. As a result, some 110 Skimmers were seen the next day at Jones Beach, and the species scattered eastward reaching Orient on the 12th. Scattered too were numbers of Forster's Terns and much more rarely the Gull-billed Tern.

As usual the fall migration of warblers and other land migrants received little attention. Geoffrey Carleton, however, furnishes us with a practically complete account of summer conditions in the Ramble. His first transient was a Kingfisher on July 19. The first small wave, August 13, was followed by flights of fair size on August 21 and 29-30.

The warm foggy night of September 6th brought a wave of many warblers into the park the next day along with the Philadelphia Vireo and the Gnatcatcher. Further flights were observed on the 19th and 28th. The first week of October was continuously good and after it the warbler migration practically ceased.

October counts of ducks were somewhat distorted. The long hunting season destroyed all chances of good fall maximums at Troy, warm weather apparently affected the early numbers at Barnegat while other places like Hempstead and Jones Beach had fine numbers of certain species, particularly Green-winged Teal. A fine flight of Rough-legged Hawks began around the early date of October 12.

November was remarkable for the unprecedented number of lingering shorebirds, no less than twenty species (counting one cripple) being present in this region and on the New Jersey coast. Longspurs came down in big numbers although the new unusual maxima may be due to the recent accessibility of favored areas. The Shrikes were well distributed particularly on Long Island. A small but appreciable flight of Snowy Owls eventually got as far south as Staten Island. Most of the northern finches were unreported but the Purple Sandpipers returned again to Long Beach and the Jersey coast. European Teals once more favored Hempstead Lake with their presence. The first killing frost in Central Park was noted on November 3. This gave a plant growing season of 219 days, 34 more than last year and 11 more than normal. A gale from the northwest set a new November record here (61 miles per hour on the 1st) and may or may not have caused the extraordinary appearance of Blue Geese on the Atlantic seaboard during the month.

December found not only King Eiders at Montauk but American Eiders as well. On the 1st a 53 mile gale from the south drove a few Dovekies onto the beaches of Long Island. White-winged gulls were noted only infrequently. Christmas censuses were the ultimate that time, effort and money could produce. Unfortunately the contingencies of space forbid here the detailed statistical comparison with other years that these 1934 censuses deserve. About 127 varieties were recorded in the New York Region, and 16 more were also reported from Ocean County, N. J.

In studying this summary of the ornithological events of the year, the reader will undoubtedly gain some impression of the numerous contributors whose notes have given the paper whatever value it has. Many people, however, went out of their way to make the compiler's task a lighter one. Dr. Mayr inaugurated an index system which we found invaluable in keeping records; Mr. Cruickshank gave us practically all our information on the Grebe flight; Mr. Malley compiled complete data on the spring migration in Bronx Park; Mr. Rich listed all the spring arrival dates in *The Ramble*; Mr. Vogt made completely accessible the correspondence on "The Season"; Miss Brooks undertook, at our behest, daily observation on spring ducks and waders at Old Greenwich; and Mr. Carleton gave us the most complete information on the fall movement of warblers. A number of people, like Messrs. Helmuth and Latham, promptly and generously answered our letters with clear, comprehensive reviews of their observations. Active observers, like Messrs. Sedwitz and Urner, we have bothered time and time again for information. Theirs and many others, has been a cheerful willingness to make this report as complete as possible.

Gavia immer immer. Common Loon.—Old Greenwich, May 29 (M. Brooks); 2, Moriches Inlet, Aug. 11 (Wilcox).

Gavia stellata. Red-throated Loon.—Easthampton, Aug. 29-30 (W. T. Helmuth III).

Colymbus griseogen holboelli. Holboell's Grebe.—20 flying, "The Farms" fishing bank, Jan. 7 (Matuszewski); 1, Princeton, Feb. 18 (Rogers); 50, Long Beach, Feb. 22 (Sedwitz); Parsippany Lake, April 8 (Edwards); Old Greenwich, May 18 (M. Brooks); 1 in full breeding plumage, Port Newark, July 8 (Eaton, Rose); see also remarks by Breslau and others in summary previously given.

Colymbus auritus. Horned Grebe.—70, Old Greenwich, April 18 (M. Brooks); 48, Fort Salonga, April 28 (Bohn).

Podilymbus podiceps podiceps. Pied-billed Grebe.—Brookhaven, Jan. 27 (Aste and Matuszewski); Bronx Park, May 7-8 (H. Lunt and G. J. Schmidt); pair bred near Somers, N. Y. (J. F. and R. G. Kuerzi); adult with young bird, Millneck, July 2 (Bohn, Walker); Idlewild, appeared on July 24 and remained (Mayer); 4, Mecox Bay, Aug. 15 (Cobb, Wilcox).

Puffinus griseus. Sooty Shearwater.—2, Jones Beach, May 19 (Carleton, Sedwitz); 3, Easthampton, May 20 (Helmuth); 2, two to five miles out from Moriches Inlet, Aug. 25 (Cobb, Wilcox); 2, Easthampton, Sept. 7 (Helmuth).

Puffinus gravis. Greater Shearwater.—3, Jones Beach, May 19 (Carleton, Sedwitz); 2, Aug. 19 (Cruickshank, Carleton, Sedwitz), and 1, Sept. 2 (Cruick-

shank, and J. and H. Murdock); 6, Easthampton, Sept. 7 (Helmuth); Oak Island Beach, Sept. 9 (Cruikshank, J. and H. Murdock).

Puffinus diomedea borealis. Cory's Shearwater.—7, two to five miles out from Moriches Inlet, Aug. 25, and 4, Aug. 31 (Cobb, Wilcox); 23, Easthampton, Sept. 7 (Helmuth); 3, Sagaponack, Sept. 16 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram).

Oceanites oceanicus. Wilson's Petrel.—40, Jones Beach, June 12, and 100 well distributed off Rockaway Breakwater, June 13 (Matuszewski); 14, Easthampton, Sept. 7 (Helmuth).

Moris bassana. Gannet.—6, "The Farms" fishing bank, Jan. 7 (Matuszewski); Long Beach, Feb. 4 (Janvrin); Sagaponack, Sept. 16 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram); 25, Montauk, Dec. 29 (Sedwitz).

Phalacrocorax carbo carbo. European Cormorant.—Manhattan Beach, Feb. 10 (Cruikshank); Dr. Helmuth reports 16 at Montauk, May 20, 2 at Easthampton, May 21, and 1 at Montauk, July 4; 2, off Barnegat, Dec. 23 (Evans, Walsh).

Phalacrocorax auritus auritus. Double-crested Cormorant.—5,000, Jones Beach, April 22 (Vogt and others); 75, flying, Bear Mt., May 19 (Kritzler); Jones Beach, July 1 (Vogt); 1 flying over Central Park, Aug. 2 and 2 over the George Washington Bridge, Aug. 6 (Helmuth); Manhattan Beach, Jan. 15 (Wiegmann); 2 in the same general area, Feb. 10, and 1 dead on the beach at Coney Island about Feb. 12 (Cruikshank).

Fregata spec. Man-o'-war-bird.—"I give this record for what it may be worth; I myself believe it to be authentic. On September 5, my son, who has seen Frigate Birds in Florida, came to me in great excitement to tell me of having seen a large, black, long-winged and fork-tailed bird soaring across the sky at Easthampton. The bird was at a great altitude, almost a speck in the sky, and sailed northward without moving its wings. My son pointed out the bird to a friend who agreed in the above description. Later in the same day, Mrs. Walter Keck, of Easthampton, told me of seeing two large birds sweeping eastward over the ocean. She saw them from her porch, which faces the sea, and they were very large, coal black, and had the longest thinnest wings of any bird she had ever seen. These wings they scarcely moved as they flew. They were so unusual that she at once sent for me to tell me about them."—Dr. Helmuth.

It is always of interest to check the weather phenomena attending records of such distant visitors. A tropical disturbance was reported about 500 miles east of Jacksonville on Sept. 1 accompanied by squalls, winds and gales over a considerable area; this moved northward and by the third had markedly decreased.

Ardea herodias herodias. Great Blue Heron.—Orient, Jan. 22 (Latham); Idlewild, June 5 (Mayer); 71 on the beach side of Shinnecock Bay, Quogue to Southampton, Sept. 6 (Wilcox).

Casmerodius albus egretta. American Egret.—Jones Beach, April 25 (Vogt) to May 11 (Mayer); Elizabeth Reservoir, May (Urner); Mastic, June 1-3 (W. F.

and J. T. Nichols); Troy, June 10 (Knoblauch); 21, Tuckerton, July 16 (Brown); Jones Beach outer strip, July 20 (Vogt) to Sept. 30 (Vogt), maximum 18 on Sept. 9; Orient, Aug. 2 to Sept. 4 (Latham); Speonk, Aug. 25 to Sept. 9, maximum 3 (Wilcox).

Egretta thula thula. Snowy Egret.—Tuckerton, Aug. 11 (Urner); Jones Beach, Aug. 28 (J. and R. Kuerzi, Vogt) to Sept. 9 (Matuszewski and others), maximum 3.

Florida caerulea caerulea. Little Blue Heron.—Hempstead Lake, April 18-19 (J. L. Chapin, Terry); Rye, July 22 (Cruikshank); Easthampton, July 29; 6, Wanaque Reservoir, N. J., Aug. 14, and 1, Montauk, Aug. 18 (Helmuth); 2, Bayside, Sept. 2-16 (Rordan); Jones Beach outer strip, Sept. 9-30, maximum 3 (Breslau, Sedwitz and others); Orient, Sept. 16 (Latham).

Butorides virescens virescens. Eastern Green Heron.—Central Park, April 21 (M. Rich and others); Jamaica South, complete set of eggs, May 27 (Mayer); Central Park, Aug. 7 (Sedwitz); Bronx, Oct. 16 (Malley).

Nycticorax nycticorax hoactli. Black-crowned Night Heron.—2, Shinnecock, Jan. 20 (Wilcox); Idlewild, 4 wintering birds increased to 20 on March 5, later to over 50 (Mayer); 25 pair, Westhampton, May 17 (the eighth colony now in the county—Wilcox); 1,000 nests, Great Neck, where the colony has existed for many years (M. V. Beals).

Nyctanassa violacea violacea. Yellow-crowned Night Heron.—Mill Neck, May 5-6 (Mr. and Mrs. Rich); Ozone Park, May 13 (Lind); Jamaica South, May 13-14 (Mayer); Bayside, May 16 (Bohn); Mattituck, June 5-July 2, two birds (Latham); Bronx, July 27 to Aug. 20 (Malley); Newark marshes, Aug. 11-12 (Urner, Sedwitz); Moriches Inlet, Aug. 21 (Wilcox); Jones Beach, Aug. 26 (Vogt) to Sept. 16 (Moore), maximum 2 birds.

Botaurus lentiginosus. American Bittern.—Speonk, Jan. 14 (Wilcox); Troy, March 29 (Walsh); 2, Central Park, Aug. 29 (Carleton); Idlewild, Nov. 22 (Mayer).

Ixobrychus exilis exilis. Eastern Least Bittern.—Nest, Van Cortlandt Park, June 2 (Cruikshank).

Sthenelides olor. Mute Swan.—Piermont, flying up the river, Dec. 23 (Edwards and others).

Cygnus columbianus. Whistling Swan.—Lake Como, N. J., Nov. 11 (Rebcll, Urner); Montauk, killed striking wires, Dec. 28 (Walker, Wilcox).

Branta canadensis canadensis. Common Canada Goose.—Union Square, N. Y. C., 6 flying over, March 5 (Staloff); Old Greenwich, May 18 (M. Brooks); Easthampton, "flying strongly over ocean, may have been feral," Aug. 4 (Helmuth); 20 honking and going westward, Easthampton, Aug. 29 (J. L. Helmuth).

Branta bernicla hrota. American Brant.—5, Mecox Bay, May 20 (Helmuth); 2, Gilgo, June 7 (Noble, Vogt); 4,000, Shinnecock, Nov. 25 (Breslau, Carleton, Johnson, Sedwitz).

Chen hyperborca. Snow Goose [subspecies?].—2, Barnegat, Oct. 14 (Urner); Jones Beach outer strip, Nov. 4 (Astle, Hickey, Matuszewski) and Nov. 18 (Vogt); Tuckerton Marshes, Nov. 11 (Rebell, Urner); 2, Mecox Bay, Nov. 27 (Helmuth). Six immature birds arrived at the Oceanside Country Club, Long Beach, Oct. 7. They soon learned to like grain, were eventually reduced (by hunters?) to four, and occasionally wandered off. When they returned after the longest of these intervals during the fall, about ten days, they were unusually hungry and greedily raced toward the food thoughtfully provided for them by Mr. Darmstadt, who discovered their first presence on the grounds; seen by scores of observers and still present Dec. 31; track measurements corresponded to those of *atlantica*, the Greater Snow Goose (Farley, Matuszewski). Birds at Tuckerton, Nov. 11, showed so much greater span than Blue Goose with which they were associated that they were probably Greaters.

Chen caerulescens. Blue Goose.—Small flock of 4, one of which was shot, Shinnecock Bay, Nov. 1 or 2 (Cottam *vide* Leroy Wilcox); 2 flocks, the largest containing 9 birds, Moriches Bay off Swan Island, Nov. 8 or 9 (Carlos Wilcox); 2, Tuckerton Marshes, Nov. 11 (Rebell, Urner); Orient, Nov. 19 (Latham); also 2, Shinnecock Bay, either this species or the last, Nov. 25 (A. M. Thomas); evidences of this unusual deviation from the normal migration route of this species were also noted elsewhere in the east.

Mr. Cottam writes that at least four birds were reported as killed early in November by gunners (Dorsey Carter, Everett Talmadge, Samuel Lane) and that another bird was also reported shot on Mecox Bay early in December. Records of this species on the Atlantic seaboard during the fall ran from Maine down to South Carolina. At this writing the chronology of this extraordinary movement is unavailable and a proper correlation with meteorological phenomena is impossible. Late in October a disturbance of great intensity north of Lake Erie moved toward the mouth of the St. Lawrence River causing strong northwest winds and gales from Boston to Hatteras. A wind squall here on Nov. 1 was the highest ever recorded locally in November.

Anas rubripes rubripes. Red-legged Black Duck.—Idlewild, 76 remained until April 28; arrived in the fall, Sept. 27 (Mayer).

Anas rubripes tristis. Common Black Duck.—Oakland Lake, 9 eggs, April 22 (Scott); Jamaica South, 10 eggs, May 6 (Mayer).

Chaulelasmus streperus. Gadwall.—4, Brookhaven, March 25 (J. F. Kuerzi, Potter, Street and others); 4, Hempstead Lake, Sept. 23 (Matuszewski); Jones Beach, Oct. 28 (Sedwitz); Brookhaven, 10 on Nov. 25 (Breslau, Carleton, Johnson, Sedwitz); 42 on Dec. 23 (Wilcox).

Mareca penelope. European Widgeon.—Hempstead Lake, 2 on Jan. 28 (Cruikshank, Cobb, Hickey, J. and H. Murdock), remained until April 18 (Mayer), returned Oct. 7 (Chapin, Matuszewski) and two drakes on Dec. 9 (Berliner, Sedwitz); Jones Beach, five spring records, March 23 to April 29 (Vogt and others), maximum 2, and fall records, Oct. 7 to Nov. 25 (Vogt); Brookhaven, definite winter data lacking, 2 on March 25 (Potter, Street and others), returned Sept. 22 (Sedwitz); elsewhere only one record, New Inlet, Sept. 22 (Sedwitz).

Mareca americana. Baldpate.—Idlewild, May 13 (Sedwitz).

Dafila acuta tzitzihoo. American Pintail.—150, Jones Beach, Feb. 16 (Vogt); Old Greenwich, May 5 (M. Brooks); Shinnecock Bay, May 19 (Sedwitz).

Nettion crecca. European Teal.—Hempstead Lake, 2 drakes wintered, last seen April 15 (Kritzler, McBride, Scott), returned Nov. 29 (Rordan); Jones Beach, April 3 (Vogt).

Nettion carolinense. Green-winged Teal.—Jones Beach, May 13 (Vogt); Idlewild, Aug. 13 (Mayer); 200, Jones Beach, Nov. 17 (Vogt); 57, Hempstead Lake, Dec. 6 (Mayer).

Querquedula discors. Blue-winged Teal.—Troy, nest of 12 eggs, May 13 (Chalif); 2, Mecox Bay, May 20 (Helmuth); pair, Jones Beach, until June 15 (Vogt); Idlewild, July 8, Aug. 11-12 (Mayer); Bronx, July 31 (Malley).

Spatula clypeata. Shoveller.—Hempstead, Jan. 20 (Astle, Matuszewski); Brookhaven, March 18 (Cruikshank, Cobb, Hickey, J. and H. Murdock), March 25 (J. F. Kuerzi and others); Newark Marshes, Sept. 30 (Rebell).

Aix sponsa. Wood Duck.—Westbury, banded bird weakly flying about, Feb. 10 (Matuszewski); Montauk, Feb. 22 (Breslau); Troy, 13 eggs in nest May 13 (Cruikshank), young June 16 (Brown); Barnegat region, Dec. 23 (Evans).

Nyroca americana. Redhead.—Jones Beach, April 27 (Vogt); Old Greenwich, April 23 (M. Brooks); Jones Beach, Oct. 14 (Sedwitz); rare and decreasing.

Nyroca collaris. Ring-necked Duck.—Jerome Reservoir, Jan. 20 (Cruikshank); Hempstead, Jan. 21 (Breslau, Sedwitz); 9, Cross River, Westchester Co., Feb. 12 (J. F. and R. G. Kuerzi); 2, Alley Pond Creek, March 11 (Scott); Parsippany Lake, 85 on April 8 (Eaton, Edwards), 22 on April 22 (Mr. and Mrs. Rieh).

Nyroca valisineria. Canvas-back.—Central Park, March 10 (Carleton); Parsippany Lake, April 29 (Cobb, Cruikshank, J. and H. Murdock).

Nyroca marila. Greater Scaup Duck.—50,000 (est.), East River between Fort Schuyler and Clason Point, Feb. 11 (J. F. and R. G. Kuerzi); Central Park, March 5-11 (Carleton); 1 (sp.?), Jones Beach, May 30 (Vogt).

Nyroca affinis. Lesser Scaup Duck.—Manhattan Beach, Feb. 17 (Cruikshank); 7, Parsippany Lake, May 13 (Edwards and others); pair, Passaic River, June 17 (Brown, Edwards); Rye, Dec. 23 (Herbert and others).—Also the follow-

ing reported without details: 2, Old Greenwich, May 29-30 (M. Brooks); Idlewild, July 14 and Aug. 11 (Mayer).

Glauclonetta clangula americana. American Golden-eye.—3, Old Greenwich, May 28 (M. Brooks); Jones Beach, May 28 (Vogt); Hempstead Lake, Oct. 28 (Chapin, Matuszewski).

Charitonetta albeola. Buffle-head.—2, Old Greenwich, April 20 (M. Brooks).

Clangula hyemalis. Old-squaw.—Old Greenwich, lingered until June 23 (M. Brooks); Suffolk Co., July 23-27 (J. L. Chapin); cripple, Oakwood Beach, Aug. 12 (Carleton, Cruickshank, J. and H. Murdock, Sedwitz).

Histrionicus histrionicus histrionicus. Eastern Harlequin Duck.—Montauk, drake, Jan. 20 (Wilcox) to March 4 (Drescher, Farley, Herbert, Hickey, Kessler); Lake Montauk, female, Feb. 22 (Breslau); Jones Beach, Feb. 25 (Vogt); Shark River, N. J., Feb. 25 (Brown, Eaton, Edwards, Urner); Manasquan River, N. J., Feb. 25 (Urner) to March 3 (Brown, Edwards, J. F. and R. G. Kuerzi, Mayr). Unprecedented numbers were also seen in Massachusetts. A disturbance of great intensity centered off the southern New England coast on Feb. 20th; this had increased by the 23rd and moving in a north-northeasterly direction resulted in strong northeast winds and gales.

Somateria mollissima dresseri. American Eider.—Brighton Beach and vicinity, Feb. 3-17; Long Beach, Feb. 18-25 (Cruickshank and others); Montauk, 2 on Dec. 16 (Helmuth, Sedwitz and others); 1 on Dec. 23 (Breslau, Carleton, Lind, Sedwitz).

Somateria spectabilis. King Eider.—Montauk, 8 on Feb. 23 (Breslau, Sedwitz), 1 on Nov. 11 (Breslau, Carleton, Johnson, Sedwitz), 9 on Dec. 16 (Helmuth, Sedwitz and others); Orient, Nov. 30 (Latham); Manhattan Beach, Jan. 15 (Wiegmann), 2 same general area Feb. 3, 1 plus 2 sp., Feb. 17 (Cruickshank); Long Beach, Feb. 25 (Cruickshank and others).

Melanitta deglandi. White-winged Scoter.—80,000 (est.) Scoters mostly this species. Montauk, March 4 (Drescher, Farley, Herbert, Hickey, Kessler); 150, Saugatuck Shores, Conn., May 27 (Farley, Hickey); Gilgo, June 13 (Matuszewski).

Melanitta perspicillata. Surf Scoter.—Jones Beach, July 22 (Jaques, Vogt).

Oidemia americana. American Scoter.—2, Bayside, Aug. 18 (Bohn); Gilgo, Aug. 26 (Breslau, Cruickshank, Herbert, J. F. and R. G. Kuerzi, Sedwitz).

Erismatura jamaicensis rubida. Ruddy Duck.—Kensico, Jan. 28 (Cruickshank); 14, Parsippany Lake, April 29 (Cobb, Cruickshank, J. and H. Murdock); 2, Jones Beach, May 24-27 (Vogt); 2, Central Park, Sept. 28 (Carleton); 6, Old Greenwich, Nov. 17 (Cruickshank, H. Greer).

Lophodytes cucullatus. Hooded Merganser.—Pompton, March 29 (Walsh); Troy, May 19 (Edwards); Jones Beach, July 29 (Rose, Sedwitz, Vogt); Rye,

Oct. 21 (Cruickshank), and 12 Dec. 2 (Oboiko and others); Jones Beach, Dec. 25 (Sedwitz).

Mergus merganser americanus. American Merganser.—Long Beach, Feb. 4 (Janvrin), and 4 Feb. 22 (Sedwitz); Central Park, March 26 (M. Rich); 135, Parsippany Lake, April 8 (Eaton, Edwards); Old Greenwich, May 10 (M. Brooks).

Mergus serrator. Red-breasted Merganser.—25, Parsippany Lake, April 8 (Eaton, Edwards); 5, Oakwood Beach, May 21 (Wiegmann).

Cathartes aura septentrionalis. Turkey Vulture.—Sheepshead Bay, March 17 (Cruickshank); Amityville, April 21 (Welles); 10, Wingdale, Dutchess Co., May 6 (J. F. and R. G. Kuerzi); Easthampton, Aug. 4 (J. L. Helmuth); 19, boundary line between Dutchess and Putnam Counties, Oct. 21 (Frost); Central Park, Oct. 28 (Sedwitz); west end of Southern State Parkway, Oct. 30 (Vogt); Orient, Nov. 3 (Latham); Bayside, Nov. 15 (Sabin).

Coragyps atratus atratus. Black Vulture.—Colts Neck, N. J., April 8 (Janvrin and Urner); Bayside, Oct. 12, "seen moving about 250 feet overhead, I noted the short, *spread* tail, rather wide wings and light almost white bases to the primaries [which] gave an effect as though there were holes in the wings at first. I know the Turkey Vulture very well and am positive that the bird in question was a Black Vulture" (Herman Bohn).

Astur atricapillus atricapillus. Eastern Goshawk.—Freshly killed bird, five miles south of Kent, Conn., Nov. 18 (Edwards, Kassoy, J. F. and R. G. Kuerzi, Oboiko); Barnegat region, Dec. 23 (Walsh); 2, Queens, Dec. 29 (Sedwitz).

Accipiter cooperi. Cooper's Hawk.—Staten Island, bred for the second consecutive year (Cleaves).

Buteo borealis borealis. Eastern Red-tailed Hawk.—Pair bred near Rutherford (Rebeli); Central Park, April 10 (M. Rich).

Buteo platypterus platypterus. Broad-winged Hawk.—Van Cortlandt Park, badly crippled bird discovered two months earlier, still present Feb. 7 (W. J. Norse); 8, Hook Mt., April 15 (Farley, Herbert, Meredith).

Buteo lagopus s. johannis. American Rough-legged Hawk.—Hohokus, N. J., "carefully identified at close range," May 13 (Helmuth); eastern Long Island, Oct. 12 (Wilcox); Jones Beach, Oct. 12 (Cobb, Maynard, Vogt); Bronx, Oct. 13 (R. G. Kuerzi).

Aquila chrysaetos canadensis. Golden Eagle.—Short Hills, N. J., Nov. 25, well seen by an observer aware of its extreme rarity and familiar with the species in the west (Chalif); New Jersey State Game Preserve, Forked River, trapped Dec. 8 (Dowd *vide* G. G. Fry). Some doubt of position identification in latter record.

Haliaeetus leucocephalus (subsp.). Bald Eagle.—9, Croton Point, Jan. 28 (Brandreth, Farley, Herbert, J. F. and R. G. Kuerzi).

Pandion haliaëtus carolinensis. Osprey.—Millneck, nest in process of construction, later abandoned, April 22 (Bohn); Mastic, Oct. 28 (J. T. Nichols); 2, Millneck, Oct. 28 (J. L. Chapin); Idlewild, Nov. 3 (Mayer); Speonk, Nov. 14 (Wilcox).

Falco obsoletus. Black Gyrfalcon.—Orient, Feb. 15 (Latham), see "Notes," *Proceedings*, Nos. 45-46, p. 102; reported also from Jones Beach, Oct. 20 (Lane). for details see *Bird-Lore*, v. 36, no. 6, Nov.-Dec., '34, p. 364.

Falco peregrinus anatum. Duck Hawk.—Bernardsville, May 6 (C. K. Herbst).

Falco columbarius columbarius. Eastern Pigeon Hawk.—Hook Mt., April 15 (Farley, Herbert, Meredith); Central Park, April 23 (Cruickshank, E. and M. Rich); Jamaica South, Aug. 31 (Mayer); Central Park, Nov. 11 (Watson); Orient, Dec. 11 (Latham); Bronx, Dec. 23, well seen by observers aware of its winter rarity (R. G. Kuerzi and P. P. Malley).

Bonasa umbellus umbellus. Eastern Ruffed Grouse.—Trap Rock Ridges, Union Co., N. J., 2 pairs bred (Rebell); Barnegat region, Dec. 23 (Jackson).

Colinus virginianus virginianus. Eastern Bob-white.—15, Inwood Park, present all fall (W. J. Norse).

Rallus elegans elegans. King Rail.—Dead bird, Baxter Inlet, Bronx, where it was seen Dec. 24, 1933 (R. G. Kuerzi, Matuszewski), March 6 (Malley); Troy, April 20 (Walsh); Ozone Park, May 13 (Lind, Sedwitz); Jamaica South, May 18 and 20 (Mayer); Mecox Bay, July 4 (Helmuth).

Rallus longirostris crepitans. Northern Clapper Rail.—Dead bird in fresh condition, Jamaica Marshes, March 18 (Wiegmann); Baxter Inlet, May 20 (R. G. Kuerzi), female with brood, Aug. 20 (Malley); Long Beach, nest found June 3, eggs still unhatched June 10, one egg left June 17 (Janvrin); has wintered regularly during the last few years at Oakwood Beach (Wiegmann); Barnegat area, Dec. 23 (C. K. and C. M. Nichols); Baychester Marshes, Dec. 23 (Hickey, Solotar, Weber); Flushing, Dec. 23 (M. V. Beals, Walker).

Rallus limicola limicola. Virginia Rail.—Van Cortlandt swamp, Dec. 23 (R. P. Allen, Cruickshank, J. and H. Murdock).

Porzana carolina. Sora.—Flushing, Nov. 2 (Mayer).

Coturnicops noveboracensis. Yellow Rail.—Bayside, "flushed twice in a dry pasture . . . noted the small size, general yellow color and white wing patches," Sept. 19 (Bohn).

Creciscus jamaicensis stoddardi. Black Rail.—Jones Beach, Sept. 29 (Astle, Matuszewski).

Ionornis martinica. Purple Gallinule.—Jones Beach, "captured in a mosquito ditch and possibly carried north by the storm of June 19," June 21 (Vogt); Barnegat strip, Oct. 28 (Urner).

Gallinula chloropus cachinnans. Florida Gallinule.—Mill Neck, April 15 (Kritzler, McBríde, Scott); Troy, April 20 (Walsh) and 9 young, June 19 (Brown); Fort Salonga, L. I., Nov. 18 to Dec. 31 (G. G. Fry).

Fulica americana americana. American Coot.—2, Kensico Reservoir, Jan. 28 (Cruikshank); Clove Valley, Dutchess Co., April 1 (Baker); Millneck, May 20 (Sedwitz); 2, Rye Lake, Dec. 16 (Cook).

Charadrius melodus. Piping Plover.—Jones Beach, egg hatching, June 3 (Vogt); 4, Oak Island Beach, Sept. 30 (Breslau, Sedwitz, Wolfram).

Charadrius semipalmatus. Semipalmated Plover.—2, Brigantine, April 4 (Walsh); Central Park, May 29 (E. and M. Rich); Idlewild, July 2 and 6 (Mayer); 4, Newark Marshes, July 7 (Urner); Baxter Inlet, Oct. 30 (Malley); 2, Oak Island Beach, Nov. 18 (Breslau, Carleton, Johnson, Sedwitz).

Oxyechus vociferus vociferus. Killdeer.—Central Park, March 19 (M. Rich); Idlewild, full set of eggs, July 11 (Mayer); Orient, very common and increasing, lingered to Dec. 21 (Latham).

Pluvialis dominica dominica. American Golden Plover.—Mecox Bay, 76 arrived Aug. 29 and remained in varying numbers until Oct. 5 (Helmuth); Jones Beach, Aug. 5 (Breslau, Sedwitz) to Nov. 25 (Cruikshank, Jove, J. and H. Murdock, W. A. Weber), maximum 5, Aug. 26 (Breslau, Cruikshank, J. F. and R. G. Kuerzi, Sedwitz); 40, Hempstead Plains, Sept. 10 (Matuszewski); Orient, Nov. 16 (Latham).

Squatarola squatarola. Black-bellied Plover.—Baxter Inlet, June 12 (Malley); Idlewild, lingered to July 2, returned July 19 (Mayer); 15, Newark, Aug. 8 (Urner); Orient, Nov. 16 (Latham).

Arenaria interpres morinella. Ruddy Turnstone.—Old Greenwich, May 16-28, maximum 10, May 20 (M. Brooks); Baxter Inlet, May 21 (R. G. Kuerzi); Idlewild Beach, June 16, then July 13 and first regular migrants July 31 (Mayer); Rye, Oct. 21 (Cruikshank); 3, Tuckerton Marshes, Nov. 25 (R. P. Allen, Evans, Peterson, Walsh).

Philohela minor. American Woodcock.—Central Park, March 24 (Cruikshank) and May 19 (Carleton); 2, Port Chester, Dec. 16 (Cook); Bronx, Dec. 23 (Hickey, Jove, Norse, Solotar, W. A. Weber).

Phaeopus hudsonicus. Hudsonian Curlew.—South Oyster Bay, April 23 (Vogt); 100, Westbury, May 20 (Matuszewski); 3, Mecox Bay, June 1 (Wilcox); 2, Newark Marshes, Aug. 12 (Eaton); Orient, July 2 to Oct. 13 (Latham); 960, Barnegat, July 21 (Urner).

Bartramia longicauda. Upland Plover.—Lamington, 6 pair bred (an increase of two), arrived May 5 (C. K. Herbst); 12, New Hyde Park, Aug. 5 (Cruikshank, J. and H. Murdock, Sedwitz); 55 plus, Newark Marshes, Aug. 11 (Urner); 2, Bronx, heard flying over, Aug. 11 (J. F. Kuerzi); Orient, Sept. 17 (Latham).

Actitis macularia. Spotted Sandpiper.—Sullivan Co., virtual colonial nesting noted, 4 clutches completed May 24 (Mayr); 25, Old Greenwich, May 10 (M. Brooks); Jamaica South, Oct. 5 (Mayer).

Tringa solitaria solitaria. Eastern Solitary Sandpiper.—Newark Marshes, July 11 (Urner); Van Cortlandt Park, crippled bird, Nov. 18 (W. A. Weber).

Catoptrophorus semipalmatus subsp. Willet.—2, July 20 (Vogt); good scattering of fall birds along the coast; maximum 12, Moriches Inlet, Sept. 1 (Cobb); 10, Jones Beach outer strip, Sept. 6 (K. Browning, J. F. and R. G. Kuerzi, Oboiko). Leroy Wilcox, who has collected *inornatus* on Long Island and who is familiar with the measurements of *semipalmatus*, writes of an observation at Mecox Bay, Sept. 9: "In a flock of 11 Willets, I picked out an Eastern which was very noticeably smaller than the Westerns. It was in young or winter plumage. This is the first time I have been able to pick out the Eastern Willet in the fall." 2, Orient, Sept. 14 (Latham).

Totanus melanoleucus. Greater Yellow-legs.—Central Park, May 6 (E. and M. Rich); Jones Beach, "all of June" (Vogt); Idlewild, lingered to June 26, 6 returned July 3 (Mayer); Orient, June 29 (Latham); 3 "swimming and tipping for food in a pool, exactly in the manner of ducks," on a farm south of Flushing, Sept. 20 (Astle, Matuszewski); Idlewild, Dec. 4 (Mayer); Orient, Dec. 7 (Latham); 3, Old Greenwich, Dec. 23 (M. Brooks, Cook).

Totanus flavipes. Lesser Yellow-legs.—Old Greenwich, 4 records of 1 or 2 birds, May 7-21 (M. Brooks); 9, Newark Marshes, June 30 (Urner); Idlewild, July 2 (Mayer); Ocean County, Nov. 4 (Urner).

Calidris canutus rufus. American Knot.—18, Idlewild Beach, June 16 (Mayer); 16, Jones Beach, June 17 (Vogt); 150, Ocean Co., N. J., Nov. 11 (Urner); Beach Haven, Dec. 23 (C. K. and C. M. Nichols).

Arquatella maritima. Purple Sandpiper.—Long Beach, maximum of 24, Feb. 25 (Cruikshank); Montauk, remained until March 25 (Farley, Potter, Street and others); Oak Island Beach, Nov. 18 (Breslau, Carleton, Johnson, Sedwitz); 4, Long Beach, Nov. 18 (Lind); Beach Haven, Dec. 23 (C. K. and C. M. Nichols); 4, Larchmont breakwater, Dec. 23 (Cobb, Vogt).

Pisobia melanotos. Pectoral Sandpiper.—Jones Beach, Nov. 25 (Cruikshank, Jove, J. and H. Murdock, W. A. Weber).

Pisobia fuscicollis. White-rumped Sandpiper.—2 flocks of 50, Mastic, June 10 (J. T. and W. F. Nichols); Jones Beach, June 26 (Vogt); 50-75, Oak Island Beach, Sept. 9 (Breslau, Sedwitz); Beach Haven, Nov. 11 (Urner); Orient, Nov. 19 (Latham).

Pisobia bairdi. Baird's Sandpiper.—Jones Beach, June 3 (Vogt), Aug. 25 (Evans, Lawn, Vogt) and Aug. 31 (Matuszewski); Idlewild, Aug. 29 and 2 on Sept. 9 (Mayer); Newark Marshes, Sept. 8 and 15 (Urner), and 22 (Rebell); New Inlet, "catching insects on the wing," Sept. 22 (Sedwitz); Oak Island Beach, Oct. 21 (Breslau, Matuszewski, McKeever, Sedwitz).

Pisobia minutilla. Least Sandpiper.—Idlewild, June 12 and 2 possibly south-bound, June 24 (Mayer); Jones Beach, cripple, June 17 (Vogt); 4, Newark Marshes, June 30 (Urner); 4, Tuckerton, July 1 (Urner).

Erolia testacea. Curlew Sandpiper.—Beach Haven, Oct. 28 (Urner).

Pelidna alpina sakhalina. Red-backed Sandpiper.—Jones Beach, July 2 (Vogt) and July 19 (Bohn, Walker); Brigantine, July 15 (Urner); 300, Beach Haven, Aug. 12 (Urner); Oak Island Beach, Dec. 2 (Astle, Matuszewski); Moriches Inlet, Dec. 14 (Wilcox).

Limnodromus griseus griseus. Eastern Dowitcher.—Old Greenwich, May 7 (M. Brooks); Baxter Inlet, May 20-21 (Malley); 300, Mecox Bay, May 19 (Sedwitz); 3, Jones Beach, June 26, and 2, June 30 (Vogt); 2, Idlewild, June 30 (Mayer); Newark Marshes, June 30 (Urner); 1,000 (est.), Brigantine, July 21 (Urner); 3, Jones Beach, Nov. 4 (Astle, Matuszewski, Hickey); 10, Tuckerton Marshes, Nov. 4 (Urner).

Limnodromus griseus scolopaceus. Long-billed Dowitcher.—Jones Beach, July 1 (Vogt); Tuckerton, Aug. 18, and 3, Nov. 4 (Urner).

Micropalama himantopus. Stilt Sandpiper.—Newark Marshes, July 7 (Urner).

Ereunetes pusillus. Semipalmated Sandpiper.—Idlewild, 2 arrived April 23, 123 as late as June 15, lingered until June 29 and returned July 4 (Mayer); Central Park, May 29 (E. and M. Rich); 10, Jones Beach outer strip, Nov. 3 (Bohn, Walker and others); 1, Nov. 18 (Breslau, Carleton, Johnson, Sedwitz).

Ereunetes mauri. Western Sandpiper.—Jones Beach, June 10 (Vogt); 2, Idlewild Beach, June 12 and 2, July 15 (Mayer); Oak Island Beach, Nov. 4 (Astle, Hickey, Matuszewski); Ocean County, N. J., Nov. 11 (Urner).

Tryngites subruficollis. Buff-breasted Sandpiper.—Newark Marshes, Aug. 30 and Sept. 15 (Urner).

Limosa fedoa. Marbled Godwit.—Moriches Inlet, Aug. 5 and Aug. 20-21 (Cobb, Wilcox); Brigantine, Aug. 5-Sept. 2 (Edwards, Urner); Jones Beach, Sept. 6 (K. Browning, J. F. and R. G. Kuerzi, Oboiko) to Sept. 23 (Cruickshank, J. and H. Murdock), maximum 5 birds; Orient, Aug. 16 and Sept. 17 (Latham).

Limosa haemastica. Hudsonian Godwit.—Brigantine, May 16 (Urner); Easthampton, Sept. 10 (Helmuth); Newark Marshes, Sept. 18 (Urner); Oak Island Beach, Oct. 28 (Breslau, Carleton, Johnson, Sedwitz).

Crocethia alba. Sanderling.—Old Greenwich, April 20, maximum 25 on May 7-8 (M. Brooks); 2, Idlewild until June 18, returned July 11 (Mayer); 25, Brigantine, July 15 (Urner).

Phalaropus fulicarius. Red Phalarope.—2, Newark Marshes, May 19 (Urner); Jones Beach, May 28 (Vogt); Gardiner's Bay, June 26 (Latham); Beach Haven, Aug. 18 (Urner).

Steganopus tricolor. Wilson's Phalarope.—Newark Marshes, May 12, and Brigantine, June 19 (Urner); Jones Beach, June 28 (Bohn, Walker) and July 29 (Sedwitz); Tuckerton Marshes, Aug. 5 and 4, Newark Marshes, Aug. 8 (Urner); 4, Jones Beach outer strip, Aug. 26 (Breslau, Herbert, Vogt and others) to Sept. 9 (Cruickshank, Sedwitz and others); 4, Gardiner's Bay, Sept. 4 (Latham).

Lobipes lobatus. Northern Phalarope.—Montauk, June 1 (Wilcox); Jones Beach, Sept. 9 (Vogt and others) and Sept. 16 (Farley, Herbert, Vogt); Newark Marshes, Sept. 18 (Edwards, J. F. and R. G. Kuerzi).

Stercorarius parasiticus. Parasitic Jaeger.—Oakwood Beach, a bird either this species or the next, May 22 (J. F. and R. G. Kuerzi); only a few shore records during the fall.

Stercorarius longicaudus. Long-tailed Jaeger.—Jones Beach, June 8 (well seen and carefully identified, J. F. Matuszewski).

Larus hyperboreus. Glaucous Gull.—Scattered individuals seen during the winter, much less frequent during the fall; 3, Westchester Creek garbage dump, Feb. 3 (J. F. and R. G. Kuerzi); 2, Long Beach, April 1 (Cobb, Cruickshank, J. and H. Murdock); between Shark River and Brigantine, April 8 (Janvrin, Urner and others); Hillview Reservoir, April 21 (Mr. and Mrs. Rich); Atlantic Beach, April 29 (Sedwitz and others); Jones Beach, May 6 (Cruickshank, J. and H. Murdock); Easthampton, May 20 (Helmuth).

Larus leucopterus. Iceland Gull.—Well distributed and most often at garbage dumps and sewer outlets; S. W. of Scotland Light Ship, Jan. 7 (Matuszewski); Hudson River, Englewood, Jan. 14 (Cruickshank); East River at Welfare Island, Jan. 15 (Helmuth); Harlem River at 155th St., Jan. 27 (Hickey); 3, Westchester Creek garbage dump, Feb. 3 (J. F. and R. G. Kuerzi); 2, Long Beach, Feb. 11 (Breslau, Cruickshank and Sedwitz); Little Neck Bay, April 8 (Brown); 3, between Shark River and Brigantine, April 8 (Janvrin, Urner and others); Jones Beach, May 6 (Cruickshank, J. and H. Murdock); one summered at Beach Haven (Urner); less numerous in the fall; probably 12 different birds at the Westchester Creek garbage dump during the winter of 1933-34 (R. G. Kuerzi).

Larus kumlieni. Kumlien's Gull.—Jones Beach, Dec. 16 (Peterson, Vogt).

Larus marinus. Great Black-backed Gull.—Over 200 in one flock, Long Beach, Feb. 11 (Breslau, Cruickshank, Sedwitz); 6, Montauk, July 25 (Sedwitz).

Larus fuscus fuscus. Lesser Black-backed Gull.—Beach Haven, N. J., Sept. 9, sight record (Edwards, Urner), see *Auk*, v. 52, no. 1, Jan., 1935.

Larus fuscus graellsii. Lesser Black-backed Gull.—Westchester Creek garbage dump, Bronx, Dec. 9, sight record (J. F. and R. G. Kuerzi); see *Proceedings*, v. 45-46, p. 101.

Larus delawarensis. Ring-billed Gull.—14, Old Greenwich, May 30 (M. Prooks); 60, Jones Beach, June 17, where it summered (Sedwitz, Vogt).

Larus atricilla. Laughing Gull.—1,000 (est.), two miles N. W. of Setauket, Long Island, mostly immature plumage, June 27 (Wilcox); Orient, Dec. 2 (Latham); Barnegat region, Dec. 23 (C. K. and C. M. Nichols).

Larus philadelphia. Bonaparte's Gull.—3, Parsipanny Lake, April 22 (Mr. and Mrs. Rich); 38, Old Greenwich, May 8 and 1,000 (est.), Southport, May 9

(M. Brooks); Idlewild, May 30 (Mayer); 1,000 (est.), Montauk, Dec. 29 (Sedwitz).

Larus minutus. Little Gull.—Oakwood Beach, April 22 (Drescher) and May 22 (J. F. and R. G. Kuerzi); Lower New York Bay, off Robbin's Reef, April 29 (Mr. and Mrs. Rich) and off the Staten Island Ferry, April 30 (J. P. Chapin).

Pagophila alba. Ivory Gull.—“A pure white gull flying in good view over Gardiner's Bay. I feel quite certain was this, although only a sight record,” Feb. 1 (Latham); see Notes,” *Proceedings*, v. 45-46, p. 102.

Rissa tridactyla tridactyla. Atlantic Kittiwake.—24, Idlewild, Jan. 16 (Mayer); 2, Jones Beach, Jan. 31 (Mayer); Manhattan Beach, 1 on Jan. 26 (Rich), 6 on Feb. 10 (Cruikshank) and 2, Feb. 11 (Breslau, etc.); 8, Long Beach, Feb. 11 (Breslau, etc.); 3, Montauk, Dec. 29 (Sedwitz).

Gelochelidon nilotica aranea. Gull-billed Tern.—Oakwood Beach, Aug. 4 (Cruikshank); Jones Beach, Sept. 9 (Matuszewski and others); Sagaponack, Sept. 16 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram); 2, Mecox Bay, Sept. 17 (Helmuth).

Sterna forsteri. Forster's Tern.—Jones Beach, July 29 (Sedwitz); Idlewild, Aug. 29-31 (Mayer); 25, Jones Beach outer strip, Sept. 9 (Breslau, Sedwitz); 2, Moriches Inlet, Sept. 9 (Walker, Wilcox); 50, south shore of Long Island, Sept. 16-17 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram); New Inlet, Sept. 23 (Breslau, Sedwitz); Barnegat region, Dec. 23 (C. K. Nichols, Walsh).

Sterna hirundo hirundo. Common Tern.—Old Greenwich, May 5 (M. Brooks); Orient, former colony of 4,000-5,000 now reduced to about 500 (Latham); 3, Fire Island Inlet, Nov. 7 (Breslau, Johnson, Sedwitz).

Sterna paradisaea. Arctic Tern.—Georgica Pond, Aug. 4 (Helmuth).

Sterna dougalli dougalli. Roseate Tern.—Orient, colony of 400 now entirely wiped out (Wilcox); Mt. Sinai, adult feeding young bird, June 27 (Wilcox); Baxter Inlet, Aug. 25 (Cruikshank); 3, New Inlet, Sept. 16 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram).

Sterna fuscata fuscata. Eastern Sooty Tern.—Barnegat Inlet, May 27 (Rogers).

Sterna antillarum antillarum. Least Tern.—Idlewild, 2 eggs hatched, July 15 (Mayer); 50, Moriches Inlet, Aug. 11 (Wilcox).

Hydroprogne caspia imperator. Caspian Tern.—Barnegat area, Aug. 18 (Rogers) to Sept. 16 (Hickey, J. F. and R. G. Kuerzi, Urner, usually 2 (Urner); Jones Beach outer strip, 4 on Sept. 9 (Breslau, Sedwitz), regularly until Oct. 14 (Breslau, Carleton, Johnson, Sedwitz), maximum 6, Sept. 23 (Cruikshank, J. and H. Murdock); Moriches Inlet, 3 on Sept. 9 (Walker, Wilcox) to 2, Sept. 16 (Colb); largest daily total between Montauk and Moriches, 8, Sept. 10 (Helmuth); 2, Gardier's Bay, Sept. 2 (Latham); 2, Long Beach, Sept. 9 (Hagood);

Jerome Reservoir, Sept. 30 (Cruikshank); dead bird at Jones Beach was banded July 18, 1931, by Wm. Lyon at Hat Island, Michigan (*vide* Vogt).

Chlidonias nigra surinamensis. Black Tern.—Oakwood Beach, May 22 (J. F. and R. G. Kuerzi); Rye, July 22 (Cruikshank); Gardner's Bay, Sept. 26 (Latham).

Rynchops nigra nigra. Black Skimmer.—3, Amityville, June 18 (Harris) and Jones Beach outer strip, June 29, almost daily thereafter; Gilgo, nest found with young birds, Aug. 18 (Vogt); Hudson River above Dyckman St. ferry, Sept. 3 (Cruikshank); 110, Jones Beach outer strip, Sept. 9 (Breslau, Sedwitz); 16, Moriches Inlet, Sep. 9 (Walker, Wilcox), 24 on Sept. 12 (Wilcox), last seen Sept. 16 (Cobb); 6, Idlewild, Sept. 14, to 2, Oct. 6 (Mayer); 30, Long Beach, Sept. 9 (Hagood); 7, Orient, Sept. 12 (Latham); 18, New Inlet, Sept. 16 (Breslau, Carleton, Helmuth, Sedwitz, Wolfram).

Alca torda. Razor-billed Auk.—A few, Montauk, Feb. 22 (King, *vide* Breslau); Orient, March 4 and April 4 (collected, Latham); Montauk, Dec. 29 (Sedwitz).

Uria lomvia lomvia. Brünnich's Murre.—2, Montauk, Jan. 27 (Aste, Matuszewski); Manhattan Beach, Jan. 28 (J. M. Cunneen); Brighton Beach, Feb. 18 (Rich); several, Montauk, Feb. 22 (King).

Alle alle. Dovekie.—Jones Beach, Jan. 26 (Vogt); S. W. of Scotland Light Ship, Jan. 27 (Matuszewski); 12, Montauk, Feb. 21 (King); 1, Swan Island, Moriches Bay, 1 alive in road at Speonk Shore, Dec. 1, and 1 at Moriches Bay, Dec. 2 (Wilcox); 2, Mecox Bay, Dec. 1-2 (Arm and Boughton Cobb); 3 (2 oil-soaked), Jones Beach, Dec. 2 (Vogt); dead bird in fresh condition, Long Beach, Dec. 9 (G. G. Fry, C. K. Herbst); dead bird, Montauk (Sedwitz) and another in fresh condition, Englewood (Cruikshank), Dec. 29.

Zenaidura macroura carolinensis. Eastern Mourning Dove.—Idlewild, 2 eggs, May 14 (Mayer); Central Park, Aug. 30 and Sept. 22 (Carleton).

Coccyzus americanus americanus. Yellow-billed Cuckoo.—Miller Place, May 4 (G. P. Helme).

Coccyzus erythrophthalmus. Black-billed Cuckoo.—Central Park, Aug. 13 (Carleton).

Tyto alba pratincola. Barn Owl.—New Providence, young birds, June (Rebell); Floral Park, dead bird, April 23 (Breslau, Cruikshank, Lind, Sedwitz); Troy, June 16 (Brown); Hohokus, N. J., Aug. 7 to Nov. (Helmuth).

Otus asio naevius. Eastern Screech Owl.—Jones Beach, May 12 to 27 (Vogt).

Bubo virginianus virginianus. Great Horned Owl.—Eastport, Nov. 27 (Wilcox); Idlewild, Dec. 12 (Mayer).

Nyctea nyctea. Snowy Owl.—Montauk, Jan. 1, second individual in nine days (Breslau, Sedwitz); Mecox Bay, Jan. 2 (Helmuth); Orient, Feb. 5 (Latham); Baxter Inlet, March 6 (Malley); Idlewild, April 29 (Lind) to May 3 (Sedwitz);

arrived in the fall Oct. 31, Eastport (Wilcox) and Flushing (shot, Molnar); others recorded at Flanders, Idlewild, Jones Beach, Mecox Bay, Montauk, Orient (three birds) Shinnecock Bay and Speonk; Bronx, Nov. 11 (Knoblauch); Staten Island, Dec. 23 (Rich, Wiegmann).

Strix varia varia. Northern Barred Owl.—East Patchogue, left nest about Aug. 1 (Overton); Bronx Park, Nov. 6 (Gibson).

Asio wilsonianus. Long-eared Owl.—Easthampton, crushed by car, Sept. 7 (Helmuth); Central Park, Nov. 14 (Watson).

Asio flammeus flammeus. Short-eared Owl.—Central Park, Oct. 5 (Carleton).

Antrostomus vociferus vociferus. Eastern Whip-poor-will.—Central Park, Aug. 29 (Carleton).

Archilochus colubris. Ruby-throated Hummingbird.—Jamaica South, Sept. 25 (Mayer); 2, Bronx Park, Oct. 8 (Gibson, Malley, Petersen).

Megaceryle alcyon alcyon. Eastern Belted Kingfisher.—Central Park, July 19 (Carleton).

Ceophloeus pileatus abieticola. Northern Pileated Woodpecker.—Dutchess County, April 14 (Baker); North of Kensico Reservoir, Dec. 23 (Brand, Zimmer).

Melanerpes erythrocephalus. Red-headed Woodpecker.—Rapidly decreasing; now only a migrant in the Passaic River Valley (Eaton); bred in Pelham Bay Park, three pairs (Malley) and in Scarsdale (Farley); 3, Hatfield Swamp, N. J., Jan. 1 and 2, Troy, April 2 (Brown); Central Park, May 18 (Rich, Sedwitz); Baldwin, July 29 (Sedwitz).

Tyrannus tyrannus. Eastern Kingbird.—Central Park, Sept. 10 and Wantagh, Sept. 23 (Carleton); Jamaica South, Sept. 28 (Mayer); Bronx Park, Oct. 11 (Gibson, Malley).

Tyrannus verticalis. Arkansas Kingbird.—Jones Beach, Aug. 28 (J. F. and R. G. Kuerzi, Vogt) to Sept. 3 (Vogt); another, Sept. 9 (Vogt and others); Wantagh, Sept. 12 (Mangels); Montauk, Nov. 11 (Breslau, Cruickshank, Sedwitz and others) to 2, Nov. 18 (Freidle, Watson).

Myiarchus crinitus boreus. Northern Crested Flycatcher.—Jamaica South, Sept. 14 (Mayer); Central Park, Sept. 19 (Carleton).

Empidonax flaviventris. Yellow-bellied Flycatcher.—Elmhurst, Aug. 17, 29, 30 and 31 (all trapped and identified in the hand—M. V. Beals).

Empidonax trailli trailli. Alder Flycatcher.—Central Park, singing male, May 21 (Cruickshank, E. Rich); Bayside, singing male, Aug. 21 (Bohn); Elmhurst, Aug. 17 (trapped bird carefully identified in the hand—M. V. Beals).

Empidonax minimus. Least Flycatcher.—Elmhurst, trapped, Sept. 11 (M. V. Beals); Jamaica South, Sept. 20 (Mayer), reported without details.

Otocoris alpestris praticola. Prairie Horned Lark.—Newark Airport, June 23 (Urner); 2, Van Cortlandt Park, Oct. 25 (J. F. and R. G. Kuerzi).

Iridoprocne bicolor. Tree Swallow.—Idlewild, May 31 (Mayer).

Stelgidopteryx ruficollis serripennis. Rough-winged Swallow.—Central Park, April 20 (Rich and others); 3, Mattituck, June 29 (Latham); Westwood, June 30 (Carleton).

Hirundo erythrogaster. Barn Swallow.—Hempstead Lake, April 3 (J. L. Chapin); Springfield, N. J., albino bird, (Rebell); Idlewild, 3 eggs, May 28 (Mayer); 3, Jones Beach, Nov. 8 (Vogt); 4, Montauk and 4, New Inlet, Nov. 11 (Breslau, Carleton, Johnson, Sedwitz).

Petrochelidon albifrons albifrons. Northern Cliff Swallow.—Brewster, N. Y., colony of 20-30 pairs, May 27 (Farley, Hickey); Idlewild, July 31 (Mayer).

Progne subis subis. Purple Martin.—Still nests at Baldwin (Matuszewski).

Cyanocitta cristata cristata. Northern Blue Jay.—Large migration, May 6, many localities; Jones Beach, May 7 (Vogt).

Corvus corax principalis. Northern Raven.—Wawayanda Mt., Sussex Co., seen and heard May 2 (Helmuth).

Corvus brachyrhynchos brachyrhynchos. Eastern Crow.—Stillwater, Sussex Co., N. J., albino male with small testes taken Aug. 6; albino female with undeveloped ovaries taken Aug. 21 (Ammann).

Corvus ossifragus. Fish Crow.—Montauk, 2 pair breeding, June 1 (Wilcox).

Bacolophus bicolor. Tufted Titmouse.—Pelham Bay Park, Nov. 12 (Carleton, Hickey, A. M., P. A. and R. R. Thomas).

Sitta carolinensis carolinensis. White-breasted Nuthatch.—Battery Park, May 21 (Paul).

Certhia familiaris americana. Brown Creeper.—Garden City, Aug. 31 (J. T. Nichols).

Troglodytes aedon aedon. Eastern House Wren.—Central Park, Sept. 19 (Carleton); Millbrook, Dutchess County, Nov. 18 (Peterson).

Thryothorus ludovicianus ludovicianus. Carolina Wren.—Orient, killed by cat late in February after having remained in a garden four months (Latham); Jones Beach, April 20 (Vogt); Milltown, N. J., "more common than I can ever remember," May (Collins); Palisades, only one pair bred (Herbert); New Jersey, pine barrens, entirely absent after the severe winter (Urner); Inwood Park, July 23 (Norse); Orient, 2 irregularly recorded during the fall, still present Dec. 24 (Latham).

Telmatodytes palustris palustris. Long-billed Marsh Wren.—Central Park, May 7 (Rich and others), May 18 (Cruickshank); Bayside, Oct. 27 (Sabin); Montauk, Nov. 18 (Astle, Drescher, Hickey); 6, Piermont Marsh, Dec. 23 (Peterson and others).

Cistothorus stellaris. Short-billed Marsh Wren.—George Washington Bridge, found dead Oct. 2 (Hadley) (identified by Rogers); Bayside, Oct. 5 (Bohn); Hohokus, Oct. 24 (Helmuth); Jones Beach, Nov. 18 (Rose).

Mimus polyglottos polyglottos. Eastern Mockingbird.—Orient, wintered on Main Street (Latham); Whitestone, Feb. 5-7 (M. V. Beals); Saugatuck, Conn., Feb. 3 and 11 (M. Brooks); Jones Beach, April 29 (Vogt); Springfield, N. J., May 5 (Rebell); Elmhurst, Sept. 5 (M. V. Beals); Bronx, Sept. 9 (Malley); Moriches Inlet, Sept. 9 (Walker, Wilcox); Rye, Oct. 5-11 (Oboiko); Montauk, Dec. 23-29 (Breslau, Carleton, Lind, Sedwitz); Jamaica Estates, Dec. 23-28 (Knorr).

Dumetella carolinensis. Catbird.—Georgica Woods, Jan. 1 (Breslau, Sedwitz); Biltmore Shores, Jan. 1 (Aste, Matuszewski); Central Park, possibly summered, May 31, Aug. 7, 13, 22 (Carleton); Jamaica South, 4 eggs, June 8 (Mayer); Bronx Park, present all December (Gibson); Mastic, Dec. 9 (W. F. Nichols).

Taxostoma rufum. Brown Thrasher.—Rye, April 7 (Cruikshank); cripple, Jamaica Estates, Dec. 29 (M. V. Beals, Knorr).

Turdus migratorius migratorius. Eastern Robin.—Sullivan Co., 4 clutches all hatching the same day, May 28 (Mayr).

Hylocichla mustelina. Wood Thrush.—Central Park, Aug. 29 (Carleton).

Hylocichla guttata faxoni. Eastern Hermit Thrush.—2 in the oak scrub and pine woods between Sag Harbor and Easthampton, July 29 (Helmuth).

Hylocichla ustulata swainsoni. Olive-backed Thrush.—Bronx Park, June 9 (Malley); Central Park, Oct. 20 (Mayer).

Hylocichla fuscescens fuscescens. Veery.—Ocean Co., colony apparently breeding birds near Collier's Mills, June (Urner); Mill Neck, bred (Matuszewski); Elmhurst, Aug. 25 (M. V. Beals).

Hylocichla fuscescens salicicola. Willow Thrush.—Princeton, killed striking a building, Sept. 10 (C. H. Rogers).

Sialia sialis sialis. Eastern Bluebird.—Darien, Conn., full clutch 5 eggs, nest with 3 eggs, nest 1 egg, 4 other nests in boxes apparently nearing completion, April 21 (E. E. Dickerson); 4, Montauk, Dec. 29 (Sedwitz).

Paliptila caerulea caerulea. Blue-gray Gnatcatcher.—Bronx Park, April 25 (Malley and others); Newark Marshes, Aug. 21 (Rebell); Elmhurst, Aug. 29 (M. V. Beals); Central Park, Sept. 7 (Carleton); Jones Beach, Sept. 9 (Cruikshank).

Carthylus calendula calendula. Eastern Ruby-crowned Kinglet.—Queens, Dec. 22-23 (Knorr).

Anthus spinoletta rubescens. American Pipit.—Approximately 100, Orient, Nov. 27 to Dec. 24 (Latham); 125, Idlewild, Dec. 25 (Sedwitz).

Bambycilla cedrorum. Cedar Waxwing.—Small flock, Kent, March 28-31 (J. F. and R. G. Kuerzi), 26, Milltown, April 26 (Collins); Central Park, May 6 (E. and M. Rich and others); 5, Hewlett, Nov. 20 (Hunt); 7, Riverdale, Dec. 23 (Cruikshank).

Lanius borealis borealis. Northern Shrike.—Few in the winter; generally distributed in the fall; Millneck, Jan. 21 (Breslau, Sedwitz); Kissena Park, Jan. 21 (McBride); arrived Garden City, Nov. 25 (J. T. Nichols) and 2, Montauk Point, Nov. 25 (Breslau, Carleton, Johnson, Sedwitz); 2, Westbury, Nov. 29 (Matuszewski); 3, Hempstead Lake, Nov. 29 (J. L. Chapin); recorded also at Babylon, Orient, White Plains, Jamaica Estates, and south of Piermont.

Lanius ludovicianus migrans. Migrant Shrike.—Hicksville, Jan. 21 (Breslau, Sedwitz; see "The Season," *Bird-Lore*, v. 36, no. 2, March-April, 1934, p. 112); Kent, April 14 (J. F. and R. G. Kuerzi); Jones Beach, Aug. 26 (J. F. and R. G. Kuerzi, Sedwitz and others); Pine Plains, Dutchess Co., Aug. 30 (Frost).

Sturnus vulgaris vulgaris. Starling.—Newark Marshes, over 90,000 blackbirds, mostly this species and the Redwing, Nov. 6 (Urner).

Vireo griseus griseus. White-eyed Vireo.—Bronx Park, Oct. 4 (Gibson).

Vireo flavifrons. Yellow-throated Vireo.—Bayside, Oct. 12 (Bohn).

Vireo solitarius solitarius. Blue-headed Vireo.—Central Park, Sept. 19 (Carleton); Elmhurst, Oct. 23 (M. V. Beals).

Vireo philadelphicus. Philadelphia Vireo.—Bernardsville, May 10 (C. K. Herbst); Orient, May 11 (Latham); Hohokus, May 21 and Easthampton, Aug. 27, "very carefully identified" (Helmuth); Central Park, Sept. 7 (Carleton).

Vireo gilvus gilvus. Eastern Warbling Vireo.—Kent, May 4 (J. F. and R. G. Kuerzi); 2 nested, Easthampton, June (Helmuth).

Protonotaria citreo. Prothonotary Warbler.—Bronx Park, April 29 (Hickey, Malley) and May 27 (Malley); Jones Beach, May 8 (J. A. Vogt).

Helmitheros vermivorus. Worm-eating Warbler.—Jones Beach, April 20 (Vogt).

Vermivora chrysoptera. Golden-winged Warbler.—Bayside, Aug. 6 (Bohn).

Vermivora leucobronchialis. Brewster's Warbler.—Miller Place, May 8 (G. P. Helme); Idlewild, May 20 (Mayer).

Vermivora lawrencei. Lawrence's Warbler.—Bronx Park, May 7 (Schmidt).

Vermivora peregrina. Tennessee Warbler.—Bayside, Oct. 7 (Bohn).

Vermivora celata celata. Orange-crowned Warbler.—2, Bayside, May 5 (Bohn); 3, Kissena Park, May 13 (Sedwitz); Bernardsville, May 24 (C. K. Herbst).

Vermivora ruficapilla ruficapilla. Nashville Warbler.—Jamaica South, May 23 (Mayer).

Compsothlypis americana pusillo. Northern Parula Warbler.—Central Park, June 26 (Carleton).

Dendroica aestiva aestiva. Eastern Yellow Warbler.—Complete nest, no eggs, Jamaica, May 27, lingered to Sept. 21 (Mayer); Jones Beach, Sept. 27 (Astle).

Dendroica magnolia. Magnolia Warbler.—Barnegat region, Dec. 23 (Rebell).

Dendroica caerulescens-caerulescens. Black-throated Blue Warbler—Elmhurst, Aug. 31 (M. V. Beals).

Dendroica townsendi. Townsend's Warbler (?).—"On August 18 at Easthampton I saw a bird in a flock of Warblers, which I at length felt sure was a Townsend's Warbler, although it was not in the bright plumage of the Townsend's Warblers I have seen in the spring in the west. At first glance I took it for a Blackburnian Warbler, but in a moment I knew this could not be—especially after finding a real Blackburnian in the flock. My next supposition was that it must be a very queer Black-throated Green Warbler, for it had a rather indefinite blackish throat-patch, and a larger, more solid patch of dark color on the cheeks than in any Black-throated Green I ever saw. In other respects, there was much similarity between the two, but also the following differences:—The blackish-green face patch extended forward to the base of the bill, was definitely wedge-shaped, large, and distinctly outlined. The black of the throat ended far up on the breast, and did not extend along the sides as in *virens* although it tapered off in broken lines along each side. These lines were narrower than the rather spotty markings on sides of *virens* also. Below the black, the bird's breast was decidedly yellow, though not of a very bright tone, a richer color than in the Black-throated Green. The upper parts were olive-green, thinly streaked with black, there were white wing bars, and white in the outer tail feathers, and a pale yellowish spot under the eye was conspicuous, and unlike any marketing of *virens* that I ever remember. Townsend's Warbler was so far from my mind that I did not think of it for several minutes, but it came upon me with complete conviction—after it was too late to collect the bird. I personally cannot feel any satisfaction, however, in this sort of record, without a specimen to back it up."—W. T. Helmuth III.

Dendroica virens virens. Black-throated Green Warbler.—Idlewild, April 21, and Richmond Hill, Aug. 31 (Mayer); Hempstead Lake, Oct. 14 (J. L. Chapin); Fort Totten Reservoir, Oct. 31; Inwood Park, Nov. 2 (Norse).

Dendroica fusca. Blackburnian Warbler.—Bronx Park, Oct. 12 (Cruickshank).

Dendroica castanea. Bay-breasted Warbler.—Central Park, May 6 (E. and M. Rich).

Dendroica discolor discolor. Northern Prairie Warbler.—Bronx Park, April 25 (Gibson, Malley, Schmidt); a considerable number nesting at 600 feet elevation, near Newburgh, May 20 (Murphy, Urner); 9 pair nesting, Bergen Co., June (C. K. Nichols); Bronx Park, Oct. 12 (Cruickshank).

Dendroica palmarum palmarum. Western Palm Warbler.—Central Park, April 19 (E. and M. Rich); 2, Montauk, Nov. 11 (Breslau, Carleton, Johnson, Sedwitz); 2, Hempstead Lake, Nov. 29 (J. L. Chapin), and 1, Dec. 28 (Chapin, Mahukin).

Dendroica palmarum hypochrysea. Yellow Palm Warbler.—Oakland Lake, April 5 (Scott); Baxter Inlet, Nov. 20 (Malley).

Seiurus aurocapillus. Oven-bird.—Bronx Park, April 26 (Schmidt, Seyffroth); Central Park, Aug. 13 (Carleton).

Seiurus noveboracensis noveboracensis. Northern Water Thrush.—Bronx Park, Oct. 11 (Malley).

Oporornis formosus. Kentucky Warbler.—2 singing males, Route 301, one mile east of Post Road, Putnam Co., May 15 (L. N. Nichols); Bronx Park, May 21 (Malley); singing male, Orient, July 1 (Latham); singing male foot of Storm King Mt., July 2 (Helmuth).

Oporornis agilis. Connecticut Warbler.—Elmhurst, Oct. 3 (M. V. Beals); Bayside, Oct. 10 (Bohn).

Oporornis philadelphia. Mourning Warbler.—Bronx Park, May 25 (Fuld); 2, Milltown, May 23, and 1, May 27 (Collins).

Geothlypis trichas brachidactyla. Northern Yellow Throat.—Inwood Park, Oct. 29 (Norse).

Icteria virens virens. Yellow-breasted Chat.—Central Park, May 6 (Rich, Walker); Elmhurst, Oct. 16 (M. V. Beals).

Wilsonia citrina. Hooded Warbler.—Nest with one egg, northern New Jersey, May 18 (Bowditch); Staatsburgh, Dutchess Co., probably bred (Frost); Bayside, Aug. 6 (Bohn).

Wilsonia pusilla pusilla. Wilson's Warbler.—Bayside, July 31 (Bohn); Elmhurst, Aug. 17 (M. V. Beals).

Wilsonia canadensis. Canada Warbler.—Jamaica South, Sept. 29 (Mayer).

Dolichonyx oryzivorus. Bobolink.—Central Park, May 18 (Cruikshank); 200 males, Milltown, May 16, and 175 males, May 19 (Collins); pair feeding young, Newark Marshes, Aug. 11 (Urner); 2, Jamaica South, Oct. 10, where it began arriving as a migrant July 6 (Mayer).

Xanthocephalus xanthocephalus. Yellow-headed Blackbird.—New Hyde Park, adult male accompanying grackles to a roost, Aug. 5 (Cruikshank, Sedwitz).

Agelaius phoeniceus phoeniceus. Eastern Red-wing.—Beaverkill, Sullivan Co., nesting in low pine trees, nidification in all stages from one egg in nest to two day old young, May 26 (Mayr); Montauk, Nov. 25 (Breslau, Carleton, Johnson, Sedwitz) and Dec. 16 (Helmuth, Sedwitz and others).

Icterus spurius. Orchard Oriole.—Singing male, Speonk, June 8 and later (Wilcox); young male, Easthampton, July 20 (Helmuth); male and two immatures, Bronx Park, Aug. 7 (L. N. Nichols).

Icterus galbula. Baltimore Oriole.—Jamaica South, Oct. 1 (Mayer).

Quiscalus quiscula quiscula. Purple Grackle.—Prospect Park, mixed flock of 100 in which both races were identified with certainty, Nov. 19 (Cruikshank); Central Park, Nov. 14, 15, 23 (Watson).

Piranga ludoviciana. Western Tanager.—"An adult male seen at close range in a small patch of oak woods at Wainscott, L. I., on May 20. This bird is so

vivid, conspicuous and unmistakable that no detailed description is needed but even so . . . the bird should have been collected" (Helmuth).

Piranga erythromelas. Scarlet Tanager.—Miller Place, April 27 (G. P. Helme).

Richmondia cardinalis cardinalis. Eastern Cardinal.—Eatons Neck, July 10 (Matuszewski); Bayside, Oct. 12 and Fort Totten, Oct. 31 (Bohn); Hastings-on-Hudson, irregularly throughout December (M. Voyse).

Guiraca caerulea caerulea. Eastern Blue Grosbeak.—Young male collected, New Inlet, Sept. 21 (Wilcox).

Passerina cyanea. Indigo Bunting.—Complete albino with pink eyes, road between Cornwall and Lime Rock, Conn., all summer to Aug. 13 (Whitman).

Hesperiphona vespertina vespertina. Eastern Evening Grosbeak.—50 or more, Cannondale, Conn., Jan. 5 to at least Feb. 15 (M. Brooks); 50, Warwick, N. Y., Jan. 13 (Brown); 18, west of Carmel, Putnam Co., Jan. 28 (Brandreth, Farley, Herbert, J. F. and R. G. Kuerzi).

Carpodacus purpureus purpureus. Eastern Purple Finch.—Singing male, Easthampton, July 4 and on numerous occasions thereafter but no evidence of nesting discovered (Helmuth).

Pinicola enucleator leucura. Canadian Pine Grosbeak.—Small flock, Bernardsville, mid-January and sporadically to February; 10, March 5-9 (C. K. Herbst).

Carduelis carduelis britannica. British Goldfinch.—Garden City, April 24 and 2, April 26 (J. T. Nichols); same place, Sept. 12 and Westbury, Oct. 20 (Matuszewski); 4, Jamaica Estates, Dec. 25 (Knorr).

Acanthis linaria linaria. Common Redpoll.—2, Northern White Plains, Dec. 23 (Brand, Zimmer).

Spinus tristis tristis. Eastern Goldfinch.—500 or 600 in a single flock, Warwick, Jan. 13 (Brown).

Loxia curvirostra pusilla. Red Crossbill.—Large flock, Westbury, Jan. 31 (Emory) and one, stunned striking a building, Nov. 2 (Matuszewski).

Loxia leucoptera. White-winged Crossbill.—Bronx, Jan. 3-6 (Malley); 6, Dock Watch Hollow, Warren Township, N. J., Jan. 21 (Brown, Eaton).

Pipilo erythrophthalmus erythrophthalmus. Red-eyed Towhee.—Milburn, N. J., Nov. 17 (Hix); Mastic, Dec. 9 (W. F. Nichols); Barnegat area, Dec. 23 (Bowdish).

Ammodramus savannarum australis. Eastern Grasshopper Sparrow.—Milltown, April 19 (Collins); Central Park, May 10 (Cruikshank).

Passerherbulus henslowi susurrans. Eastern Henslow's Sparrow.—Male singing, Freeport, July 12 (Thurston).

Ammospiza caudacuta subvirgata. Acadian Sparrow.—Beach Haven, Dec. 23 (C. K. and C. M. Nichols).

Ammospiza caudacuta caudacuta. Sharp-tailed Sparrow.—Baxter Inlet, 2, Dec. 7 and 1, Dec. 23 (Malley).

Ammospiza maritima maritima. Northern Seaside Sparrow.—Idlewild, April 22 (Breslau, Cruickshank, Lind, Sedwitz); Long Beach, 4 eggs on June 10, young being fed June 17 (Janvrin); Biltmore Shores, Dec. 2 (Astle, Matuszewski).

Pooecetes gramineus gramineus. Eastern Vesper Sparrow.—Central Park, April 13 (M. Rich); Hempstead Lake, Nov. 25 (J. L. Chapin).

Chondestes grammacus grammacus. Eastern Lark Sparrow.—Jones Beach, Aug. 5 (Cruickshank, Sedwitz and others); Oyster Bay, Aug. 14 and Sept. 2 (Swope); Easthampton, Aug. 17 and Montauk, Aug. 18 (Helmuth); Orient, Sept. 11 (Latham).

Junco hyemalis hyemalis. Slate-colored Junco.—Bronx Park, individual with both wings entirely albinistic, Oct. 22 (Gibson).

Spizella arborea arborea. Eastern Tree Sparrow.—Oakland Lake, April 22 (Scott).

Spizella passerina passerina. Eastern Chipping Sparrow.—3, Westbury, Dec. 25 (Matuszewski); Queens, present throughout December (Knorr).

Spizella pallida. Clay-colored Sparrow.—Jones Beach, Sept. 30, carefully observed at close range and confirmed by examination of museum skins (Breslau, Sedwitz).

Zonotrichia leucophrys leucophrys. White-crowned Sparrow.—Baxter Inlet, Dec. 23 (R. G. Kuerzi).

Passerella iliaca iliaca. Eastern Fox Sparrow.—Elmhurst, Oct. 9 (M. V. Beals); Westbury, Oct. 10 (Matuszewski).

Melospiza lincolni lincolni. Lincoln's Sparrow.—Elmhurst, Oct. 17 (M. V. Beals); Rye, Oct. 21 (Cruickshank).

Melospiza melodia melodia. Eastern Song Sparrow.—Jamaica South, 5 eggs, May 9 (Mayer).

Calcarius lapponicus lapponicus. Lapland Longspur.—10 plus, Westbury, Feb. 4 (Matuszewski); Orient, lingered until April 4 (Latham); extraordinarily heavy flight in the fall; 3, Oak Island Beach, Oct. 21 (Breslau, Matuszewski, McKeever, Sedwitz); Van Cortlandt Park, Oct. 25 (J. F. and R. G. Kuerzi); 60, Oakwood Beach, Nov. 18 (Rose, Sedwitz and others); 12, Idlewild, Nov. 22 (Mayer); 30 or 40, Tuckerton Marshes, Nov. 25 (R. P. Allen, Evans, Peterson, Walsh).

Plectrophenax nivalis nivalis. Eastern Snow Bunting.—Orient, "much rarer than last winter," fall maximum only 30 (Latham); 400 (est.), Gilgo, Nov. 11 (Breslau, Carleton, Johnson, Sedwitz); 800 (est.) in 3 flocks, causeway Lido to Jones Beach, Nov. 17 (G. G. Fry).

Report of the Secretary of the Linnaean Society of New York For the Year 1934-1935

The Linnaean Society of New York has held during the past year 15 regular, 4 informal summer meetings, and 6 ornithological seminars. The average attendance at the regular meetings has been: members, 33.8; guests, 43.5.

The Annual Dinner of the Society was held in the Flying Bird Hall of the Museum, and the Annual Meeting, as usual, immediately following, in the Duplex Hall. The speaker of the evening was Dr. James P. Chapin, of the American Museum of Natural History in New York, on: *The Bird Life of the Galapagos Islands and its significance for the study of evolution.*

The following officers were elected: President, Mr. John H. Baker; Vice-President, Mr. Charles A. Urner; Secretary, Dr. Ernst Mayr; Recording Secretary, Mr. Joseph J. Hickey; Treasurer, Dr. E. R. P. Janvrin; and Editor, Dr. Ernst Mayr.

During the year the Society has been so unfortunate as to lose by death Mr. Inness Whitaker, a long time member.

Four members have resigned, or been dropped for non-payment of dues, and 17 new members were elected. The membership now stands: Honorary Member, 1; Fellows, 9; Non-Resident Members, 13; Resident Members, 143; total, 166, a decided increase over last year.

Most of the papers read before the Society related to ornithology.

The speakers and their subjects were as follows:

March 27, 1934—Dr. James P. Chapin: *The Bird Life of the Galapagos Islands and its Significance for the Study of Evolution.*

April 10, 1934—Mr. Charles A. Urner: *The Influence of Human Settlement on the Bird Life of the Pine Barrens.*

April 24, 1934—Mr. Alden H. Hadley: *Wanderings of a Bird Lover in the South.*

May 8, 1934—Dr. William K. Gregory: *Remarks on the Origins of the Ratites and the Penguins.*

May 22, 1934—General Discussion: *The Current Spring Migration.*

Dr. John B. May: *Notes on the Birds of Gaspé.*

October 9, 1934—Mr. Robert P. Allen: Problems in Wild Life Conservation.

October 23, 1934—Mr. Warren F. Eaton: The Birds of Hudson and Essex Counties.

November 13, 1934—Mr. Charles H. Rogers: The Woodpeckers, their Relationships and Adaptations.

November 27, 1934—Mr. William Vogt: An Experimental Study in Sex Recognition in Birds.

December 11, 1934—Dr. Austin L. Rand: Collecting in Papuan Mountains.

December 26, 1934—General discussion: Christmas Census Reports.

January 8, 1935—Dr. E. W. Gudger: Abnormalities in Flatfish and their Evolutionary Significance.

January 22, 1935—Dr. Arthur A. Allen: Breeding Birds of Churchill, Canada.

February 12, 1935—Mr. Seth Low: Observations on Tree Swallows.

February 26, 1935—Mr. Irving Kassoy: The Nesting Habits of the Barn Owl.

The most notable event in the history of the society during the past year was a change of the constitution which resulted in a more even distribution of the work among the officers. The Recording Secretary was free to devote all his time to the gathering of important field notes and thus succeeded in a greater completeness than in almost any previous year.

The creation of the office of Editor put the issuing of the publications of the society on a more stable basis. One double-number of the Abstracts was published during the year, another number is in press, and a third in active preparation.

Conservation matters have as usual taken the particular attention of the Society. Through its Conservation Committee it has urged upon the Biological Survey the preservation of Troy Meadows as a wild life sanctuary, supplied data and maps covering the area, and supported the Audubon Association in opposing the destruction of this, the finest fresh-water swamp in New Jersey. In the summer of 1934 it opposed the "rest day" provision of the Federal hunting regu-

lations, and in 1935 gave its support to the Audubon Association's policy of a one year closed season on waterfowl. One hundred dollars were donated to the Emergency Conservation Committee for current expenses of the Hawk Mountain sanctuary.

The Society's most important conservation activity is unquestionable concerned with mosquito control. It was not until Conservation Commissioner Osborne was requested, at a meeting of the Society, to aid in correcting evils growing out of mosquito control, that local and national forces rallied in a joint attempt to ameliorate a situation that was rapidly becoming one of the worst hazards faced by our wild life. Observations made by the Society's members have included some of the most important data available on the subject. One may probably say, without exaggeration, that the cooperation now planned by federal departments, and by state game departments and mosquito elimination bodies, might not have been undertaken without efforts of this Society to initiate such cooperation; it is certain that this cooperation would have been postponed, in spite of the fact that destruction of wild life habitats by mosquito controllers was being constantly extended.

Field Work was as active as ever, and the results assembled to a higher degree than in the past, thanks to the zeal of the Recording Secretary. Careful preparations made the Christmas Census of 1934 an outstanding success. All time records were broken in New Jersey, the Bronx Region, and on Long Island. Work on the breeding activities of birds was pursued to a gratifying degree. In this connection, the investigations of John and Richard Kuerzi in Litchfield County, those of the Queens County Bird Club on Long Island, the work of Messrs. Vogt and Noble on sex-discrimination among birds, and the continuation of Mr. Kassoy's studies on the Barn Owl deserve special mention.

The Ornithological Seminar for the review of important ornithological literature remained a center of stimulating discussions. There were 6 meetings with an average attendance of 27.5.

The Secretary wishes to express to many members of the Society his thanks for their cooperation during the past year, and, in particular, his gratitude to the Recording Secretary, Mr. Joseph Hickey, for much assistance during his illness and absence in Europe.

ERNST MAYR, Secretary.

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

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PUBLICATION COMMITTEE 1935-1936

Ernst Mayr, *Chairman*

Charles K. Nichols

John F. Kuerzi

Change in the Membership of the Linnaean Society of New York

(Between March 1, 1935 and Feb. 1, 1936.)

A. New Resident Members:

- AJELLO, LIBERO, 183 Weequahic Ave., Newark, N. J.
 ALLYN, RICHARD, 50 Haven Ave., New York City.
 BIRCKHEAD, HUGH, 435 Monterey Ave., Pelham Manor, N. Y.
 BOHN, HERMAN, 33-29 171st St., Flushing, L. I.
 RAND, AUSTIN, American Museum of Natural History, New York City.
 ROSENBLUM, LLOYD, 603 Clinton Ave., Newark, N. J.
 WOLFARTH, FLOYD, 503 Summer Ave., Newark, N. J.

B. New Non-Resident Members:

- AMMAN, ANDREW, Museum of Zoology, Ann Arbor, Mich.

C. Deceased Members:

- LUNT, MISS HELENE,
 OSBORN, PROF. HENRY FAIRFIELD
 WEBSTER, MRS. J. E. B.

D. Names of Members Transferred:

- YATES, LEICESTER B., 1716 Victoria Ave., Los Angeles, Cal. (Resident to N. R.,
 note new address).

E. New Addresses:

- ALLEN, FRED, 227 Bay Ave., Highlands, N. J.
 BLIEMEYER, MISS ROSE, 8770 115th St., Richmond Hill, N. Y. C.
 BOULTON, MRS. W. R., Cherry Lane, Westport, Conn.
 CRUICKSHANK, ALLAN D., National Association of Audubon Societies, 1775
 Broadway, New York City.
 DESMOND, THOMAS C., 94 Broadway, New York City.
 FROST, ALLEN, 143 Academy St., Poughkeepsie, N. Y.
 HOWLAND, R. H., P. O. Box 51, Hudson Terminal, New York City.
 JOHNSON, JULIUS M., 2935 Pleasant Ave., Ridgewood, N. J.
 SMITH, MRS., H. W., 86 South Bay Ave., Islip, N. Y.
 STRYKER, CAROL, Staten Island Zoological Society, Clarence T. Barrett Park
 West, New Brighton, Staten Island, N. Y.

Please notify Secretary of any change of address.

(For last published list of members see Proceedings, Nos. 45, 46.)

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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.

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OCTOBER, 1937

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The Great Wisconsin Passenger Pigeon Nesting of 1871

By A. W. SCHORGER, Madison, Wisconsin

The nesting of the Passenger Pigeon at Petoskey, Michigan, in 1878, is assumed usually to have been the largest that ever occurred. Professor Roney¹, in his paper so often cited, states regarding the above: "Here, a few miles north, was a pigeon nesting of irregular dimensions, estimated by those best qualified to judge, to be forty (40) miles in length, by three to ten in width, probably the largest nesting that has ever existed in the United States, covering something like 100,000 acres of land, and including not less than 150,000 acres within its limits." The nesting in Wisconsin in 1871 was so much larger that one hesitates to believe the evidence. This nesting had a minimum length of 75 miles and a width of 10 to 15 miles. A conservative estimate of the area is 850 square miles. It can be stated without hesitation that Wisconsin had the largest nesting that has ever been described.

For years I have been collecting information on the history of the Passenger Pigeon in Wisconsin. The data in the formal literature were disappointingly meagre. Little progress was made until the thought occurred that any nesting or trapping of consequence should receive mention in the local papers. An examination of the files of the Wisconsin newspapers provided information that exceeded all expectations. It led to the "discovery" of the 1871 nesting and this paper will be limited to it.

DISTRIBUTION OF NESTING AREAS

It was characteristic of the Passenger Pigeon to fly and nest *en masse*. A popular assumption is that the nestings were limited to a single or a few large areas; but this is far from the truth. Within its range the species nested over the entire area in single pairs, small groups, and colonies covering from a few hundred to thousands of acres. Frequently there were several nestings in the same region. In 1858, a beechnut year, there were three separate simultaneous nestings in Oconto County, Wisconsin, (Green Bay *Advocate*, June 3 and 10, 1858). There was one nesting 1.5 miles wide by 7 miles long on the Peshtigo river; a second on the Oconto river reported as larger than the first; and a third, covering two square miles, on the same stream. In certain favored sections the Pigeons nested annually in variable numbers, while in others nestings were erratic. Huge nesting areas were the exception. Wilson mentions one south of Danville, Kentucky, in 1810, that was 3 miles wide by 40 miles long. In 1843 (?) there was a nesting on the left bank of the Mississippi extending down the river from La Crosse, Wisconsin, "the whole length of the roost being about forty-five miles."

The food supply was a natural control on the size of the nestings and their distribution. The breeding areas were usually in long lines. The reason for this offers a fertile field for speculation. Presumably this form facilitated arrival and departure from the nesting. The cruising range is stated to have been 50 to 100 miles daily. A simple mathematical calculation will show that a line does not afford the maximum accessible food area. Assuming a cruising range of 50 miles for a nesting covering 120 square miles, it is found that the radius of a circular nesting would be about 6.3 miles. The feeding area available 50 miles from this circle would be over twice that afforded on the sides of a parallelogram 40 miles long by 3 miles wide.

In order to illustrate the distribution of the nestings during the period under discussion, a few examples will be given. In certain years no large nestings appear to have occurred due to lack of mast.

1864

- Minnesota - - Nesting at St. Charles.
- Wisconsin - - Large nesting in the Kickapoo woods south of Leon.
- Michigan - - - Large nesting between South Haven and St. Joseph.

1865

- Canada - - - Large nesting at Angus Station, Georgian Bay, Ontario.
 Wisconsin - - - Nestings at Afton, Brandon and Appleton destroyed by snow-storm.
 Minnesota - - - Nesting in the Chatfield timber near Rochester.
 Michigan - - - Large nesting at Marquette, upper Peninsula.

1866

- Pennsylvania - - - Nestings in Potter County and at Wilcox, Elk County.
 Michigan - - - Nestings at Grand Haven on Lake Michigan; Forestville, Sanilac County; Town of Vassar, Tuscola County; and Van Buren County, where no nesting had occurred for fifteen years.
 Indiana - - - Large nesting at Martinsville, Morgan County.

1867

Nestings in Ohio, Minnesota and Wisconsin were broken up by shooting and deep snow.

1868

- Michigan - - - Large nesting at Manistee, Manistee County.
 Pennsylvania - - - Nestings in Northwestern counties.

1869

- Wisconsin - - - Comparatively small nesting in the Richland timber, southeast of Monroe in Green County; a large nesting south of Sparta; and a nesting at Oakfield, Fond du Lac County, broken up by farmers.
 Michigan - - - Nesting at Mt. Pleasant, Isabella County.
 There were also nestings in Indiana and Canada.

1870

- Canada - - - Nesting at Goderich, Ontario.
 Pennsylvania - - - Nestings in McKean and Potter counties reported to be the largest since 1830.
 Michigan - - - Nestings at Glen Haven and Cheboygan.

1871

- Wisconsin - - - Large nesting in south central portion of the state.

1872

- New York - - - Nesting in the southern end of Ulster County.
 Michigan - - - Large nesting at South Haven, Van Buren County; and another at Clam Lake.
 Wisconsin - - - Nesting three miles long near Shawano, Shawano County; and a large nesting in Brussels Township, Door County.

1873

- Wisconsin - - - Small nesting in Springfield Township, Marquette County.
 Minnesota - - - Nesting four miles long northwest of Rochester in Olmsted County.

One dealer³ has stated that he followed the main body through Michigan, Wisconsin, Iowa and Minnesota and that there was no large nesting owing to the scarcity of mast; and that he later learned that there was a small nesting in the western part of Minnesota, a small one in New York and one in Michigan. Another dealer⁴ confirms this: "In 1873 we did baiting in Ohio and Wisconsin but located no nesting."

DISTRIBUTION OF NESTING AREAS

In studying the nesting of 1871 I have attempted to get definite information on the following points:

- (1) The flight ways and movements northward.
- (2) The area covered and its outline.
- (3) An estimate of the number of birds nesting.
- (4) The number of birds killed by trappers and sportsmen.
- (5) The food consumed.
- (6) The number of eggs or squabs in the nest.
- (7) Was there a second nesting?
- (8) Where did the pigeons go after the nesting?

THE FLIGHT WAYS AND MOVEMENTS NORTHWARD

The Pigeons appear to have migrated into Wisconsin over the western two-thirds of the state. The Mississippi and Rock River valleys, especially the latter, were two main funnels by which the birds poured into the nesting area. The main column passed through Beloit, Monroe, Janesville, Stoughton, Madison, Jefferson, Watertown, Baraboo and Kilbourn.* The Mississippi columns passed over La Crosse swinging northeast to Black River Falls, Sparta and Tomah.

The Beloit *Journal* of March 16, mentions that pigeons were flying north in large numbers, while on the 23rd extensive preparations were being made for trapping in the vicinity. At the same time pigeon hunters were out in force at Monroe. The Janesville *Gazette* of March 9 states that pigeons are flying northward; on the 15th large flocks are mentioned, while on the 20th it is said: "Trapping pigeons is a profitable vocation to many of our farmers." On the 28th pigeons are mentioned at Lake Koshkonong so that the flight continued over a

*Now called Wisconsin Dells.

period of at least three weeks. On March 11, the *Madison Democrat* stated that "pigeons fly every morning in thousands."

The *Jefferson Banner* of March 15 states that "pigeons were flying quite lively last week." On the same date the *Watertown Republican* informs us that "Myriads of wild pigeons . . . put in an appearance in this vicinity last week." They are mentioned at Columbus (*Democrat*) for March 8 and 29, and at Lodi (*Journal*) on March 22. The *Baraboo Republic* states on March 8 that "large flocks of pigeons have been seen passing over the village for the past day or two." We now approach the concentration point. The editor of the *Kilbourn Mirror* was apparently not impressed by the early flights for pigeons are not mentioned until April 22. The day previous the entire village seems to have turned out for a pigeon hunt, and it was estimated that 2,000 were killed and 1,500 brought into town. Numbers finally made an impression for the May 6 issue reads: ". . . it seems unaccountable where they all come from For the past three weeks they have been flying in countless flocks which no man could number. On Saturday, April 22, for about two hours before nightfall, they flew in one continuous flock from south to north darkening the air and astonishing the people by the sound of their wings and could be seen for miles in extent. And they have still continued to come, although not in so great numbers."

Snowstorms caused an ebb and flow. There was one in Adams County as late as April 10, at which time the pigeons were reported to be nesting. At Columbus on March 8, the birds were flying southward. They appeared at Fond du Lac (*Reporter*) on March 11, and on April 8 we read: "The flocks without-any-end-either-way succeed each other in rapid succession." Pigeons appeared at Wautoma (*Wau-shara Argus*) March 2, several days prior to mention of their presence in the southern part of the state. The *Appleton Crescent* on April 1 states: "Wild pigeons are hurrying northward." They were reported as far north as Shawano on April 6. There was no nesting in the northern part of the state so far as I have been able to determine. All the birds that made an early appearance in the Lake Winnebago region appear to have wheeled about eventually, to nest in Adams County.

In the region of the Mississippi Valley, pigeons appeared at La Crosse on March 7, and on March 9, they "darken the vernal atmosphere" (*La Crosse Morning Leader*). By the 17th they were at Hudson. The flight does not appear to have extended inland to any great extent. The *Viroqua Censor* states on March 15th that wild pigeons have made their appearance though they are not very plentiful as yet. That the main western flight followed the river rather closely is supported by the statement of Leffingwell^s that "they annually flew up the Valley of the Mississippi following the river in its windings."

The southwestern portion of the state had no flight producing comment except at Platteville where on March 9 numerous flocks were stated to have appeared. Most of the papers do not mention them at all. Pigeons appeared at Mineral Point (*National Democrat*), March 15, but are not mentioned again. At Darlington (*Republican*) they are reported on March 15, but only in connection with a hunting accident. On the other hand, the flight of 1873 is noted.

Lack of editorial comment is not conclusive evidence of the absence of pigeons as will be observed from the papers within and on the edge of the nesting area. The *Friendship Adams County Press* does not comment until April 8 when "clouds of pigeons fill the air" and damage to crops is feared. The editor of the *Mauston Star* is finally moved to mention pigeons on April 20 after receiving a "fine lot" for a pigeon pie. The new *Lisbon Argus* is more observing. On March 16 it states: "During the early part of this week immense flocks of wild pigeons were wending their way north, and they still continue to come." This is further proof that most of the pigeons came via Kilbourn and the Rock River valley. At Sparta (*Herald*) pigeons are not mentioned until April 11. On the 18th there are "immense numbers." The birds arrived at Black River Falls (*Badger Banner*), March 11, and by April 8 there were "thousands."

Not one reference was found to pigeons moving along Lake Michigan. The editor at Sturgeon Bay (*Advocate*) commented on April 6: "No pigeons have made their appearance here this spring." This statement is important for the reason that in a year when the pigeons nested in Michigan, part of them frequently followed the shores of Green Bay. From this point they entered Michigan by way

of the Upper Peninsula or crossed Lake Michigan over the Manitou Islands.

THE AREA COVERED AND ITS OUTLINE

It is not possible to outline the nesting area with satisfactory accuracy. There are ample independent observations as to its length, however. John Muir⁶ quotes Chief Pokagon as follows: "I saw one nesting-place in Wisconsin one hundred miles long and from three to ten miles wide." Mershon⁷ quotes from a letter received from Mr. Henry T. Phillips, the Detroit game dealer: "In Wisconsin I have seen a continual nesting for 100 miles, with from one to possibly fifty nests on every oak scrub." In neither case is there any indication as to date or location. It is safe to assume that they refer to the 1871 nesting, since I have been unable to discover any other nesting since 1850 that approached it in magnitude. In a letter dated December 17, 1896, Pokagon,⁸ without reference to size, mentions visiting a nesting "north of Kilb[o]urn City, Wisconsin, about twenty-five years ago," making the date exactly 1871.

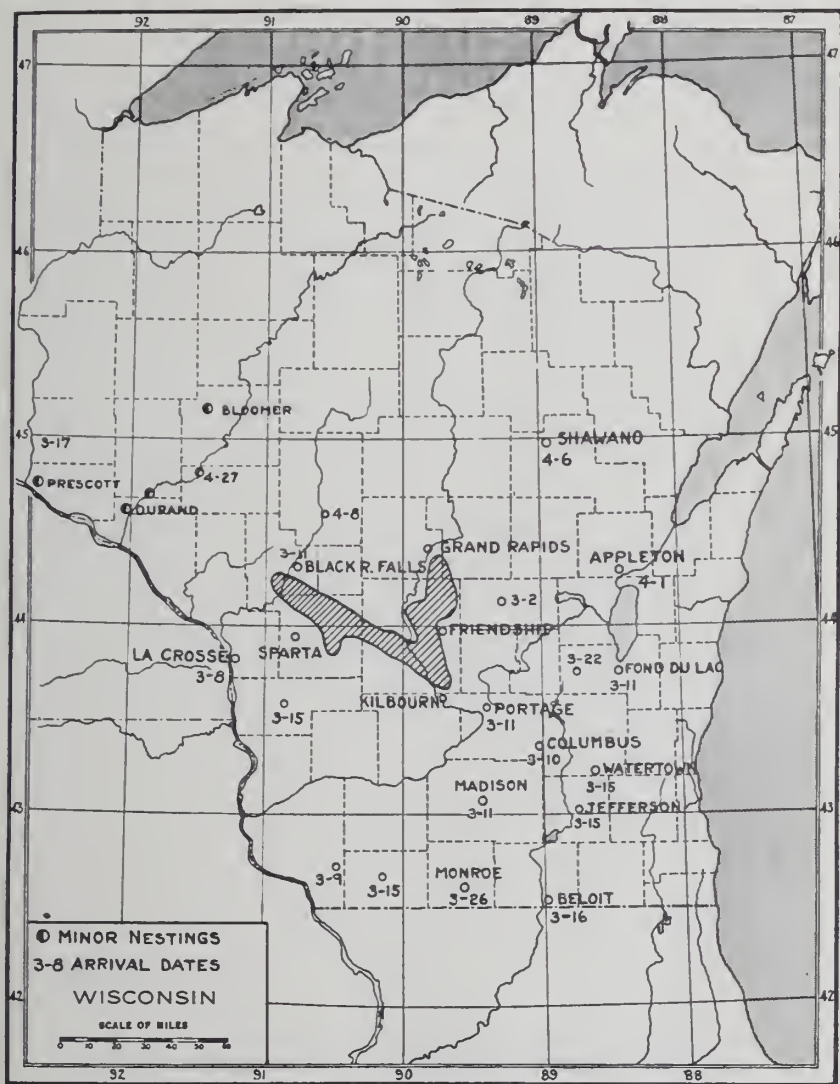
The local editors appear to have known little about the vast pigeon roost outside of their own bailiwick. The best information comes from visitors outside of the area. General Henry Harnden⁹ visited the section north of Kilbourn and spent several days on the breeding ground. He states that the roost commenced five miles from Kilbourn, was eight to ten miles wide, and extended as far north as Grand (Wisconsin) Rapids in Portage County, a distance of forty or forty-five miles. The editor of the Kilbourn *Mirror*, under date of April 22, states that the nesting begins about six miles from the village. According to travelers and farmers, the nesting was "three miles wide and fifty miles in extent north."

There is a good description of the roost by Hugh Kelley published in the Baraboo *Republic* for May 3. Abandoned nests were found, on leaving Kilbourn, as soon as his party struck timber. They went ten miles and pitched their tent where the pigeons were "thick as locusts." As a matter of fact, nearly all of the timbered portions of Adams County seem to have been occupied by pigeons to some extent. In the northern part of the county the nesting extended en-

tirely across it, a distance of 25 miles. The editor at Friendship (*Adams County Press*, April 15) states: "The pigeons are nesting three or four miles north of this place. The nesting ground extends for miles in the towns of Strong's Prairie, Monroe, Preston, Big Flats, and Leola. Flocks containing tens of thousands of the birds are continually flying over, while the woods are literally alive with them." This shows that the nesting extended to the top of Adams County, if not as far as Grand Rapids. Unfortunately, a paper from the latter town is not available. It is entirely probable that the nesting did extend nearly to Grand Rapids for the Plover *Times* of May 13 states: "Several loads of young pigeons passed through our village this week. They were captured below Grand Rapids, where the pigeons have nested and hatched."

It would be conservative to take a length of 50 miles and an average width of 8 miles, or 400 square miles for the nesting east of the Wisconsin River. I have found no evidence that the nesting extended into Waushara and Marquette County, though the northwestern corner of Marquette County, as well as Adams County, was considered favored nesting ground. The *Waushara Argus*, of Wautoma, on April 27 states: "These birds are very numerous in this part of the state. It is said that they are nesting west of Flyte's Mills in Adams County."

Mr. Hugh Kelley in the article above cited says: "This roost extends from Kilbourn to Black River Falls, and varies in width from ten to fifteen miles. Inside this tract as far as I have been, not a single tree has been slighted by the nest builders." He is not alone in this statement. There is a long article in the Fond du Lac *Commonwealth* of May 20, in which the writer states that his party "headed for the great pigeon roost, stretching from Kilbourn City on the Wisconsin River, for scores of miles beyond." The Portage *Register* of May 6 published a short article on the "Pigeon Trade." The information was obtained from agents of the American Merchants' Union Express, who should have been well informed of the extent of the nesting. It states: "Few persons have any adequate idea of the extent of the pigeon trade carried on at points on the La Crosse road west of here. The country from Kilbourn City to Sparta and as far north as Grand



SITUATION AND EXTENT OF WISCONSIN PASSENGER PIGEON NESTING OF 1871

Rapids, has been taken possession of by the pigeons, and converted into one grand roost, from which the birds radiate."

On April 18, the Sparta *Herald* states: "There is said to be a pigeon roost on Silver Creek, from which large numbers are taken"; on April 25: "These birds are a prominent topic of conversation . . . in Sparta and vicinity. They are nesting in immense numbers in the woods, extending from the Kickapoo far up into Jackson County, and covering a territory many miles in extent eastward. They can be reached by a drive of six to eight miles from Sparta, in a northeasterly direction." The Black River Falls *Banner* (April 29) extends the roost by announcing: "From J. B. Melrose, we learn that the timber land between this place and Big Creek is literally alive with pigeons from three to seven miles in extent in every direction." Whether the nesting extended as far as Augusta is not known satisfactorily. From Kilbourn to the known western extremity of the nesting is approximately 75 miles; if the nesting extended to Augusta the length was 100 miles, in agreement with the statements of Phillips and Chief Pokagon. There are other reasons for believing that the nesting extended to Augusta, though Mr. Alvin McKnight of this city informed me recently that they never nested there. Mershon⁹ has a letter from Mr. E. Osborn to H. T. Phillips in which Osborn states: "In 1871 we located a large body at Tomah, Wisconsin, and did some heavy shipping . . . We also shipped from Augusta, Wisconsin, express, \$13.50 per barrel. A nesting at Eau Claire, but we could not get to do much with them there." In another letter Osborn says of large catches by netting: "At Augusta, Wisconsin, in 1871, Charles Curtin, then of Indiana, over one hundred dozen; William W. Cone of Masonville, N. Y., Samuel Schook of Circleville, Ohio, and some other boys, 100 dozen and over."

At this period trapping was usually done close to the nesting. The evidence is not conclusive, however, that there was a nesting. The Adams County birds fed extensively to the eastward and there was much trapping by baiting in Waushara and Marquette Counties.

Taking the nesting west of the Wisconsin River as 75 miles long and averaging 6 miles wide, we have 450 square miles. Adding to this

the 400 square miles in Adams County, we have a continuous "roost" of 850 square miles.

This was not all. There were several isolated nestings of which at least four are known. A nesting mentioned for Berlin appears to have been a temporary roost. I have been unable to obtain further information on the nesting at Eau Claire mentioned by Osborn. There was a nesting of considerable size north of Bloomer. The Chippewa Falls *Herald* under date of June 3 states: "Chippewa County, not to be outdone by any other place in the state, has a pigeon roost, where millions of 'em are nesting, just about four miles above Bloomer. Parties who have been up there describe the scene as very interesting." There was also a nesting on an island in the Mississippi below Prescott (*Prescott Journal*, June 21). The nesting at Durand was by nature better defined. The *Durand Times* of May 2 states: "There are millions of pigeons nesting on Nine Mile Island and in the timber on the bottoms below Plumer's Mill. The oldest inhabitant says he has never seen anything equal to the present numbers." Plumer's Mill was in the town of Waterville below Durand. Nine Mile Island, in the Chippewa River three miles north of Durand, has an area of about 4 square miles. On May 8 an excursion party went by boat to the island from Durand. In three-quarters of an hour 12 hunters shot 215 pigeons that were recovered, in addition to many others that were not found. There is reason for supposing that these isolated nestings were second attempts and they will be discussed later.

THE NUMBER OF BIRDS NESTING

The main nesting took place in the sandy, scrub oak region of central Wisconsin. Chief Pokagon⁶ states regarding the large Wisconsin nesting: "Every tree, some of them quite low and scrubby, had from one to fifty nests on each. Some of the nests overflow from the oaks to the hemlock and pine woods. When the pigeon hunters attack the breeding-places they sometimes cut the timber from thousands of acres." With specific reference to the nesting of 1871, he says: "I there counted as high as forty nests in scrub oaks not over twenty-five feet high; in many places I could pick the eggs out of the nests, being not over five or six feet from the ground."⁸ Quoting General Harnden on the Kilbourn roost: "The General says the country is poor, sandy, and

scrubby. The pigeons have literally taken possession of the woods, and their nests are to be seen on every tree. On one tree he counted forty-six nests, and thinks there must have been at least a hundred on some of the larger ones." Kelley says: "The first belt of timber we came to shows signs of the game, and no sooner have we struck the solid forest than we come upon the deserted nests in great quantities, the birds having been driven back or killed. Every tree is full of the nests, —often we counted thirty in a single tree Whatever induced the pigeons to stop here is more than I can comprehend. All the soil you find is bottomless drifts of white sand, capable only of producing little scrubby oaks and stunted pines, which appear to be better adapted to bearing pigeons' nests than foliage."

For Friendship (*Adams County Press*, April 15) we read: "A gentleman informs us that he counted forty nests on one tree, and he don't think it was a very good day for nests, either."

The writer for the Fond du Lac *Commonwealth* (May 20) visited that portion of the Kilbourn nesting extending along the shore of the Wisconsin River. It is probable that some of his figures need revision, but it should be mentioned that here the trees were much larger than on the sandy plains. He states: "Leaving the rest of the party, we drove off a few miles further into a high wooded ridge, where the nests were located. Every tree contained from one to four hundred nests We saw more than a hundred trees that had fallen, by reason of the number of nests built upon its branches."

I have found no estimate of the number of nests per tree at the western end of the nesting, but the Sparta *Eagle* (May 12) says: "Never in the history of the La Crosse Valley were such myriads of pigeons seen cutting the air in all directions, and making the whole valley resound with the noise of their constant fluttering. From early morn to dewy eve the air is filled with flocks of the swift-flying birds, so numerous that no man can number them."

I have been so bold as to make an estimate of the number of nesting birds within the main area. It will be noted that the statements of various observers give from one nest per tree to as high as four hundred. Consideration must also be given to the fact that every acre

within the area was not occupied by pigeons. There were marshes, swamps, and some farin lands. I have assumed that the area would average 25 trees per acre and that there was an average of five nests or ten birds per tree, giving 250 birds per acre. As mentioned above, the nesting area covered 850 square miles, or 544,000 acres. This gives a total of 136,000,000 nesting pigeons. While this number seems huge it is scarcely a tenth of the number of pigeons estimated by Wilson and Audubon to have been seen by them in a single flight. It would appear that practically all the pigeons left in the United States nested in Wisconsin in 1871. We came eventually to speak of the northern and southern herds of bison. It would be equally proper at this period to speak of the Appalachian and Mississippi flocks of pigeons. This was not a beechnut year and I have failed to discover that there was any extensive nesting elsewhere in the United States. The reason for the congestion in Wisconsin is not apparent.

THE NUMBER OF BIRDS KILLED BY TRAPPERS AND SPORTSMEN

I shall make an estimate of the number of birds killed based on isolated figures. The slaughter by netting commenced as soon as the birds entered the Rock River Valley early in March. The *Berlin Courant* of May 11 states: "The trade that at present seems to be doing the most business is that of the pigeon catcher. Gentlemen of that 'profession' are doing a lively business a short distance from our village and in . . . many localities in this and surrounding counties." On April 24, Wm. H. and Charley Locken caught 600 pigeons in one throw of the net and on May 9 Charley Locken caught about 400. The number of birds trapped decreased steadily until by May 17 very few were being caught.

A Michigan trapper passed through Wautoma on April 21 with ninety dozen pigeons that were sold in Berlin at 50 cents a dozen. On May 4 the trappers were netting at Wautoma and sending the pigeons alive to market. The air was full of birds, morning and evening. Trapping was conducted from one end of the nesting to the other. The netting of the old birds meant the death of the squabs in the nest as we shall see later.

The *La Crosse Leader* of May 20 states that a man from Burnham's Valley has contracted to deliver 100,000 pigeons to a La Crosse

dealer. It is unlikely that this contract was fulfilled since most of the birds had left the region before the end of May. The Black River Falls *Banner* of July 15, however, states that many pigeons were netted this season in the vicinity of Augusta, and that recently 100 dozen—1,200 birds—were caught in one haul.

Nearly all the shipments were made on the St. Paul railroad. I was unsuccessful in my attempt to secure the shipping records for the year 1871. The data available are simply indicative of the decimation. The La Crosse *Leader* of May 13, states that during the past ten days there were shipped from Lyndon Station to Boston and New York, 3,120 dozen pigeons on which the express charges were over \$800. The Portage *Register* of May 6 published some figures on the express shipments by the American Merchants' Union Express.

Kilbourn	April 21	to	May 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	255	Barrels
Greenfield	"	12	"	April 28	-	-	-	-	-	-	-	-	-	-	-	-	-	108	"
New Lisbon	"	17	"	" 29	-	-	-	-	-	-	-	-	-	-	-	-	-	71	"
Sparta	"	19	"	" 29	-	-	-	-	-	-	-	-	-	-	-	-	-	75	"
Tomah	"	18	"	" 28	-	-	-	-	-	-	-	-	-	-	-	-	-	103	"
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	612	"

S. S. McDuffie, the express agent, estimated that the total shipments would total to date 1,000 barrels. Since each barrel contained 25 dozen, or 300 pigeons, the total would be 300,000. These figures do not include the live pigeons shipped in considerable quantities nor those shot by hunters; nor do they include the birds shipped by fast freight.

On April 24 (*Watertown Democrat*), 11 tons of pigeons packed in barrels, arrived in Watertown from Minnesota Junction for transfer. On May 4, 195 barrels were received for trans-shipment to Chicago. The Milwaukee *Sentinel* of May 2 states that 100 to 200 barrels were being received daily over the La Crosse road.

The records show that express shipments began as early as April 12 and the season did not close until June. Shipment of 100 barrels per day over a period of 40 working days would give 4,000 barrels, or 1,200,000 pigeons. This figure would be conservative for the total number killed.

Phillips, writing to Mershon, states: "There were nearly six hundred names in the register book of pigeoners in Wisconsin. Nearly every one of the farmers and their wives and daughters, were pigeon

catchers." I wrote Mershon as to the exact meaning of the "register book of pigeoners" and he explained that 600 professional pigeon trappers were registered at the various hotels.

The Kilbourn City *Mirror* (May 6) gives a somewhat colorful description of the pigeon trade: "Hardly a train arrives that does not bring hunters or trappers. Hotels are full, coopers are busy making barrels, and men, women and children are active in packing the birds or filling the barrels. They are shipped to all places on the railroad, and to Milwaukee, Chicago, St. Louis, Cincinnati, Philadelphia, New York and Boston, being picked and packed in ice for the more distant points. On no express trains is it possible to take the large amount offered, and arrangements are made to forward them on the midnight train going east. From ten to thirty thousand birds are forwarded daily, most of which have to be picked after the arrival of the trains at night, in many instances the work of picking and packing being continued all night. One man has paid over a thousand dollars to the express company in charges for forwarding. In about two weeks the pigeon season will be over. Then look out for the squabs." Here is a stark confession that thousands upon thousands of adults were being slaughtered with the young still helpless in the nest.

Pigeons appeared in the Milwaukee market on March 20. The first quotation, 85 cents per dozen, was on April 27. The price declined to 45 cents per dozen for undressed and to 65 cents for dressed birds. Allowing for packing and transportation costs, and profits to the commission man and retailer, it is doubtful if the trapper or hunter received on the average more than 18 cents per dozen. H. T. Phillips states that he bought carloads in Wisconsin at 15 and 25 cents per dozen.

So much for trapping. While somewhat long, I cannot do better than give excerpts from the article in the *Fond du Lac Commonwealth* of May 20, to give a vivid description of the condition of the nesting ground. Bear in mind that this gentleman was a hunter and note the effect upon him.

AMONG THE PIGEONS

"Embarking on the 10 A.M. train, we found already on board, a party, like ourselves, headed for the great pigeon roost, stretching from Kilbourn City on

the Wisconsin River, for scores of miles beyond. At Minnesota Junction, where we change cars and go westward, another party from Milwaukee, fully armed and equipped, joined us, and still again at Portage City, and so on at different stations until, when we reached the Wisconsin at Kilbourn, we numbered twenty-seven strong. Kilbourn City consists at present writing of innumerable coops of pigeons. . . ."

"Having made all needed preparations the night previous, we were early called to arms by the wholesome voice of Mr. F. H., before referred to, and ere long, were rolling at a break neck pace through the dark headed for the roost 10 miles beyond. The idea was to get an opportunity to rake the immense flocks of pigeons as they left the roost for the fields and feeding places throughout the State. The indescribable cooing roar produced by uncounted millions of pigeons, as arousing from their slumbers they saluted each other and made up their foraging parties for the day, arose from every side, creating an almost bewildering effect on the senses, as it was echoed and re-echoed back by the mighty rocks and ledges of the Wisconsin bank. As the first streakings of daylight began to break over the eastern horizon, small scouting parties of the monstrous army of birds to follow, every now and then darted like night spirits past our heads. Soon the skirmish line, or perhaps more correctly pigeon bummers, who belong to no regular organization, swept past in small and irregular bodies. Our guide now told us to get into position as quick as possible as the large flocks would follow in rapid succession. We quickly ranged ourselves along the crest of a hill overlooking a cleared valley through which the birds would fly on their outward passage. It was yet a long way from being light, and as the various members of our party scrambled through the thickets and brambles, to gain advantageous locations pointed out by our leader, various expressions fell from their lips which we feel rejoiced it is not our duty to record."

"And now arose a roar, compared with which all previous noises ever heard, are but lullabys, and which caused more than one of the expectant and excited party to drop their guns, and seek shelter behind and beneath the nearest trees. The sound was condensed terror. Imaginé a thousand threshing machines running under full headway, accompanied by as many steamboats groaning off steam, with an equal quota of R. R. trains passing through covered bridges—imagine these massed into a single flock, and you possibly have a faint conception of the terrific roar following the monstrous black cloud of pigeons as they passed in rapid flight in the gray light of morning, a few feet before our faces. So sudden and unexpected was the shock, that nearly the entire flock passed before a shot was fired. The unearthly roar continued, and as flock after flock, in almost endless line, succeeded each other, nearly on a level with the muzzle of our guns, the contents of a score of double barrels was poured into their dense midst. Hundreds, yes thousands, dropped into the open fields below. Not infrequently a hunter would discharge his piece and load and fire the third and fourth time into the same flock. The slaughter was terrible beyond any description. Our guns became so hot by rapid discharges, we were afraid to load them. Then while waiting for them to

cool, lying on the damp leaves, we used, those of us who had [them], pistols, while others threw clubs, seldom if ever, failing to bring down some of the passing flock. Ere the sun was up, the flying host had ceased. It continued scarcely an hour in all. Below the scene was truly pitiable. Not less than 2,500 birds covered the ground. Many were only wounded, a wing broken or something of the kind, which disabled, without killing them. These were quickly caught and their necks broken. Four of the party were Chicago men who had come out to purchase or otherwise procure several thousand birds for that market. We quickly negotiated our interest to them at the rate of one cent per pigeon, and six hours later, we understand, the birds having been thoroughly plucked and packed in ice, were headed on a through freight to Chicago. Leaving the rest of the party, we drove off a few miles further into a high wooded ridge, where the nests were located. Every tree containing from one to four hundred nests. The young pigeons (squabs) were hardly able to fly, and could be caught easily, when once ousted from the nest. Here of course were hundreds of thousands of single birds (probably the females), which could be shot one or two at a time, as fast as the hunter could load and fire. We saw more than a hundred trees that had fallen, by reason of the numbers of nests built upon its [their] branches. Many of the young pigeons were dead in their nests, the mothers probably having been killed, and her young starved."

"Thousands driven by hunger had managed to crawl or flop from the nest, and whose dead bodies lay thick upon the ground. Thousands of dead pigeons also were scattered around, having doubtless been wounded away from home, and flown to their young to die. It is estimated that not less than 100,000 hunters from all portions of the Union have visited the roost during this season. Probably as many as a thousand were there on the same day with us but scattered along through the woods twenty or twenty-five miles."

"Likewise attracted there were several tribes of Indians. We met numerous squads, the men and boys armed with bows and arrows, the squaws carrying long poles. When the nest was within reach the squaws punched the young pigeons from its home, and caught it as it fell. When too high to reach, the skillful archer generally at the first shot drove the large headed arrow plump to the center of the nest, and the young bird, shot first upward, then fell dead. We saw one young Indian shoot three pigeons on the wing, with his arrow, killing his bird on each occasion. . . ."

"The old men and squaws were engaged in picking and drying pigeons.—A full grown pigeon, when fully dried and smoked is about the size, shape and hardness of an old, last year's butternut. . . ."

The expenditure of ammunition during the nesting was enormous. A single dealer in Sparta, Wisconsin, Mr. J. H. Baldwin, handled 16 tons of shot with the corresponding amount of powder." Translated

into one ounce loads we have 512,000 rounds. It would seem accordingly that the number killed with firearms throughout the period of nesting must have equalled or exceeded the number caught by trapping.

THE FOOD CONSUMED

All the pigeons killed by General Harnden at the Kilbourn roost had their crops filled with wheat, oats and pigeon grass. At this period spring wheat was the chief crop raised by the farmers and their complaints of damage are frequent. Grain was sowed broadcast and then dragged. The birds would frequently alight on the newly sown field in such numbers that in a few minutes not a grain remained. Near Wautoma a farmer while dragging could not get his oxen forward until he had driven the cloud of pigeons away with a pole. The difficulty did not end with sowing. The pigeons pulled up the grain even when the sprouts were an inch high. Many acres had to be replanted. One paper states: "It is of no use to resow the fields as long as these swift plunderers are around, though hundreds of thousands of them have been caught, and sent to market by the ton, no impression seems to be made on them in the way of diminishing their countless numbers."

A farmer near Prescott had seven acres of corn just planted, "scratched up" by the pigeons one morning before breakfast. An editor facetiously remarked that this farmer never knew corn to come up so quickly.

By and large the chief food of the pigeon in Wisconsin was the acorn. The Wood County *Reporter* speaking of the pigeons in Adams County states: "Hundreds of flocks may be seen every morning flying to the northwest to feed on the acorns of the oak forests in the western portion of the county, and returning with the approach of night." In August the pigeons had returned to the vicinity of Brandon and were feeding on acorns and in the wheat stubble.

Regarding the nesting on Duncan Creek, at Bloomer, a writer (Chippewa Falls *Democrat*, June 1) speaks of "the pigeons who are flying about by the millions filling their crops with acorns, and playing sad havoc with the grain where sowed late." Elsewhere, however, he says: "Strange to say, the damage done by them to the crops so far has been trifling." He also speaks of passing through a magnificent

stand of hardwoods, consisting chiefly of white oak, on the Bloomer Road, where the pigeons were very "thick."

The New Lisbon *Argus* of June 22 states that "the young pigeons have done a great deal of damage to the blueberry crop."

The black oaks are the principal species in the sandy central basin of Wisconsin. Most abundant is the Hill Oak, *Quercus ellipsoidalis*. It sometimes produces a large trunk but is usually a low tree that forms thickets and copses. The acorn is small and can be swallowed readily in comparison with those of the white and red oaks. Of significance for the nesting of pigeons is the fact that the acorns of the red and black oaks require two seasons to ripen, while those of the white and burr oaks require but one.

The favorite and most important food was the beechnut. It is an interesting fact that during this decade at least the beech had nuts only in the autumn of odd years and this seems to have held throughout its range. I have data on this point covering many years and have found but few exceptions. The distribution of the beech had a profound influence on the nestings. While there are numerous minor exceptions it can be stated as a general law that in odd years there were heavy nestings in Wisconsin and Minnesota on account of the oak mast while in even years the nestings were largely in Michigan and Pennsylvania, due to the abundance of beechnuts.

It is singular that Professor Roney does not call specific attention to this fact, but he merely states: "For many years Passenger Pigeon nestings have been established in Michigan, and by a noticeable concurrence, only in even alternate years, as follows: 1868, 1870, 1872, 1874, 1876, 1878." The reason is apparent from the following quotation from Merriam¹³: "My notes show that the beechnut crop was good in the autumns of 1871, 1873, 1875, 1877, 1879, 1881, 1883,—always on the odd years—while on the alternate seasons it failed." A beechnut crop in the fall of the odd year meant abundant mast for nesting in the spring of the even year.

The beech in Wisconsin has a peculiar distribution. Its range can be defined roughly by a line drawn from the southeastern corner of the state to the southern end of Lake Winnebago, north along the

eastern shore through Oconto Falls. Prior to the year discussed in this paper there were some large pigeon nestings in this area. It is obvious that a beech-oak association meant mast in nearly every year and for this reason it appears that there was scarcely ever a year in which a nesting of size did not occur in Wisconsin.

THE NUMBER OF EGGS OR SQUABS IN A NEST

Ornithologists have always been bothered greatly by the discrepancies in the literature regarding the number of eggs laid. The greater evidence is in favor of a single egg, though there are authentic cases apparently of two eggs. Not much reliance can be placed on the memory of old men.* In July, 1934, I interviewed Mr. William Dunwoody, then 78 years of age, of Monroe. I questioned him specifically as to the number of eggs in a nest. He replied that as he remembered, he used to get two squabs from a nest. The same reply was given by Sylvester Belveal who was raised in the "Richland Timber" near Monroe, a favorite nesting ground for pigeons. The presence of two eggs or squabs does not prove common parentage.

The male pigeons fed twice daily. They left the roost at daybreak, returning at 9:00 to 10:00 A.M. to relieve the females. The latter were gone until about 2:00 P.M. and on their reassuming charge of the nest, the males again departed to feed and return in the late afternoon. Kelly, who shot at the Kilbourn roost, states that the best time to hunt is in the morning and evening and that at this season the males were "much preferable" to the females. It seems that the males suffered, accordingly, to a much greater extent than the females from shooting and trapping.

Under normal conditions the sitting bird did not leave the nest until touched by its returning mate, and for this reason it may be argued that two females could not lay in the same nest. An important

*I have interviewed and corresponded with many men familiar with the nestings in Central Wisconsin. As an extreme case I will cite the following excerpt from a letter received from a gentleman who lived adjacent to the last nestings: "They lay two eggs and soon as they hatch they lay two more in the nest with the young squabs and when the second pair hatch they push the first pair out of the nest and lay two more eggs, and follow that procedure from April until November, hatching a pair every two weeks, and in a warmer climate every two weeks in every month except February."

factor should not be overlooked. Trapping and shooting of the adults took place from the time of selection of the roost until it "broke." Every adult killed meant probably the desertion of a nest. As noted above the female was away for a four hour period and in case of the death of the male the nest would be unprotected during this time. If the female were netted, the nest was without doubt deserted. Where as high as 100 nests were found on a single tree, competition for nesting sites must have been keen. It is accordingly not at all improbable that a female that needed a nest would appropriate an unoccupied one and deposit a second egg.

The contemporaneous accounts of the 1871 nesting say nothing at all regarding the number of eggs, and little as to the squabs. The Fond du Lac correspondent writes as though there was but one squab in a nest: "When the nest was within reach the squaws punched the young pigeon(s)* from its home, and caught it as it fell. When too high to reach, the skillful archer generally at the first shot drove the large headed arrow plump to the center of the nest, and the young bird, shot first upward, then fell dead."

The writer on the Bloomer nesting says: "On every tree dozens of rude nests are visible, over the edges of which an occasional 'squab' peeps his inquisitive head."

The description of the 1882 nesting at Kilbourn is very specific on this point: "—in each nest is a 'squab'—a little yellow pigeon about as big as one's thumb, and three-fourths mouth.—These birds have a rule which the pestiferous English sparrow might adopt with benefit, to Milwaukee—one egg to a nest."

It is probable that two squabs were frequently found in one nest but one was without doubt an orphan. A description of a nesting in a beech forest in Pennsylvania mentions rows of nests on the limbs. Where there were several nests on the same branch, a hungry, orphaned bird, if able to do so, would naturally move into the nest of a squab being fed, and be adopted into the family. This takes place with tame pigeons. After the lapse of many years, the memory of an occasional pair of squabs, coupled with the powerful subconscious stimulant of

*Evidently the plural is a typographical error.

two young for the tame pigeon and the mourning dove, leaves the firm conviction that the Passenger Pigeon laid two eggs.

WAS THERE A SECOND NESTING?

It is frequently stated in the literature, chiefly if not solely on the authority of trappers, that the Passenger Pigeon nested two and three times in a season. I can find no reliable evidence whatsoever that there was a second nesting in Wisconsin in 1871.

The first specific reference to nests is in the *Friendship Adams County Press* for April 15. The incubation period was precisely 14 days. The young were fed for 14 to 16 days by the parents and then abandoned. At this stage the squabs were excessively fat and three to four additional days were required before they could fly well. It is important to keep these figures in mind as they fit remarkably the data for the great "roost." The parents were tied to the eggs and squabs for a period of 30 days. If the eggs were laid about April 15, there should have been a great flight of adults about May 15. We find this in the *La Crosse Democrat* for May 15: "Wild pigeons for the last few days have been flying over town in such myriads as to frequently darken the sun like a cloud. Their flight has been mostly from the northeast to the southwest, which leads us to believe that their nesting operations have been fooled with to such a degree as to cause them to desert their eggs, young and all. Hunters ought to have sense enough to go slow a little and give the old birds time to bring forth their young, or, they will desert this section of the country entirely, but we don't suppose the farmers would mourn much."

On May 13 the pigeon hunters at Friendship reported that the old birds were repairing their nests and the indications were that they would stay in the section until a second brood was raised. On the same date the *Kilbourn Mirror* states: "Next week will be time for squab hunting. Get ready your poles to knock them from the trees. They are better and fatter than the old birds."

As a rule the squabs were not gathered until they were about to be abandoned by the parents. The Plover paper of May 13 states that during the week several loads of young pigeons captured below Grand Rapids passed through the village. This might indicate that

the squabs were more advanced than subsequent information shows, or that they were collected at a less mature stage than usual. There is excellent agreement as to the flight of the young pigeons. The *Sparta Eagle* of May 12 states that the young pigeons will be out in about a week, i. e. May 19. The *Kilbourn Mirror* of May 19 states that the squabs are beginning to fly and that the sport is about over. On the 26th it is stated that the pigeons have left for Minnesota.

Attention was called previously to the isolated nestings at Bloomer, Durand and Prescott. They were very small in comparison with the main roost, and I am of the opinion that these were second attempts at nesting due to failure of the first. The pigeon front at Kilbourn, and probably at many other places, had been driven back five miles by persecution and slaughter, with the likelihood that the harrassed birds went elsewhere.

Nine Mile Island is only a short distance above Durand. The roost is first mentioned on May 2 at which time it probably began forming. On June 8, approximately two weeks after the main roost dissolved, there appears this laconic item: "7,000,000 squabs to be had on Nine Mile Island." They were ready for the harvest.

The roost at Bloomer is not mentioned until June 3. A visitor to the roost on June 8 found "millions" of pigeons present. Since an occasional squab could be seen peeping over the edge of the nest, it appears that the squabs were nearly ready to fly and that this roost was in about the same state of development as that at Durand.

The nesting at Prescott "broke" later. Pigeons did not excite comment from their numbers until May 10. On June 21 it is stated: "The pigeon roost on the island below the city is deserted—except by a few of the latest squabs."

The earliest possible date that can be assigned to the departure of the old birds from the main roost is May 15. Allowing 1 day to get to Prescott, 3 days for building the nest and laying the egg, 14 days for incubation, 15 days for feeding the squab, and 3 days for the young to fly, would require 36 days. This means that if the pigeons had filled the crops of the squabs in the big nesting for the last time on May 15, had proceeded at once to Prescott and reared a second

brood in all diligence, this brood could have been on the wing by June 20. We doubt if the Passenger Pigeon had so great an urge to procreate, and if so the percentage possessing it was excessively small.

WHERE DID THE PIGEONS GO AFTER NESTING?

I have taken much pains to attempt to trace the summer and fall movements of the pigeons but with meagre results. It was mentioned above that there was a great flight over La Crosse into Minnesota about the middle of May, and that the Kilbourn *Mirror* of May 26 stated that the pigeons had left for Minnesota. The Brandon *Times* of June 14 states that Tom Wilson was still near Kilbourn catching pigeons, and the week previous had over 1,000 live birds on hand. Probably only young birds were being caught.

On June 3 pigeons, probably from the Bloomer roost, were plentiful at Chippewa Falls and were reported as having been flying thickly for the past two weeks. At Hudson they were numerous on May 26, and were shot up to June 1.

By May 27, all pigeons had disappeared from the vicinity of Plover. They were abundant at Appleton May 27, and professional trappers were busy at Kaukauna on June 1. On June 20 they were reported as plentiful in the Wisconsin River bottom at Boscobel, and on June 28 as quite plentiful in the groves around Lodi. The number, however, that remained in the southern part of the state seems to have been relatively small. The Superior *Times* of July 22 states: "Wild pigeons are reported to be quite numerous in the woods adjoining town."

There then follows a wide gap. On August 30 pigeons appeared in large numbers at Brandon and at the same time they were reported as plentiful at Columbus. They were present at Green Bay (*Advocate*) September 7 "in considerable numbers." At Oakfield (*Fond du Lac Reporter*) they were reported "plentiful" on September 9; "plenty" at Oshkosh (*City Times*) on September 13; and "quite numerous" at Sturgeon Bay (*Advocate*) on September 14. Pigeon Hunting was the principal excitement at Shawano (*Journal*) on September 14, while at West Salem (*LaCrosse Republican and Leader*, September 15) hunters were having "lively times" with them. Due to a hunting accident we knew that pigeons were being hunted August 26 at Wau-

kesha. At Whitewater there was considerable shooting the middle of September, the largest morning's score reported being 40. They were fairly plentiful at Racine August 26, but not in quantities satisfactory to the local hunters. At Kenosha on September 6 "millions of pigeons" were flying southward. The latter single reference to a large migration indicates that the fall flights were by no means comparable to those of spring or that they dribbled southward.

The Sparta *Eagle* of May 12 states: "—those who are familiar with their habits and follow them constantly, assert, that the indications are that from here they will go to the Red River country and their destroyers are preparing to follow them thither." This seems like an extraordinary prediction in view of the vast flight over La Crosse into Minnesota that actually did take place a few days later; however, most of the birds appear to have gone to the head of Lake Superior rather than to the Red River. Mr. Alexander McDougall has written: "In 1871 when this town (Duluth) was first building, there were millions of them about here. In the Lake Superior region there are lots of berries but no beechnuts, except near Grand Island,—." In summer and early autumn there was little if any mast to be had anywhere, the birds being forced to live at this period almost entirely on berries and other fruits.

The Duluth *Minnesotian* for September 30, 1871, states: "Pigeon shooting is about over, though we see some fine bunches coming in occasionally."

At this time the greatest winter roosts were in Missouri, and southward to Texas. If the birds left for Minnesota in the great numbers reported, it is possible that they went southward west of the Mississippi.

The dramatic passing of so many millions is often cited as a cardinal example of man's greed and thoughtlessness. However greatly the method of trapping the breeding birds is to be deplored, the extinction of the species was inevitable on economic grounds. Wilson estimated that the flock of 2,230,272,000 birds seen by him required 17,424,000 bushels of mast daily. Audubon, for a flock of 1,150,136,000, made a comparable estimate of 8,712,000 bushels. It is obvious that if the species had persisted in anything like its original numbers agriculture would have been impossible. The pigeon was voracious. Dr. T. S.

Roberts¹⁰ mentions recovering 17 acorns from the crop of one bird. Translate acorns into wheat for a few millions of birds and the loss becomes enormous. When the purse of the farmer is touched he takes matters into his own hands as we witness even today. Which would have been preferable, our present day agriculture, or vast forests with their thousands upon thousands of flashing blue meteors is a matter of individual opinion.

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Notes on the Development of Two Young Blue Jays

(*Cyanocitta cristata*)

By A. L. RAND

(1) INTRODUCTION

The following account is based on observations on the development of two young Blue Jays that I removed from the nest and raised for a time. The elder was fifty-three days old when released. Captivity may have affected somewhat the behavior of the two captives, but probably did not change the order of the development of the instincts. The following observations were made in the spring and summer of 1935 at Woodmere, Long Island, N. Y.

I could devote but a small part of my time to this study and my wife, Rheua M. Rand, undertook the care of the young Jays and made a number of observations on their behavior, which I have incorporated into the discussion of the development of behavior.

In the spring of 1935 at Woodmere I found one Jay's nest (Nest No. 1) with four eggs, visited the nest periodically until the young flew; and found another nest with four eggs (Nest No. 2), visited it as opportunity permitted until the eggs hatched, when my presence so disturbed the old birds that they deserted.

(2) GROWTH OF THE YOUNG

These notes were made on the contents of Nest No. 1 and Nest No. 2 as indicated, and on two young Jays, A and B, removed from Nest No. 1.

Eggs: One egg in Nest No. 2 weighed 5.75 grams (June 17). This egg would perhaps have hatched the next day if the nest had not been deserted, but as it disappeared from the nest I was unable to examine it.

First day: The young are entirely naked with no trace of down or feathers as Miller (1924, Bull. Amer. Mus. Nat. Hist., L, p. 331) has already recorded. The color of the skin is: above pink, tinged gray, below yellowish pink. The extent of the feather tracts can be traced but there are no dark spots in the skin indicating developing feathers; eyes tightly closed, the dark eyeballs showing through the skin. (There

were 2 young, less than 24 hours old, in Nest No. 2, June 16, 10:30 A.M.)

The third young in Nest No. 2, which hatched between 7:30 P.M. on June 16 and the following evening, was similar in size and color at 7:30 P. M. on June 17. It weighed 5.25 grams.

Second day: Much darker than on the first day; above dark grayish pink, tinged olive, below more yellowish-pink, tinged olive, no pin feathers showing in the skin, eyes still shut. One measured; bill from nostril 4.2 mm., tarsus 11 mm., total length 57 mm., weight 9 grams. (Two young, between 36 hours and 60 hours old, Nest No. 2, June 17.) These were very differently colored than the other recently hatched one in the nest on the same day. A similar initial color change has also been recorded in the European Jay (Heinroth, 1924-1926, *Vögel Mitteleuropas*, I, p. 234). The four young in Nest No. 1, first seen on June 3, were in this stage of development.

Fifth day: Dark pin feathers show under the skin of all the feather tracts, and those of the developing down outside of the feather tracts; the remiges barely project beyond the skin. General color of skin above is a dark olive gray, below dark yellowish pink; the feather tracts appear blackish, due to the developing feathers. The eyes are open a mere slit. (Four young, Nest No. 1, June 6.)

Seventh day: Little change except in the larger size, considerable number of pin feathers breaking through skin; eyes are slightly open and the birds move the eyelid, opening and shutting the eye. (Four young, Nest No. 1, June 8.)

Eleventh day: The feathers of the dorsal and ventral tracts are rather well developed, the feathers having broken out of the sheath for several millimeters. The development of the feathers on the head and neck is slow; the feathers have barely started to break from their sheaths. The remiges are somewhat developed, about 20 mm. long, and have begun to break out of their sheaths. Of these birds, one has the remiges still completely in their sheaths. The tail is slow in development, being only about two millimeters long. The body down (this belongs to the juvenile plumage) is well developed and fairly plentiful. The skin of the head is very dark olive-gray. The eyes are fully open and dark brown. (Four young in Nest No. 1, June 12.)

Fourteenth day: Feathers of sides of head and throat barely breaking through sheaths, elsewhere the tips of the feathers have broken from their sheaths so that the bird is fairly well clothed in feathers, crest only slightly developed. Measurements: sixth primary 47 mm., central rectrix (not the longest) 15 mm., bill from nostril 10 mm., tarsus 37 mm. (One young, A, taken from Nest No. 1, June 15.)

Eighteenth day: Another bird, B, taken from Nest No. 1 the evening before and kept captive afterwards, was somewhat more advanced than A. Possibly A had been retarded in development by captivity but the two birds differ in the shade of blue as well as in amount of development, so probably there was some inherent difference. B was rather well feathered, but some of the feathers of the throat and the sides of the head were still pin feathers. It measured: bill from nostril, 12 mm., tarsus 38 mm., sixth primary 68 mm., tail 35 mm., weight 73.25 grams (1 young, B, June 19).

Nineteenth day: The two young left in the nest were not examined, as they would have left on my close approach (June 20).

Twentieth day: Two young had left nest by evening. I did not see them on this day, but evidently they left nest with tail very short and wings only partly grown (June 21).

I have not included detailed notes on the two birds I kept captive as the records indicated that there was a pause in their growth, the result of the change when kept captive, but the following is of interest. Bill from Nostril 12.5 mm., sixth primary 72 mm., central tail feathers 43 mm., weight 72.5 grams (B, June 21). Not until the twenty-second day did B appear completely feathered about the head and throat.

Thirty-third day: The tail was about three-quarters the length of that of the adult.

Forty-third day: B appears now to be in full feather with the tail fully grown.

(3) FLIGHT

On the fourteenth day, the day it was taken from the nest, A showed its objections to being handled by hopping across the floor. Its fluttering wings were unable to raise it from the floor. On the eighteenth day B, taken from the nest the night before, would not stay

in its box but kept hopping about the room. It could fly a few feet and by jumping could get up onto the chairs. It was not attracted by the light of the window, but tried to get onto the highest objects in the room, even when these were in the darker corners. Possibly this is an adaptation to keep young birds, recently out of the nest and unable to fly, out of the reach of ground haunting predators as Sumner (1934, Univ. Calif. Pub. Zool., XL, p. 341) has noticed in young raptorial birds. A, possibly influenced by the activities of B, also made a few very short flights of a foot or two on the 19th day. On the twentieth day, the day the captives' nest mates left the nest, B could easily fly up two or three feet onto chairs. Apparently young Jays usually leave the nest before they can fly much (see Forbush, 1927, Birds of Massachusetts, etc., p. 376). By the twenty-second day there was a great improvement in flight and B could easily fly twenty feet, on a horizontal plane, across the room. Until the twenty-fourth day the birds often missed their objectives and flew directly into the wall beyond and fell to the floor. They often showed lack of discrimination in places they attempted to perch, as on the picture moulding around the top of the wall or a very narrow picture frame, and of course came falling to the floor.

By the twenty-eighth day, eight days after it presumably would have left the nest, B could fly well, though its flight lacked the firm, smooth quality of the adults' flight. It had developed wing power and balance enough to alight gracefully, without flapping to keep its equilibrium, and now discriminated against perches on which it could not land. A was a few days behind in its development. On the thirtieth day, ten days after leaving the nest, I saw what were presumably the captives' two free nest mates. They were flying freely between trees fifty yards apart in the woodland. The captives' flight seemed to be quite equal to that of the wild birds.

(4) DEVELOPMENT OF GENERAL BEHAVIOR

When A was removed from the nest on the evening of the fourteenth day it was in stage (c) of Kuhlmann (1909, Psychol. Review, XI, p. 70); i.e., the stage of passive cowering. That evening, however, when I was holding it in my hand, intending to measure it, it suddenly hopped away and, with flapping wings, hopped across the floor (stage (e) of Kuhlmann). It made no effort to evade capture but struggled

BILL

Age in Days	Tip	Tomium	Base of Mandible	Rest of Bill	Gape	Buccal Cavity	Egg Tooth	Feet
1 - - -	white	white	white	yellowish-flesh	white	yellowish-flesh	white	yellowish-flesh
2 - - -	"	"	"	more grayish	"	"	"	darker
5 - - -	whitish	whitish	whitish	dark grayish pink	whitish	flesh	"	dark-pinkish yellow
11 - - -	"	"	"	darker grayish-flesh	"	deep pink, posterior edge of tongue and spine white (1)	"	"
14 - - -	"	"	"	dark grayish, mandible slightly paler	pinkish-white	"	"	darker, more grayish, nails gray at base, rest white
20 - - -	"	"	flesh	grayish black	pinkish	"	"	gray tinged olive
23 - - -	"	"	"	"	"	"	" (2)	"
26 - - -	"	light gray	light gray	darker gray pink	pink	"	"	gray, nails gray with white tips
33 - - -	"	gray	light gray	nearly black	grayish-pink	"	"	"
43 - - -	whitish (on a very small area)	black	black	black	"	gaining a bluish cast	"	"
52 - - -	"	"	"	"	"	bluish with (3) a black area on horny palate	"	"
53 - - -	small area whitish	"	"	"	grayish	black area, of larger size	"	slaty with small white tips to nails

(1) First noted on 11th day, possibly not a change. (2) The last day the egg tooth retained; probably knocked off by flying into objects, as one bird broke the tip of its bill in this way. (3) Though the horny palate acquired a bluish cast it did not gradually turn black; the black color appeared suddenly on a small area and then increased in size.

to escape when held, and when returned to its box tried to escape. Of me it showed no fear, hopping onto my hand to get high enough to get over the edge of the box. Later in the evening it became quiet again.

On the fifteenth day it spent most of the time crouched flat, sleeping as in stage (c), except for a short time when placed in the sunshine. Then it stood up and watched objects about it, corresponding to stage (d). That evening, when measured, it again became active as the day before, and later became quiet again. From this it seems that the transition from one stage to another may be sudden and premature, depending on the circumstances, and that for a short time at least the bird may revert to the behavior of an earlier stage.

This is also seen in the actions of some birds after they have left the nest, as was illustrated by a young Thrasher I found on June 30, 1935. It was a short-tailed juvenile, apparently not long out of the nest. When I first saw it, it was sitting rigidly in a low bush, watching me, and it allowed me to approach and almost touch it before making a movement. As soon as I reached out to touch it, however, it fluttered to the ground, being hardly able to fly, and scrambled away into the shrubbery. No adult bird was present. Here were the actions of leaving the nest for the first time, re-enacted with fear expressed in two ways.

On the sixteenth day, when I measured A, it did not try to get out of my hand, evidently having become used to the operation. B was taken from the nest on its seventeenth day, when it and its nest mates sat quietly watching me as I removed B. The next day B would not stay quietly in its cage but hopped and made short flights about the room, and on the nineteenth day A, possibly inspired by B's example, also made short flights. This premature movement may have been stimulated by their being handled, or may have been because they were on a flat surface. Sumner (1934, Univ. Calif. Pub. Zool., XL, p. 336) records that Horned Owls, in a nest on a flat surface, leave the nest when they cannot fly, some time before the age at which young leave nests in trees.

This movement on the part of the birds was not the result of fear of me. At this time, at a sudden noise, they usually crouched, and turned the head to locate the sound. They had no shyness of

persons and would readily hop onto an offered hand, and they appeared to enjoy being held in the hand and tolerated being stroked on the head. On the twentieth day A was taken outdoors for the first time (the day its nest mates left the nest) and B for the first time on the twenty-ninth day. There was no change in their behavior. With Horned Owls, Sumner (1934, l.c., p. 339) found that the changed surroundings caused by taking them outdoors caused fear to appear, but that it disappeared again when they were taken indoors. On the other hand when confined in their cage after the twenty-first day, the Jays were sometimes seized with fits of restlessness, almost amounting to panic, continually trying to find a way out. If liberated in the room, this restlessness soon subsided. Finn (1920, *Bird Behavior*, p. 267) records a somewhat similar condition in the Pekin Robin which is frantic in a small cage, bold and inquisitive in a large one.

In a few days the birds no longer liked to be held, though they were quite indifferent to a person's approach and to a hand held near them (except when they gave a food reaction to it). But they objected to being stroked and hopped away to escape. They still, however, begged to be fed, and hopped about on us sometimes when they were loose in the room.

After the twenty-fifth day periods of restlessness became very pronounced when they were in the cage. Sometimes a sudden noise some distance away was the stimulus, sometimes there was no perceptible reason. If this restlessness affected only one bird it was very soon communicated to the other. It was during such a period of restlessness that A suddenly flew out through the open cage door through which it was being fed (on the thirty-second day). It flew quickly away to a tall maple across the road, but returned to be fed and made no objection to being taken in the hand and returned to its cage.

On the evening of the thirty-fourth day both flew out through the open door of the cage and spent the night in the maple 50 yards from the house. The next morning I went under the tree and they came down to me to be fed, but frequently, after almost reaching me, flew back up into the trees. Several times they were startled by the sound of a motor horn, the passing of a car or the voice of a pedestrian and went flying up into the tree. Finally, when they gave the food

response, they allowed me to pick them up without protest, and I returned them to their cage.

On the thirty-fifth day, A spent the night in the maple across the street, and in the morning came flying back to the shrubbery near the house. Several times a Catbird attacked it and instead of staying in the shrubbery it flew to the porch roof, the house apparently being associated with safety. Fear or wildness was beginning to develop, however, for it would not allow a close approach and was finally caught when, after many trials on my part, it at last gave the food response to food in my hand, and then allowed me to pick it up.

A escaped through a hole in its cage on the thirty-eighth day, while I was absent, and it was not seen afterwards.

B was released on the fifty-third day. It had been flying about freely in the house, and though it had followed me about, it was with difficulty that I captured it. I then took it outdoors and released it, allowing it to hop onto a horizontal bar in the garden. For some time the Jay hopped about on the bar, ignoring me, then for ten minutes or so hopped about on an upturned wheelbarrow before flying into some shrubbery.

The communication of an "emotional" state from one bird to another is well seen in the way one bird that is begging for food stimulates the other to beg. I also saw an illustration of how the adults communicate an emotional state to the young when I was watching a House Wren's nest. The House Wrens, a week before, had been feeding at short, regular intervals, but on this day the adults, though carrying food, did not enter the nest. They continually flew about calling excitedly, and from within the nest came the chirping (not a food call) of the young Wrens. After about a half hour a young Wren came out and flew strongly to the shelter of a thicket ten yards away. I was too far away to affect the behavior of this young. It was in a considerably more advanced state than the Thrasher mentioned above and the young Blue Jays of nest No. 1 when they left the nest. I found it impossible to capture the young as it followed the adults into the dense underbrush. This was later repeated with another, apparently the last young of the brood.

Undoubtedly if the young Jays, when at liberty, had been influenced by wild adult Jays, they would not have allowed me to capture them.

A noticeable habit that developed late was the action of suddenly springing into the air when something startled one of the Jays. Sometimes, as it alighted, the wind from its wings rustled a piece of paper, and the bird sprang a few inches into the air. Sometimes no stimulus was perceptible to me as the bird did this.

(5) REACTION TO WATER

Drinking: On the nineteenth day one of the young Jays hopped into a puddle of water and paid no attention to it.

On the twenty-fifth day a small dish of water was placed in the cage. This was the second time water had been made available to these Jays. At first the Jays paid no attention to it, and finally upset it. A then tried to eat a speck of dirt in one of the puddles, accidentally wet its bill and immediately put up its head, with bill pointing upwards, and swallowed. Then B, perhaps in imitation of A, pecked at the water, got its bill wet and then carried out the drinking action in the manner of the species. They repeated this drinking action, putting the bill in the water with a nibbling or tasting action.

On the twenty-sixth day and afterwards the Jays came to the water and drank intentionally. I did not see them give the action to stimuli other than water.

Breed (1911, Behavior Monographs, I, pp. 12, 13) shows that with chicks the drinking instinct can be set in action by accidentally wetting the bill, but that some chicks which have never drunk also begin to give the drinking action to both water and to stimuli other than water.

Thus the drinking instinct, which appears later than the seizing and picking up instinct, can be set off prematurely (as can also flight, for instance). It is surprisingly perfect when it appears and apparently needs little experimenting to restrict it to the visual stimulus of water. This is in contrast to the feeding actions.

Bathing: As already mentioned, one of the Jays gave no reaction to water when it hopped into a small pool on the nineteenth day.

On the twenty-eighth day I put a large, flat dish of water before the Jays. B hopped to it and drank, then hopped into the dish. No sooner was the Jay in the water than it squatted down, belly in the water, ducked its head, and flitted its wings, splashing water over itself. A also hopped into the dish with B and squatted down but did not bathe, though it did on the next day. Subsequently they bathed frequently. This bathing was carried on in the same manner as is the bathing of wild Jays.

The bathing instinct was first aroused by the touch of the water, which may have been accidental. That is, the hopping into the water of B the first time may have been without intent. A first hopped into the water in imitation of B, but apparently the bathing instinct was not completely developed by the twenty-eighth day. Finley, however, had a pet Condor which learned to bathe before the time it would normally have left the nest (see Sumner, 1934, Univ. Calif. Pub. Zool., XL, p. 351).

I did not see the young Jays go through the bathing action before they bathed in water. But on the twenty-ninth day A upset a small dish of water in the cage, then went through the action of bathing on damp paper. On being presented with a large dish of water it bathed in it at once. On the thirty-third day, after bathing in water, A went through the actions bathing on the dry paper at the bottom of the cage. Sumner (l.c.) points out that apparently the visual stimulus of water is sufficient to start the bathing instinct, but that the action may take place outside of water. Apparently in Blue Jays the bathing instinct arises later than the impulse to drink, and needs conditioning to restrict its use to water, though the sight or feel of water is necessary to start it.

(6) REACTION TO HEAT AND SUNLIGHT

Herrick (1935, Wild Birds at Home, pp. 61 and 278) has pointed out that many birds erect their feathers to keep cool. After describing the sun bathing of a Thrush (*Turdus merula*) he suggests that this is a typical reflex or motor response to heat and is not necessarily a sign of distress. Pycraft (1912, Infancy of Animals, p. 93) says

that with nestling and brooding birds exposed to sunlight the open mouth and erected feathers, to allow as much air as possible to reach the body, are signs of distress due to heat. Lewis (1929, *The Natural History of the Double-crested Cormorant, etc.*, pp. 75, 76) found that the spreading of the Cormorant's wings is not a reflex due to heat but is solely for the purpose of drying wet feathers.

It is well known that birds fluff out, that is erect, their feathers in cold weather to increase their insulating properties and it would be surprising if the same action could also cool the bird by allowing air to reach the body.

In the young Jays the first reaction to heat noted was the habit of sitting with the mouth open. Later it was noticed that this was accompanied by holding the feathers close to the body. This was when the birds were sheltered from the sunlight and the air temperature was between 90 degrees and 100 degrees Fahrenheit. Here the open mouth appeared to be to hasten evaporation and the closely appressed feathers reduced their conductivity, allowing body heat to escape.

When the cage was placed so that part of the floor was in bright sunlight the Jays came down from the comparative coolness of the shaded portion of the cage and repeatedly basked in the sunlight for minutes at a time. This was first noticed on the thirty-third day, but was not pronounced until the thirty-fourth day and was frequently indulged in thereafter. The Jays flew down, squatted, tilted their bodies sideways so that the sunshine fell full on the side, erected all their feathers, somewhat spread wings and tails, and with heads on one side stared open-eyed at the sun.

This was definitely sun bathing and appeared to be indulged in for the pleasure of enjoying the sun's rays. Frequently it was performed after bathing, but sometimes when the feathers were dry. Frequently the Jays came within the influence of the sun's rays and did not bask; at other times they apparently came into the sunlight for the purpose of sun basking. This seems to be an instinctive action, comparable with bathing in water. Possibly it is of use to the bird in such cases as nestling or incubating birds which cannot move out of the sunlight. Then, with the outside temperature above that of their

body, the erected feathers could supply an insulation against the heat of the sun's rays.

(7) FOOD RESPONSES

The instinct to feed and the instinct to play are both first expressed by pecking at things, then by picking them up and either eating or playing with them. Later both food and play objects are held under the claws and twisted, pulled and pecked at; both play and food objects are stored.

In the early stages it was difficult to decide whether motion was a play reaction, or a food reaction performed because of lack of discrimination. In any case the early differences are probably not important and probably both arise together. At first anything of convenient size within reach is probably eaten until experience shows that it is not food, and then such non-food objects are still handled in play.

When A was first removed from the nest and placed in a wooden box it refused to give a food response to man-made chirping or to the visual stimulus of a hand carrying food moved toward and away from its bill. A tap on the box, however, aroused the feeding reaction and food placed in the bill was swallowed. A was kept in a covered box most of the time at first. The next day it soon associated the approach of a human being with food. When A did not respond to the approach of a human being, the food response could usually be aroused, except when the Jay was satiated, by moving the hand up and down close to its bill.

B, taken from the nest on the seventeenth day, very soon learned to associate human beings with food and there was no trouble in feeding either bird, except for sudden changes in food preferences. This differs from the actions of Cuckoos and Thrashers (Herrick, 1935, *Wild Birds at Home*, pp. 282, 283) which refused to give the food reaction out of the nest, and that of a Black-billed Cuckoo, kept out of the nest for twenty-four hours, that still refused to give the food reaction and even regurgitated the food forcibly fed it. Sumner (1934, *Univ. Calif. Pub. Zool.*, XL, p. 353) records a captive Barn Owl that had to be forcibly fed.

In the two Jays there evidently was not a close association between the nest or parent and food response, and judging from the

numerous published pictures of young Jays taken from the nest to be photographed and lined up begging for food it is the usual condition in these birds.

That Jays do not lack the power of discrimination, however, is shown by the following. Mrs. Rand usually fed the Jays during the day, giving a chirping call at feeding time. The Jays very soon learned to give the food reaction in response to this call, even when Mrs. Rand was out of their sight. They would sometimes respond to this call, given by Mrs. Rand, when they refused to respond when I gave it.

It was not necessary to insert food in the throat for it to be swallowed. But there was a pause or lag before food placed in the bill was swallowed, while food placed in the throat started the swallowing reflex at once. Herrick (l.c., p. 99) has recorded that Cuckoos sometimes practise mouth feeding and that when mouth feeding is used there is the delay in the swallowing response.

By the twenty-first day, there was no change in begging for food. But there was the difference that when food was placed in the Jays' mouths they would draw back from it as though attempting to escape taking the food. I did not at first realize it but this was probably a change in instinctive behavior more or less coinciding with the development of the habit to peck at things, which appeared the next day and was later strongly developed. While the Jays pecked at various objects on the twenty-second day, it was not until the twenty-fourth day that they picked up a little food and ate it. They were rather slow in learning to pick up and swallow food, but if food was placed in the tip of the bill they were fairly expert at getting food from the tip of the bill into the throat with a jerk of the head. Especially when very hungry they would not pick up and eat food, but continued to beg. By the twenty-seventh day they would eat from the floor, if their attention was called to the food by putting it in front of them or by tapping near the food with a pencil. After the next day they picked up more food, sometimes by themselves, and by the thirty-first day evidently were quite capable of feeding themselves, but when we were about they continued to beg for food, preferring to pick it from our fingers. Until B was released on the fifty-third day it still begged us to feed it, but when left alone with a supply of food it fed itself.

They never mistook my finger for food, but if a finger was placed in a Jay's mouth when it was begging for food, this at once set off the swallowing reflex and there was an attempt to swallow the finger.

There was no sudden change from begging to be fed to self feeding as Miller (1921, *Condor*, XXIII, p. 45) found with Linnets. With the appearance of the habit of feeding themselves appeared another action, perhaps closely connected with play, and more often used in play at first. That was the habit of standing on their food, and if it was hard, pecking pieces off; if it was soft, of twisting and pulling off pieces and swallowing them. This habit appeared as play, before the birds fed themselves to any extent.

After the birds were well able to feed themselves, most of the larger pieces of food, many of a size that would have been swallowed entire earlier, were pulled or pecked to pieces. Sometimes smaller pieces were carried about in the throat, back to a perch or the floor, and then regurgitated, and reduced to smaller pieces. Sumner (l.c., p. 337) has recorded somewhat similar habits in Owls, of not swallowing food entire but tearing it to pieces after they are able to do so.

(8) STORING OF FOOD

Up until the thirty-third day both birds had frequently carried away food in the throat, then regurgitated, pecked at, and eaten or dropped it. On the thirty-third day, however, I saw both birds place food in a definite place, in a corner, crack, or a fold of paper. Later this was always a prominent activity with both food and play objects. Possibly it appeared first with food because food was more often carried. None of these stored objects was ever covered with anything, as is said to be the case with wild Jays (Forbush, 1927, *Bird of Massachusetts and other New England States*, Vol. II, p. 376) and as I have seen a tame Raven do, covering small fish with pieces of paper. These stored objects were not guarded by the Jay that put them there as I have seen one Jay immediately go and remove objects stored by the other. These objects were often removed later, but whether or not memory played a part I am not sure. The number of places the Jay could go was restricted, so they were all visited frequently; and possibly it was merely a case of happening on the stored objects. Once, however, memory seemed to play a part. B was offered

some banana which it tasted but refused. At once it flew to a place where it had stored some raw meat, took it and ate it.

Once I saw B take five blueberries from a dish and store them in its gullet. It then hopped but a few inches, disgorged them, and ate one of them. This appears to be an example of greed and possibly the storing action is a further expression of greed. The birds cannot resist taking the food, but not wishing to eat it, put it down somewhere rather than drop it. The tame Raven already mentioned used to cover up stored fish, but never returned to get them even when very hungry. That the storing up of food for a time of scarcity is the conscious object is impossible as these birds had no means of knowing there would be a time of scarcity. That such an action is merely instinctive is also shown by California Woodpeckers (Henshaw, 1921, Condor, XXIII, p. 110, 115) which sometimes store stones instead of nuts and sometimes push quantities of nuts through a small hole where they could not possibly be retrieved. I have seen a tame Raven continue to push small fish through a knot hole despite the fact that the fish fell fifteen inches below the hole where the Raven could not possibly reach them, and after each time the Raven peered through the knot hole though it could not see the fish. The storing habit appears to be instinctive, to appear relatively late, and possibly to come about or to be started by greed.

(9) INGESTIONS OF FOREIGN OBJECTS

Under "Taste and Food Preferences" I have indicated that Jays have a rather discriminating taste, but nevertheless they swallow many non-food objects. When preening the feathers bits of sheath which stuck in the bill were swallowed. On the twenty-ninth day I took B outdoors. While hopping about on the ground it swallowed a number of pebbles and lumps of dirt, though it would not eat earthworms and refused bread and blueberries, preferring meat. On the thirtieth day I held up a rubber band to B who took it, worried it a moment, and then swallowed it. On the thirty-third day I put a dish of dirt in the cage and one Jay started to eat the dirt so eagerly that I removed it.

Branches with green leaves attached were usually kept in the cage and the Jays often pulled off the leaves and carried them about

and evidently sometimes ate them, as the green stained excreta indicated.

Many other cases of swallowing foreign objects probably occurred, but as the Jay has a habit of carrying objects like buttons about in its throat and then ejecting them it is difficult to tell when they were actually swallowed.

Since the young birds continually play with objects it is to be expected that their inexperience would lead them to swallow some non-food objects. But on the other hand the Jays ate pebbles on the same day that they refused bread and blueberries in preference to meat.

Here as in other forms of behavior teaching by the adult or imitation of the adult probably plays an important part, but the young can succeed without it, learning by trial and error.

(10) PLAY ACTIONS

The curiosity and play propensities of the Crow tribe are proverbial, and play actions of the present two Jays became well developed.

On the twenty-first day A was first seen to peck at objects and marks on a paper. The next day both birds pecked at the screen of their cage and the leaves on the shrubs in their cage. By the twenty-third day play had assumed an important place in the activities of the birds when they were not hungry. Their toes interested them, they pecked at and twisted their own and each other's toes, pecked at leaves which they pulled from shrubs in the cage. Match sticks were carried about and pecked. Allowed the freedom of the room they pecked at the upholstery of chairs, pulling out threads, seized the edges of the curtains, pecked at the print of newspapers and worried the edges of paper.

Pencils and crayons on the desk appeared to interest them particularly and they were continually pecking and pulling them. On the twenty-sixth day I saw B peck at and then shake a package of cigarette papers. It seized it in its bill, then by sudden jerks of its head, now one way, now the other, shook it, treating it exactly as it did the first grasshoppers which were given it. In pecking, the bill is always

slightly open. Hard objects were always pecked repeatedly; soft or flexible objects were seized, apparently pinched hard, and shaken.

By the twenty-eighth day they were standing on hard objects as they pecked at them. This action was more used in play than in feeding, possibly because there was less need of it in connection with the food furnished them. The Jays pecked at their perch in a frenzy of activity at times, and the blows were hard enough to be heard at some little distance. Soon they were pecking splinters from their perch and from the ends of the boards of their cage, as Crows also do. (Finn, 1920, *Bird Behavior*, p. 53.)

By the twenty-ninth day experimentation was still going on, the Jays were pecking at lines on the paper, holes in paper, knot-holes in the walls of their cage, and I saw one pecking at the red lettering on a bottle. It was not long before the birds began to discriminate more and to confine their play activities largely to objects which they could seize in their bills and move. On the thirty-sixth day they were still pecking at their own and each others' plumage. There were two perches in the cage, one above the other. The bird on the lower perch sometimes reached up and pulled the tail feathers of the bird above. These actions appeared to be from curiosity and experimentation in the one way a Jay can experiment, by using its bill.

It was the thirty-fourth day that I first saw a Jay hide a plaything, a button, under a piece of cloth. This was the day after I saw one hide food.

Some of the activities with grasshoppers which were killed and not eaten, possibly belong in the category of play, though I have included them under "Reactions to Live Prey." On the thirty-fifth day the Jays wearied of grasshoppers and turned to worrying a small billet of wood. While they were still worrying grasshoppers I put a nail in the cage and one at once came to play with that. Motion was very attractive to the Jays and a straw thrust through a crack in the cage was watched attentively to the exclusion of other objects, was seized and drawn into the cage. One bird tried to pull it to pieces. Later, buttons were favorite playthings and after A was gone B would often go to the sewing basket to get one. These it would carry about (if a small one, in its gullet), stand on and peck, and finally tuck

away under some object. It picked up any small available object. On the forty-fourth day it discovered that cigarettes made good playthings and pulled them from a package, and pecked one to pieces, but eating none of the tobacco; later it repeated this.

The Jays' play activities (in the early evening, the only time I observed them in this period) were always confined to our immediate vicinity, and it was interesting to see how the bird returned to the same things; the same magazines, the same buttons, cigarettes again, then ourselves. Memory was not necessarily active here, as visual stimulus would also have served.

On the forty-sixth day I tried for the first time to teach the Jay to catch things. After the fourth trial it caught part of a match stick. It never became very adept at this, but when the thrown object passed close to its head it usually caught it.

These activities are play, not food activities carried on because of lack of discriminations, though at first the two may not be distinguishable. They are continued with non-food articles when food is available and when the bird is not hungry. The same non-food articles are played with day after day.

This play activity is not solely carried on because of curiosity and experimentation. Perhaps curiosity is the motive which first impells the bird to examine certain objects, but play is afterwards carried on for its own sake.

This play behavior seems to be explained best by Groos' theory (1898, *The Play of Animals*), that such activities appear to be carried on for the pleasure in doing something. They have no end beyond themselves but by strengthening the muscles and increasing the accuracy of coordination put the bird in a much better condition to capture live prey. Their importance in the development in the birds' behavior will be more appreciated after considering the reactions to live prey.

(II) REACTIONS TO LIVE PREY

Earthworms were fed to the Jays before they began to feed themselves. On the twentieth day they ate earthworms readily if they were placed well back into the gullet, but if the loose ends wriggled out over the bill or face, the worms were shaken out. By the next

day, however, even worms with their extremities wriggling out of the bill as far as the Jay's eyes, were gulped down. For some days, while the Jays were learning to feed themselves, they would pick up and worry worms, but rarely eat them. This is well illustrated by actions on the thirtieth day when two worms were placed on the floor of the cage. A seized them, one after the other, shaking them, dropping them, and picking them up and shaking them again until both were inert; but it did not eat them until I picked one up and gave it to the Jay.

Its actions with the worms were very similar to those with crayons and pieces of paper which I have recorded under "Play Actions." On the twenty-ninth day, with Jay B outdoors, it pecked at and killed an ant crawling about near it but did not eat it, though it at once began to pick up stones and eat them.

This introduction of earthworms to the Jays was discontinued after the thirtieth day. The great difference between the activities of earthworms and grasshoppers make it seem that the effects of learning from experience with the earthworms can be disregarded in considering the reaction of the Jays to grasshoppers.

On the thirty-third day I put a half dozen small-to-medium sized grasshoppers into the cage, waiting until one was disposed of before putting in another. This was the first time the Jays had seen grasshoppers but they chased them eagerly and seized them. This first nip was often directed at a leg or an antenna and the grasshopper was shaken vigorously, but then sprang clear in a moment. Captured again the nipping and shaking were continued, the Jay's head being close to the floor and jerked rapidly sideways this way and that so that it might appear to be beaten on the floor, but such was not the case. The grasshopper's legs, then its body, were seized indiscriminately and the worrying continued until the whole grasshopper was in a limp condition. The head and thorax received most attention, possibly because there was most resistance there. The smaller grasshoppers were swallowed entire, head or tail first; the larger ones usually lost their legs in the worrying process and these legs were swallowed first, then the whole body. All but the last grasshopper were eaten. Only once on this day did a Jay, B, stand on a grasshopper and pull it to pieces.

These actions were essentially like those used in play, the grasshopper being seized by its conspicuous appendages or indiscriminately on its body, the bird finally concentrating on the most solid parts. To the usual play stimulus was the added one of the movement of the grasshoppers which at once started the Jays to investigating them. An ant was put in afterwards and as it started to crawl a Jay seized and killed it, but did not eat it.

A mulberry was then put in and was treated exactly like a grasshopper, being squeezed, worried and picked up by its stem and shaken. Pieces of paper, such as the Jay had played with for days, were then put in and these also were treated in much the same way. One piece was even bitten at intervals throughout its length as though to break and kill it; several times a Jay stood on and pulled at a piece of paper. The fact that the ant and one grasshopper were not eaten, as well as the incident of the paper, showed that to kill or to secure food was not the conscious motivation. Right afterward a dish of sand was put in the cage to see if the birds might indulge in dust bathing. The Jays at once began to eat the sand rapidly. All these observations show that they do not recognize at once what is food and what is not.

On the thirty-fifth day I put in more grasshoppers. At first they eagerly seized the insects, shook and ate them. After eating two or three each they ignored the grasshoppers that were sitting quietly and clamored to be fed. I fed the Jays and they sat quietly. A straw thrust through a crack in the cage attracted their attention more than the grasshoppers did. They seized the straw, dragged it into the cage and worried it. They sometimes stopped worrying a grasshopper to pick up a piece of wood and peck at it (in contradistinction to the worrying of the grasshoppers) or to pick up a piece of meat or bread and eat it, and play with other objects like nails, rubber bands, pebbles or small billets of wood in their cage.

The Blue Jays being well fed and the novelty having worn off, they then treated grasshoppers like other play objects in the cage, unless their attention was especially attracted by motion.

On the thirty-sixth day the Jays were again fed grasshoppers. Another point appeared. Up until now the grasshoppers had been

swallowed head or tail first, but today I saw B try to swallow tail first a grasshopper from which the wings and tail had not been removed. The insect stuck in B's gullet, was ejected and then when tried head first was easily swallowed.

Probably prey is swallowed head first only after trial and error has shown that this is the best way.

On the forty-second and forty-third days, grasshoppers were again fed to B and the method used in disposing of them showed a great improvement in technique as the following note from the forty-third day shows.

(1) B. was hungry; I put a medium sized grasshopper into cage. B caught it at once picked it by head only, shook it savagely, crushing the head, and the grasshopper was dead. Then it seized the long hind legs and shook and broke them one after the other. Thus it killed and then dismembered the insect at once, without any indiscriminate shaking. B started to swallow the grasshopper head first, ejected it and standing on it pulled off one hind leg, swallowed it, and then swallowed the grasshopper.

(2) Then I put in a large, adult grasshopper. The Jay seized it by the head and shook it savagely, but the head was too hard to crush. The Jay then stood on the grasshopper and pulled off its head, the first time that it started to disable an insect in this manner. It did not eat the head. B then pulled off the legs and ate them, pulled off one wing cover, then left it. B later returned and pulled off and ate parts of the insect, leaving wings, part of the abdomen and the head.

For the first time, I noticed that when B commenced shaking the grasshoppers the nictitating membrane was drawn completely to cover the eye.

These actions show a number of advances over the early treatment of these insects. The actions of killing and disabling were directed only at vulnerable places, the head (and sometimes possibly anterior thorax) and the hind legs, though it is interesting to note that the hind legs were broken after the insects appeared dead from

the attack on the head, so that the action was valueless. No longer did the insects get away after the first nip. The drawing of the nictitating membrane may have escaped notice earlier but if not it may be a new action to protect the eye during the first few moments of the engagement when the grasshoppers' feet are most active.

When the usual method of disabling by crushing the head was not effective, the Jay at once used a new method which worked, the pulling off of the head. This is an efficient coping with an unprecedented circumstance (though possibly accidental).

In the natural state there is probably a certain amount of play with inanimate objects such as leaves, but probably crippled prey is also brought to the young so that this play reaction would pass naturally into the taking of live prey and imitation of the adults would hasten this. Sumner (1934, *Uni. Calif. Pub. in Zool.*, p. 356) concludes that the slowly developing ability to take live prey shown by the young raptorial birds he had under observation was the result of learning. He says that given an instinctive curiosity to follow moving bodies plus an appetite for flesh, the rest follows naturally.

With the Jays, if live prey has been introduced from the first there probably would have been a gradual increase in the effectiveness of dealing with it that would have looked like learning. But when this had been delayed until the instinct had matured, and play had had its part in perfecting the Jays' coordination, the instinct appeared perfect enough to enable the birds to deal with the live prey effectively.

From this it can be concluded that the instinct to take live prey develops slowly. It cannot be considered learning. The instinct and ability to handle live prey was well developed when the live prey was first introduced to the Jays. Learning was, however, an important factor in the improving of the process of killing and eating such prey.

(12) TASTE AND FOOD PREFERENCE

A rather large number of foods was tried on the Jays (exclusive of live prey), some of which are enumerated below. The first few days the Jays were fed on hard boiled egg mashed up with cod liver

oil, soft bread and an occasional blueberry. By the twenty-third day they refused egg and ate cooked meat eagerly; later raw meat was eagerly eaten and all bread refused. After the thirty-first day they would eat only dry bread crumbs, where formerly they would eat only soft bread.

On the thirty-third day B would not eat meat (raw or cooked), bread, egg, or blackberries, all of which it had fed on at times, and all I could get it to eat was tomato (in addition to a few grasshoppers that were given it). By the thirty-fifth day it was again eating meat avidly, and pecking off pieces of dry bread and eating them. On the forty-ninth day both sugar and salt were placed before it. It ate sugar eagerly, but when it nibbled at the salt and got some of it into its gullet it at once tried to eject it by shaking its head and working its tongue, evidently not liking the taste.

A Barred Owl that I once fed on frogs and then presented with a toad, seized the toad but rejected it with many expressions of disgust. Afterwards it would touch neither toads nor frogs. But the Jay's experiences with salt did not keep it from continuing to eat sugar and occasionally tasting salt.

Some foods, however, may be refused on sight, apparently based on previous experience, as on the twenty-ninth day when Jays were refusing bread, I held out a piece of suet to one. At first the Jay refused to eat it, evidently mistaking it for bread, but at last when I succeeded in getting it into its mouth so that it tasted it, the bird ate it eagerly.

This appears to indicate that Jays have a rather discriminating sense of taste, but may refuse food because of its appearance. Food appeared to be tested only in the gullet and perhaps the base of the tongue.

(13) MUTING

Many nestling passerine birds mute directly after feeding. This is presumably to facilitate nest sanitation by the adults (see Herrick, 1935, *Wild Birds at Home*, p. 300). The two Blue Jays, usually muted after feeding, they occasionally muted at other times, even when first

taken from the nest. Also, on the fifteenth day when A was hopping about on the floor it muted and the excreta were not in a mucous sac.

With this process of voiding after feeding was associated a very definite rhythm. Even when placed on a flat surface and fed, the Jays voided in this way. The tail was wagged violently from side to side as the posterior end of the body was raised, the tail was brought nearly to the vertical, and then the bird voided. The excreta were sometimes propelled two to three centimeters. This rhythmical action probably is comparable to that recorded by Nicholson (1932, Ibis, p. 545) in the humming bird *Topeza pella*.

Herrick (l.c.) says that the bird ordinarily voids shortly after the food reaches its stomach, or at least after it swallowed and it has been suggested that the adults' waiting posture or even tapping the anus (Pycraft, 1912, *The Infancy of Animals*, p. 74) aids in bringing about voiding after feeding.¹ The following action, though noted but once, indicates that voiding after feeding is a reflex, following the swallowing reflex.

On the sixteenth day, A was given a piece of food which was too big for its gape. It shook it from its bill, then voided just as though it had swallowed the food.

The action of muting after feeding was gradually lost. On the twenty-first day it was noticed that the excreta were no longer in a sac. On the twenty-sixth day muting, with its accompanying tail wagging, after feeding, was last noticed.

(14) TIME OF DIGESTION

The Jay B was removed from the nest at dusk on June 18. It was not fed until 7:15 the following morning, and then evacuated a large sac containing some insect remains which had evidently been retained in the body for over ten hours.

On July 22 B was not fed after 7:00 P.M. At 8:30 a clean paper was spread in its cage. Between 8:30 and 10:30 it had voided several times, and at 10:30 it voided. Thus it voided three and one-half hours after feeding and possibly later.

¹See also: Selous, *Evolution of Habit in Birds*.

On seven different days the Jays were fed mulberries and blueberries and watch was kept to see how long it took traces of these fruits to appear in the excreta. The following results were secured:

Bird's age in days	Time elapsed between feeding and first ap- pearance of stain
21	55 minutes
22	1 hour 35 "
23	1 " 15 "
29	1 " 20 "
31	1 " 45 "
33	55 "
34	1 " 10 "
Average	1 " 16 "

This is a somewhat shorter period than Stevenson found for several species of Finches (apparently full grown) where the average time for the first stained food to pass through the digestive tract was one hour and thirty-two minutes. Even so the digestive process had been presumably hurried up by the Finches having been previously starved for two hours or more (1933, Wilson, Bull., XLV, p. 161).

(15) PELLET FORMATION

As with its relative the Crow and many other species (Finn, 1920, Bird Behavior, p. 94), the Blue Jay casts up undigested material from its stomach in pellets.

Pellet formation was first noted on the forty-fourth day. The hard parts of grasshoppers, the seeds of tomatoes, and kernels of sweet corn were thrown up as pellets.

Though these pellets are firm enough to hold together they were not covered with a slimy covering as are Owl pellets.

Only once did I see the Jay eject a pellet. Directly after it had eaten a quantity of sweet corn it regurgitated the undigested pellets. The bird was standing nearby, back to me, and stood quietly for some minutes before lowering its head and depositing the pellet on its perch, apparently with little movement. This is apparently similar to the action of regurgitation in the Jackdaw (Guerin, 1928, La Vie des Chouettes, p. 31).

(16) SLEEPING

The first night that A spent in captivity (fourteenth day) it slept on the bottom of the box provided for it. Its position was much like that assumed in the nest, squatting flat on its tarsus and abdomen, head drawn in to its shoulders and bill pointed slightly ahead and slightly upwards.

By the sixteenth day A occasionally went to sleep standing on its toes, but gradually sank back onto its tarsus. When B was put in the box with A on the seventeenth day, the birds slept side by side. On the nineteenth day both birds dozed perched on the edge of the box and various other objects. That night A slept on a perch while B slept on the floor. On the twentieth day, the day that these birds' nest mates left the nest, both captives spent much of the day dozing on a perch. About midday B was seen to sleep with its head turned over its back and the bill buried between the scapulars and the feathers of the back. That night the birds slept side by side on the perch with their heads turned over their backs and the bill resting in the aperture between the scapulars and the dorsal tract so that the feathers covered the head up to the closed eyes. This was the sleeping position maintained later, though as the birds developed they stood straighter. The head was turned over the back on either side with no preference as to right or left. Indeed, in a number of instances after being disturbed, the bird put its head back on the opposite side, suggesting regular alternation.

Up until about the twentieth day both birds slept much of the time. With the development of more activity they slept less but still dozed for long intervals. While dozing during the day the head was seldom turned over the back but it always was at night.

Up until the thirty-eighth day the birds always spent the night sleeping side by side and returning to a favorite perch to sleep. But after the thirty-eighth day the birds often slept some distance apart. Does this possibly coincide with a break up of the family group?

The tendency to sleep on a perch and not on the flat surface is instinctive and may appear earlier than it would naturally be employed. The instinctive turning of the head over the back when sleeping appeared at the twentieth day, when the birds would normally have left

the nest. Stoner (1934, *Auk*, LI, p. 92), however, records that young House Finches (*Carpodacus mexicanus*) tucked their heads "under their wings" in the last six nights before leaving the nest.

(17) PREENING AND STRETCHING

These actions which are common to most passerine birds appear to be typically developed in the Blue Jay as well.

Preening was carried on vigorously from the first day of observation (fifteenth day of the bird). A, sitting on the bottom of the box, preened its remiges and body plumage occasionally. The bill was passed along the length of the remiges and rectrices. Body feathers were taken in the bill a few at a time. This action assists in clearing the feathers of sheaths. This preening was carried on vigorously until the feathers were well out of the sheath—about the twenty-fifth day. After that, preening was still a frequent action, especially after bathing, but not so continued; there was little change in this behavior.

Also on the fifteenth day, A scratched the side of its head with one foot, the foot being passed forward above the wing, and the body being supported by the other foot, the wing on the opposite side, and possibly the breast. There is little change in this behavior, more or less characteristic of birds, which is retained. When the Jay began to sit on a perch the body was supported by one foot and the wing of the opposite side resting against the perch, while the foot, put forward above the wing, was used to scratch the side of the head.

The nineteenth day was the first that the Jays were seen to wipe their bill on objects and in a few days it was a common action. At first they wiped their bills on anything within reach, even on each other, but soon the action was almost entirely restricted to wiping the bill on the perch. First on one side, then on the other, the bill is rubbed on the perch. This is done to remove bits from the sides of the bill, sometimes to remove an object, such as an earthworm, which is in the bill but projects over its sides, and sometimes appears to be mere habit after eating. By no means is it necessarily a sign of disgust at the taste of some object, though it may sometimes indicate that. Appearing at the same time as wiping the bill was the habit of sometimes rubbing the side of the head on the perch. The development

of this habit nearly corresponded with the normal time of leaving the nest. With the development of wiping the bill on the perch, the action of "licking the chops" with the tongue diminishes.

(18) EXERCISE

Exercise in which may be included stretching and yawning is an important part of the later nest life and my captive Jays indulged in it from the first day of observation. This consisted of:

Exercise (1): Extending and flapping the wings. This was discontinued after the young began to move about and fly.

Stretching (1): Standing up on its feet to stretch its legs, and often fully extending one wing downward and backward, so that the body is somewhat turned. The only change was that after the twenty-ninth day, presumably coincident with increased strength and balance, as the wing is stretched, the leg of the same side is extended downward and backwards clear of the perch, foot slightly closed, and the tail is slightly spread toward that side. This is a common avian action and I have seen it in such unrelated forms as Flickers and Bank Swallows as well as in wild Blue Jays.

(2): Raising both wings together above back and slightly depressing the body. There appears to be no change in this. This also noted in Fowl, Bank Swallow and Flicker.

(3): Shaking its body so that all its feathers stand on end.

Yawning: Not until the twenty-first day did one of them yawn, and this was always an infrequent action. Herrick (1935, *Wild Birds at Home*, p. 279) says that yawning is a relatively uncommon action in birds, that in the Gull there appears to be the same sort of relief in this act as there is to a man or a dog. With young birds which frequently beg for food with widely open mouth there is little need for yawning.

(19) USE OF THE TONGUE

The tongue of members of the genus *Cyanocitta* is of moderate size compared with the bill, and differs from the simple passerine tongue chiefly in the development of the posterior marginal spines (see Gardner, 1925, *Proc. U. S. Nat. Mus.*, 67, Art. 19, p. 25).

Gardner (op. cit., p. 7) has pointed out that the tongue of passerine birds can be depressed at the tip and elevated posteriorly and by being moved backward and forward used to force food down the throat.

My young Jays used the tongue in three ways:

1. To force food down the throat. This was most clearly noticed when the Blue Jay attempted to swallow the end of my finger, when the rasping action of the spines could be clearly felt. Food which was just too big for the gape and which stuck there as the birds attempted to swallow it was not pulled in by the tongue but discarded by the bird without further effort. Apparently the basal spines are used only after food is inside the gape. This differs from Owls for instance. In a captive young Barred Owl, the tongue with its basal spines is extended beyond food stuck at the gape and by being moved backward and forward the basal spines help to pull the food into the gullet.

2. To force food out of the bill. This is also an important function. A pellet of food just too large for the gape, and apparently stuck there, was sometimes pushed from its position with the tongue. I have seen both Barred and Great Horned Owls remove food from their mouths with one foot, but the Jays never attempted this. Jays often carried objects in their gullet and these were pushed out by the tongue. When attempting to store small objects I have seen the Jay push the object with its tongue from the tip of its bill into a crevice. The tongue was also used in moving food forward in the bill and in arranging it in the bill before swallowing.

Food was also removed from the bill by shaking it out with a sideways snap of the head and when the bird was older by wiping the bill on objects about it.

3. To clean the edges of the bill. This action was commonly used in the early stages of the bird's life before the wiping of the bill became a well established habit. It had almost disappeared by the thirty-third day and was rarely seen afterwards. In this action the tongue is extended to one side and to the other of the nearly closed bill, so that it runs along the tomium. The extent to which it was sometimes extended may be gathered from the fact that several times the posterior

marginal spines caught on the corner of the mouth so that for a moment the tongue could not be withdrawn into the mouth.

The tongue may perhaps serve in a fourth way as an organ of taste (see under "Taste and Food Preference").

(20) RELATIONS TO ONE ANOTHER

The food-begging call of one bird usually roused the other to the same action, even when the birds were not within sight of each other. Herrick (1935, *Wild Birds at Home*, p. 284) has also commented on this with young birds. Especially before they could fly one bird sometimes begged food from the other, and this stimulated the other to beg, so the two birds begged from each other. Herrick (1935, *Wild Birds at Home*, p. 62) records nestling Cedar Waxwings begging from one of their nest mates which apparently was mistaken for the parent. This was probably the case when one Jay first started to beg from the other, but when the bird solicited also begged from the first it was a case of one bird stimulating the other to beg. I once kept a tame Raven and a young Crow in the same cage. The young Crow frequently begged the Raven for food, plainly a lack of discrimination on the part of the Crow.

The two Jays liked to keep more or less close together during the day and when the two birds had their liberty on the night of the thirty-sixth day they were together in the same tree the next morning. This keeping together is of course a characteristic of young Blue Jays. Their tendency to sleep side by side has been mentioned under "Sleeping."

Many young birds quarrel amongst themselves as with Miller's Linnets (1921, *Condor*, XXIII, p. 45). The Blue Jay has been called many sorts of a rogue and a rascal, and certainly he despoils other birds' nests, and even catches and eats adult birds but in the reactions of these captive birds to each other there was never any quarreling nor animosity despite a certain amount of cause. However, I have seen a brief quarrel between two wild Jays in the fall.

When the birds began to take an interest in the things about them one often "nibbled" at the other's toes (I have also seen a Tree Swallow nibble at the feet of a Bank Swallow, sitting on a telephone wire

next it, and have the Bank Swallow simply hop away as one would expect in such inoffensive birds). They pecked at and pulled each other's body feathers; when one bird was sitting on the perch above the other in their cage one sometimes reached up and pulled the tail feathers of the other. Both birds did this. Particularly the tail pulling might be interpreted as mischievous but rather it appeared simply that the birds were exploring everything within reach with their bills. These actions were never resented; the bird touched simply moved out of reach. Either bird might occasionally take the food from the bill of the other, or pull away part of the food, but even over this the birds never quarreled, one bird just trying to swallow its food before the other got it, sometimes turning its back on the intruder. Once lost, little effort was usually made to regain the food.

(21) REACTION TO ENEMIES

On the sixteenth day, before the Jay A had begun to move about, a 12 inch garter snake was put into the box with it. The snake slid by the bird, touching it, but A paid it no attention. On the eighteenth day B was hopping about on the floor and the same snake was moving about nearby. B even hopped by chance onto and then unconcernedly off the snake, as it wandered about.

On the thirty-sixth day, I put the same snake in the cage. As it crawled about in the cage the birds were interested, watching it. As it moved the birds did not come near it, but as it rested quietly one came close to look at it. A movement on the snake's part made the Jay jump and sent the bird back to its perch. The snake curled up in the back of the cage and the birds completely ignored it.

When I pushed a stick into the cage to disturb the snake, the motion of the stick caused more consternation to the Jays than did the snake. This same result has been noted before with Owls (Sumner, 1935, Univ. Calif. Pub. Zool., XL, p. 339). Certainly the Jays have no instinctive fear of snakes.

A small poodle dog was occasionally brought into the room where the Blue Jays were. At first the Jays showed no fear of the dog and it would probably have seized the Jay if not prevented. By about the thirty-eighth day, however, when the dog came into the room, the

Jay flew up out of its reach, and beyond occasionally looking down at it, ignored it.

On the thirty-fifth day a big grasshopper was left in the back of the cage. As the Jay A hopped near it the grasshopper suddenly spread its wings, the strikingly colored yellow and black underwings making the act more conspicuous. At the motion A jumped and then flew to a perch, leaving the grasshopper undisturbed. If it had been a small grasshopper it probably would have been seized. The instinctive fear appears to be of motion of objects of larger size¹ and this fear only appears gradually. The single experience with the grasshopper seems to substantiate the hypothesis that "banner markings" such as the bright under wings of a grasshopper, or the white rump of a Flicker may be of service at times in magnifying and emphasizing the size and movement of an animal. Though this might have an effect in but a few instances in an animal's life such a factor might give the momentary diversion that would put a predator at a disadvantage for an instant and mean the difference between life and death to the pursued (see G. M. Allen, 1925, *Birds and their Attributes*, pp. 69-74).

Though fear of any large moving object may be instinctive, it seems that this instinct is slowly matured. It may be dormant and appear suddenly without apparent cause as with one of Miller's Linnets (1921, *Condor*, XXIII, p. 46) and with Sumner's Horned Owls when suddenly confronted with liberty (1934, *l.c.*, p. 340). In these two Blue Jays it did not develop very much while they were under observation.

(22) RELATION TO HUMAN BEINGS

There are relations which appear to be apart from food association.

After the Jays learned to fly they often came about us and hopped on to and pecked at us, but in a manner to suggest that we were no more than inanimate objects to them. But after A had its liberty and B alone was kept, B came to seek our company. When allowed the freedom of the house it followed us about from room to

¹See also: Lloyd Morgan, 1896, *Habits and Instinct*.

room, liked to perch near us or on one of us, sometimes playing with our buttons, hair, or ears, and finally would go to sleep by us. When confined in its cage alone the Jay became very noisy and excited; it at once became quiet if a person sat near it.

It allowed us to approach it and even quick movements near it were not resented. Up until about the twentieth day the Jays appeared to enjoy being held in the hand and tolerated being stroked on top of the head, but later they resented being touched, moved away out of reach and did not like being carried on a hand or wrist. About the forty-fourth day B suddenly became very difficult to catch when at liberty in the house. Though its behavior did not change otherwise and it allowed us to approach, it always managed to fly from under our hands at the last moment. When finally caught it only once made a defensive movement, when it bit my hand. It never pecked at me. For the rest they were always very gentle to handle and when released showed no fear of us. Talbot (1922, *Auk*, XXXIX, p. 346) in banding wild caught Jays in Georgia had the same experience in finding Jays very gentle to handle, and only once did a Jay bite him. B's sudden aversion to being caught may have been that he associated capture with being put in the solitary confinement of his cage.

Strangers made little difference in the behavior of the Jays, though they were not as familiar with them as with us.

Sumner (1934, *Univ. Calif. Pub. in Zool.*, XL, p. 339) concluded that the "affection" shown by Horned Owls was "based more on utility than emotion" but with this Jay it appeared to be a genuine attachment to us and the Jay really enjoyed our company.

Recent Notes on Bermuda Birds

By WILLIAM BEEBE¹

During the last five years my area of observation in Bermuda has shifted from Nonsuch Island to my own home and the Zoological Society's laboratory, New Nonsuch. This is at the north end of the swing bridge which crosses from Long Bird Island, at the eastern end of the Reach. The following notes were made either in Castle Harbor, or at New Nonsuch, and westward from the latter place along Mangrove Bay to and including the grounds of the Bermuda Biological Station.

I have included notes only relating to species of birds new to Bermuda or of migrant birds of unusual interest. The observations were made during visits from August 15 to November 21, 1932; August 19 to December 1, 1933; April 26 to November 2, 1934; June 1 to October 16, 1935, a week at New Years, 1936, and April 22 to August 31, 1937. To the "List of Birds Recorded from the Bermudas" (T. S. Bradlee, L. L. Mowbray and W. F. Eaton, Boston Society of Natural History, December, 1931, pp. 279-382), I have been able to add European Cormorant, Golden Eagle, Screech Owl, Purple Grackle and the Zenaida Dove (introduced) not previously listed, which, together with Mr. Griscom's record of Palm Warbler, makes a total for Bermuda of 252 species. The Whistling Swan data of Mr. Mowbray's is the first record since 1850; the Cahow, Pomarine Jaeger, Blue Jay, Brown Thrasher and Holboell's Grebe are the second positive records. I have confirmed the breeding of the Least Tern, Great Blue Heron and the Cahow, and probably, new nesting records of the Barn Owl and Green Heron.

HOLBOELL'S GREBE—*Colymbus grisegena holboelli* (Reinhardt)

On January 2nd, 1936, after a hard blow and rain, while driving around the north-west corner of Mullet Bay, I saw what I thought at first glance was a Horned Grebe, splashing and preening itself near shore. It seemed, however, too large and after further examination I decided definitely it was a Holboell. A few hours later on the same day, among the mangroves on my land at New Nonsuch, I picked up a second individual of the same species in an advanced state of decomposition. I saved only the skull.

¹Contribution Number 537, from the Department of Tropical Research, New York Zoological Society.

Contribution from the Bermuda Biological Station for Research, Inc.

AUDUBON'S SHEARWATER—*Puffinus lherminieri lherminieri* Lesson

In June, 1931, I found ten pairs nesting on a small islet off Nonsuch Island. For details and photographs see "Nonsuch: Land of Water," Chapter IX, 1932.

BERMUDA PETREL or CAHOW—*Pterodroma cahow* (Nichols and Mowbray)

The second known specimen was obtained from the lighthouse keeper on St. Davids, having killed itself against the glass on the night of June 8th, 1935. It was identified by Dr. Robert C. Murphy and was a bird of the year in excellent condition. Details and photographs in New York Zoological Society Bulletin, Vol. 38, No. 6, November-December, 1935.

LEACII'S PETREL—*Oceanodroma leucorhoa leucorhoa* (Vieillot)

Male killed against St. Davids Light, October 23, 1933. Squid beaks in stomach.

YELLOW-BILLED TROPIC BIRD—*Phaëthon lepturus eatesbyi* Brandt

Not quite as abundant in recent years as in 1929 to 1931, but still very numerous. A bird was seen in the Reach in January, 1934.

EUROPEAN CORMORANT—*Phalacrocorax carbo carbo* (Linnaeus)

An immature male taken dead from a fish-trap near New Nonsuch, six feet under water, October 20, 1932. A bird new to Bermuda.

DOUBLE-CRESTED CORMORANT—*Phalacrocorax auritus auritus* (Lesson)

About a dozen birds seen constantly in Castle Harbor, usually perched on stakes and buoys, throughout November, 1933. A late spring record is a flock of thirteen on May 6, 1937.

MAN-O'-WAR BIRD—*Fregata magnificens* Mathews

A female soaring over New Nonsuch and four others in Castle Harbor, November 17, 1932. Two were shot by colored men during the next few days.

GREAT BLUE HERON—*Ardea herodias herodias* Linnaeus

Observed a great many times each year especially in May, June, October and November. Usually they are solitary but occasionally as many as four are seen together, and on October 26, 1932, eighteen herons were counted perched on Gurnet Rock, south of Nonsuch Island. Several half grown young each season attest to their breeding in Bermuda. On June 10, 1934, an immature heron joined confined birds at the Flatts Aquarium and remained there. Long Bird Island takes its name from these "long" birds, which are reported to have bred there in numbers in former years.

AMERICAN EGRET—*Casmerodius albus egretta* (Gmelin)

Individuals noticed November 14 to 21, 1933; September 1, 1934; October 6, 1934, and three on Long Bird in company with other species on October 3, 1935.

SNOWY EGRET—*Egretta thula thula* (Molina)

Two in full plumage, with other herons, on Long Bird, opposite New Nonsuch, on October 3, 1935. Both seen again ten days later.

LITTLE BLUE HERON—*Florida caerulea caerulea* (Linnaeus)

Three in juvenile white plumage on Long Bird Island on October 3, 1935, and one seen again ten days later.

LITTLE GREEN HERON—*Butorides virescens virescens* (Linnaeus)

Nested in New Nonsuch mangroves in 1934, from circumstantial evidence of nest and egg-shells and glimpses of the birds later. One in Mangrove Bay throughout October, 1933.

BLACK-CROWNED NIGHT HERON—*Nycticorax nycticorax hoactli* (Gmelin)

Four in mangroves, two of which were in full plumage, September 12 to October 3, 1935.

WHISTLING SWAN—*Cygnus columbianus* (Ord)

In the Royal Gazette for January 1, 1936, Mr. Louis Mowbray, Jr., writes: "Through the kindness of Mrs. James Storror of Fairwinds, Tuckerstown, the presence of an exceptionally large bird was reported on her property on Sunday, December 29, 1935. After careful observation through binoculars at less than a hundred yards, and checking up on its written description it proved to be a not quite mature Whistling Swan."

BLUE-WINGED TEAL—*Querquedula discors* (Linnaeus)

A male in lean condition at St. Davids Light, October 1, 1935. In stomach, green algae, squilla and minute bits of clear quartz wholly alien to Bermuda geology. Two days before, a flock of at least one hundred and fifty reported by Mr. Roundthwaite as rising from a Tuckerstown pond, and flying off east along the south shore.

GOLDEN EAGLE—*Aquila chrysaetos canadensis* (Linnaeus)

This bird new to Bermuda was seen half a dozen times throughout May 11 and 12, 1937, flying over Castle Harbor or perched on one or another of the islands. It permitted me to approach within twenty yards.

OSPREY—*Pandion haliaetus carolinensis* (Gmelin)

One being mobbed by four crows on Long Bird, November 14, 1932; another hovering over New Nonsuch and Castle Harbor, November 26, 1933; and one seen for several weeks, May 24 to June 16, 1934.

BOBWHITE—*Colinus virginianus* subsp.

Heard near New Nonsuch and on Long Bird in May and June, 1934, and July and August, 1935.

VIRGINIA RAIL—*Rallus limicola limicola* Vieillot

Seen and heard among the mangroves, November 9, 1933.

PIPING PLOVER—*Charadrius melodus* Ord

One seen August 17, 1932.

WILSON'S SNIFE—*Capella delicata* (Ord)

Male bird of the year killed at St. Davids Light, October 3, 1934.

WILLET—*Catoptrophorus semipalmatus* subsp.

On August 31st, 1937, a single bird preened, bathed and fed on Long Bird Island directly across from New Nonsuch. I watched it at intervals of twenty minutes through twenty-four power glasses.

RUDDY TURNSTONE—*Arenaria interpres morinella* (Linnaeus)

There is no doubt that this bird is found throughout the year in Bermuda, although I have seen no signs of breeding. About twenty per cent of the birds are slightly crippled. On April 28, 1937 I counted thirteen in a single flock across from Nonsuch, and on May 11, thirty were feeding at low tide in the mud flats.

DOWITCHER—*Limnodromus griseus* subsp.

One hundred and twenty-five in a dense flock on a sand spit in the Reach just west of the swing bridge, October 13, 1935. They were sleeping, bathing, preening, fighting and carrying on pseudo-courtships.

POMARINE JAEGER—*Stercorarius pomarinus* (Temminck)

Female shot seven miles south of Nonsuch Island, June 14, 1929. Second record for Bermuda.

AMERICAN HERRING GULL—*Larus argentatus smithsonianus* Coues

Three birds, two of them adults, remained in Castle Harbor throughout November, 1933.

COMMON TERN—*Sterna hirundo hirundo* Linnaeus

Thirty-two feeding at sea near Mills Breaker, September 12, 1935.

SOOTY TERN—*Sterna fuscata fuscata* Linnaeus

A single bird in fine plumage flew slowly along the south shore of Long Bird Island, September 25, 1935. This is the first record in twenty-eight years.

LEAST TERN—*Sterna antillarum antillarum* (Lesson)

At least two pairs bred in 1935 on an islet in Harrington Sound.

ZENAIDA DOVE—*Zenaida zenaida zenaida* (Bonaparte)

Three seen and positively identified near New Nonsuch, July 7, 1935. They proved to be escaped birds brought from Turks Island, West Indies, several weeks before. The three birds were again observed about ten weeks later, on September 26, in the same place, so they seem to have become established and deserve mention in this list. They associate with ground doves.

YELLOW-BILLED CUCKOO—*Coccyzus americanus americanus* (Linnaeus)

One in mangroves, October 3, 1933.

BARN OWL—*Tyto alba pratincola* (Bonaparte)

One pair is undoubtedly resident and breeding. Two birds seen, and heard night after night near New Nonsuch and the Biological Station, 1933 to 1935, in months of May, June and November, and April to August, 1937. One on Nonsuch Island, August 1 to 18, 1934, reported by Arthur Tucker. An emaciated bird picked up half dead on Tuckertown Beach, April 25, 1937.

SCREECH OWL—*Otus asio* subsp.

A new record for Bermuda. Seen and heard a number of times both at New Nonsuch and the Biological Station, August 20 and in September, 1934, and August 10, 1935.

NIGHTHAWK—*Chordeiles minor* subsp.

One over mangroves, October 14, 1935. A late spring record is one hawking over New Nonsuch, May 12, 1937.

CHIMNEY SWIFT—*Chaetura pelagica* (Linnaeus)

One flying past New Nonsuch, August 26, 1935.

BELTED KINGFISHER—*Megaceryle alcyon alcyon* (Linnaeus)

In 1934 first noticed on September 23; and in 1935, on August 28. Last spring record in 1937, was May 9.

TREE SWALLOW—*Iridoprocne bicolor* (Vieillot)

One on September 1, 1933.

BARN SWALLOW—*Hirundo erythrogaster* Boddaert

Five on August 10, 1932; two on August 16 to 22, 1934; seven on September 12, 1935. In 1937 the latest spring record was two on May 13; earliest autumn birds were seven on August 18.

PURPLE MARTIN—*Progne subis subis* (Linnaeus)

Two females over New Nonsuch and the Biological Station, September 23, 1935. One seen the following day.

BLUE JAY—*Cyanocitta cristata* subsp.

The second record for Bermuda was a bird heard first and seen later at the Biological Station, September 27, 1935.

CROW—*Corvus brachyrhynchos* subsp.

Rare but still holding on. Four seen mobbing an osprey on Long Bird, November 14, 1932; two heard October 6, 1934; another chasing a great blue heron, November 15, 1935.

BROWN THRASHER—*Toxostoma rufum* (Linnaeus)

The first definite record for Bermuda. One very tired bird in cedar tree at New Nonsuch, September 30, 1935.

BLACK-AND-WHITE WARBLER—*Mniotilta varia* (Linnaeus)

One seen October 4, 1935.

MARYLAND YELLOW-THROAT—*Geothlypis trichas* subsp.

A second spring record for Bermuda was a male in the mangroves at Nonsuch, April 25, 1937.

PALM WARBLER—*Dendroica palmarum palmarum* (Gmelin)

In "The Auk" for October, 1937, page 543, Ludlow Griscom writes: "On March 15th, 1937, I found a Palm Warbler, typical *Dendroica palmarum*, on the golf-club grounds at St. Georges. It was very tame allowing a close approach, and was under excellent observation with a Zeiss binocular for several minutes. The subspecies was positively determined by the entire absence of yellow on the under parts except for the vent and under tail coverts which were in sharp contrast with the dirty brownish white of throat, breast and belly."

This subspecies forms a new record for Bermuda.

PURPLE GRACKLE—*Quiscalus quiscula quiscula* (Linnaeus)

On September 12, 1935, I was astonished to see one of these birds on the path near New Nonsuch. It was busily feeding and very tame, probably from weariness. A few minutes later, when I returned, it had disappeared. It forms a new record for Bermuda.

SCARLET TANAGER—*Piranga erythromelas* Vieillot

A female or male in winter plumage near the Biological Station, feeding on cedar berries, October 5, 1935.

NOTES OF NUMBER AND DATES OF FLEDGLING BROODS

May 1 to 10, 1934.

Catbird, 2 in brood
 Catbird, 1 in brood
 White-eyed Vireo, 1 in brood
 White-eyed Vireo, 1 in brood
 Bluebird, 2 in brood
 Bluebird, 1 in brood
 House Sparrow, 3 in brood
 House Sparrow, 2 in brood

June 1, 1934.

Catbird, 1 in brood.

This is interesting as showing that small size of clutches and broods holds good on the mainland as well as on Nonsuch Island.*

(*) *Aviculture*, (2) 3, 1931, pp. 86-88.

The Ornithological Year 1935 In The New York City Region

By ALLAN D. CRUICKSHANK

Ten years have elapsed since the inauguration of the yearly ornithological tabulation by the Linnaean Society of New York City. After a careful analysis of the past nine "Ornithological Years" one is impressed with the very slight variation in bird-life and bird movements from one year to another. It would not be a gross exaggeration, I believe, to state that having read the last nine summaries in the Society's abstracts one could write a ninety per cent accurate "Ornithological Year" without even being present in the region. It becomes apparent, moreover, that as the years go on the earliest arrival, latest departure and straggling out of season dates will continue and will undoubtedly lead (centuries from now perhaps) to a record for every day in the year for the majority of species occurring regularly in the region. Upon first thought this contention might seem impossible but when one studies the reliable records for the last decade and finds wintering Redstarts, Ovenbirds, Orioles, Nashville Warblers, House Wrens, Chats and what not, then the validity of the contention becomes apparent. Of course the facts revealed in the "Ornithological Year" are interesting and are worthy of preservation but it has often occurred to my mind whether the final tabulation in value is commensurate with and justifies the time and effort devoted by each conscientious Recording Secretary who utilizes at least one-eighth of all his spare time tracking down records, accumulating data, organizing index cards, ad infinitum. If not, just how can my successors, the future Recording Secretaries, expend their conscientious efforts to accomplish some work more valuable than the "Ornithological Year"?

I do not wish any of my foregoing remarks to be interpreted as arguments against field identification directed solely towards year lists, life lists, regional lists or record breaking dates. No matter what ones personal opinion may be, this type of field work still stands unchallenged as the supreme magnetic pole around which the great majority of amateur ornithologists pursue their field sport and is therefore extremely worthwhile even if judged solely for its recreational or inspirational value.

An analysis of the field notes sent in by 106 observers shows that 306 species and sub-species were reported in the New York City Region during 1935. Of these, the Magpie and the Harris' Sparrow are the only species for which we had no locally collected specimens. Strangely enough the Van Cortlandt Park swamp despite much construction and ditching produced two of the most spectacular finds of the year. On May 13 Doctor Wiegman discovered a single Glossy Ibis in this area and in spite of the immediate invasion of hourly armies of excited bird lovers tramping the swamp to get a glimpse of a new "life species" this individual remained until May 15 when it might have taken refuge in the extensive Troy Meadows marshes where a bird of this species was seen by Mr. Edwards on May 26. Running the Glossy Ibis a close second in popularity was an American Magpie discovered in the same Van Cortlandt swamp by members of the Sialis Bird Club on October 31. This bird which was last seen on December 22 was at first suspected of being an escaped cage bird but subsequent reports of Magpies in the Bear Mountain area, one flying over Rye, another seen by a party en route to the annual meeting of The American Ornithologists' Union, and rumors of several other sight records tend to indicate a light invasion of this species. This initiates the speculation as to whether these birds came from the colony now established in Nova Scotia or represent a movement from the western states.

As is to be expected in a region having as its center the largest city in the world, and stippled by numerous other cities, extensive suburban areas and rapidly growing summer resorts, the local field ornithologist sadly witnesses the slow but sure encroachment of civilization into his favorite swamps, woods and beaches until it seems that in years to come what is now the New York City Region will be naught but a mass of towns, suburbs and recreational centers. During the past year we have seen the destructive forces of man ruining the Van Cortlandt and Kissina Park marshes and promising to do away with possibly the best fresh water marsh in our area, Troy Meadows. One is led to realize that in years to come the breeding of a heron or rail or bittern within twenty miles of New York City will be but a memory.

An examination of the annual Meteorological Summary with comparative data willingly furnished by the New York City Weather Bureau shows that 1935 was outstanding for the record-breaking deficiency in precipitation. Excluding a relatively mild spell between the 6th and the 10th *January* proved to be generally cold with a mean monthly temperature of 29.2 or 1.7 below normal. This sub-freezing mean froze all inland ponds, lakes and reservoirs, forcing most of our waterfowl to seek the open water of the larger bays and rivers. As usual numbers of these birds turned up on the grounds of local sanctuaries and hunting preserves where feeding was done. Bluebirds, Robins and several species of blackbirds which were not at all regular in late December seemed to be forced down from further north and suddenly appeared throughout the region in tolerable numbers.

Up to the 22nd of the month we had had less than three inches of snow but then a fierce blizzard second only to the famous one of '88 swept the area. The storm really began on the 20th with a two day rain: on the 22nd a sudden drop in temperature changed the rain to snow. On the 23rd a forty mile northwester sent the mercury down to fifteen degrees below freezing and brought with it a wild blinding storm that did not let up until there were $17\frac{3}{4}$ inches of snow on the ground, approximately three inches within the '88 depth. Then until the end of the month near zero or sub zero temperatures were reached every day keeping the snow in clean crisp condition. The 28th set the record low of the winter when the mercury dipped down to or below zero in all parts of our region with the lowest temperatures of 10 to 24 below zero reported from northern Westchester.

Excluding a marked flight of Snowy Owls, Lapland Longspurs, Northern Shrikes and white winged gulls irregular winter visitants were absent. Species such as the Black-capped Chickadee, Purple Finch and Carolina Wren which are normally regular winter birds were astonishingly absent. The case of the Black-capped Chickadee is especially remarkable. Breeding birds seemed to gather in small flocks and remain in their general permanent territories. Let us examine, however, that portion of The Bronx County Bird Club Census which covers Bronx County proper: Here the Chickadee does not breed but is always a common winter visitant yet none was recorded despite the presence

of over one dozen alert and active observers. The winter passed with but few records for this species in some sections and all sections reported Chickadees below normal. It is now interesting to recall discussions as to whether the record-breaking winter of 1933-34 had cut down the numbers of this hardy bird; or whether we were at a low mark in the species cycle; or whether the northern Chickadees had decided to remain on their breeding grounds. Late publication enables me to insert that the following autumn Chickadees appeared in usual abundance. The absence or near absence of Carolina Wrens can certainly be attributed to the severe conditions of the previous winter.

In spite of very severe weather one finds the usual scattered reports of out-of-season species attempting to brave the rigors of winter. A Catbird and a White-crowned Sparrow found shelter in a heavy growth of yew in The Bronx Botanical Gardens and were regularly fed by considerate bird students. A female Baltimore Oriole was reported by Doctor Swope as wintering at Huntington, Long Island. My observations lead me to believe that these out-of-season birds if they survive generally attempt to winter year after year, but usually if the first trial does not prove too much the second or third does and as a consequence these revolutionary individuals are soon weeded out.

February with a mean temperature of 31.6 was approximately normal. The absence of prolonged warm spells, however, prevented any heavy thaws from occurring with a result that inland lakes and reservoirs remained ice-coated until the second week of March. Bird life was at its minimum during the early part of February: Several species or individuals present in December and early January disappeared by the beginning of the month. But strictly speaking there is no period of the year when there is no migration. In the ramble of Central Park small flocks of birds would appear from time to time, linger for a day or two and then pass on. The usual 50,000 or so Scaup gathered in New York City proper on the East River between Bronx and Queens Counties; and the European Teal and European Widgeon again graced Hempstead Reservoir with their presence. The outstanding bird of the month was an Arctic three-toed Woodpecker found working on a dead pine in the Phelps Estate of Leonia, New Jersey, by Doctor Janvrin and Doctor Heck.

While the weather remained evenly cold and raw well up into *March* and allowed no heavy thaw, some potent factor in the migratory urge greater than the temperature factor showed its presence and the harbingers of spring came in one by one. Robins first appeared in Central Park on the fourth beating the Grackles by several days for the first time in a number of years. The mean temperature of 43.2 for entire March was 5.5 degrees above normal. By the end of the month all ponds and marshes were thawed and pronounced movements of Redwings, Rusty Blackbirds, Kingfishers and waterfowl took place.

The Recording Secretary has an unusual opportunity to notice how misleading local impressions are liable to be as a basis for generalization. Mr. Urner in reporting a satisfactory increase in the Eel-grass growth on the Jersey coast records the heaviest spring duck flight in a good many years. Mr. Vogt on the other hand reports spring ducks as decidedly scarce on Long Island. To get a really complete accurate picture of the present status of our water fowl one would have to analyze reports from all over the continent.

By March 17 the progress of spring was much in evidence. The annual amphibian chorus was well under way and many turtles and snakes were already out of hibernation. Field notes indicated that migration was now a little in advance of normal. It was rather surprising to have Tree Swallows in northern New Jersey on March 24. Late in the month Lapland Longspurs which had been scarce all during mid-winter showed a decided return flight and a peak of seventy-five birds was recorded on the Newark Marshes, April 6 (Urner).

A cold raw rainy spell during the first week of *April* partly checked avifaunal movement. Rough-legged Hawks lingered later than usual: a noticeable northward movement occurring on Long Island, April 7 (Vogt); and eight remaining around Barnegat until April 21 (Urner).

With the return of warm weather on April 19 there was a noticeable influx of April migrants . . . fourteen species of shore-birds were observed in the Barnegat area. By the end of the month pronounced advancement in the vegetable and insect worlds brought in the insectivorous species of birds and the annual phenomenon of vernal migration was everywhere in evidence. The mean monthly temperatures

for both April and May were less than .2 of a degree within normal. The last killing frost of the year occurred on April 16, the last snow on April 17 and the last frost on May 25. With migration well under way the Recording Secretary received scores of reports showing the annual dissention amongst representatives of the various local regions as to the trend of vernal movements: Some reported the season well in advance of normal while others thought birds were decidedly behind schedule. A collective analysis of all reports shows, however, that the protracted cool period during the first two weeks of *May* made birding rather disappointing for this usually exciting half month was characterized by a scarcity of definite waves . . . in fact the only movement in Central Park that could be called "a wave" was on May 10.

A remarkable shorebird flight along the coast made up for the unsatisfactory landbird showing. Mr. Urner reports the peak of shorebird migration in New Jersey on May 11 when upwards of 50,000 birds in great flocks were seen leaving the coast near Tuckerton.

It is indeed a pleasure to report for Mr. J. T. Nichols the nesting of the European Goldfinch in Garden City, Long Island. This Old World species was introduced in Hoboken in 1878. For a few years it showed signs of really establishing itself, but while this promise has not been fulfilled a few individuals are reported each year and there still remains a possibility that the birds might some day increase in numbers.

June as a whole was quite normal. The minimum temperature of the month was 54 degrees on the 10th, the maximum temperature 87 degrees on the 13th. With the exception of small northbound flocks of Black Poll Warblers during the opening days of the month the migration of passerine birds was concluded. Shorebirds on the other hand continued to pass through in noticeable numbers. Interest now centered on the breeding birds. American Egrets and Little Blue Herons were again found nesting in southern New Jersey. Mr. Fred Mangels, moreover, reported four American Egrets and several Yellow-crowned Night Herons during June in a Black-crowned Night Heron colony near Massapequa, Long Island, and suspects their breeding there. This interesting discovery certainly is suggestive and should stimulate a careful annual check up of all our local heronries so that

we may have a detailed record of the potential northward extension of the breeding ranges of these southern herons into the New York City Region.

The mass of data before me leaves no doubt in my mind that several species of shorebirds summered along our coast. And while small flocks of some species were still heading northward Mr. Urner reports the first returning Dowitchers, Least Sandpipers and Hudsonian Curlew actually flying south over the regular Jersey course on June 29. By the second week in *July* southward flights were pronounced. A big Curlew flight came through on July 13-14. For some time over one thousand of these birds used Egg Island, New Jersey, as a nightly roost. These birds would leave each morning for popular feeding grounds and return regularly each evening to their Egg Island retreat. Mr. Urner counted 1,149 flying over Absecon at dawn on July 27.

With all the active field work that is carried on in the New York City Region surprisingly little is known about our off shore birds. Practically no local field man gets off the coast during the winter months and relatively few ever get off looking for pelagic species even during the summer. As a sequel the exact status of the shearwaters and petrels off our coast will have to await further study. On July 17 Messrs. Matuszewski and Rose took a fishing trip off Montauk Point and found "acres of shearwaters of all three species" as well as thirty or more Wilson's Petrels.

By the end of the month the notes compiled in *The Long Island News Letter* indicated an increase in the number of ducks and the presence of twenty-one species of shorebirds. Swallows and black-birds commenced flocking on the marshlands and our first migrant warblers and flycatchers put in their appearance.

With most local observers rushing out to the coast during *August* for shorebirds the landbird migration of the month was again sorely neglected. I find myself with few notes of importance for our passerine group in spite of the fact that these records are greatly needed. The annual post nuptial flight of southern herons was pronounced but light. Terns, Skimmers and Cormorants trickled in as the month

progressed and by the end of August we find reports of a large interesting group of birds along the outer beaches.

The mean temperatures for July and August were only slightly above normal in spite of the fact that both of these months had more sunshine than usual. This clear calm spell was rudely snapped in early *September* when a semi-cyclonic storm accompanied by eighty per cent of the entire month's rainfall rushed up the coast bringing flood tides and causing considerable property damage. As was to be expected great numbers of our more pelagic, more powerful flying shorebirds were forced to the coast and those observers fortunate enough to be afield even for weeks after the titanic forces had passed found birding to be quite exciting. Among the more interesting species to show up at this time was an Avocet and a surprising number of Hudsonian Godwits.

The first light frost of the autumn on September 24 brought a heavy rush of warblers, thrushes and other passerine birds from the north. Large daily lists were now handed in by local observers. While September was generally cool and dark *October* reversed the tables and presented thirteen per cent more sunshine than normally . . . the highest on record since 1924. Because of this mild pleasant spell a great number and variety of shorebirds and warblers remained well until the end of the month.

Evidently not content to have just September and October establish new records for the meteorological charts *November* added an extreme by presenting twenty-two cloudy days out of thirty . . . the greatest on record. During the month large flocks of Red-backed Sandpipers, the last of our transient shorebirds to pass through in the fall, impressed one with the effect of sane conservation laws. It is only a score of years ago that the discovery of a single individual of this species in any part of our region was considered a lucky find.

The first killing frost of the autumn on November 17 cleared out the large concentrations of shorebirds and brought Tree Sparrows, Snow Buntings and Horned Larks in tolerable numbers. On the 24th of the month there was a light widespread Goshawk flight. Two of these irregular winter visitors were seen flying over Riverhead, Long

Island (Cruickshank); one was seen over Bronx Park (Hickey); and two over Clason Point (Kassoy, Kuerzi and Peterson).

By early *December* the spirit of the annual Christmas census rivalry was running high. Observers rushed afield each week-end to meticulously comb the chosen area and perhaps uncover some potential addition for the coming competition. The Long Island News Letter reveals that twenty-six species of ducks and twelve species of hawks were present on the first week-end of the month. Mr. Urner reports shorebirds lingering later than usual around Barnegat with eleven species present on December 1st and eight species on December 8. While a sudden bitter snap on the 21st either killed or cleared out many out of season species the day before the census, large lists were turned in by all parties . . . The Bronx County Bird Club and Barnegat tying with 106 species each.

One has but to glance through the pages of the annotated list to realize that the compiler would have been unable to present such a complete picture of the ornithological year had it not been for the kind cooperation of all 106 observers who submitted their individual compilations. To each and every one of these contributors I wish to extend my appreciative thanks. A few individuals, however, were constantly going out of their way to make my task a lighter one. Active observers like Messrs. Kuerzi, Urner and Sedwitz never failed to submit complete records of all field trips. Messrs. Hickey and Mayr were ever willing to offer suggestions and to help with any problems that arose. It has been a pleasure to experience such cheerful cooperation from not alone friends and acquaintances but from utter strangers as well.

Gavia immer immer. Common Loon.—Breeding plumaged birds arrived at Kensico, March 30 (Gere and Murdock); one pair present up to early July (Cruickshank); Miller Place, July 22 (Helme); heavy migration of both species of Loons on Jersey Coast, Nov. 10 (Urner).

Gavia arctica pacifica. Pacific Loon.—Long Beach, Feb. 17 (Breslau, Carleton and Sedwitz); "In all probability a Pacific Loon. Had a short small bill. Back pattern exactly like that of a Common Loon. Black patch on each side of the lower neck as if part of the black throat were in molt." Montauk, Dec. 8 (Cobb, Janvrin and Peterson), "Most likely a Pacific Loon."

Gavia stellata. Red-throated Loon.—Exceptionally scarce during January and February. Manhattan Beach, March 2 (Weber); Idlewild, May 4 (Lind).

Colymbus grisegena holboelli. Holboell's Grebe.—Very scarce this year . . . no marked flights. Mt. Sinai, Jan. 9 (Walker); Jones Beach, April 4 (Mayer); Pelham Bay, Nov. 5 (Cantor and Norse); Pelham Bay, Dec. 27 (Weber).

Colymbus auritus. Horned Grebe.—Rye, Sept. 29 (Cruickshank, Gere and Oboiko); Millneck, Oct. 19 (Sabin).

Podilymbus podiceps podiceps. Pied-billed Grebe.—Franklin Lake, March 17 (Janvrin); Hempstead, March 16 (Mayer); Troy Meadows, March 17 (Rusling); Miller Place, Aug. 2 (Helme).

Puffinus griseus. Sooty Shearwater.—9, Jones Beach, May 25 (Jaques and Vogt); "Several dozen off Montauk, July 17" (Matuszewski and Rose); 4, Jones Beach, Aug. 28 (Bohn).

Puffinus gravis. Greater Shearwater.—Beach Haven, May 19 (Fry); Long Beach, July 7 (Sedwitz); "Large flock off Montauk, July 17" (Matuszewski and Rose); Peconic Bay, July 24 (Latham); 4, Jones Beach, Aug. 28 (Bohn).

Puffinus diomedea borealis. Cory's Shearwater.—3, Moriches Inlet, July 2 (C. Cobb); "Large flock off Montauk, July 17" (Matuszewski and Rose); 3, Montauk, Aug. 18 (Sedwitz); Montauk, Aug. 24 (Breslau).

Oceanites oceanicus. Wilson's Petrel.—30, off Montauk, July 17 (Matuszewski and Rose); 5, Mt. Sinai, July 20 (Helme); Oak Island Beach, Aug. 25 (Breslau and Sedwitz).

Moris bassana. Gannet.—Long Beach, Jan. 5 (Sedwitz); Jones Beach, March 31 (Rose); Moriches Inlet, Aug. 10 (J. T. Nichols); Jones Beach, Sept. 15 (Sedwitz).

Phalacrocorax carbo carbo. European Cormorant.—Jones Beach, Oct. 10 (Mayer); Jones Beach, Oct. 12 (Sedwitz).

Phalacrocorax auritus auritus. Double-crested Cormorant.—Tuckerton, April 7 (Urner); 1,500, Barnegat, April 27 (Urner); heavy flights on Long Island end of April; 250, Rye, June 23 (Cruickshank); Mt. Sinai, July 17 (Helme); Van Cortlandt, Oct. 26 (Norse).

Fregata magnificens. Man-o'-war-bird.—Brigantine, Sept. 15 (Tatum).

Ardea herodias herodias. Great Blue Heron.—Long Beach, Jan. 6 (Hickey, Herbert and Kuerzi); Central Park, March 14 (Cruickshank); Van Cortlandt, Dec. 22 (Allen, Norse and Kramer).

Casmerodius albus egretta. American Egret.—Troy Meadows, May 16 (Janvrin); "Four in Night Heron colony near Amityville during June, probably breeding" (Mangels); 14, Jones Beach, June 30 (Cruickshank); Rhinebeck, July 31 (Vogt); Salem, Nov. 4 (Brown, Edwards and Urner).

Florida caerulea caerulea. Little Blue Heron.—Idlewild, April 28 (Lind); Montauk, June 17 (Cynthia Church); 6, Jones Beach, July 14 (Hickey); Hempstead, Sept. 2 (Chapin).

Butorides virescens virescens. Eastern Green Heron.—Speonk, April 1 (Wilcox); Barnegat, April 21 (Brown); Mecox Bay, Oct. 21 (B. Cobb).

Nycticorax nycticorax hoactli. Black-crowned Night Heron.—Well marked migration during the third week in March.

Nyctanassa violacea violacea. Yellow-crowned Night Heron—Tuckerton, April 14 (Urner); 2, Kissina Park, May 12 to 19 (Lind and Sedwitz); Ridgewood, May 26 (Walsh); Jones Beach, May 26 (Vogt); Grassy Sprain, Oct. 7 (Weber).

Botaurus lentiginosus. American Bittern.—2, Baxter Creek, Jan. 15 (Malley); "one found dead near Baxter Creek, Feb. 19" (Malley); 2, Troy Meadows, March 24 (Cruickshank, Gere and Murdock); 3, Baychester, Dec. 22 (Hickey and Weber).

Ixobrychus exilis exilis. Eastern Least Bittern.—Barnegat, April 21 (Urner); Van Cortlandt, May 15 (Cantor, Weber); bred in the Van Cortlandt marsh (Sialis Bird Club).

Plegadis falcinellus falcinellus. Eastern Glossy Ibis.—A single bird discovered in the Van Cortlandt marsh, May 13 (Wiegman); remained until May 15 and seen by Hickey, Kuerzi, Rich, etc.; Troy Meadows, May 26 (Edwards).

Sthenelides olor. Mute Swan.—97, Quogue, Feb. 3 (Cobb, Cruickshank and Gere); 100, Shinnecock, Aug. 14 (Helme); 22, Barnegat, Nov. 10 (Urner); 2, Hillview Reservoir, Dec. 14 (Cantor and Norse).

Cygnus columbianus. Whistling Swan.—Barnegat, March 10 and 17 (Urner); Hackensack River, March 22 (Walsh); 4, Newark, Nov. 5 (Urner); 6, Idlewild, Nov. 5 (Lind).

Branta canadensis canadensis. Canada Goose.—40, Tod's Point, March 10 (Cruickshank and Gere); 800, Barnegat, March 24 (Urner); 2,000, Shinnecock Bay, March 16 (Wilcox).

Branta bernicla hrota. American Brant.—125, Tod's Point, March 3 (Cobb, Cruickshank, Gere and Murdock); 700, Jones Beach, March 23 (Vogt); 1,100, Jersey Coast, April 7 (Urner); 125, Jones Beach, April 28 (Sedwitz); 2,200, Barnegat, Nov. 10 (Urner).

Anser albifrons albifrons. White-fronted Goose.—4, Barnegat, Nov. 10 (Urner).

Chen hyperborea. Snow Goose (subspecies?).—4, Long Beach, Jan. 6 (Herbert and Kuerzi); 300, Woodmere, April 14 (Berliner); 750, Lake Success, April 14 (Rorden); 100, Tuckerton, Nov. 16 (Brown and Urner); 20, Jones Beach, Nov. 17 (Breslau); 30, Jones Beach, Dec. 8 (Cruickshank).

Chen caerulescens. Blue Goose.—A single bird on the Sound between Bayville and Center Island, March 17 (Lind).

Anas rubripes rubripes. Red-legged Black Duck.—Arrived in Westchester, Sept. 22 (Cruickshank); 20,000, Salem, Nov. 4 (Brown, Edwards and Urner).

Anas rubripes tristis. Common Black Duck.—Nest and eggs, Ridgewood, March 9 (Walsh); 10 eggs, Newark, April 6 (Urner); 250, Shinnecock, July 27 (Wilcox).

Chaulelasmus streperus. Gadwall.—Hempstead, Sept. 22 (Matuszewski); Tuckerton, Sept. 29 (Urner); Jones Beach, Oct. 5 (Sedwitz); 12, Brookhaven, Nov. 3 (Cobb, Cruickshank and Allyn); 16, Brookhaven, Nov. 10 (Breslau, Carleton and Sedwitz).

Mareca penelope. European Widgeon.—3 drakes, Hempstead, Jan. 1 (Cruickshank, Murdock and Peterson); 3 drakes, Brookhaven, Jan. 6 (Sedwitz); Jones Beach, March 24 (Vogt); 14, Brookhaven, Nov. 3 (Allyn, Cobb and Cruickshank).

Mareca americana. Baldpate.—Hatfield Swamp, March 1 (Rusling); Brookhaven, Sept. 28 (Cobb); Hillview Reservoir, Dec. 22 (Allen, Cantor and Norse).

Dafila acuta tsitzihoa. American Pintail.—1,000 Hatfield Swamp, March 5 (Rusling); 2, Millneck, April 28 (Chapin); 35, Brookhaven, Sept. 28 (Colb).

Nettion crecca. European Teal.—3 drakes, Hempstead, Jan. 1 (Cruickshank, Murdock and Peterson); Troy Meadows, March 9 (Rusling); Newark Bay, March 24 (Urner); 2, Hempstead, April 27 (Berliner).

Nettion carolinense. Green-winged Teal.—Old Greenwich, Jan. 1 (Gere and Murdock); Hatfield Swamp, March 1 (Rusling); 7, Central Park, March 22 (Cruickshank); 75, Barnegat, March 24 (Urner); 2,500, Salem, Nov. 4 (Brown, Edwards and Urner).

Querquedula discors. Blue-winged Teal.—Troy, March 16 (Edwards); Speonk, June 16 (Wilcox); bred near Greenwich (Brooks); Speonk, July 8-14 (Wilcox); 75, Jones Beach, Sept. 15 (Sedwitz); 85, Barnegat, Sept. 22 (Urner); Speonk, Dec. 4 (Wilcox).

Spatula clypeata. Shoveller.—2, Hempstead, Jan. 15 (Kuerzi); 24, Brookhaven, Feb. 3 (Cobb, Cruickshank and Peterson); Troy Meadows, March 17 (Rusling); 5, Newark Bay, April 21 (Urner); Brookhaven, Oct. 5 (Sedwitz); 17, Salem, Nov. 4 (Brown, Edwards and Urner); Bronx Park, Dec. 7-22 (Hickey, Kramer and Lehrman).

Aix sponsa. Wood Duck.—One on Mills Pond, Long Island, all during January and February (numerous observers); nest with broken eggs in Troy Meadows, April 14 (Gere and Murdock); Speonk, Dec. 12 (Wilcox).

Nyroca americana. Redhead.—Now one of the rarest ducks in the region; 40, Shinnecock, Jan. 2 (Helmuth); Brookhaven, Oct. 27 (Wilcox); 10, Croton Point, Nov. 30 (Cruickshank and Gere).

Nyroca collaris. Ring-necked Duck.—150, Brookhaven, Jan. 6 (Sedwitz); 15, Kensico, Jan. 27 (Allen, Cobb and Peterson); Troy Meadows, March 16

(Edwards); Kensico, May 12 (Cruikshank); Bronx Park, Oct. 27-Dec. 25 (Sialis Bird Club).

Nyroca valisineria. Canvasback.—123, Croton Point, Jan. 13 (Allen, Murdock and Peterson); 100, Shinnecock, Feb. 22 (Matuszewski and Thomas); Lake Parsippany, March 23 (Edwards); 175, Brookhaven, March 10 (Sedwitz); 400, Croton Point, Nov. 30 (Cruikshank and Gere).

Nyroca marila. Greater Scaup Duck.—50,000, Eastern Bronx, most of January and February (Bronx County Bird Club); Idlewild, June 3-9 (Mayer); Orient, Aug. 1 (Latham); Idlewild, Sept. 21 (Mayer).

Nyroca affinis. Lesser Scaup Duck.—4, Great Neck, March 17 (Allen, Gere and Murdock); 40, Jones Beach, March 24 (Vogt); 5, Sagaponack, Oct. 13 (Sedwitz); 20, Easthampton, Dec. 1 (Helmuth).

Glaucionetta clangula americana. American Golden-eye.—Mecox Bay, April 28 (Sedwitz); Lake Parsippany, May 18 (Edwards, Hickey and Urner); Oakwood Beach, May 28 (Janvrin); Hempstead, Oct. 27 (Sedwitz).

Glaucionetta islandica. Barrow's Golden-eye.—3, Orient Point, Feb. 1 (Latham).

Charitonetta albeola. Bufflehead.—15, Kensico, Jan. 5 (Cruikshank and Gere); 14, Montauk, Feb. 3 (Cobb and Peterson); Wantagh, one stayed well into June (Mangels); Brookhaven, Oct. 27 (Wilcox).

Clangula hyemalis. Old Squaw.—155, Tod's Point, March 10 (Cruikshank and Gere); 12, Jones Beach, Nov. 3 (Allyn and Cobb).

Somateria mollissima. American Eider.—Montauk, Jan. 2 (Helmuth); Hudson off Englewood, Nov. 19 (Wiegman); Easthampton, Nov. 30 (B. and A. Cobb).

Somateria spectabilis. King Eider.—14, Montauk, Jan. 2 (Helmuth); 8, Montauk, Feb. 3 (Kuerzi and Matuszewski); Orient Point, March 17 (Sedwitz); Montauk, Dec. 22 (Lind, McKeever and Sedwitz).

Oidemia americana. American Scoter.—Atlantic Beach, July 27-Aug. 8 (Arbib and Berolzheimer).

Melanitta deglandi. White-winged Scoter.—15, Orient, Aug. 1 (Latham).

Melanitta perspicillata. Surf Scoter.—25, Long Beach, July 16-27 (Breslau and Sedwitz); Mt. Sinai, Sept. 20 (Helme); Rye, Oct. 13 (Herbert and Hickey).

Erismatura jamaicensis rubida. Ruddy Duck.—Brookhaven, Jan. 6 (Sedwitz); Shinnecock, Feb. 3 (Farley, Kuerzi and Matuszewski); 14, Jones Beach, Oct. 20 (Cruikshank, Lehrman and Weber).

Lophodytes cucullatus. Hooded Merganser.—12, Rye, Jan. 4 (Cruikshank and Oboiko); Troy Meadows, March 16 (Edwards); Jones Beach, Oct. 5 (Sed-

witz); 39, Barnegat, Nov. 24 (Urner); 40, Rye, Dec. 1 (Cruickshank, Gere and Oboiko).

Mergus merganser americanus. American Merganser.—200, Stamford, Jan. 13 (Farley and Hickey); 350, Westchester, March 3 (Cobb and Murdock); Croton Point, May 12 (Cobb, Cruickshank and Gere); Inwood, Nov. 11 (Cantor and Norse).

Mergus serrator. Red-breasted Merganser.—Lake Parsippany, April 7 (Brown); 20, Rye, June 23 (Cruickshank); 640, Barnegat, Nov. 10 (Urner).

Cathartes aura septentrionalis. Turkey Vulture.—2, Middletown, N. J., Feb. 24 (Edwards and Mayr); Troy Meadows, March 9 (Rusling); Prospect Park, March 25 (Brennan); Van Cortlandt, April 23 (Norse); Bronx Park, April 24 (Cantor and Weber); Far Rockaway, Nov. 23 (Lind).

Astur atricapillus atricapillus. Eastern Goshawk.—Bernardsville, Jan. 5 (Cynthia Herbst); Tod's Point, April 14 (Brooks); definite widespread flight, Nov. 24: Bronx Park (Hickey); Clason Point (Kassoy, Kuerzi and Peterson); 2, Riverhead (Cruickshank); Jones Beach, Nov. 28 (Sedwitz); Jones Beach, Dec. 29 (Allen and Cruickshank).

Accipiter velox velox. Sharp-shinned Hawk.—Miller Place, Feb. 8 (Helme); Bayside, Aug. 24 (Bohn).

Accipiter cooperi. Cooper's Hawk.—"Sitting on eggs, New Jersey, May 5" (Bowdish); "Bred on Staten Island for third consecutive year" (Cleaves); Mastic, June 23 (J. T. Nichols).

Buteo borealis borealis. Eastern Red-tailed Hawk.—"2 over Pine Barrens, Long Island, Aug. 14" (Helme); New Inlet, Aug. 18 (Sedwitz).

Buteo lineatus lineatus. Northern Red-shouldered Hawk.—Nest building near West Caldwell, March 5 (Rusling); Northbound migration in northern New Jersey, March 24 (Cruickshank, Gere and Murdock).

Buteo platypterus platypterus. Broad-winged Hawk.—Mastic, April 28 (J. T. Nichols); Mt. Sinai, June 22 (Walker); Long Island Pine Barrens, Aug. 13 (Helme); 53, Alpine, Sept. 23 (Wiegman).

Buteo lagopus sancti johannis. American Rough-legged Hawk.—Large numbers lingered much later than usual in the Spring. Marked flight, Jones Beach, April 7 (Breslau, Sedwitz and Vogt); 8, Barnegat, April 21 (Urner); Jones Beach, Oct. 27 (Sedwitz).

Haliaeetus leucocephalus leucocephalus. Southern Bald Eagle.—6, Croton Point, Jan. 13 (Cobb, Cruickshank, Gere and Murdock); 5, Salem, Nov. 4 (Brown, Edwards and Urner); Montauk, Nov. 29 (B. and A. Cobb).

Pandion haliaetus carolinensis. Osprey.—Barnegat, March 14 (Urner); Westbury, March 30 (Matuszewski); "Numerous nests on Jersey Coast, some with

complete clutches, May 5" (Birkhead); 6, Mastic, Nov. 3 (J. T. Nichols); Absecon, Nov. 16 (Brown and Urner).

Falco peregrinus anatum. Duck Hawk.—Egg in nest on Palisades, April 14 (Herbert).

Falco columbarius columbarius. Pigeon Hawk.—Bronx Park, March 18 (Weber and Stephenson); Oak Island Beach, Aug. 18 (Matuszewski and Rose); 25, Freeport, Oct. 17 (Cruikshank); Idlewild, Dec. 26 (Mayer).

Falco sparverius sparverius. Eastern Sparrow Hawk.—Nest building at Speonk, March 14 (Wilcox); 25 in one flock near Montauk, April 28 (Sedwitz).

Bonasa umbellus umbellus. Eastern Ruffed Grouse.—Still resident around Kensico (Birkhead and Gere); Elmsford Ridge, May 12 (Cobb and Cruickshank).

Colinus virginianus virginianus. Bob-white.—36, Hempstead, April 19 (Chapin); still breeds in Inwood (Mayr and Norse).

Rallus elegans elegans. King Rail.—Troy Meadows, April 14 (Cruikshank, Gere and Murdock); 2, Troy Meadows, April 21 (Walsh).

Rallus longirostris crepitans. Northern Clapper Rail.—2, Tuckerton, April 7 (Urner); nest and 11 eggs near Hewlett, May 22 (Lawrence School Nature Club); 3, Baychester, Dec. 22 (Hickey, Stephenson and Weber).

Rallus limicola limicola. Virginia Rail.—Idlewild, March 21 (Mayer); Oak Island, Sept. 22 (Mayer); Baychester, Dec. 22 (Hickey, Stephenson and Weber).

Porzana carolina. Sora.—Troy Meadows, March 17 (C. K. Nichols); Idlewild, March 20 (Mayer); young in Troy Meadows, May 7 (Elliot and Janvrin); Central Park, Aug. 17 (Rich); Jones Beach, Nov. 19 (Cruikshank); Van Cortlandt, Dec. 15-22 (Cruikshank and Norse).

Coturnicops noveboracensis. Yellow Rail.—Fresh dead bird, Troy Meadows, March 31 (Eaton and Edwards); remains of another, Jones Beach, Nov. 28 (McKeever and Sedwitz).

Creciscus jamaicensis stoddardi. Black Rail.—Montauk, July 8 (Church).

Gallinula chloropus cachinnans. Florida Gallinule.—Speonk, April 13-14 (Wilcox); Jones Beach, May 25 (Vogt); young in Van Cortlandt swamp, Aug. 4 (Norse); Elmhurst, Nov. 3 (Walker).

Fulica americana americana. American Coot.—65, Brookhaven, Feb. 3 (Cobb, Cruickshank and Peterson); Jones Beach, March 25 (Vogt); 60, Barnegat, Nov. 10 (Urner); on Hudson off Englewood, Nov. 11 (Cantor and Norse).

Charadrius melodus. Piping Plover.—Moriches Inlet, March 16 (Wilcox); Barnegat, March 17 (Urner); Jones Beach, March 17 (Weber); 69 between Jones Beach and Oak Island, April 7 (Sedwitz, Lind and Wolfram); Oak Island, Oct. 5 (Sedwitz).

Charadrius semipalmatus. Semipalmated Plover.—4, Barnegat, April 20 (Urner); Barnegat, Nov. 10 (Urner); Jones Beach, Nov. 19 (Cruickshank).

Pagolla wilsonia wilsonia. Wilson's Plover.—Brigantine, Aug. 9 (Loetscher and Street).

Oxyechus vociferus vociferus. Killdeer.—2, Central Park, March 13 (Cruickshank); young, Demarest, April 29 (Bowdish); Rye, Dec. 22 (Herbert and Oboiko).

Pluvialis dominica dominica. Golden Plover.—Newark Meadows, Aug. 10 (Urner); 38, Newark Meadows, Sept. 28 (Urner); Rye, Sept. 29 (Gere); Idlewild, Nov. 3 (Mayer); Newark, Nov. 9 (Urner).

Squatarola squatarola. Black-bellied Plover.—Oak Island Beach, April 7 (Breslau and Sedwitz); Dutchess County, May 25 (Baker and Peterson); 6, Tuckerton, Dec. 8 (Urner); Stamford, Dec. 24 (Cruickshank).

Arenaria interpres morinella. Ruddy Turnstone.—Jones Beach, June 30 (Cruickshank); Moriches Inlet, July 11 (Wilcox); Tuckerton, Dec. 1 (Urner).

Philohela minor. Woodcock.—Central Park, Feb. 24 (Cobb); Bronx Park, March 29 (Stephenson); one in full song at Montauk, April 28 (Sedwitz).

Capella delicata. Wilson's Snipe.—5, Idlewild, Feb. 5 (Mayer); Jones Beach, March 18 (Vogt); Central Park, March 21 (Birckhead); Central Park, Nov. 7 (Birckhead).

Phaeopus hudsonicus. Hudsonian Curlew.—Beach Haven, April 20 (Urner); Oak Island Beach, June 12 (Berliner); heavy flight at Barnegat, July 13-14 (Urner); 1,149 flying over Absecon at dawn, July 27 (Urner); Oak Island, Sept. 22 (Matuszewski and Rose).

Bartramia longicauda. Upland Plover.—Kensico, April 21 (Cruickshank and Gere); Newark Meadows and New Egypt, June 1 (Urner); Orient, July 31 (Latham); Long Beach, Sept. 5 (Sedwitz); Rye, Sept. 5 (Cruickshank).

Actitis macularia. Spotted Sandpiper.—Barnegat, April 20 (Urner); marked wave on Long Island, April 28: Bayside (Bohn); Lake Success (Rorden); Montauk (Sedwitz), etc.; Hempstead, Oct. 27 (Sedwitz).

Tringa solitaria solitaria. Eastern Solitary Sandpiper.—Lake Success, April 28 (Rorden); Speonk, July 20 to Sept. 22 (Wilcox).

Catoptrophorus semipalmatus subsp. Willet.—Idlewild, June 4 (Mayer); "Much fewer August Willet on the Jersey Coast" (Urner); New Inlet, Aug. 18 (Sedwitz); Staten Island, Aug. 24 (Knoblauch and Wiegman).

Totanus melanoleucus. Greater Yellow-legs.—Idlewild, Feb. 21-23 (Mayer); Jones Beach, June 23 (Matuszewski and Rose); 4, Hempstead, Dec. 6 (Cruickshank); 4, Tuckerton, Dec. 8 (Urner).

Totanus flavipes. Lesser Yellow-legs.—Sagaponack, April 28 (Sedwitz); "Good flight on Jersey Coast, July 27" (Urner); Wantagh, Oct. 20 (Sedwitz); Tuckerton, Dec. 1 (Urner); Sagaponack, Dec. 8 (Sedwitz); Hempstead, Dec. 18 (Cruickshank).

Calidris canutus rufus. American Knot.—3, Brigantine, Jan. 6 (Urner); 5, Barnegat, April 20 (Urner); 75, Oak Island Beach, May 26 (Sedwitz); 725 on Jersey Coast, July 27 (Urner); Barnegat, Dec. 8 (Urner).

Arquatella maritima. Purple Sandpiper.—Long Beach, Jan. 6 (Herbert, Hickey and Kuerzi); Montauk, Feb. 3 (Cobb, Gere, Murdock and Peterson); 5, Long Beach, March 20 (Janvrin); 4, Long Beach, Nov. 18 (Cruickshank); Tuckerton, Nov. 24 through December (Urner); Montauk, Dec. 22 (Lind, McKeever and Sedwitz).

Pisobia melanota. Pectoral Sandpiper.—Jones Beach, April 4 and 13 (Vogt); Grassy Sprain, Oct. 7 (Weber); Jones Beach, Nov. 14 (Mayer); Tuckerton, Dec. 1 (Urner).

Pisobia fuscicollis. White-rumped Sandpiper.—Barnegat, April 27 (Urner); 6, Oak Island Beach, April 28 (Sedwitz); Tod's Point, Nov. 10 (Cruickshank); Mecox Bay, Dec. 1 (Helmuth).

Pisobia bairdi. Baird's Sandpiper.—Jones Beach, Aug. 18 (Mangels); Newark Bay, Aug. 25 (Urner); Jones Beach, Aug. 28 (Bohn); 3, Brigantine, Aug. 30 (Loetscher); Brigantine, Aug. 31 (Urner).

Pisobia minutilla. Least Sandpiper.—Barnegat, April 20 (Urner); Oak Island Beach, June 12 (Berliner); "Southbound birds on Jersey Coast, June 29" (Urner); Idlewild, Oct. 18 (Mayer).

Pelidna alpina sakhalina. Red-backed Sandpiper.—2, Freeport, Jan. 13 (Breslau); Long Beach, Feb. 3 (Heck and Sedwitz); 1,000, Barnegat, April 20 (Urner); Southampton, July 21 (Mahnken).

Limnodromus griseus griseus. Eastern Dowitcher.—Barnegat, April 20 (Urner); Moriches Inlet, April 20 (Wilcox); Tuckerton, June 29 (Urner); 14, Jones Beach, June 30 (Cruickshank); 2, Jones Beach, Nov. 19 (Cruickshank).

Limnodromus griseus scolopaceus. Long-billed Dowitcher.—Idlewild, Aug. 24 (Mayer); Jones Beach, Sept. 1 (Matuszewski and Rose); Mr. Urner sends the following records for Jersey: Barnegat, Aug. 18; Newark Bay, Nov. 5; Tuckerton, 8 present, Oct. 6-27; one still present, Nov. 10.

Micropalama himantopus. Stilt Sandpiper.—Newark, April 28 (Urner); Sagaponack, May 25 (Helmuth); 35, Jones Beach, July 20 (Sedwitz); Jones Beach, Oct. 20 (Banner, Sedwitz and Weber).

Ereunetes pusillus. Semipalmated Sandpiper.—Oak Island, April 28 (Breslau, Carleton and Sedwitz); Newark, June 21 (Urner); Idlewild, Nov. 6 (Mayer); Jones Beach, Nov. 19 (Cruickshank); Barnegat, Dec. 22 (Urner).

Ereunetes mauri. Western Sandpiper.—Oak Island Beach, May 26 (Sedwitz); Idlewild, Oct. 29 (Mayer); Beachhaven, Nov. 4 (Urner).

Tryngites subruficollis. Buff-breasted Sandpiper.—Brigantine, Aug. 30 (Loetscher); Oakwood Beach, Sept. 8 (Wiegman and Lehrman); 51, Wantagh, Sept. 30 (Mangels).

Limosa fedoa. Marbled Godwit.—Brigantine, July 27 (Urner); Oak Island Beach, Sept. 7, 15 and Oct. 20 (Sedwitz); New Inlet, Sept. 8 (Matuszewski and Peterson); Jones Beach, Oct. 15 (Sedwitz).

Limosa haemastica. Hudsonian Godwit.—Newark, Sept. 6 (Urner); 3, Moriches Inlet, Sept. 8-19 (Cobb and Wilcox); 2, Rye, Sept. 29 (Cruickshank, Gere and Oboiko); Tuckerton, Oct. 6 (Urner); Jones Beach, Oct. 27 (Cruickshank, Walsh and Vogt).

Crocethia alba. Sanderling.—3, Long Beach, Feb. 17 (Breslau, Carleton and Sedwitz); Moriches Inlet, April 20 (Wilcox); Idlewild, June 20 (Mayer).

Recurvirostra americana. Avocet.—New Inlet, Sept. 8 (Matuszewski, Peterson and Sedwitz); Jones Beach, Oct. 20 (Cruickshank, Sedwitz and Weber); Jones Beach, Oct. 24 (Mayer); Freeport, Nov. 6 (Cruickshank).

Phalaropus fulicarius. Red Phalarope.—Barnegat, May 4 (Urner); "One found dead at Sayville, May 5, following a series of easterly storms, apparently died of starvation" (H. G. Smith); Tuckerton, Oct. 6 (Urner).

Steganopus tricolor. Wilson's Phalarope.—Newark Bay marshes, Sept. 6-12 (Urner).

Lobipes lobatus. Northern Phalarope.—2, Idlewild, Aug. 26 (Mayer); Oakwood Beach, Sept. 7 (Stephenson and Weber); 2, Newark Bay, Sept. 28 (Urner).

Stercorarius pomarinus. Pomarine Jaeger.—"Four observed on September 2 from the New London Ferry between Orient Point and Plum Island. They allowed rather close approach and I saw the peculiar central tail feathers" (Bohn).

Stercorarius parasiticus. Parasitic Jaeger.—Lower Bay, Sept. 8 (Rich); Montauk, Sept. 9 (Cobb and Wilcox); 3, Jones Beach, Sept. 15 (Sedwitz); Jones Beach, Oct. 13 (Lind).

Stercorarius longicaudus. Long-tailed Jaeger.—Montauk, Aug. 25 (Breslau); "Flying only ten feet from the boat."

Larus hyperboreus. Glaucous Gull.—Baxter Creek, Jan. 1-29 (Kuerzi and Malley); 5, Pelham Bay, Feb. 17 (Kuerzi); Idlewild, Feb. 23 (Mayer); Shark River, March 17 (Urner); Freeport, Dec. 9 (Cruickshank).

Larus leucopterus. Iceland Gull.—3, Havermyer Dump, Bronx, Jan. 17-30 (Kuerzi); 2, Coney Island, Jan. 16 (Cruickshank); 2, Inwood, Jan. 31 and Feb. 1 (Norse); Hudson River, Jan. 19 (Eaton); Montauk, Dec. 8 (Cobb, Janvrin and Peterson).

Larus marinus. Great Black-backed Gull.—Over 200, Long Beach, March 23 (Chapin); 3, Moriches Inlet, June 5 (Wilcox); fling off Sandy Hook, June 27 (Eaton).

Larus kumlieni. Kumlien's Gull.—Kings Point, Jan. 16 (Matuszewski); Baxter Creek, Feb. 12 (Cruickshank and Gere).

Larus delawarensis. Ring-billed Gull.—56, Eastern Long Island, Jan. 1 (Hel-muth); "Spring flight later than usual . . . no big flocks at Newark until April 21" (Urner).

Larus atricilla. Laughing Gull.—Rockaway, April 3 (Chapin); Tuckerton, April 7 (Urner); Central Park, April 13 (Cruickshank); 20, Sealiff, Dec. 3 (Cruickshank).

Larus philadelphia. Bonaparte's Gull.—Over 1,000 at Montauk, Jan. 2 (Hel-muth); Oakwood Beach, Aug. 24 (Knoblauch and Wiegman); Idlewild, Sept. 2 (Lind and Mayer); Darien, Conn., Dec. 22 (Brooks).

Larus minutus. Little Gull.—"A single bird of this species was studied carefully in New York Bay on April 20" (Cantor and Norse).

Rissa tridactyla tridactyla. Atlantic Kittiwake.—Long Beach, Feb. 17 (Berk-heimer and Cruickshank); Barnegat, March 24 (Urner); Montauk, Nov. 29 (B. and A. Cobb).

Sterna forsteri. Forster's Tern.—Oakwood Beach, Aug. 24 (Knoblauch and Wiegman); New Inlet, Oct. 5 (Sedwitz); 12, Newark, Oct. 12 (Urner); 2, Freeport, Nov. 8 (Cruickshank).

Sterna hirundo hirundo. Common Tern.—Freeport, May 5 (Sedwitz); nest and eggs on Oak Island Beach, May 26 (Gere and Murdock); 2, Oak Island Beach, Oct. 20 (Breslau).

Sterna dougalli dougalli. Roseate Tern.—Oak Island, July 21 (Berliner); 75, Montauk, Aug. 18 (Sedwitz); Oakwood Beach, Aug. 24 (Knoblauch and Wieg-man); Rockaway Point, Oct. 3 (Wiegman).

Sterna antillarum antillarum. Least Tern.—30, Oak Island Beach, April 28 (Breslau, Carleton and Sedwitz); many eggs, Oak Island, May 26 (Gere and Murdock); Idlewild, Sept. 16 (Mayer).

Thalasseus maximus maximus. Royal Tern.—Brigantine, Sept. 15 (Tatum).

Hydroprogne caspia imperator. Caspian Tern.—Tuckerton, July 20 (Allen); Idlewild, Sept. 3 (Mayer); 7, Barnegat, Sept. 29 (Urner); Oak Island, Sept. 15 (Sedwitz); 2, Upper Greenwood Lake, Oct. 6 (Brown).

Chlidonias nigra surinamensis. Black Tern.—Oak Island, June 12 (Berliner and Berolzheimer); 150, Bayside, Sept. 7 (Bohn); 500, Moriches Inlet, Sept. 14 (Wilcox).

Rynchops nigra nigra. Black Skimmer.—6, Oak Island, June 12 (Berliner and Berolzheimer); nest again at Oak Island (Matuszewski and Rose); 35, New Inlet, Aug. 25 (Sedwitz); 40, Moriches Inlet, Sept. 14 (Wilcox).

Alca torda. Razor-billed Auk.—Long Beach, Feb. 3 (Sedwitz).

Uria lomvia lomvia. Brunnich's Murre.—Montauk, Dec. 1 (B. and A. Cobb).

Alle alle. Dovekie.—Between Montauk and Southampton, Jan. 1 (Helmuth); dead bird found at Montauk, Dec. 22 (Carleton, McKeever and Sedwitz).

Zenaidura macroura carolinensis. Eastern Mourning Dove.—18, Westbury, Jan. 13 (Matuszewski); Caldwell, Jan. 4 (Rusling); Kensico, March 22 (Gere); nest and eggs, Rye, April 14 (Oboiko).

Coccyzus americanus americanus. Yellow-billed Cuckoo.—Oak Island, Sept. 22 (Matuszewski).

Coccyzus erythrophthalmus. Black-billed Cuckoo.—Bayside, April 28 (Sabin); Idlewild, Sept. 22 (Mayer).

Tyto alba pratincola. Barn Owl.—Pelham Bay, one young still in nest, Jan. 9 (Kassoy); Miller Place, Feb. 9 (Helme); West Caldwell, March 5 (Rusling); Prospect Park, April 4 (Cruickshank); Westhampton, Nov. 14 (Wilcox).

Otus asio naevius. Eastern Screech Owl.—2, Central Park, March 14-March 29 (Birckhead, Kuerzi and Mayr).

Bubo virginianus virginianus. Great Horned Owl.—Nest near Boonton, Feb. 12 (Brown); three young in nest on Palisades, April 14 (Herbert).

Nyctea nyctea. Snowy Owl.—Long Beach, Jan. 13 (Darrow and Watson); Oceanside, Jan. 27 (Sedwitz); Jones Beach, March 25 (Vogt); Idlewild, Oct. 20-Nov. 5 (Lind and Walker); 2, Jones Beach, Dec. 8 (Allen, Cruickshank and Eynon); Pelham Bay, Dec. 27 (Weber); Newark Meadows, Jan. 26-Feb. 10 (Urner).

Strix varia varia. Barred Owl.—One egg in nest near West Caldwell, March 2; one young and two eggs, April 14 (Cruickshank, Gere and Murdock).

Asio wilsonianus. Long-eared Owl.—Bird on nest near Caldwell, March 18 (Rusling); 2, Hunters Island, March 23 (Norse).

Asio flammeus flammeus. Short-eared Owl.—18, Newark Meadows, Jan. 26 (Urner); Chestnut Ridge, Dutchess County, April 28 (Baker and Murphy); Courtship display on Newark Meadows in early April, later two broods of young seen (Urner); 4 young, Jones Beach, June 30 (Cruickshank).

Cryptoglaux acadica acadica. Saw-whet Owl.—Miller Place, Jan. 21 (Helme); Troy Meadows, Feb. 24 (Rusling); Rye, Oct. 17 (Gere); Jones Beach, Oct. 20 (Cruickshank); Elmhurst, Nov. 6 (Beals); Hunters Island, Nov. 29-Dec. 22 (Sialis Bird Club).

Antrostomus vociferus vociferus. Eastern Whip-poor-will.—Barnegat, April 21 (Urner); Long Island City, April 22 (Beals); Prospect Park, April 30 (Cruikshank); Central Park, Oct. 5 (Birckhead); Inwood, Aug. 28 (Cantor).

Chordeiles minor minor. Eastern Nighthawk.—Nest with two young, Miller Place, June 21 (Helme); remarkable flight along Jersey Coast from Aug. 29 to Sept. 7: "Several thousand seen in short time . . . 700 over South Amboy most impressive group, Sept. 1" (Urner); partially crippled bird in Freeport, Oct. 23 (Cruikshank).

Chaetura pelagica. Chimney Swift.—Flushing, April 20 (Sabin); Riverdale, April 21 (Walsh); Van Cortlandt, April 25 (Banner, Cantor and Norse).

Megaceryle alcyon alcyon. Eastern Belted Kingfisher.—Caldwell, Jan. 5 (Rusling); Central Park, March 4 (Cruikshank).

Colaptes auratus luteus. Northern Flicker.—Arrived in Central Park, March 13 (Kuerzi); heavy flight in Central Park, March 29 (Herbert); 60, Central Park, Sept. 24 (Knoblauch).

Ceophloeus pileatus abieticola. Northern Pileated Woodpecker.—Lake Surprise, Union County, N. J., March 9 (Urner); 2, Bearfort Mountain, May 4 (Brown).

Centurus carolinus. Red-bellied Woodpecker.—Prospect Park, June 27 (Cruikshank).

Melanerpes erythrocephalus. Red-headed Woodpecker.—A number bred in Pelham Bay Park (Malley); 2 present until end of year (Hickey, Kassoy and Weber); Central Park, Sept. 7-11 (Holgate); Montauk, Sept. 9 (Cobb and Wilcox).

Sphyrapicus varius varius. Yellow-bellied Sapsucker.—Miller Place, Jan. 21 and Feb. 17 (Helme); Prospect Park, March 30 (Brennan); Central Park, Sept. 25 (Knoblauch).

Dryobates pubescens medianus. Northern Downy Woodpecker.—Jones Beach Sanctuary, Nov. 19 and Dec. 29 (Allen and Cruikshank).

Picoides arcticus. Arctic Three-toed Woodpecker.—"A female of this species was observed working on a dead pine in the Phelps's Estate, Englewood, Feb. 16" (Heck and Janvrin).

Tyrannus tyrannus. Kingbird.—Definite wide ranging wave on April 28, first spring reports from Jersey, to Chestnut Ridge, Dutchess County (Baker and Murphy); southbound migration noted at Tuckerton, July 6 (Urner); 35 migrants in Long Island pine barrens, Aug. 14 (Helme).

Tyrannus verticalis. Arkansas Kingbird.—Barnegat, Sept. 8 (Urner); Stony Brook, Sept. 12 (Helme); Moriches Inlet, Oct. 13 (Lind and Sedwitz); Barnegat, Nov. 10 (Urner); Jones Beach, Nov. 14 (Herholdt).

Myiarchus crinitus boreus. Northern Crested Flycatcher.—Feeding young, Speonk, July 13 (Wilcox); Central Park, May 2 (Cantor).

Sayornis phoebe. Eastern Phoebe.—Inwood, March 13 (Cantor); Mastic, March 16 (D. G. Nichols); Syosset, Dec. 12 (Cruickshank).

Empidonax flaviventris. Yellow-bellied Flycatcher.—Miller Place, Aug. 10 (Helme); Mrs. Beals sends the following banding records from Elmhurst: Aug. 25, 26, 27, 28, 29, 31; Sept. 1, 2, 3, 6, 7, 8, 10, 22.

Empidonax virescens. Acadian Flycatcher.—Singing bird in Central Park, May 8 (Cruickshank and Kuerzi); Bayside, Aug. 25 (Bohn and Sabin).

Empidonax trailli trailli. Alder Flycatcher.—Banded at Elmhurst, Sept. 7 and 10 (M. Beals).

Empidonax minimus. Least Flycatcher.—The following banding record from Elmhurst: May 19-23; Aug. 29-31; Sept. 9-26 (Beals).

Nuttallornis mesoleucus. Olive-sided Flycatcher.—Miller Place, Aug. 17 (Helme); Montauk, Aug. 18 (Sedwitz); Richmond Hill, Aug. 31 (Mayer).

Otocoris alpestris alpestris. Northern Horned Lark.—200, Westbury, March 17 (Matuszewski); 12, Tod's Point, April 20 (Cruickshank, Gere and Murdock); 4, Van Cortlandt, Oct. 9 (Banner and Kramer); 300, Bayside, Nov. 3 (Bohn).

Otocoris alpestris praticola. Prairie Horned Lark.—Westbury, Jan. 13 and March 17 (Matuszewski); Tod's Point, March 10 (Cruickshank and Gere); Newark Meadows, July 14 (Urner).

Iridoprocne bicolor. Tree Swallow.—Troy Meadows, March 16 (Edwards); hundreds in same locality on March 24 (Cruickshank, Gere and Murdock); 14,000, Idlewild, Sept. 22 (Mayer); Oakwood Beach, Nov. 16 (Cantor and Norse).

Stelgidopteryx ruficollis serripennis. Rough-winged Swallow.—Ridgewood, March 31 (Walsh); Metedeconck, April 7 (Urner); Kensico, April 19 (Gere); Miller Place, Sept. 6 (Helme).

Hirundo erythrogaster. Barn Swallow.—2, Shinnecock, March 31 (Latham); Idlewild, Oct. 19 (Mayer); Jones Beach, Nov. 14 (Herholdt).

Petrochelidon albifrons albifrons. Northern Cliff Swallow.—Metedeconck, April 7 (Urner).

Progne subis subis. Purple Martin.—Rye, April 4 (Oboiko); Blairstown, April 7 (Edwards); Millneck, April 28 (Matuszewski and Rose); six pair nested at Rocky Point, Long Island (Helme).

Cyanocitta cristata cristata. Blue Jay.—“Flight of hundreds,” Central Park, Sept. 30 (Knoblauch); twenty in with a flock of 500 crows over Jones Beach, Nov. 19 (Cruickshank).

Pica pica hudsonia. American Magpie.—General reports indicate a light invasion in the eastern United States: One bird discovered in the Van Cortlandt Marsh, Oct. 31 (Sialis Bird Club) and remained until Dec. 22 (Cruickshank); a single bird flying over Rye, Dec. 21 (Cruickshank); specimen collected at Bear Mountain, Nov. 14 (Carr).

Corvus brachyrhynchos brachyrhynchos. Eastern Crow.—Definite flight from the southwest towards the northeast over Westchester all day, March 3 (Cobb, Gere and Murdock); 76 over Bronx Park, March 3 (Malley).

Corvus ossifragus. Fish Crow.—7, Westbury, Jan. 16 (Matuszewski); 40 wintered at Baxter Creek (Kuerzi and Malley); Troy Meadows, March 17 (Rusling); 15, Jones Beach, Nov. 14 (Mayer).

Penthestes atricapillus atricapillus. Black-capped Chickadee.—Strangely absent during the winter of 1934-35 around New York City where it is usually a common winter resident.

Baeolophus bicolor. Tufted Titmouse.—One pair bred along the Pelham Manor-Bronx line: 3 still present, Dec. 15 (Hickey, Schmidt and Weber); Massapequa, June 30 (Cruickshank and Murdock); Scarborough, Aug. 14 (Mrs. Slaker).

Sitta canadensis. Red-breasted Nuthatch.—Miller Place, Feb. 2 (Helme); excellent autumn migration; 5, Mastic, Sept. 7 (J. T. Nichols); 12, Jones Beach, Oct. 27 (Gere, Knoblauch and Vogt).

Certhia familiaris americana. Brown Creeper.—Van Cortlandt, May 2 (Cantor, Stephenson and Weber); a singing bird at Alpine, New Jersey, June 28 (Cantor).

Troglodytes aedon aedon. House Wren.—Hempstead, April 14 (Chapin); Miller Place, April 17 (Helme); bred in Central Park for the first time in many years and raised three young (Rich).

Nannus hiemalis hiemalis. Eastern Winter Wren.—Central Park, May 7 (Kuerzi).

Thryothorus ludovicianus ludovicianus. Carolina Wren.—3, Barnegat, March 17, first since Feb. 1934 . . . "became somewhat re-established during the year" (Urner); Oyster Bay, April 8 (Swope); Greenwich, April 28 (Brooks).

Telmatodytes palustris palustris. Long-billed Marsh Wren.—"In song," Jones Beach, April 21 (Vogt).

Cistothorus stellaris. Short-billed Marsh Wren.—Jones Beach, Jan. 6 (Herbert, Hickey and Kuerzi); Barnegat, April 14 (Urner); 20, Croton Point, May 12 (Cobb, Gere and Murdock); nested at Idlewild (Mayer).

Mimus polyglottos polyglottos. Mockingbird.—Montauk, Jan. 6 (Sedwitz); Bayonne, March 3 (Eaton); Woodmere, April 4 to 21 (Berliner and Adelberg); Jones Beach, Aug. 28 (Bohn); Rye, Dec. 22 (Herbert and Oboiko).

Dumetella carolinensis. Catbird.—Bronx Park, Jan. 2 to 12 (Gere and Cruickshank); Miller Place, April 20 (Helme); Bronx Park, Dec. 21 (Hickey); Jamaica, Dec. 16 to 22 (Knorr).

Toxostoma rufum. Brown Thrasher.—Islip, Feb. 2 (Bohn); Jones Beach, April 21 (Vogt); Bronx Park, Dec. 22 (Allen, Kramer and Lehrman); Jamaica, Dec. 26 (Knorr).

Hylocichla mustelina. Wood Thrush.—Rye, April 28 (Cobb and Cruickshank); Idlewild, April 28 (Mayer); Central Park, Oct. 12 (Cantor); Montauk, Oct. 13 (Lind).

Hylocichla guttata faxoni. Eastern Hermit Thrush.—Caldwell, Jan. 5 (Rusling); Bayville, March 31 (Bohn); four singing birds during July near Quogue (Cobb); Elmhurst, Sept. 23 (Beals).

Hylocichla minima aliciae. Gray-checked Thrush.—Bronx Park, April 27 (Banner, Cantor and Weber); the following banding records from Mrs. Beals at Elmhurst: May 13 to 28; Sept. 24 to Oct. 9.

Hylocichla minima minima. Bicknell's Thrush.—The following banding records from Mrs. Beals at Elmhurst: May 27; Sept. 10, 12, 14, 22, 23, 24, 25, 26, 28, 29, 30; Oct. 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14. One picked up dead at Barneгат, Sept. 29 (Urner).

Hylocichla fuscescens fuscescens. Veery.—Woodmere, April 22 (Chapin); Hewlett, April 22 (Mayer); Westbury, Sept. 7 (Matuszewski).

Sialia sialis sialis. Eastern Bluebird.—12, Kensico, Jan. 5 (Gere); 4, Montauk, Jan. 6 (Sedwitz); spring flight in Westchester, March 10 (Gere and Cruickshank).

Poliptila caerulea caerulea. Blue-gray Gnatcatcher.—Millneck, April 21 (Harrower and Rand); Barnegat, April 21 (Brown); Bayside, Aug. 24 and 30 (Bohn); Central Park, Sept. 17 (Weber).

Regulus satrapa satrapa. Golden-crowned Kinglet.—Jones Beach, March 24 (Vogt); a decided flight in Westchester, March 31 (Gere).

Corthylio calendula calendula. Eastern Ruby-crowned Kinglet.—Prospect Park, March 30 (Brennan); first Central Park wave, April 16 (Knoblauch, Kuerzi and Mayr); Grassy Sprain, Dec. 22 (Heck, Mayr and Phillips).

Anthus spinoletta rubescens. American Pipit.—30, Idlewild, Jan. 7 (Mayer); Troy Meadows, March 17 (Rusling); Oak Island, Sept. 22 (Matuszewski); Grassy Sprain, Oct. 13 (Knoblauch); over 500, Hicksville, Oct. 16 (Cruickshank).

Bombycilla cedrorum. Cedar Waxwing.—16, Idlewild, Jan. 16 (Mayer); 12, Miller Place, Feb. 5 (Helme); 18, Central Park, Sept. 17 (Knoblauch); Saw Mill River Valley, Dec. 22 (Solotar and Thomas).

Lanius borealis borealis. Northern Shrike.—Kensico, Jan. 27 to Feb. 9 (Gere and Kuerzi); Amaganset, Feb. 3 (Farley, Kuerzi and Matuszewski); Barnegat, March 7 (Urner and Vogt); Montauk, March 10 (Sedwitz); Riverhead, Nov. 24 (Cruickshank).

Lanius ludovicianus migrans. Migrant Shrike.—Westchester, April 5 (Cruickshank); Montauk, Aug. 18 (Sedwitz); Floral Park, Aug. 23 (Lind); Newark, Sept. 2 to 12 (Urner); Freeport, Oct. 23 (Cruickshank).

Vireo griseus griseus. White-eyed Vireo.—Bronx Park, April 29 (Gell-Mann); "A singing bird at Kent, Connecticut, June 15 to July 6 . . . probably a slight northern extension of the bird as a breeder" (Kuerzi); Freeport, Oct. 15 (Cruickshank).

Vireo flavifrons. Yellow-throated Vireo.—Bronx Park, May 2 (Weber); Bayside, Sept. 2 (Bohn).

Vireo solitarius solitarius. Blue-headed Vireo.—Bronx Park, April 15 (Malley); Stamford, April 20 (Gere and Murdock); Central Park, June 2 (Sedwitz); Elmhurst, Nov. 1 (Beals).

Vireo olivaceus. Red-eyed Vireo.—Bronx Park, May 4 (Weber); Speonk, Oct. 17 (Wilcox); Bayside, Nov. 1 (Bohn).

Vireo philadelphicus. Philadelphia Vireo.—Grassy Sprain, May 11 (Weber).

Vireo gilvus gilvus. Eastern Warbling Vireo.—Easthampton, June 28 to 30 (Helmuth); recommenced singing in Rye during last days of September, present to Oct. 13 (Cruickshank and Gere).

Mniotilta varia. Black and White Warbler.—Millneck, April 21 (Harrower and Rand); Freeport, Nov. 8 (Cruickshank).

Helmitheros vermivorus. Worm-eating Warbler.—Bronx Park, May 4 (Cantor); one of most abundant warblers on Elmsford Ridge, May 12 (Cobb, Gere and Murdock); Jones Beach, May 26 (Cruickshank).

Vermivora chrysoptera. Golden-winged Warbler.—Woodmere, May 5 (Lind and Sedwitz); Bayside, Sept. 1 (Bohn); Kensico, Oct. 6 (Cruickshank and Gere).

Vermivora pinus. Blue-winged Warbler.—Bayside, April 28 (Sabin); Bronx Park, April 28 (Gell-Mann).

Vermivora leucobronchialis. Brewster's Warbler.—Bronx Park, April 28 (Gell-Mann); Bronx Park, Sept. 27 (Stephenson).

Vermivora peregrina. Tennessee Warbler.—Kissena Park, May 19 (Sedwitz); Central Park, May 21 (Knoblauch and Kuerzi); Idlewild, Sept. 3 (Mayer).

Vermivora celata celata. Orange-crowned Warbler.—3, Old Greenwich, Jan. 6 (Cruickshank, Gere and Murdock); Bronx Park, Sept. 17 (Weber); Elmhurst, Oct. 22 (Beals).

Vermivora ruficapilla ruficapilla. Nashville Warbler.—Westchester, April 28 (Cobb, Gere and Murdock); "A singing bird at Briarcliff, June 20 (Eaton); Herrick, Aug. 24 (Lind and Rose); Central Park, Nov. 9-11 (Birckhead).

Compsothlypis americana pusilla. Northern Parula Warbler.—Bronx Park, April 26 (Sialis Bird Club); Millneck, April 28 (Matuszewski and Rose); a singing bird at Mastic, June 23 (J. T. Nichols).

Dendroica aestiva aestiva. Eastern Yellow Warbler.—Mt. Sinai, April 27 (Walker); Bronx Park, April 27 (Cantor and Weber); "Migrants passing through Westbury, Aug. 6" (Matuszewski).

Dendroica magnolia. Magnolia Warbler.—Bronx Park, May 4 (Cantor and Stephenson); Idlewild, Oct. 15 (Mayer).

Dendroica tigrina. Cape May Warbler.—Central Park, May 10 (Knoblauch and Kuerzi); Woodmere, May 19 (Sedwitz); Miller Place, Aug. 24 (Helme); Rosedale, Sept. 17 (Mayer).

Dendroica caerulescens caerulescens. Black-throated Blue Warbler.—Bronx Park, April 27 (Sialis Bird Club); Lake Success, April 28 (Rorden); Inwood, June 12 (Norse); Rye, Nov. 10 (Cruickshank).

Dendroica coronata. Myrtle Warbler.—4, Rye, Sept. 3 (Cruickshank and Gere).

Dendroica virens virens. Black-throated Green Warbler.—Webbs Mills, June 8 (Urner); Mt. Kisco, June 11 (Fry); Belleterre, June 21 (Helme); 2, Inwood, Nov. 1 (Norse); Rye, Nov. 10 (Cruickshank).

Dendroica fusca. Blackburnian Warbler.—Lake Success, April 28 (Rordan); Bronx Park, April 30 (Kramer, Malley and Weber); Idlewild, Sept. 11 (Mayer).

Dendroica dominica dominica. Yellow-throated Warbler.—Troy Hills, New Jersey, May 5 (E. and M. Rich).

Dendroica pensylvanica. Chestnut-sided Warbler.—Bronx Park, April 27 (Cantor and Weber); nest and eggs at Miller Place, June 21 (Helme).

Dendroica castanea. Bay-breasted Warbler.—Staten Island, May 5 (Hickey and Kuerzi); Jones Beach, May 12 (Lind and Sedwitz); Kensico, Oct. 6 (Cruickshank and Gere).

Dendroica striata. Black-poll Warbler.—Idlewild, "to June 8" (Mayer); Speonk to June 17 (Wilcox).

Dendroica pinus pinus. Northern Pine Warbler.—Phelps Estate, March 30 (Janvrin); Bronx Park, March 30 (Malley); Miller Place, singing bird present during June (Helme); Easthampton, Dec. 1 (Helmuth).

Dendroica discolor discolor. Prairie Warbler.—Bronx Park, April 20 (Weber); 2, Bedford Hills, June 11 (Fry); Mt. Sinai, June 22 (Walker).

Dendroica palmarum palmarum. Palm Warbler.—Idlewild, Sept. 7 (Mayer); Inwood, Dec. 4 (Karsch); 9, Montauk, Dec. 22 (Carleton, McKeever and Sedwitz).

Dendroica palmarum hypochrysea. Yellow Palm Warbler.—Clason Point, Jan. 15 (Malley); Barnegat, March 17 (Urner); Bronx Park, April 15 (Banner and Norse); Bayside, Nov. 8 (Sabin).

Seiurus aurocapillus. Oven-bird.—Central Park, April 27 (Cruickshank and Kuerzi); Inwood Park, Dec. 17-21 (Karsch and Norse).

Seiurus noveboracensis. Northern Water-thrush.—Kensico, April 21 (Cruickshank and Gere); Riverdale, New Jersey, April 21 (Walsh); Orient, July 26 (Latham); Idlewild, Oct. 15 (Mayer).

Seiurus motacilla. Louisiana Water-thrush.—Bronx Park, April 15 (Norse and Weber); Millneck, April 19 (Harrower and Rand); Westbury, Sept. 10 (Matuszewski).

Oporornis formosus. Kentucky Warbler.—Grassy Sprain, May 26 (Banner and Weber); Montclair, May 30 (Eaton); 2 pair, Elmsford, June 9 (Hickey).

Oporornis agilis. Connecticut Warbler.—Idlewild, Sept. 21 (Mayer); "Two adult males at Idlewild on October 31st are very late. These birds were very carefully studied in good light for a half hour. All field marks noted, including the grayish hood, white eye-ring, and yellow under tail coverts. The birds were in an aster-over-grown swamp" (Mayer).

Oporornis philadelphia. Mourning Warbler.—Easthampton, May 25 (Helmuth); Central Park, May 27 (Knoblauch and Kuerzi); Elizabeth, June 10 (Urner); Inwood, Aug. 28 (Cantor); Bronx Park, Oct. 7 (Weber).

Geothlypis trichas brachidactyla. Northern Yellow-throat.—Barnegat, April 7 (Urner); Miller Place, Nov. 26 (Helmuth); Speonk, Dec. 10-15 (Wilcox).

Icteria virens virens. Yellow-breasted Chat.—Elmhurst, Oct. 14 to 27 (Beals).

Wilsonia citrina. Hooded Warbler.—Jones Beach, May 12 (Sedwitz); Bayside, Aug. 24 (Bohn).

Wilsonia pusilla pusilla. Wilson's Warbler.—Bronx Park, May 4 (Gellmann); Bayside, Aug. 24 (Bohn); Elmhurst, Oct. 17 (Beals).

Wilsonia canadensis. Canada Warbler.—Miller Place, Aug. 9 (Helme); Inwood, Nov. 13 (L. N. Nichols).

Setophaga rusticilla. American Redstart.—Idlewild, June 5 (Mayer); 2, Westbury, Aug. 9 (Matuszewski).

Passer domesticus domesticus. House Sparrow.—Nest with four eggs as early as March 23, Prospect Park (Cruickshank).

Dolichonyx oryzivorus. Bobolink.—Ninety-three pair in the Newark Marshes during June (Urner); nesting near Freeport, Long Island (Matuszewski and Rose); migrants at Secaucus, July 7 (Eaton).

Agelaius phoeniceus phoeniceus. Eastern Red-winged Blackbird.—Seventy-five in the Van Cortlandt Marsh all winter (Bronx County Bird Club); twenty bright males in Troy Meadows, Feb. 10 (Cobb, Gere and Murdock); 80, Idlewild, Feb. 12 (Mayer); heavy flight over Central Park, March 13 (Cruickshank).

Icterus spurius. Orchard Oriole.—Glen Cove, June 2 (Fry); Roslyn, June 13 (Fry); Westbury, June 16 (Matuszewski and Rose).

Icterus galbula. Baltimore Oriole.—A single male bird wintered at Huntington (Swope).

Euphagus carolinus. Rusty Blackbird.—Flock in Central Park, March 13 (Cruickshank); several hundred in Troy Meadows, March 24 (Gere and Murdock); 1,100, Inwood, Nov. 13 (L. N. Nichols).

Quiscalus quiscula quiscula. Purple Grackle.—Central Park, March 4 (Cruickshank); Caldwell, March 8 (Rusling); 700, Orient, March 16 (Breslau and Sedwitz); Garden City, Dec. 2-8 (J. T. Nichols).

Quiscalus quiscula aeneus. Bronzed Grackle.—Bronx Park, Jan. 12 (Cruickshank and Gere); Inwood, March 13 (L. N. Nichols); Passaic Valley, March 31 (Brown).

Molothrus ater ater. Cowbird.—Twenty-four at Croton Point, Jan. 13 (Gere and Murdock); 80, Shinnecock, Feb. 3 (Kuerzi and Matuszewski); one young Cowbird being fed by Red-eyed Vireo in Inwood Park (Mayr).

Piranga erythromelas. Scarlet Tanager.—Idlewild, Oct. 15 (Mayer).

Piranga rubra rubra. Summer Tanager.—Bayside, Sept. 7 (Bohn); Oyster Bay, Sept. 7 (Swope).

Richmondia cardinalis cardinalis. Eastern Cardinal.—Hastings during January and February (Cruickshank and Gere); Central Park, March 27 (Rich); Miller Place, April 19 (Helme); Jones Beach, May 27 (Vogt); Central Park, July 19-Aug. 7 (Rich).

Hedymeles ludovicianus. Rose-breasted Grosbeak.—Dutchess County, April 28 (Baker and Murphy); Demarest, April 28 (Bowdish); Bronx Park, April 29 (Stephenson and Weber).

Passerina cyanea. Indigo Bunting.—Central Park, April 18 (Rich); St. James, Long Island, May 1 (Lane); nest with four Bunting eggs and one Cowbird egg, Elmsford, June 15 (Gere); Mt. Sinai, Aug. 13 (Helme and Walker).

Carpodacus purpureus purpureus. Eastern Purple Finch.—Scarce all during January and February. Present in Rye all through June (Cruickshank and

Oboiko); pair, Glen Cove, June 6 (Fry); Mt. Sinai, June 22 (Walker); Central Park, Sept. 30 (Knoblauch).

Carduelis carduelis britannica. British Goldfinch.—Jamaica, Jan. 5 (Knorr); Inwood, March 6 (Norse); 2, Garden City, April 4 (D. G. Nichols); nest with two young, Garden City, June 14 (J. T. Nichols); 2, Jones Beach, Nov. 19 (Cruickshank).

Acanthis linaria linaria. Common Redpoll.—Rocky Point, Long Island, Jan. 29 (Helme); Montauk, Dec. 8 (Breslau and Sedwitz); 13, Van Cortlandt, Dec. 22 (Cantor, Cruickshank and Norse); 2, Westchester, Dec. 22 (Phillips).

Spinus pinus pinus. Pine Siskin.—Garden City, April 8 (D. G. Nichols); Bearfort Mountain, May 4 (Brown); 20, Kensico, Oct. 6 (Cruickshank and Gere); 80, Jones Beach, Oct. 27 (Matuszewski and Sedwitz).

Loxia curvirostra. Red Crossbill.—20, Central Park, Long Island, Dec. 15 (Breslau).

Loxia leucoptera. White-winged Crossbill.—10, Central Park, Long Island, Dec. 15 (Breslau).

Pipilo erythrophthalmus erythrophthalmus. Red-eyed Towhee.—Baxter Creek, Jan. 1-15 (Malley); Miller Place, Feb. 12 (Helme); Kensico, April 19 (Gere); 400 near Speonk during middle of July (Wilcox); 3, Westchester, Dec. 22 (Orth).

Passerculus princeps. Ipswich Sparrow.—Idlewild, Jan. 9, through March 26 (Mayer); Newark, Jan. 27 (Urner); Barnegat, April 21 (Brown); Oak Island Beach, Oct. 20 (Weber).

Passerculus sandwichensis savanna. Savannah Sparrow.—Central Park, March 30 (Mayr); Van Cortlandt, March 30 (Norse); 20 pair breeding at Orient (Latham); 125 pair in Newark Marshes during June (Urner).

Ammodramus savannarum australis. Eastern Grasshopper Sparrow.—Staten Island, April 28 (Weber); 19 pair breeding on Newark Marshes (Urner); Montauk, Oct. 13 (Lind); Idlewild, Oct. 23 (Mayer).

Passerherbulus henslowi susurrans. Eastern Henslow's Sparrow.—15, Barnegat, April 14 (Urner); Jones Beach, May 26 (Sedwitz); Mastic, July 27 (Cobb and Wilcox); Van Cortlandt, Oct. 7 (Weber).

Ammospiza caudacuta subvirgata. Acadian Sharp-tailed Sparrow.—Jones Beach, Oct. 20 (Banner and Sedwitz); Freeport, Nov. 16 (Cruickshank); Idlewild, Dec. 2 (Mayer); Baychester Marshes, Dec. 15 and 22 (Hickey, Stephenson and Weber).

Ammospiza caudacuta caudacuta. Sharp-tailed Sparrow.—Nest with four eggs, Moriches Inlet, June 14 (Wilcox); Jones Beach, Dec. 8 (Cruickshank); Baychester Marshes, Dec. 22 (Hickey, Stephenson and Weber).

Ammospiza caudacuta nelsoni. Nelson's Sparrow.—Piermont, Dec. 22 (Matuszewski, Eynon and Van Deusen): "Excellently seen and almost caught in the hand: sharply contrasted back markings, much buffy below, unstreaked breast; carefully checked time after time again in good light." Probably the same bird seen in exactly the same place on Dec. 29 and carefully studied (D. and R. Deed): "Studied within fifteen feet."

Ammospiza maritima maritima. Northern Seaside Sparrow.—3, Gilgo, April 28 (Breslau, Carleton and Sedwitz); present at Idlewild up to Oct. 29 (Mayer).

Poocetes gramineus gramineus. Eastern Vesper Sparrow.—Kensico, March 10 (Cruickshank and Gere); 30, Riverhead, Aug. 7 (Wilcox); Jamaica, Nov. 24 (Knorr); Wainscott, Dec. 1 (Helmuth).

Chondestes grammacus grammacus. Eastern Lark Sparrow.—Brigantine, Aug. 12-18 (Lehrman); Tuckerton, Sept. 29 (Urner); Idlewild, Nov. 8 to 13 (Mayer).

Junco hyemalis hyemalis. Slate-colored Junco.—Singing flocks commenced passing through Central Park, March 4 (Cruickshank); Kensico, May 12 (Cobb and Gere); Oyster Bay, Aug. 26 (Swope).

Spizella arborea arborea. Eastern Tree Sparrow.—Bayville, April 27-29 (Bohn and Sabin); arrived in marked wave on Nov. 3.

Spizella passerina passerina. Eastern Chipping Sparrow.—Caldwell, Jan. 4 (Rusling); Central Park, March 30 (Cruickshank); Prospect Park, March 31 (Brennan); Miller Place, Nov. 24 (Helme).

Zonotrichia querula. Harris's Sparrow.—Troy Meadows, May 7 (Elliot, Janvrin and Tucker).

Zonotrichia leucophrys leucophrys. White-crowned Sparrow.—Bronx Park, Jan. 12, 18, 19 (Gere, Gibson and Cruickshank); marked wave in Central Park, May 21 (Kuerzi); Tod's Point, Oct. 13 (Brooks and Gere).

Zonotrichia albicollis. White-throated Sparrow.—Scarce in late winter; spring migration later than usual. Central Park, May 27 (Knoblauch); a singing bird in Secaucus, July 7 (Eaton).

Passerella iliaca iliaca. Fox Sparrow.—Singing flocks in Central Park, March 4-14 (Cruickshank and Kuerzi); Kensico, Oct. 6 (Cruickshank and Gere).

Melospiza lincolni lincolni. Lincoln's Sparrow.—Millneck, April 21 (Harrower and Rand); banded at Jones Beach, May 4 (Vogt); banded at Elmhurst, May 4, 20, 25, 26, 28; Oct. 17 (Beals).

Calcarius lapponicus lapponicus. Lapland Longspur.—25, Newark, Jan. 6 (Urner); 2, Rye, Feb. 4 (Cruickshank and Oboiko); present on Newark Marshes to April 6 (Urner); Freeport, Oct. 23 (Cruickshank); Van Cortlandt, Nov. 6 (Weber).

Plectrophenax nivalis nivalis. Snow Bunting.—Bronx Park, Jan. 23 (Ephram); 2, Orient, March 30 (Latham); Jones Beach, Oct. 26 (Gell-Mann).

Notes from Field and Study

Intimidation Display in the Eastern Meadowlark (*Sturnella magna*)—On May 7, 1937, at 8:50 A.M., on a *Spartina patens* marsh near Fortesque, N. J., I observed an interesting exchange of displays by two male Meadowlarks. They had been feeding in the recently mowed grass, some distance east and west of my blind, which was apparently on the boundary between their territories. In the course of their feeding they approached to within a few yards of each other. Then, silently, so far as I could tell, they walked still closer to each other, stopping every few inches to stretch the tips of their beaks skyward. This pose they would hold, a second or two.

As they drew nearer, they turned their backs, from time to time, and flashed their white rectrices by flicking them apart and together; the effect was as if a semaphorist should, as briefly as possible, signal a series of N's. When they were separated by only 15 or 20 feet, they would hop into the air, back to, with rectrices flashing. After a few minutes of this—Willetts claimed most of my attention and I did not carefully time the Meadowlarks, though their performance surely took less than 6 minutes—they seemingly tired of the performance and drifted apart again. The flashing diminished in frequency and intensity as the distance between them increased.

No females had been observed and since this was the seventh day I had spent in the blind, it seemed probable both the displaying birds—seen repeatedly—were unmated.—WILLIAM VOGT.

Another Six Egg Clutch of the Song Sparrow—Mrs. Margaret M. Nice, in her recent paper, "Studies of the Life History of the Song Sparrow," states that she found in only one instance the Song Sparrow laying six eggs in one clutch in her region (Columbus, Ohio).

On June 10, 1937, while on a field trip near Newfoundland, New Jersey, Myron Mittleman and I stumbled over a nest of the Eastern Song Sparrow (*Melospiza melodia melodia*) with six eggs. On further examination all the eggs proved to be those of the Eastern Sparrow with no Cowbirds eggs among them.

Unfortunately, nothing is known of the history of this clutch. In the case described by Mrs. Nice the first and second nests of the particular bird had come to grief, which leads Mrs. Nice to this explanation:

"As to the six egg set, I believe this was in the nature of a combination of the second and third set, somewhat as with a young bird the fourth egg that normally goes with the first set sometimes appears in the second." (Page 109.)

She continues further by adding:

"I believe that this phenomenally large set had some eggs in it that should have been laid in the second set." (Page 110.)

The date of the laying of the third set by the Ohio bird was May 23 or 24, 1933. It is quite possible that my Song Sparrow had a similar history because of the late date that it was discovered, although there did not appear to be any destroyed or deserted nests in the immediate vicinity. Unfortunately, I was unable to return to Newfoundland and learn the subsequent history of this interesting nest.—HOWARD KRASLOW.

The Black-backed Gull as a Predator—On January 1, 1936, with Allen Thomas, and Hobart van Deusen, I witnessed the rather unique spectacle of a Great Black-backed Gull killing and eating an adult male Red-breasted Merganser, off Tod's Neck, Conn. The combat took place about a quarter of a mile off shore. The Sound was very calm, and with the use of a 60 power telescope, a fairly accurate observation was obtained.

The few scattered flocks of scoters, goldeneyes, and sheldrake had been checked over, when a scream of a Black-backed Gull drew our attention to a flock of mergansers, at which the gull was diving. Instinctively rather than consciously, and with the naked eye I watched the outcome, which ordinarily results in the ducks diving or scattering, and the gull flying off.

This time, however, a struggle ensued, a general commotion among the flock, which took wing, leaving two birds beating and flapping their wings. With the binoculars it became evident that the gull had a firm grip on the duck, which was making frantic efforts to get away by flying rather than diving. Within perhaps less than a half-minute the merganser's wing flapping was becoming much slower, the grip of the gull was apparently paralyzing in some way. By the time the telescope was trained on the pair the paralysis was almost complete. Very shortly the gull released its grip on the back, and the duck remained motionless. Next the gull administered three or four powerful, and vicious blows with its beak on the sheldrakes neck and head, which dropped perceptibly. A few more vicious pecks by the gull concluded the kill. The body of duck floated belly up with the head submerged, and the killer vigorously began tearing at the entrails. When we left some fifteen minutes later, the gull was still feeding.

From the speed and efficiency with which the Black-backed Gull dispatched the merganser, it would seem safe to say that it was not the first such encounter. Just how the paralyzing was effected, remains problematic. Unfortunately we did not observe the initial strike, which may have been instrumental in the final result. However, what we do know is that the duck was very active and lively immediately following the first blow.

No doubt the element of surprise was greatly to the gull's advantage, for a duck under ordinary conditions would not associate the Black-backed Gull as a killer. This fact is borne out when we read in Forbush's *Birds of New England* the account of the actions of coots which were preyed upon by Black-backed Gulls. Their normal instinct to dive and avert danger entirely left them when

pursued by these gulls. They kept above the water, and made easy targets for the killers.

That this gull will kill and eat incapacitated ducks is well known. The importance of this observation lies in the fact that the merganser was apparently a perfectly healthy bird.—RICHARD G. KUERZI.

Additional Notes from Litchfield Co., Conn.—To secure new information on the distribution of certain Canadian species in Connecticut, we undertook another survey of northern Litchfield County between May 29 and June 1, 1936. Interesting records of the following species were obtained:

Prairie Horned Lark (*Otocoris alpestris praticola*).—One pair on field on Skiff Mt. (May 30). No sign of nest or young.

Brown Creeper (*Certhia familiaris americana*).—Nest with 6 young found at Sharon Spruce Bog (1,400 feet altitude) (McClellan property) on May 30, 1936. The nest was about 3 feet from the ground under the loose bark of a dead tree. This seems to be the first definite nesting record of the Brown Creeper for Connecticut.

Golden-crowned Kinglet (*Regulus satrapa*).—One pair observed at the Sharon Spruce Bog on May 30. This is the second Connecticut locality (see *Proc. Linn. Soc., N. Y.*, No. 43/44, p. 3, 7).

Winter Wren (*Nannus h. hiemalis*).—A single singing male observed for $\frac{3}{4}$ hour in the Canaan Mt. Hemlock Gorge on May 31. The bird moved about a great deal and gave no evidence of nesting.

Myrtle Warbler (*Dendroica coronata*).—On May 31 a singing male was observed at Lower Doolittle Pond and on June 1 another bird in the hill country southwest of Winchester. Neither bird seemed to be nesting although the dates are unusually late for stagers of this species.

Northern Parula Warbler (*Dendroica americana pusilla*).—One bird near the shore of Highland Lake (Winsted) on June 1. The species has previously been recorded from this locality.—ERNST MAYR, JOHN AND RICHARD KUERZI.

On the Nesting of the Black Skimmer in New York State—Our attention has been called by Wm. Vogt to an apparent error which appears in "The Ornithological Year 1934" (*Proc. Linn. Soc.*, No. 47, p. 107) wherein *Rynchops nigra nigra*, the Black Skimmer, is mentioned as having previously been recorded among the breeding birds of the state. A nest of this species was found off Fisher's Island, N. Y., on August 11, 1919, by Mr. Charles C. Manmer, a veteran egg-collector of East Hartford, Conn. In compiling his material for *Birds of the New York City Region*, Ludlow Griscom heard that but one egg had been laid by the birds and that this egg was in Mr. Hanmer's possession. He accordingly wrote Mr. Hanmer asking that the egg be sent to the American Museum for

complete verification of the record. This Mr. Hanmer refused to do, and Mr. Griscom was justified in giving such a freak occurrence no further consideration.

In a correspondence with those observers who have worked the eastern part of Long Island, Wilcox subsequently resurrected this report and Mr. Hanmer wrote to him as follows: "Regarding the Black Skimmer I would say that the single pair of these birds was all that I ever saw at any time around Fisher's Island. The first time I saw them was probably two or three weeks before collecting the egg on August 11, 1919, on Flat Hummock, one-half mile just off to the north of Fisher's Island. . . . I had spent parts of two seasons in Florida where I became well acquainted with these birds. Thus I was able to recognize the birds at first sight. Flat Hummock is a small sand spit, so that when Mrs. Hanmer and I rowed out to it, it was impossible not to see the bird sitting on the single egg. The location was carefully checked and upon walking to the place from where the bird flushed the egg was very easily found. This bird is too characteristic to be confounded with any other bird that I ever saw. The egg was not sent to the American Museum as I did not want to risk breakage or losing it. . . . The lateness of the find has always seemed queer to me. . . . Certainly I was very much surprised to find the pair at Fisher's Island." Mr. H. L. Ferguson has also written Wilcox that the Skimmers were seen by "all of us throughout the season."

Since the psychology of egging has been brought out but recently, modern ornithologists can appreciate Mr. Hanmer's motives for keeping his egg much better than Mr. Griscom could at the time. East Hummock, lying as it does off the main portion of Fishers, is in the opinion of R. P. Allen, ecologically suitable for the species. The date, which years ago must have been inexplicable, takes on added interest today when the normal nesting season of the Skimmer on Long Island is readily discernible. Bent gives dates for Virginia from June 2 to July 26 as the extremes for full clutches, adding that this is one of the last sea birds to lay. At Moriches Inlet where Skimmers now nest, of four nests found by Wilcox on July 31, 1936, all contained eggs, while one nest contained two eggs and two freshly hatched young. A check on August 15 showed still more young only just hatched.

The fact that Mr. Hanmer secured his egg with no conception of its documentary value does not in our mind cancel the authenticity of his observation, and we believe that in view of the above evidence his aberrant nesting record should now be accepted in the literature of our local avifauna.—JOS. J. HICKEY AND LEROY WILCOX.

Migrating Gannets—On the afternoon of March 26, 1936, while observing a decided northward migration of Gannets (*Moris bassana*) off the shore of Jones Beach, Long Island, I thought it might be interesting to see just what percentage of the passing birds were adults and what percentage were immature. Very careful scrutiny for the next two and one-half hours revealed

that of the 107 Gannets counted 76 were adult birds, 17 were mottled immature birds and 14 were intermediate representatives with the black and white patchwork appearance. These figures themselves seemed of little importance until April 30th when I chanced to observe another heavy flight of Gannets off New Inlet further east on Long Island and found that on this particular afternoon of 214 Gannets counted, 147 were immature birds, 31 were in the black and white stage and only 36 were apparently full adults. An analysis of the figures obtained on these two occasions leads one to believe that the majority of adult Gannets move forward early in the Spring while only a few of the old birds linger late enough to be caught in with the definite flight of immature Gannets towards the end of the migration period for this species.

A contention built solely on two days observations is admittedly open to question but nevertheless it allows room for thought. If field observers would keep tabulations on not alone the number of birds seen on a single trip but, if possible, the age and sex ratios, in a few decades many interesting facts concerning migration could be definitely established.—ALLAN D. CRUICKSHANK.

Report of the Secretary of the Linnaean Society of New York For the Year 1935-1936

The Linnaean Society has held during the past year 16 regular meetings, 4 informal summer meetings and 7 ornithological seminars. The average attendance at the regular meetings was 29.8 members and 31.3 guests. The average attendance at the informal meetings was 13.5 members and 10.25 guests.

The papers presented were as follows:

March 26, 1935—Symposium on Mosquito Control and its Effect on Wild Life.

April 9, 1935—Wild Life Conservation in America; J. H. Baker.

April 23, 1935—A Himalayan Walking Trip; C. H. Rogers.

May 14, 1935—Birds of our Southland; F. R. Oastler.

May 28, 1935—Field Notes and Current Migration Data.

October 8, 1935—Field Notes by Members.

October 22, 1935—Distribution of Breeding Birds of Ocean County; C. A. Urner.

November 12, 1935—The Homing Ability of Birds; Ernst Mayr.

November 26, 1935—In the Everglades and Elsewhere South; H. H. Cleaves.

December 10, 1935—The Hawk Migration at Cape May Point; R. T. Peterson.

December 26, 1935—Discussion of the Christmas Census.

January 14, 1936—Relationship between Structure and Function in Birds; E. Stresemann.

January 28, 1936—Backstage at the Zoo; C. W. Leister.

February 11, 1936—The Vernay-Hopwood Chindwin Expedition; H. C. Raven.

February 25, 1936—The History of the Roseate Spoonbill in the United States; R. P. Allen.

March 10, 1936—Annual Meeting—A Winter with the Eskimos; G. M. Sutton.

At the annual meeting the following officers were elected:

<i>President</i>	-	-	-	-	-	-	WILLIAM VOGT
<i>Vice-President</i>	-	-	-	-	-	-	JOSEPH J. HICKEY
<i>Secretary</i>	-	-	-	-	-	-	CHARLES K. NICHOLS
<i>Recording Secretary</i>	-	-	-	-	-	-	ALLAN D. CRUICKSHANK
<i>Treasurer</i>	-	-	-	-	-	-	DR. CLEMENT B. P. COBB
<i>Editor</i>	-	-	-	-	-	-	DR. ERNST MAYR

During the year the Society lost by death the following four members:

Warren F. Eaton
 Miss Helene Lunt
 Prof. Henry Fairfield Osborn
 Mrs. J. E. B. Webster

The deep regret of the Society at the loss of Mr. Eaton was expressed by a resolution adopted at the regular meeting of February 25.

Seven new members have been elected as members of the Society and eight have resigned or have been dropped.

Dr. Walter Granger was elected a Fellow of the Society.

Numbers 45 and 46 of the Proceedings of the Linnaean Society of New York for the two years ending March, 1934, were issued as of April 15, 1935.

(Signed) C. K. NICHOLS, Secretary.

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

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COUNCIL 1937-1938

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Charles K. Nichols	Dr. Clement B. P. Cobb
Robert P. Allen	Dr. Ernst Mayr

End of Term 1938

E. R. P. Janvrin	John H. Baker	Charles A. Urner
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End of Term 1939

Allan D. Cruickshank	T. Donald Carter	Edward B. Lang
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End of Term 1940

James L. Edwards	Richard H. Pough	Allen M. Thomas
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Robert P. Allen, *Chairman*

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	Walter Sedwitz	Charles A. Urner
	William Vogt	

Membership List,¹ September 1, 1937

Honorary Member

STONE, WITMER, Sc. D., Academy of Natural Sciences, Philadelphia, Pa.

Fellows

- 1878² BENNER, FRANKLIN, 2223 Pleasant Ave., Minneapolis, Minn.
 (1920)³ CHAPMAN, FRANK M., Sc.D., American Museum of Natural History,
 New York City.
 1878 FISHER, A. K., M.D., The Plymouth, Washington, D. C.
 (1920) GRANGER, WALTER, DR., American Museum of Natural History, New
 York City.
 (1920) GRISCOM, LUDLOW, Museum of Comparative Zoölogy, Cambridge, Mass.
 1878 INGERSOLL, ERNEST, 404 West 116th St., New York City.
 1878 MERRIAM, C. HART, 1919 16th St., N. W., Washington, D. C.
 (1920) NICHOLS, JOHN T., American Museum of Natural History, New York
 City.
 1878 OSBORN, WILLIAM C., % Osborn, Fleming and Whittlesey, 20 Exchange
 Place, New York City.
 1921 URNER, CHARLES A., 173 Chambers St., New York City.

Resident Members

- 1928 ABBOT, MRS. LAURA W., R. D. 2, Bristol, Pa.
 1935 AJELLO, LIBERO, 183 Weequahic Ave., Newark, N. J.
 1937 ALDOUS, MISS RUTH, National Association of Audubon Society, 1775
 Broadway, New York City.
 1928 ALLEN, FRED, 227 Bay Ave., Highlands, N. J.
 1931 ALLEN, ROBERT P., National Ass. Aud. Soc., 1775 Broadway, New
 York City.
 1935 ALLYN, RICHARD, 50 Haven Ave., New York City.
 1931 ARCHBOLD, RICHARD, American Museum of Natural History, New
 York City.
 1935 ASTLE, WILLIAM C., 149-31 Delaware Ave., Flushing, Long Island, N. Y.
 1924 BAKER, JOHN H., 1165 Fifth Ave., New York City.
 1928 BALDWIN, ROGER N., 31 Union Square, West, New York City.
 1937 BANNER, GILBERT, 1924 Loring Ave., Bronx, N. Y.
 1937 BARBER, ARTHUR, 177 Jackson Ave., Jersey City, N. J.
 1931 BEALS, MRS. A. T. (MARIE V.), 5833 85th St., Elmhurst, Long Island.
 1937 BERLINER, R. W., 205 Club Drive, Woodmere, Long Island, N. Y.
 1936 BIRCKHEAD, HUGH, 435 Monterey Ave., Pelham Manor, N. Y.
 (1920) BISHOP, LOUIS B., 450 Bradford St., Pasadena, Cal.
 1934 BLIEMEYER, MISS ROSE, 8770 115th St., Richmond Hill, N. Y.

¹The figure preceding each name indicates the year of election to the Society.

²Founders of the Society are indicated by the year 1878.

³(1920) indicates that the member was elected to the Society prior to 1920.

- 1929 BOEHRER, CHARLES A., 500 St. John's Place, Brooklyn, N. Y.
 1937 BOGERT, MISS CARDINE, 151 East 79th St., New York City.
 1935 BOHN, HERMAN, 33-29 171st St., Flushing, Long Island, N. Y.
 1923 BOULTON, W. R., JR., Field Museum of Natural History, Chicago, Ill.
 1925 BOULTON, MRS. W. R., Cherry Lane, Westport, Conn.
 1920 BOWDISH, BEECHER S., Demarest, N. J. ,
 1935 BOWEN, LEON W., 77 Evergreen Ave., Bloomfield, N. J.
 1931 BRAND, ALBERT R., 208 Fernow Hall, Cornell University, Ithaca, N. Y.
 1923 BRANDRETH, COURTENAY, Ossining, N. Y.
 1931 BRESLAU, LEO, % Laurel Printing Co., 480 Canal St., New York City.
 1933 BROOKS, MISS MARGARET, Shore Road, Old Greenwich, Conn.
 1934 BROWN, CLARENCE D., 222 Valley Road, Montclair, N. J.
 1925 BUTLER, MRS. ELLIS PARKER, 144-41 35th St., Flushing, Long, Island,
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 1932 CARLETON, GEOFFREY, 52 West 94th St., New York City.
 1925 CARR, WILLIAM H., Trailside Museum, Bear Mt. Park, Iona Island, N. Y.
 1921 CARTER, T. DONALD, American Museum of Natural History, New York
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 1934 CHALIF, EDWARD L., Barnsdale Road, Short Hills, N. J.
 (1920) CHAPIN, JAMES P., Ph.D., American Museum of Natural History, New
 York City.
 (1920) CHUBB, SAMUEL H., American Museum of Natural History, New York
 City.
 1931 CHURCH, MISS CYNTHIA, Kings Point, Great Neck, L. I.
 (1920) CLEAVES, HOWARD H., 8 Maretzek Court, Princess Bay, Staten Island.
 1933 COBB, DR. CLEMENT B. P., 1261 Madison Ave., New York City.
 1931 COOK, WILLIAM B., 65 Wesley Ave., Port Chester, N. Y.
 1928 COOLIDGE, OLIVER, Broad Brook Road, Bedford Hills, N. Y.
 1920 CRANDALL, LEE S., New York Zoological Park, New York City.
 1927 CROWELL, NOYES A., 216 West 105th St., New York City.
 1926 CRUICKSHANK, AILAN D., Nat. Ass. Aud. Soc., 1775 Broadway, New
 York City.
 (1920) DAVIS, WILLIAM T., 146 Stuyvesant Place, New Brighton, Staten Island.
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 1929 DESMOND, THOMAS C., 94 Broadway, Newburgh, N. Y.
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 1927 EDWARDS, JAMES L., 27 Stanford Place, Montclair, N. J.
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 1930 FARLEY, COLVIN, 4 Martine Ave., White Plains, N. Y.
 (1920) FISHER, G. CLYDE, Ph.D., American Museum of Natural History, New
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 (1920) FLEISHER, EDWARD (PROF.), 295 St. John's Place, Brooklyn, N. Y.
 1937 FLYNN, MICHAEL, 928 East 40th St., Brooklyn, N. Y.

- 1921 FRIEDMAN, RALPH, 14 East 75th St., New York City.
 1923 FROST, ALLEN, 143 Academy St., Poughkeepsie, N. Y.
 1925 FRY, MRS. GLADYS GORDON, 66 Eagle Rock Way, Montclair, N. J.
 1923 GARVAN, MRS. FRANCIS P., 740 Park Ave., New York City.
 1937 GILLIARD, E. THOMAS, 957 Madison Ave., New York City.
 1928 GRINNELL, LAWRENCE L., 1160 Park Ave., New York City.
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 1928 GUTLOHN, MRS. WALTER, 112 West 59th St., New York City.
 1937 GUY, LOREN, M.D., 446 East 66th St., New York City.
 1926 HAGOOD, MAJOR LEE, 15 West 51st St., New York City.
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 1924 HASBROUCK, HENRY C., 61 Broadway, New York City.
 1935 HECK, EDSON B., M.D., 117 West 11th St., New York City.
 (1920) HELME, ARTHUR H., 223 Bayview Terrace, Port Jefferson, Long Island.
 1932 HELMUTH, DR. W. T., III, 667 Madison Ave., New York City.
 1928 HERBERT, RICHARD, 961 Fox St., New York City.
 1929 HERBST, MRS. CYNTHIA KUSER, Bernardsville, N. J.
 1924 HICKEY, JOSEPH J., 2952 Marion Ave., New York City.
 (1920) HIX, GEORGE E., % Equitable Life Insurance Co., 393 Seventh Ave., New York City.
 1924 HOLGATE, W. D., 155 West 82nd St., New York City.
 1921 HOWLAND, R. H., 80 Wall St., New York City.
 1924 HUNTER, ROLAND JACKSON, 68 Broad St., Freehold, N. J.
 1937 HUTTER, ELMER P., 304 Argyle Road, Brooklyn, N. Y.
 (1920) HYDE, FREDERICK WILLIAM, 340 43rd St., Brooklyn, N. Y.
 1933 INGERSOLL, MRS. RAYMOND V., 380 Clinton Ave., Brooklyn, N. Y.
 1929 INGRAHAM, EDWARD A., 16 Court St., Brooklyn, N. Y.
 (1920) JANVRIN, E. R. P., M.D., 38 East 85th St., New York City.
 1925 JAQUES, F. L., American Museum of Natural History, New York City.
 (1920) JOHNSON, JULIUS M., 2935 Pleasant Ave., Ridgewood, N. J.
 1937 KARSCH, HENRY, JR., 136 Seaman Ave., New York City.
 1925 KASSOY, IRVING, 817 Faile St., New York City.
 (1920) KIERAN, JOHN F., 525 West 238th St., New York City.
 1937 KRASLOW, HOWARD, 2025 Regent Place, Brooklyn, N. Y.
 (1920) KUSER, JOHN DRYDEN, Bernardsville, N. J.
 (1920) LADOW, STANLEY VAUGHAN, % C. N. Edge and Company, 20 Exchange Place, New York City.
 1935 LANG, EDWARD B., 156 Joralemon St., Bellville, N. J.
 1936 LEHRMAN, DANIEL S., 136 West 168th St., New York City.
 1921 LITCHFIELD, MISS GERTRUDE, 183rd St. and Pinehurst Ave., Hudson View Gardens, N. Y.
 1937 MANGELS, FREDERICK P., 2047 Nostrand Ave., Brooklyn, N. Y.
 1937 MANNING, MISS ELIZABETH S., Caroline Country Club, Scarsdale, N. Y.

- 1932 MATHEWS, WM. H., 27 St. Andrews Place, Yonkers, N. Y.
 1924 MATUSZEWSKI, JOHN F., 6 W. 16th St., New York City.
 1932 MAYR, ERNST, Ph.D., American Museum of Natural History, New York City.
 1922 McAULIFFE, GEORGE B., M. D., 26 West 87th St., New York City.
 1937 McDERMOTT, JOHN, 95 Dwight St., Jersey City, N. J.
 1937 McKEEVER, CHRISTOPHER, 1043 Carroll St., Brooklyn, N. Y.
 (1920) NAUMBURG, MRS. ELSIE M. B., American Museum of Natural History, New York City.
 1934 NELSON, MISS THEODORA, 2695 Heath Ave., New York City.
 1930 NICHOLS, CHARLES K., 212 Hamilton Road, Ridgewood, N. J.
 1934 NICHOLS, MRS. C. K., 212 Hamilton Road, Ridgewood, N. J.
 (1920) NICHOLS, EDWARD G., REV., % L. N. Nichols, 315 East 68th St., New York City.
 (1920) NICHOLS, L. NELSON, 315 East 68th St., New York City.
 1937 NORSE, WILLIAM, 531 West 211th St., New York City.
 1927 PETERSON, ROGER T., Nat. Ass. Aud. Soc., 1775 Broadway, New York City.
 1923 PHILHOWER, CHARLES A., 303 Mountain Ave., Westfield, N. J.
 1937 PHILLIPP, FREDERICK B., Gap Road and West Road, Short Hills, N. J.
 (1920) PHILLIPP, P. BERNARD, 220 Broadway, New York City.
 1937 POUGH, RICHARD H., Nat. Ass. Aud. Soc., 1775 Broadway, New York City.
 1936 PRESTON, RALPH C., Bronxville Public Schools, Bronxville, N. Y.
 1935 RAND, AUSTIN, American Museum of Natural History, New York City.
 1929 RICH, M. C., 92 Morningside Ave., New York City.
 1922 RICH, MRS. M. C., 92 Morningside Ave., New York City.
 (1920) RIKER, CLARENCE B., 432 Scotland Road, South Orange, N. J.
 (1920) ROGERS, CHARLES H., Princeton University (Mus. of Zoology), Princeton, N. J.
 1934 ROSE, GEORGE C., 202 Linden Road, Mineola, Long Island, N. Y.
 1935 ROSENBLUM, LLOYD, 603 Clinton Ave., Newark, N. J.
 1926 RUNYON, MRS. CLARKSON, JR., 1175 Park Ave., New York City.
 1935 RUSLING, WILLIAM J., 335 Central Ave., West Caldwell, N. J.
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 1931 SEDWITZ, WALTER, 124 West 79th St., New York City.
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 1937 STEPHENSON, ORLANDO, JR., 105 Mt. Hope Place, Bronx, N. Y.
 1929 STEVENS, CHARLES W., M.D., 1 West 68th St., New York City.
 1929 STEVENS, MRS. CHARLES W., 1 West 68th St., New York City.
 1933 STEWART, MISS E. GRACE, 457 West 123rd St., New York City.
 1933 STODDARD, MRS. RALPH, 535 Oak Ave., Flushing, Long Island, N. Y.
 1937 STORER, ROBERT, 522 Vose Ave., South Orange, N. J.

- (1920) STREETER, DANIEL D., 217 Havemeyer St., Brooklyn, N. Y.
 1925 STRYKER, CAROL, Staten Island Zoological Society, Clarence T. Barrett Park, West New Brighton, Staten Island, N. Y.
 1923 TAYLOR, IRVING K., % W. A. Taylor & Co., 13-15 Laight St., New York City.
 1933 THOMAS, ALLEN M., Graham School, Hastings-on-Hudson, N. Y.
 1926 THOMAS, MRS. MARGARET L., 366 West 245th St., Riverdale-on-Hudson, N. Y.
 1925 THORNTON, A. P., 27 West 44th St., New York City.,
 1925 TUCKER, CARLL, 733 Park Ave., New York City.
 1923 TUCKER, MRS. CARLL, 733 Park Ave., New York City.
 1933 VAN DEUZEN, HOBART, 210 East 68th St., New York City.
 1928 VOGT, WILLIAM, Nat. Ass. Aud. Soc., 1775 Broadway, New York City.
 1924 WALSH, LESTER L., Nat. Ass. Aud. Soc., 1775 Broadway, New York City.
 (1920) WALTERS, FRANK, 536 Grand Central Palace, New York City.
 1937 WEBER, WILLIAM A., 576 West 183rd St., New York City.
 1935 WHITMAN, F. BURTON, JR., United Mutual Fire Insurance Co., 10 East 40th St., New York City.
 1933 WHITMAN, ROGER, 540 East 89th St., New York City.
 1928 WILCOX, LeROY, Speonk, Long Island, N. Y.
 1935 WOLFARTH, FLOYD, 503 Summer Ave., Newark, N. J.
 1937 WOODBRIDGE, MISS NANCY, 37 Washington Square, West, New York City.
 1933 WOODELTON, MRS. HELEN S., 454 Seventh St., Brooklyn, N. Y.

Non-Resident Members

- 1936 AMMANN, ANDREW, Museum of Zoology, Ann Arbor, Mich.
 (1920) AYER, MRS. NATHAN EDWARD, 1300 Hillcrest Drive, Pomona, Calif.
 1925 BAASCH, K. W., 86 Harrison Ave., Baldwin, Long Island, N. Y.
 1937 BUCHHEISTER, CARL W., 822 Main St., South Hingham, Mass.
 1923 FERGUSON, HENRY L., Fishers Island, N. Y.
 1937 HERHOLDT, JOHN, Colonial Hotel, Smyrna, Del.
 (1920) HOWELL, ARTHUR H., Biological Survey, Washington, D. C.
 (1920) INGERSOLL, A. M., 908 F St., San Diego, Calif.
 1933 KRITZLER, HENRY, 36-27 216th St., Bayside, Long Island, N. Y.
 1924 KUERZI, JOHN F., Box 273, Ridgefield, Conn.
 1927 KUERZI, RICHARD, R.F.D., Kent, Conn.
 1933 McBRIDE, ARTHUR, Marine Studios, Inc., St. Augustin, Fla.
 (1920) MORRIS, ROBERT T., M.D., Box 554, Stamford, Conn.
 1934 MURDOCK, JAMES, 835 Golden Gate Ave., San Francisco, Cal.
 1937 NICE, MRS. MARGARET MORSE, 5708 Kenwood Ave., Chicago, Ill.
 (1920) OBERHOLSER, HARRY C., Ph.D., Biological Survey, Washington, D. C.
 1925 RIGGENBACH, H. E., % A. Sarasin & Co., Basle, Switzerland.
 1921 WILLIAMS, LAIDLAW, Box 453, Carmel, Calif.
 1934 YATES, LEICESTER B., 1716 Victoria Ave., Los Angeles, Calif.

Please notify Secretary of any change of address.

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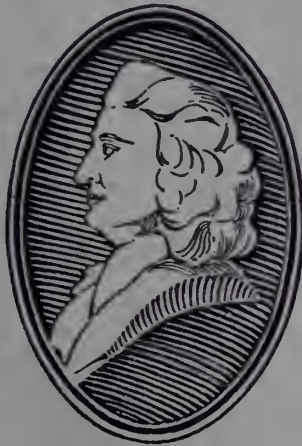
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*Charlie Urner with Oscar Eayre, his boatman,
on one of his many observation trips at Barneget.*

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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 unflinching 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 Willet¹

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 (*Ammodramus 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 exhibit 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.

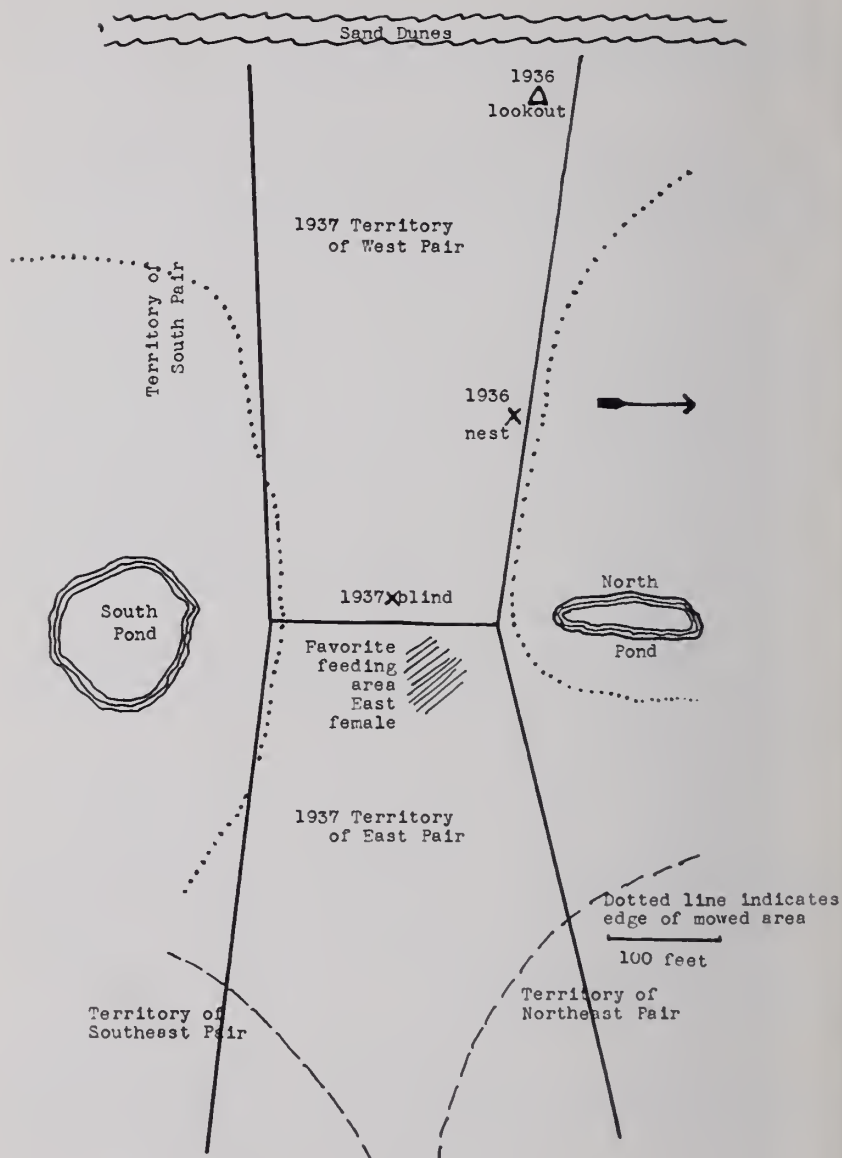


PLATE I. Schematic representation of Willet breeding areas, distances estimated.

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 *eh-eh* 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 *tee-ecr*—I immediately named, in the field, the Tern note because it was "very like the high pitched and thin Arctic" Tern (*Sterna paradisaca*) 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

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

X	west male	west female
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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). New-comer 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-willetts* 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 (Makink, 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).

Willetts 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 *Larus 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 (Dirksen, 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 repeatedly 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 unflinching 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 dependent 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 course, 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.

Gríscom (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.

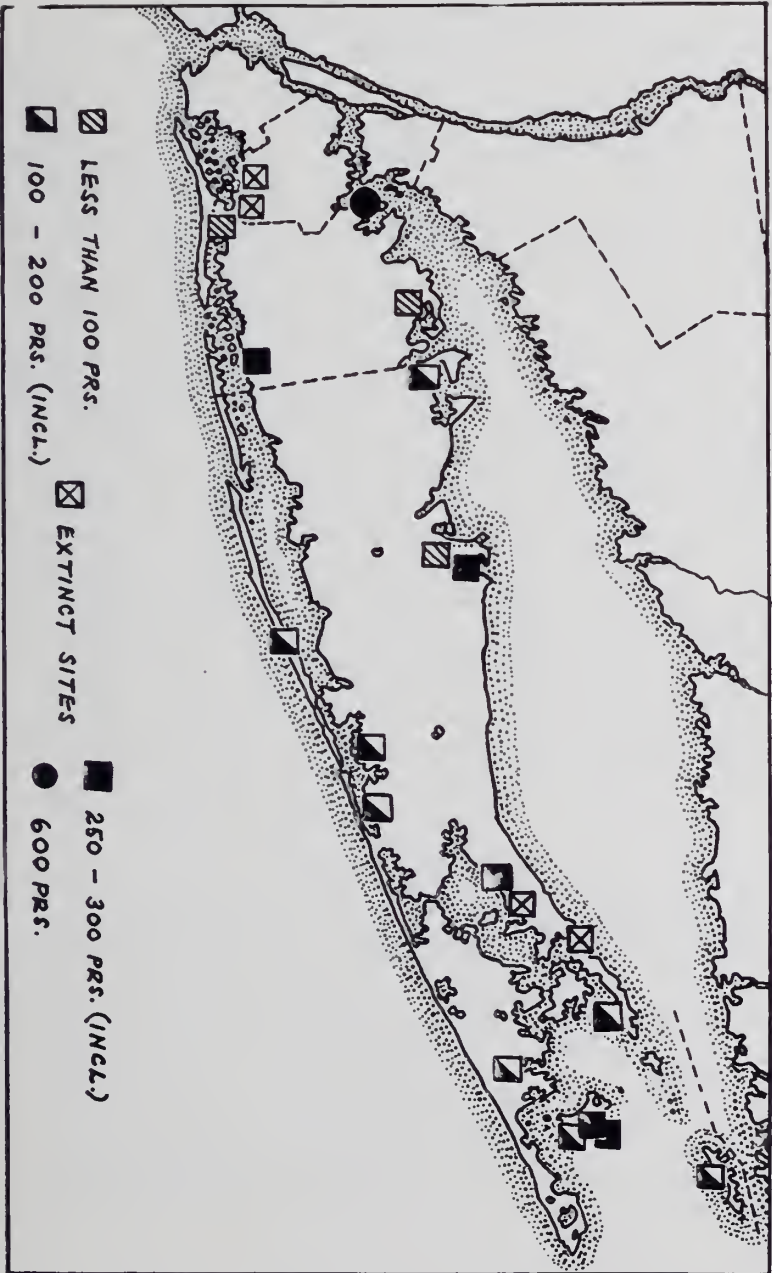
Further reasons for the census may be termed biological and conservational. Nicholson (1929), who reported on the exhaustive inquiry into the history and distribution of heronries in England and Wales, emphasized the biological importance of "satisfactory data regarding the numbers of animals in relation 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.

Heron 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 (*Casmicrodius 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 Weethampton 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 (Cruikshank)	Chiefly Swamp Maple	In park area with police protection. Status favorable.	Marie V. Beals Alan D. Cruikshank
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 1/4 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 1946)	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 Spoonk 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	Waiter 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: $51^{\circ} 03' N.$, $17^{\circ} 13' W.$) Clear, slight winds. 9:00-10:00 A.M., several Greater Shearwaters, at about $51^{\circ} 10' N.$, and $15^{\circ} 50' W.$; 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: $49^{\circ} 32' N.$, $29^{\circ} 34' W.$) Clear, absolutely calm. At 7:45 A.M., a flock of at least 30 Greater Shearwaters with a school of Porpoises (Blackfish) at about $49^{\circ} 44' N.$,

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 off-shore 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 $19\frac{1}{2}$ 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 $49^{\circ} 00' N.$, $31^{\circ} 35' W.$, two birds were observed (one of the few mid-Atlantic records), and at $43^{\circ} 30' N.$, $50^{\circ} 20' W.$, 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 $49^{\circ} 41' N.$, $28^{\circ} 20' W.$ 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 paradisaca*): 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 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 Northern (*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 Northernns 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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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 tertiaries 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 Warb.	Orient State Park	Moriches Inlet (west side)	Gilgo Island
Herring Gull - -	30-40			about			1	
Common Tern - -	600	500	15	250	25	(50)	75	a few
Roseate Tern - -	100			?				
Least Tern - - -								a few
Black Skimmer - -							about 6	at least 15
Osprey - - - -	18			about 5				

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). One 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-

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

OTHER BEACHES

Spotted Sandpiper	Killdeer
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*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

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

UNCULTIVATED FIELDS

Dry	Grasshopper Sparrow	Bobolink
Wet	Henslow's Sparrow	

FIELDS WITH BEGINNINGS OF FOREST

Cedar	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.
Pine	
Oak Scrub	
Locust-Blackberry	
Sassafras	
Blueberry-Azalea	

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

*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	Break down all open habitats according to presence
Pastures	of hedge rows, singing perches.
Crops	
Fallow Fields	
Orchards	
Lawns and Buildings	
City Parks	
Golf Courses	
Forest Subjected to Fire	
Bird Sanctuaries	
Reservoir Plantations	

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 c. exilis*), King Rail (*Rallus c. 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 demonstrate 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 ornithology¹

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

¹Mapping 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 c. 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 (*Tannus h. hiemalis*)
- Blue-gray Gnatcatcher (*Poliophtila 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 savaannarum 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. linicola*)
- 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.

²See 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 Vogt³, who carried on his research at Fortescue, N. Y. Similar research with the Black-crowned Night Heron (*Nycticorax 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-

³Mr. 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:

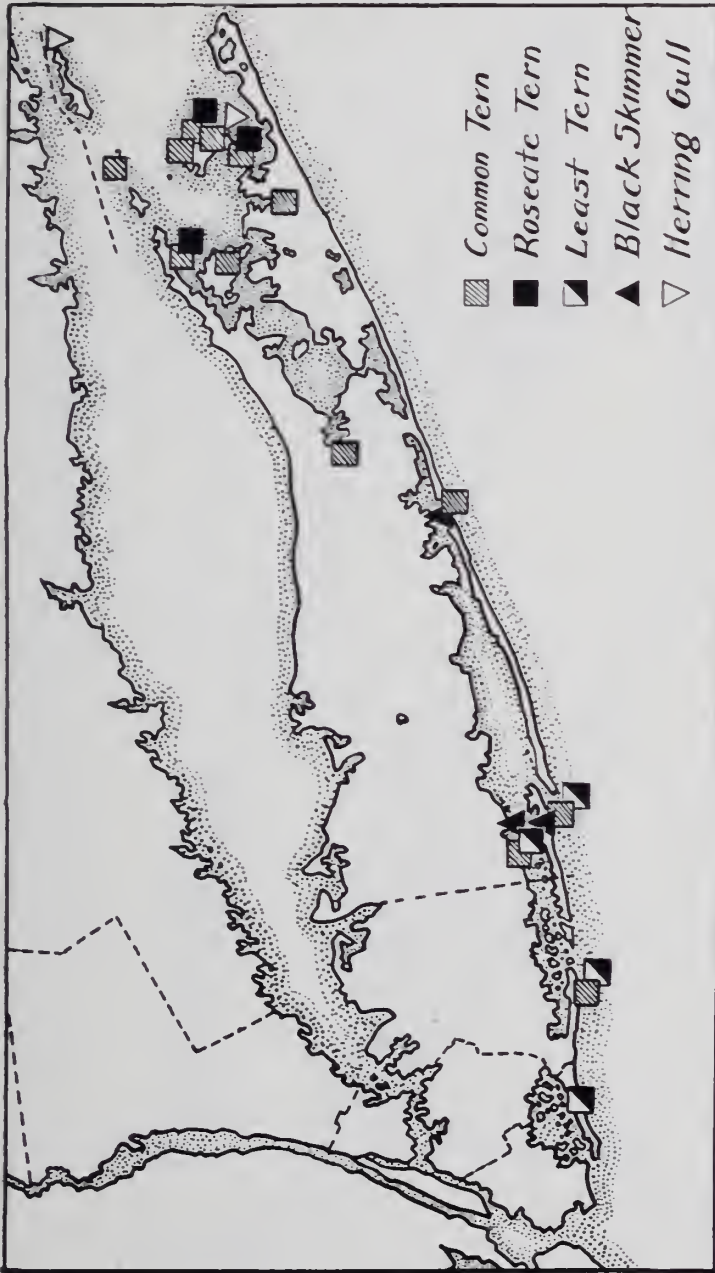
- Turkey Vulture (*Cathartes aura septentrionalis*)
- Kentucky Warbler (*Oporornis formosus*)
- Acadian Flycatcher (*Empidonax vireescens*)
- Warbling Vireo (*Vireo g. gilvus*)
- Yellow-throated Vireo (*Vireo flavifrons*)
- White-eyed Vireo (*Vireo g. griseus*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)

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.

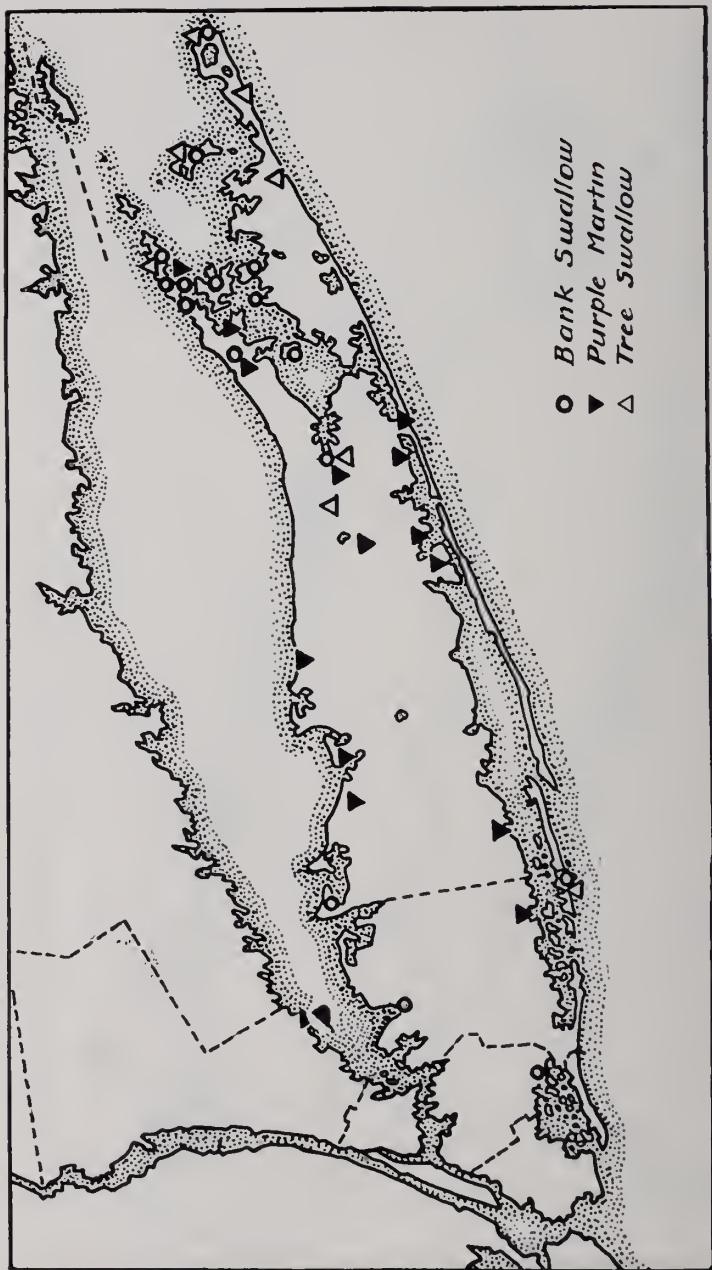
Suggestions in this first release with regard to population and life history studies may not be expected to bring about immediate results, but doubtless will show returns over a long period. In fact, this release, although perhaps too inclusive to be entirely practical, may prove to have been wholly 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 (*Passercella i. iliaca*)
- Phoebe (*Sayornis phoebe*)
- Greater Yellow-legs (*Totanus melanoleucus*)
- Chipping Sparrow (*Spizella p. passerina*)
- Ruby-crowned Kinglet (*Corthylio c. calendula*)
- Towhee (*Pipilo c. 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 term.

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 Librarian 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*.

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THE LINNAEAN SOCIETY OF NEW YORK

1878

1938

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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."

1938-1939

Nos. 50, 51

PROCEEDINGS
OF THE
LINNAEAN SOCIETY
OF
NEW YORK

For the Two Years Ending
March, 1939



Date of Issue, October 25, 1940

Price: Seventy-five Cents

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1938-1939

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Studies of the Nesting Behavior of the Black-crowned Night Heron^{1 2}

By ROBERT P. ALLEN and FREDERICK P. MANGELS

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INTRODUCTION AND METHODS

This paper presents the results of three seasons (1936-37-38) of study of a colony of the Black-crowned Night Heron (*Nycticorax nycticorax hoactli* Gm.) in Nassau County, Long Island, New York. The period of study in each season began with the arrival of the birds and ended with the fledging of the young. The heronry is located in a grove of red cedars (*Juniperus virginiana*) on the edge of a salt marsh. Beneath the cedars the ground is covered with a heavy mixed growth of poison ivy, sumac, honeysuckle, bayberry, smilax and various bushy plants. Approximately 350 pairs of Black-crowns occupied nests in this area.

During the first season (1936), only one blind was used. This was a fixed frame on the ground, 3' x 3' x 3', covered with burlap. Peepholes were cut as desired. For the second season (1937), an elevated blind was constructed. This blind was a 6' x 4' x 5' burlap-covered frame with wooden floor and canvas top. It rested on posts 20' in height. A collapsible 5' x 5' x 5' ground blind was also used to study parts of the heronry not visible from the tower. This also was a burlap-covered frame. Other equipment included aluminum bands and colored celluloid bands for marking birds, and paint of various colors for marking both birds and eggs. A 15' wooden ladder was used as an aid in reaching nests. Zeiss binoculars (8X and 18X) were used, and a Bausch and Lomb spotting scope (19.6X to 36X).

¹Read in part by Frederick P. Mangels at the annual meeting of the A.O.U., Charleston, S. C., November, 1937; and by Robert P. Allen at the annual meeting of the A.O.U., Washington, D. C., 1938.

²Awarded the Linnaean Prize for Ornithological Research in 1940.

This study was made with the intention of observing, recording, and insofar as possible, interpreting the Black-crown's behavior during certain important phases of its life cycle. The combined total of time in the field was 175 hours for the two observers. This represents actual observation time only, and does not include time devoted to construction of blinds and preparation of other equipment.

We are indebted to many persons for encouragement of one sort or another. Critical assistance of great value has been given us throughout the course of our study by Joseph J. Hickey, Daniel Lehrman, Dr. Ernst Mayr, Mrs. Margaret M. Nice, and William Vogt. The manuscript, in whole or in part, has been read, and helpful suggestions given us by all of the above, and also by Dr. Konrad Lorenz and Dr. N. Tinbergen. To Allan D. Cruickshank we wish to express our thanks for the use of photographs taken by him, and to Roger T. Peterson for the pen and ink drawings which he has made from our notes and rough field sketches. We are grateful to Dr. G. K. Noble for much bibliographic assistance.

FUNCTIONAL EQUIPMENT OF THE BLACK-CROWN (EXTERNAL)

A brief mention of the functional equipment of the Black-crown is necessary at this point to enable the reader to understand better the discussion which follows.

Those external parts of the heron which have important functions in courtship are: the plumes, soft parts (lores and legs), and the normal adult plumage. The plumes, usually three in number, are long white feathers located on the top of the head. By far the most unusual feature of the functional equipment is the change in the color of the legs. Normally a pale greenish-yellow in color, they change to brilliant salmon-pink for the period beginning after the arrival of the birds on the nesting grounds and ending with the laying of the complete clutch. The lores become deep blue-black during the same period.

In general, the plumage of adult Night Herons is of two types: fully adult and what may be termed 'dusky adult.' The latter does not have the immaculate white plumage on the throat, breast and underparts, and the crown, saddle and back are not a glossy, greenish-black as in the mature adult. Underparts have a dirty or dusky appearance, being washed with grays and browns, and the back has a brownish tinge. No detailed plumage studies were made, but these dusky adults were assumed to be birds in their third spring and summer plumage, or, about two years of age. Lorenz (in lit.) found this to be true for *Nycticorax n. nycticorax*.

PLATE I.



FIG. 1.—BLACK-CROWNED NIGHT HERON.
STEALTHY APPROACH TO THE NEST.



FIG. 2.—BLACK-CROWNED NIGHT HERON.
GETTING IN POSITION FOR INCUBATION.

The percentage of dusky adults appeared to vary in different years, there being a relatively high percentage in 1936 and among first arrivals in 1938. When the entire population of the heronry had assembled, there was no time when these younger adults could have exceeded 10% of the total flock, but this is a very general estimate.

Plumes of dusky adults appeared shorter than in herons that had reached full adult plumage. However, the dusky birds showed soft part changes that are evidently comparable in degree and function with those of the mature adults.

SONG—The song of the male Black-crown is a *buzz* (*hiss*, Noble, Wurm and Schmidt, 1938, hereafter referred to as Noble, *et al.*) preceded by a soft *plup* such as might be made by a bursting bubble of mud. An impression of the *buzz* may be obtained by stretching a heavy rubber band across the top of a chair and 'twanging' the band lightly. A description of the accompanying action will be given under *pairing*.

ARRIVAL OF FLOCK ON NESTING SITE

The first appearance of Night Herons at the Massapequa heronry has been in late March in each of the three seasons of study. Actually, four birds that were assumed to be migrants, were observed at the nesting site on March 20 in 1937 and again in 1938. In 1936 the birds were present in late March but the arrival date was not observed. These first arrivals evidently do not stay in the heronry, however. Arrival of the first flock—usually a group of from forty to seventy herons—averaged April 7th.¹

In 1937 it was noted that migrant Night Herons did not appear on the south shore of Long Island between March 15 and 19, when a low pressure area was moving east and then north along the Atlantic coast. Northerly winds prevailed until the 17th, when conditions changed with the appearance of two highs over the southeastern interior. From March 18 to 20 winds were southerly from Florida to Long Island, and a high pressure area had moved to a point off Long Island by the 20th. The general tendency at this time was toward a rising temperature. The first herons to appear were observed at the Massapequa nesting site on March 20.

Thus, on the south shore of Long Island, individual birds and small groups of migrants appear at the nesting site toward the last week of March, the first sizable flock about the end of the first week of April. Evidently these arrival dates may be counted on regardless of weather conditions and apparently irrespective of temperature, although winds from an unfavorable quarter may retard migration.

¹Replies to questionnaire sent to observers on Long Island indicated the following average dates for this species: earliest arrival, March 12; average arrival, March 22; first occupied nests, April 17; first eggs, April 19 (Allen, 1938).

First arrivals have been adults with no observed exceptions. As with some other birds the immature herons seem to travel together, at least during their northward migration. Numbers of immature birds were observed in the heronry some days after the arrival of the adult flocks. Verwey (1930) found this same behavior in the Fischreiher (*Ardea cinerea*). There are numerous other examples. Immature hawks of several species migrate southward in flocks that may not contain a single adult, and adults of the Sharp-shinned Hawk (*Accipiter velox*) more often than not take an inland route while immature Sharp-shins journey southward along the Atlantic coast (Allen and Peterson, 1936).

It seems reasonably certain that adult Night Herons migrating northward in spring have pale lores and yellow legs on arrival at the nesting site.

The stimulating function of the flock on its individual members has been noted by Lorenz (1937) and discussed by Darling (1938) and Marshall (1936). It is our belief that this stimulation is necessary to the preparation, as it were, of the Night Heron for reproduction. The attainment of essential releasing equipment (Lorenz, 1935) marks so definite a change and is so indispensable to that which follows, that suggestions regarding the conditions and circumstances that may be correlated with such attainment should be of interest.

If we accept the idea that Night Herons move northward in spring as a result of internal physiological changes resulting chiefly from rising temperature (Nice, 1937) and increased light (Rowan, 1925, 1931), it may be assumed that they reach the nesting location with enlarged gonads, ready for pairing and the succeeding stages of the reproductive cycle. Are we to suppose, then, that between arrival at the nesting site and the pairing activities, the essential color changes in soft parts take place automatically, regardless of the presence or absence of certain circumstances, environmental or otherwise?

Darling (1938), in his thought-provoking essay on bird flocks and the breeding cycle, suggests that a concentrated number of the same (or of a similar) species, and the visual and auditory patterns exhibited by the activities of these assembled individuals, are indispensable to the reproduction of colonial birds. From observations of the Night Heron it is our impression that this stimulating function of the flock organization very likely is *essential* to reproduction in that species.

Behavior of the flock on arrival is reasonably uniform. Noble, *et al.* (1938) state, "When the flocks of herons return from winter

quarters in early spring they settle down on or near trees which contain last year's nests. Each bird selects a certain territory in accordance with the territorial requirements found even in immature herons." Early in the season and prior to formation of the pairs, Night Herons at the Massapequa heronry appeared to occupy various perches in the nesting area and in the nearby maple grove without any evidence of seeking to claim or defend definite territories. As is frequently observed in gulls, terns, and in many other herons, there is competition between individual birds of an unmated flock for perches. Usually a gull, for example, will replace another gull on a perch by flying at the perched bird so as to throw it off balance, thus forcing it to leave the perch. A similar behavior was observed throughout the flock before formation of the pairs, although the displacement of a heron from its perch seems to depend simply on the precariousness of its balance, rather than on any territorial claims or establishment of a social hierarchy. In short, we were unable to find evidence that the same perches were occupied day after day by any of the herons at this time. It is a fact that the heronry is divided later on into definite sectors or nesting groups, but we observed no tendency to group prior to nest-building.

Behavior on and after arrival is definitely responsive to climatic conditions. On the second day of the flock's appearance in 1938 (April 3) the temperature at 9 A.M. was 45°F., wind moderate to strong northwest, sky clear. The herons were found perched low among the cedars in the midst of the nesting area. Most of this group were in the dusky adult plumage and *none of them showed red or reddish legs*. When disturbed, they rose and flew to the grove of red maple (*Acer rubrum*) and gum (*Nyssa sylvatica*) about three hundred yards west. This group contained approximately 40 birds.

Nine days later, after a period of freezing temperatures and snow during which all Black-crowns left the heronry, there was a sudden rise in temperature and between 150 and 200 herons appeared. The bulk of these birds were in a narrow strip of birch trees (*Betula* sp.) on the southeastern edge of the heronry. This entire group was discovered at 9:30 A.M., perched with their heads under their feathers, evidently asleep, in the comforting warmth of the early sunlight. They were evidently exhausted since we were able to approach within a few feet before they took alarm. Undoubtedly they had just completed a long flight². The herons of this newly arrived group had yel-

²On this date there were large flights of Double-crested Cormorants (*Phalacrocorax auritus*) and some movement of Loons (*Gavia i. immer*).

low legs. However, a score or more that were located in the center of the heronry—in trees in which there were many old nests—showed red legs, and the first ‘song’ was heard. This change in behavior marks the beginning of the *pairing* phase.

The following chart shows an apparent correlation between temperature and flock behavior during the first days of the breeding season

TABLE I
APPARENT EFFECT OF TEMPERATURE AND OTHER CLIMATIC FACTORS ON
BEHAVIOR OF NIGHT HERONS (1938)

Date	Temp. °F.		Precipitation	Wind	Behavior
	High	Low			
April 2	47	38	Cloudy	W	Arrival of 70 adults at nesting site.
April 6	38	31	Snow	NE	Herons disappear.
April 7	43	37	Rain	E	No herons at nesting site.
April 8	41	38	Rain	Calm	No herons at nesting site.
April 10	43	33	Cloudy	S	No herons at nesting site.
April 11	52	40	"	SW	Arrival of 12 herons.
April 12	65	51	"	SW	Arrival of 150 herons First red legs, first song.
April 14	78	63	"	SW	Pairing in progress 200 herons present.
April 15	81	53	Rain	NE	Pairing continues. Very active.
April 16	65	56	"	W	Much less activity. Singing has fallen off.
April 17	57	49	"	SE	Pairing at a standstill.

In south Florida (author's observation—R. P. A.) where comparable low temperatures during the principal nesting months would be extremely rare or unheard of, and where temperature changes are not an important factor, other factors seem to inhibit pairing among several species of wading birds, notably among White Ibises (*Guara alba*). There appears to be a correlation in such instances with the availability of food. Over a period of eight years several heronries and ibis ‘rookeries’ on the southwest Florida coast were occupied during three seasons only. Accumulated rainfall was close to the mean average up to the usual nesting date in each of these three seasons. In the five seasons when the birds did not nest the accumulation was either well below or considerably in excess of the mean average.

FORMATION OF THE PAIR

Pairing in the Black-crowned Night Heron apparently takes place each year shortly after the arrival of the flock at the nesting area. In 1938 the first flock (approximately 70 herons) to settle in the Massapequa heronry arrived April 2 (in 1937, April 4; 1936, April 11). On April 3 this flock was carefully observed and all individual members were *adults with yellow legs*.

The behavior of the flock at this time is extremely puzzling on first acquaintance. For the most part the birds pass the entire day, perched nearly motionless in the vicinity of the nesting area. *They seem to have no interest in each other*. On windy days, or when there is a drop in temperature, the entire flock seeks low perches, in this case well sheltered areas in the center of the thickest cedars. When disturbed they fly out in scattered groups or sometimes *en masse*, and generally move westward about 300 yards to a grove of red maple (*Acer rubrum*) and gum (*Nyssa sylvatica*). The anthropomorphic impression made upon the novice is that these birds are waiting for something to happen. In a sense this is correct.

Compared with the seeming uncertainty and the relative inactivity of the flock upon arrival, the behavior that immediately precedes and overlaps pair formation is in startling contrast. The following extracts from our notes describe briefly the behavior on the first day of the pairing phase.

April 12 (1938): Much warmer, clear and bright. First 'song' heard, south of tower blind. This song is not completely audible and only the initial 'plup' can be heard. However, the performing heron can be seen, an adult with red legs. Another heron with red legs observed. These are the first red legs noted this season.

Change in behavior of flock very striking. Today the herons are very restless. They fly and walk from perch to perch, their movements stealthy, like a heron approaching the nest later in the cycle. Plumes are much in evidence, *i. e.*, they are frequently raised vertically, and sometimes, in the excitement that accompanies the proximity of another heron (female?), forward so as to fall across the crown, arching in front so that the tips lie below the bill ("specific salutation ceremony"—Lorenz).

Singing is nervous and irregular, so much so that it was impossible to count the number of performances per minute. Not only is the spacing of songs irregular, but the birds preen and shake out their feathers continually. Preening movements are concentrated in the region of the lower breast feathers and brood patch. Very little twig-shaking noticed.

The first visual evidence of an interest in pairing is quite definitely coincidental with the appearance of pink or red legs and darkened lores. And, as noted, at this same time the first songs are heard, and the general behavior changes abruptly. Before discussing this behavior any further it should be stated that temperature seems to have an important bearing not only on the initiation (Table I) but also on the progress and completion of pairing in this species.

The following condensation of notes (1937) indicates the considerable delay in the progress of pairing that may be occasioned by climatic factors.

- April 8—48°F. at 7:30 A.M. Wind SW. First red legs noted. Singing heard but no progressive pairing activity. Flock restless, moving from one area to another.
- April 10—10° drop in temperature. Wind NW, 26 m.p.h. Singing stopped. Herons move out of nesting area.
- April 15—Slightly warmer with high of 68° recorded. A few herons in nesting area, some of them singing faintly.
- April 29—Warmer. Large number of herons at nesting site.
- May 2—Much warmer. Singing general. Pairing begins in earnest.

Noble, *et al.*, studied Black-crowned Night Herons breeding in captivity and state that "the first pair courted February 15, and the last egg of their first set was laid April 3." It should be mentioned that these birds were in a room where an approximate temperature of 70°F. was maintained. As these authors found that Night Herons (in captivity) require an average interval of about 45 hours between eggs, the pair that completed their clutch on April 3 must have had their first egg about March 27. This indicates, in this instance, with temperature control, an interval of about 39 days between the initial courtship (*i.e.*, initial pairing?) and the first egg.

In nature there is evidently considerable variation in the time between the attainment of red legs and actual pairing, but the interval between pair formation and the first egg is regular in time. It is considerably shorter than the period just cited. Table II shows average dates and variation in significant intervals during three seasons at the Massapequa heronry.

TABLE II
SIGNIFICANT AVERAGE DATES AND INTERVALS

Part A: Averages

- (a) Average date of first red legs, April 8.
- (b) Average date when pairing is completed (in one or more pairs), April 25.
- (c) Average date of first copulation, April 26.³

Part B: Intervals

- (a) Average interval between attainment of red legs and completion of pairing, 16 days. Longest interval recorded, 26 days. Shortest interval, 2 days.
- (b) Copulation usually follows on first or second day after formation of the pair.
- (c) First eggs were laid on an average of 3.3 days after the first copulation; 4 to 5 days after pair formation.
- (d) One record of 11 days was obtained for completion of the clutch.

Thus, although captive Night Herons in a constant temperature of 70° may require as much as 39 days between the first 'courtship' and the first egg, the average interval under natural conditions appears to be only about four or five days. Lorenz (in lit.) explains this by saying that they are "instinctive actions 'accumulated' through climatic inhibition, breaking forth with a rush when it grows warmer. Under abnormally constant temperature, no accumulation, constant 'stripping' of reaction, high intensity never attained."

The pair formation is initiated by the male Night Heron, occupying a perch near an old nest and engaging in a special performance that may be described as a 'song and dance.' This performance supplies visual and auditory patterns that serve to stimulate female herons in the vicinity so that they respond by approaching the performing male and attempting to join him.

Invariably in our experience these singing males are adult birds with red legs. Exhaustive observations of a long series of lores and mandibles of such birds were not made, but Noble, *et al.*, found that "the lores and bill of the courting bird tend to become bluish black." We noted, however, many examples wherein birds with pink or red legs had darker lores and bills than birds with yellow legs.

The females also show a color change in the legs and probably on lores and mandibles, but, as Noble, *et al.*, state, "females usually lag behind males in plume length and often in leg reddening." It is also possible that the degree of redness in the legs of the female herons varies according to the presence or absence of stimuli, *i.e.*, a performing or displaying male.

³Single act of copulation observed on April 8, prior to the formation of pairs throughout the flock.

We believe these color changes, combined with the auditory stimulus of the male's song, are essential to pairing, and that their principal function is to stimulate the female heron by releasing inborn patterns that result in her awareness or recognition of the male, and her approach to the male. We did not observe paired birds with an incomplete clutch in which both the male and female did not have red legs. Red legs in the female (as in the male) would appear to be determined by the degree of sexual development or 'readiness' that she has attained, and male birds always refused females who overtured during the pairing performance, if the female did not have legs that were somewhat pink.

Noble, *et al.*, correlate the fact that males may have "pinker legs" with the observation that the males display them more "during the courtship ceremonies" but do not attribute to these pink legs any function as releasers. In fact, they seem to misinterpret the term 'releaser.' Lorenz uses the term releaser to signify actions or structures delivering stimuli which act upon the sensory organs of a fellow member of the species so as to launch a responsive chain of acts. These actions or structures are highly specialized and possess a "minimum of general probability" (Lorenz). For example, the releasing combination of red legs and a specialized type of song in the Night Heron are highly unlikely to appear (that is, are generally improbable) except during an extremely limited period in the year's cycle. Otherwise there might be an "accidental release of the reaction at the wrong place, biologically speaking" (Lorenz). There is nothing in the evidence of Noble, *et al.*, to show that these characters (leg color, plumes, etc.) are not releasers.

We believe that the ability to acquire red or pink legs for a period of two to four weeks, more or less, of the reproductive cycle is an inborn character of *Nycticorax n. hoactli* functioning chiefly as a releasing stimulus and serving as an indicator of readiness for pairing.

It is true that the male herons 'display' their legs more than do the females during the 'courtship ceremonies.' In our belief the releasing function of red legs has a greater scope and necessity in the male than in the female. Red legs in the male must release in female herons a pattern of sexual behavior of the utmost importance. They are an outstanding visual stimulus and as such they function in combination with special posturing and use of voice, all of which, separately and especially in combination, are highly improbable. But it is likely that this combination is also important in stimulating other male herons

PLATE II.



FIG. 1.—BLACK-CROWNED NIGHT HERON.
SETTLING ON THE EGGS.



FIG. 2.—BLACK-CROWNED NIGHT HERON.
INCUBATING WOODEN BLOCKS.

by hastening these developments in them, a fact which lends it still greater scope and significance.

We believe that although the physiological state of the bird is a necessary condition for the full development of the releaser equipment it is not a sufficient condition. The stimulating effect of the song is necessary for its further development. For instance, the song of one bird, desultorily given, stimulates another bird to the same effort. This, in turn, further stimulates the first bird. This spreads through the entire group of birds. Repetition may also cause a lowering of the threshold of reaction.

On the other hand, the changed color in female legs appears to have less scope. By means of this releaser the male heron in his turn responds favorably to the female response. Absence of special color in female legs appears to provoke a threatening or defense reaction that may correspond to the reaction toward all fellow members of the species except the first pink-legged female to respond at this time.

We did not observe the reversal of subordination and dominance between male and female Night Herons as found by Noble, *et al.* The pairing act, in our experience, generally takes place as described in our notes, extracts of which follow:

April 15, 1938—7:10 A. M. (E. S. T.)—Heron *H*, adult with very red legs, singing from rim of old nest. Another adult heron, *F1*, approaches *H*. Legs of *F1* show the merest suggestion of pink; are more yellow than pink. *H* raises feathers of back (saddle), stops singing and shuffles restlessly. *F1* comes near, perching on limb beneath nest, plumage unruffled, bill raised toward *H*. *H* *claps* (rattles) bill close to head of *F1*.

Third adult heron, *F2*, approaches. Legs yellowish. *H* threatens *F2* with neck extended, wings raised forward in posture comparable to intimidating display of certain owls, at same time he gives 'snap' note, which is first part of song⁵. *F1* takes no part in this exchange. *F2* departs. *H* then threatens *F1* and *F1* departs. Both *F1* and *F2* perch on nearby cedars within about 20 feet of *H*.

Fourth adult heron, *F3*, appears close to *H*. *F3* approaches *H*. *H* continues song and dance. *F3* has pale yellowish legs. *F3* perches just beneath and close to *H*, and sits motionless, without any form of display. This posture resembles the 'crouch' of the female, but body is less depressed. (7:38) *H* stops singing, threatens and drives off *F3*.

⁵Noble *et al.* termed this the "peck-hiss" and considered it a combination of "the usual *peck* of territory defense with the snap-hiss ceremony" (song-dance). They state that it is "given by the male soon after a female has joined him and before the paired condition is fully established." Our observations indicate that this behavior is limited to male herons who wish to threaten and drive off females that are not 'ready' for pairing. It was not used against females with pink legs (see p. 13).

7:40—*H* continues song-dance display at rate of eight complete performances to the minute*. A fifth adult heron, *F4*, approaches and *H* picks up a loose twig from the nest and with the twig between mandibles bobs head up and down.

7:45—*F4* occupies position close to and below *H*. *H* rattles bill near head of *F4*, but one minute later threatens and drives off *F4*. Legs of *F4* very pale yellow with no evidence of pink.

Four herons that have been repulsed by *H* now perched close together. They are restless and appear to be watching *H* as well as each other. Occasionally one of them will attempt to fly toward *H*, and the nearest other one will fly at this bird, throwing it off balance. Both birds will then resume approximately their original perches. *H* meanwhile has resumed his song-dance display.

8:03—One of the four herons succeeds in reaching *H* again (we will term it *F5*). *F5* has yellow legs. *H* leaves nest and assumes perch immediately above. *F5* walks from perch beneath nest to nest rim and then stands in nest itself. *H* descends and climbs onto back of *F5*, who walks from under. Both perch on limbs near nest. *H* has stopped song-dance display.

8:15—*H* resumes song-dance. *F5* inactive. *H* moves in and out of nest, singing irregularly, preening beneath wings frequently, and grasping loose twigs and nearby branches and shaking them nervously.

8:20—*H* moves toward *F5*, clapping bill. *F5* turns head toward *H* and claps bill. *H* threatens *F5*, driving *F5* out on limb of nest tree. *H* returns to nest and shakes twigs and branches nervously. *F5* preens vicinity of brood patch.

8:21—*H* walks out on limb again, threatening and driving *F5* out of tree. *H* resumes song-dance from nest, *F5* perches in nearby tree near three other *F* birds.

8:25—*F5* approaches *H* but is repulsed.

8:35—*H* resumes song-dance.

8:36—*F5* flies to nest tree, perches on limb above nest. *H* suddenly stops song, moves toward *F5* with threatening posture and drives *F5* out on limb, returns to nest, but does not resume song. *H* resumes song-dance at irregular intervals. *F5* remains quiet, turned slightly away from *H*.

9:20—No change, except that singing is retarded throughout heronry.

10:02—No change. Left blind.

The behavior of *H* indicated that this heron was a male. Noble, *et al.*, assume that this behavior, the "snap-hiss ceremony," is "characteristic of the male before he secures a mate." We also observed male herons engaging in this ceremony after a mate had been secured and the clutch started. On one occasion a male heron went through the entire ceremony while standing on the back of a female, the female being crouched and therefore prepared for copulation. There was one egg on the nest. After a series of song-dance displays a successful copulation appeared to follow.

Hérons *F1* to *F5* were assumed to be females on the basis of behavior.

*Average number was seen. Noble, *et al.*, recorded 8 to 10 minute. Maximum number we recorded was twelve per minute.

Pairing behavior wherein the responsive bird (female) had pink or red legs is described in the following extract from field notes.

May 1, 1937—8:38 A.M. (E.D.S.T.)—Bird observed singing on nest about 60 feet north of blind. Legs very red. Another bird sitting about 8 feet away assumed to be a female. This bird also has red legs. Bird on nest faces this bird. Pulls twigs between songs and preens feathers of breast with a single stroke of the beak. Sitting bird shows little interest in song but seems to be watching.

8:45—Bird which had been sitting away from nest goes to bird on nest. Bird on nest erects feathers and plumes and, rattling, touches beak of other. They stand caressing beaks. Bird on nest reaches out with opened bill and erected plumes and shakes head at other.

Their subsequent behavior was typical of mated birds and there were eggs in the nest the following week-end.

We note that the male ceased singing as soon as a female with red legs approached and entered the next stage of the cycle: mutual caressing and copulation. We never observed this if the approaching female had yellow legs.

The male's singing display may result chiefly from a combination of (1) the male's physiological condition at this season, and (2) stimulation by the songs of others. Thus, according to this theory, an unmated male would continue to sing until other males ceased singing, or until an acceptable female responded. Mated males may sing and dance with diminishing interest and vigor, until the first one or two eggs of the clutch are deposited. However, such examples may prove to be the exception and ordinarily it would seem that this particular ceremony is no longer necessary after pairing has been accomplished, and therefore ceases altogether or is greatly retarded at this time.

Verwey (1930) quite definitely establishes a song in *Ardea cinerea* that is of vital significance in the reproductive cycle of that species. In *cinerea*, the male selects a nest site and sings from this location. Apparently the unattached females move from one singing male to another. When a male bird is "satisfied" with the visiting female, the song ceases. This, however, does not mean that the male will be satisfactory to the female, and if he is not, she will leave, and his singing begins again immediately. This procedure continues until two birds meet that are mutually satisfactory, and when this occurs, pairing follows.

It should be stated that Lorenz (1934) has mentioned a "nest-luring call" in *Nycticorax n. nycticorax*, which may be similar in most

respects to the song of our Black-crown. Bent (1926), quoting from Huxley's notes, speaks of a performance of the male Louisiana Heron (*Hydranassa tricolor ruficollis*) in which the bird "droops its wings, erects its neck vertically and its head almost so and gives vent to a groaning sound." Townsend (1928) describes the song of the Green Heron (*Butorides v. virescens*). The bird "stands erect on a perch and at intervals raises his head and neck, opens wide his bill and emits his curious song. The repetitions are irregular in time, sometimes only once, twice or three times a minute, sometimes eight or ten times and sometimes as often as ten times in a quarter of a minute. . . ." No mention of sex of bird giving this performance is made. There may be similar male songs in many or in all of the herons.



FIG. 1. Song—First position.



FIG. 2. Song—Second position.

The typical song of our Black-crown is always given in conjunction with some degree of bowing and leg movement. Occasionally the 'dance' is observed minus the song, but we believe the herons in these instances were males that never secured mates. Such performances were more frequently observed after incubation had begun.

The so-called dance is a *treading* movement. In the first position (figs. 1 to 5) the heron stands erect, neck extended. The legs are lifted alternately, and the toes flexed so that when the leg is lowered the toes are stretched to maximum length and as far apart as possible. As the leg comes up, the bird arches the back and extends the neck and head forward and down. The plumage of saddle, crown, neck, throat, and breast is raised; plumes are raised almost vertical or

vertical. The eyes are dilated and appear to literally 'pop' from their sockets. Their redness seems greatly accentuated. When the bill is almost level with the feet the song is given, and a preening movement usually follows. The dancing movements with legs and feet accompany the bowing throughout. The head is raised and the performance repeated. Series of songs are broken by twig-shaking and preening movements, which may be inserted either between each separate performance or between brief series.



FIG. 3. *Song—Third position.*



FIG. 4. *Song—Fourth position.* FIG. 5. *Song—Fifth (preening) position.*

The dance as distinct from the song-dance is described in notes of May 7, 1937:

Preen, lift right leg then left leg. Walk out on limb, preen, lift right, left, walk back on limb. Left leg, right leg, turn around. Right, left, preen. Quiet. Preen, shake twig below, repeat twig-shaking, preen in region of brood patch. Shake twig, turn around, right leg, left leg. Quiet, preen under wings. Right leg, left leg, etc., etc.

This particular heron, assumed to be an unmated male, continued a nearly unbroken series of dancing performances for thirty-six minutes (5:04—5:40 A.M.). He was in full adult plumage with two long plumes that reached almost to the middle of his back. He flew into a crotch in a cedar close to the top and near another heron that had been indulging in a partial dancing ceremony. This first bird moved out of sight a few minutes after the second heron began dancing. The second bird remained on the same limb forty-eight minutes. There

was no nest in this tree or in that particular section of the heronry. No other herons came near this individual during his performance and eventually he flew off. At this date, pair formation had not been completed in the heronry and it is possible that the individual described was a male that had not as yet reached the full development necessary to success at pairing. Response of a female to the dance only is a doubtful possibility.

Hérons observed later in the season (during the early incubation period) were seen performing greatly diminished dance ceremonies. These birds were congregated in a sector of the area in which there were no nests. They were assumed to be males that had not been successful in securing mates, possibly because of a retarded or incomplete physiological development that prevented the completion of their equipment for pairing.

We were unable to trap adult herons and therefore did not continue these pairing studies experimentally. For example, coloring the legs and mandibles and pasting a light patch on the lores of several marked birds that were known to be males from their behavior prior to pairing, might prevent success in finding a mate. Also plugging the ears of marked female birds might prevent response to pairing overtures of the male, and in male birds, might bring a halt to the song-dance ceremony. These and similar experiments will result in more definite and more comprehensive information on the pairing of this species than we have been able to assemble in these preliminary studies.

We found that, during the periods covered by this paper, there was little difference between day and night behavior. During the courtship period there is a pronounced lull in activities during the middle of the day, but during incubation and when there are young in the nest there is no appreciable difference in behavior. Other observers, working on other birds, have used various methods of night lighting. We did not attempt this, however, since we wished to avoid creating artificial conditions as much as possible.

It was known from the works of Gross (1923) and others that the young were fed throughout the night so that we concentrated on night courtship observation. The night of April 15, 1938 (11:30 P.M., April 15—7:12 A.M., April 16) was spent in the heronry. Since the night was rather overcast very little of the birds' behavior could be seen but one familiar with the song and other notes can obtain a very complete behavior picture by careful listening. No pause in courtship activity occurred at any time during the night.

COPULATION

Copulation usually takes place at or near the nest site. It is mutual, never coercive within the record of our observation.

Copulation usually occurs after a pair has been sitting quietly for some time near the nest site or on the nest. The birds often occupy the nest together during this period. Verwey also found this true of *cinerea*. The phase of the cycle immediately preceding copulation is a quiescent period, somewhat similar to the "bethrothal period" (Nice, 1937) of the Song Sparrow (*Melospiza melodia beata*). This is not



FIG. 6. Typical greeting ceremony.

characterized by total inactivity, however, for it is at this time that the singing of the male reaches its peak. This singing takes place when the female is absent, and the presence of the female is characterized by quiescence on the part of both birds. Thus, the general picture consists of lone singing males, pairs sitting quietly together, and occa-



FIG. 7. Crouch of female.

FIG. 8. Typical copulatory positions.

sional copulation. In Florida, where the natives may have an intimate acquaintance with members of the heron family, it is not unusual to find a typical 'cracker' who is well versed in certain phases of bird

behavior. Audubon wardens engaged in locating nesting 'rookeries' along the southwest Florida coast describe almost perfectly the 'betrothal period.' This 'settin' around,' as they term it, is evidently well known to the bird-wise native. See also Huxley (1916).

A few typical instances of observed copulation are given here as they appear in the notes.

1. Two birds in tree near nest sitting about six feet apart. Male approaches female. Both erect feathers and touch beaks—beaks at this time are open. Sit close together and caress each other's heads with their beaks. Male then casually walks around female and mounts. Copulation takes place. After act, birds preen feathers and remain in tree.

2. A female flies to tree in which male is sitting. Caress beaks—female then goes to branch below and stretches neck as if inviting male, who then mounts female. After act birds sit quietly and preen.

3. Two birds sitting on nest together. After some moving about and some caressing, male mounts female. Copulation occurs. Female stays on nest. Male moves about one foot away. Female shakes head vigorously upon completion of the act.

4. Male at irregular intervals breaks off a twig from the tree and presents it to female on nest. Female works twig into structure. Male then sits on nest with female and caresses back, neck, breast and beak of female. Male mounts female without display. After act, caressing ceases for some time.

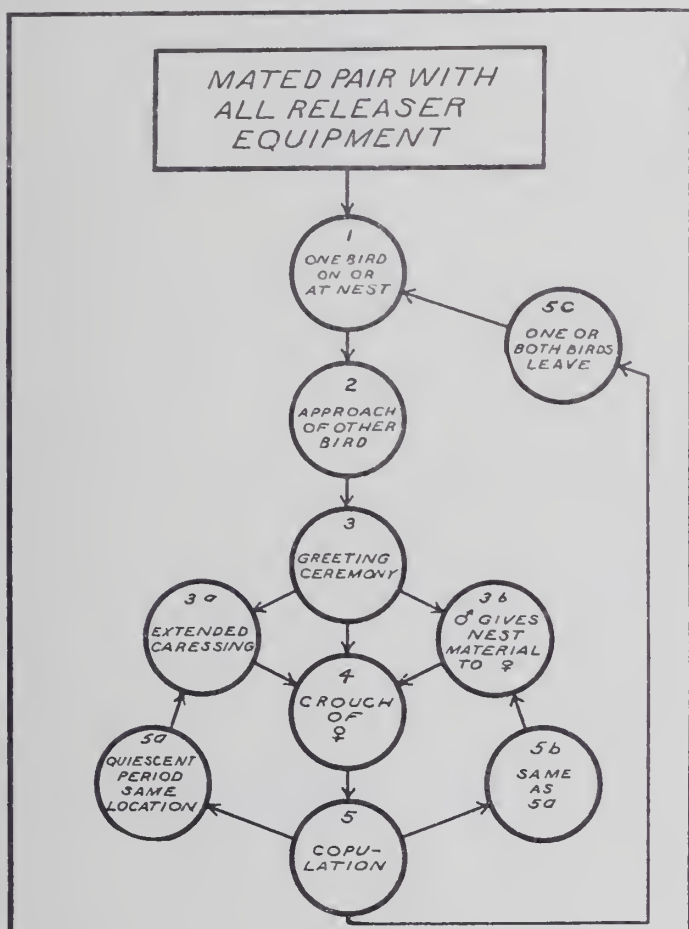
5. Pair of birds alight in tree—remain several minutes. Female proceeds to nest. Male immediately follows. Both birds erect feathers, stretch out necks, touch beaks, rattle beaks, shake heads and call *wok wok* softly. Copulation occurs.

The erecting of feathers and plumes and rattling of beaks mentioned in the foregoing notes is the usual greeting ceremony. This is performed by the members of the pair when they meet both before the eggs are laid and during incubation preceding each nest relief. A series of soft '*wok wok*' notes accompanies the bill rattling (fig. 6).

The diagram presents a chronological sequence of the steps in the copulatory behavior of a mated pair. It is evident that there are five steps leading to the initial copulation. Subsequent copulations follow the original sequence of a shortened form as indicated in the diagram. In this shortened form, step 3a is characteristic during the early copulatory period and 3b later on and up to egg laying. (Fig. 6 shows step 3, fig. 7 step 4, fig. 8 step 5, fig. 9 shows quiescent state.)

The action of each of these steps upon the next step following has important releaser significance. This action may be explained by comparing it to the method used by barbaric African tribes in sending a message over long distances. Drum beats at point *A* are relayed one hundred miles or more to point *B*, which is entirely beyond sight and sound of *A*. However, relay drums at regular inter-

vals between *A* and *B* are essential in transmitting the message and are comparable to the essential steps in our diagram. In other words, the special behavior of each step releases the behavior that characterizes the following step, and so on. We believe that this is a purely mechanical process and that the heron cannot see beyond the next step



Dr. Lorenz (in lit.) has pointed out that single steps in such a chain may be skipped. The single subsequent actions may have different thresholds in the intensity of specific excitation necessary for their being released. If the level of intensity is raised by damming up the reaction (by taking 2way specific stimulation) a very high

level may be reached without releasing any reaction. If then the proper stimulus is presented, the highest intensity reaction may result at once without those usually preceding it. Thus Verwey saw copulation at once when females were secured by male herons (*Ardea cin-*



FIG 9. 'Quiescent' position.

erea) who had been unable to secure mates for a long period. Lorenz (in lit.) states, "It is well to remember that there are *two* chains of events guaranteeing the sequence of actions: (a) the sequence of thresholds and (b) the corresponding chain of releasers, acting with a stimulating function absolutely correlated with the reactional intensity of the action itself."

Verwey states: "Almost the whole behavior of the Fischreiher (*Ardea cinerea*) takes its course artificially . . . that the actions are to be taken as the more or less direct reaction on the incentive." The pairing, copulatory and intermediate behavior has been explained (Noble, *et al.*) by a shift in dominance from male to female and then back again. This is based on similar observed positions of dominance in immature birds when pairs are formed regardless of sex. We have observed no such immature pairs under natural conditions, nor any



FIG. 10. Male breaking off nest material.

evidence of peck order. It would appear that peck order is a phenomenon that is associated closely with caged bird behavior. Nice (1939) found evidence of peck order in the Song Sparrow (*Melospiza melodia beata*), a highly territorial bird, when confined.

Nest construction in the Black-crown is not to be regarded as a separate step in the reproductive cycle. In the diagram we have noted step 3b, "Presentation of nest material to the female," which, as mentioned, is characteristic of the later stage of the copulatory period and persists until long after the eggs are laid.

Twigs are obtained by the male by breaking them from trees (fig. 10) and occasionally by picking them up from the ground. In the absence of the female, males are seen working twigs into the nest structure but we have not seen a female do this except with twigs presented to her by a male bird. This presentation is accompanied by behavior similar to the greeting ceremony (fig. 11). In these observations sex was determined by subsequent behavior. No first-year birds were observed breeding. Since they arrived much later and are never very numerous, their chances of getting a mate are rather slim. We never saw a first-year bird with red legs, with plumes or singing, although Noble, *et al.*, observed this under artificial conditions.



FIG. 11. Typical twig-presentation, male to female.

Aside from its importance as a receptacle for the eggs and young, the nest is of great importance as a bond between the members of the pair. During the 'honeymoon' period, the approach of the female to the nest is the signal for the male to renew activity and copulation usually follows. As will be shown in experiments to follow, the nest or nest site exerts a far stronger influence on the birds than does the contents.

INCUBATION

Continuous incubation with the Black-crown begins with the first egg, and is of about twenty-four days' duration. Incubation is performed by both sexes; the exact amount of time and period of the day for each sex was not observed.

The nest relief ceremony was observed many times, and there is little variation in the procedure. The relieving bird approaches the nest and goes through the usual greeting ceremony, which is responded

to in a like manner by the brooding bird. The change takes place following this display. The length of the display appears to depend upon the willingness or reluctance of the brooding bird to be relieved.

As in copulation, the bond between the pair appears to be the nest or nest site. The eggs or young cannot very well have significance as a bond, as neither are recognizable to the parent.

In order to test the ability of this species to recognize their eggs, we painted eggs with different colors and color patterns, and in addition substituted for the eggs foreign objects such as wooden cubes, wooden spools, china eggs and rubber balls. We also tested the Black-crown's ability to recognize their young by removing young and substituting eggs from a nearby nest. Out of a large number of experiments the following are typical:

Experiment 1. *Recognition of eggs.*—Part 1.

Climbed tree *F* to nest *Y*, which contained four eggs. Painted horizontal lines in bright red on surface of each egg (5:05 A.M.). Returned to blind. Herons in nearby nests returned at 5:20. Bird returned to painted eggs in nest *Y* at 5:35 and after peering into nest momentarily, settled on the painted eggs and brooded them without further behavior of unusual nature.

This experiment was repeated several times with different colors and patterns. All birds accepted the painted eggs. Incidentally, all of these eggs hatched without complication.

Experiment 1. *Recognition of eggs.*—Part 2.

a. Replaced three eggs in nest *WW* with three spools (10:30 A.M.). Usual cotton thread spool used. Bird returned to tree 10:48 and perched above nest. At 10:49 bird settled on nest in normal manner. Sat rather high and seemed to have some difficulty adjusting spools to brood patch. At 10:51 bird was brooding normally.

b. Selected two nests, one (*N7*) an empty nest about four feet below *N8*, which contained four eggs. At 8:52 four eggs in *N8* placed in *N7* and four wooden cubes placed in *N8* to replace eggs. These cubes were $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $1\frac{1}{2}$ ", and of unpainted wood. At 9:05 bird arrived in top of nest tree, and at 9:06½ bird is brooding blocks in normal manner and pays no attention to its real eggs in *N7*, although at first it had some difficulty in arranging blocks in brood patch. Bird continues to sit normally.

Experiment 2. *Recognition of young.*—Part 1.

Selected two nests, one of which (*N8*) contained four eggs, the other (*N9*) four young. At 9:28, the contents of these nests were exchanged. At 9:33 the adult bird returned to *N8* and covered young. At 9:35 adult of other pair returned to *N9*, stood above nest and inspected eggs. At 10:22 this bird settled on eggs. Young birds in this experiment about four days old. At 11:00 no change. Seven days later, young thriving in both *N8* and *N9*.

Another experiment gave results which appeared to be strikingly different, but which ultimately presented similar results.

Experiment 2. *Recognition of young.*—Part 2.

Placed three young from nest *U* in nest *V* and three eggs from *V* in nest *U*. Nest *U* is four feet above nest *V* in same tree. Adults from both nests returned and bird that had been caring for vigorous young approximately fifteen to twenty days old, accepted the substituted eggs without the slightest hesitation. However, adult from nest *V* seemed startled upon seeing young in nest and struck at them, showing a partial attack reaction, which lacked the usual outcry and violence. The young struck back vigorously, a natural counter reaction. The foster adult retired to nearby limb and the young began their normal food call. This caused an uneasiness in their actual parent, brooding the substituted eggs in the nest above. Again the foster adult attempted to approach the young in nest *V*. The attacks were repeated on both sides. This time the actual parent left the nest above and attacked the foster parent, driving it off. The actual parent then approached the young in the usual, stealthy manner—a crouching walk, with head lowered, neck pulled in—and was accepted by the young without question. It brooded the young, but soon became restless and returned to its own nest. This stealthy, crouched approach is shown in the photographs. The foster adult—presumably the same that had recently retired—returned and again approached young. In spite of their antagonism it forced itself upon the young and brooded them. The mate of the foster parent returned to the nest. It simply relieved the first foster parent without complications. This marked the end of abnormal behavior on the part of either pair.

On analyzing the above experiment it can be readily seen that there was actually no recognition of the young birds as their own by either pair. Each step on the part of all the birds concerned was a normal reaction to the preceding stimulus. The hesitation of the foster parent returning to its nest and finding young instead of eggs is due to the fact that the bird naturally accepts very small young but must be conditioned to them in the more advanced stages of growth. In part 1 of the experiment, the young were small, inactive and practically the same as newly hatched birds so that no conditioning was necessary to elicit a normal reaction. The ultimate acceptance of these young by the foster parent can be explained by the strong nest tie, which overcame the lack of conditioning. In the case of the second foster parent, we have the normal reaction of a relieving bird. The fact that the upper bird defended the young in the lower nest can be explained by the fact that it was already conditioned to react to the alarm call of the young. However, this bird was also overpowered by the strength of the nest tie.

Another experiment showed the bird's inability to recognize its eggs and demonstrated as well the strength of attachment to the nest. A false nest was constructed next to the actual nest (see plate 4) and the clutch placed therein. Wood blocks were placed in the actual nest. As can be seen in the photo, the bird returned to the nest and brooded the wooden blocks, paying no attention to its eggs.

There is a territory about the nest which is roughly an ellipsoid, with the nest at the center. This ellipsoid has a long, horizontal diameter of about 8' (variable) and a short vertical diameter of about 4'.

Vertical territorial limits are governed seemingly by the distance the bird can reach with its beak without leaving the nest. The determining factors of the horizontal territory limits are not known. No evidence of territory on the feeding grounds has been observed, all birds feeding peacefully together as at any other time of the year. The existence of three-dimensional territory appears to have been first mentioned by Palmgren (1933). Williams (1936) describes two nests of the Red-eyed Vireo (*Vireo olivaceus*), one of which was approximately 64' directly over the other. Urner (in lit.) has described similar territories in the Eastern Robin (*Turdus migratorius*). In such cases it is suggested that in the definitions of territory of Mayr (1935) and Tinbergen (1939) the term 'area' be replaced by the term 'space.'

FOOD AND CARE OF YOUNG

Young Night Herons start calling for food shortly after hatching. This call is an incessant *chip, chip, chip*, as if two stones were struck together so as to scrape slightly when striking. The exact age of the bird at the time of the first feeding is not known. Both parents feed the young. Feeding usually occurs just after the bird has relieved its mate on the nest. No voluntary attempt to feed is made, feeding being a response to clamorous begging on the part of the nestlings. Here again we have blind action being released by a set stimulus. The heron feeds its young not because it knows they need food but because the behavior of the young releases the feeding action.

Feeding evidently takes place only at the nest, although there may be exceptions in the same species under artificial conditions (Lorenz, 1934).

Gross (1923) goes into some detail in describing the food of the Black-crown, and his data indicate that there is variation from one locality to another, which would seem to demonstrate the importance of availability. Our observation of the food habits of the herons at Massapequa show that mice (*Microtus pennsylvanicus*) form a major item of diet when their abundance makes large numbers of mice available. In 1935 they ate *Microtus* to the almost complete exclusion of other items. However, in 1936 and 1937 these birds turned to fish as an exclusive diet and no evidence was obtained of *Microtus* being taken in even a single instance. The *Microtus* cycle in the Great Lakes Region reached a periodic low in 1936 (Wing, in lit.). Apparently

this low extended to Long Island where it was not only evidenced by a marked change in the feeding habits of the Black-crowns but by a scarcity of the usual wintering Rough-legged Hawks (*Buteo lagopus s. johannis*), also a mouse-eating species.

The importance of availability is discussed by Elton (1935) in connection with the size of food taken by various animals. The smaller the size of the prey the greater the number that must be taken. Consequently, when *Microtus* are scarce a sufficient number cannot be caught per unit of time to satisfy the food requirement, therefore, a larger or more numerous prey must be taken. Elton points out: "Foxes find it worthwhile to live entirely on mice in the years when the latter are very abundant, but prey on larger animals, like rabbits, at other times."

GENERAL PICTURE OF HERONRY

We have given a close-up of various phases in the life cycle and we now give a general picture of the rookery as a whole. As already mentioned, each separate phase is not reached simultaneously by all the pairs, and all stages may be observed during that period beginning with the first eggs and ending with the first young. The end of egg laying occurs just about the time the first young appear. Therefore, we have roughly, the following general periods for the rookery as a whole:

- A. Flock units
 - No obvious pairs
 - Singing
 - Some copulation
 - No nests
- B. Pairs formed
 - Copulation
 - Occupation of nests
 - Singing.
- C. Pairs intact
 - Eggs
 - Copulation (diminishing)
 - Singing (diminishing)
 - Nest of major importance
- D. Pairs intact
 - Eggs and young
 - Copulation ceased
 - Singing ceased
 - Nest still highly important
- E. Young in all states
 - Pairs breaking up
 - Nests with young still important, others deserted.

We observed what were ultimately considered as unmated males, occupying perches in a remote corner of the heronry where they went through the singing performance. This singing was not done at or near a nest or nest site, but from the upper branches of nestless trees. It produced no response on the part of other herons, although the most extended song periods were recorded in these instances. As mentioned, one bird, evidently an unmated male, sang for thirty-six minutes without cessation, but did not dance throughout this performance.

The foregoing does not necessarily prove that there is an unbalanced sex ratio in the Night Heron, and that there is a preponderance of males. There could have been any number of unmated females whose presence it would be almost impossible to detect since we know of no special behavior, such as singing, in the case of the male, which would distinguish them from other herons.

If there is a balanced sex ratio, then there are several conclusions that might be reached. Possibly in a certain percentage of both sexes some physiological deficiency prevents successful pairing. Nothing further can be said until the presence of unmated females is definitely established.

At the Massapequa heronry only one predator was observed, the crow (*ossifragus* and *brachyrhynchos*) and the damage done was considerable in number of eggs destroyed. However, the net effect of the crow after being counterbalanced by replacement of destroyed eggs by the female herons, is impossible to state without further data, but from our observation would seem to be of no great importance to the survival of the species in its present number.

The attitude of the herons, as a group, toward the crows is in no way hostile, thereby differing greatly from the tern-gull relationship, for example, except when the crow is in the act of robbing a nest or in the territory previously described. Then the crow will be driven away by the owner of the nest. No other herons show the slightest concern over the pilfering of a neighboring nest.

No evidence was obtained indicating that the Black-crowns in the Massapequa heronry raise second broods. Other herons are reported as raising second broods in Florida (Grimes, in lit.) but the question is raised as to whether these are actually second broods or merely later nestings by pairs which were unsuccessful the first time.

In the initial situation, the arrival at the heronry site, the physiological condition of the individual and, therefore, of the heron's equipment (plumes, red legs, etc.,) are the outstanding releasers. But with

the incubation the legs fade to the usual yellow. Is a change in the gonads responsible? Can a second change take place, giving the legs a reddish hue for a second time in the same season?

Recrudescence of courtship behavior or copulation was not definitely observed among birds that had raised first broods. Lorenz (in lit.) states, however, that his herons (*Nycticorax n. nycticorax*) always attained red legs the second time and rarely a third time.

The resumption of the flock unit is casual to all appearances. The post-nuptial flock is made up indiscriminately of adults and immatures.

SUMMARY

1. The Black-crowned Night Heron has an elaborate courtship display in which, we believe, (a) a change in the color of the legs, (b) the plumes, and (c) the song play important parts as constituents of rather complicated releasers.

2. The behavior of the Black-crowned Night Heron upon arrival at the heronry depends to a considerable extent upon temperature. The normal cool temperatures of spring so inhibit the instinctive actions of the bird that a much shorter period elapses between the beginning of pairing and egg-laying than occurs under the abnormal conditions of captivity. This inhibition causes an accumulation of instinctive actions resulting in a higher intensity and a lower threshold of reaction.

3. We find no evidence of peck order or of dominance and believe that they are strictly cage-bird phenomena.

4. There is no important difference between day and night behavior during the 'courtship' period.

5. The construction of the nest is an integral part of the courtship and the nest forms a very powerful bond between the members of the pair.

6. The Black-crown is unable to recognize its eggs and will accept almost any object of comparable size in their place. It also seems unable to differentiate between its own young and the young of other Black-crowns. However, the nest exerts such a powerful attraction that it may overbalance other stimuli in these experiments.

7. The food of the Black-crown on Long Island consists chiefly of fish or mice depending upon the laws of availability.

8. A small territory about the nest is vigorously defended. However, this may not be 'territory' in the generally accepted sense of this term.

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General Notes

Faunal Records from Eastern New York State.— In order to complete the picture of the avifauna north of the New York Region, the following sight records of birds that are relatively rare for Schenectady County, are herewith presented:

BLUE-WINGED TEAL.—A nervous female and five small young were seen on July 18 and 20, 1939. Sixteen miles away a second pair with seven young were also observed on August 3rd.

TURKEY VULTURE.—Studied on May 6, 1939; contrary to many authorities the bird was observed to be flapping and sailing while soaring with spread tail. Details of the observation were sent to A. C. Bent who confirmed the identification.

GREAT BLACK-BACKED GULL.—One, carefully observed along the Mohawk River, April 14, 1939; apparently the first county record.

MOCKINGBIRD.—Photographed at the feeding station of B. D. Miller of Schenectady; arrived in late March, 1939, began to sing April 1st and disappeared about mid-April; first county record although this species has been reported in spring from nearby Albany in 1900 and in 1928.

ORANGE-CROWNED WARBLER.—Observed May 10 and May 16, 1934, and again on May 11, 1939, at Vale Cemetery in Schenectady; previously reported by Eaton, May 10, 1916.

NORTHERN PRAIRIE WARBLER.—This species is still very rare here although I am told it is rapidly increasing in the Northeast. In the rolling scrub oak-pine country known as the Pine Bush section halfway between Albany and Schenectady, Dr. Bronson, of the New York State Teachers College, observed one of these birds some years prior to 1937. About the middle of May, in 1937, Dr. Homer D. House discovered another bird in the same habitat, and Edgar Bedell and the writer have now ascertained that a colony of about two dozen pairs resides there.

MIGRANT SHRIKE.—Bedell and the writer found an apparently breeding pair along the Schenectady—Saratoga Road, from June to August, 1939.

PHILADELPHIA VIREO.—Seen well on May 19 and August 28, 1939. The fall arrival for New England is given by Forbush as September 7th.

ORCHARD ORIOLE.—A singing first-year male was observed in the Collins Lake section, June 11, 1939.

JOSEPH JANIEC, Schenectady, N. Y.

A Doubtful Occurrence of the Reddish Egret in New Jersey.—

A specimen of the Reddish Egret, *Dichromanassa rufescens*, now in the American Museum of Natural History has a label reading "Egg Harbor, New Jersey. Coll. (Collection of) Geo. N. Lawrence." If this locality is correct, the record represents the only occurrence of this heron in the north-eastern United States. The skin is that of a bird in first-winter or perhaps retarded adult plumage, presumably a non-breeding bird, and as it was taken when this species was still abundant in Florida, this individual may quite possibly have wandered north to New Jersey.

Lawrence did not include the Reddish Egret in his *Catalogue of Birds observed on New York, Long and Staten Islands, and the adjacent parts of New Jersey*, published in 1866 (*Ann. Lyc. Nat. His. N. Y.*, v. 8, p. 292). His collection was not purchased by the museum until 1887, so the undated specimen may have been acquired after the appearance of the list. However, reference to the manuscript copy of this article, which fortunately still exists, shows that the Reddish Egret was included and then crossed out; it is the only species thus deleted. Opposite its name in the margin is the word "Note" used in the manuscript to designate birds of rare occurrence which were annotated in the published "Catalogue . . ." Lawrence, then, rejected this record for reasons unknown but suggested, perhaps, by an admonition of Mr. Ludlow Griscom (to whom I am indebted for comments regarding this specimen): "Remember that several very dubious birds were purported to have been secured at Egg Harbor, New Jersey, a century or so ago."

This specimen has apparently been overlooked during the compilation of all modern lists of New Jersey birds. Hence it seems best to present the above evidence against the validity of the record before the facts are further obscured by the passage of time.

DEAN AMADON.

A Nest of the Black Duck (*Anas rubripes*).—On March 10, 1938, the first migratory Black Ducks appeared in the Clarence Fahnestock Memorial State Park in Putnam County. One pair eventually settled in a marsh not fifty feet from the parkway, laying their first egg on March 21st. The set was completed on April 2nd when the twelfth egg was laid. This early date may be contrasted to the dates beginning with April 2 listed by Forbush (1925) for New England, and April 5 for Montauk and April 19 given by Chapman (1932).

In characteristic fashion no lining was put into the nest until the last egg was laid. Daily visits were made to the nest and on April 27

at 6:30 P.M. the female was observed to be still brooding. At 8 A.M. the next day only a few bits of shell were found in the nest and a search of the surrounding area revealed the adult and twelve young in a wooded swamp across the parkway from the nest. The period of twenty-six days' incubation was a normal one, according to data in Bent (1923), but it is interesting to note that on April 6th a heavy fall of snow occurred and on April 7th, the female was brooding surrounded by a six-inch blanket of snow. In spite of this, there was a hundred percent hatch and as late as May 6th the entire family was found intact.

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ALLEN FROST.

Albinism in Gulls.—On December 19, 1938, at Jones Inlet, Long Island, I was startled to see a pure white gull of small size. Being very familiar with our two regular white-winged gulls, the Glaucous (*Larus hyperboreus*) and Iceland (*Larus leucopterus*), I naturally immediately suspected that I was seeing my first Ivory Gull (*Pagophila alba*), a species of extreme rarity in any part of the United States. The bird was uniformly snowy white, entirely too small to be even a minimum sized Iceland Gull and its flight was far too rapid and graceful. I studied the bird intently as it flew down the middle of the inlet darting to snatch particles of food from the water.

The bird was a bit too far off for me to record accurately the coloration of the feet and bill but its size and coloration had me feeling certain that it could be nothing but an Ivory Gull. When the bird, however, flew into a group of Bonaparte's Gulls (*Larus philadelphia*) and its size, actions and wing beats were seen to be identical, I realized that it was not an Ivory Gull that I was observing but a perfect albino Bonaparte's Gull. A half hour's observation of this bird as it mingled with this flock of Bonaparte's Gulls flying, feeding and at rest leaves not the slightest doubt in my mind that it was of the same species.

Singularly, a light flight of Ivory Gulls actually did reach the New England coast the following winter. Sight records were reported by Griscom from Newburyport, Gloucester (2) and Rockport in mid-January, 1940, and an actual specimen found on the shore at Island Beach, New Jersey, on February 3, 1940, is now preserved in the Museum of Princeton University. During this flight my albino could

very well have been alone and momentarily darted in to some inlet; an observer could easily be convinced that he had seen an Ivory Gull. It is true that even a small Ivory Gull is slightly larger than a large Bonaparte's Gull . . . but then size is deceptive. This discussion naturally brings up the whole question of albino gulls. Unquestionably such birds are extremely rare but I am led to wonder whether albino Herring Gulls, Ring-billed Gulls, Bonaparte's Gulls, *et al.*, are not often seen and reported as something else.

ALLAN D. CRUICKSHANK.

The Breeding of the Herring Gull (*Larus argentatus smithsonianus*) on Long Island in 1939.—The 1937-1938 Report of the Field Work Committee by R. P. Allen (1938) lists only two Long Island colonies for this species in 1937, one on Wicopesset Island and the other on Cartwright Island, without attempting to estimate the number of pairs. However, in another note, LeRoy Wilcox (1938) records 30 or 40 pairs for Cartwright Island in 1938. No other attempts have apparently been made to find out just how many pairs breed in the area. Inasmuch as this species is a comparatively recent breeder and seems to be spreading, it appears that the only way to keep track of it properly is to record the location of the colonies and their approximate population for 1939. Then there will be a sound basis for future work in calculating the rate of increase or decrease from season to season.

The number of colonies, in two groups of islands off the eastern tip of Long Island, has increased to five. The location and known age of each colony and an estimate of the number of pairs in each for 1939 follow:

Group	Colony	Year First Known	Estimated No. of Pairs
Fishers Is.	East end	1939	20
	Wicopesset Is.	?	750
Gardiner's Is.	Bostwick Bay	1939	12
	Great Pond	1939	150
	Cartwright Is.	1936	125
Total			1057

The first-named colony was definitely new that year. The same cannot be said for the other two, which were first known in 1939, but judging from their size it is probable that the Bostwick Bay colony was a new one, and just as probable that the one at Great Pond was as old or older than the one on Cartwright Island, which it slightly exceeded in size. John L. Helmuth of Easthampton, L. I., in 1936

found a set of eggs of this species and about a dozen pairs of very excited adults on Cartwright Island. This is apparently the first record of their breeding in this group. According to Dr. William T. Helmuth, also of Easthampton, the number of nesting pairs on Cartwright in 1937 was about the same as that estimated by Wilcox for 1938.

Dr. Helmuth also reported that he had found a set of eggs of this species and several nesting hollows on Goff Point in 1939. This is on the mainland, south and a little east of Cartwright Island. Unfortunately, on a later visit, they were found to have been deserted. Wilcox had the same experience with a set of eggs he found in 1938 on the west side of Moriches Inlet, a location which was not used in 1939. These attempts seem to indicate that the species is still extending its range and that a close watch will have to be kept on all likely locations if we are to get an accurate picture of its spread.

I am indebted to Wilfred C. O'Brien of Noank, Conn., for the data he supplied on the Fishers Island group.

ALLEN, R. P. 1938. Report of the Field Work Committee, 1937-38. *Proc. Linn. Soc. N. Y.*, 49: 84-92.

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CHRISTOPHER K. MCKEEVER.

A Christmas Census of Banded Herring Gulls.—On December 23, 1939, a systematic count of *Larus argentatus smithsonianus* was made in the general vicinity of New York City by E. Adelberg, R. Arbib, M. Brooks, A. D. Cruickshank, J. Elliott, S. C. Harriot, J. J. Hickey, J. Mayer, T. S. Pettit, O. K. Stephenson, Jr., and H. M. Van Deusen. These eleven observers, working in eight parties, thoroughly covered Jamaica Bay, the East River, most of the upper New York Bay, nearly all of the north shore of Long Island, and a concentration at Freeport. Age ratios were reported as follows:

Locality	Number of Gulls Seen	Number of			
		1st Year	2nd Year	3rd Year	Adult
Jamaica Bay	3700	33%	12%	25%	30%
Staten Island	2156	23%	—	77%	—
Brooklyn and Queens.....	4792	20%	8%	4%	68%
The Bronx	1400	28%	14%	12%	46%
Freeport	700	—	45%	—	55%
Fulton Fish Market.....	235	32%	6%	11%	51%
North Shore	970	.....	.....	.....	.....
Totals	13,953	3116	2866	1298	5518

It is interesting to note that the total number of approximately 14,000 birds is far less than estimates reported in *Bird-Lore's* Christmas censuses for this region. Every major concentration point near New York was checked, however, with the exception of a few in New Jersey and two in Connecticut. Based on impressions from two previous years' work of this sort, we would say that the numbers of first-year birds are too high, those of adults too low. In addition the following birds with colored bands were seen:

	1937	1938	1939	Totals
St. Mary Islands, P. Q.....	1	1	—	2
Razades Islands, P. Q.....	2	3	4	9
Kent Island, N. B.....	6	9	6	21
Duck Islands, Maine.....	—	2	—	2
Muscongus Bay, Maine.....	2	10	3	15
Heron Islands, Maine.....	2	—	—	2
Isles of Shoals, N. H.....	—	—	3	3
Penikese Island, Mass.....	1	1	1	3
Wicopesset Island, N. Y.....	1	1	—	2
	—	—	—	—
	15	27	17	59
Kent Island, N. B. (adults).....	1	1	—	2

In only a few cases were the conditions suitable to a thorough search for marked birds, so that the 61 listed above represent but a fraction of those banded gulls actually present in this region at the time of the census. Four birds also wore defective combinations as a result of one celluloid band breaking or falling off; two adult gulls wore aluminum bands only.

——— 1940. Bird-Lore's Fortieth Christmas Census. *Bird-Lore*, 42:66-136.

R. ARBIB ET AL. 1939. First Census of Banded Herring Gulls. *Bird-Lore*, 41:56. Suppl.

SAMUEL C. HARRIOT and JOSEPH J. HICKEY,
for the Gull Survey Committee.

Scandinavian Lesser Black-backed Gull on Long Island.— While examining a flock of gulls, which were on Oyster Bay Bird Sanctuary pond at Jones Beach, Long Island on October 30, 1939, I found one which I identified as an adult Scandinavian Lesser Black-backed Gull (*Larus fuscus fuscus*).

I observed the bird carefully from about 8:18 A.M. to 9:08 A.M. with a 50X telescope in good light at a distance of about four hundred feet. Direct comparison with 125 Herring Gulls (*Larus argentatus smithsonianus*) and some 50 Great Black-backed Gulls (*Larus marinus*) was available.

The bill was of the common, larger, adult *Laridae* type (yellow with a red spot on the downward projecting angle). It was rather

dull, resembling some of the other adult birds which were going into winter plumage. I noticed that both bill and bird were slightly smaller than some and larger than others of the surrounding Herring Gulls. This is in accordance with the measurements in Witherby (1920-24) relative to these species. The head, upper parts to the beginning of the mantle, under parts and tail were pure white, except for a slight grayness in the posterior auricular area, extending to, but not including the nape. The back and wings were slaty black and in this respect agreed with the mantles of the adult Great Black-backed Gulls standing beside it. The feet and legs were distinctly yellow.

On January 13, my wife and I saw what I believe was the same bird on an ice-covered pond near the same place. The head and neck were slightly streaked, otherwise it was similar to the October 13th specimen. The dark mantle and yellow feet and legs were very evident. There was very little, if any, streaking on the throat and breast, which were white as were the rest of the under parts. Subsequently, I visited the American Museum of Natural History and examined a series of Scandinavian and British Lesser Black-backed and a number of Great Black-backed Gull skins, which convinced me that I had obtained the first sight record of the Scandinavian Lesser Black-backed Gull for Long Island and one of the very few for North America. On February 22, 1940, Mr. and Mrs. Allan D. Cruickshank found a Lesser Black-backed Gull at Heckscher State Park, Long Island, N. Y., in a flock of Herring Gulls and 3 Great Black-backed Gulls. They informed me that it was similar in size to *argentatus* and that its back and wings matched *L. marinus* in color, obviously being *Larus f. fuscus*.

Previous records of this subspecies in North America are limited to two sight identifications, one in New Jersey (Edwards, 1935) and one in Florida (Sprunt, 1938). Records of *graellsii* include a specimen from Greenland (*A. O. U. Check-List*) and sight records in New York (J. and R. Kuerzi, 1935) and New Jersey (by C. A. Urner; Sedwitz, 1940).

———. 1931. *Check-List of North American Birds* (Fourth Edition).

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JOHN ELLIOTT.

A Note on the 'Begging' of Nestling Flickers.—Konrad Lorenz (1935), speaking of the release of the gaping (or 'begging') reaction in nestling birds, remarked ". . . very many young hole-nesters begin to beg when darkness descends, because to them the darkening of the entrance of the cave or hollow in which they are situated always means the arrival of the parent bird . . ." (transl.)* This statement, with no supporting examples, was the only published discussion of this particular problem, until the experiments of Tinbergen and Kuenen (1939) on the European Blackbird (*Turdus merula*), a species that builds its nest in the open, showed that young of that species raised in the laboratory, do not gape in response to lessened illumination. Slightly later, Holzapfel (1939) showed that young of the Starling (*Sturnus vulgaris*), which builds its nests in holes, do not gape at lessened illumination either. Consequently the following simple experiment, while not at all conclusive, constitutes, so far as we know, the first definite evidence for Lorenz's statement, and is therefore worth publishing.

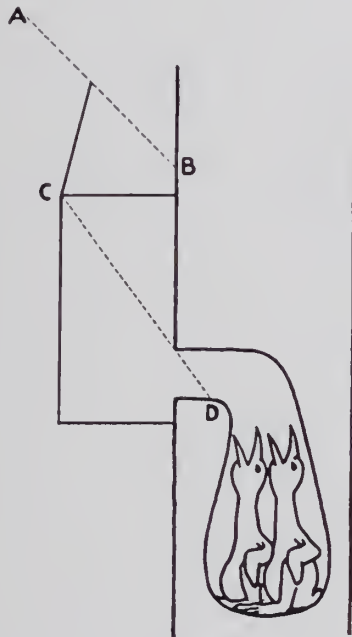
On June 7, 1939, in Van Cortlandt Park, the Bronx, N. Y., we discovered a nest of the Flicker (*Colaptes auratus luteus*), containing three half-grown young, in a telegraph pole; the external opening of the nest was only about two feet from the ground. We were able to cause the fledglings to gape by various methods—tapping the pole, making clicking noises, moving our hands in front of the hole, etc. By looking into the hole, we noted that we could always tell whether the young were gaping or not by a characteristic, continuous note, given only when they were gaping.

In order to test the effect of diminishing illumination, we arranged the following experiment: An ordinary shoebox (12" x 6" x 6") was used. We tore the two side-fastenings of one end, so that it was attached to the box only by a single hinge. We placed the box against the pole, its lower end flush with the lower edge of the opening, the hinged flap at its upper end.

The line AB indicates the angle of the sun. Therefore no movement of the flap could be reflected in a movement of a shadow inside the nest. The line CD indicates that the birds at no time could see the movement of the flap directly. Therefore the only optical stimulus presented by a lowering of the flap must be a darkening of the nest. When we lowered the flap, absolutely soundlessly, a loud begging call was instantly started by the birds. If we waited for it to die down (a

*We are indebted to Dr. G. K. Noble for the translation of Lorenz's paper.

matter of 20 seconds or so), and then raised the flap, there was a slight reaction, but very much weaker than that resulting from darkening. We repeated this experiment four times, each time with the same result.



This experiment does not, of course, indicate whether the stimulus-pattern is inborn or learned (Tinbergen and Kuenen showed that all the elements of the gaping-releaser in *Turdus* are inborn). But it seems to show that young Flickers gape at decreased illumination. We publish this note as a suggestion, since neither of us has, at present, any intention of investigating the problem further.

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DANIEL S. LEHRMAN and ORLANDO K. STEPHENSON, JR.

The Roosting of Tree Swallows (*Iridoprocne bicolor*).—While acting as warden-observer at the Witmer Stone Sanctuary during the autumn of 1937, I witnessed one of the most spectacular features of the Tree Swallow migration, their mass roosting. The incident occurred at the Pond Creek Marsh, a large fresh-water marsh of about 100 acres, situated immediately northeast of the sanctuary at Cape May Point, N. J. It can best be described by quoting from my journal under date of September 22, 1937:

“Arrived at sanctuary 7:45 P.M. and Tree Swallows were already arriving from a southerly direction at a relatively low elevation of perhaps 50 to 100 ft., and moving toward Pond Creek. When I came to Cedar Point (an observation point on the south margin of the marsh), the air over the entire marsh was literally filled with swallows milling about in all directions, at an elevation of about 100 ft. After a little over ten minutes, the influx of birds ceased and the birds over the marsh began to consolidate until the flock resembled a huge dark mass, that gyrated about like a monster balloon caught in a whirlwind. Immediately following this condensation, the flock gradually gained several hundred feet in altitude and finally began to steady itself. In a few seconds a dark column or stream of swallows began to pour down from the center of the flock. When they reached the tops of the cattails, they flowed over the surface like a pall of black smoke. This coursing back and forth (actually more of a rolling action) continued until the entire flock was drained from the sky, as through a huge funnel. While the last individuals were descending to the marsh, the first were already dropping among the cattails to roost. In a very few minutes no trace of the birds could be seen or heard.”

The sound of these swallows rushing through the air on the downward plunge was incredibly loud, and could be heard as a low muffled roar at the relatively great distance I was from the actual roosting site. Pond Creek Marsh was not used again that season as a roosting place by the Tree Swallows. Nor was it used at all during the 1938 season. To attempt an estimate of the number of swallows in this great concentration would be merely to venture a guess. After reviewing my daily notes on the numbers of migrants that passed through Cape May during the autumnal period, I feel that in all probability this flock represented a major portion of the Tree Swallow population using the coastal flyway. A somewhat similar observation has been graphically described by Forbush (1929) with this difference: in southern Florida, where the birds winter, the Tree Swallows appar-

ently collected at some distant spot and then approached the roosting marsh like "a huge black cloud."

CHAPMAN, F. M. 1903. *Bird Studies with a Camera*, pp. 89-105.

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RICHARD G. KUERZI.

Nesting of the White-eyed Vireo in the Housatonic Valley.—

The cyclic changes in the abundance of Carolinian species at the northern edge of their breeding range are always an interesting feature of bird distribution. It is with this in mind that the following notes are offered. On June 15, 1935, a singing male White-eyed Vireo (*Vireo g. griseus*) was discovered near a small wooded swamp just southeast of our property at Kent, Connecticut. This area is surrounded by abandoned farm lands that have grown up to blackberry, bush dogwood, cedar and a few fruit trees. Hedgerows are also an important part of these lands. Other Carolinian species breeding regularly in this habitat are the Chat and Prairie Warbler. Daily observations were not possible that year, but the bird was heard again on June 29 and July 4. A singing male was present again in 1936. During both these years the bird was very localized and could be found within the same three-acre tract, a possible indication of its breeding during this period.

In 1937, the bird arrived on May 16 and a concerted effort was made to determine if the bird was a nonbreeder, or else to procure the first nesting record for the region. Aided somewhat by a late spring (foliage was over a week behind normal), a pair was located and it was possible to observe the female in the process of finishing the nest and the male singing near at hand. The pendent nest was affixed to a lateral branch of a small alder bush, and was a mere eighteen inches from the ground. A small thicket of shrub cinquefoil surrounded the alder, and when the foliage matured, the nest was perfectly concealed. In place of the usual scrap of paper, the nest contained a few strips of white birch bark. By May 28, the nest was complete, and although the female was found on the nest, there were no eggs. The first egg was laid on May 29. Two more were laid on the 30th and the fourth and final on May 31. On June 12, three of the eggs hatched and the fourth on the following day, June 13. The nestlings were still in the nest on the evening of June 23, but a visit the following morning found the nest empty and the remains of one nestling on the ground beneath the nest. The male was in full song nearby, but the female could not be located. Whether the three remaining fledglings had

flown or been destroyed is not known. But the male sang continuously until July 21. Such behavior might indicate in a good many species that the fledglings or the female, or both, had been destroyed. However, the White-eye indulges in much post-breeding song. At Cape May Point, N. J., this species sings regularly past mid-September, and in 1938 was heard as late as October 5. In any event the adolescent period was very nearly, if not actually, complete by June 24, and it may be that the fledglings had left the nest.

In 1938, the White-eye returned on May 18, and on May 22 two singing males were present in the same locality. No attempt was made to locate nests, but the birds were again present and singing until the third week of July. This past season, 1939, the White-eyes failed to return, thus terminating a four-year period, during which time one pair definitely bred in at least one of the years. It is probable that they nested in all four years. This breeding record of the White-eyed Vireo constitutes a more northerly extension of its range in at least the Housatonic Valley, and is a new record for northwestern Litchfield County. The incubation period of thirteen days differs slightly from the twelve days reported by E. A. Samuels and the sixteen days found by A. A. Saunders.

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RICHARD G. KUERZI.

The Ornithological Year 1937 in the New York City Region

BY WALTER SEDWITZ

The following summary is but a brief outline of the year, with none of the embellishments that my predecessors have been accustomed to give; the annotated list of birds, however, is as complete as my research would allow. Anyone familiar with the status of the various species will understand the reason for inclusion of the records, and those who are less familiar with the past history of our birds and our region are directed to Griscom's *Birds of the New York City Region*, and the various *Proceedings* of the Society.

It was apparent in *January* that we were to have a good flight of Redpolls. Records came from almost all the local regions, from the mountains of New Jersey to the shores of Long Island. The temperature readings for January were higher than normal, and the same was true to the north of us, leading to the belief that food shortage, and not climatic conditions, was forcing this species south of its range into our territory. The latter half of this month was very cold, and the suffering among the birds on land and water was widespread. Ducks and gulls were frozen in the ice at the shore, and in a barn at Troy Meadows, N. J., several Jays and a Kingfisher were found frozen to death, as well as a Starling which was still on its perch. *Alcidæ* were scarce on the coast, and records were on hand for only a few species.

February brought more Redpolls and records of large flocks of birds occurring in new localities accumulated rapidly. A newspaper article, stating that there were 500,000 Scaup in the East River, caused action among the Society's more accurate counters; aided by an airplane, these observers finally estimated the wintering population to be about 60,000.

March, warmer than usual, erased the signs of winter, and spring weather prevailed. A Louisiana Water-Thrush was noted toward the end of March, an early date.

April, cooler than normal, halted any land migration, but Gannets and Cormorants were seen in vast numbers on the coast.

May found grebes and loons still present in numbers. Sooty and Cory's Shearwaters were first noted in this month. The first hint that Yellow-crowned Night Herons might be nesting locally was found when a bird was observed carrying sticks to a Black-crowned Night Heron colony. Great numbers of Knots were seen on the Jersey coast.

June found Prairie Horned Larks nesting on Long Island and in New Jersey with greater frequency than ever noted before. An American Egret's nest was found in southern Jersey, the first nesting of the species in or near our region for many a generation. Upland Plover nested on Long Island on the Hempstead Plains, a rediscovery that had been hoped for and sought after for many years. Both Red and White-winged Crossbills were found in the central New Jersey pine barrens in *August*, having either bred or summered in that region. White herons were seen in fair numbers everywhere, but no extensive flight was noted.

The late summer brought the rare western species, as of years gone by, and in *September* a hurricane blew hard, but little was brought up with the storm.

In *October* the ducks came south in goodly numbers, a heartening sight to observers. Certain species were very scarce, the Redhead being present in greatly reduced numbers.

Small birds were very numerous until the cold snap in *November*, when most of the lingerers went south. Only a few stayed into *December*, which was mild and open.

For the help that Dr. Harrower and the Messrs. Hickey, McKeever, Breslau and Carleton gave, I extend sincere appreciation, and to the unnumbered observers who always contributed their records and made my work possible, I give a vote of thanks. As the popular names of the following birds conform to those given in the Fourth Edition of the *A.O.U. Check-List*, scientific names have been omitted.

RED-THROATED LOON.—9, in full adult plumage, Eaton's Neck, May 15 (Cruikshank); 1, May 22-27, found dead on latter date, Bayside (Sabin).

HOLBOELL'S GREBE.—1, Sept. 10, Rye (Cruikshank).

HORNED GREBE.—Flock of 100 birds, Jones Beach, March 8 (Cruikshank); 100, Jersey coast, March 8 (Urner).

PIED-BILLED GREBE.—1, Dec. 27, Shinnecock Bay (McKeever, Sedwitz); 1, Dec. 27, Inwood Park (Norse, Cantor, Karsch).

SOOTY SHEARWATER.—50, off the New Jersey coast, May 14 (Breslau); 1, Aug. 25, Brigantine (Banner).

GREATER SHEARWATER.—Common at Easthampton, Mecox Bay, and Montauk, Aug. 27-30 (Helmuth); few, Long Island, Sept. 27 (Sialis Bird Club).

CORY'S SHEARWATER.—4, May 24, Seaside Park (Walsh); common, Aug. 27-30, Easthampton to Montauk (Helmuth); some on Long Island, Sept. 27 (Sialis Bird Club); 600, Mecox to Montauk, Oct. 12 (Helmuth); 200, Montauk, Oct. 25 (Cruikshank); 2, Long Beach, Nov. 21 (Cruikshank).

WILSON'S PETREL.—14, June 7, Jones Beach (Sedwitz); 2000, Lower New York Harbor, Aug. 17 (Stephenson).

E. BROWN PELICAN.—A bird seen very well at Rockaway Point on May 10, and substantiated by careful notes and other observers (Joseph F. Buske); another individual, perhaps the same bird, was noted at Beach Haven, N. J., on May 13, flying south over the surf (Urner).

GANNET.—147 birds out of 214 seen at Moriches Inlet, April 30, were immature (Cruickshank); 1, immature, feeding in Jamaica Bay, Nov. 9 (Mayer).

EUROPEAN CORMORANT.—1, Jan. 1, Long Beach (Cruickshank); 2, Feb. 16, Quogue (Sedwitz); 2, Sept. 3, Easthampton (Helmut).

DOULE-CRESTED CORMORANT.—1000, April 25, Massapequa (Cruickshank).

AM. EGRET.—First seen June 7, Jones Beach (Sedwitz); a count from Pawling, N. Y., to Danbury, Conn., in August, revealed over 50 birds, the abundance possibly due to the drought in Virginia and southeastern states (Preston); breeding in a colony of Great Blue Herons, Tuckerton (Brown); maximum of 29, Jones Beach, Aug. 10 (R. and B. Berliner); 1, Nov. 8, Jones Beach (Cruickshank).

SNOWY EGRET.—2, Aug. 2, Jones Beach (Bronx County Bird Club); 1, East Moriches, Aug. 15 (Wilcox, Rose); 13, Newark Meadows, Aug. 26 (Urner); 25, Tuckerton, Aug. 30 (Urner, Mayr, Fables); 1, Newark Meadows, Sept. 26 (Urner).

LITTLE BLUE HERON.—1, April 17-24, Hewlett (Peterson); 1, Prospect Park, May 16 (Kraslow); 3, July 7, Southampton (T. Mahnken).

YELLOW-CROWNED NIGHT HERON.—Its presence with the Black-crowned Night Heron throughout the breeding season was noted on Long Island and in northern and central New Jersey, but actual nesting not positively proved. 1, April 22, Eaton's Neck (Cruickshank); 3, in colony of other herons, carrying sticks, suggestive of nesting,

May 6, 9, 10, Massapequa (Cruickshank); 2, May 30, Absecon (Rich, Brown); 1, Sept. 27, Newark Meadows (Urner).

AM. BITTERN.—Wintered at Jones Beach, and noted by many observers.

LEAST BITTERN.—May 17, Troy Meadows (T. D. Carter); Aug. 8, Wantagh (Mangels); both in dark phase.

MUTE SWAN.—1, March 22, Inwood (Karsch).

WHISTLING SWAN.—9, south of Salem, N. J., March 29 (Urner, Janvrin).

AM. BRANT.—4500, April 5, Jones Beach (Peterson); also seen same day, 18,000 Am. Scoters, 1000 White-winged Scoters, and 4000 Surf Scoters; 50, May 6, Upper New York Bay (Solomon).

GREATER SNOW GOOSE.—4500, March 29, Fortesque (Janvrin, Urner, *et al.*); 40, Nov. 18, Van Cortlandt Park (Karsch); 1, Dec. 23, Montauk (Helmut).

BLUE GOOSE.—4, March 29, Fortesque (Janvrin, Urner, *et al.*); 1, April 12-13, Idlewild (Mayer); 1, Oct. 24-Nov. 8, Jones Beach (Norse, Cantor).

COMMON BLACK DUCK.—"Still holding own, when all other ducks are decreasing," from a letter of Nov. 10, written by Urner.

GADWALL.—1, Jan. 26, Shark River (Edwards); 2, March 22, Brookhaven (Cruickshank); 20, Oct. 11, Brookhaven (Carleton, Sedwitz).

EUROPEAN WIDGEON.—1, Nov. 21, Lake Como (Urner).

AM. PINTAIL.—May 31, Quogue (Fry); 4, July 25, Cold Spring (Heck).

EUROPEAN TEAL.—5 pair, March 15, Hempstead (Adelberg, Harrower); 1, March 22, Heckscher State Park (Cruickshank); 4, Nov. 23, Hempstead (Cruickshank).

BLUE-WINGED TEAL.—11, March 18, Heckscher State Park (Cruickshank);

females, July 29-31, Speonk (Wilcox); 1, Nov. 23, Hempstead (Cruickshank).

SHOVELLER.—6, March 22, Brookhaven (Cruickshank); 6, March 22, Heckscher State Park (Cruickshank); 2, April 30, Brookhaven (Cruickshank); 1, Sept. 6, Jones Beach (Berliner, *et al.*); 50, end of Oct., Fort Mott (Urner).

REDHEAD.—2, Nov. 23, Hempstead (Cruickshank); 7, "on Long Island in one day," Dec. 5 (Carleton, McKeever, Sedwitz); 200, Dec. 23, Montauk (Helmuth).

RING-NECKED DUCK.—60, Jan. 5, Brookhaven (Sedwitz).

CANVAS-BACK.—200, March 15, Croton Point (Cruickshank).

GREATER SCAUP.—A flock of birds in the East River, variously reported to be 500,000 ducks, was estimated by R. Kuerzi and R. T. Peterson to be about 60,000. These birds are generally reported each winter from the same region.

LESSER SCAUP.—Wintered at Bayside (Sabin); also wintered at Idlewild (Mayer).

BARROW'S GOLDEN-EYE.—Jan. 5, Raritan Bay (Urner).

AM. EIDER.—5, Nov. 18, Moriches Bay (Wilcox); 1, Dec. 5, Montauk (Carleton, McKeever, Sedwitz).

KING EIDER.—1, May 9, Eaton's Neck (Allyn, R. Berliner, Whitman, Lehrman); 1, changing male, May 15, Eaton's Neck (Cruickshank); 2, Nov. 27, Rockaway Point (Kraslow); 8, Dec. 5, Montauk (Carleton, McKeever, Sedwitz); 5, Dec. 24, Long Branch (Black, Seeley).

HOODED MERGANSER.—1, pine barrens of New Jersey, Aug. 1 (Edwards); 24+, Nov. 29, Rye (Cruickshank).

AM. MERGANSER.—1500, March 15, Croton Point (Cruickshank).

E. GOSHAWK.—1, Jan. 5, Hempstead (Mathews, Rose); 1, Jan. 16, Bayside (Sabin); 1, Feb. 6, Babylon (Cruick-

shank); 1, adult, April 26, Van Cortlandt Park (Lehrman, Stephenson); 1, Oct. 3, Van Cortlandt Park (Cantor, Norse, Karsch); 1, Nov. 21, Hunter's Island (Norse, Karsch); 1, Nov. 23, Watermill (Wilcox).

BROAD-WINGED HAWK.—1, March 10, Idlewild (Mayer).

AM. ROUGH-LEGGED HAWK.—1, May 8, Newark Meadows (Peterson); 1, Oct. 6, Freeport (Cruickshank).

GOLDEN EAGLE.—About Nov. 1, Bear Mountain (Deeds).

BALD EAGLE.—1, May 29, Rockville Center (Mahnken); 1, May 29, Mastic (J. T. Nichols).

OSPREY.—1, March 15, Woodmere (Berolzheimer); a bird banded on Gardiner's Island in 1914, found dead on the same island, having lived 21 years (Cleaves).

E. PIGEON HAWK.—1, March 15, Bayside (Sabin).

KING RAIL.—1, May 10, Troy Meadows (Wolfarth); 1, May 14-16, Van Cortlandt Park (Lehrman, Norse).

N. CLAPPER RAIL.—1, Jan. 11, Idlewild (Mayer); 1, Jan. 26, Orient (Latham); June 28, nest with 14 eggs, nest with 9 eggs; July 3, 3 pair, one chick, Idlewild (Mayer).

VIRGINIA RAIL.—July 5, nest with 5 eggs; July 7, 4 eggs and one chick, Idlewild (Mayer); 1, Nov. 28, Freeport (Cruickshank).

YELLOW RAIL.—April 29, Freeport (Breslau).

FLORIDA GALLINULE.—Two pair bred, Van Cortlandt Park (Lehrman).

PIPING PLOVER.—May 10, Oak Island, 200 birds on the flats and a nest with 4 eggs (Gere and Cruickshank); May 21, 23 nests each with 4 eggs, Jones Beach (Cruickshank).

SEMPALMATED PLOVER.—April 26, Van Cortlandt Park (Kramer); 1000, maximum, Aug. 6, Idlewild (Mayer).

KILLDEER.—Nest with 4 eggs, Troy Meadows (Sialis Bird Club); nest

with 4 eggs, April 26, Lake Success (Rorden).

AM. GOLDEN PLOVER.—3, Aug. 27, Easthampton (Helmuth); 2, Sept. 7, Newark Meadows (Edwards); 1, Sept. 13, Oak Island (Mangels, Mathews, Rose); 18, Oct. 12, Mecox to Montauk Point (Helmuth).

BLACK-BELLIED PLOVER.—350, June 2, Idlewild (Mayer).

RUDDY TURNSTONE.—1, daily, June 17-July 2, Idlewild (Mayer); 1, June 26, Orient Point (Latham).

AM. WOODCOCK.—April 26, adult with 3 young, Alley Pond Park (Rorden).

LONG-BILLED CURLEW.—July 26, alone, but size and long bill were indicative of the species, Egg Island (Urner).

HUDSONIAN CURLEW.—158 on July 18, 1208 on July 26, 170 on Aug. 8 (after a cold snap), Egg Island roost (Urner); 1, June 3, Idlewild (Mayer).

UPLAND PLOVER.—The rediscovery of this species as a breeding bird is a tribute to the persistent effort of Mr. McKeever and his work on Long Island. In June, south of Hicksville, he found several pairs, but in July the young were seen on the plains, though no nest had been found. 45, July 18, Newark Meadows (Urner).

SPOTTED SANDPIPER.—June 14, nest with 2 eggs, Idlewild (Mayer).

E. SOLITARY SANDPIPER.—1, April 4, Pawling (Preston).

E. WILLET.—May 9, Mecox Bay (Helmuth).

W. WILLET.—Oct. 25, Moriches Inlet (Cruikshank and Audubon Society).

GREATER YELLOW-LEGS.—1, Jan. 1, Hempstead Reservoir (Rose); 4, March 26, Cold Spring Harbor (Cruikshank); present up to Dec. 28, Rye (Herbert, Gere, Oboiko, Cruikshank).

LESSER YELLOW-LEGS.—Jan. 27, Hempstead Reservoir (Peterson); 1, May 3, Montauk (Sedwitz); 500, maximum, July 18, Newark Meadows (Urner).

AM. KNOT.—1500, May 30, Atlantic Beach (Brown); 4, Nov. 8, Jones Beach (Cruikshank); 3, Nov. 30, Swan Island, Moriches (Wilcox); Dec. 27, Barnegat (Christmas Census).

PURPLE SANDPIPER.—Feb. 22, Coney Island (Sialis Bird Club); April 28, Montauk (Sedwitz); Oct. 31, Montauk (Raynor, Wilcox); at Rockaway Point, 24 on Dec. 5 (Kraslow), 13 on Dec. 13 (Kraslow, Flynn), 10 on Dec. 20 (Kraslow, Flynn), 1 on Dec. 24 (Alperin).

PECTORAL SANDPIPER.—Several flocks late in March and early April, probably due to the severe storms on the New Jersey coast (Urner); April 4-5, Newark and Tuckerton (Urner); 55, July 25, Newark Meadows (Urner).

BAIRD'S SANDPIPER.—1, May 3-June 7, Oak Island (Breslau, Mathews, Sedwitz); 6, May 9, Georgica Bay (Helmuth); 1, Aug. 17, Brigantine (Loetscher); Sept. 7, Newark (Urner); Sept. 13, Jones Beach (Mathews, Mangels, Rose).

E. DOWITCHER.—April 11, Long Beach (Cruikshank); 1375, July 25, Jersey coast (Urner).

LONG-BILLED DOWITCHER.—1, Aug. 19, Idlewild (Mayer); late Oct., Delaware River, near Ft. Mott (Edwards, Urner, *et al.*).

WESTERN SANDPIPER.—May 24, Mecox Bay (Breslau, Sedwitz); 1, May 31, Jones Beach (Mathews, Sedwitz); 2, Dec. 27, Barnegat (Christmas Census).

MARbled GODWIT.—May 17, Absecon (Walsh); numerous records from Aug. 20, Brigantine (Banner) to Sept. 20, Oak Island (Breslau, Sedwitz); 1, Aug. 23, Idlewild (Lind, Mayer).

HUDSONIAN GODWIT.—Aug. 21, Neponsit (Mayer) to Oct. 12, Tuckerton (Urner); New Inlet, Sept. 7-20, numerous observers.

AVOCET.—Sept. 27, Moriches Inlet (Wilcox).

RED PHALAROPE.—2, April 29, Fire Island Inlet (Breslau); May 17, Seaside Park (Walsh); Aug. 31, Brigantine (Banner); Sept. 20, Oakwood Beach (Norse); Oct. 4, Elizabeth (Urner); 1, Oct. 5, Moriches Inlet (Wilcox).

WILSON'S PHALAROPE.—Adult female, May 12, Jones Beach (Cruikshank); Aug. 30, Mecox Bay (Helmuth); Sept. 11, Newark Meadows (Fechtner).

NORTHERN PHALAROPE.—1, Aug. 21, Rockaway Point (Mayer); Sept. 20, Oak Island (Norse).

POMARINE JAEGER.—1, Aug. 27, Georgia Pond (Helmuth); Sept. 27, Jones Beach (Lehrman); 1, Oct. 25, Montauk (Cruikshank).

PARASITIC JAEGER.—2, possibly 3, May 9, Jones Beach (Allyn, Berliner, Lehrman, Whitman); May 13, Atlantic Beach (Mayer); 20, Aug. 31, Oak Island Beach (Mathews, Mangels, Rose); several, Oct. 25, Montauk Point (Cruikshank); 1, Dec. 5, Montauk (Carleton, McKeever, Sedwitz).

LONG-TAILED JAEGER.—Aug. 29, Georgia Pond (Helmuth).

GLAUCOUS GULL.—May 13, Atlantic Beach (Mayer).

ICELAND GULL.—June 12, Jones Beach (Mayer); Aug. 2, Jones Beach. Presumably the same bird, with worn-off primaries in the first winter plumage, was collected alive, and presented to the New York Zoölogical Park; in a few months the bird molted out into a perfectly plumaged Kumlien's Gull (Hickey).

GREAT BLACK-BACKED GULL.—June 25, Jones Beach (Mayer).

LAUGHING GULL.—April 21, Bayside (Sabin).

BONAPARTE'S GULL.—Summered on Newark Bay (Urner); Jan. 5, 4500 birds in one flock, Montauk (Sedwitz).

LITTLE GULL.—May 1-4, New York Harbor (Chapin, Rich).

ATLANTIC KITTIWAKE.—1, immature, Sept. 20, Moriches Inlet (Breslau, Sedwitz); 1, Oct. 5, Montauk (Helmuth); 8, Dec. 5, Montauk (Carleton, McKeever, Sedwitz); 1, immature, after a hard storm, Dec. 24, Rockaway Point (Alperin, Kraslow).

SABINE'S GULL.—Nov. 8, Barnegat Bay (Walsh).

GULL-BILLED TERN.—Aug. 26, Moriches Inlet (Fry).

FORSTER'S TERN.—6, Aug. 27, Easthampton (Helmuth); 100, peak of flight, Oct. 12, Newark Meadows (Urner); 50, Nov. 6, Rockaway Point (Mayer).

COMMON TERN.—May 10, Oak Island, a maximum count of 1500 on the flats (Sedwitz); 800, Nov. 6, Rockaway Point (Mayer).

LEAST TERN.—May 10, 6 nests with 3 eggs each (Sedwitz).

CASPIAN TERN.—2, May 8-9, Easthampton (Helmuth); 1, June 20, Jones Beach (Chapin, Mahnen, Posel); 1, July 25, Jones Beach (Sabin); Aug. 26, Oakwood Beach (Norse); 4, Aug. 29, Easthampton (Helmuth); Sept. 20, Asbury Park (Mitterdorf); 1, Sept. 21, 26, Moriches (Wilcox).

BLACK TERN.—May 31, Jones Beach (Fry); in August, 22 miles off the coast of New Jersey, suggesting that they migrate regularly offshore each fall (Urner).

BLACK SKIMMER.—April 30, Moriches Inlet (Cruikshank); 1, June 7, Oak Island and Gilgo (Sedwitz); Moriches Inlet, 8 on July 2, 10 on July 3, one pair west of the inlet in tern colony; July 31, 5 nests, one with young (Wilcox); 1, July 8, Idlewild (Mayer); 1, immature, Nov. 6, Rockaway Point (Mayer).

RAZOR-BILLED AUK.—1, March 7, Long Beach (Mayer); 1, Dec. 27, Montauk (McKeever, Sedwitz).

DOVEKIE.—Feb. 16, Montauk (Sedwitz, Stephenson, Weber); Dec. 26, Moriches Inlet (D. G., J. T. and W. F. Nichols); Dec. 27, Montauk (McKeever, Sedwitz).

BLACK GUILLEMOT.—Dec. 27, Newark Bay (Urner); Dec. 27, Montauk (Breslau).

E. MOURNING DOVE.—June 18, Roslyn, nest with 2 eggs, placed in this year's nest of a Robin (Fry).

BARN OWL.—Oct. 15, 22, 23, Elmhurst (Mrs. Beals); Dec. 23, Montauk (Helmuth).

GREAT HORNED OWL.—Dec. 26, Palisades, N. J., "so tame that observer scratched the owl's head and neck, without making the bird move; later the bird flew away, perfectly normal" (Karsch).

SNOWY OWL.—2, Jan. 19, Long Beach (Cruickshank); March 26, Idlewild (Mayer).

E. WHIP-POOR-WILL.—2 pair bred at Forest Lake, White Plains (Cook).

E. NIGHTHAWK.—20, Sept. 2; 200, Sept. 3; 1000, Sept. 4, Port Chester (Cook).

CHIMNEY SWIFT.—Oct. 10, Summit (P. Murphy).

N. PILEATED WOODPECKER.—March 1, Sparta (Wolfarth).

RED-BELLIED WOODPECKER.—1, Jan. 25, Hatfield Marshes (Edwards, Rusling); 1, Dec. 23, Woodmere (Harrower).

RED-HEADED WOODPECKER.—Dec. 29, Bayside (Sabin).

YELLOW-BELLIED SAPSUCKER.—Feb. 24, Rye (Cruickshank).

ARCTIC THREE-TOED WOODPECKER.—Oct. 12, Georgica Woods (Helmuth).

ARKANSAS KINGBIRD.—2, Sept. 7, Miller Place (Helme); Sept. 27, Jones Beach (Lehrman); Oct. 11, Jones Beach (Carleton, Sedwitz); 2 and 1,

Oct. 4, and Oct. 31, respectively, Idlewild (Mayer).

E. PHOEBE.—Dec. 27, Van Cortlandt Park (Cruickshank, Lehrman).

ACADIAN FLYCATCHER.—Nest with one egg, June 9, Long Branch (Seeley).

N. HORNED LARK.—1500, March, Orient (Latham).

PRAIRIE HORNED LARK.—Bred at Idlewild, having two broods (Mayer, *et al.*); 1, Nov. 8, Jones Beach (McKeever, Sedwitz).

TREE SWALLOW.—5, March 15, Bay-side (Sabin).

BARN SWALLOW.—March 15, Westbury (Mathews).

N. CLIFF SWALLOW.—April 7, Brookhaven (Allyn, Berliner, Whitman); the studies of Wolfarth and Wilson show that this species has shifted its distribution in central New Jersey, 110 nests being found at West Milford.

AM. MAGPIE.—Feb. 12, Englewood (Norse, Cantor).

E. CROW.—Nest with 2 eggs, April 8, Yaphank (Cruickshank).

FISH CROW.—May 10, 2 nests, Massapequa (Fables).

CAROLINA CHICKADEE.—January and February, Union (Fables).

E. HOUSE WREN.—1, Dec. 27, Queens County (Queens County Bird Club).

SHORT-BILLED MARSH WREN.—2, daily throughout August, Idlewild (Mayer).

E. MOCKINGBIRD.—1, Aug. 7, Mt. Sinai (Helme); Dec. 25-27, at a feeding station, Essex County (Essex County Bird Club).

N. VARIED THRUSH.—This rare western species was found in the garden of Mrs. John H. Boesh on Staten Island, Nov. 24, and the record corroborated by Miss Mackie and Mr. Davis (see *Auk*, *Bird-Lore*, *Staten Island Bulletin*, etc.).

BICKNELL'S THRUSH.—Sept. 12, Oct. 12, Nov. 8, birds caught in traps, Elmhurst (Mrs. Beals); 1, injured bird, Oct. 6, Kensico (Gere, Cruickshank).

GREENLAND WHEATEAR.—1, Dec. 27, Montauk. Studied for over 3 hours, at times as close as 10 yards, while it fed and flew with a flock of 50 Snow Buntings (Breslau).

BLUE-GRAY GNATCATCHER.—May 1, Mastic (D. G. Nichols); autumn records from Aug. 14, Central Park (Mathews) to Oct. 27, Columbia College (Stephenson).

CEDAR WAXWING.—June 2, Central Park (Rich).

N. SHRIKE.—March 15, Montauk (McKeever, Sedwitz); March 22, Kew Gardens (Sedwitz); Nov. 23, Hempstead (Cruikshank); Dec. 27, Montauk (McKeever, Sedwitz).

MIGRANT SHRIKE.—April 18, Queens Village (Rorden); Aug. 22, Miller Place (Helme).

BLUE-HEADED VIREO.—April 21, Bay-side (Sabin).

RED-EYED VIREO.—Nov. 3, Palisades, N. J. (Norse, Cantor, Karsch).

PHILADELPHIA VIREO.—May 4, In-wood (Norse).

PROTHONOTARY WARBLER.—Aug. 18, Elmhurst (Mrs. Beals); Aug. 22, In-wood (Norse).

WORM-EATING WARBLER.—July 26, Elmhurst (Mrs. Beals); Oct. 11, Bronx Botanical Gardens (Lehrman).

BLUE-WINGED WARBLER.—April 28, Bronx Park (Solomon).

ORANGE-CROWNED WARBLER.—Sept. 25 and Nov. 13, Inwood (Norse); Dec. 23, Rye (Cruikshank); Dec. 28, Alley Pond Park (Astle, Imhof, Fischer).

N. PARULA WARBLER.—Singing male, June 20 and 21, Mastic (J. T. Nichols); Nov. 18, Manorville (Raynor).

MYRTLE WARBLER.—A coastal flight, March 1, Jones Beach (Peterson).

BLACK-THROATED BLUE WARBLER.—Nov. 3, Palisades, N. J. (Norse, Cantor, Karsch).

YELLOW-THROATED WARBLER.—April 12, North Wildwood, N. J. (Norse, Cantor, Karsch).

N. PRAIRIE WARBLER.—Increase in Dutchess County (Preston).

W. PALM WARBLER.—Dec. 26, Princeton (Loetscher, Russell).

OVEN-BIRD.—June 18, Roslyn, feeding one young out of the nest (Fry).

N. WATER-THRUSH.—July 20, Elmhurst (Mrs. Beals).

CONNECTICUT WARBLER.—Sept. 7, Elmhurst (Mrs. Beals); Oct. 1, Inwood (Karsch); Oct. 18, Jones Beach (Cruikshank).

N. YELLOW-THROAT.—Jan. 4, Jones Beach (Cruikshank); Dec. 25, Bronx Region (Bronx Christmas Census).

YELLOW-BREASTED CHAT.—Aug. 26, Elmhurst (Mrs. Beals).

BOBOLINK.—June 30, migrating south-west and calling, Idlewild (Mayer).

E. RED-WING.—July, Floral Park. A pair of nests in the middle of a plain, the closest water being over a mile distant. The nests were in stunted trees not over a foot and a half from the ground, and contained 4 eggs each. The unusual situation was made more unique because the birds seemed to be feeding exclusively on the tent caterpillars that infested the trees, sucking the insects dry and leaving the hairy skins all over the trees. Not a live caterpillar was found within 50 feet of the nests (Sedwitz).

RUSTY BLACKBIRD.—1, Jan. 17, Idlewild (Mayer).

BOAT-TAILED GRACKLE.—May 10, Beach Haven, a male and female seen in the high-tide bush on the marshes (Urner).

GRACKLE (subsp.).—10,500, Dec. 26, Princeton (Christmas Census).

E. CARDINAL.—April 12, 16, 20, 23, Central Park 'Ramble' (Lehrman, Janvrin, Knoblauch); April 12, 19, Bronx Park (Sialis Bird Club); 1, singing male, Aug. 15, Idlewild (Mayer).

E. BLUE GROSBEEK.—August, Princeton (Loetscher).

E. EVENING GROSBILL.—15 or 16, Nov. 27, and 2 weeks previous, West Point (Gerard Haigh).

E. PURPLE FINCH.—Nestcd at Chap-
paqua (Pangburn).

CANADIAN PINE GROSBILL.—18, Jan.
5, Montauk (Sedwitz, Wolfram).

BRITISH GOLDFINCH.—March 15,
Hempstead (Rorden); April 12, Sea-
ford (Mangels); Aug. 8, Bayside
(Bohn).

REDPOLL.—One of the greatest inva-
sions ever known in our region was
recorded by numerous observers, in all
parts of the New York City area. A
good flight of the species was noted in
January, but in February it became very
heavy. A flock was seen in the fall of
the year, although no real flight ap-
peared at that time. Maximum number
of Redpolls in one flock was 300 at
Orient, Jan. 26 (Latham); 150, Oct.
30, Bronx Park (Banner); latest rec-
ord in the spring was April 8, 2 birds
at Inwood (Karsch, Werner). The
flight was noted as far south as Prince-
ton (Rogers), and the birds were not
uncommon on the outer beaches (Cruick-
shank).

N. PINE SISKIN.—200, Jan. 4, Jones
Beach (Cruickshank).

RED CROSSBILL.—9, Jan. 9, Syosset
(Cruickshank); 4 of this species were
observed summering before and after
Aug. 14, Pine Lake Park, near Tom's
River (Fables).

WHITE-WINGED CROSSBILL.—3, July
10, Pine Lake Park (Fables).

IPSWICH SPARROW.—1, March 29,
Montauk (Sedwitz).

SHARP-TAILED SPARROW.—July 5, nest
with 5 well-feathered young, Idlewild
(Mayer); 1, caught in web of the
Golden Spider, Newark Meadows, Aug.
16 (Urner).

NELSON'S SPARROW.—Dec. 22, Bronx
Region (Bronx County Bird Club).

N. SEASIDE SPARROW.—Jan. 18, Free-
port (Cruickshank); June 28, nest with
3 eggs, Idlewild (Mr. and Mrs. Beals,
Mayer); Oct. 20, Pelham Bay Park
(L. N. Nichols).

E. LARK SPARROW.—July 25, Jones
Beach (Sabin); Oct. 10, Freeport
(Cruickshank).

E. CHIPPING SPARROW.—4, March 25,
Garden City (Cruickshank); 1, Dec.
27, Van Cortlandt Park (Cruickshank).

LINCOLN'S SPARROW.—May 7, Idle-
wild (Mayer); 3, one in song, Roslyn
(Fry); Nov. 8, Hempstead (McKeever,
Sedwitz).

LAPLAND LONGSPUR.—Feb. 15, Hill-
view (Norse, Karsch); 1, Nov. 7, 8,
Rodman's Neck (Banner, Lehrman);
10, Nov. 8, Jones Beach (Cruickshank).

BREWSTER'S WARBLER.—May 31,
Grassy Sprain (Lehrman); June 6, fe-
male mated to a Blue-winged Warbler,
Grassy Sprain (Norse); July 24, Great
Swamp (Rebell); July 28, 31 and Aug.
15, Inwood (Cantor, Norse).

THE ORNITHOLOGICAL YEAR 1937 IN THE
NEW YORK CITY REGION

BY WALTER SEDWITZ

With little beyond bare details of the highlights of the year, and a smattering of general discussion, this report is presented with the hope that in the near future a publication will consolidate the great fund of material that is to be found in the fertile territory of the New York City region.

The year 1937 was a most successful one for the many bird observers who were constantly in the field, for it was a year of unusual and rare birds in our section. Moreover, it was the first year that young Herring Gulls were marked with the bright red, yellow, and blue celluloid bands that gave these usually stodgy, mottled, and unattractive birds new life in the eyes of bird watchers. When one could say that he or she had seen a gull from Kent Island, N. B., it added interest to the report. Records from fishermen, sailors, and many keen sportsmen soon came through the mails from many sections, and by the end of the year a splendid set of records was at hand. Several species of birds, long absent from our region, were definitely reported as nesting; and a new breeding record was finally substantiated for a species long suspected of nesting in this State.

January was a mild month, with several snowfalls; in each case, the snow lasted only a few days. This was to the advantage of the wintering birds, especially our smaller species. There was little general frost, and a temperature reading on the 15th was 65° F. In discussing the weather, Mr. Urner thought that the warm winter was a great aid in preserving our small wintering birds, and predicted a fine breeding season for these species. Forsythia and pussy willows were blooming in mid-January in the Barnegat region, according to Urner. Great flocks of many varieties of shorebirds wintered on the flats in the Barnegat region, as many as twelve species being noted at one time. Pintails were migrating north over the coastal marshes in mid-January. Upland birds, however, were little affected by the unseasonable warmth, and what migration was detected consisted of a slight increase in Grackles and Song Sparrows. Mr. Vogt thought, and his opinion was corroborated by many observers, that there was a definite decrease in the number of small land birds, and he expected a corresponding decrease in the Raptores that prey on these species for food. Observers from eastern Long Island told of a fine flight of Kittiwakes, with maximum counts at Montauk, and a fair sprinkling of records

along the south shore. King Eiders were seen on western Long Island, in numbers rarely recorded. A small flight of Auks and Dovekies was also reported.

February, until the middle of the month, was as mild as January, but after the 15th lasting snows fell. There was a diminution of migration and a general lull in bird life. To shake the dust off the records, however, Urner reported a careful identification of the Lesser Black-backed Gull at Newark Bay, where he had an opportunity to compare the actions of the bird with the many other species of *Larus* present at the same time.

March, a normal month in a meteorological way, brought one of the real ornithological finds of the last few decades. Observers located a roost of blackbirds that, at first, was regarded as impossible to count. Conservative estimates were in the vicinity of 100,000. The roost consisted mainly of Starlings, Grackles, and a scattering of the other blackbirds. This roost, at Raritan Arsenal, N. J., was found only after diligent detective work on the part of coöperating observers, who tracked the birds over many miles of the State.

April was a rainy month but, in spite of the inclement weather, there were many interesting records. In southern New Jersey, over 5000 Snow and Blue Geese were found in a flock off Fortescue. In early April, migrants showed up many days ahead of their usual appearance and late in the month a fine May-like wave of warblers and other migrants was noted all over the region. At Moriches Inlet, L. I., a great flight of both ocean-going phalaropes was observed about April 29th. These birds stayed into May, and were seen as far west as Jones Beach by many observers.

May, with very little rain and a great deal of heat, was disappointing because of the lack of the concentrated waves that are always expected. Due to this condition, the big-list days in mid-May were only fair, and the higher counts were made only with great effort. The *rara avis* nevertheless came through, as witness: Oystercatcher and Purple Gallinule from Long Island, Yellow Rail from northern New Jersey, and Summer Tanager from Manhattan and Brooklyn parks. An amazing date for the Purple Sandpiper was recorded at Tuckerton marshes in late May.

June still found many species migrating, such as Kingbird, Chat, Robin, and a host of warblers. Having lasted past the calendar date of May 31, the duration of the migration brought forth comment, although few are the bird hunters who venture out in search of mi-

grants at that date. Nesting birds claimed attention, with the following results: nests of the Prairie Horned Lark, Upland Plover, Herring Gull, and Black Rail, all found in the confines of our region.

July was a month for the rarer species: Glossy Ibis, up to five individuals in southern Jersey; European Bar-tailed Godwit in the Barnegat Bay region; Red Crossbills all summer near Lakewood, N. J.; and a most astounding number of Wilson's Petrels in Lower New York Bay, estimated at 100,000. There was a fair flight of white herons, all three species being present for several weeks in favored spots. A definite warbler movement was observed in late July by two independent observers, Norse from Inwood Park, and Carleton from Central Park.

August was very warm and excessively rainy, factors that helped to break the dryness of the two previous months. Both godwits were recorded toward the end of the month after a small blow, and a Curlew Sandpiper was noted at Jones Beach.

September saw a great flight of Broad-winged Hawks over a two-day period at Clifton, N. J., when more than 1600 birds were counted in a short time.

October brought a wide flight of warblers, and large lists were compiled all over the region, especially near the seacoast. An Avocet was seen and collected on Fire Island in the early days of the month. The first appreciable numbers of ducks showed that the flight was not up to par.

November found the ducks well below normal counts, with the exception of the Ruddy. There were some fair flocks of Redheads reported from Long Island. Working with foresight, endurance and speed, Cadbury and Cruickshank recorded twenty-nine species of ducks, geese and brant in one day on Long Island, an outstanding list anywhere. Urner attributed the duck shortage in New Jersey to the lack of new eel grass in the bays of eastern New Jersey, while others thought the lack of cold weather held the ducks to the north of us. There were several records for the Green Heron.

December was mild, but a definite flight of Snowy Owls was noted all through the coastal region, with as many as five and six noted at one place in a few hours, such as at Jones Beach, L. I. There was also a small flight of Dovekies on Long Island, but the majority of birds were found dead.

With this brief résumé, the notes that follow are meant to be the meat of this report, and if any important data have been omitted, the

observer is to blame, for along with the regular notes of the Society, *Bird-Lore* and *Long Island Bird Notes* were carefully searched for worthwhile records.

Finally, thanks are due to Dr. Harrower, Mr. Hickey, Mr. Cruickshank, Mr. Carleton, Mr. McKeever, and the late Mr. Urner, as well as to the host of friends who have been kind enough to go through their notes and unearth pertinent facts. As the popular names of the following conform to those given in the Fourth Edition of the *A. O. U. Check-List*, scientific names have been omitted.

PACIFIC LOON.—1, Oct. 3, Long Beach, "still dark on the fore neck . . . paleness in crown was still present, but the bird in general was changing into winter plumage (Sedwitz).

RED-THROATED LOON.—5, May 16, Eaton's Neck (Allyn, Berliner, Harrower); 1, May 22, Lake Parsippany (Fleischer, Solitar, Solomon).

PIED-BILLED GREBE.—1, Feb. 7, Brookhaven (Carleton).

SOOTY SHEARWATER.—2, May 23, Oak Island Beach (Carleton, Sedwitz, Stephenson); 2, May 29, Moriches Inlet, and 1, Southampton, same day (McKeever, Sedwitz); 1, May 30, Jones Beach (Denniston); 1, Sept. 12, Jones Beach (Sabin).

GREATER SHEARWATER.—3, May 4, Easthampton (Helmuth); 5, Sept. 19, Jones Inlet (Lind).

CORY'S SHEARWATER.—2, June 26, Mastic (J. T. Nichols); 1, June 27, Oak Island Beach (Carleton, Sedwitz); 200, Nov. 7, Montauk (R. T. Peterson); present, Nov. 11, Montauk (Arbib, Berolzheimer); 1, Nov. 14, Long Beach (Sedwitz).

ATLANTIC FULMAR.—1, Oct. 13, "an adult bird in the light phase was noted fluttering and circling about 100 feet outside the surf, near Ft. Tilden . . . pigeon-like head, etc. . . ." (Mayer). A well-authenticated sight record of one of the rarest pelagic birds to visit our shores.

WILSON'S PETREL.—100,000, June 1, New York Harbor (F. Allen); estimated over 30,000, about same place and date (Breslau); as far north as Ft. Lee ferry (Deeds); 100, June 14, Rockaway Point (Imhof); 50, July 3, Long Beach (Sedwitz); 3, Sept. 19, Jones Inlet (Lind).

GANNET.—Common on the south shore of Long Island, Jan. 17 (Carleton, Cruickshank, Mangels, McKeever, Rose); 15, Jan. 19, Jones Beach (Cruickshank); 20, Feb. 13, Montauk (Wilcox); 125, Feb. 7, Montauk (Carleton, McKeever, Staloff, Stephenson); 1, Sept. 19, Jones Inlet (Lind).

EUROPEAN CORMORANT.—5, Nov. 11, Montauk (Arbib, Berolzheimer).

DOUBLE-CRESTED CORMORANT. — 1, Jan. 3, Rockaway Point (Sedwitz).

AM. EGRET.—1, April 25-26, Orient (Latham); 3, June 25, Tobay Beach (Denniston); 60, present on Long Island, July 25 (*Long Island Bird Notes*); 40, middle of Sept., Oak Island (*Long Island Bird Notes*); 1, Nov. 12, Moslein Springs, Pa. (Broun, Shainin).

SNOWY EGRET.—1, Aug. 15, Gilgo Beach (Carleton, Sedwitz, Shainin, Stephenson); maximum, 4, early Sept., Jones Beach (Cruickshank); 1, Oct. 1, Freeport (Cruickshank).

LITTLE BLUE HERON.—1, April 30, Hewlett (Cruickshank); present in small numbers throughout Sept. on Long Island.

E. GREEN HERON.—1, Nov. 7, Greenwood Cemetery (Hix); 1, Nov. 16, Long Beach (Cruickshank); 1, Nov. 26, Mecox Bay (Wilcox).

YELLOW-CROWNED NIGHT HERON.—2, April 24, Seaside Park (Painter, Shainin); 1, May 3, Woodmere (Adelberg, Lustberg); 1, May 23, Idlewild (Mayer); 1, Oct. 11, Hewlett (Cruickshank).

AM. BITTERN.—1, Jan. 2, Port Newark (Rosenbaum).

E. LEAST BITTERN.—3, Aug. 29, Idlewild (Mayer).

E. GLOSSY IBIS.—As many as 5 at one time at Fallsboro, N. J., during July (Urner); 1, Aug. 15, Jones Beach (Carleton, Sedwitz, Shainin, Stephenson).

AM. BRANT.—3800, April 10, Jones Beach (Sabin); 1, all summer, Oak Island Beach (many observers).

GREATER SNOW GOOSE.—5000 to 6000, April 4, Fortesque (Urner); large flock, April 13, over Union City (Eynon); 1, immature, Sept. 26-Oct. 3 (Lind, Rose); 1, Dec. 22, Westport (Cruickshank).

BLUE GOOSE.—A few mixed in with the Snow Geese, April 4, Fortesque (Urner).

GADWALL.—1, Jan. 17, Lake Agassiz (Norse); 2, Oct. 3, Hempstead (T. Mahnken); 2, Oct. 3, Brookhaven (Cruickshank); 8, Nov. 21, Brookhaven (Cruickshank).

EUROPEAN WIDGEON.—3, Nov. 21, Brookhaven (Cruickshank).

AM. PINTAIL.—1, Aug. 29, Van Cortlandt Park (Norse).

EUROPEAN TEAL.—1, Jan. 24, Jones Beach (many observers); 6, April 16, Hempstead (Cruickshank).

BLUE-WINGED TEAL.—1, Nov. 22, Hempstead (Cruickshank).

SHOVELLER.—18, Feb. 12, Brookhaven (Raynor); 150, mid-Nov., Ft. Mott (Urner).

WOOD DUCK.—12, March 13, Oakland Lake and Alley Pond (Sabin).

REDHEAD.—1, May 22, Watermill (Sabin); 1, Oct. 9, Baldwin (Norse, Cantor); 8, Watermill, and 6, Brookhaven, Nov. 10 (Cadbury, Cruickshank); 35, Nov. 25, Little Neck Bay (Bohn). In view of the local rarity, it is the author's view that every record of the Redhead should be recorded, to keep a strict watch on the future status of this diminishing species.

GREATER SCAUP.—All summer at Old Mill (Imhof).

LESSER SCAUP.—5, Oct. 2, Northport (Fry, Ingersoll).

AM. GOLDEN-EYE.—1, female, all summer at Old Mill (Imhof).

BARROW'S GOLDEN-EYE.—1, Feb. 1, Montauk (reported for Pangburn, by Hickey).

BUFFLE-HEAD.—4, May 1, Kensico (Cruickshank).

AM. EIDER.—1, March 14, Montauk (McKeever, Sedwitz); 1, March 21, Montauk (Helmuth); 1, Dec. 12, Montauk (Arbib, Davis); 1, Dec. 19, Montauk (Cobb, Helmuth, Peterson).

KING EIDER.—9, Jan. 3, Rockaway Point (Sedwitz); 3, Jan. 9-10, Montauk (Janvrin, Vogt); 1, adult, Feb. 28, Northport (Allyn, Janvrin); 2, March 17, Eaton's Neck (Cruickshank); 4, March 21, Montauk (Helmuth); 1, Oct. 16, Rockaway (Painter); 13, Dec. 12, Montauk (Allyn, Carleton, Sedwitz, Woodbridge).

RUDDY DUCK.—1, May 16, Eaton's Neck (Allyn, Berliner, *et al.*); 239, Nov. 7, Kellis Pond, L. I. (Peterson).

HOODED Merganser.—2, Nov. 7, Rockaway Point (Sedwitz).

AM. Merganser.—3, July 4, Delaware Water Gap (Ajello, Sanford).

RED-BREASTED Merganser.—Seen with young in Barnegat Bay during the summer (Potter).

TURKEY VULTURE.—2, April 3-12, Ashoken Reservoir (Cruickshank); 1, April 12, Inwood (Norse); 2, March 17, Eaton's Neck (Cruickshank); 2,

May 15, Pound Ridge (Cruikshank); 1, May 31, Orient (Latham); 3, Aug. 25, Idlewild (Imhof).

BLACK VULTURE.—1, May 23, Tuxedo (Berliner).

E. GOSHAWK.—1, Feb. 1, Pelham Bay Park (Norse); 1, Feb. 13, Rosedale (Mayer); 2, March 13, Pound Ridge (Cruikshank); 1, Nov. 26, Montauk (Shainin, Jacobson).

COOPER'S HAWK.—Nesting on Staten Island for the 5th consecutive year (Cleaves).

BROAD-WINGED HAWK.—1, April 12, Freeport (Cruikshank); 1200 on Sept. 20, 900 on Sept. 21, Clifton (Mangels); 2, Sept. 26, Jones Beach (Cruikshank).

BALD EAGLE.—Aug. 13-15, Mastic (J. T. Nichols); 1, Sept. 12, Brookhaven (Rose); 1, Sept. 20, Bayside (Sabin).

OSPREY.—1, March 20, Hempstead (Kraslow); 1, Nov. 7, Mastic (Nichols); 1, Nov. 11, Oak Island (Imhof).

KING RAIL.—1, June 10, Troy Meadows (Kraslow); 1, Nov. 2, Hewlett (Cruikshank).

SORA.—Bred and raised young in Van Cortlandt Park (Sialis Bird Club).

YELLOW RAIL.—2, calling, early May, Troy Meadows (Hun).

BLACK RAIL.—Noted from early May until June 20, when the nest and 8 eggs were found at Oak Island. On June 27, 3 eggs and 4 downy young were seen. This constitutes the first State breeding record for the bird (Carleton, Sedwitz, Stephenson); about the same time, young were found at Long Beach, L. I. (Mrs. Beals).

PURPLE GALLINULE.—1, April 28, Freeport (Cruikshank).

AM. OYSTER-CATCHER.—1, May 9, Moriches Inlet (Sven Raven, and corroborated by Wilcox).

PIPING PLOVER.—12, Oct. 3, Point Lookout (Sedwitz).

KILLDEER.—Nest with 4 eggs, hatched out on May 7 (Cruikshank).

AM. GOLDEN PLOVER.—1, April 18, Idlewild (Mayer); 8, Sept. 6, Mecox Bay, and 9, Sagaponack (Carleton, McKeever, Shainin, Stephenson); 17, Sept. 13, Mecox Bay (Sedwitz, Carleton); 13, Sept. 25, Oak Island Beach (Allyn, Brooks, Carleton, Woodbridge); 1, Nov. 2, Idlewild (Mayer).

RUDDY TURNSTONE.—1, Nov. 14, Rockaway Point (Carleton); 1, Dec. 26, Sands Point (Cruikshank).

AM. WOODCOCK.—A great movement on Nov. 1 (Rich).

HUDSONIAN CURLEW.—1, April 18, Oak Island (Allyn, Adelberg, Berliner, Whitnan); 3, May 23, Oakwood Beach (Mr. and Mrs. Rich); 300, July 17, Absecon (Urner); 1, Oct. 29, Freeport (Cruikshank).

UPLAND PLOVER.—2, April 9, Freeport (Cruikshank); 6, May 4, Farmingdale (Cruikshank); several pair probably breeding in Morris County, N. J. (Eynon).

SPOTTED SANDPIPER.—1, Nov. 14, Newark (Ajello).

E. WILLET.—Several, April 29, Moriches Inlet (Wilcox); 2, May 23, Oakwood Beach (Mr. and Mrs. Rich).

GREATER YELLOW-LEGS.—Jan. 1, Rye (Cruikshank).

AM. KNOT.—Jan. 24, Barnegat (Urner).

PURPLE SANDPIPER.—30 wintered on the Barnegat strip (Urner); 3, May 23, Tuckerton (Rogers, *et al.*); on L. I., came in on Oct. 9, Long Beach (Cruikshank); Oct. 12, Oak Island (Kraslow); Oct. 17, Atlantic Beach (Mayer); 13, Dec. 19, Montauk (Cobb, Helmuth, Peterson).

BAIRD'S SANDPIPER.—1, May 16, Oak Island (Allyn, Berliner); 4, May 22, Mecox Bay (Carleton, Sedwitz); 2, July 23, Oak Island (Denniston); 1, Sept. 15, World's Fair grounds (Fischer, Sabin); 1, Oct. 20, Idlewild (Mayer).

CURLEW SANDPIPER.—1, in pale spring plumage, June 27, Oak Island Beach (Carleton, Sedwitz, Stephenson); 1, Aug. 8, Jones Beach, possibly same bird (?) (Allyn); 1, Oct. 3, Brigantine (Urner).

RED-BACKED SANDPIPER.—2, Aug. 8, Oak Island Beach (Carleton, Sedwitz, Stephenson), one in full winter plumage and the other in breeding plumage, both associating with the Curlew Sandpiper.

LONG-BILLED DOWITCHER.—1, May 9, Brigantine Beach (Nathan, Staloff, Weber); 1, Sept. 10, Jones Beach (Mayer); 1, Sept. 11, Tuckerton (Storer); 1, Sept. 12, Jones Beach (Allyn, Brooks, Carleton, Sedwitz, Woodbridge).

STILT SANDPIPER.—1, May 16, Brigantine (Urner); 1, July 1, Jones Beach (Carleton, Stephenson).

WESTERN SANDPIPER.—Wintered in N. J. (Urner); 2, June 3, Point Lookout (L. N. Nichols); great influx on Sept. 19.

MARbled GODWIT.—1, Aug. 27, Oak Island (Norse); 2, same place, Aug. 28 (Brooks, Allyn); 2, early Sept., Newark Bay (Carleton, Urner); 2, Sept. 11, Tuckerton (Storer); 1, Sept. 19, Meadowbrook Causeway (Mayer); 1, Oct. 3, Oak Island (Rose); 2, Dec. 26, Barnegat (Urner).

BAR-TAILED GODWIT.—1, July 17, Absecon (Urner). One of the few continental records for this species; it was present in that region for over a week.

HUDSONIAN GODWIT.—1, Aug. 29, Jones Beach (Carleton, Sedwitz, Stephenson); 2, Oak Island, same day, same observers; 1, Aug. 12-16, Moriches Inlet (Cobb); 1 on Sept. 11, Newark, 1 on Sept. 19, Barnegat, 1 on Sept. 26, Tuckerton (Urner).

AVOCET.—1, shot, Oct. 3, Point Democrat, Fire Island (reported to Dr. E. Mayr by Ed. Hen of Amityville).

RED PHALAROPE.—2000 or more, 75% Red, April 29, and still present a week later. Fed on the tentacles of a species of large red jellyfish washed ashore in great numbers by the storm that brought in the phalaropes (Wilcox); 2, April 25, Jones Beach (Allyn, Carleton, Sedwitz); 11, May 1, Jones Beach to Oak Island Beach (Shainin); 8, Sept. 18, Brigantine (Painter); 6, Sept. 19, Oak Island (Cruikshank).

WILSON'S PHALAROPE.—1, July 11, Jones Beach (Carleton, Sedwitz, Stephenson).

NORTHERN PHALAROPE.—25% of the 2000 phalaropes at Moriches Inlet, April 29 (Wilcox); 4, May 2, Jones Beach (Carleton, *et al.*); 1, May 9, Jones Beach (Solomon, Solitar).

POMARINE JAEGER.—2, Sept. 12, Atlantic Beach (Mayer); 1, Aug. 29, Quantuck (Cobb); 1, Oct. 23, Rockaway Point (Kraslow); 2, Nov. 26, Montauk (Jacobson, Shainin).

PARASITIC JAEGER.—2, May 9, Jones Beach (Allyn, Cobb); present through June and July, off Jones Beach (Cruikshank); 1, Dec. 3, Rockaway Point (Mayer).

N. SKUA.—“At Montauk Point; general rich brown color, even on wings . . . also buff patches at bend of wings . . . soaring over water like a shearwater . . . dived hawk-like at Herring and Laughing Gulls,” Nov. 11 (Arbib); also reported verbally to the writer by Helmuth.

GLAUCOUS GULL.—4, Feb. 13, Hillview Reservoir (Stephenson); 1, Dec. 12, Montauk (Arbib, Davis).

ICELAND GULL.—1, Feb. 12, 10 miles south of Rockaway (Carleton, McKeever); 1, Feb. 13, Hillview Reservoir (Stephenson); 1, May 7, Idlewild (Mayer); 1, Central Park (Mrs. R. T. Peterson); 1, immature, May 1, Upper New York Harbor (Storer); 1, Oct. 16, Canarsie (Jacobson, Kraslow).

KUMLIEN'S GULL.—1, March 26, Northport (Woodmere Bird Club).

GREAT BLACK-BACKED GULL.—1, June 27, Atlantic Beach (Mayer); 1, Jones Beach, same date (Carleton, Sedwitz, Stephenson).

LESSER BLACK-BACKED GULL (*Larus fuscus graellsii*).—Feb. 7, Newark Meadows (Urner).

BONAPARTE'S GULL — 5, June 26, Long Beach (Denniston); 5 to 10 all through June and early July (Carleton, Sedwitz, Stephenson).

LITTLE GULL.—New York Bay, April 20-23 (Rich), and April 30 (Carleton).

ATLANTIC KITTIWAKE. — 1, Jan. 16, Rockaway (Kraslow); hundreds, Jan. 17, Montauk (Carleton, Cruickshank, *et al.*); 4, Feb. 7, Long Beach (Mayer); 2, May 23, Mecox Bay (Helmuth); 2, Nov. 7, Montauk (Peterson); 100, Nov. 26, Montauk (Cadbury, Cruickshank).

FORSTER'S TERN.—2, Moriches Inlet (Rorden, Mayer); 10, Sept. 24, Rockaway Point (Mayer).

COMMON TERN.—15, Nov. 10, Rockaway Point (Mayer); 1, Dec. 4, same place (Flynn, Jacobson, Kraslow, Painter).

ARCTIC TERN.—July 11, Oak Island, 2 birds, in breeding plumage, along with several Roseate Terns; neither were present the week before (Carleton, Sedwitz).

ROSEATE TERN.—35-50, nesting, July 8, Gardiner's Island (Cobb).

CASPIAN TERN.—April 29, Moriches Inlet (Wilcox).

BLACK TERN.—1, May 9, Jones Beach (Allyn, Cobb); 8, May 23, Oak Island Beach (Carleton, Sedwitz).

BLACK SKIMMER.—13, adults, July 14, Moriches Inlet (Wilcox); 12, adults, young and eggs, Aug. 20, Moriches Inlet (Cobb, Helmuth).

RAZOR-BILLED AUK.—A few, Jan. 9-10, Montauk (Janvrin, Vogt); 3-6, Jan. 17, Montauk (Cruickshank, Carleton, *et al.*); 4, March 14, Montauk (McKeever, Sedwitz); 2, April 1, Montauk (Sabin); 2, Nov. 21, Atlantic Beach

(Breslau); 3, Dec. 19, Montauk (Cobb, Peterson).

BRÜNNICH'S MURRE.—1, March 4, Orient (Latham); 1, Dec., Moriches Inlet (Wilcox).

DOVEKIE.—1, Jan. 9, Montauk (Janvrin, Vogt); 1, Jan. 16, same location (Carleton, Sedwitz); 11, dead, Jan. 18-22, south shore of Long Island (Cruickshank); 1, Jan. 27, Rockaway Point (Karsch, Kraslow, Norse, Sabin); 3, Feb. 22, Montauk (Nathan); 1, Nov. 26, Rockaway (Kraslow); 1, dead, Woodmere (Harrower); 1, Dec. 8, Rockville Center (Denniston); 1, Dec. 12, Montauk (Carleton, Sedwitz).

ATLANTIC PUFFIN.—4, Feb. 1, Montauk (Pangburn, through Hickey), without details, and therefore open to question, as this is one of the rarest winter visitants in our region.

E. MOURNING DOVE.—32, Jan. 19, Bridgehampton (Aste).

BARN OWL.—1, Jan. 23, Alley Pond Park (Imhof); 1, April 24, Van Cortlandt Park (Imhof); 1, Aug., Old Mill (Imhof).

GREAT HORNED OWL.—1, Orient (Latham).

SNOWY OWL.—1, Nov. 26, Rockaway Point (Fischer, Sabin); 1, Dec. 1, Beach Haven (Potter); 1, Dec. 4, Floyd Bennett Airport (Kraslow); 1, Dec. 5, Jones Beach (Carleton, Sedwitz); 1 at Phillipsburg, 1 at Newark, 2 at Beach Haven, in Dec. (Urner); 6, Dec. 19, Jones Beach (Cadbury, Cruickshank); 3, Dec. 26, Montauk (Carleton, McKeever, Breslau, Sedwitz).

LONG-EARED OWL.—1, March 26, Manorville (Raynor); 1, March 26, Grassy Sprain (Imhof, Kraslow, Norse); pair on nest, southern Nassau County, April 18, with eggs, but deserted before the young hatched (R. Allen, Cruickshank).

SHORT-EARED OWL. — Nest with 2 eggs, 6 young, southern Nassau County (Mangels).

SAW-WHET OWL.—1, Feb. 7, Alley Pond Park (Astle); 1, Nov. 25, Hillside Park (Fischer); 1, same location, Nov. 30 (Astle); 1, Dec. 1, Hillview Reservoir (Komorowski).

CHIMNEY SWIFT.—34, Oct. 24, Watchung Ridge (Eynon).

N. PILEATED WOODPECKER.—May 25, Short Hills (Mrs. Jay Kilpatrick).

RED-BELLIED WOODPECKER.—1, April 25, Woodmere (Harrower).

RED-HEADED WOODPECKER.—At least one pair nesting at Bayside (Sabin); pair nesting, Troy Meadows (Mr. and Mrs. Rich); 1, Feb. 6, Bayside (Imhof).

E. HAIRY WOODPECKER.—May 10, nest with 3 young, Bayside (Sabin); May 8, nest with young (Cruickshank).

E. KINGBIRD.—1, June 26, Central Park (Carleton); 1, Aug. 3, Central Park (Carleton).

ARKANSAS KINGBIRD.—1, Oct. 14, Idlewild (Mayer).

N. CRESTED FLYCATCHER.—1, Dec. 4, Oradell Reservoir (L. W. Robinson).

E. PHOEBE.—1, Jan. 23-25 and Feb. 3-9, Speonk (Wilcox); 1, Feb. 7, Van Cortlandt Park (Peterson); 1, Feb. 22, Hempstead (Keil); 1, Nov. 11, Jones Beach (Carleton).

YELLOW-BELLIED FLYCATCHER.—1, May 14, Great Neck (Cruickshank).

OLIVE-SIDED FLYCATCHER.—1, Aug. 2, Central Park (Carleton).

PRAIRIE HORNED LARK.—Bred twice—6 young on Aug. 4, Idlewild (Mayer); bred at Canarsie, several pair (Imhof); at least 2 pair bred in Morris County (Eynon); 1, Feb. 28, assuming nuptial plumage, Idlewild (Mayer).

TREE SWALLOW.—2, Cypress Hills, Feb. 27 (Kraslow); Jan. 11, 11 birds, Jones Beach (Cruickshank); 3000, July 18, Orient (Latham).

BANK SWALLOW.—1, Oct. 24, Nepeague Bay (Audubon Society, noted by many observers).

BARN SWALLOW.—1, Dec. 19, Jones Beach (Cruickshank).

N. CLIFF SWALLOW.—13 nests in one colony south of Greenwood Lake, June 29 (Carleton, Kramer, Stephenson); 4, April 24, Moriches Inlet (Cruickshank); 20, Sept. 6, Jones Beach (Cruickshank).

AM. RAVEN.—1, May 23, Tuckerton (Fleischer).

BROWN CREEPER.—July 4, Catfish Pond, Kittatiny Ridge (Ajello, Sanford).

SHORT-BILLED MARSH WREN.—6, daily, Idlewild (Mayer), all spring and summer; 1, Oct. 12, Rockaway (Imhof); 1, Dec. 3, Van Cortlandt Park (Norse); 1, Dec. 26, Montauk (McKeever, Sedwitz).

E. MOCKINGBIRD.—1, Jan. 22, Newark (J. Fetchner); 1, May 4, Inwood (Norse); 1, May 23, Tuxedo (Berliner); 1, July 1, Riverside Drive, seen from a bus (Vogt); 1, July 6-7, Old Mill (Imhof); 1, Sept. 1, Jones Beach (Sabin); 1, Sept. 9, Inwood (Boardman); 1, Sept. 12, Moriches (Lind); 1, Dec. 19, Pelham (Stephenson).

E. ROBIN.—Great movement on March 14.

BICKNELL'S THRUSH.—Sept. 22, Elmhurst (Mrs. Beals).

BLUE-GRAY GNATCATCHER.—1, April 24, Bronx Botanical Gardens (Sialis Bird Club); 1, Oct. 3, Van Cortlandt Park (Norse).

E. RUBY-CROWNED KINGLET.—Feb. 27, Hempstead (Carleton, Karsch, Norse).

N. SHRIKE.—1, Feb. 15, East Moriches (Wilcox); 1, March 21, Montauk (Helmuth).

MIGRANT SHRIKE.—Aug. 15, Jones Beach (Carleton, Sedwitz, Stephenson).

YELLOW-THROATED VIREO.—3, April 19, near Hanover Neck (Mr. and Mrs. Rich).

PHILADELPHIA VIREO.—1, May 4, Central Park (Sedwitz, *et al.*); 1, Aug. 25, Turta, N. Y. (Painter).

RED-EYED VIREO.—1, Nov. 7, Montauk (Peterson).

E. WARBLING VIREO.—Parents feeding young, June 11, Roslyn (Fry).

PROTHIONOTARY WARBLER.—1, male, May 9, Summit (Lang).

NASHVILLE WARBLER.—1, Nov. 30, Central Park (Cantor).

N. PARULA WARBLER.—1, singing male, June 8, Prospect Park (Shainin).

MAGNOLIA WARBLER.—1, June 29, Wawayanda Plateau (Carleton, Kramer, Stephenson).

CAPE MAY WARBLER.—1, Oct. 24, Inwood (Norse).

CERULEAN WARBLER.—1, Aug. 3-6, Central Park (Carleton).

N. PINE WARBLER.—1, Feb. 14, Montauk (Mr. and Mrs. Rich).

W. PALM WARBLER.—1, March 11, Orient (Latham); 1, April 17, Bayside (Sabin).

YELLOW PALM WARBLER.—1, Feb. 26, Hempstead (Carleton, Kraslow, Norse, Imhof); 1, Dec. 26, Montauk (Carleton, McKeever, *et al.*).

OVEN-BIRD.—Nest and eggs, May 23, Elmsford Ridge (Cruickshank); Nov. 3, St. Nicholas Park (Norse).

KENTUCKY WARBLER.—2, May 23, Elmsford Ridge (Cruickshank).

CONNECTICUT WARBLER.—1, Aug. 17, Alley Pond (Sabin); 1, Sept. 10, Inwood (Kane); 2, Sept. 21, Inwood (Boardman, Karsch); 2, Oct. 3-5, Bayside (Fischer, Sabin); 1, Oct. 8-10, Idlewild (Mayer); 1, Oct. 31, Prospect Park (Breslau).

MOURNING WARBLER.—1, May 16, South Mt. Reservation (Rosenblum); 1, May 18, Great Neck (Cruickshank); 1, Sept. 1, Inwood (Norse); 1, Sept. 18, Idlewild (Mayer).

N. YELLOW-THROAT.—Present all winter, Hempstead (Rorden); 1, April 11, Mill Neck (Lind).

HOODED WARBLER.—Breeding at Bayside (Sabin).

GRACKLE (subsp.).—62,000, Raritan, Nov. 7 (Eynon); 50,000, Dec. 12, Princeton (Carleton, Sedwitz).

E. COWBIRD.—300, Jan. 19, Bridgehampton (Astle).

SCARLET Tanager.—1, female, Nov. 7, Demarest (Bowdish).

SUMMER Tanager.—1, April 26, Central Park (Peterson); 1, May 5, Prospect Park (Kraslow, Nathan).

E. CARDINAL.—1, April 24, Massapequa (R. Allen, Mangels); 1, Aug. 14, Central Park (Carleton); 1, Oct. 4, Bryant Park (L. N. Nichols); 1, Nov. 21, Sunken Meadows, L. I. (Cruickshank).

INDIGO BUNTING.—1, April 25, Orient, freshly dead (Latham); 1, April 25, Seaside Park (Kramer, Shainin).

BRITISH GOLDFINCH.—1, April 17, Weequahic Park, Newark (Sanford).

COMMON REDPOLL.—A flock, Jan. 9-10, Montauk (Janvrin, Vogt); 2, Oct. 31, Palisades (Shainin); 1, Dec. 19, Van Cortlandt Park (Komorowski, Norse).

RED CROSSBILL.—9, Feb. 21, Bronx Park (Nathan); 12, May 15, Pound Ridge, N. Y. (Cruickshank); 6, Aug. 14, Tom's River, N. J. (Fables).

WHITE-WINGED CROSSBILL.—1, Dec. 26, Montclair (Christmas Census).

RED-EYED TOWHEE.—1, Feb. 22, Nyack (Peterson).

IPSWICH SPARROW.—1, Nov. 6, Pelham Bay Park (Cantor).

E. HENSLOW'S SPARROW.—1, Oct. 3, Van Cortlandt Park (Norse).

ACADIAN SHARP-TAILED SPARROW.—1, April 25-May 16, Oak Island (Carleton, Sedwitz).

NELSON'S SPARROW.—1, Sept. 21, Oak Island (Sedwitz, Stephenson).

SLATE-COLORED JUNCO.—1, May 22, Jones Beach (Shainin).

E. TREE SPARROW.—2, May 8, Rye (Cruickshank).

E. CHIPPING SPARROW.—1, Feb. 26, Central Park (Carleton).

The Ornithological Year 1938 In The New York City Region

BY ALFRED E. EYNON

The attempt to condense for publication within the restricted limits now imposed by the Society the abundant material turned in to the Recording Secretary while essaying to impart some value as a record of the year for future use, is a task made possible only through the generous contributions of field data by over 100 observers. About 312 forms were reported to the writer as being present in the region during the course of the year, four of which are birds for which no local specimen has ever been secured. These species are the Eared Grebe, Franklin's Gull, European Black-headed Gull, and Western Tanager.

The year opened with the second real mild *January* in succession. The cold snaps were short in duration and apt to come and go with decided suddenness. An example of this rapid fluctuation occurred during the last week of the month, when the temperature reached 56°F. on the 25th, only to dive to 15°F. on the 28th. Little snow fell and the month closed with a slight deficiency in precipitation. The outstanding ornithological event of the month was the discovery of an Eared Grebe at Long Beach on the 9th by Dr. Janvrin and Mr. Sedwitz. These observers re-located their bird in the same locality on the 16th and a full account of their observations and the reasons why they decided that the bird was of the European subspecies can be found in *Proc. L., S. N. Y.*, No. 49, p. 48. A Sabine's Gull was closely studied at Atlantic Beach on the 16th (Brigham). The late Charles A. Urner found an unusual winter bird in the Marbled Godwit he observed at Barnegat on January 8. An Orange-crowned Warbler on January 29 (Cruickshank, Helmuth), and a Harlequin Duck on January 30 (Brigham, Helmuth, Jacobson) were notable records from Montauk Point. All during the month numerous people turned in records of the Snowy Owl, a good incursion of which had taken place in the fall. There were six birds on the outer strip from the Jones Beach Tower to Fire Island Inlet (Cruickshank), four about New Inlet, many singles at other spots on the Island, one up at Tod's Point, and in New Jersey the bird was reported from Newark Meadows, the Raritan River marshes, Barnegat, and Tuckerton (Urner, *et al.*). White-winged Gulls were scarce, and there were but a few scattered Alcid reports. Northern Shrikes were reported only from eastern Long Island. Tree Swallows again wintered at Jones Beach (Cantor, Jacobson) and hundreds of Mourning Doves wintered near feeding stations on the North Shore (Cruickshank). Wintering individuals of Bittern, Wood Duck, Virginia Rail, Wilson's Snipe,

Phoebe, Prairie Horned Lark, Long-billed Marsh Wren, Catbird, Migrant Shrike, Northern Yellow-throat, Towhee, and Chipping Sparrow, and other half-hardy species swelled the lists of local bird-lovers.

February was chiefly notable for the absence of snow, only a trace being recorded, the smallest total on record. When we note that 161°1'. of excess temperature had been accumulated since January 1 at the end of February, we can easily see how favorable the weather was for the wintering birds. In New Jersey, the second annual mid-winter census conducted under the auspices of the N. J. Field Ornithologists' Club showed 150 species present and a great increase in the total number of wintering individuals. Twelve, possibly thirteen, species of shorebirds were included in this survey. The tremendous concentration of Starlings and Blackbirds roosting in the marshes near the Raritan Arsenal, N. J., was given much attention by C. A. Urner and others. At its peak, this huge assembly totaled over 200,000 birds and those who heard Urner's vivid descriptions of the arrival and dispersal at the roost will fully realize what a spectacular part of the winter's bird-life it made up. On Long Island, the flight lines of Starlings were watched and at Heckscher State Park, R. P. Allen, J. J. Hickey, and A. D. Cruickshank located a roost of at least 20,000 birds. During February reports of a few Redpolls came from several observers, and a Red Crossbill turned up at Atlantic Highlands on the 5th (Urner). Early in the month, evidence of north-bound migration in several species was reported. A Golden Eagle was also seen at Great Neck, L. I., on the 26th (Mayer). Among the ducks, a King Eider appeared at Atlantic Beach on the 14th (Breslau), and as many as 18 Gadwall were present at Patchogue on the 5th (Raynor, Wilcox).

The mild weather so prevalent during February continued in *March*. Exceptionally warm weather from the 19th to the 25th, with a high reading of 74°F., broke the highest weekly mean record for the period. Migration seemed a bit ahead of normal. The Robin took possession of the countryside and presented an interesting picture. Doubtless due to the high survival ratio made possible by the two successive mild winters, the returning birds found competition keen when attempting to settle on their territories. At Elizabeth, N. J., Urner saw as many as seven male Robins battling for territory in an area which in certain past years had been occupied by a single male without serious competition. The outstanding record for the month was the discovery of a female Western Tanager at Island Beach, N. J., on the 6th by a party led by C. H. Rogers. This was the first

of its species to be found in the state. For the whole region there is just one previous sight record of the species from Long Island. Peculiarly enough, the bird frequented a feeding station where it fed on bread crumbs! It was reported that it had been in the locality about three weeks at the time it was identified. Several parties of enthusiasts rushed down to Island Beach on the subsequent week-end and were rewarded with close views of the bird. The last report for Snowy Owl was from Tod's Point on the 24th (Miss Brooks). A flock of six Common Terns was seen in the Raritan River on the 20th (Cant, Eynon) and about the same time some were reported off the south shore of Staten Island. Since they were seen in company with Bonaparte's Gull, there is a possibility that they may have wintered through with that species along the Jersey coast. Roy Latham found a Woodcock's nest, with eggs well incubated at Sandy Beach, Greenport, on March 26.

Early *April* was favorable and the plant world showed great development. Spring suffered a temporary setback on the 6th and 7th, however, when a snowfall of five inches, heavier than any fall during the preceding winter months, covered the region. This reversion to winter was but temporary and the remainder of the month was warmer than normal, with a good rainfall. As a result, vegetation was over a week ahead of normal by the middle of April and by the end, was so heavy that warbler hunting became a trying task. As the migration of fresh-water ducks passed its peak, a notable increase was evident in the numbers of Green-winged Teal (Urner, Sedwitz). Good numbers of Brant were seen at Jones Beach on the 2nd (Norse, Cantor). Quite a few Lesser Yellow-legs were also noted during this period. The closing days of the month saw a heavy Double-crested Cormorant flight passing Long Island, and there was a great Loon flight on the 30th (Cruickshank). Among the early April migrants appearing ahead of normal in numbers were the Barn and Rough-winged Swallows. The Semipalmated Plover and the Semipalmated Sandpiper were reported from Long Island as early as the 2nd and 3rd respectively (Jacobson, Sedwitz). Mr. Urner identified three Long-billed Dowitchers at Tuckerton on April 10.

A slight incursion of Turkey Vultures near the city was evident during the third week of the month. Several were seen at Van Cortlandt Park and Fred Allen had the somewhat unique experience of seeing five Buzzards migrating north over New York Bay on the 24th. Good hawk flights were noted along the ridges in New Jersey. With the month's progress, the migration rapidly gained momentum and many birds appeared on dates ahead of normal. Least Terns at

Jones Beach on the 20th broke the arrival date for that species. There were more than the normal number of Blue-gray Gnatcatchers reported from all parts of the region. Sedwitz's party saw a male Indigo Bunting at Jones Beach on the 24th, and Mayer at Idlewild reported two unusual birds for the period, two Golden Plover on the 22nd, and an adult Little Blue Heron on the 28th. Southerly winds began on the 26th and the prevailing wind was southwest until the 29th, ideal weather for a mass arrival of birds. North of us in New England, the migration during this period was the earliest ever recorded. The White-eyed Vireo reached Ocean County, N. J., by the 21st (Urner) and Prospect Park by the 23rd (Shainin). The general arrival in numbers of the Chestnut-sided Warbler on the 28th and 29th was early indeed. Half the birds in Griscom's Group I (May migrants) had arrived near the City by April 27-28.

With the coming of May, favorable weather continued and in New England, Griscom reported the migration passing its peak by the 7th. Around New York City, the picture is more complicated. Exceptionally early migration took place through the 6th, which agrees with conditions in New England. May 7 to 16 was a rather backward period locally with only small waves reported, but fine weather returned on the 17th and on the following day and again on the 21st and 22nd, the year's heaviest flights took place. Apparently these big waves never reached the region around Boston, where the migration after the first week of the month was poor. Those Group I birds that had not appeared in April were present May 1-4. Group II showed indications of arrival on April 30 and the remainder came in May 2-4. By May 6, most of Group III birds were present near the City, and most of Group II had pushed eastward into Suffolk County (Cruickshank). The appearance of a Cape May Warbler in Bronx Park, April 29-30 (Gell-Mann), was an outstanding example of the early arrival of warblers. This same species was at its peak May 6-7 generally, much earlier than normal. An exceptionally early Gray-cheeked Thrush reached South Orange, N. J., by May 3 (Storer). Group IV birds were distributed over the region by May 3-8, an example being the Yellow-billed Cuckoo, the general arrival of which was reported throughout the region May 1-3. An Olive-sided Flycatcher was carefully identified in Kissena Park May 4 (J. Mann). As usual, some indications of migration were still evident during the first week of June. Among land-bird rarities, Dr. Helmuth saw and heard a pair of Summer Tanagers at Easthampton on May 8, and Jacobson discovered a male of this species at Jones Beach on May 18.

On the coast, the height of the shorebird migration seems to have been reached in New Jersey about May 12, when Urner observed a notable concentration of shorebirds at Brigantine. Unusual numbers of White-rumped and Red-backed Sandpipers were seen on Long Island and a Curlew Sandpiper in full breeding plumage delighted dozens of observers by remaining at Jones Beach Pond from May 21 to 30. Big Days were popular at the migration's height. Mr. and Mrs. Cruickshank, on a rather spontaneous trip prompted by the favorable conditions on the morning of May 18, found 148 species on Long Island. The late Mr. Urner led his last New Jersey Big Day over the usual route on May 15, and despite the worst weather imaginable for a trip of this sort, the party listed 151 species. In the Bronx, the group led by O. K. Stephenson, Jr., found 126 species on May 14. Even as late as the third week in May, there was some evidence at hand to show that some of the early spring migrants were still on the move. Urner and Edwards found Robins at this time that could only have been migrants and Dr. Helmuth's observations on Long Island convinced him that Grackles were still on the move in migrating flocks.

June was a wet month, finishing with an excess of 4.26 inches above normal rainfall, the third heaviest amount of precipitation in the history of the local Weather Bureau. Four rains were of an inch or more! The disastrous effects of such heavy rainfall upon our breeding birds are too well known to be cited here, but suffice it to say that the beach nesting species suffered the most and many of their young were lost. On the Jersey coast, mortality was high among the nesting Terns and Skimmers. The outstanding breeding record of the year was the discovery of the first nesting of the Yellow-crowned Night Heron in New York State by A. D. Cruickshank. Four pairs nested near a large Black-crowned Night Heron colony in Nassau County and a full account may be found in *The Auk*, vol. 55, p. 666. The Prairie Horned Lark continued to occupy new areas as a breeder. Mr. Urner added it to the breeding birds of Union County, N. J., and new spots for the species on Long Island were discovered. Mr. Urner also reported a good-sized colony of Black-throated Green Warblers breeding in the Manahawkin Swamp, a southward extension of this species near the coast. The Black Skimmer nested again at Oak Island (Sedwitz). The Bobolink was found near the limit of its range at Long Branch, N. J. (Seeley). British Goldfinches continued to increase in the Massapequa area, where F. P. Mangels saw as many as 17 birds in one day. Roy Latham reported that the Wood Duck was nesting on Shelter Island and that in a colony of eleven or

more nesting Mourning Doves located near Greenport, L. I., ten doves were found sitting on second clutches of eggs in June.

July, too, was very wet and no less than 16 thunderstorms were recorded by the Weather Bureau. This had no very noticeable effect on birding—the immense number of mosquitoes produced made many spots unbearable to summer enthusiasts! Unusual conditions obtaining offshore seem to have affected pelagic species. No Shearwaters were seen, despite the fact that some observers, notably Sedwitz, were on especial look-out for them. *Time* reported unaccustomed high temperatures prevailing off Montauk Point, bringing Gulf Stream fish such as blue marlin and blue runners out of their usual range. Dr. Helmuth reported unusual quantities of gulf-weed deposited on eastern Long Island beaches, while off the Jersey coast, Fred Allen reported conditions similar to those off Montauk. Late in the month, rain-pools inland caused a wide variety of shorebirds and waders to be attracted to spots where they normally do not occur. The biggest movement of south-bound shorebirds on Long Island apparently took place during the last week of the month. The Golden Plover arrived early and was continuously reported into October. Three Wilson's Snipe at Hanover Neck, N. J., were an unusual record for July 17 (Wolfarth). Among the rarities reported during July were: the second specimen of Audubon's Shearwater for the region, a dead bird picked up at Long Beach on the 24th by Messrs. Lind and Rordan and reported by them in *The Auk*, vol. 56, p. 73; Leach's Petrel, one picked up dead at Echo Bay, New Rochelle, on the 28th, the same day that Petrels of unidentified species were reported to Leo Breslau as appearing at Titicus Lake in Westchester County; Black Vulture, at Easthampton, on the 31st (Helmuth); Purple Gallinule, one captured at Southampton on the 27th (Cobb); Little Gull, a species which had failed to turn up in May, on the 29th, New York Bay (F. Allen); and a Summer Tanager near Clifton, N. J. (Mangels).

August was quite normal, save for a deficiency in rainfall, a condition which caused the rain-pools of the previous month to disappear early and exposed large areas about the margins of our larger ponds. The land-bird migration gathered way as shown by the usual reports of birds like Migrant Shrike and Golden-winged Warbler on Long Island. American Egrets which had appeared earlier in the year reached maximum numbers in August, the flight amounting to a slightly better than normal influx. Little Blue Herons were common and a number of Snowy Egrets were reported from both Long Island and New Jersey. A Louisiana Heron was seen at Stone Harbor, N. J.,

on the 13th (Lehrman). Fred Allen counted 350 Wilson's Petrels between the City and Sandy Hook from a steamer on the 29th. There was a wide variety of summering ducks on the Jones Beach Strip. The Blue-winged Teal present may have bred, but Brant, Baldpate, Pintail, Green-winged Teal, Scaup, Ruddy Duck, and Hooded Merganser were also seen. Dr. Helmuth reported a drake King Eider present on the Oyster Pond, Montauk, during June, July, and August. Marbled Godwits were seen in unusual numbers, an example being the continual presence of a flock at Beach Haven from mid-August until October. There was a good flight of Stilt Sandpipers on Long Island and a Curlew Sandpiper was seen at Oak Island on the 6th (Mayer). A Long-billed Curlew was identified by Helmuth at Georgica Pond, L. I., on August 11.

Early *September* was about normal, the middle of the month wet, and the final week cool and favorable for heavy migration. A decided flight of Cory's Shearwaters off Montauk was noted during the first week of the month, followed by a smaller number of Terns and Jaegers (Cruickshank). On a three-day trip over the Labor Day week-end Sedwitz found 24 species of shorebirds between New Inlet and Montauk Point. On the 10th, tiny young of the Black Skimmer were photographed on Gilgo Island by R. P. Allen and A. D. Cruickshank. Mrs. Cruickshank and Mrs. Selby found two noteworthy birds on Oak Island on the 14th—Wilson's Phalarope and Lark Sparrow. An Orange-crowned Warbler was carefully identified at Neponsit, Queens, also on the 14th (Albert Rees).

On September 18, a hurricane originating in the low latitudes was reported central at 8.30 A.M. due east of the Bahama Islands. Thus began the story of the most violent meteorological disturbance in the New York City region since 1815! As is often the case, the storm was first headed for the southern tip of Florida, where residents wisely took the precautions that unhappy experiences have taught them to take. Making a characteristic curve northward, the storm speeded up and by 8.30 A.M. on the 21st, was centered off Cape Hatteras. The normal movement of this storm would have continued northeastward, offshore, but in this case, there was a high pressure area over the land and another high pressure area over the ocean beyond the hurricane. Thus a valley of low pressure lay between, forming a trough more on a true northward course, a perfect right of way for the terrific whirling mass of air that now headed directly for Long Island.

September 21 was the day of the highest tide of the year, the so-called equinoctial tide pulled up by the gravitational tug resulting when the sun and moon are in line with the earth. Eastern Long Island lay on the right side of the storm's center, known to mariners as the dangerous semi-circle, where the most violent winds and waves of the storm are felt; central Long Island's south shore was exposed to the hurricane's own high tide—the cone of water formed under the low pressure area at the storm's center. Climbing the shoaling bottom of the continental shelf, this great wall of water struck the coast with the nearest possible parallel to a tidal-wave that it is possible to imagine in this latitude. Breaking and thundering out at sea, the waves flung their tons of water against the shore with an impact so great that at Fordham University, the seismograph recorded the vibrations of the earth as though an earthquake were in progress. The water went over the shore, flooding the marshes and sweeping into the bays. The toll taken on the lives and works of man is a matter of history. Here we can consider only the ornithological aspects of the storm.

Ornithological interest surrounding a hurricane is two-fold. There is the immediate effect—*i.e.*, the exciting discoveries of storm-blown rarities and exotics which may be deposited in one's local region, and the more permanent, more depressing effects of the damage done by the storm to the local avifauna and its habitat. The great hurricane of 1938 produced the second result with shocking suddenness and left us surprisingly few visitants from distant parts. The real out-of-range birds—the Yellow-billed Tropic Birds, Cory's and Greater Shearwaters, Petrels, etc.—were for the most part, blown far over Long Island and dropped in northern New England. Our own records as reported may be listed here:

Yellow-billed Tropic Birds, 2, found dead along the beach at Easthampton in October (Helmuth).

Mediterranean Shearwater, 1, found dead at Montauk Point in early October (Helmuth).

Sooty Tern, 1, seen during a lull in the hurricane in company with Least Terns at Manorville (Raynor).

Wilson's Plover, 1, seen at Long Beach, Sept. 22 (Cruickshank).

It is questionable whether the few western sparrows—Lark Sparrows, Clay-colored Sparrows, Dickcissels—seen shortly after were really brought here by the disturbance, since the tendency of these birds to appear at scattered spots in the Northeast in fall has been noticed in recent years. Aside from these, some other immediate effects of the

storm are interesting. Cruickshank, on the ocean front during the blow, found that an unprecedented flight of Laughing Gulls came in. Shortly after a definite increase in the ducks along the coastal marshes was noted. Hummingbirds, our smallest feathered inhabitants, were undoubtedly effected, for three were seen at Long Beach and four at Atlantic Beach on the day following the storm (Cruickshank, Arbib). The birds seen by Arbib were flying east to west across the surf!

The other side of the picture is even more interesting, but the fact remains that the majority of local field students failed to survey and interpret properly the first evidences of permanent damage left by wind and wave on the avifauna. The toll of dead birds was probably the highest ever taken in a single stroke in Long Island's ornithological history. A list of those found just about runs the gamut of the A. O. U. Check-List. At Long Beach, Mr. Cruickshank found dead King Rail, 1; Clapper Rail, 3; Virginia Rail, 1; Meadowlark, 1; and several Savannah Sparrows. He also caught a Brant in such weakened condition that it was taken in the hand. Dr. Helmuth found a great many dead birds in his area, including Pied-billed Grebe, Great Blue Heron, Mute Swan, Sora, Herring Gull, and Common Tern. Roy Latham kindly summed up his observations in the Orient Region in a letter to the writer dated March 1, 1939, and his notes are so interesting as to warrant inclusion here *verbatim*. Describing conditions just before the storm, Mr. Latham writes:

The wind was fresh to strong southerly during the morning, following the heavy rains of the preceding night. Large flocks of Tree Swallows were present throughout the morning, with the usual numbers of various other common birds. By noon, the wind had varied to due east, steadily increasing to gale force by two P.M., and all birds had sought shelter or become quiet. None were seen or heard thereafter during the height of the storm while trees and buildings were being razed by the strength of the wind. Three hours later, after the wind had abated appreciably several Pectoral Sandpipers were noticed alighting on the cultivated fields directly ahead of the advancing tides, which were rapidly rolling in over the farms. These Sandpipers appeared extremely weak from fatigue and sought food immediately, but had to move frequently to keep beyond the approaching water. No other birds were seen that day.

The following morning the usual species and numbers of birds apparently were present, and no distraction seemed visible in their movements locally. The marine tide had reached a point inland approximately one-half mile farther than any previous record established within the memory of living man. The whole southern border, paralleling the salt marshes was flooded, and water stood from four to ten feet deep over all the salt meadows. Consequently, the greatest mortality should be expected among the Sharp-tailed Sparrows. The remains of these sparrows were found in numbers mixed with the tide trash left by the receding water on lawns, among crops on farms, among wreckage in woods, and wherever trash from the salt meadows had been deposited by the tide. The

birds naturally sought shelter within the meadow grasses and as the water rose quickly while the wind was still near its maximum power, these birds were forced to fly or be engulfed. Once in the air, their resistance was nil against such velocity, filled with driving salt spray, and they were swept before the gale to succumb to the elements. Upward of a thousand individuals of this species evidently perished in the Orient Region. Birds of this order would be incapable of alighting on perches in such strong wind, even if such were available. Between twenty and thirty dead bodies of the Pectoral Sandpiper were found in the tidal trash, also a few Catbirds, Towhees, Robins, and one each of Flicker and several other common forms. Apparently only birds within reach of the tide were compelled to move, and once they flew, they were swept along to doom or safety. One Gannet with a fractured wing was picked up on the beach, the only sea species noted from the storm. An Osprey was found exhausted on the Sound beach; after resting over night, it was able to fly. It was a young of the season, banded by LeRoy Wilcox in Orient. No doubt but that many birds were carried into or over the Sound along with the storm here where the distance between bay and Sound is narrow. The exact result of the hurricane on bird-life here may never be correctly determined, but it does not appear to be generally severe.

Mr. Latham's interpretations may be accepted as general for most of those parts of the Island so affected by the storm. The heaviest toll naturally would be among the weak-winged species, flooded out of their usual spots of refuge by the advancing waters, and carried away by the fury of the storm. The list of dead birds found by numerous observers bears this out.

The other angle of this question concerns the changes made in existing habitats used by those species not present at the time of the storm. The Rough-legged Hawk was generally reported as scarce on eastern Long Island during the late fall and early winter following. We find a likely explanation in the story told to R. P. Allen, and repeated by him to the writer, of large numbers of *Microtus* seen riding tide-propelled driftwood and wreckage across the wind-swept bay. Hundreds of small mammals must have perished thus and the staple food supply of the Rough-legs was removed. This hawk was more numerous than is usual in the Barnegat region during the winter of 1938-39, suggesting that those birds normally frequenting Long Island were forced to move southward to an area that suffered comparatively little damage from the hurricane. Late in the fall, Sedwitz reported a "lack of Myrtle Warblers, Savannah Sparrows, and all small birds due to the destruction of their normal cover on the eastern end of Long Island." Shortly after the storm, the Department of Commerce sent out a bulletin notifying mariners that maps compiled by the Coast and Geodetic Survey were useless to a great extent from Cape Cod to Cape May. Imagine, then, the changes wrought in the normal feeding grounds of the hundreds of sea-fowl usually resorting to these waters. Observations since the hurricane have shown the

old areas largely deserted and the ocean ducks—Old-squaws, Scoters, etc.,—congregating in good numbers in areas where they were formerly much less abundant. The effect on the breeding birds as yet remains to be determined. The numbers of those species breeding in the devastated forests of New England may be due for fluctuations that will alter their status as transients in the New York City Region.

Shortly after the storm, exceptionally fine weather for a mass movement of southbound land birds occurred, September 25 being a day on which a widespread wave flooded the region. As many as 112 species were seen by one party on Long Island that day, and the northwest wind swept land birds across the New Jersey Pine Barrens to deposit them in unusual numbers along the outer beaches. It was a day on which conditions were at an optimum for hawk migration and the Urner Ornithological Club witnessed from a favorite lookout near Montclair, N. J., what is probably the largest hawk flight ever seen in one day near the City. The total number of hawks seen was about 2,600, mainly Broad-winged Hawks. There was a great movement of Blue Jays over Long Island at this time. A rarity for this eventful day was a winter-plumaged Franklin's Gull, under observation at Long Beach for several minutes at close range (Allyn, Breslau, Carleton, Jacobson, and Sedwitz). A Hudsonian Godwit was present, surviving the hurricane, from September 12 to October 17 in the Mecox area (Sedwitz, *et al.*). On the 27th, Cruickshank found a Bob-white with newly hatched young at Brookville, L. I. Edward Chalif discovered a Brewster's Warbler in his yard at Short Hills, N. J., on the 29th. On September 28-29, another decided flight occurred on Long Island and by October 1-2, all three Scoters had come in in numbers, and big flights of Pipits, Myrtle Warblers, and Red-breasted Nuthatches were noted (Cruickshank).

October was abnormally warm on the whole. On the 8th and 9th, there was a spectacular migration of Double-crested Cormorants over eastern Long Island and on the 10th, a definite sparrow flight, bringing many Vespers (Cruickshank). On the 23rd, there was a large movement of small land birds in the hills of northwestern New Jersey (C. D. Brown). A huge number of Starlings and Blackbirds resorted to a roost in the Hackensack Meadows near Kingsland, N. J., during the month, the peak about 250,000 birds (Brown, Wolfarth). A Sabine's Gull was seen on October 10 at Easthampton, an immature European Black-headed Gull on the 11th at Georgica Pond, and an immature Yellow-crowned Night Heron at Watermill on the 16th and 17th, all reported by Dr. Helmuth. There was a greater than normal number of late lingering birds. American Egrets were present

at Jones Beach until the 9th and one stayed at South Plainfield, N. J., until October 29 (J. T. S. Hunt). Black Skimmers stayed well into October at Oak Island. On October 11, at Smithtown, L. I., Cruickshank found Whip-poor-will, Eastern Kingbird, and Bank Swallow, all far beyond their normal dates of departure. He also saw a White-eyed Vireo at Cold Spring Harbor on the 13th, and a Canada Warbler on the 28th at Bayville. Late in the month, Purple Sandpipers reached Rockaway Point in numbers and Goshawks were reported from the ridges of northern New Jersey.

November continued the warm weather of October until winter arrived with a blizzard that brought 14 inches of snow on Thanksgiving and the day following. Late October and early November were notable for the large numbers of ducks seen, particularly on Long Island. Baldpate were especially numerous and there were tremendous rafts of Scoters off Jones Beach. In New Jersey, Boonton Reservoir served as a concentration sanctuary for ducks during the hunting season. The best Snow Goose flight in a number of years now took place. Although the birds were reported as early as October 12, the first real flock was seen on October 23, fifty birds passing over Pelham (Kramer). Mr. Cruickshank saw several with Canada Geese flying over Long Island, November 6-9, and a single bird was present with two Blue Geese at Jones Beach, November 5-11. Lee Edwards and A. S. Peterson saw a flock pass the Montclair look-out while hawk-watching on the 13th, and as late as the 25th big flocks were seen flying southwest at Manorville, L. I. (Raynor). An immature bird was picked up at Princeton on December 7 and identified by C. H. Rogers as a Greater Snow Goose.

There was a heavy, concentrated Loon flight on Long Island (Cruickshank, Helmuth). Black Skimmers stayed about Barnegat Inlet until November 20 (Watson). The European Widgeon was widely distributed in southwestern Connecticut, Long Island, and New Jersey, and the Buffle-head, Ruddy Duck, and Hooded Merganser showed remarkable increases. The Redhead continued its status as one of our rarest ducks! Evidence came in of a slight Goshawk invasion near the city and a few Northern Shrikes reached eastern Long Island. The presence of several Tufted Titmice near Wilton, Conn., November 3-27, represents a northward extension of the range of this species (Heck). Dr. Helmuth saw Blue-headed Vireos several times in November and a House Wren on the 26th, all at Easthampton.

December was warmer than normal with little snow. Records of lingering birds continued to come in despite the Thanksgiving Day

blizzard. Piping Plover were still present at Barnegat Inlet on the 4th (Watson), and five Lesser Yellow-legs remained in the Mecox region until the end of the year (Sedwitz). Blue-winged Teal lingered in Van Cortlandt Park until the 17th (Norse, Cantor), and eight Clapper Rails were in the vicinity of Floyd Bennett Field on the 24th (Hickey, R. T. Peterson). Most surprising of all was the Black-throated Blue Warbler discovered at Montauk Point on December 11 (Helmuth, McKeever, Sedwitz). In contrast to the invasion of the previous year, only one Snowy Owl reached Long Island (Cruickshank). The Pileated Woodpecker is pushing forward right to the edge of the City's doorstep—a bird was discovered at Grassy Sprain, five miles from the City limits, on the 26th, and remained for the winter (Thomas, Van Deusen). There were reports that British Goldfinches, increasing so rapidly on Long Island, were moving westward—December 1, Short Hills, N. J. (Chalif) and December 26, Sand's Point (Cruickshank). A drake Harlequin Duck appeared at Jones Beach on the 22nd and remained into the new year, being seen by numerous observers. The Christmas Census as usual occupied the attention of local bird-lovers as the year drew to a close. The long-reigning leaders in the New York City Region, the Barnegat and Bronx groups, tied with a list of 94, but were replaced in the top bracket by the group working on western Long Island with a list of 104 species. Considered as a whole, the various censuses in the region showed fresh-water ducks present in unusual numbers, particularly high counts being turned in in the case of the Black Duck. Landbirds, especially the Junco, were below the normal.

The now abandoned annotated list of the birds seen during the Ornithological Year has one strong point in its favor—it gave credit and fixed responsibility where they were due, to all observers who turned in their notes. In a summary such as the Recording Secretary now prepares, only the more outstanding records can be included and it is easy to lose sight of the fact that all general statements regarding bird movements during the year are only based in the end on the trends indicated in a perusal of all the notes turned in. Records not included here are preserved in the files of the Society and to all who contributed, the writer wishes to express his thanks. Certain people were particularly kind and helpful, notably the late Charles A. Urner, Dr. Ernst Mayr, and Messrs. Cruickshank, Hickey, and Sedwitz.

Report of the Field Work Committee, 1938-1939

BY ROBERT P. ALLEN AND J. J. HICKEY

The committee's efforts to stimulate coöperative field work in this area were limited to the Gull project mentioned in an earlier report, and to the follow-up work on regional breeding-bird maps.

In May, about 400 check lists were distributed for preliminary censuses of breeding birds in the various habitats of the Hudson River Valley and Long Island. The technique of 'spot censuses' had been successfully developed in New Jersey by the late Charles A. Urner in 1937, but his sudden death in June, 1938, robbed the current scheme of most of its leadership and inspiration. Only one observer, A. D. Cruickshank, turned in any considerable number of reports. This method remains, however, the best one so far devised for an initial analysis of local environmental types . . . and it will not, we hope, be dropped. It could easily be applied, for instance, to spot censuses of the habitats suggested in an earlier report of the committee (Hickey, 1938).

A review was also made of the many species that once bred commonly in this general region but are now extirpated. Among these, as given by Griscom (1923) and by Stone (1937) are the following:

Laughing Gull (*Larus atricca*)—last known to nest on Long Island in 1888.

Snowy Egret (*Egretta thula thula*)—undoubtedly bred on Long Island; small companies regularly recorded up to 1885.

Avocet (*Recurvirostra americana*)—bred on the lower New Jersey coast up to about 1829.

Black-necked Stilt (*Himantopus mexicanus*)—bred sparingly in southern New Jersey to at least 1843.

Eastern Mockingbird (*Mimus polyglottus polyglottus*)—colonies once found as far north as Sandy Hook and Keyport.

Cardinal (*Richmondia cardinalis*)—formerly a common summer resident at the extreme western end of Long Island, breeding in Prospect Park up to 1902.

Dickeissel (*Spiza americana*)—a common summer resident on Long Island in 1842 and in New Jersey at Hoboken in 1851.

Because of the slowness with which wildlife management is approaching the problems of non-game species, the committee secured the council's permission to transport six dozen Snowy Egret eggs

from Florida to the Black-crowned Night Heron (*Nycticorax nycticorax hoactli*) colony at Massapequa, L. I. These were obtained for us by Samuel A. Grimes, of Jacksonville, and were placed in Long Island nests by Mr. and Mrs. A. D. Cruickshank and R. P. Allen. In spite of extreme care in candling by Mr. Grimes, only four eggs hatched. The young were subsequently found dead under their separate nests—about one week after hatching. The result very closely paralleled a similar experiment with Stork eggs that were placed in the nests of Gray Herons (*Ardea cinerea*) in England and reported by Blockey (1939).

Disappointment in the present case may possibly have been due in the initial stage to the failure of ordinary candling to detect incubation one day advanced, and in the secondary stage to failure of the white nestlings to release normal parental patterns of behavior in the adult Night Herons. Young Black-crowns normally develop a gray down. Damage to the eggs that failed to hatch may have resulted from handling during transport. The egg transportation technique, however, is extraordinarily cheap (our costs ran to about \$10.00) and it can be effective. Some 260 eggs of the Common Gull (*Larus canus*), Schüz (1939) reports, were shipped 500 km. to a Black-headed Gull (*Larus ridibundus ridibundus*) colony at Rossiten in 1934. Seventy-nine young were successfully raised by their foster parents and were banded. In spite of the fact that the region there was ecologically unsuited to them, two pairs of these birds returned in 1938 and succeeded in raising their own young.

The study of the banded Herring Gulls around New York has been a particular source of pleasure to many members of the Society. Over one thousand sight recoveries were accepted by the committee up to March 1, 1939, and a majority of them came from this region. Monthly reports to the banders were sent out and a special progress report has just been completed. This was read in part at the last meeting of the Eastern Bird-Banding Association in Philadelphia by J. J. Hickey of the committee. In the course of the next two years, the picture of the autumnal migration of this species through our region will, we are confident, be an unrivaled one. No report will be published, however, until all the recoveries are in. Progress in the study of plumage sequences of the Herring Gull has opened up a new phase of the study. Over 250 sketchy field descriptions have been submitted to the committee—almost all of them from this region. There is, however, a great opportunity for some collector to build up a unique series of study skins of these marked birds.

With the death of Mr. Urner, the number of breeding-bird censuses, completed on an acreage basis in this region in 1938, dropped to one (by Hickey in Westchester County). The magnificent stand of primeval hardwoods on Gardiner's Island was, we are told, almost completely swept down by the great hurricane of last September. This brought to a tragic close one of the great unwritten chapters in our avifauna, for no complete picture of this forest—one of the finest in our state—was ever obtained by ornithologists east of the Alleghanies. An example of similar primitive woodland, we are told by Ludlow Griscom, still exists on an island in Buzzards Bay, like the tract on Gardiner's unexplored and neglected except by botanists.

After due study, the committee recommends to the Society a suggestion of Dr. E. B. Heck that the next *Birds of the New York City Region* be published in loose leaf form. This method has been very successful in such publications as the Oxford Loose Leaf Medicine and is eminently suited to meet the needs of an ever changing avifauna.

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GRISCOM, LUDLOW. 1923. *Birds of the New York City Region*.

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SCHÜZ, E. 1939. Ueber künstliche Verpilanzung bei Vögeln. IXme Congress Orn. Int., Rouen: 311-325. (Reviewed by Margaret M. Nice, 1939, in *Bird-Banding*, 10: 164-165).

STONE, W. 1937. *Bird Studies at Old Cape May*.

Report of the Field Work Committee, 1939-1940

BY ROBERT ARBIB, JR.

Cognizant of the growing interest among bird students in studies concerning breeding birds, and recognizing the dearth of published or collected information for the New York City region in this field, the committee is now conducting an intensive survey of the distribution, habitat, and status of the breeding birds of the region. Before focusing attention on problems concerning individual species, it was felt that a general study of the whole region would be both more adaptable and more acceptable to the varied interests of the membership of the Society. Therefore, in the spring of 1939, the committee set out to compile accurate maps of the local ranges of all breeding birds in the territory. From the list of 129 species known to breed within the area, 43 were tabled for the present, as being so common as to warrant specialized studies; nine others had been treated in a previous survey of colonial nesting species. Those remaining, however, are either unknown, slightly known, or in such a state of transition or instability, both as to range and abundance, that immediate mapping seemed eminently worth while.

Every reader of ornithological literature is struck with the generalities unrelated to the fact or statistics with which he must reconcile his own observations. In seeking to learn whether a certain species has decreased or increased over a period of years, he runs across constant obstacles. He must weigh the author's personalized comparative terms, his powers of observation, his experience, and the reliability of his sources. There can be only one true basis for accurate comparison—figures. Nothing but guesswork can be deduced from many records left to us by the past, but it is the desire of the present committee to provide as highly accurate statistics as possible in this current survey, for the benefit of the future as well as the present.

For the first year of the survey, 15 species were chosen which presented particularly interesting problems, such as striking changes in status, habitat, or abundance, or about which little was known. Questionnaires were sent on June 1 to some 200 members of the Society and to others among the list of local bird students. Positive replies were received from 45 observers, and further correspondence resulted in additional information from 30 other sources. The 15 species mapped were Pied-billed Grebe, Blue-winged Teal, Wood Duck, Florida Gallinule, Barn Owl, Prairie Horned Lark, Carolina Wren, Hermit Thrush, Louisiana Water-Thrush, Black-throated Blue Warbler, Canada Warbler, Yellow-breasted Chat, Orchard Oriole, Bobo-

link, and Cardinal. Questions were asked regarding locality of breeding, evidence of breeding, number of pairs located, type of habitat, and the present status of the species in the area reported on.

Although the replies are still in the process of evaluation, preliminary study reveals a marked change in the status of these species since the last authoritative publication, Griscom's *Birds of the New York City Region*, of 1923. For example, Griscom summarizes the status of the Pied-billed Grebe by listing several very old records from New Jersey, commenting that "at the present time no breeding colony is known in our area." He concludes that a reasonable possibility exists of it breeding in northern New Jersey and sporadically at least on Long Island. The 1939 returns indicate no less than 21 pairs breeding. For Wood Duck the contrast is even more striking. For 1923 Griscom states, "Now nests in a few scattered localities." The current survey located more than 113 pairs in the same area. For Florida Gallinule Griscom states that all known colonies on Long Island had been wiped out, but lists a few for New Jersey. Present returns show more than 29 breeding pairs, about half from Long Island. But can we infer that these birds have increased during a period when much of their natural habitat has been destroyed? A large part of their apparent increase must be attributed to a more thorough coverage today of areas within our region which were untouched in 1923. As noted above, unfortunately there is no method of measuring these unknown factors. With respect to Barn Owls, Griscom indicates that there were no nesting pairs *known* at the time of writing, except on Staten Island. In 1939, 23 definite breeding stations were located.

In the case of Prairie Horned Lark, a very marked change has occurred, dating back no further than 1935. According to Griscom this species bred only in northern New Jersey. In 1939, 34 pairs were recorded from the area, and the spread can be readily traced. It was recorded as far east as Gardiner's Island and Montauk, but it is probable that these birds are offshoots of an earlier-established Block Island colony. Similarly, for the other species, a more perfect picture of the distribution and numbers is found in the data gathered by the committee. Such interesting facts are revealed as the apparent change in the range and habitat of the Orchard Oriole and Bobolink, the marked fluctuation in the status of the Carolina Wren, and the peculiar distribution of the Hermit Thrush and Cardinal.

In a preliminary questionnaire for the use of the committee, the birding preferences and interests of the observers, their chosen territories, and the length of their observations were polled. From these

returns and the response to the breeding questionnaire it was found that there are still sizeable areas in the region where no constant or even occasional observation is maintained. Among these localities are northern Westchester County, Rockland County, scattered sections of New Jersey, Staten Island, and the southwest portion of Suffolk County, from the west boundary to Mastic. It is hoped that this brief report will spur observers to help fill in these blank spots with the ink of investigation.

For the coming year, an additional twenty species will be studied, all presenting interesting distribution problems. Questionnaires similar to those of 1939 will be sent to all active observers in the region, and a wide response is urgently solicited. The following species have been added to the list for 1940: Red-shouldered Hawk, Marsh Hawk, Sparrow Hawk, Clapper Rail, Virginia Rail, American Bittern, Fish Crow, Screech Owl, Wood Pewee, Rough-winged Swallow, Nighthawk, Whip-poor-will, Bluebird, White-eyed Vireo, Blue-winged Warbler, Chestnut-sided Warbler, Black-throated Green Warbler, Indigo Bunting, Seaside Sparrow, and Swamp Sparrow. Coincidental with this survey, observers will be asked to continue reports on the species mapped last year, as well as to supply data on all hawk and owl stations.

The committee is greatly indebted to the many observers who coöperated in submitting their data for correlation and integration in the work now in progress, and regrets that space will permit only collective acknowledgment of gratitude at this time.

Report of the Secretary of the Linnaean Society of New York For the Year 1938-1939*

The activities of the Society during the past year have been the usual compromise between the ideals of its officers and the limited time at their disposal, between their hopes and the exigencies of life in a modern metropolis, between the past and the present. The Society has reached a respectable age and it has changed much since that day in March, 1878, when Franklin Benner and Ernest Ingersoll first summoned a group of kindred spirits to meet in an office on Liberty Street. In order to throw our more recent activities into sharper focus, we should like to review here the early conditions under which the Society then operated. There were no Audubon societies at that time, nor was there an A. O. U. The early meetings were devoted to discussions of mammalogy, entomology, botany, ornithology, parasitology and ichthyology—all relatively unexplored fields of natural history. About six members, and perhaps one or two visitors, appeared at the monthly gatherings where a great deal of time was given to the task of creating precedents for such things as meeting places and publications. To miss a meeting in those days was more disconcerting than it is today. "For absence from regular meetings," an early by-law stated, "there shall be imposed a fine of twenty-five cents (!)."

For some years the Society met in the rooms of the American Geographic Society, but in 1891 it moved to the American Museum, and attendance increased noticeably. Shortly thereafter its present affiliation with the New York Academy of Sciences and other local scientific societies was undertaken. Timely announcements of meetings have long been extended to our members by the Academy in its periodic bulletins, a source of assistance which every secretary has deeply appreciated. About this time the membership list was multiplied about four times by the Society's amalgamation with another organization. These new members paid their dues for years, but they seldom attended meetings. As a result, the Society rapidly acquired a sound financial position, but it gradually found itself unable to obtain quorums for its regularly scheduled meetings. This led to the inclusion of ladies in its membership, a step dictated by necessity which has never since been regretted.

In the course of its sixty-one years, our organization has set up two special classes of membership. Among its Fellows are five Found-

*Condensed for publication. A fuller report has been placed in the archives of the Society.

ers (Dr. C. Hart Merriam—its first president, Ernest Ingersoll—the first secretary, Franklin Benner, Dr. A. K. Fisher and William C. Osborn) and three valued ex-presidents, Walter Granger, Ludlow Griscom and John T. Nichols. To this group, who have specially distinguished themselves in its service, the Society elected on March 8, 1938, Dr. James P. Chapin, its president from 1928-29. At the same time, H. Eliot Howard, the late Dr. Joseph Grinnell, and Dr. Erwin Stresemann were elected Honorary Members, and the first Linnaean prize for ornithological research was awarded to William Vogt for his paper, "Preliminary Notes on the Behavior and Ecology of the Eastern Willet." Assisting the council in judging the latter were Mrs. M. M. Nice, Dr. Herbert Friedmann and Dr. Ernst Mayr.

During the past five years, the Society's annual income from dues has averaged about \$400.00 a year. Annual expenditures, exclusive of the occasional publication of *Transactions*, have exceeded this income by about \$50.00. It was the considered opinion of the council that these expenditures have been timely and important and that they could not be reduced without seriously impairing the effectiveness and usefulness of the Society.

Changes in the Society's membership since 1920 are shown in the following table:

	1920	1923	1926	1929	1932	1935	1938	1939
Honorary Members and Fellows	4	3	6	9	10	10	11	14
Resident Members	81	103	127	159	153	143	154	154
Non-resident Members	26	24	23	17	10	13	19	17
Total	111	130	156	185	173	166	184	185

During the year, the Society lost three members by death, Frederick William Hyde, Mrs. Herbert W. Smith and Charles A. Urner. Mr. Hyde had been a member over twenty-five years, Mrs. Smith a member since 1922. Like the loss of Warren F. Eaton in 1936, Mr. Urner's death was an irreparable and untimely loss upon which the officers received many personal messages of condolence as well as a memorial message from the D. V. O. C. A saddened and shocked membership adopted the following resolution:

"With profound sorrow and a sense of deep personal loss the members of the Linnaean Society of New York have learned of the sudden and untimely death, on June 22nd, 1938, of Charles A. Urner, Past President and Fellow of this Society.

Be it therefore resolved: That the Linnaean Society of New York place on record its feeling of untold regret at the untimely close of a life so outstanding in accomplishments in field ornithology and so remarkable as an inspiration to his innumerable friends. His leadership was kindly and his followers found it

easy to become his disciples. His unflinching good humor and thoughtfulness made him the best of companions in the field. His vivid descriptions of field observations and his scholarly interpretation of the factors involved have contributed vastly to our store of knowledge, and those interested in ornithology will be his debtors for many years to come.

"Be it further resolved: That a copy of this resolution be transmitted to Mrs. Margaret E. Urner that we may extend to her and to the members of the family this expression of our sincere sympathy and our heartfelt condolences."

Scheduled papers and speakers were as follows:

Date	Speaker	Title
March 8, 1938 (Annual)	Dr. J. P. Chapin	To the Eastern Congo in 1937
March 22, 1938	C. A. Urner	The Midwinter Census of New Jersey Birds
	J. J. Hickey	<i>Bird-Lore's</i> Second Breeding Bird Census
April 12, 1938	Dr. C. W. Leister	Recent Acquisitions at the Bronx Zoo
April 26, 1938	Robert P. Allen	The Coöperative Herring Gull Project to Date
	J. J. Hickey	Symposium on Fly-Lines of Warblers in the New York City Region
May 10, 1938	J. F. Street	Edward Harris and His Birds
May 24, 1938	- - - - -	Field Notes on the Spring Migration
June 21, 1938	- - - - -	Informal Meetings
July 19, 1938	- - - - -	" "
August 16, 1938	- - - - -	" "
September 20, 1938	- - - - -	" "
October 11, 1938	Dr. N. Tinbergen	A Year in Greenland
November 1, 1938	F. P. Mangels	Pairing in the Black-crowned Night Heron
	J. J. Hickey	Notes on the Breeding Birds of a Wooded Slope
November 15, 1938	R. T. Peterson	Symposium on Bird Photography
	R. H. Pough	
	R. P. Allen	
	J. F. Porter	
November 29, 1938	R. P. Allen	Preliminary Notes on the Migration and Homing of Herring Gulls
December 13, 1938	James Bond	Birds of the Bay Islands, Honduras
December 27, 1938	- - - - -	Discussion of the Christmas Censuses
	O. K. Stephenson	Notes on the Breeding Birds of Van Cortlandt Park
January 10, 1939	Ernest G. Holt	Wildlife Program of the Soil Conservation Service
January 24, 1939	Dr. E. Mayr	The Proportion of Sexes in Birds
February 14, 1939	R. L. Birdsall	A Recent Expedition to Karakorum
February 28, 1939	T. E. Gilliard	The Phelps-Venezuela Expedition to the Guiana Highlands

The sixty-first Annual Meeting and dinner was held at the Hotel Alamac on March 8, 1939. The occasion was an extremely informal

one. Weird cartoons of non-existent birds were exhibited—"bean birds," "bugle birds," and "gimlet-nosed snoos"—and were subsequently raffled off to a delighted audience. President-elect Cruickshank introduced the greatest ornithologist he had ever met—himself!—and thereupon launched into an amusing recital, "Great Ornithologists Who Have Known Me"—a series of candid camera pictures of Linnaean members sleeping, yawning, and in other unguarded moments. As a means of intensifying the bonds of friendship between our members, this meeting struck a new note and proved to be one of the most successful ever held by the Society.

The average attendance at the informal summer meetings, fourteen members and six guests, did not depart from the average for these gatherings since their inception over a dozen years ago. The crowded programs of 1937-1938—travelogues alternated with meetings crammed full of field ornithology—encouraged the highest attendance of members in the history of the Society. As the council wished, these meetings discouraged purely casual visitors and indifferent strangers, but there was a slight falling off in 1938-39 when less varied programs were scheduled.

	1895	1915	1920	1923	1926	1929	1932	1935	1938	1939
Members	9	10	14	18	27	27	34	34	36	33
Guests	8	15	11	14	22	28	48	43	28	23
	—	—	—	—	—	—	—	—	—	—
Totals	17	25	25	32	49	55	82	77	64	56

The Secretary wishes to express his thanks to all those who have helped him in carrying out his duties.

Respectfully submitted,

ROBERT P. ALLEN, Secretary.

Report of the Secretary of the Linnaean Society of New York For the Year 1939-1940

During the year, the Linnaean Society has held sixteen regular meetings and four informal meetings. The average attendance at regular meetings has been: members 38, guests 30—summer meetings: members 19, guests 7.

The calendar for the year was as follows:

March 8—Annual Meeting.

March 28—A Recent Trip to Colombia, South America, by Dr. Robert Cushman Murphy.

April 11—The Private Life of the Gannet (motion picture).

April 25—At Home with the Ospreys, by Samuel H. Chubb.

May 9 and 23—Discussion of the Spring Migration.

October 10—Discussion of Field Notes by Members.

October 24—The Prairie Falcons of William's Canyon, by Drs. W. Sargent and A. B. Klots.

November 14—A Discussion of the Hurricane's Effect on Local Bird-Life, by Dr. William Todd Helmuth 3rd.

November 28—Southern Sanctuaries, by Alexander Sprunt, Jr.

December 12—Birding in the Southwest, by Roger Tory Peterson.

December 26—Further Notes on the Coöperative Gull Survey, by J. J. Hickey.

January 9, 1940—Evolution of Species of Birds, by Dr. Ernst Mayr.

January 23—Behavior of Some Young Blue Jays, by Dr. Austin L. Rand.

February 13 — New England Migration Flyways, by Ludlow Griscom.

February 27—Little Known Florida, by Allan Cruickshank.

At the Annual Meeting, March, 1939, the following officers were elected: President, Allan Cruickshank; Vice-President, Dr. E. R. P. Janvrin; Editor, Dr. Ernst Mayr; Treasurer, Irving Kassoy; Secretary, John F. Mathews; Recording Secretary, Robert Storer.

Two Honorary Members, Dr. Witmer Stone and Dr. Joseph Grinnell, and two resident members, Dr. Loring Turell and Irving K. Taylor, passed away during the year.

Twenty new members have been elected and six have resigned or been dropped. The total membership now stands at 202 members, the largest membership in the history of the Society.

Dr. N. Tinbergen's behavior study of the Snow Bunting was published in Volume V of the *Transactions* and distributed to the members.

The most notable events in the history of the Society during the past year were the creation of a "Charles A. Urner Memorial Fund" for the promotion of ornithological field work in New Jersey, New York, and Connecticut, and for the publication of studies made in these areas, and of an "Endowment Fund," the income of which is to be devoted primarily to the publication of worthy ornithological papers.

The secretary wishes to express his thanks for the coöperation and help received during the past year from the many members of the Society.

Respectfully submitted,

JOHN F. MATHEWS, Secretary.

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

OFFICERS 1939-40, 1940-41

President - - - - -	ALLAN D. CRUICKSHANK
Vice-President - - - - -	E. R. P. JANVRIN
Secretary - - - - -	JOHN F. MATHEWS
Treasurer - - - - -	IRVING KASSOY
Editor - - - - -	ERNST MAYR
Recording Secretary (1939-40) - - - - -	ROBERT W. STORER
" (1940-41) - - - - -	RICHARD H. POUGH

COUNCIL 1939-41

Ex Officio

Allan D. Cruickshank

E. R. P. Janvrin	Irving Kassoy
John F. Mathews	Ernst Mayr
Robert W. Storer (1939-40)	Richard H. Pough (1940-41)

Term 1937-1940

James L. Edwards	Richard H. Pough	Allen M. Thomas
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Term 1938-1941

Joseph J. Hickey	Alfred E. Eynon	Robert P. Allen
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Recent Publications of the Linnaean Society of New York

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TRANSACTIONS

Vol. IV, 1937, Octavo, 248 pages, 3 plates, many figures, charts and tables, \$2.00 (\$1.50 on direct order from the Society).

Studies in the Life History of the Song Sparrow I. By Margaret M. Nice.

Vol. V, 1939, Octavo, 94 pages, 2 plates, 20 figures, \$1.00 (75c on direct order from the Society).

The Behavior of the Snow Bunting in spring. By N. Tinbergen.

PROCEEDINGS

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of

NEW YORK

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1940-1941

Nos. 52-53

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OF THE
LINNAEAN SOCIETY
OF
NEW YORK

For the Two Years Ending
March, 1941



Date of Issue, December 29, 1941

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Life History Studies of the Tree Swallow

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I. INTRODUCTION

The following paper is a factual account of a Tree Swallow (*Irodoprocne bicolor*) colony founded on a small tract of land in the Housatonic Valley, a few miles south of the town of Kent, Litchfield

County, Connecticut. It is based on almost daily observations covering three breeding seasons. Representing the only sizable colony within the state that has been under observation and study, it forms a favorable basis of comparison with the colonies at Princeton (Chapman, 1935 and 1939), and Cape Cod, Massachusetts (Austin and Low, 1932 [Referred to throughout this paper as Low, 1932]; Low, 1933 and 1934).

The project was undertaken with a view to song-bird management that could be applied to other similar areas in New England. Primary stress was, therefore, given to the colony's rate of increase, reproductive efficiency and the subsequent relation of these quantities to other species nesting within the area. To reduce the possibility of error to a minimum in determining these two elements necessitated allowing the colony to operate under natural conditions with as little disturbance as possible. The latter policy has been followed throughout the study, and is, I believe, reflected in the results.

In the course of the project, however, other phases of the breeding cycle were naturally under observation and are included in the work. Considering the work as a whole it furnishes a fairly complete picture of the breeding cycle of the Tree Swallow for the latitude of southern New England.

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A. DESCRIPTION OF COLONY SITE AND ENVIRONS

Four miles below Kent the Housatonic is dammed for power, causing the river to resemble a long narrow lake. On the eastern bank of the river a mile above the dam is the area on which this colony was founded. Rising from the western shore to an average height of 1200 feet (375 meters) are the Schaticoke Mountains, foothills of the Taconic Range. To the east there is a gentle rise of hills which drops off to a secondary valley. In this valley are two small lakes, which are at most but a mile from the colony. Connecting these lakes is a rather extensive swampy tract, the flora of which consists mostly of pond lilies (*Castalia*), a swamp tussock grass, cattails (*Typha*), a fair sprinkling of swamp alder (*Alnus*), and along the borders, red maple (*Acer rubrum*).

The actual site of the colony is a played-out tobacco lot, three acres (1.3 hectares) in extent. To the east and north are fields once farmed, but now growing up to cedar (*Juniperus*), speckled alder (*Alnus incana*), bush dogwood (*Cornus* sp.), and an occasional fruit tree. On the south are open fields terminating in a small ravine, which includes a small spring-fed swamp, pretty well choked with bush cinquefoil (*Potentilla fruticosa*). The ground elevation of the colony site is 450 feet (137 meters) above sea level.

Considered in relation to its surroundings, the colony area is not unlike a natural habitat for Tree Swallows, if we except the actual nesting boxes themselves.

B. HISTORY OF THE COLONY

In 1930 one acre (.4 hectare) of this land was acquired, and upon completion of a house, plantings were begun with a view to attracting birds. Two years later a few bird boxes were erected in the hope of attracting some box-nesting species. A small flock of Tree Swallows visited the place in late July 1933, and inspected the few boxes. Next spring, 1934, the first pair nested in box 11 and reared one brood. In 1935 1 pair again nested. Four more boxes were added in the early spring of 1936 making seven in all, but the new boxes were placed in hedgerow positions. Nevertheless, 3 pairs nested that year.

During the fall of 1936 two more acres (.8 hectare) were acquired. In the spring of 1937 a concerted effort was made to increase the number of pairs by the placing of ten new boxes. The response was an increase to 10 pairs. In 1938 fifteen more boxes were added with a resultant increase to 23 pairs for that year. Again in 1939 twelve new boxes were erected, and the colony increased to 35 pairs. In the autumn of 1939 twenty more boxes were erected.

It should be remembered that, including the buildings and driveway, the total area available for boxes was only 3.25 acres (1.3 hectares); and that in addition to the swallows there were in 1939 one pair of Starlings (*Sturnis vulgaris*), 2 pairs of Bluebirds (*Sialia sialis*), 8 pairs of House Wrens (*Troglodytes aëdon*), and 19 pairs of open-nesting species—a total of 65 pairs. Thus we find for that year a density of 20 pairs per acre (8 per hectare) representing 14 species.

During the period of this study, open-nesting birds steadily increased both in the number of species and individuals. In 1930 only 3 pairs of birds (1 Song Sparrow—*Melospiza melodia*, 1 Field Sparrow—*Spizella pusilla*, and 1 Northern Yellow-throat—*Geothlypis trichas brochidactyla*) were found on the actual area. Their subsequent increase to 19 pairs in 1939 can best be correlated with the matur-

ing of the plantings which afforded both food, cover, and nesting sites. Since this increase was progressive over the three-year period and paralleled the Tree Swallow increase, the box-nesting species either had no effect or were perhaps beneficial.

On June 27, 1940, an opportunity was had to check over the colony in an attempt to discover the number of pairs of Tree Swallows for the year. Instead of an anticipated increase to 50 pairs, there was actually a loss of 5 pairs over the 1935 nesting season. Whether this colony has begun to decrease as Chapman (1939) found at the Princeton area in 1936 or whether the heavy losses this species suffered during the severe winter of 1939-40 in the South have had a direct effect is problematic at this time. However, more recent reports from the New England states (Griscom, 1940) tend to prove that the species suffered a general decrease over its northeastern breeding range as a result of the preceding severe winter in the South.

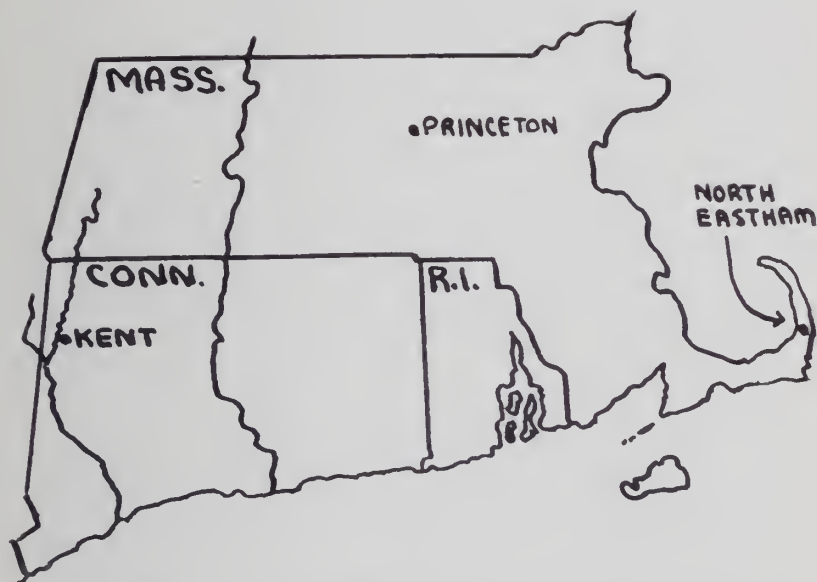
The 1940 check disclosed no decrease in the number of Bluebirds or House Wrens. These two species have probably, as was to be expected, reached a stationary condition in their respective populations. Another fact, perhaps significant, was disclosed in the 1940 survey, namely, the total absence of Phœbes (*Sayornis phæbe*), where for the past two years 2 pairs have bred. This is another species which might have suffered losses as a result of the severe cold on its southern wintering grounds.

C. RELATIVE ISOLATION OF THE COLONY

During the nesting seasons, 1933, 1934 and 1936, extensive breeding-bird surveys were made of northwestern Litchfield County (J. F. and R. G. Kuerzi, 1934). These investigations revealed only a few scattered pairs of Tree Swallows nesting in natural haunts. No colonies were found and few, if any, natural habitats remain in this part of Connecticut. The few scattered pairs were found not in the Housatonic Valley, but in the smaller and higher valleys to the east. At the present time there are no known colonies or even individual pairs in the Housatonic Valley between New Milford and Canaan—a distance of over 50 miles. No doubt their absence can be accounted for by a lack of nesting sites, as was the case at Cape Cod (Low, 1932). Enough field work has been done in the Harlem Valley from Brewster through Pawling and Millerton to Sharon, Connecticut, to establish the absence of this species in that extensive area, or at least to exclude the possibility of any sizable colonies.

Princeton, Massachusetts, where Chapman established his colony, is 100 miles northeast of Kent in a straight line. North Eastham,

Cape Cod, the location of the Austin Ornithological Research Station, where Low worked with Tree Swallows, is practically the same latitude as Kent, but 200 miles directly east.



Where studies of the Tree Swallow were made in southern New England. The Kent colony studied by the author is on the Housatonic River in Connecticut, Chapman's colony at Princeton is 100 miles northeast, Austin and Low's at North Eastham is 200 miles east.

D. TYPE OF BIRD BOXES

Government specifications were followed fairly closely in the construction of the boxes. Inside measurements were roughly: floor 6" x 6" (15.2 cm. x 15.2 cm.), rear height 7" (17.8cm.), front height 6" (15.2 cm.) with an opening of 1.5" (3.8 cm.) in diameter 4" (10.2 cm.) from the floor. Roofs slant down toward the opening (overhang was found to be unnecessary), and are hinged on the side rather than the rear with a hook and eye locking device on the side opposite the hinge. Fronts do not open. The side-hinging has two advantages over the conventional type: the roof will not blow open even if unlocked, and will not curl due to moisture warping. This insures a weather-tight lid at all times. For banding operations, manually controlled shutters were employed, and access to the trapped birds was had through the hinged lid.

These boxes are set out on creosoted posts and average from 4 to 5 feet (1.2 to 1.5 m.) above the ground. The posts for the 1939 season were on 50-foot (15.2 m.) centers, and the total number of boxes for the same season was 50.

In the matter of paint some experimenting was done to determine the most weatherproof kind of color that would be accepted by the birds. The Tree Swallows accepted (as did Bluebirds and wrens) boxes stained with creosote or painted a dull brown, gloss brown, white, gray, blue, orange or aluminum. Aluminum paint was finally adopted for general use, not only for its excellent weather-resistant qualities, but also since it was found to keep the boxes cooler. This latter quality may be important during the fledgling period when hot spells usually occur, particularly when we realize that the birds' natural nesting sites are normally in cool situations above or near water. However, Weydemeyer (1934) found that Tree Swallows could successfully stand temperatures as high as 98° F. (36.7° C.) during the fledgling period.

E. BOX LOCATIONS AND PREFERENCE

As expected, houses placed out in the open are most eagerly sought by the swallows, but occasionally a hedgerow box is occupied. However, the hedgerow boxes have a very definite value in the plan of the colony, as they afford nesting sites for wrens for their first broods. To reduce further any possible friction between the swallows and wrens, one or two wren boxes have been placed each year at suitable points. Results seem to indicate that such manipulation of boxes cuts down possible damage resulting from this interspecific antagonism.

Unfortunately, this latter technique cannot be applied to the Bluebird situation, which so far has not been serious, but which will probably become more acute as the swallow population further increases. Here again the policy of keeping boxes available in excess of the number actually required may help to lessen this pressure.

Herewith is a tabulation for the three seasons covering the three species of box nesters in the colony: swallow, wren and Bluebird.

TABLE I

	1937	1938	1939
Number of boxes available	23	40	50
" " " occupied	17	31	42
" " " in excess	6	9	8
Percentage of boxes occupied.....	73.9%	77.5%	84%
" " " in excess	26.1%	22.5%	16%

In the other colonies where similar studies were undertaken, boxes were not placed nearly as closely for the simple reason that the areas

under investigation were considerably larger than the area at Kent. However, there is a record of a Tree Swallow colony in Massachusetts where boxes were placed as densely as 7 foot centers, and according to reports were occupied (Whittle, 1926). This gives some inkling as to the Tree Swallow density that can be attained in a given area.

II. TIME OF ARRIVAL AT THE COLONY

First arrival dates were as follows:

1937 — April 8	3 birds
1938 — April 11	3 birds
1939 — April 5	8 birds
Average date of arrival for three years—April 8.	

Other investigators seem to agree that early April is the normal time of arrival for the Tree Swallows. Low (1932) gives April 3 for Cape Cod, and Forbush (1929) April 12 for eastern Massachusetts. Chapman (1935) and Weydemeyer (1934), in their respective papers, set the time as early April.

From the tabulation it is evident that the swallows at Kent usually arrive in a small band, rather than singly. This small band of swallows is daily augmented until early May when the entire colony is pretty well established. During the latter part of the third week of April, or as in 1938 the early part of the fourth week of April, the first immature females appear in the colony. By the middle of May these later immature arrivals have settled down to nest building, when egg-laying is already underway among the fully adult birds.

It is at this time each year that a secondary flight of Tree Swallows occurs. This interesting feature of the spring Tree Swallow migration is noted by Sage, Bishop and Bliss (1913), but neither Chapman nor Low make any mention of it.

Checks made of these movements over the three years revealed that about 40% of the birds were immature or brown females. The remaining 60% have been found to be green, and hence their age is indeterminable, since the male attains the green plumage the first year. It may possibly be that this unknown quantity is composed wholly of first-year males, and that the secondary flight is of first-year males and females.

Needless to say, these late arrivals cause much disturbance in the already established colony, especially at dawn and dusk when they are most in evidence. That these intruders are successfully driven off is attested to by the fact that over the three breeding seasons not one pair from this secondary flight has nested in the colony. The latter fact is substantiated by the dates of first eggs for each pair within the group.

Dates of these secondary flights were:

1937 — May 13 to 15, and May 19, 20.

1938 — May 16, 17 and 18.

1939 — May 22 and 23.

It is evident that these flights are abnormally late for Tree Swallow migration. It is true that, in all, these late movements contain perhaps only from 150 to 200 birds; but it should be remembered that the Housatonic Valley is only a very minor migration route, particularly in the spring migration. It might be well to add that these late migrants are present only for the two or three days indicated in the above tabulation.

Further considering the birds in this late flight, let us suppose they do wander on and perhaps within a hundred or more miles find a favorable nesting locality. The locating of a nesting site, nest-building, courtship, etc., would at the very least consume from ten days to two weeks or more. This would bring the date of laying of the first egg to sometime in early June, which would be late for the latitude of Kent. These late arrivals, then, would seem to be either non-breeders for the first year (as Chapman's fledgling returns tended to show), or, more likely, birds that finally locate and nest in a more northerly latitude where the breeding season is later. In Forbush (1929) we find egg dates for Maine from May 30 to July 12, which would fit the above theory rather nicely. However, the answer can only lie in more extensive banding operations over the entire New England area. Then it might be found that this late flight of Tree Swallows, which might represent the surplus population, disperses in a northerly direction from its point of origin.

III. MASS DEPARTURE

One interesting but rather perplexing feature of the pre-egg-laying period is what might be termed the mass departure of the swallows from the colony. Depending on certain meteorological conditions they may leave in the morning, at noon or in the early afternoon and stay away for the remainder of the day. In some few instances they have been absent all day. While this behavior is more usual during the time of box selecting and nest building, it is carried over into the egg-laying period. And in a few cases females have been known to leave complete sets of eggs that had already been incubated.

Chapman (1935), Weydemeyer (1934), Shelley (1934) and Forbush (1929) all make mention of this phenomenon, but fail to give the answer as to where the swallows actually go when they leave a given colony. All seem agreed that it is a reaction to climatic con-

ditions which directly affect the food supply of the species.

During the three-year period an effort was made to determine what meteorological factors induced the swallows to leave. In Table II are arranged several instances of days on which the birds left, together with weather data. It is quite evident from the temperature column that the birds invariably departed on a rising temperature, which would exclude that factor at least as an immediate cause. Wind intensity, which might have a bearing on the swallows' food supply, was also found to be a negligible factor for the birds remained at the colony on days when the wind intensity equalled or even exceeded the figures given in this table.

TABLE II
Meteorological Conditions Affecting Mass Departure*

Year	Date	Temp. (Mean)	Wind (M.P.H.)	Weather	Time of Departure
1937	Apr. 12	45° F. Rising	N. 18	Pt. Cloudy	2.00 p.m.
	" 14	58° F. "	S.W. 25	" "	2.00 p.m.
	" 20	54° F. "	N.W. 22	" "	1.00 p.m.
	" 21	46° F. "	N.E. 13	Cloudy	12.00 p.m.
	" 22	39° F. Static	N. 15	"	Absent all day
	" 23	42° F. Rising	N. 24	"	9.00 a.m.
1938	May 13	49° F. Rising	S.W. 18	Pt. Cloudy	11.00 a.m.
	" 14	54° F. "	S. 16	" "	4.00 p.m.
	" 16	48° F. "	N.W. 22	Cloudy	Absent all day
1939	Apr. 28	44° F. Rising	N.E. 15	Cloudy	Absent all day
	" 29	50° F. "	N. 12	Pt. Cloudy	1.00 p.m.
	" 30	50° F. "	F. 15	" "	7.00 p.m.
	May 1	50° F. "	N. 15	" "	12.00 p.m.
	" 13	47° F. "	S. 14	Cloudy	12.00 p.m.
	" 14	50° F. "	S. 16	Pt. Cloudy	Absent all day
	" 15	52° F. "	E. 16	Clear	Present all day

*Weather data courtesy of U. S. Weather Bureau, Hartford Station.

In considering the character of the day, we have what would seem to be the real determining factor, namely the lack of sunshine. In no instance when there was bright sunshine did the swallows depart. They were present on days of bright sunshine even though the temperature was as low as 28° F. Yet they left the colony on a cloudy day as early as 9 A.M. when the temperature was 60° F. Under the column marked "Weather" we find nine days of partly cloudy skies. In these cases the clouding-over preceded the birds' departure time by less than an hour.

On days of actual hard rains in this period the birds were totally absent. But this fact is not unusual, as most birds are inconspicuous under similar conditions.

Chapman (1935) and Forbush (1929) described this mass departure behavior and attribute it to lack of food in the immediate vicinity of the nesting grounds. While this could very readily have been the case at Princeton, it would hardly seem to hold for Kent. Here feeding conditions should be better than on any near-by areas, for the deep-set Housatonic Valley and lesser valleys to the east could readily afford shelter for insects, even during unfavorable weather conditions; and at the same time the large water areas should tend to stabilize temperatures.

Probably the answer lies in the birds' roosting habits. That they roost elsewhere than at the colony site normally is evident from the fact that in the pre-egg-laying period both birds are absent from the boxes no matter what the climatic conditions. Forbush (1929) states that during such periods of low temperature the swallows resort to protected cavities and nest boxes. This was definitely not the case at Kent, for on several occasions during such absences all boxes were checked and no birds found within.

It would seem, then, that lack of sunshine is the determining factor in the birds' leaving. It is conceivable that the absence of sunlight could lessen the available insect food supply to a considerable extent. However, such conditions would hardly be of a local character, and the birds would have to travel a considerable distance to find a better food supply. Their prompt return when the sun again shines would argue against such a practice.

It may well be that lack of sunshine slows up the breeding impulses in this species to such an extent that they revert to such pre-nesting behavior as they would exhibit during migration or on their wintering grounds. Thus, a diminishing degree of light could conceivably cause premature roosting. If such a theory is at all possible, it would do away with the necessity of basing the cause of mass departure on lack of a sufficient food supply. As with other investigators, all attempts to locate the birds during their absences within a considerable distance of the colony proved futile.

Similar behavior was noted with a pair of Phœbes that nested on the house. On May 13, 1939, a cloudy day with the thermometer 32° F. at dawn, the female was absent from the nest all day. The nest contained a complete set of eggs which had already been incubated for six days. The sun came out on the following morning and the bird returned to incubate. Neither bird was seen about on the 13th. The five eggs were unaffected by the female's absence, for all five later hatched.

At Kent the only box-nesting species that seems to be unaffected by these low temperature periods is the Bluebird. During the time of these investigations, the Bluebird was noted incubating consistently, irrespective of climatic conditions.

IV. TOWERING

Coinciding with this period of mass departure is still another action participated in by the colony as a unit. For convenience I have termed it 'towering.' Without apparent reason one bird takes to the air uttering a note that closely resembles the alarm note, and immediately the entire colony follows this same behavior pattern. They generally ascend to about 100 feet. The whole flock then boils about for perhaps a minute, when just as suddenly the birds break ranks, cease calling and descend to the boxes. This towering occurs principally between the time of arrival and the start of general egg laying. There appears to be little or no correlation between this behavior and weather conditions other than the fact that it is more frequent on warm days. It occurs principally during the morning hours but has also been noted during the afternoon. It is most frequent during the nest-selecting and building stages of the cycle and is participated in by all individuals of the colony, whether they happen to be resting on the box or working within.

At first towering was thought to be the reaction to some predator invisible to the observer, but subsequent observation proved this false. The Tree Swallows' reaction to an actual enemy, whether it be on the ground or in the air, is quite different. Then they do not tower at all but swarm about the intruder, and any thing but man is pretty effectively driven off. Tree Swallows are very pugnacious and fearless birds. Not even the Cooper's Hawk (*Accipiter cooperi*) is free from attack if it happens too near the colony. Another difference between this towering and the reaction to an intruder is that the latter is not carried out by the entire colony as a unit. What usually happens is that only the birds in the immediate vicinity of the disturbance are alarmed.

Towering, then, would not seem to be a fear reaction, but must represent some obscure aspect of the Tree Swallow's colonial behavior pattern. Similar and possibly a parallel behavior is noted by Kirkman (1937) in the case of the colonial Black-headed Gull of Europe (*Larus ridibundus*). He found that the presence of an enemy would cause the entire nesting flock to take wing ('up-flights') and leave the nesting site for a period of an hour or more, after which they usually returned. It was also noted to extend over the same period as the towering of the

Tree Swallows, being indulged in most frequently before nest building had begun. The shyness exhibited by these birds in their 'up-flights' decreases sharply with the nest-building and egg-laying periods, and when it does occur during these periods, it is localized at the point of disturbance. The only points of difference between these 'up-flights' and the towering of the Tree Swallows were that the swallows never left the colony site, nor was any visible enemy present. It may well be that these are differences of degree rather than kind.

V. TERRITORY

Following the pattern of most colonial-nesting species and, in particular, most swallows, the Tree Swallow's territory is restricted to the actual nest or nest box. Competition among these birds at the breeding season would seem to be for nesting sites rather than availability of food. Thus it is that we have the danger of a Tree Swallow colony increasing beyond the carrying capacity of the area through the artificial stimulus of bird boxes. Such a condition admittedly existed in the Princeton colony and resulted in an abnormally high fledgling mortality.

Once the individual selection of the nest box is made (probably by the male), it is protected against all rivals (probably by both male and female). The following cases tend to show how effectively this protective activity is carried out.

On May 12, 1937, during a daily box check a pair of dead adult Tree Swallows was discovered in box 16. The one bird in fine green plumage, undoubtedly a male, was lying on its back with legs extended and feet in a defensive fighting pose. There were six small holes in the left lateral process of the sternum which was exposed. The diameter of these punctures was exactly the width of the terminal portion of a Tree Swallow's bill. That this bird died in a struggle was further evidenced by a small white breast feather which was still clinging to its half-open bill. Alongside this male was the body of a brown female resting on its side and with no apparent injuries. This particular box is mounted on a steel pole, so only a bird could have entered the box. Unfortunately, at that time there was no way of obtaining post-mortems.

Box 16 was not of home manufacture, and the opening was a full $7\frac{1}{2}$ inches from the bottom which made it very deep. Immediately following this discovery the box was altered to standard specifications and placed back on the same location.

On May 21 of the same year another brown female, which later nested in box 16, had the male from box 15 (50 feet north of 16) on

the ground. The ensuing struggle was watched for a full minute. On this occasion the male was belly down and the female was perched on his rump (perhaps pinning down the male's wings with her feet), delivering hard blows to the back of his head. Several blows would be given and then the female would rest for a few seconds. A closer approach was attempted which frightened off the female, and only after several seconds did the male take wing. During the struggle the male was motionless.

There were several more of these combats in 1937 and again in '38 and '39 involving others pairs. Invariably a brown female was involved and generally proved to be the aggressor. On May 18, 1939, a similar encounter was in progress beneath box 32. It so happened that there was a tangle of ground blackberry at the spot, and in their combat the pair had worked down into it. The male in this case seemed to be the aggressor. As I approached, the male extracted itself and flew off, but the female was firmly pinned down and was easily captured. Although unbanded, this was clearly a first-year bird. It was then banded and later was found to be mated to a first-year male (fledgling return). The pair used box 32.

Another curious case was discovered on May 7, 1939, at box 50. No nest had been started in the box. At 7 P.M. a check of this box disclosed that there were three Tree Swallows in it. On capture one was found to be an unbanded female in the first-year plumage; the other two were males that had been banded the previous year as fledglings. One of these males later mated with this brown female and used box 50. The other mated with a two-year-old female (banded in '38 as a brown female) and used box 10, only 50 feet from box 50. Another similar case was noted in 1937 in box 20. But as this occurred before banding operations had commenced, the birds could not be traced. It is, however, a fact that the female which did nest in box 20 that year was a brown female.

While checking the boxes for nest development on April 30, 1939, a male Tree Swallow in fine plumage was found dead under box 27, impaled on a short stalk of golden rod. The field had been cut over the previous year, and this particular stalk had been cut off $4\frac{1}{2}$ inches above the ground. Somehow the bird had been driven down on this rather sharp stick. The latter entered the bird's body at the breast, went clear through, and protruded $\frac{1}{4}$ inch from the middle back region. The bird was found thus, belly down, axis of body lowered toward the head, wings three-quarters spread and tail closed. It appeared as would a butterfly or moth that had been mounted on a pin.

A tentative explanation of this freak accident is that this bird was involved in a territorial struggle, locked in midair with the rival, and both had fallen to the ground. In the fall the dead bird accidentally hit the stalk and was impaled.

This locking in midair and falling practically as dead birds, I have witnessed many times, and it is generally concluded on the ground with a struggle. Generally, the locking does not occur much above 20 or 30 feet, but in this case the height may have been greater.

Barn, Bank and Rough-winged Swallows (*Hirundo erythrogaster*, *Riparia riparia riparia*, and *Stelgedopteryx ruficollis serripennis*) breed very near the colony site, and during the spring migration Cliff Swallows pass through the area. All these species can freely enter the colony limits to feed or gather nest material without any molestation by the Tree Swallows. However, on June 11, 1938, a female Purple Martin entered the colony and was immediately set upon by the Tree Swallows. The whole colony was agitated for about 30 minutes, but the martin was soon mercilessly driven off. Townsend (1920) cites an instance of a pair of Barn and a pair of Tree Swallows nesting within the same enclosure without the least amount of friction.

Interspecies friction exists to a high degree between Tree Swallows and Bluebirds, and to a lesser degree with House Wrens. The latter retire to the hedgerow boxes for their first brood nestings which greatly reduces the competition. But the Bluebirds prefer the open-site boxes, and so are in direct competition with the swallows. Manifestations of this friction between the Tree Swallows and Bluebirds can best be shown by citing actual instances of nest competition.

In 1937 only one pair of Bluebirds nested in the colony, and as there were only ten pairs of swallows, little competition existed. The following year ('38) one pair again nested, and a second pair entered the colony for what was apparently a second brood. Again a minimum of friction ensued, for the second pair of Bluebirds began nesting when most of the swallows had already left. During the spring of '39 conditions were different, for 2 pairs of Bluebirds arrived at about the same time as the swallows. This meant that they were in direct competition with the swallows. Pair No. 1 was driven from a partially completed nest to box 24. Unfortunately for the Bluebirds, a pair of Tree Swallows (fledgling returns) also selected this box, and for the next three days the male Bluebird tried to get possession of the box. When the Bluebird lit on the box, it was set upon by the Tree Swallows and literally knocked off the box and driven to the ground. On the fourth day the Bluebird relinquished claim to the box and successfully used another near-by.

Pair No. 2, toward the rear of the colony, began and completed a nest in box 43. Within a short time (3 hours) after the laying of the first egg, the latter was destroyed and thrown out, undoubtedly by the Tree Swallows. The Bluebird next tried box 39 where the first two eggs were again destroyed, and the bird abandoned the nest for box 45 where it finally raised a brood. However, even after the Tree Swallows' young were more than half grown, the Bluebird in approaching its box would occasionally light on a near-by box before entering its own. If this box contained Tree Swallows, the latter immediately drove the Bluebird off. Once the Bluebird gained its own box it was no further molested.

While not the sole cause, this friction was at least a partial determinant in the reduction of the Bluebird's reproductive efficiency from 80% in '38 to 20% in '39.

Another instance of the severity of this competition with the Bluebird was discovered in box 22 in '37. Near-by (50 feet) a pair of Tree Swallows was using box 23. During the construction of the Bluebirds' nest the Tree Swallows showed resentment by attacking them. However, the Bluebird persisted and laid its full complement of eggs by May 2, and normal incubation continued until May 20 without any loss or destruction of the five eggs. On the 20th one egg was found on the ground beneath the box, but the female continued to incubate despite the fact that the eggs were either infertile or had been chilled and could not possibly hatch.

At noon on May 21 the female Bluebird was found dead beneath the box. The bird was on its back with feet and legs extended in a defense position. There was no decided or appreciable disarrangement of the feathers to indicate traumatic death, yet the posture of the bird could hardly indicate any other cause. The probable explanation would seem to be that the near-by Tree Swallow had driven the Bluebird to the ground and with a little more violence than usual had struck a vital part of the bird with its bill causing death. While this is at best only circumstantial, a casual study of the Tree Swallow's behavior pattern would reveal not only the feasibility of such action, but its probability as well.

About the middle of June '38 a pair of English Sparrows (*Passer domesticus*) came to the area to nest and selected a box in the center of the colony. Amidst considerable friction the nest was completed. The first egg was laid on June 16, but on the afternoon of the 17th the two eggs were destroyed, probably by the swallows, and were found on the ground. The pair of sparrows was discouraged and

abandoned the colony. In 1939 no attempt was made by the English Sparrow to nest in the colony. Both Hersey (1933) and Forbush (1929) mention the pugnaciousness of the Tree Swallow both with its own kind and with other box-nesting species, such as English Sparrow, Bluebird, House Wren and Purple Martin.

A discussion of the pugnacious character of the Tree Swallow is not complete without a reference to Shelley's observations (1934) in Massachusetts during 1933. An immature female entered his colony on June 10, and during the next eight days killed over 19 nestlings, representing 5 broods. This female killed the young "by striking them at the posterior corner of or just above the eye, probably doing this when the young lifted their heads to be fed." Another adult female was noted to kill 3 of what were presumed to be its own 5 nestlings in the same manner. Even though these observations concern nestlings, they illustrate the Tree Swallow's ability to kill its own kind.

All these data are given in an attempt to prove that the Tree Swallow's territorial and interspecies friction is caused by its demand for nesting sites rather than by its attempt to insure an adequate food supply for its young.

VI. CALL NOTES

Four main notes are heard during the breeding cycle: the courtship song, the mating call, the alarm note, and the food call of the young.

The courtship song consists of three fairly long descending notes that terminate in a liquid warble. During establishment of the colony each spring this song is much in evidence. In the courtship behavior the song plays an important part and is accompanied by much bobbing and bowing. It is usually given when the female is near-by. This song is more in evidence during the morning hours from the first sign of dawn until noon. Indulged in most at the courtship time, it was found to continue less persistently during the incubation period, and rarely if ever was heard during the nestling period. Weydemeyer (1934) reports a similar description for the courtship song. During the actual courtship antics, the male gives more emphasis to the gurgling or liquid notes and less to the three longer opening notes.

Townsend (1920) refers to the courtship song as "a rather monotonous and rather labored repetition of rolling or warbling notes. Every third or fourth is sharper and shorter and at times the note may possibly be called melodious." While the aesthetic value of bird song does not properly belong in a scientific treatise the writer cannot agree with Townsend, but since he does agree that association plays a large part in such a subjective value as bird song, we can go on to a more

scientific angle. The above description could be considered correct, but I would favor my own as more correct.

A short, sharp rapidly repeated call is the usual note of alarm. During the earlier part of the pre-egg-laying period this note sounded by one bird will, as described elsewhere, cause the entire colony to respond as a unit—and towering results. When there is an actual intruder within the nesting area, this note is given freely by the birds nearest the disturbance and is not answered by the whole colony. Both males and females use this note. It may well be that what I term an alarm note, heard in connection with towering, is really a flight organization note, or it may be that this note induces two different responses. To my ear it sounds similar to the usual alarm note, but may be different in fact.

During the act of copulation a call is given by the male which may be termed the mating call. It is a metallic twittering note and is uttered as the bird is descending toward the female. The female has not been noted to give any notes during the act.

There were a few males during the 1938 and 1939 seasons that developed a habit of diving at my head whenever their nest boxes were approached. If I were anywhere near these boxes, which were all on the south line, the males would immediately tower above my head, go into a power dive, only to pull out so close to my head that the compression of the air could be readily felt. The accuracy and ability of these birds to maneuver were remarkable, for no matter what obstruction was placed in the way of their rapid descent they could always veer off, even though their headway was a matter of mere inches. During this descent a note was given, which to my ear was identical with the mating call. There would seem to be little connection between the two stimuli. The only apparent similarity between these two instances (mating and warding off an enemy) is that in each case the bird is descending when the note is given.

A food call, which can best be described as somewhat similar to the alarm note, but less sharp, more rounded, and perhaps more musical, is a familiar sound in the colony during the fledgling period of the nestlings. Normally, this note is first given by the nestlings when they are from twelve to fifteen days old, but has been noted as early as the ninth day. It becomes more persistent as the time of leaving nears. It has also been heard in late July and early August when the migrants from farther north begin to move south along the Housatonic River Valley. By the middle of July all the Kent birds have left, and the majority usually leave before the first week of July. During the fall

of 1940, at Myrtle Beach on the South Carolina coast, the first immature Tree Swallows to arrive in July were still occasionally giving the food call. It has also been heard by the writer in the large flocks of Tree Swallows that congregate at Cape May Point, New Jersey, in September.

VII. NEST BUILDING

The time taken for completing the nest varies, for first arrivals go about nest construction in a leisurely manner and are subject to more interruptions than later birds. These early comers have the better part of a month for the task. Occasionally, a later arrival will complete a nest within a week, but the more usual time requirement is two weeks or, as in a few cases, close to three weeks. Substantially, these figures agree with the findings of Low (1932) on Cape Cod.

Weydemeyer (1934) describes nest building as a slow process averaging 29 days. He noted that on days of relatively low temperature nest building ceased. In the case of second broods he found that only three or four days were necessary for completion of the nest. Cessation of nest building during cold days was noted at Kent, but such was to be expected, as elsewhere in this paper it is shown that the birds very often left the colony entirely under such climatic conditions.

Low (1933), in his rather detailed account of the nest construction of the Tree Swallow, gives the time consumed as from a few days to two weeks. On Cape Cod, nest foundations were composed of marsh grasses and pine needles. At Kent this portion of the nest was composed wholly of broom grass (*Andropogon*), which grows plentifully both on the colony site and in the near-by fields. Of the feathers used in the lining of the nest Low found that 99% were those of the Herring Gull (*Larus argentatus smithsonianus*), and the few remaining were those of ducks, geese and Great Horned Owls (*Bubo virginianus*). Only a very small fraction were of domestic fowl, even though the latter were available at least to some of the boxes. As was true at the Kent colony, he found that the position of the hollow for the eggs varied, being either to one corner or at the center.

Unlike the colony on Cape Cod, the feathers used by the Kent birds were practically all from domestic fowl. This was to be expected for there were farms within a mile either side of the colony. Only a very few feathers of wild birds were found among the nests—mostly hawk and owl feathers. One bird was individualistic enough to use a bright green feather from a parrot. This latter was obtained at a farm a quarter of a mile distant.

With the fully mature birds the nest is complete and well-lined with feathers before the first egg is laid. This was not found to be the case with the brown or first-year females. Very rarely have feathers been found in nests of these immature birds at the time of laying of the first egg. In fact, there was one case this past season (1939) of a female (fledgling return) which nested in box 25, where even the grass foundation was incomplete and the eggs rested on the bare floor of the box. Incubation was carried on, but no more material was added to the unfinished nest. The more usual procedure with these brown females is for them to add feathers to the nest as incubation progresses. However, they never seem to attain the full complement of the more adult birds.

The rule at Kent was for both birds to participate in the nest building, but the female was usually found to be either more proficient or industrious. In one instance the male of the pair assisted in neither the nest construction nor the later feeding of the young.

While further study would be necessary to substantiate the following, it would seem that the male brings the first few pieces of grass and probably in this way establishes his claim to the box. This theory was also advanced by Low (1932).

In a few instances, even after the eggs had hatched, the adult birds would bring an occasional feather to their nests. When such a bird arrived at the colony with a feather, he or she was immediately set upon by its nearest neighbors, and a scramble for the feather would ensue. Usually the original owner lost the feather, which would pass through many 'hands' before finally arriving at its destination. In Weydemeyer's paper (1934) a description of the above can be found.

VIII. COURTSHIP

During the courtship period the pairs are often seen perched on the roofs of the nest boxes. Usually the male makes a short flight with quivering wings (wing beat is more rapid and the wing arc more shallow) about and over the nesting box. Returning to the lid, the bird walks slowly toward the female accompanied by much bobbing and bowing of head and body. Sometimes the pair indulge in bill carressing. During this behavior the courtship song is freely given by the male. If the female responds, copulation takes place.

Copulation has been noted to take place for the first time five (2 pairs) and six (2 pairs) days before the laying of the first egg. In these four cases the females were observed to refuse the males three days before insemination actually occurred. However, these observations are too meager for any generalizations.

The act of copulation consists of from four to eight contacts of a few seconds duration each. Following the courtship behavior, the male takes wing and hovers a few feet above the female, darts down on quivering wings emitting at the same time a twittering of almost metallic notes in rapid succession. If the female is ready, the axis of the body is lowered toward the head and the male makes contact, gripping the back of the head feathers of the female with the bill. Contact is broken, and the male again mounts the air over the female and the procedure is repeated. When the female rejects the male, there is no lowering of the body, and the male's approach is warded off by a motion of the wings or head.

That copulation continues after incubation has begun is suggested by the disarrangement of the head feathers of the females captured while brooding complete sets of eggs, the disarrangement being caused by the gripping of the male's bill during the act of copulation as explained above.

IX. EGG LAYING

Normally, the Tree Swallow deposits its eggs at the rate of one per day (24-hour period). At Cape Cod, Low (1932) noted only a few exceptions to this rule: first, where a female laid two eggs within the 24-hour period and, second, where there were lapses between eggs, two of two days and one instance of four days. Shelley (1934) cites one instance of a female that laid three eggs in a 24-hour period. At Kent there were only three instances where a female laid two eggs within a 24-hour period, but quite a few instances where there were delays in the egg laying anywhere from a day to 7 days.

TABLE III
Suspension of Egg Laying (in Days)
Due to Temperature Decrease and Decrease in Sunshine

♀ No.	No. of days between eggs	No. of eggs at time of temperature drop	Final No. (eggs)	No. Hatched
30 — brown	4	1	4	4
18 — green	3	2	6	4
20 — green	3	1	4	4
48 — brown	1	2	5	5
46 — green	4	2	3	2
38 — green	3	1	6	6
39 — fledgling return	3	1	2	destroyed
40 — green	7	1	4	3
5 — fledgling return	7	1	5	5

Table III gives the number of days between the laying of eggs within the same set caused by low temperatures from May 13 to 18. This five-day period averaged 6.2° F. (3.4° C.) below normal, with the percentage of possible sunshine at 78.5%. For convenience, the females are given the numbers of the boxes they occupied. Table III illustrates that once the egg-laying period is well underway temperature and, to a less extent, sunshine are still important factors in egg production. This fact was well established during the 1939 season. On the afternoon of May 12, the temperature started to drop and on the 13th was 10° F. (5.5° C.) below normal. The percentage of possible sunshine fell from 100% on the 12th to 17% on the 15th. This abnormal low continued until May 18 when the normal temperature was again reached. The effect of this prolonged cold spell was that egg production fell to zero among nine laying females, and no first eggs of new sets were laid between the 14th and 18th. On the latter date egg production went back to normal.

It is clear from the numbers under the fifth column in Table III that these suspensions do not affect the fertility of the eggs, for in five of these set, 62.5%, all the eggs hatched. We can disregard female No. 39, for the set of eggs was destroyed before completion.

TABLE IV
Date of First Egg and Related Meteorological Data

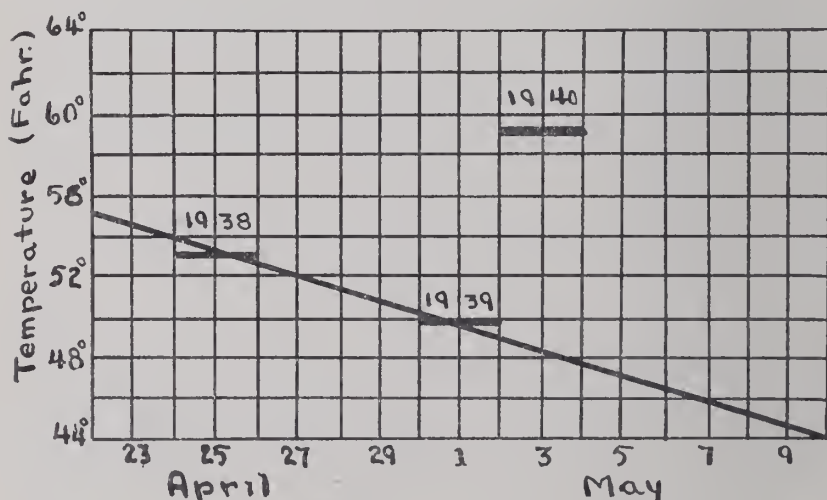
Year	Date of 1st Egg	Average Degrees F. for 6th, 7th and 8th days	Humidity	Possible Sunshine
1937	May 9	59.0° F. (15.0° C.)	50.0%	100.0%
1938	May 2	53.3° F. (11.6° C.)	67.3%	92.6%
1939	May 7	50.0° F. (10.0° C.)	62.3%	72.6%
3-Year Average	May 6	54.0° F. (12.2° C.)	59.8%	88.4%

An effort was made to determine if possible what meteorological factors govern the laying of the first egg and the start of general laying. The latter was found to correspond within a day or two with the laying of the first egg. We know from the time of replacement of a destroyed set that the Tree Swallow's egg development requires from six to seven days. If we follow Nice's treatment (1937) with respect to the Song Sparrow, the meteorological conditions on the 6th, 7th and 8th days before the laying of the first egg should be the determining factors.

Table IV lists the dates of the first egg for the Kent colony over the three-year period and the meteorological conditions influencing the same. In working over this material its meagerness is only too apparent and perhaps excludes any definite conclusions. Nevertheless, it is worthy of some consideration. While temperature is undoubtedly the prime factor, sunshine may well prove to be a secondary determinant. For the three years the per cent of possible sunshine clearly runs consistently high. However, more study will be needed to place this factor in its possible causative position. Humidity would seem to have little bearing, and probably at best only works as a complement to the other two factors.

In considering the dates of the first eggs for the Kent colony, it might be well to compare these with what other observers have found. In New England Forbush (1929) gives the date of the first egg for eastern Massachusetts as April 19, which would seem exceptionally early. Low (1932) at the Cape, gives May 7 for one year of his study there. For Kent we find that the three-year average of May 6 is practically the same as that of Low's colony and is probably representative of the southern New England area.

CHART I
Threshold of Laying



The data contained in Chart I are for the 6th, 7th and 8th days preceding laying of the first egg and are based on the period of the Tree Swallow's egg development. Following the formula given by

Nice (1937) for the Song Sparrow, a very tentative one is given here for the Tree Swallow, $55.3^{\circ}-0.6$ d., i.e., the first egg is probably laid 6 days after the mean temperature of three successive days was 55.3° F., and the threshold decreased about 0.6° F. each day thereafter. The data of 1937 plainly do not fit this curve, but since the colony consisted only of 10 pairs, the date of laying of the first egg is not exactly comparable with those of the two subsequent years. However, at best this formula is decidedly tentative.

It might be well to point out that in 1937 and 1938 the average temperature of the 6th, 7th and 8th days was 6.6° F. and 3.0° F. respectively above normal. In 1939 the temperature was 2.0° F. below normal for the 6th, 7th and 8th days. However, if we consider a ten-day period preceding these three days, we find that the temperature averaged 3.3° F. above normal, which may have been a compensating factor. The percentage of possible sunshine ran consecutively high for all three years and is no doubt a contributing element in the egg production, as well as in other phases of the 'Tree Swallows' breeding cycle.

TABLE V
Time of Replacement of a Destroyed Set

♀ No.	No. of Eggs Destroyed	Days Incubated	Interval between Sets	No. of Eggs in Repeat Set
1937				
8	5 (complete)	5	11 days	5
20 (1st repeat)	2 (incomplete)	0	8 days	5
20 (2nd repeat)	5 (complete)	4	7 days	5
1938				
10	1 (incomplete)	0	6 days	5
8	5 (complete)	0	6 days	5
1939				
27	5 eggs and 1 fledgling	14	7 days	4
38	1 (incomplete)	0	No delay	6
39	2 (incomplete)	0	11 days	5
28	5 (complete)	5	6 days	5
21	5 (complete)	5	7 days	6
11	6 (complete)	0	7 days	6

In computing the time interval between the destruction of a set of eggs and the laying of the first egg of a repeat set, it seems from Table V as if the number of days were not as constant as was found by Nice (1937) in the Song Sparrow. In the case of the Song Sparrow, Nice found that the time of replacement of a destroyed set was invariably five days. However, the discrepancies in the number of

days can largely be explained on the basis of temperature fluctuation. Thus in the case of ♀ No. 8, whose set was destroyed on May 18, the temperature on May 19 and 20 averaged 6° below normal, which was found to be sufficient to cause delay in egg production and explains the eleven-day interval. An unseasonable cold spell also intervened in the case of ♀ No. 39 in 1939, which again supplies an explanation for the eleven-day interval. The eight-day intervals also involved periods of subnormal temperatures. Although ♀ No. 27 involved the destruction of a fledgling, the time interval was no longer and may indicate that the Tree Swallow follows the pattern of the Song Sparrow. There was no delay in the record of ♀ No. 38, probably due to the fact that only the first egg of the set was destroyed.

Another interesting record for the 1939 season was ♀ No. 11. The fifth egg had been laid on the morning of May 13, and the five eggs were destroyed the same afternoon. On the following morning, May 14, what was probably the sixth egg of the destroyed set was laid, but was also destroyed the same day. Seven days later the first egg of the repeat set was laid and again the set numbered six.

With only two exceptions in the records of these destroyed egg sets, the number of eggs in the repeat set equaled the number in the destroyed set.

The average number of days between the destruction of a set of eggs and the laying of the first egg of the repeat set is 7.6. However, I think that under normal temperature conditions six to seven days would be the rule.

On the basis of 68 pairs of Tree Swallows over the three-season period, the following data are tabulated with respect to the number of eggs per set.

TABLE VI
Number of Eggs per Set Covering 68 Pairs Over Three-year Period

Number of pairs with 3 eggs per set:	2— 2.9%
“ “ “ “ 4 “ “ “ :	10—14.7%
“ “ “ “ 5 “ “ “ :	30—44.1%
“ “ “ “ 6 “ “ “ :	24—35.2%
“ “ “ “ 7 “ “ “ :	2— 2.9%

Three-season average for 68 pairs—5.6 eggs per set.

From the above Table VI we see that the number of pairs with sets of five eggs predominate, and that those with six run a fairly close second. Low's Cape Cod findings (1932, 1933) for a two-season period (1931 to 1932) showed a similar predominance of five-egg sets, but in 1931 four-egg sets were second, and in 1932 6 replaced 4 for second place. His average number of eggs per set over a three-season period (1931 to 1933) on the basis of 291 pairs was 4.7 eggs per set. This is one egg less per set than the Kent colony. At Princeton, Chapman's (1935) average number of eggs per set over a three-season period (1933 to 1935) on the basis of 58 pairs was 5.3 eggs per set, nearer to, but also below, the average at Kent. In Montana Weydemeyer (1934) found that the average number per set was six, which is considerably higher than any of the eastern colonies.

Combining the results of these three colonies over a three-year period covering 417 pairs of Tree Swallows, we arrive at an average of 5.2 eggs per set, a figure which should be fairly representative for the species in the latitude of southern New England.

Before concluding this section on the Tree Swallow's eggs, the egg records of four individual females are worthy of mention. The first three of these females, banded as adults in 1938, were typically brown first-year birds. They returned to breed in 1939, and Table VII gives the dates of their first eggs and the number of eggs per set for the two years 1938 and 1939. Nice (1937) found with Song Sparrows that the first-year females tend to lay their first eggs considerably later the first year. Apparently this also holds true of Tree Swallows, for these three females laid their first eggs eight, twelve and seven days earlier in their second year or an average of nine days earlier, despite the fact that laying started May 2 in 1938 and not till May 9 in 1939.

TABLE VII
Egg Records of Four Individual Females

♀ No.	Date of First Egg		No. of Eggs in Set	
	1938	1939	1938	1939
1. 138-11231	May 19	May 11	5	5
2. 138-11213	May 23	May 11	5	5
3. 138-11230	May 20	May 13	5	5
4. 138-11209	May 12	May 12	4	4

Judging from the plumage characters of the fourth female (138-11209) also banded as an adult in 1938, it was a second- or third-year bird at the time of banding. There was no difference in the dates of the first eggs in 1938 or 1939.

The age at which six females laid their first egg is given in Table VIII.

TABLE VIII
Age at Which Six Females Laid First Eggs

♀ No.	Date of Hatch	Date of First Egg	Age in Days
1. 138-11240	May 28, 1938	May 12, 1939	349
2. 138-11241	May 28, 1938	May 13, 1939	350
3. 138-11256	May 29, 1938	May 13, 1939	349
4. 138-11286	June 3, 1938	May 13, 1939	344
5. 138-11287	June 3, 1938	May 20, 1939	351
6. 138-11290	June 3, 1938	May 23, 1939	354
Extremes			344-354
Average age for 6 birds			349.16 days

Since the Tree Swallow in the latitude of Kent is not a two-brooded bird, there is relatively little variation in the age of these six birds (Table VIII). In the case of the Song Sparrow (Nice, 1937), a wider variation was recorded, namely from 316 days to 372 days, or 56 days for the Song Sparrow and only 10 days for the Tree Swallow.

X. SECOND BROODS

A review of the literature on the Tree Swallow covering the New England states in no case gives a clear-cut or thoroughly substantiated statement that this swallow raises two broods. In both cases (Low and Chapman) where a systematic investigation has been undertaken, there has been no evidence that this species is anything but a one-brooded bird. The unsubstantiated data which we occasionally find may well be based on repeat broods rather than true second broods. Therefore, until such thorough studies disclose the contrary, there would seem to be little reason to consider the Tree Swallow a single brood species. Weydemeyer's (1934) work in Montana proved the species to be a two-brooded bird in that locality; but it was not until his colony had been established for two years that the birds began to raise two broods. So it is with these considerations in mind that the following note is offered from the Kent studies.

There was only one instance supported by rather strong circumstantial evidence of a second brood, and that occurred during the 1937 season. It happened to be before the banding of adults was undertaken so the exact identity of the parent birds was not known. How-

ever, there were certain plumage and behavior characteristics that made their individual identity practically certain.

The first nesting began the third week of April, and the first egg was laid May 5. This latter date is relatively early, considering that the first egg for the entire colony in 1937 was May 2. There were five eggs in the set, and the four fledglings (one egg failed to hatch) left the nest box June 12. The parent birds remained in the vicinity, and on June 19 the first egg of the possible second brood was laid. This set also contained five eggs, four of which hatched on July 7. Three fledglings left the nest box on July 25, one having died on July 24. If this were a second brood, it would mean that the young of the Tree Swallow are independent very shortly after leaving the nest box, a fact which seems to be further substantiated by the discussion in the chapter on fledgling development.

XI. INCUBATION

It was found at Kent that under normal conditions the female invariably does the incubating. This statement is contrary to that given by Forbush (1937), who states that both birds incubate, but it is in agreement with the findings of Low (1932). Only one instance of a male incubating occurred at Kent—in 1939 in box 9. The female of this pair died of a fungus mold disease (see section on mortality) three days after incubation had begun, and the male took over the incubation; on the 15th day all five eggs hatched and were later successfully fledged.

While the male does no incubating under normal conditions, it is usually on hand to protect the eggs in the female's absence. When the female leaves for feeding, the male immediately enters the nest box, reappears after a few seconds and remains, until the female returns, with its head and shoulders filling the hole and its feet resting on the inner lower circumference of the opening. Sometimes, when the female is ready to leave at the termination of an incubation interval, she will remain perched at the opening until the male appears before she actually leaves to feed. If the male returns before the female has concluded the incubation period, he is refused entry and so is forced to remain near-by until the female is ready to leave.

In connection with incubation the following paragraph quoted from Low (1932) is of importance, for it explains how the Tree Swallow can reproduce efficiently under seemingly adverse conditions.

“The normal incubation temperature of the Tree Swallow is slight-

ly below the body temperature of the parent which is given by Wetmore as 106° to 107° F. Development will go on at a considerably lower temperature, but its rate is retarded in proportion to the lowering of the temperature and ceases altogether in the neighborhood of 70° F. Cooling in its early stages does not result in the death of the embryo, which will resume its development when it is brooded even after the egg has been kept for many days at ordinary temperature."

On the basis of 67 nests covering the three seasons, 1937, 1938 and 1939, the incubation in days follows:

TABLE IX
Duration of Incubation Period*

Duration of Incubation	Number of Nests
13 days	17
14 "	21
15 "	22
16 "	6
Three-season average of incubation period — 14.5 days.	
Extremes — 13 days and 16 days.	

*Following Low so that a comparison could be had, the incubation periods are estimated from the day the last egg was laid to the day the first one hatched.

Working on daily observations, an attempt was made to determine what factors influence the duration of the incubation period other than the brooding idiosyncrasies of the individual females. In respect to the number of eggs per set it was found that the size of the set had no apparent bearing on the length of the incubation period.

At the Kent colony 15 days for this period predominates, with 14 and 13 running a fairly close second and third. At the Cape Cod colony 14 days predominated, with 15 days and 13 days running second and third. Weydemeyer (1934) gives 14 to 15 days as the incubation period for his Montana colony, and Forbush (1919) gives the period as about 14 days.

Concerning the incubation period Weydemeyer (1934) speaks of delays in the incubation as "sometimes as long as a week." At Kent no such long delays were noted, but on rainy or cloudy days of relatively low temperature complete sets, some in fact where incubation had already begun, were neglected for a day or two until favorable climatic conditions were again reached.

Both Weydemeyer (1934) and Cash (1933) refer to the fact that the male brings food to the female during this period. While such procedure was not noted at Kent, it cannot definitely be stated that such did not occur.

INCUBATION RHYTHM

TABLE X

Records of Incubation Rhythm — 1939

Date, Hours and Temperature	Minutes on	Minutes off	Date, Hours and Temperature	Minutes on	Minutes off
♀ 138-15971			♀ 138-15988		
June 11			June 11		
3.00 to 4.12 P.M.	—	10	7.00 to 8.21 P.M.	—	20
Temp. 87° F. (30.5° C.)	7	—	Temp. 77° F. (25° C.)	53	—
	—	10		—	8
	10	—	June 13		
	—	16	7.20 to 8.00 P.M.	—	7
	14	—	Temp. 68° F. (20° C.)	10	—
	—	5		—	10
June 12				13	—
6.40 to 7.37 P.M.	8	—	June 16		
Temp. 78° F. (25.5° C.)	—	8	7.52 to 8.27 P.M.	28	—
	16	—	Temp. 75° F. (24° C.)	—	7
	—	9			
	16	—	♀ 138-11230		
June 14			June 14		
6.50 to 7.24 P.M.	13	—	7.25 to 7.45 P.M.	11	—
Temp. 66° F. (19.0° C.)	—	15	Temp. 66° F. (19.0° C.)	—	9
	6	—			

The material set up in Table X is too meager to form any generalizations. In the three afternoon periods (eggs five to seven days incubated), female 138-15971 incubated for 6 to 16 minutes, averaging 10.4; and was off for periods 5 to 15 minutes, averaging 10.4. In the case of the second female, 138-15988, we can disregard the two long periods as the lateness of the hour might suggest that the female had already settled for the night but was disturbed and so left. Disregarding these two birds, we find the female averaged 11.5 minutes incubating and 8.5 minutes off. The third female, 138-11230, incubated 11 minutes and was off 9 minutes. Averaging the records of these three females, we find that the three females incubated 10.9 minutes and were off for 9.3 minutes.

In *Hirundo rustica* Moreau (1939 a) found that both parents incubated with periods of 8 to 12 minutes on the nest and from 5 to 6 minutes off of it. Considering that this species is not a hole or box nester, the periods off would naturally be shorter, for the loss of heat would be greater than in the case of the Tree Swallow which nests in

a very well insulated house. For the House Martin (*Delichon u. urbica*) the same author found the usual period on the nest was 7 to 14 minutes.

XII. NESTLING PERIOD

In some sets of eggs, mostly among the earlier nests where incubation did not begin until the set was complete, all the fertile eggs hatched on the same day. It was more usual for the later sets to hatch over a two-day period (48 hours). No study was made at the Kent colony of the weights of the nestlings, for the plan was to avoid any disturbance that might affect normal or natural conditions. At the Cape colony Low (1933) made studies of the progressive weights of the young Tree Swallows, and since they are probably representative, a summary of his material is included here.

On the basis of three nests under observation he found that the newly hatched young weighed about 1.5 grams on the average. From that point approximately 2 grams each day for the first eleven days, dropping to 1 gram per day until the peak was reached on the fourteenth day. They then seesawed, gradually losing weight until they left the nest. A great deal of variation may be accounted for by the time elapsed between the weighing and the excreting. The fecal sacs vary in weight between 1 and 2 grams. Low (*op. cit.*) adds:

"At their peak the young weigh more than the adults, but gradually regress to normal adult weight before they fly. Two adults were weighed with empty stomachs and two were apparently full. The weights were ♀ 19.5 g., and ♀ 20.3 g., ♂ 19.7 g., and ♂ 21.2 g. The average for the four is 20.2 g."

For the first three days after hatching, the young are consistently brooded by the female. One pair under observation, both of which were fledgling returns, had one-day-old young. The female was observed for a 31-minute period. During this time she was in the box for two 12-minute intervals and out for 7 minutes. During the two 12-minute intervals the female alternated with 1-minute brooding and 1 minute perched at the opening, or 50% of her time at the box was spent brooding.

Based on 66 pairs over the three seasons, the following table gives the duration of the nestling periods figured from the day the first egg hatched to the last day that young remained in the nest.

TABLE XI
Nestling Periods

Duration of Nestling Period	Number of Nests
15 days	1
16 "	1
17 "	1
18 "	16
19 "	14
20 "	22
21 "	7
22 "	3
23 "	0
24 "	1

In no case did the young leave prematurely through disturbance, for they were banded when they were twelve days old to avoid any such possibility.

TABLE XII
Nestling Period

Yearly averages — 1937	18.4 days
1938	19.7 "
1939	19.4 "
Three-year average	19.16 "

TABLE XIII
Number of Young Raised Per Nest — Based on 65 Pairs Over Three Years

No. of Young	No. of Nests	Nestling Period
2	7	19.5 days
3	4	20.3 "
4	14	19.1 "
5	28	19.3 "
6	12	20.0 "
Yearly averages — 1937		4.5 per nest
1938		4.7 " "
1939		4.3 " "
Three-year average		4.5 " "

At Cape Cod, Low (1932) found that the number of nests with 23-day nestling periods predominated, with 22 as second and 21 as third. For the Kent colony the number of nests with 20-day periods

predominated, with 18 and 19 second and third. This might indicate a more abundant food supply at Kent and perhaps a more healthy colony. Weydemeyer (1934) gives 17 to 23 days for his colony.

Bearing on this discussion of the nestling period are three interesting cases from the 1939 season. Mentioned in the section on the Tree Swallow's eggs was the pair in box 9. The female had died before incubation had been completed. The male incubated the eggs and successfully reared a brood of five, and yet the nestling period was only 18 days. In the instance of the pair in box 5 the male did not desert but he was never observed to feed the young, yet the nestling period for the five fledglings in this nest was 20 days. Despite the fact that only one bird did the feeding in these cases the average duration of the nestling period was 19 days, below the average for the three years.

Contrary to the findings of Low in the case of the Tree Swallow, but in agreement with Nice regarding the Song Sparrow, there seems to be no correlation between the size of a brood and the number of days the young are in the nest. A glance at Table XIII clearly shows this for the two extremes, namely, 2 and 6 young in nests, only show a difference of one-half day. And the number with 4 young in the nest had shorter nestling periods than the nests with only 2 young.

The feeding range of the adults during the nestling period was found to be anywhere within a mile south and three miles north of the colony site along the river. More usual limits were a mile either side of the colony on the Housatonic River. Some little feeding was done to the rear of the nesting area (about 1000 feet) over a small swamp fed by a spring. The latter was resorted to in the later portion of the nesting season.

The excreta sacs of the nestlings were carried from the nests mostly by the females. For some curious reason these sacs were invariably carried out over the river before they were dropped. This meant that the birds with the rear boxes transported the sacs some 700 feet before disposing of them. On one occasion a female was observed to start for the river with a sac but lost hold of it in getting under way. The bird immediately dived to regain it, but the attempt failed. Stoner (1936) mentions this trait in the case of the Bank Swallow. It would seem to indicate that the sanitary instinct of this species is pretty well developed, and perhaps is a carry-over from the time the Tree Swallows' nests were usually located over water.

TABLE XIV

Data on Feeding Rythm of Four Pairs

Box No.*	Date	Hour	Age of Young	No. of Visits by ♂	Visits by ♀
20	7/10/37	6.55 to 7.55 p.m.	11 days	57	16
20	7/11/37	6.55 to 7.35 p.m.	12 days	12	7
20	7/13/37	1.00 to 2.00 p.m.	14 days	24	8
24	6/11/39	2.00 to 2.55 p.m.	1 day	3	2
24	6/22/39	8.05 to 8.30 p.m.	12 days	9	1
24	6/28/39	8.15 to 8.45 p.m.	18 days	11	0
43	6/28/39	7.35 to 8.05 p.m.	9 days	15	15
43	7/3/39	7.00 to 8.00 p.m.	13 days	10	16
51	6/30/39	5.15 to 5.55 p.m.	8 days	4	5
51	7/1/39	7.20 to 8.20 p.m.	9 days	9	22
51	7/2/39	9.55 to 10.25 a.m.	10 days	5	7

*Box No. indicates Pair No.

Pair 20 — ♀ probably 1st yr. (plumage characters), ♂ unknown.

" 24 — ♀ 1st yr. (fledgling return), ♂ 1st yr. (fledgling return).

" 43 — ♀ probably 2nd yr. (plumage characters), ♂ unknown.

" 51 — ♀ adult (plumage characters), ♂ unknown.

XIII. FEEDING OF THE YOUNG

Except for the first few days after the young hatch, the normal or average number of visits by both parents was approximately one visit every two minutes (see Table XIV). However, this frequency varied during a 60-minute period, speeding up for a while and then slackening off. It was probably during these slack periods that the parents fed themselves.

The case of the pair in box 20 is interesting since it indicates that the first-year females (determined by plumage characters) do not follow the pattern of the more adult birds. Here the male made three visits to every one made by the female. Box 24 also bears this out, and in this instance both birds were definitely known to be first-year birds through banding.

In the case of the pair in box 43, where the female (from plumage characters) was most likely a second-year bird, the number of visits by each parent was nearly equal. Box 51, where the female was a full adult, illustrates the more normal ratio of the visits of each parent—the female exceeding the male.

On several occasions while banding the adults during the nestling period, one of the parents would be captured before it had a chance to feed the nestlings. In such cases it was noted that the birds carried many insects in the bill at one time. In a few instances the bird never released the insects that it was holding in its bill during the whole of the banding procedure. Upon the bird's release it would eventually carry these insects to its young.

Within a day or so of the fledglings' leaving, the adults definitely attempted to coax the young to leave. They could be seen flying to the boxes without apparently carrying any food. The adult would perch at the opening for a moment, flutter off, and then return. The young reacted, as though food were being brought, with the usual chorus of the food call. Each time the adult appeared at the box the young would strain out a little further, and in a few instances they were observed to leave on their first flight following three or four such attempts by the parent. Once out, the parents seem to drive the young on, rather than to assist them.

However, in some instances the young were noted to leave of their own accord. One such nestling was watched with a field glass during its first flight and observed to cover close to a mile before it left the limit of vision. Such initial flights would seem to indicate that the young of the Tree Swallow are independent almost immediately after leaving the nest. Feeding by the parents after the fledglings had left the nest box continued for not more than three days.

Weydemeyer (1934) states that the nest of the second brood is begun three days after the young of the first brood have left. In view of these facts it would seem that the young of the Tree Swallow are independent, if not immediately, at least within a very few days after their leaving.

In no instance were the young observed to re-enter the box after they had left, as was the case in Weydemeyer's colony. Low (1933) is in agreement with the findings at Kent, for he definitely states that the young never entered a box they had once left. Only once was a nestling seen to enter a box that contained half-grown young of another brood.

XIV. MORTALITY

Both adult and fledgling mortality may now be considered.

TABLE XV
Adult and Fledgling Mortality During the Nesting Season

	1935	1936	1937	1938	1939	Total
Adult	1 ♂	0	1 ♂, 1 ♀	1 ♀	1 ♂, 1 ♀	6 (3 ♂, 3 ♀)
Fledgling	0	1	1	5	1	8
5-year average — adult	.....					1.2 per year (3.6%)
“ “ — fledgling	.....					1.6 “ “ (2.4%)
Comparative Data (Fledglings)						
Cape Cod — over 2-year period	.....					18.5%
Princeton — over 5-year period	.....					27.5%

It is evident from Table XV that the fledgling mortality over five years was so low as to be negligible. These extremely low figures would seem to prove that crowding a Tree Swallow colony is a comparatively safe procedure, provided a good food supply is assured. Of the five young that died in 1938, three died in one nest containing five. Post-mortems were not available at the time so the cause of the mortality is unknown. However, it seems safe to say that starvation was not the cause, for the weather at the time was favorable for insect life, the food supply of the swallow. The other two may have died of starvation, for during the days previous to their death heavy rains intervened, which may have cut down the possible food supply. The other single individuals for 1937 and 1939 most likely died of causes other than starvation.

The relatively high fledgling mortality of the Cape Cod and Princeton colonies, 18.5% and 27.5% respectively, are attributed to lack of a proper carrying capacity of the colony sites. Both Low and Chapman agree that lack of food was the primary cause of their high fledgling mortality. If we assume this to be correct, then it may very well follow that at Kent ecological conditions for the Tree Swallow are fairly near the ideal.

Nice (1937), in her work on the Song Sparrow, found the fledgling mortality of that species to be 23.5%, a rather high mortality, but to be expected with an open-nest species. However, the comparison shows what a high fledgling mortality Chapman had for a hole-nesting species.

Adult mortality, though also very small, is of note, for no mention of such is made by Low or Chapman. Unfortunately, however, post-mortems could not be obtained until recently. Thanks to the coöperation of Dr. C. Brooke Worth and the Bird Disease Project of the Eastern Bird Banding Association they are now available.

Fifty per cent of these adult birds met a traumatic death as described elsewhere in this paper. Of the three remaining, which evidently died from some disease, I have one postmortem through the courtesy of Dr. C. Brooke Worth. The bird in question was a female and was captured on May 12, 1939, while brooding two eggs, and was banded. On May 17 the female was recaptured and released at about 8 P.M. This same bird was found dead the next morning, May 18, in box 29, where there was a partially completed nest. Box 29 is fully 300 feet from this female's nest box, which was box 9. The bird was immediately sent to Dr. Worth, and I quote from his report *in litt.* as follows:

"The Tree Swallow had a severe mold disease caused by a mold or fungus known as *Aspergillus*. This involved left lung and extended down through left abdominal air sac, gluing the viscera of that side to the body wall. Emaciation suggests bird was ill for a long time.

"The disease is primarily one of the air passages, and is transmitted from bird to bird by spores which are breathed in. I don't know how contagious it is, but suggest you burn any boxes known to have been visited by the bird this year."

This latter advice was not followed, since one of the aims of the colony project was to determine the Tree Swallow's breeding efficiency under conditions of minimum molestation. This implied little or no interference on my part. However, the infection ended with the dead bird, for both boxes were subsequently used by Tree Swallows, and no further adult or fledgling mortality resulted.

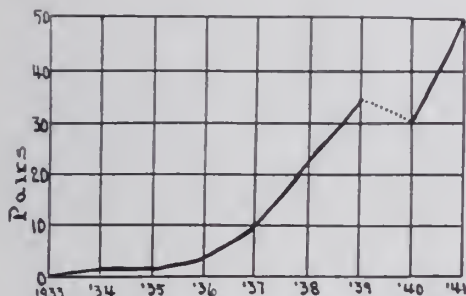
XV. REPRODUCTIVE EFFICIENCY

Chart II illustrates the relation that has existed for the past three seasons between the colony's rate of increase and the reproductive efficiency. This relationship would seem to be a fair index of the health of a colony.

The sudden sharp rise in the rate of increase is correlated with the systematic introduction of nest boxes, as outlined under the section

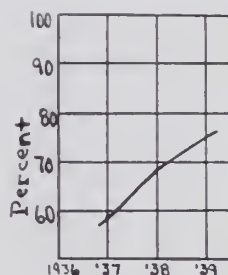
on the history of the colony. So far, there has been no tendency for the rate of increase to level off, as was found to be the case at Princeton*. This probably indicates that at Kent there is an ample supply of Tree Swallows passing through each spring, and that the sole limiting factor is availability of nesting boxes.

CHART II



A. Rate of increase

Data on the 1941 population are discussed in Section XIX of this paper.



B. Reproductive efficiency

We see from this chart that the increase in the reproductive efficiency has begun to level off. This may indicate that there is a seasonal fluctuation or that the colony is becoming too crowded. To date, both the rate of increase and the reproductive efficiency indicate a healthy colony operating under very favorable ecological conditions. The danger of over-crowding still seems remote in view of the ample food supply which practically surrounds the nesting area.

TABLE XVI
Reproductive Efficiency and Relative Data

Season	Nests	Lay	Hatch	Mortality	Fledged	Efficiency
1937	10	77	47 — 61.0%	1 — 2.1%	46	59.74%
1938	23	152	110 — 72.4%	5 — 4.5%	105	69.17%
1939	35	201	153 — 76.1%	1 — 0.6%	152	75.62%
3-year average	.....	.....	72.09%	2.4%	.....	70.46%

*In itself the 1940 decrease might be taken as an indication that the Kent colony has begun to level off and decrease, thus following the Princeton colony pattern. However, correlating the great and general decrease of the Tree Swallow due to severe cold in its winter quarters, it would seem wiser to disregard the 1940 figure as any indication of a normal increase or decrease at the Kent colony.

TABLE XVII
Comparative Data

Season	Hatch	Mortality	Efficiency
Cape Cod Colony — Low			
1931 to 1933 (3-year average)	81.3%	36.2%	50.0%
Princeton Colony — Chapman			
1933 to 1937 (5-year average)	————	31.8%	62.16%
1933 to 1935 (3-year average)	89.8%	————	————

It is evident from Tables XVI and XVII that the percentage of eggs hatched is considerably higher in both the Cape Cod and Princeton colonies. The percentage of fledgling mortality is, however, so much higher than at the Kent colony that the greater number of eggs hatching is more than nullified and the reproductive efficiency is sharply reduced.

TABLE XVIII
Total Number of Eggs and Percentage Destroyed

Season	No. Eggs Laid	No. Eggs Destroyed	Percentage
1937	77	12	15.5%
1938	152	6	3.9%
1939	201	26	12.9%
3-year average			10.23%

From Table XVIII it is evident that egg destruction is a considerable factor at Kent in the lowering of the bird's efficiency. Some little study has been given this phase, and the tentative conclusion is that the cause of this egg loss lies with the swallows themselves, either directly or indirectly: directly through competition for nesting sites, and indirectly when, during periods of low temperature, the birds abandon complete or partially complete sets of eggs; and it is fairly certain that the actual destruction is done by birds rather than by any other predators. It might possibly be explained on the basis of hunger of the parents during the periods of low temperature or, what seems more likely, by wandering birds.

Low's (1932, 1933) percentage of eggs destroyed for two years averaged 4.4%, considerably below that of Kent. Chapman (1935, 1939) gives no data on the point.

For a direct comparison with the same years we refer again to the Princeton colony for fledgling mortality (Table XIX).

TABLE XIX
Fledgling Mortality

	1937	1938	Avg. for 2 seasons
Princeton Colony	21.5%	52.8%	42.2%
Kent "	2.1%	4.5%	3.3%

While the heavy mortality at the Princeton colony could be ascribed to an inadequate food supply during the nestling period, this same reason would hardly seem to hold for the Cape where the food supply was admittedly plentiful. However, it is conceivable that adverse weather conditions in such a relatively exposed area as the Cape could reduce the plentiful supply to a dangerous low.

Table XX is of considerable interest for it proves that the first-year birds are to a great extent quite competent in carrying out the complete breeding cycle. Their average efficiency of 75.0% is fully as high as the more adult birds (Table XVI).

TABLE XX
Data on Ten Individual Pairs
in Which One or Both Birds Were Fledgling Returns

Pair No.	No. Eggs	No. Fledged	Age of One or Both Parents
24	6	2	♂ and ♀ fledgling returns
5	5	5	♀ a fledgling return; age of ♂ unknown
47	6	5	♀ a fledgling return; age of ♂ unknown
25	5	0	♀ a fledgling return; age of ♂ unknown
42	4	3	♀ a fledgling return; age of ♂ unknown
39	5	4	♀ a fledgling return; age of ♂ unknown
50	3	3	♂ a fledgling return; ♀ (on plumage) 1st yr.
10	5	5	♂ a fledgling return; ♀ 2nd yr. bird
32	4	4	♂ a fledgling return; ♀ (on plumage) 1st yr.
8	5	5	♂ a fledgling return; ♀ (on plumage) full adult
Average	4.8	3.6	

Reproductive efficiency of these 10 pairs 75.0%

TABLE XXI
Reproductive Efficiency and Relative Data
House Wren

Season	Nests	Lay	Hatch	Mortality	Fledged	Efficiency
1937	12	76	51 — 67.10%	6 — 1.14%	45	59.21%
1938	11	71	37 — 52.11%	6 — 1.61%	31	43.66%
1939	11	64	47 — 73.43%	5 — 1.06%	42	65.93%
3-year average			63.98%	1.26%		55.92%
Bluebird						
1937	1	5	4 — 80.00%	0 — 0	4	80.00%
1938	3	13	12 — 92.30%	2 — 1.6%	10	76.92%
1939	5	15	3 — 20.00%	0 — 0	3	20.00%
3-year average			57.57%	1.5%		51.51%

The percentages in Table XXI show the ability of the wren to cope with the Tree Swallow despite the latter's superiority in numbers. Use of hedgerow boxes by the House Wren is probably the reason for this species' relatively high efficiency within this particular colony.

While at first glance the Bluebirds' situation would seem to be entirely due to Tree Swallow competition, this is not the complete picture, for the greatest single factor causing the reduction in efficiency was the number of eggs that failed to hatch—the latter being either infertile or chilled. So it would appear that the overcrowding point at Kent has not as yet been reached.

XVI. BANDING OPERATIONS

Banding was begun in the spring of 1938 with two features in mind, the banding of all fledglings to determine the percentage of return for this small tract, and the banding of all brown and greenish first-year females to find out when full nuptial plumage is acquired. In 1938, bands were given 15 females, of which 7 were first-year birds, and 108 fledglings which represented the entire crop of young. Following this procedure in 1939, but with an added effort to capture all adults, 50 adults and 153 fledglings were banded. This adult figure represented all the females and 50% of the males.

It might be argued that, had the remainder of the males been captured, the percentage of fledgling returns might have been higher than the figure actually obtained. However, I am fairly certain that the percentage is quite accurate for two reasons: (1) immatures are among the later arrivals, and only the males of the earlier arrivals escaped capture due to a delay in obtaining shutters for the boxes; (2) a very close daily check revealed no banded individuals among the uncaptured group. While these reasons are not strictly conclusive, they tend to show that the margin of error was very slight.

A. Adult Returns

Of the 15 adult females banded in 1938, 4 (26.7%) returned to breed in 1939. None of these females returned to the same box to nest. In Table XXIII, distances the birds nested from their 1938 boxes are indicated.

TABLE XXIII

♀ No.	1938 Box	1939 Box	Distance
138-11231	20	33	50 feet (15.2 meters)
138-11213	36	10	200 feet (61 meters)
138-11209	38	40	100 feet (30.5 meters)
138-11230	8	21	100 feet (30.5 meters)
Average			112.5 feet (34.3 meters)

B. Fledgling Returns

As was mentioned previously, 108 fledglings were banded in 1938. One of these birds died shortly after leaving the nest box, and another died on September 3, 1938. This brings the number of return possibilities to 106. Of this number 11, or 10.4%, returned to the three-acre (1.2 hectares) tract to breed—45.5% males and 54.5% females. This sex ratio, with only a slight preponderance of females, is of note, for it agrees with Kluijver's (1935) findings regarding the Starling, another hole-nesting species. In his studies he found that the sex ratio of the fledgling returns was practically equal. In the case of the Song Sparrow, Nice (1937) found that almost twice as many males returned as females, or 26 males to 14 females. The number of swallows here treated is, of course, comparatively small.

TABLE XXIV
Comparative Return Percentages

Species	Colony	Adult %	Fledgling %
Tree Swallow	Cape Cod, Mass. (Low, 1933)	30.0%	11.0%
Tree Swallow	Kent, Conn. (Kuerzi)	26.7%	10.4%
Tree Swallow	Princeton, Mass. (Chapman, 1939)	48.5%	4.6%
Swallow of the Genus <i>Hirundo</i>	Japan (Uchida, 1932)	46.0%	1.6%
Bank Swallow	Iowa and New York (Stoner, 1937)	5.2%	1.4%

Table XXIV clearly shows how closely the Kent colony follows the pattern of the Cape Cod colony. It also illustrates that Chapman's findings agree favorably with the results reported by Uchida (1932) in studies carried on in Japan. A consideration of this material would seem to show a direct correlation between the adult and fledgling re-

turn percentages. In other words, the higher the adult return percentage, the lower the fledgling return percentage. This may well be the case with the Tree Swallow, for as shown elsewhere the adults are the first or earlier arrivals to the colonies. Hence what Whittle (1932) attempted to show with Song Sparrows in New Hampshire, that "the reason juveniles do not seem to return to their birth places is that the old returns preempt the nesting territories used," may be just as true, and even more so, with the Tree Swallow.

In comparing the data for three Tree Swallow colonies in the Northeast, it is well to remember that the Cape Cod colony covered a square mile in extent and that Chapman's results were obtained in two areas four miles (6.4 km.) apart, both of which clearly exceeded in extent the Kent colony site which is a mere $3\frac{1}{4}$ acres (1.3 hectares). This note is given to illustrate that an increase in the extent of the colony site does not increase the return percentages of fledglings, and that the excess of the fledglings which we assume are driven off by the adults must disperse to a more distant location for nesting. It may well be that much more extensive banding operations over the entire New England states would shed much light on the fledgling dispersal problem.

C. House Wren Population

In connection with the relatively high fledgling return percentage of the Tree Swallows at Kent, the following note on the wren population is of interest. Banding operations on this species began in 1938 when all the nestlings were banded, totaling 32 birds. During 1939 this procedure was continued, with the addition of capturing and banding all adults for the second brood.

The 1939 season proved an interesting one with this species. Four pairs nested in the colony for their first brood, augmented by four more pairs during the second brood period, or an increase in the population of 100%. Banding operations carried on during this second brood period disclosed that the male (138-11335) of the pair nesting in box 16 was a fledgling return from the previous year. The bird had been banded on July 21, 1938, which would indicate it had been banded as a second-brood fledgling of that year. It had been reared in box 4 (only 100 feet—30.5 meters—from box 16) with five other nestlings.

This record gives the Kent colony a House Wren fledgling return percentage of 3.12%, which is higher than the 2.6% return of Kendeigh (1934) in his studies at Gates Mills, Ohio. In considering this percentage, we should not lose sight of the fact that the area at Kent is relatively very small.

TABLE XXV
Distances between Fledglings' Birthplace and Nest Box

Fledgling No.	1938 Box	1939 Box	Distance
1. ♂ 138-11226	29	8	400 feet (122 meters)
2. ♂ 138-11228	29	50	250 feet (76.2 meters)
3. ♂ 138-11243	15	24	50 feet (15.2 meters)
4. ♂ 138-11250	11	10	100 feet (30.5 meters)
5. ♂ 138-11269	30	32	250 feet (76.2 meters)
6. ♀ 138-11240	18	39	400 feet (122 meters)
7. ♀ 138-11241	18	47	300 feet (91.3 meters)
8. ♀ 138-11286	35	42	50 feet (15.2 meters)
9. ♀ 138-11287	35	25	100 feet (30.5 meters)
10. ♀ 138-11256	40	5	100 feet (30.5 meters)
11. ♀ 138-11290	38	24	400 feet (122 meters)
Average distance between fledgling birthplace and nest box for 11 fledgling returns			218.18 feet (66.5 meters)
Maximum possible distance in the colony			600.00 feet (182.8 meters)

Table XXV illustrates what can be expected from a Tree Swallow colony on a small area. This material is not comparable to either Low's or Chapman's colonies, for both areas were much greater in extent. Chapman's colony site was over twelve acres (4.8 hectares) and Low's a full square mile (256 hectares). Due no doubt to the relatively confining limits of the Kent colony, the distances between the fledglings' birthplace and their first-year nesting boxes are probably the smallest on record. Low's distances ran from 150 feet (47 meters) to 30 miles (48 kilometers), based on 48 fledgling returns and covered both the main station and several substations. Chapman gives no data on his first-year birds.

TABLE XXVI

Known Survival Percentages of Eight Broods Based on Fledgling Returns				
Fledgling No.		Origin 1938	Size of Brood	Survival in 1939
1. ♂ 138-11226	} Brothers	Box 29	6	33.3%
2. ♂ 138-11228				
3. ♂ 138-11243		Box 15	6	
4. ♂ 138-11250		Box 11	5	
5. ♂ 138-11269		Box 30	5	20.0%
6. ♀ 138-11240	} Sisters	Box 18	4	50.0%
7. ♀ 138-11241				
8. ♀ 138-11286				
9. ♀ 138-11287	} Sisters	Box 35	5	40.0%
10. ♀ 138-11256		Box 40	5	20.0%
11. ♀ 138-11290		Box 38	4	25.0%
Average known survival for 8 broods				28.11%

Before discussing Table XXVI it is worth noting that in this group of fledgling returns there were two pairs of sisters and one pair of brothers. Speaking of his high percentage of fledgling returns for 1932, Low (1933) says that "two nestlings returned from each of three broods but in no instances did more than two from a brood come back." In six years of study, Chapman's only fledgling return occurred in 1935 when two nestlings returned from each of two broods. Neither of these workers mention the sex ratio of these returns, and neither are explicit as to whether they actually bred.

In plumage characters the brothers were similar, as was found to be the case with all the male Tree Swallows irrespective of age. On the other hand the sisters were different, for in each case one was brown and the other greenish. Whether this proportion is representative is unwise to predict, for the greenish phase would seem to be the commoner first-year plumage.

Table XXVI, on the known survival of eight broods, stimulates more questions than it answers. How nearly representative of the actual number of nestlings that survive the first year is the high of 50.0% or the low of 16.6%, or in fact the average of 28.11%? We could theorize much, but we would still have unsolved the problem of the actual surplus and the attendant problem of its distribution or dispersal.

D. Distant Recoveries

At the time of this writing there have been only two distant recoveries. One, a bird banded as a nestling on June 17, 1938, was found sick and died September 3, 1938, at Leonardo, New Jersey (near Atlantic Highlands). The other bird, banded as a nestling June 10, 1939, was killed by an auto January 26, 1940, at Homestead, Florida.

There is nothing unusual about the first record, for the location is on the eastern or coastal flyway of this species, and the bird was found at a time which is normal for the species at that point. In a direct line Leonardo is 90 miles (145 kilometers) south southwest of Kent. It therefore throws no light on the problem of the fledgling dispersal immediately after leaving the nest. Sight records at Kent would seem to indicate a northerly dispersal, but the records are too local for any predictions. Furthermore, their early arrival along the coast at points south of their breeding localities would argue against any considerable dispersal northward immediately after leaving the nest boxes. Chapman records two fledgling recoveries, both of which were obtained at points south of his colony and during the same summer of their hatching. He is of the belief that the birds move south immediately after leaving their nest boxes (Chapman, 1935).

The second distant recovery for the Kent colony is of interest in view of the decrease in the number of breeding pairs for the 1940 season. It no doubt indicates that at least some of the Kent birds were in peninsular Florida at the time of the severe cold spell where and when a great many Tree Swallows perished. Therefore, the 1940 decrease could readily be attributed to the decimation of these birds at their winter quarters. Howell in 'Florida Bird Life' (1932) describes several such instances where unseasonable cold spells so cut down the insect population that the Tree Swallows died in great numbers, apparently from starvation.

XVII. PLUMAGE NOTES

One of the purposes of this study was to determine at what age the female acquires the full (green) adult nuptial plumage. This involved a fuller knowledge of the so-called brown female, both as to age and corresponding plumage characteristics. Before considering these immature birds, it is well to realize that in the field a fully adult female is indistinguishable from the male even with the best binoculars, if we rely on plumage alone. And even in the hand, differences are so slight as to be unreliable. If the female can be distinguished from the male, that female is not fully mature. As Low (1933) found on the Cape, actions will readily separate the sexes in the field. Apart from the fact that the female incubates, the infallible guide is that a female will always enter the box directly, while the male invariably perches at the opening before entering.

The following plumage characters have been worked out based on fifteen birds banded in 1938 which returned to breed in 1939. Of these fifteen birds, four were adult returns and eleven were fledgling returns.

Among the first-year females, there are two distinct plumages. For convenience we can term the one plumage 'brown,' in which there is hardly any trace of green. At any distance these birds appear to be entirely brown above. The second and commoner plumage is what might be termed 'greenish,' in which very definite traces of green appear on the back of the head, on the back between the shoulders and on the leading area of the inner half of the wing. In flight these females appear darker above than the brown females and have a decided smoky cast to the wings and tail.

Following these plumages through to the second year, we find that the typically 'brown' plumaged bird acquires the 'greenish' phase in its second year; and that the first-year 'greenish' females may acquire the full adult nuptial plumage, or may still bear faint traces of

immaturity in their second year. In these latter birds the forehead is still washed with brownish, and a slight smoky cast still remains on wings and tail. It would appear, then, that the female Tree Swallow requires at least two years to attain the full green-blue adult nuptial plumage, and in some few instances it does not attain it until the third breeding season after hatching. In other words, if the first-year female is a typically 'brown' bird, it will take three years to attain the adult green-blue plumage; and if the first-year female is a typically 'greenish' bird, it may attain the adult green-blue plumage either in the second or third year.

In no instance did a female attain the green-blue adult plumage the spring after its hatching. On the other hand, all five fledgling return males did attain the adult nuptial plumage. Of the 68 males under observation during the three seasons, there was no instance of males in any but the green-blue plumage of a full adult.

Thus, when Forbush (1929) describes the adult female in breeding plumage as "similar to male or as male, but usually duller above, often chiefly dusky-grayish brown, with only tips of feathers glossy blue or greenish; upper breast frequently shaded brownish gray," he is not entirely correct. The latter half of his description fits a second- or third-year female, and not a fully adult bird. Again, his plumage notes for "immature in first breeding plumage" as similar to adults is only half true for it would only hold for the males. Immature females would never be similar to adult females.

TABLE XXVII
Plumage Changes

Adult Returns

1. ♀ 138-11231, banded as brown first-year in 1938, returned as a greenish bird and bred in 1939.
2. ♀ 138-11213, banded as a greenish first-year in 1938, returned with traces of immaturity and bred in 1939.
3. ♀ 138-11209 and ♀ 138-11230, banded as greenish first-years in 1938, returned as full green-blue adults and bred in 1939.

Fledgling Returns

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. ♀ 138-11290 2. ♀ 138-11241 3. ♀ 138-11286 4. ♀ 138-11240 5. ♀ 138-11256 6. ♀ 138-11287 | } banded as nestlings in 1938, returned as greenish first-year birds and bred in 1939. |
| <ol style="list-style-type: none"> 1. ♂ 138-11243 2. ♂ 138-11250 3. ♂ 138-11228 4. ♂ 138-11226 5. ♂ 138-11269 | } banded as nestlings in 1938, returned as green-blue adults and bred in 1939. |

XVIII. DISCUSSION

Before the introduction of bird boxes the determining factor in Tree Swallow distribution and relative abundance was availability of actual nesting sites. These sites were usually to be found at the heads of lakes, borders of fresh-water marshes and along river valleys, where whole stands of dead trees occur. Cavities formed as a result of tree decay and old woodpecker nest holes supplied the need. Only a casual survey of such natural areas would reveal that a swallow food supply is guaranteed and would probably be far in excess of the need of the number of birds that natural cavities or woodpecker holes could accommodate. This undoubtedly developed in the economy of the Tree Swallow a disregard for the food supply of an area, since under natural conditions food could be taken for granted. Nesting sites then became the dominant motivation in its breeding distribution.

In the New England area this urge could readily explain the species' eagerness to adopt the artificial nest box, particularly as we know that with the development of this country the natural habitats of this species have been fast disappearing for many years.

Bird boxes have introduced a new element which is tending to satisfy this species' drive for nesting sites. While it may be effecting an increase of Tree Swallows in New England, it is much too recent an innovation to have caused any change in the birds' economy. This species will probably continue to function instinctively on the basis that actual nesting sites always insure adequate food supplies.

In describing the Princeton site Chapman (1935) writes that the "colony is located on a small area of open farmland that is very unfavorable for a nesting site for this species." He goes on to point out that there are no ponds nearer than two miles and that the only water areas are a few small alder-choked brooks. Besides these unfavorable conditions the elevation of the area is high (1100 feet) and the colony site entirely exposed to the northwest. Surely no trained ecologist would expect to find Tree Swallows in such a habitat, but yet the introduction of bird boxes has brought this swallow to such an ecologically poor area.

Low (1932, etc.) gives no detailed description of his areas at Cape Cod. However, in telling of the main station he states that it has "an excellent food supply." Therefore, we can take for granted that some sort of fresh-water lake is either on the site or near-by. But here again the seacoast could not be considered the ideal breeding habitat of Tree Swallows, for such areas are too exposed to severe easterly storms which would cause detrimental fluctuations in the birds' food supply.

Speaking of natural nesting sites such as cavities, Low (1932) states that on the Cape they "are so few, if not even non-existent, they may be eliminated from the discussion." Considering the flora of Cape Cod it seems highly improbable that any sizable natural habitats ever existed on the Cape for Tree Swallows to use. Therefore, the relative abundance of this species at that area has been affected by the introduction of nest boxes. Thus again we find this artificial stimulant, working as it does on the species' drive for nesting sites, has caused the Tree Swallow to nest in the country where the ecological conditions are at times very unfavorable.

Kent, on the other hand, with the exception of the actual nesting boxes very closely approaches the natural nesting habitat of the Tree Swallow. Aside from the river which is in actuality a long narrow lake with a few swampy coves, there are several small lakes and swampy areas to the east. It has some elevation (450 feet—137 meters) and, being situated in the deep-set valley of the Housatonic, is well protected by the hills to the west and the east. What the actual carrying capacity of this area, is remains for future years to divulge. It is, however, safe to say that, up to the present at least, results indicate ecological conditions existing at Kent can support a considerable further increase in its Tree Swallow breeding population.

XIX. ADDENDA

The following notes are given to supplement the material contained in the body of the paper. These data are based on observations made in the colony from April 10 to May 11 (inclusive), 1941.

The period from April 10 to 30 inclusive averaged 8.9° F. above the normal mean, and the period from May 1 to 11 inclusive 1.5° above normal. Clearly this period was abnormally warm. It should have had an appreciable effect on the date of the laying of the first egg, since temperature is conceded to be one of the major factors in the early stages of the reproductive cycle. Yet the date for the laying of the first egg for 1941 was May 6, corresponding exactly with the average of 1937, 1938 and 1939 when no such abnormally high temperatures occurred.

On the other hand the Bluebird did respond to the higher temperatures, by laying its first egg on April 13, the previous earliest date in this study being April 21. This was a very decided advance and can be readily attributable to the abnormally warm spell.

Just why the Tree Swallow, a box-nesting species, did not react in a similar way is a problem for future study. In itself it would appear to lessen the importance of the effect of temperature on the re-

productive cycle of the Tree Swallow. However, one such instance is hardly a basis for generalization, and more data would be necessary in my opinion to decrease the importance of temperature in the life cycle of this species.

Another unexpected fact was disclosed by the 1941 observations. This was the gratifying comeback which the Tree Swallow staged at the Kent colony. It is best illustrated in Chart II (see Page 00). The rate of increase following 1940's low even exceeded the steep rise in 1937, 1938 and 1939. Based on the findings up to May 11 the colony in 1941 reached a new peak of 50 pairs. By May 11, 14 females were laying, and at least 36 other nests had progressed to a point where it was certain that the breeding cycle had begun. Whether the increase witnessed at Kent was a general condition over the entire New England area is not at present known to the writer. Should it be the case, it graphically illustrates the fecundity of the Tree Swallow in the Northeast.

Towering was again under observation with special emphasis on the quality of the note that provoked it. Here it was found that the towering note was softer, less harsh and more rapidly repeated than the true alarm note, such as is given at the close approach of humans. Being of a different quality, it may well be the reaction to a different stimulus. Judging from the results which this towering note produces, it is the belief of the writer that it is a flock organization call note.

Since drafting the main body of the paper another recovery record was obtained. A bird banded as a nestling on June 10, 1939 was found dead May 21, 1941 at Lakeville, Connecticut, a point 17 miles—30 km.—north (a few degrees west of north) of the colony site. The date could readily indicate that the bird was breeding in the vicinity. The individual, who found the bird, reports that the Tree Swallow is seen during the summer months at that point. If we can rely on this statement it would perhaps indicate a northerly dispersal of the fledglings. In other words the fledglings tend to return to the point of their origin, some few remain there to breed, while the others are perhaps driven off by the more mature birds and continue their migration north until suitable nesting sites are found. The latter may be a few miles or many miles from their point of origin, or it may result in wandering non-breeding birds.

XX. SUMMARY

1. This paper is a nesting study of the Tree Swallow in southern New England based on almost daily observations for three breeding seasons at an isolated colony which grew to 35 pairs. From 74 to 84%

of the nesting boxes were occupied, the excess lessening friction with other species. The best type of box is described.

2. The average date of arrival at Kent was April 8, a secondary flight occurring in the middle or third week of May. This latter flight is believed to be a mass arrival of first-year birds or birds which bred farther north.

3. Mass departure during the nesting season was directly correlated with lack of sunshine rather than a drop in temperature.

4. A curious towering of the entire flock into the air is not believed to be a fear reaction and has no acceptable explanation at this time.

5. Territory was limited to nesting boxes but the birds sometimes killed one another in the competition for these sites.

6. Various call notes are described and discussed.

7. Mature females were more efficient in nest-building than one-year-old birds, two weeks being the average time and the nest composed of material locally available.

8. Details of courtship displays and copulation behavior are given.

9. Eggs were laid normally at the rate of one per day. A drop in temperature would suspend egg-laying but had little or no effect on the percentage hatched. The date for the first egg (average May 6) was influenced by temperature and possibly by the amount of sunshine. It is tentatively believed to be six days after the mean temperature is 55.3° F. (12.8° C.), the threshold decreasing 0.6° F. each day thereafter. Clutch size varied from 3 to 7 eggs; 68 sets averaged 5.6 eggs per set. Sets destroyed were replaced in 6-7 days. One-year-old females appear to lay later than older birds.

10. In New England this species is generally single-brooded.

11. Females normally carry on all incubation, the males guarding the nest-site in their absence. The incubation varied from 13 to 16 days, averaging 14.5 in 66 cases. Random observation of the rhythm indicated 19 minutes on the nest, 9 off.

12. All eggs in early clutches hatched on the same day, those in late clutches over a two-day period. Young were consistently brooded for the first few days after hatching and left the nest when 15 to 24 days old. In 66 instances this age was 19.2 days, and in 65 was 4.5 young per nest. No correlation existed between duration of nestling period and size of brood.

13. Nine hours' observation on young of various ages showed an average of one visit every two minutes by the parents. Parents definitely coaxed their young to leave, the initial flight of fledglings covering a considerable distance and feeding by the parents ceasing 2 or 3 days later.

14. Ideal ecological conditions for this species apparently existed at Kent, an average of only 3.6% of the adults and 2.4% of the nestlings dying during the breeding seasons of a five-year period.

15. The systematic introduction of nesting boxes promoted an increase in the size of the colony, and until 1939 this was accompanied by an increase in reproductive efficiency. The latter averaged 67.7% over a 3-year period, egg destruction being the most serious mortality factor. First-year parents had the same nesting success as adults.

16. Returns after one year were 26.7% for 15 adults, 10.4% for 108 fledglings. Sex ratio of the latter (11 birds) was 45.5% males to 54.5% females. The known survival on 8 broods varied between 16.6 and 50.0%, averaging 28.1%. Distant recoveries were limited to two cases, in New Jersey and Florida.

17. Males invariably acquired the nuptial plumage in one year, females requiring at least two years.

18. Nesting sites are believed to be such an important factor in the distribution of this species, that the erection of nest boxes may even cause colonization in areas where ecological conditions are poor.

19. Severe climatic conditions on the birds' wintering grounds early in 1940 brought about only a brief decline in the growing colony which was studied.

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St. Marys,
Georgia.

Notes on the Distribution of Oceanic Birds in the North Atlantic 1937-1941

By HILARY B. MOORE, Ph.D.

There are a few birds, chiefly shearwaters, petrels and phalaropes (in the North Atlantic), which live most of their lives, except for the breeding period, at sea. For this reason, and because their identification must usually depend on sight records, we have relatively little detailed information as to their distribution and seasonal migrations. In fact the bulk of our knowledge is based on two papers by Jespersen (1930), and Wynne-Edwards (1935). Additional information, however scanty, is therefore valuable. The present notes are based on four transects of the Atlantic between England and Bermuda,* three by the author and one by Miss K. S. Russell, and on observations made from the Royal Society's ketch "Culver" between 1938 and 1941, the latter all within thirty miles of Bermuda. A few land records made at Bermuda between 1937 and 1941 are also included, but most of these, together with records of land birds seen at sea round Bermuda, are treated in another paper (Moore, 1941). No attempt at a general bibliography has been made, since Wynne-Edwards (*loc. cit.*) has given so good a summary of the available information.

Specific identification of storm petrels has not always been possible, but all those of which I could be certain were Wilson's (*Oceanites oceanicus*). Similarly some of the large shearwaters might have been either *Puffinus gravis* or *P. kuhlii*, though on most occasions these two could be separated with certainty, and once the presence of both together afforded a useful comparison. The actual numbers of birds seen are given in tables at the end of the paper, those for Bermuda being grouped together as totals for each month.

Jespersen (*loc. cit.*) has given a chart showing the average numbers of birds observed per day in different parts of the North Atlantic. Between Bermuda and the Azores these ranged from one to four per day, and from there to the Bay of Biscay >11 and >18 . If we take the figures in Tables I to V and express them, for comparison, as numbers of birds per ten hours watching, we get 6.5 for the area round Bermuda, 19.6 for the July transect (excluding time in port on all transects), 83 for the November transect and 79 for the December one. In the case of the last of these the area of Land's End has been

*Notes on the first of these have already been published (Moore, 1938).

omitted, but if this is included the value is 1,235. No doubt our figures for the Bermuda area are higher than Jespersen's because they refer only to an area close to the island, and this is a breeding ground for tropic-birds, whereas his figures refer to a much larger area of the Sargasso Sea. But the difference between our figures for the region between Bermuda and Europe and his, is so great that we must regard the minimal figures which he describes, as definitely too low.

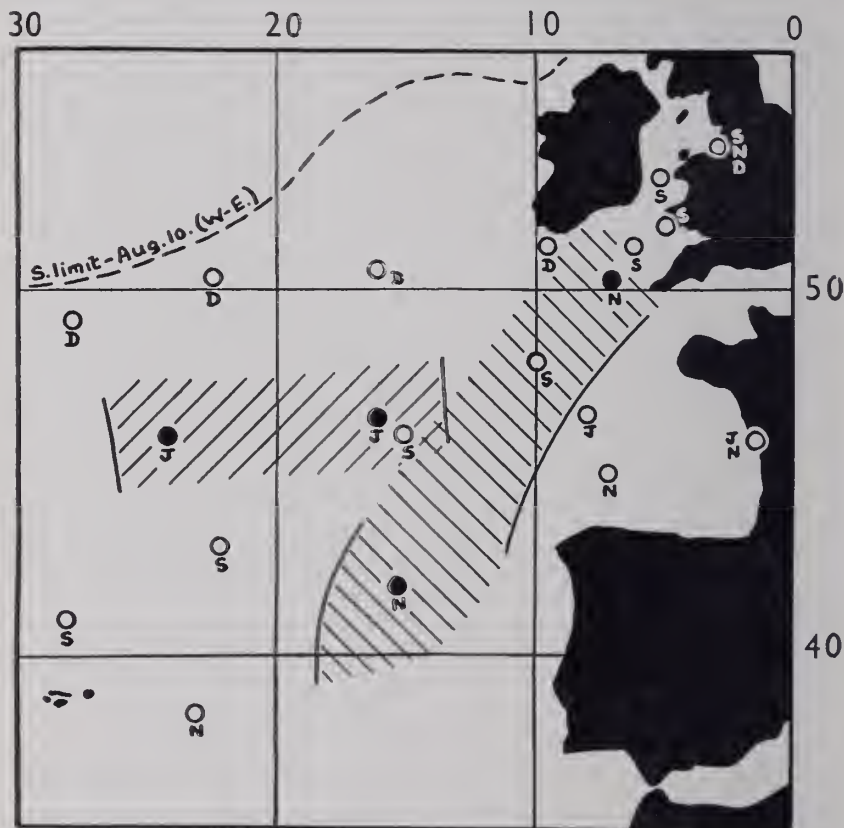


FIG. 1. Areas in which Greater Shearwaters were seen, and their southern limit in August as given by Wynne-Edwards. In this and subsequent figures, presence is indicated by a black circle and absence by an open one. Circles show noon positions, and the letters by them indicate the month (July, September, November or December).

Greater Shearwater, *Puffinus gravis* (O'Reilly). — According to Wynne-Edwards' summary, this bird, which nests only at Tristan da Cunha, crosses the equator and moves northwards in the western North Atlantic in the spring and



FIG. 2. Distribution of North Atlantic Shearwaters in the central North Atlantic in July (open hatching), September (close hatching) and November (cross hatching).

early summer. It spreads across the whole northern North Atlantic during the summer, and in the autumn it moves south again in an eastern and a (smaller) western stream. Our data, though few, fit in well with this outline, although they do little to elaborate it. There are definite records of single birds round Bermuda on May 10 and 15, and three on May 18. There are also records of either this or the next species for early June and September. Finally Bradlee, Mowbray and Eaton (1931) record it at Bermuda in June. The Greater Shearwaters undoubtedly move northwards very rapidly in the spring, as Wynne-Edwards gives their southern limit on June 25 for the western side of the North Atlantic as about 40° N., whereas the earliest arrivals pass Bermuda (32° N.) in mid-May.

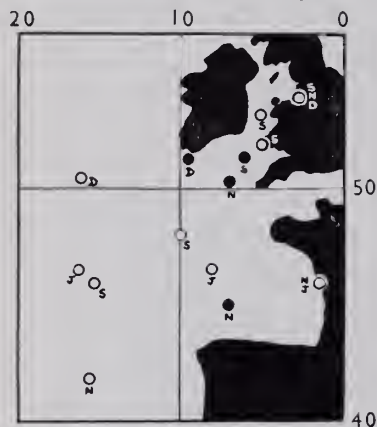


FIG. 3

FIG. 3. *Records of Gannets.*

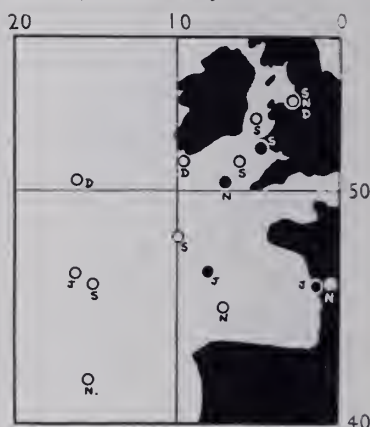


FIG. 4

FIG. 4. *Records of Manx Shearwaters.*

In July, except for two doubtful records, which were probably *P. kuhlii*, we found Greater Shearwaters only in a patch about six hundred miles northeast of the Azores, and then not in great numbers. In September on a more southern route, none were seen, but in November they were present in large numbers off Land's End, and a large shearwater, probably this species, was present in smaller numbers about three hundred miles west of the Spanish coast. None were seen in November either in the Bay of Biscay or round the Azores. Finally in December, on a northern route, none were seen at all, and it is to be presumed that they had all moved well south by that time. Except that our records northeast of the Azores in July are farther south than the limits given by Wynne-Edwards for that month, our records of both presence and absence agree well with his account.

North Atlantic or Cory's Shearwater, *Puffinus kuhlii* (Boie).—Our records for this species are of more help in filling in details as to distribution since its northern limits fall more within the area covered by our transects than do those of *P. gravis*. The earliest record is of three birds near Bermuda on May 28, and there are single records of either this or the previous species in June and September also. According to Wynne-Edwards it reaches Cape Cod about August, and its farthest north on the west side is about 44° . On the east side of the Atlantic its limit is about 50° , and it reaches this in August and September. In July we found

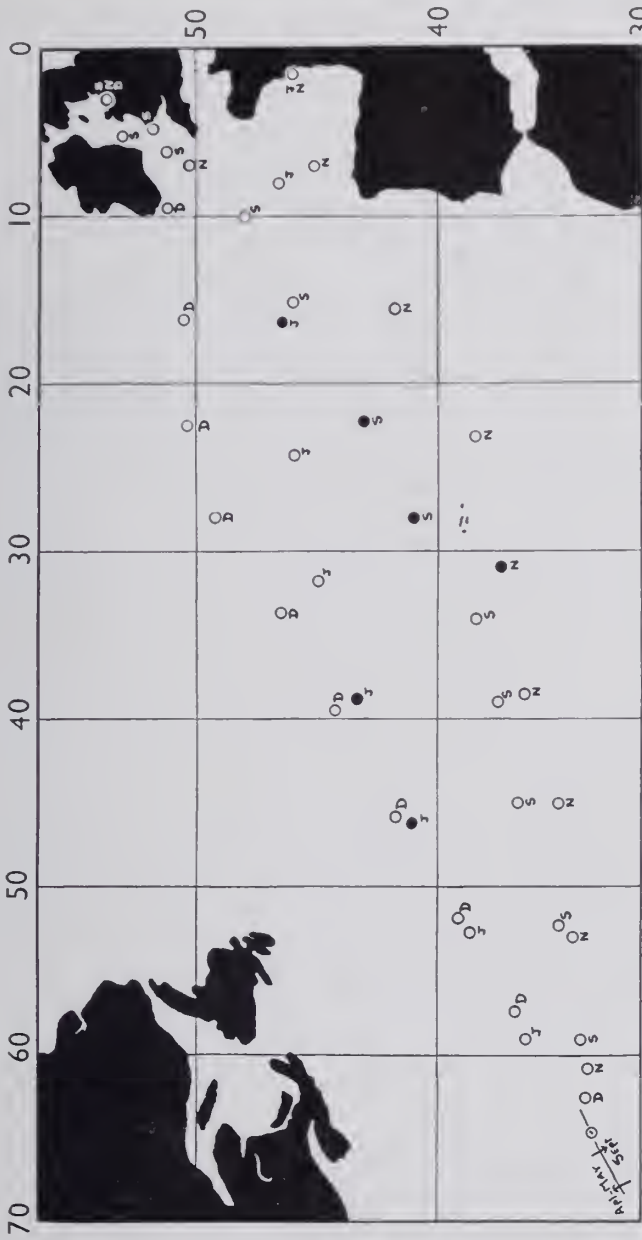


FIG. 5. Records of storm petrels. Only those on the July transect, and those of Bermuda in May were definitely Wilson's.

it present on the western side at 38°-43° N., (4 definite identifications, and three probably this species), and at about 46° N., on the eastern side. The Nicholson's (1931) found it present in the same month right across the Atlantic on a more southerly transect. Our September transect found it only in an area centering on the Azores and running from 15° to 38° W., although Wynne-Edwards states that it may occur in the mouth of the English Channel at this time. The Nicholson's October records are about this area, though rather farther east. In November we saw them on only one day, slightly southwest of the Azores. The December transect was too far north to be of any use. Taking all these observations together we are able to make some picture of the seasonal movements of the northern limit of *P. kuhlii* in the central North Atlantic.

Sooty Shearwater, *Puffinus griseus* (Gmelin).—None were seen on any of the transects, but round Bermuda a bird which was probably this species was reported (not seen by me) on April 26, and single birds were definitely identified on May 15, 16 and 28, and one was caught on the "Culver" on October 20. Bradley, Mowbray and Eaton (*loc. cit.*) also record them close to Bermuda in the winter of 1907 and 1908. Our spring records agree with Wynne-Edwards' statement that they appear on the North American coast at the end of May, and remain in the North Atlantic throughout the summer. Their general scarcity compared with the last two species may account for none being seen on any of the transects.

Audubon's Shearwater, *Puffinus lherminieri lherminieri* Less.—I have assigned all small shearwaters seen round Bermuda to this species, which breeds here in small numbers, but they might possibly have been *P. puffinus*, of which there are two definite and one doubtful record from Bermuda. Two were seen in May, two in July and one in September, all close to a known nesting site. None were seen out at sea.

Manx Shearwater, *Puffinus puffinus* Brünnich.—I have assumed that all small shearwaters seen in the eastern North Atlantic were this species. They were recorded off the Bay of Biscay and round La Pallice in July but not later in the year, off the Welsh coast in September, and off Land's End in November. None were seen far out at sea.

Wilson's Petrel, *Oceanites oceanicus* (Kuhl).—Specific identification of storm petrels is always difficult with sight records, and these are of little value unless the evidence for them is given. In May, 1939, when they were fairly abundant round Bermuda, all those seen had a similar type of flight and marking. In a few of these cases the projection of the feet beyond the tail in flight was well seen. It may safely be assumed therefore that all these were Wilson's Petrels. In the July transect, others were seen which, from their habit of following the ship, their markings, and the similarity of their flight to the May ones, were fairly certainly also Wilson's Petrels. From the above, and the locality and time of year they were very unlikely to have been *Hydrobates*, and the flight did not agree with that described for *Oceanodroma*. Those seen on the September and November transects, and other Bermuda records, might have been this species, but are uncertain.

Jespersen found storm petrels, probably this species, in large numbers in the Sargasso Sea towards the end of April. We found Wilson's Petrels present in maximum numbers round Bermuda in May, although present (sp.?) from April to September, and Bradley, Mowbray and Eaton record them as present there regularly throughout the summer. In July, when Wilson's Petrels are widely dis-

tributed in the North Atlantic (Wynne-Edwards), we found them about halfway between the Azores and the American coast in latitude 41° - 43° N., and again halfway between the Azores and Ireland. These are all the definite records, but in September storm petrels (sp.?) were seen northeast of the Azores, and in November southwest of the Azores, while in December on a northern transect none were seen.

Fulmar, *Fulmarus glacialis glacialis* (Linn.).—Only recorded once, off Land's End in November. Our July, September and November transects were all south of where, according to Wynne-Edwards, Fulmars would be expected at these times, but our December transect, which ran along or north of the 50th parallel from the south of Ireland to 27° W., and crossed the 40th about 49° W., was well north of the limit he gives for January, and yet none were seen. This suggests either that they do not reach their extreme southern limit until after December 31 or else that this limit may at times be farther north than Wynne-Edwards indicates.

Gannet, *Sula bassana* (Linn.).—The only records are in the Bay of Biscay and off Land's End in November, off the Welsh coast in September, and off the south of Ireland in December. None of these were far from land.

Great Black-backed Gull, *Larus marinus* Linn.—Although most of the gulls cannot be considered as oceanic, a few were seen on the transects and round Bermuda, which is about 580 miles from the nearest land, so the observations are best included here. The only records of Great Black-backed Gulls on the transects were near Liverpool and off the south of Ireland. None were seen round La Pallice. Wynne-Edwards says that they are rarely seen more than forty miles from land, but they occur regularly in small numbers round Bermuda, although they do not breed there. Bradlee, Mowbray and Eaton record them at Bermuda in December and February or March, and we have seen them there from October to February, so they may be regarded as regular winter visitors. Both adult and immature birds occur.

Lesser Black-backed Gull, *Larus fuscus* Linn.—None were seen far out to sea, and none have been recorded at Bermuda. They were seen round Liverpool and in the Irish Sea in September and December, off Land's End in November, and round La Pallice and in the Bay of Biscay in July and November. In December six birds followed the ship from the south of Ireland as far as about 16° W.

Herring Gull, *Larus argentatus* Pontoppidan.—These gulls were seen round Liverpool and in the Irish Sea in September, November and December, off Land's End in November, and round La Pallice and in the Bay of Biscay in July and November. In December, on the way to Bermuda, an adult and an immature bird were picked up at about 39° N., 51° W. These had not previously been following the ship. The next day six birds (two immature) were seen, and the next day one. They frequently came close under the stern of the ship, where an excellent view of them could be obtained, and there could be no question of confusing them with fulmars (see Wynne-Edwards). Bradlee, Mowbray and Eaton record them as regular winter visitors to Bermuda, occurring in moderate numbers from November to March. I have seen both adults and immature birds there regularly from December to March.

Mew Gull, *Larus canus* Linn.—Seen only at La Pallice in November and at Liverpool in December.

Black-headed Gull, *Larus ridibundus* Linn.—These were seen only at Liverpool, La Pallice, and in the Bay of Biscay, all in November.

Atlantic Kittiwake, *Rissa tridactyla tridactyla* (Linn.).—The July, September and November transects were too far south for their respective seasons for Kittiwakes to be present out at sea (see Wynne-Edwards), and the only record on any of these was off Land's End in November. In December, by which time they have dispersed well south, they were seen from about 50° N., 16° W., to 47° N., 37° W., and from 41° N., 50° W., to 39° N. 51° W. These records consisted of both adult and immature birds. Bradlee, Mowbray and Eaton record them in small numbers at Bermuda from December to February, and I saw one young bird there on April 18. None were seen at sea around Bermuda.

Common Tern, *Sterna hirundo* Linn., Least Tern, *S. antillarum* (Less.).—No terns were seen on any of the transects, and the individuals of these two species which we saw round Bermuda were probably local residents.

Great Skua, *Catharacta skua skua* Brünnich.—One was seen in July at about 46° N., 16° W., two (+2?) in the Bay of Biscay in November, and one at about 50° N., 22° W., in December.

Man-o'-war-bird, *Fregata magnificens* Mathews.—None were seen on any of the transects, but two were seen at sea near Bermuda in May, 1939, and one in May, 1940. Beebe (1937) records it there in November, and Bradlee, Mowbray and Eaton in September, April and May. Jespersen found none north of about the 23rd parallel.

Yellow-billed Tropic-bird, *Phaeton lepturus catesbyi* Brandt.—None were seen on any of the transects except for a single bird in September, less than one day out from Bermuda. They nest at Bermuda, and we have seen them there regularly out to the limits of our cruises—about thirty miles from the islands—and in all months except January.

Phalaropodidae.—Ten phalaropes in winter plumage were seen in November a short distance southwest of the Azores.

SUMMARY OF OBSERVATIONS

A. Sh.=Audubon's Shearwater	Kit.=Kittiwake
At. Sh.=Atlantic or Cory's Shearwater	L. B. B. G.=Lesser Black-backed Gull
Fgt.=Frigate Bird or Man-o'-war-bird	M. G.=Mew Gull
Fu.=Fulmar	Mx. Sh.=Manx Shearwater
B. H. G.=Black-headed Gull	Pet.=Storm petrel sp.
G.=Gannet	Phal.=Phalarope sp.
G. B. B. G.=Great Black-backed Gull	S. Sh.=Sooty Shearwater
Gt. Sh.=Greater Shearwater	T. B.=Yellow-billed Tropic-bird
Gt. Sk.=Great Skua	Wi. Pet.=Wilson's Petrel
H. G.=Herring Gull	

Note that, owing to war time conditions, only very approximate noon positions can be given for the transects in September and December, 1939.

Numbers are the actual numbers seen. If in italics they represent birds following the ship. Times are hours of observation.

TABLE I

Liverpool to Bermuda, November, 1937. Observer H. B. M.

4.xi.37—Round Liverpool: 1 G. B. B. G.; 50 H. G.; 4 B. H. G.
5.xi.37—Noon position 50° 13' N., 06° 53' W. (3 hr. 22 mt.): 2 L. B. B. G.; 71 H. G.; ca. 400 Kit.; 1 Fu.; ca. 1500 Gt. Sh.; 4 Mx. Sh.; ca. 750 G.

- 6.xi.37—In and round La Pallice: 100 L. B. B. G.; 2 H. G.; 1 M. G.; 50 B. H. G.
 7.xi.37—Noon position 44° 59' N., 07° 03' W. (3 hr. 22 mt.): 13 L. B. B. G.;
 3 G.; 7 (+7?) B. H. G.; 2 (+2?) Gt. Sk.
 8.xi.37—Noon position 41° 40' N., 15° 25' W. (3 hr. 00 mt.): 3 (?) Gt. Sh.
 9.xi.37—Noon position 38° 15' N., 22° 55' W. (4 hr. 30 mt.): no birds.
 10.xi.37—Noon position 36° 47' N., 30° 47' W. (2 hr. 30 mt.): 1 Pet.; 25 At.
 Sh.; 10 Phal.
 11.xi.37—Noon position 35° 34' N., 38° 37' W. (2 hr. 30 mt.): no birds.
 12.xi.37—Noon position 34° 06' N., 45° 03' W. (1 hr. 30 mt.): no birds.
 13.xi.37—Noon position 33° 23' N., 52° 54' W. (1 hr. 15 mt.): no birds.
 14.xi.37—Noon position 32° 40' N., 60° 45' W. (1 hr. 30 mt.): no birds.
 15.xi.37—Bermuda: no birds seen.

TABLE II

Bermuda to Liverpool, July, 1939. Observer H. B. M.

- 12.vii.39—Near Bermuda (1 hr. 21 mt.): 3 T. B.
 13.vii.39—Noon position 35° 39' N., 58° 58' W. (2 hr. 00 mt.): no birds.
 14.vii.39—Noon position 38° 21' N., 52° 30' W. (1 hr. 00 mt.): 1 At. Sh. (?).
 15.vii.39—Noon position 41° 04' N., 46° 03' W. (2 hr. 30 mt.): 13 Wi. Pet. + 1
 Pet. (sp.?) ; 4 At. Sh.; 15 sp.?
 16.vii.39—Noon position 43° 18' N., 39° 01' W. (2 hr. 40 mt.): 4 Wi. Pet.; 2 At.
 Sh. (?).
 17.vii.39—Noon position 44° 54' N., 31° 39' W. (1 hr. 00 mt.): no birds.
 18.vii.39—Noon position 46° 06' N., 24° 15' W. (1 hr. 00 mt.): 2 Gt. Sh.
 19.vii.39—Noon position 46° 37' N., 16° 19' W. (1 hr. 35 mt.): 1 Wi. Pet.; 1 Pet.;
 1 Gt. Sh.; 58 At. Sh.; 1 Gt. Sk.
 20.vii.39—Noon position 46° 31' N., 08° 11' W. (1 hr. 53 mt.): 1 H. G.; 23 At.
 Sh.; 5 Mx. Sh.; 1 sp.?
 21.vii.39—La Pallice and near (1 hr. 05 mt.): 15 L. B. B. G.; 30 B. H. G.; ca.
 130 Mx. Sh.
 La Pallice to Plymouth: visibility nil.

TABLE III

Liverpool to Bermuda, September, 1939. Observer K. S. R.

- 4.ix.39—Round Liverpool: Many L. B. B. G.; many H. G.
 5.ix.39—Noon position 52° 30' N., 05° 30' W.: Many L. B. B. G.; many H. G.
 6.ix.39—Milford Haven: Many L. B. B. G.; many H. G.; 1 Mx. Sh.
 7.ix.39—Milford Haven: Many L. B. B. G.; many H. G.
 8.ix.39—Noon position ca. 51° N., 06° W.: Many L. B. B. G.; many H. G.; 5 Ga.;
 6 Auks. sp.?
 9.ix.39—Noon position ca. 48° N., 10° W.: no birds.
 10.ix.39—Noon position ca. 46° N., 15° W.: no birds.
 11.ix.39—Noon position ca. 43° N., 22° W.: 2 Pet.; 4 At. Sh.
 12.ix.39—Noon position ca. 41° N., 28° W. (2 hr. 20 mt.): 1 Pet.; 26 At. Sh.
 13.ix.39—Noon position ca. 38° N., 34° W. (0 hr. 55 mt.): 6 At. Sh.
 14.ix.39—Noon position ca. 37° N., 39° W. (1 hr. 50 mt.): no birds.
 15.ix.39—Noon position ca. 36° N., 45° W. (0 hr. 45 mt.): no birds.
 16.ix.39—Noon position ca. 34° N., 52° W.: no birds.
 17.ix.39—Noon position ca. 33° N., 50° W.: 1 T. B.
 18.ix.39—Bermuda: no birds.

TABLE IV

Liverpool to Bermuda, December, 1939. Observer H. B. M.

- 19.xii.39—Round Liverpool (1 hr. 00 mt.): a few L. B. B. G.; 200 H. G.; 3 M. G.
 20.xii.39—Noon position 51° 00' N., 09° 57' W. (2 hr. 15 mt.): 2 G. B. B. G.;
 2 L. B. B. G.; ca. 150 H. G.; 4 G.
 21.xii.39—Noon position 50° 43' N., 16° 04' W. (2 hr. 10 mt.): 6 L. B. B. G.;
 20 Kit.; 1 Auk, sp.?
 22.xii.39—Noon position 50° 14' N., 22° 07' W. (2 hr. 20 mt.): 30+ Kit.; 1 Gt. Sk.,
 23.xiii.39—Noon position 48° 57' N., 28° 06' W. (1 hr. 05 mt.): ca. 35 Kit.
 24.xii.39—Noon position 46° 34' N., 33° 52' W. (1 hr. 15 mt.): 4 Kit.
 25.xii.39—Noon position 44° 13' N., 39° 42' W. (1 hr. 20 mt.): no birds.
 26.xii.39—Noon position 41° 30' N., 45° 53' W. (1 hr. 15 mt.): 80 + 20 Kit.
 27.xii.39—Noon position 38° 53' N., 51° 36' W. (0 hr. 30 mt.): 1 (+1 juv.) H. G.;
 30 Kit.
 28.xii.39—Noon position 36° 07' N., 57° 32' W. (0 hr. 55 mt.): 4 (+2 juv.) H. G.
 29.xii.39—Noon position 32° 47' N., 62° 30' W. (1 hr. 35 mt.): 1 H. G.
 30.xii.39—Bermuda: no birds.

TABLE V

Monthly Summary of Observations at Sea Round Bermuda

- January—No observations.
 February—8 hr. 15 mt.: 3 gull sp.?
 March—No observations.
 April—No observations.
 May—78 hr. 41 mt.: 13 T. B.; 3 At. Sh.; 3 At. or Gt. Sh.; 4 Gt. Sh.; 2 A. Sh.;
 3 S. Sh.; 55 Wi. Pet.; 3 Fgt.; 4 gull sp.?; 3 sp.?
 June—6 hr. 30 mt.: 2 T. B.; 1 At. or Gt. Sh.
 July—25 hr. 10 mt.: 10 T. B.; 1 Pet.; 1 Phal?
 August—30 hr. 45 mt.: 31 T. B.
 September—56 hr. 43 mt.: 14 T. B.; 5 At. or Gt. Sh.; 6 Pet.
 October—18 hr. 25 mt.: 5 T. B.; 1 G. B. B. G.; 1 sp.?
 November—5 hr. 53 mt.: no birds.
 December—52 hr. 37 mt.: 4 T. B.; 1 G. B. B. G.; 1 gull sp.; 1 sp.?

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Biological Station
 Bermuda.

The Ornithological Year 1939 in the New York City Region

By ROBERT W. STORER

The summarizing of the large quantity of material turned in to the Recording Secretary was much facilitated by the previous year's Secretary, Mr. Eynon, whose new style of Ornithological Year has been used as a pattern by the writer. The large amount of data and the many observers reporting have made it difficult to evaluate some of the records, especially those of observers not known personally by the writer; but in spite of this, it is hoped that a minimum of errors has entered this summary. A total of about 317 forms was reported for the region during 1939. Of these, there are four forms for the occurrence of which no actual proof in the form of specimens has been obtained in this region. These birds are the White Gyr Falcon, the Lesser Black-backed Gull, the Brown-headed Nuthatch, and the Green-tailed Towhee; and must therefore, according to established precedent, be relegated to the hypothetical list. Since the popular names of all birds mentioned in this paper are those used in the A. O. U.'s *Check-List*, scientific names have been omitted to save space and increase readability.

While *January* had its share of cold weather and snow, this weather was alternated with periods of higher temperatures which melted the snow and prevented any protracted cold spells from producing unfavorable conditions for the winter birdlife in the region. Cowbirds wintered in numbers near Mastic, while Robins were absent through the winter on Long Island, coming in at the end of the month and early in February (J. T. Nichols). Unusual wintering records were those of a Baltimore Oriole at Flushing (Astle) and a White-crowned Sparrow at Sea Girt, New Jersey, on the 15th (Rogers, Storer). Waterfowl were present in good numbers with many of the rarer species such as European Widgeon, European Teal, Gadwall, Shoveller, and King Eider having been recorded several times and Barrow's Golden-eye, Harlequin Duck, and Hooded Merganser once each. Black-bellied Plover, Red-backed Sandpiper, and Sanderling were present during the month at Beach Haven (Eynon); American Bittern was reported in two places on Long Island; and a Virginia Rail was found at the Flushing Airport on the 28th (Fischer). The most outstanding records of the month were those of one Black and one White Gyr Falcon both seen on the 8th within one-half a mile of each other. The former was found by Mr. Cruickshank at Short

Beach, L. I.; and the second by Mr. and Mrs. Pough flying over the Freeport Causeway. A Razor-billed Auk picked up oiled at Island Beach, N. J. (Rogers, Storer) on the 15th was the first of a series of Alcids records lasting as late as April 15th.

In spite of an average daily excess of 6.1° above the normal, birds were not numerous in the region in *February*; and the first waves of transients were not noted until the 19th and 24th of the month. Sharp-tailed and Seaside Sparrows and Clapper Rails wintered in the salt marshes in the region; and several Pied-billed Grebes were found on Long Island. Barrow's Golden-eye was reported at Leonardo, N. J. (Brown, Edwards, Wolfarth); at St. James Harbor, Smithtown (Ralston); and at Stillwater on the upper reaches of the Hudson River (H. D. V. Allen). Wintering owls were scarce with Snowy Owl recorded at only two localities (Oak Island on the 5th, Sedwitz; and Old Mill from the 3rd to the 19th, Imhof). Prairie Horned Larks continued to increase on Long Island, the first singing bird being reported on the 6th at Canarsie (Norse, Cantor). A flight of Redpolls was noted from the 11th (1 at Beechurst, D. and W. Reid) until April 21st (2 at Heckscher, Mrs. Cruickshank) and was highlighted by the discovery of a bird described as a Hoary Redpoll, seen with 32 of the common species at Scarsdale on March 14th (Lichten, Rosenheim). Another rarity was a Kumlien's Gull observed from the ferry opposite Jersey City on the 10th (Cant).

March had its share of raw, cold weather but the average temperature was slightly above normal and the more than average precipitation, combined with the February excess, filled streams and ponds and got plant growth off to an early start. This month saw the start of a particularly heavy Purple Finch flight especially on eastern Long Island, but occurring throughout the region and leaving stragglers to be reported as late as May 14th (Queens, Queens County Bird Club; and the N. J. Pine Barrens, Urner Ornithological Club). The first hawk flight of the season was recorded at Montclair, N. J., on the 9th (60 birds including an Osprey, Wolfarth). A wave of land birds was reported at Prospect Park on the 24th (Jacobson) followed by records of American Bittern (Troy Meadows and Smithtown on the 25th); Long-billed Marsh Wren (Troy Meadows on the 25th, Norse and Cantor); and Chipping Sparrow (Kissena Park on the 26th, Bernhardt). Mayer reported an early Migrant Shrike at Idlewild on the 22nd while a marked flight of both species of loons was observed on the 30th and 31st (Helmuth) and 40 Red-throated Loons, probably part of the same flight, were seen at Jones Beach on April 1st.

More rain than usual was coupled with cool weather during *April*; but after a cold snap on the 9th, good numbers of early transients were reported almost daily to the end of the month. Two concentrations of Holboell's Grebes were found in the region, 64 at Point Lookout, L. I., on the 11th and 21 at Long Beach on the 22nd. A Yellow-crowned Night Heron showed up at the Massapequa Black-crowned Night Heron colony on the 8th, followed by Little Blue Heron on the 9th and Snowy Egret on the 20th (Cruickshank). An early American Egret was seen at Idlewild on the 16th (Mayer) and an early Least Bittern at Van Courtlandt Park on the 23rd (Norse). A flock of 1,600 Brant at Freeport on the 9th (Sedwitz *et al.*) was an encouraging sign after the scarcity of this species during the winter. Scaups and Scoters were seen in a large flock 7-8 miles long off Jones Beach on the 9th (Sedwitz *et al.*), and a great flight of the latter was observed on the 16th going past Montauk by the same observer. The largest observed hawk flight of the season at Montclair occurred on the 3rd when 145 birds of nine species passed the quarry (Wolfarth *et al.*). A flight of Red-tailed and Rough-legged Hawks was also recorded on the 15th at Montauk (Helmuth). Early records include Rough-winged Swallow at Van Courtlandt Park on the 11th (Norse) and Golden-winged Warbler in Bronx Park on the 30th (Komorowski *et al.*). Several rarities were found during the month, including an Orange-crowned Warbler at Newark on the 30th (Lang); a Western Palm Warbler on the 15th in Central Park (Mr. and Mrs. L. N. Nichols); Summer Tanagers at Bronx Park on the 22nd and 23rd (numerous observers) and in Prospect Park on the 25th (Breslau); a Lark Sparrow in full song at Riverdale on the 11th (Griscom); and 2 Brown-headed Nuthatches on the 22nd between Toms River and Lakewood, N. J. (L. L. Walsh).

The month of *May* brought more than its share of warm, dry weather, threatening drought conditions. The paucity of rain and fog was responsible for unusually few waves of transients, the only pronounced ones coming on the 14th, 18th, and 25th with smaller ones on the 5th, 6th, 7th, 10th, 11th, 19th, and 28th. Small birds, especially flycatchers, seemed scarce, probably due to this lack of marked waves, but large flocks of shore birds were noted several times. The following maxima were reported for Idlewild: Dowitcher, 8,000 on the 12th, Semipalmated Plover, 6,000 on the 17th; Black-bellied Plover, 1,200 on the 17th; Least Sandpiper, 5,000 on the 19th; and Semipalmated Sandpiper, 4,000 on the 25th (Mayer). A notable flight of 3,000 Red Phalaropes were recorded by Helmuth at Easthampton on the 16th, and a large list of other rare shore birds was reported. This included

Golden Plover at Idlewild from the 5th to the 13th (Mayer), 9 Purple Sandpipers at Atlantic Beach on the 7th (Mayer), Baird's Sandpiper on the 16th, 17th, and 25th at Idlewild (Mayer), Curlew Sandpiper from the 28th to 30th at Jones Beach (Bull, Sedwitz *et al.*), and Hudsonian Goodwit present at Idlewild from the 13th to 17th (Mayer). Wilson's Petrel and Sooty Shearwater were both seen on the 28th, the former at Atlantic Beach (Mayer) and the latter at Jones Beach (Sedwitz *et al.*). Hybrid *Vermivora*e were unusually common, 3 Brewster's Warblers and one Lawrence's Warbler having been seen at Waterloo, N. J., on the 14th (Urner Ornithological Club), and a total of 8 Lawrence's Warblers was recorded between May 7th and September 6th. Two records of Connecticut Warblers were turned in, one bird in song on the 13th at St. James, L. I. (Jas. W. Lane), and three birds on the 6th at Makania Swamp, N. J. (Hunn). It should be noted that only one spring specimen of this last species has ever been collected in this region. Orange-crowned Warbler and Summer Tanager were again recorded, the first at Woodmere on the 14th by Sedwitz *et al.*, and the second in Central Park on the 9th by Mathews. Other rarities included a Philadelphia Vireo at New Rochelle on the 24th (Bull); a Glossy Ibis at Troy Meadows on the 21st (Brown, Edwards); and a Purple Gallinule at Peekskill on the 31st (Breslau).

The first half of *June* continued warm and dry, but plenty of rain in the latter part made up for the earlier deficiency. This weather had little adverse effect on the breeding birds, and several non-breeding water birds appeared to summer in the region. These included all three Scoters, Gannet, Double-crested Cormorant, Parasitic Jaeger, and Great Black-backed Gull; while an apparently non-breeding Knot and three Red-backed Sandpipers were seen at Jones Beach on the 29th by Bull and Young. An Oyster-catcher appeared for the third consecutive year at Moriches Inlet on the 10th (Wilcox); and Herring Gull, Turkey Vulture, Black Rail, Black Skimmer, Prairie Horned Lark, and Carolina Wren seemed to be on the increase as breeding birds. Kentucky Warblers were recorded as having bred in five localities in the region, and Hooded Warbler was added to the list of breeding birds of Litchfield County, Conn. Mrs. Beals reported a Blackburnian Warbler on the 8th at her banding station at Elmhurst, L. I.

July was very dry with precipitation only 10% of the normal for the period. This also appeared to have little effect on the breeding birds, but transients were uncommon except along the coast where the shorebird flight was about normal. Stilt Sandpipers appeared in somewhat larger numbers than usual, a maximum of 30 having been

seen at Jones Beach. Also out of the ordinary were reports of 2 Baird's Sandpipers at Jones Beach on the 16th (Sedwitz *et al.*), and a Curlew Sandpiper in winter plumage on the 16th at Oak Island Beach (Mayer and Rose). The increasing number of records of this last species in recent years may be due to an increase in the number of competent observers in the region or possibly to a westward extension of the breeding range of the species. If this last hypothesis is correct, it would seem odd that all or almost all of these birds do not migrate along their ancestral route along the European coast, like the Greenland Wheatear.

Unusual summering birds were Greater Scaup on Pelham Bay on the 16th (Bull and Preston) and a European Cormorant seen twice on eastern Long Island in early July (Helmuth and McKeever). The invasion of white herons was smaller than usual, the only sizable gathering having been at Titicus Reservoir where 1 Snowy Egret, 4 American Egrets, and 22 Little Blue Herons were present (C. Pangburn). Carleton and Jacobson reported a pair of Saw-whet Owls, possibly breeding, at Glen Spey, N. Y., on the 22nd. This is especially interesting to the writer who has for several years held the opinion that it will be only a matter of time before some keen observer rediscovers this species as a breeding bird in this region.

The first half of *August* continued warm and dry, but the drought was broken by heavy rains on the 19th; and the total precipitation for the month ended up about normal, while the mean temperature remained up (3.7° above average). The shore bird flight continued about normal, and several rarities were reported. These included a Wilson's Phalarope at Newark Bay on the 12th (Eynon); a Red Phalarope at Atlantic Beach on the 20th (Mayer); and a Northern Phalarope at Manorville, L. I., on the 22nd (Raynor). Western Sandpipers appeared in the middle of July and reached a maximum of 165 at Idlewild on August 16th (Mayer). There was a scattering of records of Marbled Godwit over the region. Little movement of land birds was noticed until the 26th and 27th when the first big wave occurred. Carleton reported that the migration in Central Park was later than usual. Other observers found that elsewhere the birds were more or less on schedule. Early arrivals were a Canada Warbler on the 1st at Elmhurst (Mrs. Beals) and a Wilson's Warbler on the 8th at New Rochelle (Bull). The beginning of a rather heavy flight of Forster's Terns occurred on the 11th when 2 birds were seen at Moriches Inlet (Raynor). Roseate Terns also appeared to have increased in the region. Bull and Young reported a flock of 70 at Montauk on the 28th.

The weather during *September* was dry but otherwise about normal. Waves of land birds were noted on the 1st, 6th and 7th, 12th and 13th, 18th, and 21st and 22nd. The last brought a Philadelphia Vireo to New Rochelle (Bull). A Lark Sparrow was seen at Oak Island on the 3rd, (Fischer *et al.*), and on the 8th, a Dickcissel appeared in Central Park where it was seen over a period of a week by numerous observers. On the 9th at Moriches Inlet, Cruickshank and Cadbury found ten Black Rails and topped off the day with a Ruff at the same place. A Buff-breasted Sandpiper was seen at Sagaponack on the 24th and October 1st by several observers, and a Wilson's Phalarope showed up at Idlewild on the 9th (Mayer). Four Caspian Terns were seen at Sagaponack and another at Mecox Bay, all on the 24th (several observers); and a report of 200 Black Skimmers at Moriches Inlet was particularly gratifying to everyone who had been watching with interest the increase of this species on Long Island. The outstanding record was that of a Bell's Vireo seen for over a week in a back yard at Easthampton by Helmuth who had the good fortune to hear it sing and also to compare it with a White-eyed Vireo which was present at the same time.

An early killing frost on *October* 18th was followed by generally warm weather with strong northwest winds on the 22nd and 29th when large flights of land birds were seen. Earlier flights occurred on the 2nd when 19 species of warblers were recorded in Central Park (Carleton), and on the 7th and 8th when large numbers of Song, Swamp, and White-throated Sparrows and Juncos were observed (Fischer). White-crowned Sparrows were unusually abundant throughout the region for the greater part of the month. Rare shore birds continued to turn up. A Curlew Sandpiper was found at Mecox Bay on the 1st (Helmuth, Sedwitz); an Avocet was seen at Hunter's Island, The Bronx, on the 7th and 8th by several observers; and a Purple Sandpiper appeared at Moriches Beach on the 26th (J. T. Nichols). Blue-winged Teals, unusually numerous this fall, were found in a large flight on the 8th on Long Island with a flock of 115 at Sagaponack (Helmuth, Cruickshank, Sedwitz). The warm weather after the frost on the 18th was possibly the reason for the lingering of a Green Heron until the 26th (Mastic, J. T. Nichols) and a Yellow-crowned Night Heron until the 21st (Idlewild, Norse, Cantor). A flight of Saw-whet Owls appeared on the 24th and remained in somewhat larger numbers than usual through the rest of the year. The most notable records were a Black Gyrfalcon seen on the 8th by Sedwitz at Montauk, and a Lesser Black-backed Gull carefully noted on the 30th at Jones Beach by Elliott who checked the identification with study skins.

Generally mild weather continued throughout *November*, and consequently several birds were recorded later than usual. Scarlet Tanager stayed until the 2nd (South Salem, N. Y., Wheeler); Arkansas Kingbird until the 6th (Montauk, Church); Nashville Warbler until the 18th (Idlewild, Norse, Cantor); and Laughing Gull until the 28th (Pelham Bay Park, L. N. Nichols). The northern finches which invaded central New England failed to reach the New York City Region, with the exception of 5 Evening Grosbeaks on the 12th (Wheeler) and a Pine Grosbeak on the 20th at Pound Ridge Reservation, N. Y. (Wheeler). Waterfowl, however, continued to come in in good numbers with several rarities including a Whistling Swan at Jones Beach from the 19th of this month to December 24th; a Blue Goose at Boonton Reservoir on the 26th (Cadbury, Hiatt); and one American and one King Eider at Rockaway on the 26th (R. T. Peterson). Most unusual was a Black Guillemot at Boonton Reservoir on the 26th (Cadbury, Hiatt).

The abnormally mild weather of *November* continued through the first three weeks of *December*, and consequently many birds remained longer than usual. A good increase of ducks might be explained in part by this warm weather. This year's coöperative census of waterfowl on Long Island between the 9th and 13th of the month showed 190,000 birds of 34 species as against 115,000 birds of 31 species for 1938. Great increases were found in both some of the commoner species (Mallard, Black Duck, Baldpate, Canvas-back, Golden-eye, and Old-squaw); and some of the rarer forms (Shoveller, Redhead, and Hooded Merganser). Brant were alarmingly scarce while Ruddy Ducks and Coot were both down in numbers. Fifteen Baldpates, 4 Pintails, and 30 American Mergansers stayed at Mastic until the 24th (J. T. Nichols), and an exceptionally late Snowy Egret stayed at Jones Beach until the 3rd (Skopec, Sabin). Shorebirds also lingered abnormally late. On the 3rd, Pectoral Sandpiper was reported at Idlewild, Greater Yellow-legs at Hempstead, and 475 Red-backed Sandpipers at Oak Beach (Bull, Darrow, Elliott); while 6 Black-bellied Plovers and 26 Knots remained at Jones Beach until the 24th (Elliott). The mild weather also was a factor in making some of the largest Christmas Censuses ever made in the region. The Barnegat group, high with 110 forms, was closely followed by western Long Island with 108, the most out of the way bird having been a singing Baltimore Oriole reported by W. and D. Reid on the latter census. C. H. Rogers noted a scarcity of small buntings in the Princeton area while Meadowlarks were numerous. Meadowlarks, Horned Larks, Lapland Longspurs and Snow Buntings were found by others to be

up in numbers. Norse and Cantor discovered a Green-tailed Towhee at Overpeck Creek, N. J., on the 23rd. The bird remained on through January and leaves one with no logical explanation for its appearance.

The task of writing a summary of this nature would have been an impossibility without the coöperation of the many people who were kind enough to send in their notes. It may appear that only a few of these notes were used because of the necessarily few actual records cited; but those not quoted directly were most valuable in forming the general statement. So it is to all observers whose data have made the Ornithological Year that the Recording Secretary is deeply indebted. He also wishes to thank Mr. J. J. Hickey for much advice in the preparation of this paper and Mr. D. G. Nichols for many helpful suggestions.

Berkeley, Calif.

Notes on Bermuda Birds

By HILARY B. MOORE, Ph.D.

This paper is not intended as in any way a full list of Bermuda birds, but rather as a supplement to that of Bradlee, Mowbray and Eaton (1931) and Beebe's notes (1937). It gives additional data on various species, further records of some rare species, and one new record. The observations were made, mainly, in the neighbourhood of the Biological Station and on Longbird Island, between 1937 and 1941. Some records from other parts of the islands are included, as well as some from the Royal Society's research ketch "Culver" which worked within a radius of about thirty miles of Bermuda, but the latter have been treated in more detail in a separate paper (Moore, 1941). No records of the smaller sandpipers have been included, since I did not feel sufficiently familiar with these to identify them with certainty in winter plumage. It might however be mentioned that sandpipers were present in unusual numbers in the autumn of 1940.

Pied-billed Grebe, *Podilymbus podiceps podiceps* (Linn.).—Five to nine were seen regularly throughout the winter (October to January) on Mangrove Lake, and one to four on Trott's Pond (January).

Kittiwake, *Rissa tridactyla tridactyla* (Linn.).—One young bird was seen on Harrington Sound in April, 1938.

Great Black-backed Gull, *Larus marinus* (Linn.).—In four winters I have seen five (three immature) near the land, and two within thirty miles of the islands. None were seen from March to September. Apparently increasing.

Herring Gull, *Larus argentatus* Pont.—These records probably refer to the American sub-species *L. a. smithsonianus*, but I cannot be certain of this. I have seen them regularly in small numbers (maximum 33) each winter from January to March. Apparently increasing.

Common Tern, *Sterna hirundo hirundo* (Linn.).—Bradlee, Mowbray and Eaton (*loc. cit.*) say . . . "Formerly abundant summer resident, now a regular visitor in small but increasing numbers." In August, 1940 I saw several pairs, one pair accompanied by a young bird. The latter group flew regularly round a small island, and cried loudly whenever I approached it. I could find no trace of a nest, but the island was covered with their droppings, and I think it is very likely that they had nested and reared the young bird there. Since this bird has already once been exterminated from the islands, it is unwise to specify the exact locality.

Least Tern, *Sterna antillarum antillarum* (Less.).—Seen in small numbers near their known nesting site. No increase evident.

Greater Shearwater, *Puffinus gravis* (O'Reilly).—Probably passes near the islands regularly in the spring and autumn. I have seen several in May, and several of either this or the next species in June and September (see Moore, 1941).

North Atlantic Shearwater, *Puffinus kuhlii* (Boie).—This species also probably passes regularly near the islands in the spring. I have definitely identified several in May, and seen others, either of this or the last species, in June and September (*loc. cit.*). It has not previously been recorded from Bermuda.

Audubon's Shearwater, *Puffinus lherminieri lherminieri* Less.—Two were seen in May, two in July and one in September, all off castle Roads, which is near a known nesting site. The identification is not certain, since they might have been *P. puffinus*, although there are only two certain records of the latter species from Bermuda. This formerly abundant resident is presumably still rare on the islands.

Sooty Shearwater, *Puffinus griseus* (Gmel.).—This species might be expected round the islands in small numbers throughout the summer. I have seen it several times close to Bermuda in April, May and October. Identification is certain, since one was caught on the "Culver" on October 20, 1938.

Wilson's Petrel, *Oceanites oceanicus* (Kuhl).—These were seen in fair numbers round the islands in May, and definitely identified (Moore, *loc. cit.*). Smaller numbers of storm petrels were seen in July and September also, but not specifically identified.

Yellow-billed Tropic-bird, *Phaeton lepturus catesbyi* Brandt.—I have seen these birds regularly up to thirty miles from Bermuda, but have very rarely seen them settled on the water (at sea) or diving. They are too well known to need further comment except for the following dates of early and late records: 1938, last seen December 12; 1939, first seen February 28; 1940, first seen March 4, last October 8; 1941, first seen February 26.

Double-crested Cormorant, *Phalacrocorax auritus auritus* (Less.).—I have seen these regularly in small numbers (maximum 7) each winter, usually in Castle Harbour, but occasionally in Ferry Reach and St. George's Harbour. I have twice seen birds in immature plumage. Records extend from October 19 to April 7. Increasing.

Man-o'-war-bird, *Fregata magnificens* Mathews.—These were seen twice near Bermuda in May, 1939, and once in May, 1940. Little change in status.

Red-breasted Merganser, *Mergus serrator* Linn.—A group of five or six ducks wintered in Ferry Reach in 1937-38 and 1938-39, and in February, 1939, they were joined by a drake. A group of five birds is recorded in the same locality in the winters of 1929-30 and 1930-31 by Bradlee, Mowbray and Eaton. One duck was seen on Mangrove Lake in the winter of 1940-41. A small but perceptible increase in numbers.

Hooded Merganser, *Lophodytes cucullatus* (Linn.).—One duck was seen with the Red-breasted Mergansers on Ferry Reach from December, 1937 to February, 1938. Little change.

Mallard, *Anas platyrhynchos platyrhynchos* Linn.—Three ducks were seen in the small pond northwest of Trott's Pond in December, 1940.

Shoveller, *Spatula clypeata* (Linn.).—A drake was seen on Mangrove Lake in December, 1940, and January, 1941. There is only one previous record for Bermuda.

Lesser Scaup Duck, *Nyroca affinis* (Eyt.).—Two ducks were seen on Mangrove Lake in January, 1938, and one drake in January, 1941. A duck and drake were seen on Trott's Pond in December, 1940, and January, 1941. Excellent views were obtained, so there was no doubt as to the species.

Ibis, sp.?—In October, 1940 a small flock of birds was seen round St. George's. They were described to me by two different observers as being all white birds, like small herons, but with bills curved downwards. One of the flock was brown. There can be little doubt that these were five adult and one immature ibis, and the descriptions suggest the White Ibis, *Guara alba* Linn., although this species has not previously been recorded from Bermuda.

Great Blue Heron, *Ardea herodias herodias* Linn.—There are usually one to four of these herons fishing in Ferry Reach, and I have seen them there in all months of the year, so they can certainly be considered as permanent residents. I have never seen either nests or very young birds. Those which I have watched fishing were feeding mainly on crabs. Not definitely known to have bred here since 1846.

American Egret, *Casmerodius albus egretta* (Gmel.).—One was seen on Longbird Island in January, 1939, and one in Ferry Reach in April, 1940. The species has not apparently increased here during the past decade.

Snowy Egret, *Egretta thula thula* (Molina).—One was seen at St. George's in March, 1940.

Little Blue Heron, *Florida caerula* (Linn.).—One or two are usually present in Ferry Reach throughout the winter. I have seen them there in all months from November to March, and had reports of them also in August and September. The juvenile white phase is less common than the mature blue. One, which was watched through the winter, had only one or two dark feathers on its back in December, but had nearly as many dark as light feathers by the following March.

Little Green Heron, *Butorides virescens virescens* (Linn.).—Single birds were seen at Tom Moore's in June, and at the small pond northwest of Trott's Pond in December.

Yellow-crowned Night Heron, *Nyctanassa violacea violacea* (Linn.).—These birds are present throughout the year round Longbird Island, and, from the way that pairs of adults are seen with young birds in the autumn, I think it is quite likely that they breed there. One such party of two adults and a young bird was seen repeatedly in October, 1940. They are usually present in small numbers, but I once saw six together, and once eleven. Formerly regarded only as a migrant.

Florida Gallinule, *Gallinula chloropus cachinnans* Bangs.—Seen regularly on Mangrove Lake and the small pond northwest of Trott's Pond.

American Coot, *Fulica americana americana* Gmel.—Seen regularly in winter on the small pond northwest of Trott's Pond.

Hudsonian Goodwit, *Limosa haemastica* (Linn.).—One was seen on Mid-Ocean golf course on August 24, 1940.

Greater Yellow-legs, *Totanus melanoleucus* (Gmel.).—Seen at Longbird

Island, Mid-Ocean golf course and Spittal Pond. Up to twelve at once in August and September, and regularly in ones and twos from then to March. Some birds almost certainly winter here.

Lesser Yellow-legs, *Totanus flavipes* (Gmel.).—One was seen on the small pond, northwest of Trott's Pond in March, and one caught on Castle Island on August 21. The latter was exhausted and had probably just arrived on migration.

Hudsonian Curlew, *Numenius hudsonicus* Lath.—Two or three regularly spend the winter on Longbird Island, and two definitely spent the summer of 1938 there. I have also seen two at Lover's Lake, St. George's in March, and one at Spittal Pond in July.

Black-bellied Plover, *Squatarola squatarola cynosurae* Thayer and Bangs.—Regularly present on all suitable beaches in the winter. A few probably spend the summer here, as I have seen them in all months except July. The following counts of the population of the shore of Longbird Island (averages, 1937-41) show clearly the seasons of arrival and departure:

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average No.	18	20	17	8	2	1	0	2	1	1	8	17
No. of observations	7	8	3	3	2	2	1	2	1	1	2	6

Mr. T. C. Desmond (personal communication) reported birds in summer plumage at Spittal Pond on August 21 and November 1, but I have never seen any.

Killdeer, *Oryzechus vociferus vociferus* (Linn.).—Six were seen on Longbird Island in November, twenty-two on Cooper's Island in December, and one or two near Ferry Bridge in November and February.

Ruddy Turnstone, *Arenaria interpres morinella* (Linn.).—Common on all suitable beaches throughout the winter, and a few remain all summer and assume summer plumage. The following counts of the population of the Longbird Island beaches (averages, 1937-41) show the main seasons of arrival and departure:

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average No.	21	27	37	29	8	13	1	4	6	7	12	27
No. of observations	7	7	5	3	3	1	2	2	2	1	3	8

The following counts show the proportion of birds in summer plumage: April 2, none out of 40; April 11, 4 out of 19; April 29, all of 29; May 13, all of 13; May 27, all of 4; June 26, all of 13; July 24, 1 of 4.

Bob-white, *Colinus virginianus virginianus* (Linn.).—Though common in other parts of the islands, I have never heard this bird on St. George's Island.

Domestic Pigeon, *Columba livia* Gmel.—Many of these birds have gone wild, and I saw several nests, one with eggs, in the cliffs on Harrington Sound in August, 1940.

Bermuda Ground Dove, *Columbigallina passerina bermudiana* (Bangs and Bradlee).—Common. I have noted birds sitting on eggs on April 17, and newly hatched chicks on April 16 and 25.

American Osprey, *Pandion haliaetus carolinensis* (Gmel.).—One was seen near Gurnet Rock in the winter of 1937-38, one stayed round Ferry Reach and Castle Harbour from January to March, 1939, and one was seen there in April, 1940.

Barn Owl, *Tyto alba pratincola* (Bonap.).—One was seen near Ely's Harbour in August, one on St. David's in June, one at the Biological Station in March

and August, and one heard several times near Harrington Sound in October and November. These birds are probably resident in small numbers.

Belted Kingfisher, *Megaceryle alcyon alcyon* (Linn.).—Widely distributed in ones and twos during the winter. Seen regularly in Ferry Reach from November to April.

Crow, *Corvus brachyrhynchos* Brehm.—A small flock of about nine has been seen regularly round the east end of the islands.

European Starling, *Sturnus vulgaris* Linn.—On two occasions, one in the winter of 1937-38, and one in the winter of 1940-41, small flocks of birds, which looked like Starlings, have been seen near the Biological Station. In February, 1941, at the same place, two or three Starlings were seen several times and positively identified. There are only two previous records for Bermuda.

House Sparrow, *Passer domesticus* (Linn.).—Still very abundant. Eggs have been found from mid-March on.

European Goldfinch, *Carduelis carduelis* (Linn.).—Fairly common.

Cardinal, *Richmondia cardinalis cardinalis* (Linn.).—Common. The first dates on which its summer song was heard were: January 7, 1938; February 2, 1939; February 1, 1941. They may, however, commence singing as much as a week earlier in other parts of the islands.

Rose-breasted Grosbeak, *Hedymeles ludovicianus* (Linn.).—One was reported near the Biological Station in April, 1939.

Barn Swallow, *Hirundo rustica erythrogaster* Bodd.—Two were seen near Ely's Harbour in August, 1938. Other swallows seen have not been specifically identified.

Bermuda White-eyed Vireo, *Vireo griseus bermudianus* Bangs and Bradlee.—Common. I have seen a young bird flying with its parents as early as April 25.

Black and White Warbler, *Mniotilta varia* (Linn.).—One was seen near the Biological Station in October, 1940.

Nashville Warbler, *Vermivora ruficapilla ruficapilla* (Wils.).—One flew aboard the "Culver" close to Bermuda in September, 1938, and one was seen on Longbird Island the same autumn. There is only one previous record.

Myrtle Warbler, *Deudroica coronata* (Linn.).—A large flock invaded the grounds of the Biological Station about October 28, 1940, although none were seen more than half a mile away. For a time they were nearly as common as vireos, and they remained abundant up to about November 20. The last was seen on January 1, 1941.

Oven-bird, *Sciuurus aurocapillus* (Linn.).—One flew on board the "Culver" close to Bermuda on May 12, 1939. There are no recent records of this species.

Redstart, *Setophaga ruticilla* (Linn.).—A hen bird flew on board the "Culver" close to Bermuda on May 12, 1939. This is the second record for Bermuda.

Catbird, *Dumetella carolinensis* (Linn.).—Common. Nests with eggs in May. First summer song—as distinct from squawk—on February 10, 1940.

Bluebird, *Sialia sialis sialis* (Linn.).—Common. The first summer song was heard on February 26, 1941. A nest with young was seen on April 4, 1938, and another had two eggs on April 16, four on April 24, two chicks and two eggs on May 5, and three chicks and one egg on May 10.

SUMMARY

Notes are given on 56 species of birds seen at or near Bermuda between 1937 and 1941. Of these, one, the North Atlantic Shearwater,

has not previously been reported, two are second records, and one is a third record.

Despite the fact that previous records of Bermuda birds were of a sporadic nature, present observations nevertheless indicate certain population trends which reflect similar trends on the North American mainland. Birds like the Red-breasted Merganser, Herring Gull, Great Black-backed Gull, and Starling are now increasing, but the latter is not yet known to be a resident species.

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Biological Station

St. George's, Bermuda.

Red-wing Observations of 1940

By ERNST MAYR

The extensive monograph of the Red-winged Black-bird (*Agelaius phoeniceus*) by Arthur A. Allen (1914) was written in "preterritorial" days, and it seemed worthwhile to study this interesting species again in the light of our increased knowledge of bird behavior. Unfortunately, I had to interrupt the work repeatedly and was, therefore, prevented from obtaining a continuous story. Even so, some of the observations seem to be valuable enough to justify publication. All observations were made early in the morning, late in the evening or on Sundays and holidays.

AREA OF OBSERVATION.—Most observations were made in two swamps in northern Bergen County, New Jersey, along the county road that leads from Englewood to Nyack, parallel to the Hudson River, but on the bottom of the western slope of the Palisades. "Morgan Swamp" is an almost pure cattail swamp with a few elderberry and poison sumac bushes. There were no Rallidae in it, but one Black Duck's nest was found and Swamp Sparrows were common. The swamp is about 120 x 80 yards and surrounded by bushes in drier terrain. "Henslow Swamp" (see map) hardly deserves the name swamp. It practically dries up during the summer, but consists of flooded brush-land during the spring with a few small cattail puddles. The two swamps lie in the same valley at the same altitude about $\frac{1}{2}$ mile apart. Occasional observations were made in a few additional swamps.

SEASON.—Field work was started early in February, but due to the particularly hard and long winter no blackbird migration was observed until March 20th. On March 22 a careful survey failed to reveal any birds in several of the smaller swamps, but there was a flock in some trees near the large Piermont marsh. No birds were in the marsh itself. March 24th was the coldest Easter on record in the New York Region, with a low of 13°F., a high of 31°F., and a mean of 23°F., which is 17° below normal for this date. Occupancy of the smaller swamps was initiated during the last days of March when the weather began to be warmer.

OCCUPATION OF TERRITORY.—On March 31, 1940, male Red-wings were beginning to occupy territories in most of the smaller swamps and were singing occasionally. No females were seen, but migrant flocks of blackbirds passed by continuously. In M. S. ("Morgan Swamp") two males had taken up stations, in H. S. ("Henslow Swamp") only one male (the East male). Male A in M. S. arrived at 9:08 A.M., sang about 7-10 songs per minute, but paused repeatedly for 1-2 minutes during which time he just called *check-check*. He left the swamp 9 minutes later to feed on the ground in the nearby woods. On April 6th (1:50 P.M.) and April 13th (forenoon) no Red-wings were visible in any of the visited smaller swamps, but some birds were seen in trees along the margin of Piermont marsh. On April 19th two males in M. S. were observed at 5:40 A.M. and had apparently spent the night in the swamp sitting in the lower branches of some elderberry bushes. Three displaying males were noted in H. S. On April 20th, there was pouring rain all day. Between 3:30-4:30 P.M. no birds were seen to display in H. S., but one was feeding on the ground between some bushes. No sign of any Red-wings in M. S., but a flock of about 30 males, 40 females was feeding on a last year's cornfield, east of the swamp. These were the first females seen this year, but none were observed in the swamps. After April 27th, male Red-wings were found in the swamps fairly regularly, but they still had periods right up to and including the egg-laying time when they left the swamps to feed in the uplands. It seems that at the beginning of the season more time was spent away from the swamp than at the swamp.

Observations were not completed in M. S., but there seemed to be 4-6 males stationed there at the height of the season, while only 2-3 males were observed there on April 27th and May 4th. Henslow Swamp was thoroughly covered during the second half of May and it was definitely established that only 3 males were established there. Their territories are illustrated in the sketch map.

TERRITORY.—The territorial situation in this species is usually rather complicated since the singing posts of the males tend to be situated at some distance from the location of nests. This was the situation found in Morgan Swamp. In Henslow Swamp the territory layout was more diagraphmatic, even though perhaps not as typical.

Henslow Swamp

This swamp was neatly and completely divided into three territories, belonging to the E(ast), N(orth) and S(outh) males. E was the first male to arrive; it was observed on March 31st in its future

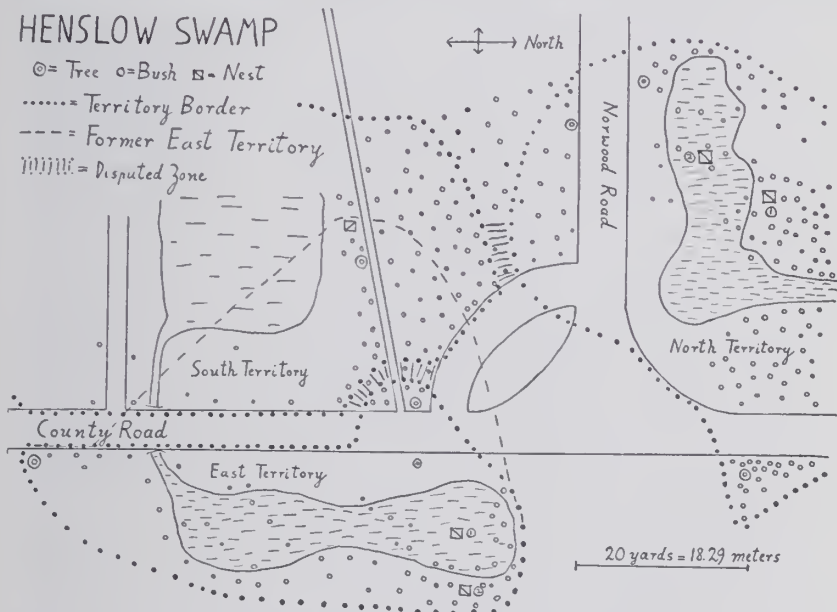


FIG. 1. The three territories in Henslow Swamp.

territory. No Red-wings were observed in H. S. on April 6th or April 13th, but three males displayed on April 19th. Of these three at least E and N were settled permanently. The third male observed on this date may or may not have been S; it stayed near the southern end of S territory and did not act as if permanently settled. No Red-wings were visible in H. S. on April 27th between 2:00 and 2:45 P.M.; they must have been feeding at a considerable distance from the swamp. May 4-11, both E and N males had definite territories which touched each other. There was some fighting with additional males, particularly in the south region, but there was no evidence until May 18th that the S male was definitely established and was defending a terri-

tory of his own. On that date the S male had definitely conquered the SW tree, as well as a broad belt of bushes around it, part of which had belonged to E and part to N. No further change of the territorial situation was observed during the 1940 season.

Morgan Swamp

This swamp is an open cattail marsh interspersed with not more than three or four low elderberry and poison sumac bushes. All the nests of the females were in this open part of the swamp, while most

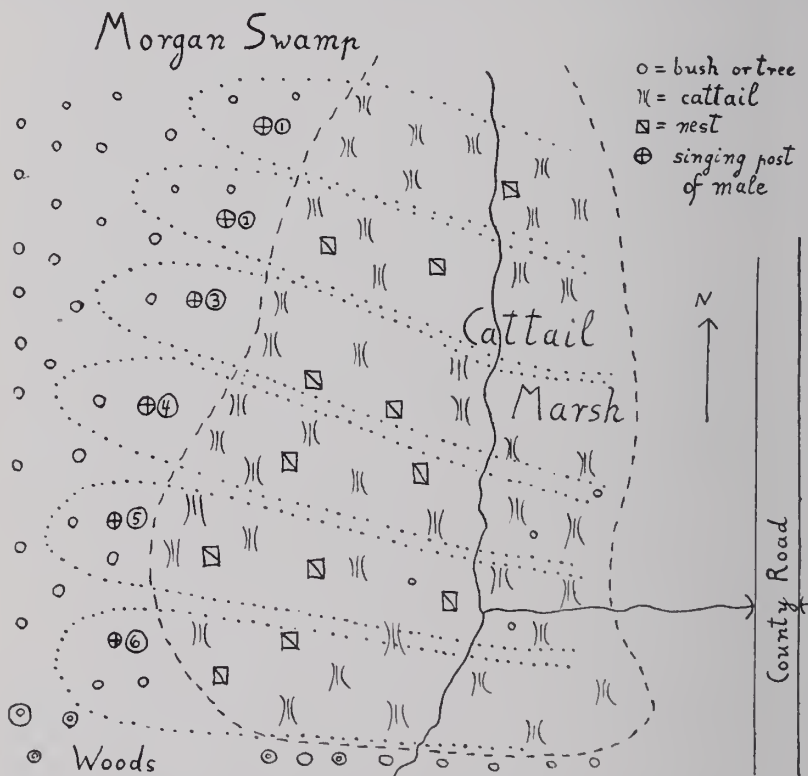


FIG. 2. The six territories in Morgan Swamp (diagrammatic).

of the singing posts of the males were outside this nesting area on older shrubs and maple trees. It was impossible in view of this complicated set-up to determine the size and number of the territories. Furthermore, since one or two (or more?) males were always absent or inactive, at any given time, it was not even possible to determine

the exact number of the males. Of these there were not less than four and not more than six. The way in which the territories seem to have been arranged is indicated diagrammatically in the attached sketch (Fig. 2).

TERRITORY DEFENSE.—The details of the staking out and defense of territory were observed only in Henslow Swamp. This is the locality to which all the following notes refer, except when some other locality is specifically mentioned.

Early in the season, when the weather was still cold and the males had just recently established themselves in their territories, they spent a good deal of their time sitting on the top of small bushes or old cattail stalks and calling softly *chuck-chuck*, particularly when migrating blackbirds flew overhead. They were rather fluffed up and only the yellow margin of their shield showed. As soon as a singing spell "overcame" one of the birds his whole attitude changed, and he displayed his red brilliantly—only to fall back into his former lethargic condition when the singing was ended. Due to the rather cold weather and the low density of the Red-wing populations, no pugnacity between males was observed until late in April. Two or three migrating males settled down in Henslow Swamp on April 19th at about 7:00 A.M., but they did not show any red, did not sing or display and were not molested by the three singing males which already held territory.

On April 27th at 1:30 P.M. a large flock (about 80-100 birds) of migrating Red-wings fed in an old cornfield about 300 yards from Morgan Swamp. Every five or six minutes the whole flock flew up to a big maple tree, and the males sang actively with the red well visible but without intolerance toward each other. At 1:48 P.M. male B of Morgan Swamp chased half-heartedly another male as it arrived from the feeding ground. Both descended eventually into the cattails (for feeding?) without singing or further commotion. This was the first sign of territorial pugnacity observed in 1940, although no consistent observations had been made between April 19th and April 27th, particularly in the all important morning hours.

May 7: Henslow Swamp.—East male still half asleep at 5:50 A.M. (Daylight Saving), sits quietly low in a bush and shows no red (only yellow) although on his territory. Is alarmed at my presence and flies to higher bush, incessantly calling *chuck*. This wakes up the North male who begins to sing. At 5:55 a strange male arrives in East territory and without showing his red wing patch he approaches East female which is feeding at bottom of bush. East male drives him away immediately amid much commotion but very little singing. The driving away consists of threatening postures (with showing of the red shoulder patches), but no actual combat takes place.

6:10—East male flies threateningly at another male which is attempting to enter its territory. The other male retreats immediately.

6:20—Several males enter East territory simultaneously; all birds fly around excitedly. Finally four males together with one female Cowbird settle down on the top of the westernmost tree in East territory. All birds sit there without much movement but chattering excitedly, showing no red. After about three minutes one male flies off; suddenly East male "wakes up," shows red, sings once and drives the other two males off.

May 11: Henslow Swamp.—Watching East male from 5:00 A.M. on; 5:41 East male gives his first song, while North male had started at 5:26. At 5:50 both males sing actively "against" each other from their favorite song perch, about six songs per minute. 5:53 East male is "patrolling" the border of his territory, shifting his singing perch repeatedly to stay opposite N male which comes close to the territory border. There is no fighting, only a song contest and N male does not enter E male's territory.

6:00—E male fighting intruding male; 6:03 E male chasing out two intruding males; 6:08 E male chases a female which trespasses his territory, but which leaves at once with another male. Most of the fighting takes place in the high elms and maples above the territories; 6:10 E male chases another male.

May 18: Henslow Swamp.—N male goes feeding after a song period, the red no longer shows while he is feeding; 6:18 A.M. E male chases other male out of his territory, both settle on the southwest elm (which is still part of E territory), the intruder slender with the red withdrawn, E male displaying actively; 6:20-6:30 one territorial fight follows the other so quickly that I can hardly follow what is going on. There are more males in the swamp than on earlier days. At 6:35 strange male enters E territory, is chased out without actual combat, but much calling: *chick-chick*. The same bird enters N territory and is chased out in actual combat. At 6:45 everything rather quiet now, no singing, no territorial fights. Nearly all the territorial activity seems to occur within the first fifty minutes after awakening.

May 25: Morgan Swamp.—Two males of adjoining territories leave simultaneously at 4:34 P.M. to feed on farmland several hundred yards away; return again at 4:39 P.M. and sing actively.

May 26: Henslow Swamp.—All three territories have now nests with eggs, and the males attack me as I enter the territories. N and E males stop their attacks as soon as I leave their territory, while S male joins with E in attacking me on E territory. He is not chased or bothered by E, the territory owner.

May 30: Demarest Swamp.—The only two males of this swamp protest against my intrusion from the same tree without molesting each other.

June 30: Henslow Swamp.—E territory abandoned (10:15 A.M.). N territory, nests empty, both male and female present, but disappear without a sound. No young seen.

These observations indicate that territorial disputes are frequent particularly during the early morning hours, that the territorial owner drives out intruders mostly by threatening rather than by actual combat, and that territorial defense relaxes in the course of the breeding season.

POLYGAMY.—Polygamy is well-known in this species [Allen, 1914; Roberts, 1932, etc.]. In H. S. males E and N had two females each,

male S had only one. In view of the rather secretive behavior of the females, I did not succeed in obtaining the exact dates of pair formation. In the general vicinities of the territories the first females were observed in a migrating flock on April 20th; this flock consisted of about thirty males and forty females. East male in H. S. was apparently mated on May 4th. No females were apparent in M. S. as late as May 7th during a fifteen minute observation period in early morning. An apparent sexual flight between E male and female (1) was observed on May 7th at 6:10 A.M. On May 11th H. S. was under observation from the first dawn. The E female (1) woke up and began calling at 5:40, its mate (E male) began singing one minute later. Only one female seemed to be in E territory, but two females were clearly seen in N territory.

May 18.—Two females were now resident in E territory. It is probable that pair formation between E male and the second female took place between May 11th and May 18th. E male was mated with only one female probably for at least one week. S male in H. S. swamp was mated with only one female. The two mates of E and N were studied for considerable time. They generally stayed in each others vicinity, but paid no attention to one another. One of the N females was climbing through small trees at 6:35 A.M. on May 18th calling for food or inviting copulation. Its male paid no attention to it. This female had a nest and laid its first egg on May 20th.

In Morgan Swamp there were 4-6 males and about 10-13 females, but my studies were interrupted before the actual territories and matings could be established.

Another male was studied in an isolated swamp (Closter Swamp) which had undoubtedly only a single female.

SEXUAL FLIGHTS.—Flights during which a male pursues his own female or a potential mate are frequent among certain species of birds and seem to have an important physiological function, as pointed out by Howard (1929) and Tinbergen (1939). A few observations on such sexual flights may, therefore, be quoted from my note-books:

May 7: Henslow Swamp.—E female (1) is chased by E male in sexual flight, at about 6:05 A.M.

May 11: Henslow Swamp.—6:17 A.M. Sexual flight of North male with female, repeated at 6:23. It is not clear which of the two N females is involved.

May 22: Morgan Swamp.—7:50 P.M. Much chasing of females. One female in particular, which seems to be feeding near a territory border (?), is being chased by two males almost continuously.

May 25: Morgan Swamp.—NE male chases female for almost five minutes, circling around in a small area. She finally retreats to territory which belongs to southeast male. The owner immediately gives chase, she returns to NE territory and finally flies far away to some bushes in neutral area.

THE START OF EGG-LAYING.—Red-wings can be considered, with certain reservations, to be colonial birds. We find that even in large marshes the nests are invariably clustered in a semi-colonial fashion. It seemed, therefore, worthwhile to check Darling's (1938) contention that on account of the mutual stimulation, breeding starts earlier in larger colonies than in smaller ones. To check this hypothesis was one of the reasons why I undertook the present study.

It was found that, exactly opposite to expectation, the isolated pairs and small colonies had nests and eggs before reproduction began in the large colony (about 12 nests) in Morgan Swamp. The exact figures are as follows:

Henslow Swamp (3♂, 5♀)

E female 1.....	first egg	May 20
N female 1.....	first egg	May 21
S only female.....	first egg	May 22
E female 2.....	first egg	May 24
N female 2.....	first egg	May 25

Demarest Swamp (2♂, 2♀)

Nest 1	first egg	May 24
Nest 2	first egg	May 25 or 26

Closter Swamp (1♂, 1♀)

Only nest	first egg	May 23
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Morgan Swamp (4-6♂, 10-13 ♀)

May 24:	2 fresh nests, no eggs
May 30:	1 nest with 4 eggs (first egg probably May 26 or 27)
	2 nests with 1 egg (apparently laid on May 30)
	5 fresh complete nests without eggs
	3 partly complete nests
	x nests not yet built

The last visit to the territories was made on this date.

General egg-laying started in Morgan Swamp 5-10 days later than in the other localities where only 1-5 females were present. The reason for this delay is obvious as soon as we consider the ecological conditions of the nesting site. Henslow Swamp, the earliest nesting locality, has three waterholes which coincide with the three territories. However, bushes and trees cover the entire area closely, except for a small cattail patch of about 300 square feet in East territory. In a nest in the dead cattail of this patch the first egg was found on May 20th. All the four other nests of this swamp were built in bushes and were, therefore, rather well concealed even though the leaves came out very late in the spring of 1940. The three nests in Demarest and Closter Swamps were in small but thick, old cattail stands, surrounded by trees and shrubs.

Morgan Swamp, on the other hand, is much larger than the other three and consists of a practically unbroken cattail area of about 80 yards length and 20-50 yards width. There were no bushes inside the nesting colony, except for three or four bare sumac or elderberry bushes. It is unknown to me whether the greater exposure delayed egg-laying or the lack of singing posts for the males impeded the staking out of territories. There was a considerable amount of dead cattail in the marsh. Much of it, however, had been flattened out during the winter and it is possible that it was not adequate for nest construction. As a matter of fact, nearly all the new or incomplete nests that were found on May 30th had been constructed on new and growing cattail stems. The nest with the four eggs was one of the few exceptions. It seems, therefore, a fairly sound conclusion to state that the vegetational difference between Morgan Swamp and the other swamps was the primary reason for the delay in egg-laying. How this worked in detail, whether through the females (delayed ovulation due to lack of psychological stimulation due to lack of proper nesting sites) or through the males (lack of singing posts inside the nesting area making territory establishment and pair formation more difficult) can not be stated at this time. It is certain, however, that Darling's hypothesis is not supported by the Red-wing colonies studied by me.

The period between start of nest building and the laying of the first egg (which is normally 5-6 days) seemed to be longer in the second female of polygamous males. Female 2 of E male and female 2 of N male had superficially finished (but not completely lined) nests on May 18th, but their first eggs were laid May 24th (E female) and May 25th (N female).

SUMMARY.—The behavior of Red-wings was studied in a small swamp in which 3 males had territory. Occupation and defense of territory is described. Two of the three males were polygamous. Egg-laying started earlier in several smaller colonies than in a large one.

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Distribution and Habitat Selection of Some Local Birds*

By CHRISTOPHER K. MCKEEVER

This report, utilizing the data received in reply to the 1939 questionnaires sent out by the committee, attempts to present with some degree of accuracy, the present distribution in the New York City region of the 15 breeding species chosen. At the same time an effort is made to describe the habitat or habitats which each species favors in this region, and where possible, its status, not in terms of "common" or "rare," as was formerly done, but rather by giving the total of known nesting pairs or occupied stations. In such a task as the last, it is needless to say that it is by no means considered that any of the figures represent total population of that species in the area. While the coverage in this region is now many times more widespread than it was when Griscom (1923) was gathering the data for his *Birds of the New York City Region*, it can not even now be said that the region is completely covered. We would only be deluding ourselves if we claimed it was.

It is hoped that the studies of each species, as given later on in this report, will provide for the bird students of the future in this region something, which the present day students lack and miss sorely, namely, a reasonably accurate basis for comparison of local changes in the distribution or status of a particular species. The present day student, when he goes over the past literature on the birds of the region in an effort to find out if a species has increased or decreased, is constantly confronted by statements that the bird is "uncommon," or perhaps "locally common" with absolutely no inkling of where the localities are or were. How is it possible for him to judge what the writer designated as "common"? There were innumerable factors entering into the writer's decision or judgment, and the reader, confronted by the bare statement, can only hazard a guess as to what they were. It is in an effort to fill this need, which was so clearly and in much greater detail discussed by J. J. Hickey (1938) in the 1936-1937 Field Work Committee Report, that the present work was undertaken.

Before taking up the individual species and discussing them, it is well to mention several factors, which undoubtedly have a bearing on the marked discrepancy between the findings of the present survey on several species and those given by Griscom in 1923. The first of these is the great increase in the number of *competent* field observers. While Griscom (*op. cit.*) in the preface to his book comments on the great increase in the number of observers since the publication of Dr. Chap-

*Report of the Field Work Committee, 1940-1941.

man's *The Birds of the Vicinity of New York City* (1908), he restricted himself in his acceptance of sight records to those by people known to him personally, or whose ability he had an opportunity to verify. The publication of Griscom's own book and later on of Peterson's *Field Guide* (1934) enabled novice observers to become much more quickly proficient at identifying birds than was previously possible, when it was necessary to pore through long descriptions in order to determine what bird one had just seen. Consequently, except in the case of certain species difficult to distinguish, it is now possible to accept records from persons who have shown an active interest in birds, especially in the case of breeding species, where for the most part opportunity is offered for several observations.

The second factor could be called progress in land transportation. This includes (a) improvements to automobiles, both as to comfort and speed; (b) improvements to and extensions of road systems. The combined effect of these improvements has been to render almost any part of this region accessible in two or three hours' driving, and to open up localities which had formerly been nearly unworked because of difficulty of access by land. It is necessary to stress the word 'land' since there has been very little utilization of water transportation locally, despite the marked improvement in that field also. While not pertinent to a breeding bird survey, it should be noted that the aspect of local ornithology which has shown the least increase of knowledge concerns the pelagic species.

Unfortunately there is no way to weigh these factors and make allowances for them when attempting to compare the present data with those given by Griscom. However, they might have less effect than one would suppose. While it is not to be doubted that they have resulted in much better coverage of our region, one of the most conspicuous effects is that they permit observers to concentrate their efforts in the zones where the occurrence of rarities is most frequent, and most of them do just that, to the detriment of the intervening areas. The best example of this is the south shore of Long Island with its well known waterfowl and shorebird focal points. The great majority of observers visit these places, and any records of land birds they turn in, aside from those on the coastal migration route, are usually those which they are able to pick up while travelling at fifty miles per hour or better from point to point. Consequently the region on the south shore from Lindenhurst to Mastic is probably one of the most traversed and least worked in our region.

Before making any acknowledgements, it is only fair to say that the present writer is an interloper, and that, but for a recent call to

army life, Robert Arbib, Jr. would be the author of this report. It is hoped that his ideas have been expressed and his plans have been carried out in the manner he wished them to be. To him belongs the credit for initiating this inquiry, and for the original spade work in composing the questionnaire and compiling and evaluating the data received in reply in 1939. However, in the compilation and evaluation of the data, and in securing information from other sources, the efforts of the entire Field Work Committee were so necessary that without them, the task would have been impossible. Therefore, a debt of gratitude is owed to John L. Bull, Jr., Alfred E. Eynon, Robert W. Storer and Hobart M. Van Deusen for their full hearted coöperation.

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Throughout this report the New York City region is understood to include that section treated by Griscom (northern New Jersey, Westchester County and Long Island) as well as Rockland County, New York.

PIED-BILLED GREBE

(Podilymbus podiceps podiceps)

This species' status is one of the outstanding examples of the discrepancy between that given by Griscom (*op. cit.*) and what it is now. He considered this species to be a possible, rare breeder over most of the area, but could only cite three actual or probable breeding localities for it. He added that much work remained to be done on this species to settle its summer status in our area.

Our returns indicate that this dab-chick has no contiguous range in this region, but is widely and sparsely distributed throughout, breed-

ing in ponds, reservoirs and large marshes. Of the 25 stations known for it, a dozen are on Long Island, five in Westchester County and 8 in the New Jersey section. So far as can be seen from the information on the returns, it is impossible to point out any particular type of pond or plant association and say that all the stations in use conform to it. The best one can say is that all the sites are in fresh or slightly brackish water areas with a moderate or large amount of surface and edges provided with the thick emergent vegetation. This seems to be necessary, if this species is to nest successfully. However, since there are many other ponds in the region, which to the human eye appear to be just as suitable, and are never used, it will take more than a casual study to find out, if possible, what induces the birds to use quite steadily certain locations, and just as steadily shun others.

The two basic requirements for this species to nest successfully would seem to be (1) adequate shelter from the elements and from animal and human enemies, and (2) a sufficient supply of food for the adults and young all through the breeding season. The first requirement seems to be satisfied by a variety of plant associations with such dominants as cattails (*Typha*), rushes (*Juncus* and *Scirpus*) and water lilies (*Nymphaea*), no two stations having the same proportions between the various species of plants making up the association.

The second requirement also seems to be satisfied by a variety of associations as is shown in the New York State Conservation Department's "Biological Survey of the Fresh Waters of Long Island." This survey was made in 1938. Because it was primarily concerned with sporting fish, it dealt with only three of the known stations used by this species. One of them was a coastal pond, somewhat brackish, but with a fresh water marsh at its upper end. The other two are both ponds resulting from dams thrown across south shore streams. According to the survey all three bodies of water support quite a varied fish life, none of them having fewer than 9 species, a figure which is well above the average for the 65 ponds surveyed. However the conditions are so varied in these three ponds that the eastern barred killifish (*Fundulus d. diaphanus*) is the only fish common to all three. This has no significance, however, since the species was found in two out of every three ponds so surveyed.

Another indication of the variations in the aquatic conditions is the fact that, while all of them are described as white water ponds with sand and muck bottom, two with abundant submergent vegetation and one with scanty, the stocking recommendations were different with respect to each of the ponds, indicating differences in the areas not disclosed in the rather brief tables. The coastal pond was

considered most suitable for largemouth bass (*Huro salmoides*), the stream pond with abundant vegetation for brook trout (*Salvelinus f. fontinalis*) and the one with scant vegetation for panfish only.

The Pied-billed Grebe does not show nearly the degree of dependence on man that the Florida Gallinule does in this region, and well over half its stations are in natural ponds. The water level of the pond is very important as is shown by the fact that, when the coastal ponds on eastern Long Island break out through the barrier beach and empty into the ocean, the grebes will not nest, until they are filled up again.

It is also note worthy that nearly all the ponds in use by this species have no boats on them. If there are boats, these have not access to the section frequented by the grebes. Therefore, even though some of the stations are in well settled areas, the species is relatively undisturbed by anyone but prying birdmen, since access by land usually entails getting very wet and muddy.

BLUE-WINGED TEAL
(*Querquedula discors*)

There is no longer any doubt that the Blue-winged Teal should rightfully be included as a breeding bird in our region. Up to 1930 it was only an accidental breeder in the area and the only record was a nest found by Latham at Orient in 1922. Chapman (1906) did not include it in his list of summer residents and referred to it only as a migrant. Griscom, writing in 1923, probably when this species was at its lowest ebb, mentioned that "it was said to have bred many years ago," but added no details to this terse report. It is possible he had in mind the statement by Giraud (1844) that it may have bred at Montauk.

In 1938 Wilcox reported seeing young birds of this species at East Moriches. He has also recorded it as nesting at Speonk. These are the only positive Long Island records, and apparently conditions there are not sufficiently suitable to cause it to breed regularly. Since it is on the increase and this last season (1941) bred as far south as South Carolina, it can no longer be said, as it once was, that we are south of the southern limit of its breeding range. This was once considered to be western New York and Maine (Bennett, 1938). There are now considerable numbers of this bird breeding well to the south of us, and the only reason, it would seem, that this is not so in our region, is that favorable nesting areas are few and far between.

Conditions in New Jersey seem to be more favorable and it was thought to have bred at Troy Meadows in 1930, and a nest with eggs

was located there in 1931. Since then it has been recorded as breeding at Morristown and South Plainfield, and there is little doubt that this species can be considered as a very rare but regular breeder in that portion of our region.

Few local data were turned into the Committee on the habitat this species prefers for breeding, but it probably does not vary much from that used in other parts of its range. There it seems to use most often the vicinity of a small or medium sized fresh water pond, usually bordered by fields and meadows, with a grassy or marshy growth of protective cover at the water's edge. Quite often, however, it does not place the nest close to the pond, but in grass forty or more yards from the edge, making it that much harder to locate (Bennett, *op. cit.*). Detailed data will have to be secured on several local nestings before we can say that its preference here conforms to that given above.

WOOD DUCK
(*Aix sponsa*)

Our study of this duck shows one of the most heartening and at the same time, definitive results of the entire survey. It indicates, in no uncertain figures, a tremendous increase in recent years, in both the migrating and nesting numbers of this handsome species, despite the steady shrinkage of favorable habitats and of wilderness areas. This improvement in conditions can readily be seen by quoting from two reports of its status, covering the period when its numbers were lowest in this region. In 1906 Chapman stated that it was "a rare summer resident on some of our more retired wooded streams." Griscom, as late as 1923; painted an even more unfavorable picture, saying that "it now nests in a few scattered localities." His specific information was confined to about four stations in New Jersey, one in The Bronx, and two on Long Island.

As late as 1930 there were practically no known breeding sites on Long Island, and ornithologists regularly journeyed from there to Van Cortlandt Park swamp in order to acquaint themselves with the species. The present survey indicates that the Wood Duck can be found breeding in nearly forty different locations in the region. Seventeen localities in New Jersey were reported, fourteen on Long Island, and about seven or eight in the Westchester region. The word 'locations' is used advisedly to distinguish pairs from stations in the discussion. Many of the reports turned in cover fairly large areas such as several miles of stream valley, and include an estimate of the numbers of pairs usually found there. In one case, that of the Bear Mountain State Park, no less than 22 pairs were estimated to breed. This

is an exceptionally large tract of wilderness land for the New York City region. However many of the returns showed several pairs breeding in a single locality, so that the estimated total number of pairs was about 115.

The chosen haunts of the Wood Duck are well known, and in this region conform to those generally described for this species elsewhere. While this species has increased greatly of late, there are many apparently suitable areas which are not occupied by it during the breeding season. This is especially noticeable on the south shore of Long Island. Most of the streams on the Island run south into the Great South Bay, and most of the apparently suitable woodland swamps are there. Yet most of our returns are from the little ponds and small streams on the north shore of the Island. It is just possible that the areas not occupied lack suitable nesting sites, and it would be most interesting to experiment with some nesting boxes somewhere in the area to see if Wood Ducks could be induced to nest. Another factor in this apparent scarcity, which cannot be definitely weighed to determine what part it plays, is the lack of thorough field study in the area mentioned. It is probable that some birds breed there, but certainly it is not as common there as elsewhere in the region.

FLORIDA GALLINULE
(*Gallinula chloropus cachinnans*)

This species has probably not increased in numbers since Griscom outlined its status and so well described its habitat. However, at the present time there are 18 known locations where it has nested in the last few years. Half of them are on Long Island, six in New Jersey, and three in the New York State section. About half as many old, abandoned stations were recorded, and when all of them are mapped out together, it is seen that for the most part the presently occupied stations are away from the metropolitan area and the abandoned ones are in it.

Of thirteen present and former stations known on Long Island, only four are beyond thirty miles from the western tip of the Island, and none are beyond seventy.

This change in distribution is indicative of this bird's peculiar dependence on man for a suitable nesting site in this area. Griscom was only half right when he said that the Florida Gallinule was being driven away from the metropolitan area by fill and drainage operations. Our present knowledge allows us to state definitely that in most cases the suitable habitat was first *created* by some operation of man. This is especially noticeable in the New York and Long Island

areas which were provided by nature with few spots favorable for this bird.

While we have incomplete data on some sites, it is evident from what data we have that the majority of them were created in one of two ways. The first was by damming up a fresh water stream. In the course of time the resulting pond at some point (depending on land contour, the establishment and spread of aquatic vegetation, and the maintainance of a proper and stable water level) became ecologically suitable for this species. Two of the New York stations were known to have been created in this manner, those at Van Cortlandt Park and Grassy Sprain, and five of the Long Island ones, namely, Plandome, Mill Neck, Oyster Bay and Wantagh, and an old one at Rosedale. As a general rule these were not as desirable as those created in the second manner and not as regularly occupied. Probably a closer study of these areas will indicate that the fluctuation of the water level decides whether or not a site is used.

The second method of creating a "niche" was by fill operations, and such former stations as at Dyker Heights, Long Island City, Hunt's Point, West Farms, and possibly the present one at Old Mill on Jamaica Bay were so formed. It is apparent from a study of these localities that there is a time when there are created in a partially filled marsh, better conditions for this species than existed in the original area.

This can best be shown by reviewing the history of the Long Island City marsh, first brought to prominence by the records of the Hendricksons (1906) for this species, coot and rails (*Rallidae*). Originally the tract in question was a section of salt or brackish marsh (*Spartina*) bordering Newtown Creek. It was then entirely cut off from the salt water by the construction of a railroad embankment, and after many years became a deep water fresh marsh suitable for this species. Unfortunately for ornithologists, neither here nor elsewhere, where a similar chain of operations occurred, did the filling-in cease at this point. Invariably it continued to completion. If the character of these marshes had not been first changed, there is little doubt that they would have been entirely unsuitable for this bird. It is certain that the railroad embankment, mentioned by Urner (1934) in his account of the colony found on the Newark Meadows, and probable that the one mentioned by Clinton G. Abbott (1907) writing of a large colony in the Hackensack marshes, maintained a favorable water level which would not have otherwise occurred. Therefore, even in the case of the largest known colonies of former times, man first created the habitat before he destroyed it. The Belt Parkway fill along

the shore of Jamaica Bay is doubtless in the process of altering the character of the brackish and salt marshes above it in a similar manner, and a detailed study of the changes would be of great interest.

In New Jersey the situation may be different from that described above, and the proportion of the half a dozen colonies in natural habitats is doubtless higher, since there was more of it originally. The largest known colony in the New York and Long Island area contains two or three pairs. Most of the stations are occupied by single pairs, so that the total population now is probably not any greater than that of the single large colony described by Abbott (*op. cit.*).

BARN OWL

(*Tyto alba pratincola*)

Both Chapman (1906) and Griscom (1923) called this species a rare permanent resident, but the latter came nearer to the mark when he stated that "in all probability it is commoner than the scant records would indicate." So far as definite breeding stations were concerned, Griscom knew of no positive nesting pair on Long Island at the time of writing. He gave one record for Staten Island and several old ones for New Jersey, but added that "no effort has been made recently to determine whether the bird still occurs."

In marked contrast to this rather inconclusive report, the returns sent in to this committee disclosed a number of valid breeding records for the region. Once again the factor of better coverage of the region enters into the picture. Therefore it is next to impossible to determine conclusively whether this reflects an actual increase in numbers or merely more intensive and effective methods of search. Our own opinion, given as such, is that observers in the past could not have been quite so careless or disinterested as to overlook this bird, and that it has been increasing slowly and steadily in numbers throughout most of this region. This is given support by the fact that, during the same period, it has been slowly spreading northward in southern New England.

This bird, in common with nearly all the other members of its family, very frequently eludes the ordinary, everyday ornithologist. It requires special methods of search and snooping around old deserted buildings, and familiarity with its call notes to uncover a nesting site. Most of the stations were located by luck rather than by deliberate search for them, and many others were found by natives of the nesting area who heard the food call of the young birds. As a matter of fact, the best way to locate them is to watch the local newspapers for accounts of workmen who, while engaged in repairing or painting

some water or church tower, encounter the birds. Because so many of the stations are located by natives unacquainted with their worth, the nestings so found usually end in disaster, the birds killed, or as at Oakdale in 1941 the young sent to Frank Buck's Jungle Camp.

A noteworthy factor, discouraging all but the most persistent searchers, is the fact that in our region this species might be nesting at almost any season of the year, as eggs and young have been found in nearly every month. This was determined by Irving Kassoy. In 1939 a pair, which he studied, made four attempts at nesting in the same place, three of which were successful. The first clutch was laid in February and the last in October, and both of them were successful.

Altogether 28 old and new stations were recorded in this region, 22 of them being used in 1939 or later. The latter total was made up as follows: 10 on Long Island; 1 definite location on Staten Island; 4 in the Bronx-Westchester area; and 7 in New Jersey. There were 4 old stations on Long Island, two of them occupied in 1938, and one each in Westchester and New Jersey. According to the returns, the favored nesting places seemed to be old unused water towers and church or other building towers, even though the latter premises were occupied by man. Several pairs were reported as using the primitive type of location, namely, hollow trees.

These stations seem to be rather evenly distributed throughout the better settled portions of the region, ranging from the suburbs through the rural residential towns out into the farming towns. Wherever the country is well wooded with few cultivated or overgrown fields, it appears to afford insufficient hunting grounds for this species or else it provides competition with some one of the woodland owls. It is probable that the rat-infested dumps of some of the larger cities and the filled areas afford this species far more fruitful hunting grounds than any it can find in a natural, undisturbed habitat, or even in a farming area. The eastern end of Long Island from Riverhead east had only two nesting pairs at the time of the survey, one at Watermill and the other on Gardiner's Island, and can be cited as a possible example of a region where food is the determining factor in limiting the distribution of this species. Most of the south fluke, with the exception of the Montauk peninsula, is wooded. However, there are also fairly large areas of cultivated ground just back of the ocean front. The Orient peninsula, on the other hand, is mostly under cultivation with a comparatively small amount of woods and very little brushy country. The method of cultivation in both areas is very similar. The farm land is worked in very large units and, as there are few or

no hedgerows, is a good example of clean farming. If a field is left fallow for a season it is usually back in crops the following season. All this has the effect of keeping the rodent population at a minimum in those areas and may have something to do with the scarcity of breeding records for this species in that region.

In contrast to this, the farming on the rest of the Island is more varied in its land utilization, with smaller fields and hedgerows. At the present time there are large expanses of abandoned fields, which tend to grow up rather rapidly. While they are doing so, they probably afford shelter to a fairly high number of rodents and are not so dense as to entirely protect them from this species.

PRAIRIE HORNED LARK
(*Otocoris alpestris praticola*)

When Griscom (*op. cit.*) wrote of this species, it bred in our area only in the south portion of Sussex County, New Jersey, and was rarely even recorded elsewhere. Since then it has been found as breeding also in central Sussex County but no check had been made of the earlier stations. Prior to 1936 it was recorded away from that area only at Lamington, New Jersey, in 1929. In 1936, however, John Mayer made the surprising discovery of a nest and eggs of this species at Idlewild on Jamaica Bay. This was the first record for the metropolitan area, though not the first for Long Island as Latham had previously found it at Montauk and Gardiner's Island, offshoots probably of the well established colony on Block Island.

One would naturally expect any increase in numbers in our region to occur near to one of the larger breeding groups, the surplus birds of which would populate unused adjoining areas. Instead, while these stations remained in a static condition, the one at Jamaica Bay, nearly midway between them, formed the nucleus of a newly founded but steadily growing breeding range. The following season this species was recorded for the first time as breeding at Canarsie (5 miles west) and at Valley Stream (3 miles east). The latter station was not used again, probably because the abandonment of the airport there made vegetational conditions unfavorable. In 1938 it spread about four miles south to Atlantic Beach, the limit of land in that direction, and about ten miles west to Dyker Park.

In 1939, perhaps because of the present survey, we have the greatest number of new localities reported. That year, it was first recorded on the Freeport-Jones Beach Causeway, about 12 miles east; at Westbury, about 12 miles northeast; near Astoria, about 8 miles northwest; and at Miller Field, Staten Island, about 18 miles west. The stations above mentioned are only the most distant from Idlewild recorded that season. It was also found at intermediate points such as Lido Beach, Hewlett, and Floyd Bennett Field, Brooklyn, for the first time.

According to the returns, the total estimated population that season, not including an unknown number known to breed on the inaccessible (by land) islands in Jamaica Bay, was about 40 pairs. Seventy-five per cent of these were on the shores of the last mentioned bay, and half of the birds there were in the two oldest groups, equally divided between Idlewild and Canarsie. As a census, however, this survey is already made out-of-date by the subsequent tremendous increase in numbers. This is best illustrated by John Mayer's estimate of 34 pairs breeding at Idlewild in 1941 and R. B. Fischer's estimate of 15 pairs along Ocean Parkway.

In 1940, a new, slightly more distant station was found at West New Brighton, Staten Island, but the greatest increase of range was to the east where the bird occupied the whole length of Ocean Parkway, running from Jones Beach to Oak Island Beach. The last statement can be made with a good deal of assurance, because that stretch of road connects several of the best worked birding spots on Long Island, and this species could hardly have been overlooked if it had been present in 1939. This past season (1941), no greater distances were recorded, but within the range the increase in numbers has been marked, especially along the Ocean Parkway.

The only recent breeding records which do not tie up into this pattern are at South Plainfield, N. J. (1937), Allwood, N. J. (1939) and Newark, N. J. (1938). It is possible however, that the last locality may have been populated from the western Long Island group. A single observation of a singing male at Sunken Meadow in 1940 by Cruickshank is rather weak evidence of breeding which was not substantiated in 1941, when the ground was carefully covered by the author. If a pair was breeding there, it was using an area more like that occupied by Prairie Horned Larks at the eastern end of Long Island, and less like that used in most instances by the western end birds. The finding of a nest and eggs of this species at Easthampton and a pair at Wainscott by W. T. Helmuth this past season may be an indication that the eastern end birds have started to increase also.

The most interesting thing about this remarkable increase is the fact that it is greatest where man has been most active in changing the general aspect of the landscape. Practically all of the nests found have been either in sandy, sparsely covered fill areas, or on closely cut sod. The latter has been provided by two different types of operations. One is by the building of golf courses, the fairways of which provide suitable sod. The second is the practice of the Park Commissions in laying a narrow strip of sod on each side of the concrete roadways, where they run on sandy stretches, either natural or fill.

Most of the records have been near water areas, probably because fill operations are most often found there, and the ideal combination appears to be a fill area with some sod on it. There are great numbers of golf courses on western Long Island, and with but one exception those used by this bird are close to some bay and for the most part on filled in ground. The exception to this is the Westbury station which was an inland golf course. However, this course differed from most others in that it was located on the Hempstead Plains, a natural prairie where the dominating plant was one of the *Andropogon* grasses.

On the eastern end of Long Island, from the few records we now have, the preferred habitat seems to be sandy, sparsely covered wastelands, though the Easthampton pair was on golf course sod, near water. It is possible that the relatively static condition of the species there can be correlated with the relatively few changes made by man in that area in comparison with those effected at the western end of the island.

CAROLINA WREN
(*Thryothorus ludovicianus*)

This species is still one of the most variable in status in the New York City region. Since Griscom wrote about it and so accurately traced its status through to the low point in 1922, one complete cycle has been completed, and we are in the midst of another one. According to him the very severe winter of 1917-1918 cleaned out this species completely throughout the whole area. This appears to be open to some doubt however, since Dr. Helmuth recorded it at Gardiner's Island on a Christmas census in 1924, and as breeding in 1925 and 1926. It would seem quite remarkable, no matter how favorable the habitat, if this bird could jump over 100 miles of empty territory at one step and re-establish itself in the same spot. It would be more likely that a few birds survived on the island and formed the nucleus of the new colony. Always excepting the factor of better coverage of the area, it would seem that on Long Island at least, this species was commoner in 1932 and 1933 than it was at any other time in recent history. This bird has its own idiosyncracies which make it a little difficult to judge properly all records of its occurrence and say definitely whether or not it is breeding in a particular locality. The first of these is the skill with which it conceals its nests, comparatively few of them ever having been found in our region. The second is a tendency for singing birds to establish themselves in a territory for a while and then vanishing before a successful nesting could have been completed. There are many records occasioned by vagrant birds which appear for a few days and then move on. Also considered as vagrants

are birds for which the interval between arrival and departure was less than a couple of months during the breeding season.

From the records on hand, it is safe to say that in the peak years mentioned above, the New Jersey ara was sparsely occupied, with a colony along the Palisades. No birds established themselves in Westchester, but on Long Island there were several pairs living in widely scattered localities on the north shore, a slightly larger number on the south shore, mostly at the west end. In addition to these there was the thriving colony on Gardiner's Island and a relatively large population on the north and south flukes at the eastern end of Long Island. At that time Dr. Helmuth estimated that there were over a dozen pairs living in the area from Easthampton to Montauk. Singing birds were recorded in the woods only a half-mile or so from Montauk Point.

During the winters of 1933-34 and 1934-35 sustained, extreme cold and heavy snowfalls throughout the region, again wiped out all the individuals of this species except for a few on Gardiner's Island. How many individuals survived there we do not know, since there is no record of any visit by an ornithologist to the island until June, 1939, when on a two-day survey of it, Dr. Helmuth and the writer recorded, as carefully as we could, 26 singing birds. In view of this large number only four years after the conditions which extirpated them elsewhere, it would seem that a fair number of them survived those rigorous winters. In support of this is the fact that in 1937 an individual of this species was recorded for the first time on Fisher's Island, 12 miles across the water to the northeast. By 1939 there were three singing birds established on that island. This expansion was in a direction never before noted in the periodic increases of this species.

As before, this nucleus at Gardiner's Island, has started to overflow onto the surrounding areas. Dr. Helmuth reported the occurrence of several individuals at Easthampton in 1938, and felt certain that at least one pair bred there in 1939 and 1940. Latham has reported it as breeding in 1939 at Orient and Greenport on the northern fluke, and on Shelter Island—several miles directly west of Gardiner's. Singing birds have been recorded as far west as Aquebogue on the northside and Speonk on the south, but these were apparently only wanderers. Up to date there have been no records of other than vagrant birds for the rest of Long Island. In New Jersey, the severe winters pushed the breeding range south of the southern limit of our region. In the years following a gradual come-back has occurred. At the present time there are a few pairs sprinkled around the region and a small colony along the Palisades. It is probable that a com-

bination of two factors allows the birds to survive and flourish at Gardiner's Island.

(1) The first of these is that the woodland there has not been subjected to the fires and cutting which prevent the forests on most of Long Island from being anything but second growth. In fact it has been described by Norman Taylor as the finest climax deciduous forest in the state. Unfortunately the hurricane of 1938 laid low a large proportion of the trees. However on our visit in June, 1939, it was easy to see that the woods differed greatly from any seen on Long Island in size and species of the trees. Several trees were seen which are only found on Long Island at the western end of the north shore, such as Basswood (*Tilia glabra*) and Elm (*Ulmus americanus*). In addition the woodland had a heavy undercover in its drier parts of *Smilax* and Poison Ivy (*Toxicodendron radicans*); in its wet, swampy parts of various shrubs. There seemed to be ample cover to provide both food and shelter for Carolina Wrens.

(2) The second favorable factor is that the climate of eastern Long Island is more temperate than that of northern New Jersey and Westchester. While no detailed statistics are available on temperature and precipitation in the latter regions, it will be acknowledged that both areas have appreciably more severe weather than New York City. Yet Gardiner's Island, in the same latitude with Armonk in Westchester and Ringwood in New Jersey, has a more favorable climate than has New York City (Taylor, 1927). No weather tables are available for the island and none for Montauk, but Norman Taylor (*ibid.*) wrote an article dealing with the climate of all Long Island and for Montauk used data compiled at Block Island. These tables can safely be used since Gardiner's Island is at its nearest point two miles from any land which would act as a windbreak. Assuming that the critical months for this species are those of December, January and February, we find that, though the mean yearly temperature at Montauk is 2.5 degrees lower than that of New York City, the mean average temperature for these three months is about 1.5 degrees higher. This is mainly because the ocean surrounding this region is warmer than that at the western end of Long Island until late winter, when conditions become reversed until the following November. The total average yearly precipitation at Montauk is only about 1.5 inches less than that of New York City, and about three inches less than that for Long Island generally. However during the critical months, it is the same as that of New York City. Because of the higher temperature, more of this precipitation falls as rain at Montauk instead of snow. Snow also melts faster on eastern Long Island, so that the

necessary feeding areas are not covered as long in that region.

Probably the most important climatic factor in keeping the feeding areas open, is that Montauk is the windiest point on the Atlantic coast. From December through March it has on the average 80 winds of over 50 miles per hour principally from the northwest. Anyone who has gone birding on Montauk may be surprised to learn that it is so relatively warm, but he would not be surprised to learn that it is the windiest point along the coast, and would not need tables to prove that comparatively little snow falls and covers, since the winds usually sweep it into drifts and leave bare great stretches of country.

HERMIT THRUSH

(*Hylocichla guttata faxoni*)

This species is described by Griscom (*op. cit.*) as locally common on Long Island and as a possible breeder in northwestern New Jersey. At the present time it is considered to be a very rare and sporadic resident of the latter section, southeast to Boonton. Griscom (*ibid.*) gave no localities for the bird and did not attempt to show its range on Long Island. President information indicates that the Hermit Thrush breeds locally and not uncommonly in loose colonies up to a dozen pairs or more, from Comac east to Hither Hills. As just noted, this range is not a continuous one and the birds seem to group themselves in thinly settled 'colonies' which may run a mile or more each way, as at Comac, Manorville and Northwest Woods. Colonies are now know at ten localities, five from Hither Hills to North Sea on the south fluke of the island, and five from Quogue to Comac. Between these latter two points, there are four other localities where the species had been recorded in summer years ago, but no check has been recently made of them. Since it is possible that these stations are still occupied, they are named with the hope that some one will try to check on them in the near future. They are Lake Ronkonkoma, Lake Grove, Yaphank (just east of the town), and Long Pond (northwest of Manorville). The territory which this species occupies, holds little attraction for the rarity seekers among bird students and consequently is not very well worked. It is entirely possible that further work within the limits of its range will show it to have a nearly continuous one, at least in the Quogue-Mastic-Manorville triangle. Any attempt to explain why this species should have an established range, well to the south of its main one and so different in habitat, seems inadequate. Geologically, most of the stations lie on or close to the Ronkonkoma moraine, which runs through the center of the island, south of Comac, out through the center of the south fluke. The only exceptions to this are the Quogue and Mastic areas which are well to

the south of the moraine on Manhasset formation covered with a thin coating of morainal outwash, and the Comac area most of which, if not all, lies in the so-called 'Smithtown driftless area' just to the north of the moraine. This is so named, because in some manner—probably by a covering of snow or ice—the surface of the ground there was once protected from glacial action and now shows the eroded contours of a pre-Wisconsin river valley.

So far as the habitat goes, it is quite varied and seems in no way to restrict the colonies, as apparently the same types can be found in many places where the bird has never been found breeding. Most of the colonies are naturally in rolling country, but several of them are in nearly level areas. It seems to make no difference to the species whether or not it is close to fresh water, or what type the ground cover is. It has been found equally often (1) in heavily undergrown scrub woodland of the barrens type; (2) in normal deciduous second-growth or taller, mixed or unmixed with pitch pine (*Pinus rigida*); and (3) in scrubby or tall pitch pine woods. Most of the reports indicate that this species maintains its numbers well and sticks to its chosen area for years. Because it is rather thinly spread over a locality, most of the returns gave merely rough estimates of the number of pairs. Consequently we can merely do the same. The probable total population—as now known—is somewhat under one hundred pairs.

BLACK-THROATED BLUE WARBLER
(*Dendroica caerulescens*)

The Black-throated Blue Warbler is a bird that seems to have increased slightly in our region during the past half-century. But in the case of this species, the apparent increase may very well be caused by more thorough search and coverage of the outlying district. Chapman (1904) regarded it purely as a migrant. Griscom (1923) stated that it had recently been found nesting locally in Sussex and Passaic Counties, New Jersey, in the northwestern portion of our region. The species can be found breeding in the Kittatiny Mountains and on the Wawayanda Plateau east to Wyanokie. However, the only definite records turned in to the Committee were as follows: 2-3 pairs at Bloomingdale in Passaic County, six pairs in the Ramapo Mountains, and a pair at Bowling Green Mountain near Green Pond Ridge. The last represents the first definite record for Morris County, though birds had been recorded regularly north of Newfoundland, on the border between Morris and Passaic Counties. Because of the lack of adequate coverage, it would be the merest pretense to attempt an estimate of the total number of breeding pairs. The typical breeding habitat in

northeastern United States is a well wooded hillside with a heavy undergrowth, preferably of mountain laurel (*Kalmia latifolia*), and a small woodland clearing and some water nearby. If that was all that this species required, it would be breeding throughout many sections of the region, as there are numerous localities which satisfy all those specifications. Consequently there must be some other factor limiting it to these areas and to those north of us.

LOUISIANA WATER-THRUSH
(*Scirurus motacilla*)

In the case of this species, what Griscom said about it in 1923 is substantially true today. He considered it a rare and local summer resident on the northern shore of Long Island, and common in northern Westchester and in New Jersey. About the only point, at which issue can be taken, is this bird's status in Westchester, where the returns show it to be rather local, at least, at the present time. Whether this represents a real decrease, or merely a disagreement as to what the word 'common' covers, we are in no position to say. Judging again from the returns, it is still widespread through New Jersey portion of our region and in Rockland County, New York. From New Jersey, a total of 73 pairs were recorded in 15 separate localities, an average of nearly 5 pairs per location. From the mainland section of New York State, a total of 20 pairs were found in 8 places, averaging 2.5 pairs per locality, while from Long Island were reported 11 pairs at 6 locations, less than 2 pairs average. So far as the writer can tell, the coverage on Long Island is complete, but that of Westchester is probably not. If we take it to be a representative sample of the area, however, one can hardly put it in the same class as New Jersey, since the average number of pairs per location is only half.

In Westchester, the southernmost points for definite breeding locations seem to be around Bedford and Chappaqua, though it has been recorded as an occasional breeder at Grassy Sprain in the southern portion of the county. This is probably the same limits and location referred to by Griscom (1923) though in the absence of any place names, we cannot be certain of this.

On Long Island, all the definite records for this species are on the north shore, from Mill Neck to Greenport. The latter location represents a considerable jump to the east from the next western location at Miller Place. Since the Louisiana Water-thrush nested in 1939 at Greenport for the first time in Roy Lathan's long study of that area, it is probably only sporadic that far east. How many stations west-of Mill Neck have been lost through the destruction of the habitat from various causes cannot be guessed at, for we have no definite

records of nesting localities prior to this study, except Cold Spring Harbor and Huntington. The latter was destroyed long ago. It is probable that at one time, the suitable combination of woods and streams existed as far west as Flushing or even Long Island City. The long destroyed woods of those localities were much richer than anything now used on the island, if we are to judge by the remnants around Flushing and Bayside.

We cannot be certain of this, however, because at the present time, much suitable, apparently unspoiled territory on the north shore remains unoccupied by this bird. This is especially noticeable along the Nissequogue River around Smithtown. This stream is the largest on the north shore, and yet only a single pair of this species has been found on it by Wilcox. The writer has traversed much of the western portion of the Nissequogue in a vain effort to locate this species. In sharp contrast to this is the Cold Spring Harbor brook (only a mile or so long), where the author once heard 5 singing birds on an early June morning. The most conspicuous differences between the two areas were as follows: The Cold Spring Harbor valley had steeper and higher sides which were better wooded. Both valleys had mainly red maple (*Acer rubrum*) in the wet portions, but there was a greater variety at Cold Spring Harbor in the composition and height of the woodland. The most noticeable tree present in good numbers there (and entirely absent from the portions of the Nissequogue visited) was the Tulip (*Liriodendron tulipifera*), which at that place grows to at least 70 or 80 feet in height.

As Griscom (*ibid.*) noted, this species appears to be entirely absent from the south shore of Long Island, although by far the greater portion of the wooded streams and swampy lowland woods on the island are on this side. Most of these areas are distinctly less rich than the north shore in the composition and variety of the woodland. Practically all of the former, because they cross the outwash plains, are in shallow valleys. It is probable that the combination of both these factors, renders these areas unsuitable for this bird. It may nest there occasionally, however, since the pair at Greenport were recorded in a wooded swamp in a shallow depression. It is not without significance that this swamp, Roy Latham's studies indicate, is a good deal richer in vegetation than the average south shore swamp.

YELLOW-BREASTED CHAT

(*Icteria v. virens*)

In 1906 Chapman called this bird common throughout the region, but Griscom in 1923 said that, though it was generally distributed, it could not be called common. The latter seems to be nearer to the

truth and roughly describes its status at the present time. It is probable that Chapman's designation was colored by the fact that he did most of his work in northeastern Bergen County where even today, this species is commonest. Griscom called it uncommon north of the coastal plain on Long Island. This is not strictly true today as will be shown later. He remarked on its decrease in the suburban areas, but failed to note the trend which at the same time was creating habitats for the Chat just beyond this zone.

Present reports indicate that on Long Island this species bred in 1939 in ten different localities with an estimated total of 22 pairs. Two of these and two old stations were on the western end of the south shore. The rest of them, as well as 2 more old stations, were along or close to the Harbor Moraine which forms the 'backbone' of the north shore. Included in this, because it is merely a continuation of the moraine, was a pair on Fisher's Island. Aside from two abandoned stations on the Orient peninsula and an occupied one on Gardiner's Island, the remainder were on the north shore from Rocky Point west. We cannot say, however, that the Chat favors that region, because one of the largest groups of this species on Long Island breeds at Massapequa on the south shore. According to Breslau, this is only one of a number of places, since it could be found on the south shore as far east as Bay Shore. In Westchester we have record of 9 places with a total of 25 pairs for 1939. These locations were very well distributed throughout the length and breadth of the county and appear to show only a sample rather than the greater part of the population which the Long Island records cover. They indicate that the bird is local, however, and confined to a special type of habitat. Several pairs can still be found on Staten Island within the city limits. In New Jersey 55 pairs (plus) were reported from 13 locations. Many of the latter included large stretches of country compared to the returns from the rest of the region. The returns show that the Chat is well distributed throughout the eastern half of this region and probably only slightly less so in the western half. It seems to taper off through Rockland County, and become very local, so that only a single pair was found in the Bear Mountain area.

In this region this bird is very definitely one which depends in most instances for a favorable habitat in a plant succession. It apparently has no need at all for the presence of water in the areas it inhabits. It is nearly always found in an old overgrown field, with a hedgerow near-by, also usually overgrown. So far as can be found from the returns sent in, the vegetation consists of a mixture of low and high thickets and trees bound together and enmeshed in such

vines as cat-briar (*Smilax*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), or grape (*Vitis*). In the writer's experience the thickets are formed of such bushes and trees as sassafras, choke cherry (*Padus Virginiana*), red cedar (*Juniperus Virginiana*), and bay-berry (*Myrica Carolinensis*). Possibly these combinations are usually found on Long Island. There they represent one of the stages in the transition of a cultivated field or pasture to woodland. In the writer's experience they only follow those two types of land use, as when the woods are cut over or burned in that area (mainly around Huntington), the succession is entirely different, usually consisting of stump sprouts which form a low growth of the same general composition as the original woods. Depending upon the fertility of the soil and the amount of disturbance, in that area it probably takes from 15 to 20 years for an abandoned field to reach a stage favorable for this species. Only one definite case can be cited in this respect. In about 1928 the writer found a Meadowlark's (*Sturnella magna*) nest in a field on which the old furrows were still noticeable though it was already starting to grow up. In 1939 the Chat first came into this area, not, it is true, where the Meadowlark was nesting previously, but about 50 yards away, where it was already bushy in 1928. How long it takes for the growth of the vegetation to make it unsuitable for this species, has not yet been noted. There is a fair number of such areas around Huntington, most of them brought about by the abandonment of farms because the soil (or the farmer) was played out. This trend is not local, however, but is noticeable all the way into New York City limits, the fields lying idle until the suburbs engulf them, and destroy the succession.

Worth noting is the fact that, in the writer's experience at least, wherever this species is found, the White-eyed Vireo (*Vireo griseus*) is also present. The converse is not true, however, since there are two locations where the latter occurs, to every one for the present species in the same area. There seems to be no apparent difference in the stations where both Chats and vireos are found and those where only the latter are found.

CANADA WARBLER
(*Wilsonia canadensis*)

The Canada Warbler is still found most frequently in Sussex and Passaic Counties in northwestern New Jersey, south to Budd Lake and east to Newfoundland. This is the outline of its range as given by Griscom in 1923. Inasmuch as the species is at the extreme southern limit of its range here, all the stations are at a fair altitude and not in any of the lowland portions of our region. As is to be expected the

greater part of the returns were from the area mentioned above and give a good idea of its distribution along the eastern edge. Two reports were from the vicinity of Newfoundland, indicating 2 pairs at Buck Mountain and several pairs in another near-by location. Other returns showed locations somewhat to the east of the line drawn by Griscom (1923) and may indicate a slight extension of range in that direction. A report of 5 pairs at Bowling Green Mountain, Green Pond Ridge in western Morris County, is one of these. Further to the north, the report of six pairs in the Ramapo Mountains (five at Yawpaw) in western Bergen County seems to show a slight movement to the east. The only other reports for the rest of the region are from northern Rockland County and northeastern Westchester County in New York. The former has six known pairs at Bear Mountain at an altitude of 1,000 feet. A pair was seen throughout June and most of July in a mountain laurel (*Kalmia latifolia*) thicket at 700 feet elevation in the Poundridge Reservation in 1940 by Wheeler. No nest was found, and this was the first time the species had been recorded there in the breeding season.

This tendency to favor the mountain laurel has been remarked on before and seems to be pretty well established. However there are hundreds of acres, perhaps thousands, of woodlands in our area with this plant as the dominant under-growth. These woodlands are of all sorts, wet and dry, level and hilly, thick and thin, so that if laurel was the only requirement it could be met in numerous areas where this species has never bred and would not be expected to breed, on the basis of our present experience. The limiting factor for this species is something not so obvious and probably will have to be found in a close analysis of its habitats in the optimum areas as well as on the fringe of the range. The only easily noted difference between the areas used here and those not used is that the average temperatures, which the species favors at moderate altitudes, are considerably lower than those of the rest of the region.

BOBOLINK

(*Dolichonyx oryzivorus*)

It is felt that this species has increased in numbers since Griscom's time, but, because of the lack of any true standard of comparison, it is impossible for us to say so with certainty. The same tendency to move away from the city in the face of the ever advancing suburbs, on which Griscom (*op. cit.*) remarked, is still noticeable. Also noticeable in the present survey was a marked habit of occupying a field for several seasons, and then abandoning it while condi-

tions remained about the same and apparently just as suitable. Since this species nests in open areas, which are usually of a uniform plant association, it is possible to describe its chosen habitats in fairly good detail. The returns showed it to be breeding in at least 45 localities within the region but, with the exception of Long Island, it is felt that this does not include the total population, because the reports from northern Westchester and northwestern New Jersey on this species were rather incomplete. The total number of pairs, which are given in the estimates sent in, was a little over 250 pairs. This might seem low for a small bird which is considered to be not uncommon. However, both the habitats used and the conspicuousness of the breeding males in their flight song make it one of the easiest birds to spot even by casual or transient birders. These characteristics should yield a much higher number of observations of this species than would an equal number of such birds as the Henslow's (*Passerherbulus henslowi*) or Grasshopper Sparrows (*Ammodramus savannarum*) in the breeding season. There seems to be no particular range in our region for this species, but its distribution is spotty, because its favored habitats are so located. An analysis of the breeding stations known for it indicates that no less than four environmental types are used in nesting. All agree in being open, nearly level areas covered with low grasslike vegetation.

(1) The first type is a purely natural one, that of parts of the Hempstead Plains, a natural prairie, the remnants of which are still found in central Nassau County on Long Island. The word 'parts' is used because the areas presently available for study are not entirely uniform, and the Bobolink uses only one type. The prairie can be divided into three general floral areas or sub-types, all of them dominated by the beard grass (*Andropogon scoparius*). (A) Where the black-jack and post oaks (*Quercus Marylandica* and *Q. stellata*) grow to a good size, the prairie is of course not used. (B) The second sub-type is that entirely dominated by the grasses to the exclusion of any bushy vegetation. This is not used by Bobolinks, and may be likened to the poor fallow fields which they do not favor either. (C) The last sub-type on the prairie is that where the gray birch (*Betula populifolia*), Dwarf and Scrub Oaks (*Quercus prinoides* and *Q. ilicifolia*) grow, the former sometimes to a height of several feet, and the two latter in large patches rarely over a foot or perhaps a little more high. The only nest of the Bobolink, which the author ever found in this subtype, was next to an isolated birch. It would appear that the bushes were necessary not only for song perches, but also for shelter. The only Bobolink colonies on the prairie were in the third subtype.

(2) The second environmental type in the region is also to some extent a natural one, but it is probable that the action of man has made this more favorable than it was originally. It consists of the upper, usually brackish portions of salt marshes. In the Newark marshes, the late Charles A. Urner noted an increase in the numbers of this species as the marsh was progressively dried up by the ditching and drainage operations. John Mayer recorded the start of a colony at Idlewild in 1936 which is still in existence. Whether this was merely one of those irregular movements noted in the first paragraph of the discussion of this species, or represents an improvement of habitat due to ditching and drainage operations, our present data cannot allow us to determine. The stations of this type are mainly along the south shore of Long Island on the landward side of the big bays. However in this habitat, the Bobolink—at least in the smaller colonies—has a habit of moving into an area, occupying it for several years and then deserting it, all without any apparent change in vegetational conditions, amount of moisture, etc.

The last two types to be discussed are entirely man-made, and there the bird is entirely dependent on man for the maintenance of a particular station. They are so nearly alike that they could be discussed as one. The only reason they are separated is because the processes, which create them, are different.

(3) Along the south shore of Long Island, from Southampton to Amagansett, the large potato fields are planted with a winter cover of grass. When it is decided to allow a field to lie fallow through the following spring and summer, it is covered during those seasons with a rather sparse growth of grass, free of those weeds which so quickly creep into fallow fields elsewhere on the island. With few exceptions the colonies of this species in this section of the south shore nest in these fields. Since these fields are rather intensively cultivated, it is rare that they lie fallow two years running and consequently the colonies have to shift frequently.

(4) Along the north shore of the island, from Roslyn east to Smithtown, the fourth type is found—the lush grassy upland fields, which are probably typical of most of the stations in Westchester and inland New Jersey. All those known on Long Island are in dry situations, but it is probable that with the different topographical conditions in the rest of the area a large proportion of such stations are near streams or lowland marshes. These stations on Long Island are located without exception on large estates, which are usually kept as showplaces or operated by gentlemen farmers. In either case parts of such estates are kept as extensive grassy fields, often merely for

scenic purposes, often for hayfields. Unless positive action is taken every few years to maintain them in that condition, these fields usually deteriorate into weedy areas, or a succession will start to cover the field with bushes and small trees. Either happening will spoil such tracts for this species. These colonies are also extirpated by mowing, grazing, or turning the grass under for crops.

It is felt that it would be futile to name specific breeding stations when so many factors (including the whims of the birds themselves) mitigate against their re-appearance over successive seasons. Consequently a detailed description of the habitats used should be of more assistance to those searching for a colony. It is not claimed, however, that wherever such habitats occur, there will be found Bobolinks. So far as we can now tell, the species occupies only a portion of the available area in any one season.

ORCHARD ORIOLE

(*Icterus spurius*)

It is doubtful if the status of this species has changed much since Griscom wrote it up in detail in 1923. However, because of the more widespread coverage, we now know that it breeds nearly all along the north shore of Long Island, sometimes in the interior, and a little more frequently on the south shore. We also know that, while it is local in Westchester, it cannot be classified as 'rare and irregular' there. Starting from the extreme eastern end of our area, this bird breeds on Fisher's Island and Gardiner's Island quite regularly, though only a pair or so at each place. The same holds true of the north fluke of the east end of Long Island where there are three stations for it. The harborless and unbroken stretch of shoreline along Long Island Sound from Mattituck to Miller Place is apparently unoccupied, but from there to the City's suburbs at Beechhurst scattered pairs can be found, mostly close to the shoreline or some fresh water. A few scattered pairs have been found in the interior of the island from Deer Park west to Hicksville. There seems to be a regular station for it at Massapequa on the south shore, and possibly another one at Brookhaven. The total number of locations is 28, and the total number of pairs about 40. In Westchester, the number of reports is only four and the number of pairs six, but according to John L. Bull, Jr., the Orchard Oriole is local along the sound shore and along the stream valleys in the southern portion of the county. In New Jersey reports were received from 16 localities totaling 30 pairs. Most of these were from the northeastern portion of that section and show the same scattered population which Griscom (*op. cit.*) mentioned. It is interesting

to note that as one goes south, the reports include a progressively larger number of pairs in a locality, indicating that there is a steady increase of density southward.

The descriptions of habitat given in the returns indicate that this species is at present nearly always found in the following disclimax types; rural estates or villages, well planted suburbs, parks, orchards and nurseries. This is so often the case that one is led to wonder what niche the Orchard Oriole occupied in the primeval woodlands which at one time covered most of the area. The present land-use in a large part of the area has greatly decreased the number of orchards, but at the same time increased the number of nurseries which seem sometimes to make an acceptable substitute. All the inland records noted on Long Island have been away from any water, but have been in nurseries. If there are pear orchards in the vicinity, this species seems to prefer them to apple or peach. Aside from the records just mentioned, the overwhelming majority were from locations in the vicinity of water. The water ranged from small streams and ponds through rivers and lakes to the salt waters of Long Island Sound. The majority also indicated that this species was quite regular and usually bred in the same location each year. Others claimed that the bird was irregular from year to year. An analysis of the various returns showed that most of those, where the birds did not return to breed the next year, were where *fresh* water was absent. This included the inland nursery stations mentioned and a great many of those along the Sound shore. The writer's personal experience at Huntington has been along the same lines. There some birds nested in a park with a brook running through it, while others were in the pear orchards some distance inland, away from any water other than a mudhole. Still others were on estates fronting on salt water, without any ponds near-by. The only birds that can be located every year are those along the brook. Along shore the birds seem to desert and move out completely, but if enough shoreline is worked, the species will usually be picked up at some entirely different place. Occasionally, however, a group of pairs along shore will persist at a station from year to year. This is the exception, not the rule. The returns from Long Island probably include a very high percentage of the total population. The reasons are that this species occupies areas where it is easily found, especially when in song, and that the main areas occupied are summer residential areas, which are thus well covered at the best time of year to record the oriole's presence.

CARDINAL

(*Richmondia c. cardinalis*)

The history of this bird in our region is most interesting. In 1922, when Griscom was discussing its status, he could record only two definite locations for it, both in Union County, New Jersey, one at Plainfield and the other at Elizabeth. According to him, it had apparently bred as far west as Morristown at one time, and as far north as Englewood Cliffs. As for the rest of the region, it had never been found breeding in the Bronx-Westchester area and had not been found, except as a visitant, for many years in Central Park and on Long Island. Staten Island was briefly dismissed with the statement that it was *probably* extirpated there. This shrinkage of range Griscom unequivocally attributed to the rapid advance of the suburbs, with its consequent clearing of woods and thickets, which he said, either destroyed the bird's haunts or rendered them uninhabitable. It is probable that in the case of Central Park and Long Island this was so. In the area lost in northern New Jersey, events since then render another explanation necessary.

The returns received by this committee show definitely that the withdrawal in New Jersey was only a temporary one and also that the Cardinal has now moved beyond the original range described for it by Griscom. Because of the manner in which it has done so, it is best to describe it in some detail. The New Jersey records, which were received, listed 16 localities for it with a total of about 40 pairs. As it would be expected, the greater density is shown at the more southern localities. As we go north, only a pair or two are reported from a station. The movement from the Union County stations has been to the north, so that eastern Essex County is fairly heavily populated, extreme eastern Passaic County less so. There were seven stations recorded from eastern Bergen County, totaling 9 pairs. The majority of them were in the Hackensack Valley and back of the Palisades. The westernmost station, also northernmost, was at Park Ridge. The northward movement was not stopped by the state boundary, however, and now a few scattered pairs can be found in southeastern Rockland County, mainly in the vicinity of Nyack. Just when or how the next step was taken, we cannot say but about 1924 this species was found breeding at Scarsdale in southern Westchester County. Historically speaking, this represented the first step into never before occupied territory east of the Hudson River. Since 1931, it has been found at Scarborough in central Westchester on the east bank of the Hudson. In 1937 it was found at Chappaqua, a few miles to the east, and in 1939 there were 3 pairs there. No other stations for it

were found until 1940 when it was found at three definitely new spots. They were Croton Point, a few miles north of Scarborough, Grassy Sprain and New Rochelle in extreme southern Westchester, the latter on Long Island Sound. Except for the Scarsdale record, we could map out a nice movement coming into the county from across the Hudson and going east and then south nearly to City limits. The only breeding locality not yet mentioned is Staten Island where this bird is said to be fairly common, with no venture as to the number of pairs. We have no data on the status between the time of Griscom's book and the present time. Consequently we are not in a position to say whether it moved out and then regained the area. It seems rather remarkable that it could stage a comeback there in the face of the steady destruction of habitat, which is supposed to have driven it out, and which is still continuing there. There is one direction however, which in the writers' opinion, has been closed to the Cardinal by the destruction of habitat. That is directly east to Brooklyn. There, there is now such a wide belt of unsuitable territory that it seemingly forms an insuperable barrier to this species, and prevents it from recovering any part of western Long Island, though wanderers are not infrequently recorded in that area. There is probably considerable suitable habitat still left in northern Nassau County and, if it is ever occupied naturally, it will probably be by birds from southern Westchester across the Sound. The word, 'naturally,' is necessary here because experiments have been started in the vicinity of Roslyn in releasing trapped birds brought in from a distance in an effort to establish them in a wild state there.

The chosen habitat of this species in this region seems to conform to that used throughout most of its range, but there are large areas of seemingly suitable country which it does not use and has not yet occupied. It is generally considered to be increasing, however, and perhaps some or much of this empty area will be taken up in the near future.

SUMMARY

These studies are based on returns received as a result of a coöperative survey conducted by the Field Work Committee of the Linnæan Society of New York among all known persons interested in birds in the New York City region, both members and non-members of the Society. They attempt to present the true status of the species chosen, in number of pairs rather than use the often misleading terms such as 'common' and such. The survey discloses that several species have unusual habitats in the areas, some of them directly or indirectly man-made. It also discloses that other species are irregularly distributed

and do not fully occupy the seemingly favorable habitats within the region. In other words we cannot say, on the evidence submitted, that certain species will be found breeding wherever a seemingly suitable habitat is found for them. This is true, not only of species which are here on the northern or southern edge of their ranges but also of several for which this region is considered to be well inside the main breeding grounds.

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General Notes

The inclusion of General Notes is a vital and growing part of the Society's Proceedings which its members should note with interest. The published material, which follows, however, undoubtedly represents but a small fraction of the many valuable observations in the field made by members and still unpublished. These do not necessarily have to be restricted to those occurring within the past year. Local migration routes, roosting habits, distribution, very rare faunal records, behavior notes—fragments like these are wanted. Members, who do not have access to library facilities, should feel no compunction in asking the editorial committee to check their manuscripts against literature already published.—THE EDITOR.

Hawk Migration Routes in the New York City Region.—The subject of the routes followed by various species of birds in their migrations has been responsible recently for much discussion and not a little published material. This is a natural outgrowth of our coming of age in our migration studies. The question of when a species migrates, with proper allowance for variations of the particular year, has long been an established fact. We are now well into the "where" stage and are beginning to enter the "how". No group of our local birds offers more opportunity for the study of routes and methods of migrations than the hawks. Large, conspicuous and entirely diurnal in their movements, they twice annually pass our region in greater numbers than the average local field student realizes. In order to appreciate this latter fact, he must learn to watch for hawks and upon discovering the best localities, visit them regularly under proper flight conditions. Since 1937, members of the Urner Ornithological Club in New Jersey have been actively watching the spring and fall hawk flights in the northern half of the state. As a result the picture in this area has been fairly well blocked in. This note is published herewith to sketch roughly for students in other sections of the New York City region the present knowledge of these flights with the hope that they will become sufficiently interested to complete the picture in their own areas.

The fall flight regularly begins in late August and continues for the next three months. Three flight lines are well known to cross the state of New Jersey and a fourth undoubtedly does also. Because of its proximity to the metropolitan area, the best known of these is the

Watchung flight. This one is really "double-jointed," because two entirely different types of migration can be expected along this route—a ridge flight and a cross-ridge flight. It is best observed along the first ridge at "the Quarry" above Upper Montclair, but can be seen in part at least at various points along the first and second Watchung ridges in Essex and Union Counties.

The second flight line enters the state southwest of Mt. Peter and follows along the Highlands. This route is an old favorite of the hawk shooters, and good spots for observation are Breakneck Mountain, Stag Lake, and the Bowling Green fire tower.

The third flight line follows the long Kittatinny Ridge across the state from High Point to the Delaware Water Gap. This, of course, practically the same flight that has made Hawk Mountain near Dreherstown, Pa., famous, the Blue Ridge of Pennsylvania being but a continuation of our Kittatinny.

The fourth route has not been adequately observed in northern Jersey but it is at once obvious that it must pass quite near New York City, since a distinct flight along Long Island's south shore and outer strips and a similar one along the outer strip in Ocean and Atlantic Counties, N. J., are undoubtedly made up of the same birds. Many of these eventually form part of the Cape May flights.

The spring flight always commences even in backward seasons by early March and continues through May. Less field work has been done at this season, and most of the observation has been along the Watchungs where a ridge flight with numbers of birds nearly comparable to fall has been noted. The relative numbers using the second and third routes remain to be determined, and data on the fourth route are almost non-existent.

Reference was made above to the two types of hawk migration observable at Montclair. These are (1) a flight composed of birds following along the ridge and utilizing the up-currents generated by winds striking the sloping sides of the ridge; and (2) a flight of birds circling upward on thermals until the updraft is exhausted, then gliding on set wings in the direction of migration with a gradual loss of altitude until another thermal is reached. A third type of migration has been noted—birds progressing with an alternation of flapping and gliding at high altitudes. This apparently occurs more often in spring and usually takes place over hilly country.

These three types are predicated upon a single apparent fact pointed out by James L. Edwards whose keen insight and interpretations have proved invaluable in this study. This is simply that hawks constantly endeavor to move along their migration routes with the

least expenditure of energy in wing motion, and they accomplish their purpose in a remarkably efficient manner by adopting their mode of flight to conditions of weather, wind, and local topography. Knowing the New Jersey flight lines and the types of migration employed by the hawks, the observer in other sections of the New York City region can feel prepared to do the necessary field work that must be completed in order to prove our theories as to what takes place in other areas. When New Jersey's hawk enthusiasts gather, their conversation usually gets around to what is happening north and east of them, and it often tends along the following hypothetical lines.

From the observations of field workers in New Jersey, it is apparent that there is a southwestward drift of hawks in fall across southeastern New England. As we get further westward their numbers increase. Long ago in *The Auk* the hawk flights at Fisher's Island, New York, off the Coast of the southeastern Connecticut, were brought to the attention of ornithologists. In the northwest winds, many of these birds get across Long Island Sound to Long Island, particularly the coastal preferring species—Falcons, Accipiters, Marsh Hawks (*Circus hudsonius*). These birds are well known migrants along Long Island south shore beaches. At Morgan, New Jersey, on the south shore of Raritan Bay, hawk gunners formerly found good shooting, particularly of Sharp-shins (*Accipiter velox*). Probably these birds are an integral part of Long Island flights, but the route followed between points remains largely speculative. Remembering that hawks as well as species with lesser powers of flight are wont to cross bodies of water at their narrowest width, bird students in Kings County, in Manhattan, and on Staten Island should be able to discover the route employed. In spring under favorable weather conditions, it is suspected that the northward moving hawks may use the "outside" route from Sandy Hook to Rockaway Point but more work is needed to support this interesting conjecture.

The bulk of the birds probably do not cross the Sound but continue across Connecticut, Westchester, and The Bronx to New Jersey. At Montclair many of these birds approach from the direction of the George Washington Bridge and make up the cross ridge flight under favorable conditions, or they may turn and follow the Watchung ridges, if these are reached during northwest winds. The exact route followed across western Connecticut, Westchester and The Bronx remains to be worked out by watchers in those areas.

What happens to the migrating hawks at Mt. Tom, Massachusetts, in the fall flight? These birds probably cross New Jersey on one of the more western routes but we are not at all sure of this. Here is an

opportunity for students up the Hudson River Valley, in the Ramapos or in the Shawangunks to work out the flight lines there and perhaps furnish us with the missing links in the chain.

It cannot be too strongly emphasized that incidental or casual hawk watching will fail entirely or at best give us no more than a smattering of information on the best routes. The observer should spend his time at some advantageous lookout and watch the sky, remembering that brisk to strong winds blowing against slopes generate ridge-type flights and warm sunny days with thermals (best located by watching cumulus clouds which are the tops of these thermals) generate flights of the circling-gliding type. He should watch the weather and remember that, generally speaking, westerly winds usually mean some to many hawks and easterly winds few to no hawks. Hawk watching is highly contagious. Observation of one good flight is often all that is needed to make the otherwise indifferent birder a devotee.

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ALFRED E. EYNON.

Local Roosting and Migration Routes near New York City.—

There appears to be increasing agreement among migration watchers in the New York City Region that a number of extremely interesting flight lines can be mapped by a coöperative effort. Herewith then are a few that the writer has observed in or near New York City.

(1) Departure of Greater Scaup Duck from the East River in spring. *Nyroca marila* is well known to bed down in large numbers (25,000-50,000) in or near Eastchester Bay both in winter and in spring. On April 9, 1933, A. D. Cruickshank, R. A. Herbert and the writer observed approximately 1,000 of these birds cross the Hudson River in a west by northwest direction. The birds were grouped in flocks of 20 to 100 and quite evidently started from the general vicinity of Eastchester Bay. The flight was first noticed at 5:44 P.M. and was still in progress when visibility ceased at 6:44. Scaups were seen crossing the river as far south as the George Washington Memorial Bridge and as far north as Yonkers—a distance of about 2½ miles.

(2) Departure of Canvas-back in spring. *Nyroca valisineria*, which winters in various bays on the East River, apparently uses the

same general flight line as the Scaup above. A flock of 20 were seen among the Scaup on the date previously mentioned.

(3) The Hudson River has been well described by Griscom (1923) as a highway for waterfowl. It is also used in spring by Ospreys (*Pandion haliaëtus carolinensis*), Duck Hawks (*Falco peregrinus anatum*) and Sparrow Hawks (*F. sparverius*). In the writer's experience the lower part of the river, say from Ossining south, is too wide to permit daily crossings by Starlings (*Sternus vulgaris*) to and from communal roosts. Purple Grackles (*Quiscalus quiscula*) regularly cross it, however, during the spring, Bronx birds passing each evening from Manhattan to Fort Lee or points farther south.

(4) Bronx to Long Island is probably a standard route but very little inter-change of birds has been directly observed. There are apparently no communal roosts of Eastern Crows (*Corvus b. brachyrhynchus*) or Fish Crows (*C. ossifragus*) now in Bronx County or lower Westchester. These birds regularly cross Long Island Sound near City Island and at other points to the north. On January 25, 1936 they were seen to reach Manhasset Neck about $\frac{1}{8}$ mile in from Barber Point. At 11:05 A.M. on the same day, a single Eastern Goldfinch (*Spinus t. tristis*) crossed the East River to Long Island from Ferry Point despite a westerly wind of 14-24 miles per hour. On the following day 9 Northern Horned Larks (*Otocoris a. alpestris*) apparently made this same journey in the A.M. when there was but little wind.

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JOSEPH J. HICKEY.

A Local Migration Route of the Barn Swallow.—On August 10, 1941, the writer, in the company of Mr. John Bull, Jr., and Dr. Oliver K. Scott, spent the day in a small fishing boat at the entrance to New York Harbor, most of the day being spent about four miles south of Fort Wadsworth. Throughout the entire day a steady flight of Barn Swallows (*Hirundo erythrogaster*) was noted crossing the Lower Bay, apparently leaving Long Island from Rockaway Point and flying west to Staten Island. Single individuals flying from two to twenty feet above the water passed by the boat at the rate of one bird every few minutes. The day was clear and cool, and a moderate northwest wind was blowing.

This observation would appear to indicate a definite migratory movement of Barn Swallows over a recognized local flight line.

HUSTACE H. POOR.

Autumnal Migration Counts in Central Park.—Herewith are the total individuals which I recorded in five years of regular observation in Central Park, New York City, August-October inclusive. As the popular names of the birds listed here conform to those in the A. O. U. Check-List of North American Birds (Fourth Edition), the scientific names are omitted.

	1934	1937	1939	1940	1941
Mourning Dove	3	1	0	1	1
Eastern Belted Kingfisher.....	3	3	4	3	5
Olive-sided Flycatcher	3	2	1	1	1
Eastern House Wren.....	1	1	2	1	0
Veery	7	1	14	4	8
Blue-headed Vireo	1	1	5	1	0
Black and White Warbler.....	16	20	27	20	29
Golden-winged Warbler	0	4	1	2	1
Blue-winged Warbler	2	14	3	8	6
Tennessee Warbler	1	1	10	8	9
Nashville Warbler	2	4	10	1	6
Cape May Warbler.....	4	0	10	10	1
Blackburnian Warbler	2	2	4	1	1
Black-poll Warbler	51	x	197	33	39
Western Palm Warbler.....	3	2	19	8	7
Oven-bird	3	1	4	4	7
Wilson's Warbler	3	3	14	5	6
American Redstart	50	64	107	94	88
Scarlet Tanager	0	2	3	6	5

x—Not counted.

This list of selected species shows remarkable regularity in the case of some species from year to year, and divergence in others. The amount of observations in each period was approximately the same, about 15 trips of 1½ hours' duration being made each month. The time per trip given is an average figure which tended to be less in August and October, and more in September.

GEORGE CARLETON.

Some By-products of Bird Banding.—For doubtless far the greater number of banders, bird banding involves two main objectives, getting bands on as many birds as possible and securing the greatest possible number of returns or recoveries. The great mass of banders have barely enough time available for this activity to band, to keep their records and to transmit the necessary data to Washington. Not for them are the specializations which involve time and labor many times greater than merely banding and recording. They help, however, to swell the data of the Fish and Wildlife Service, and their records

are available to the analyzers. Though the routine of the mere bander may seem drab compared to the performance of the specialist, it nevertheless brings him many side gleanings without materially greater time expenditure.

As an aid to those interested in knowing what birds are near-by, when one is closely limited in available time for investigation, it is surprising what revelations may be found in the traps, of birds that might otherwise go unnoticed in the neighborhood. Wilson's (*Wilsonia p. pusilla*), Connecticut (*Oporornis agilis*) and Mourning Warblers (*O. philadelphia*), Northern Water-Thrushes (*Seiurus n. noveboracensis*) and many others have been taken in our traps although not otherwise observed, either before or after the trapping record.

The number of a given species, which visit a small area within a comparatively brief period, would never be suspected were it not for the figures which the banding record shows. In the second half of 1937 we banded 134 Catbirds (*Dumetella carolinensis*) in an area about 100 by 200 feet. Strangely enough the distant recoveries of Catbirds do not compare with those of Brown Thrashers (*Toxostoma rufum*), of which we do not band half as many. Our old friend, Ludlow Griscom, reported that Catbird A261858, which we banded August 17, 1931, broke its neck by flying against a window at Riverdale, N. J., July 26, 1933. Number 38-134003, banded June 25, 1938, was killed by a motor vehicle at Teaneck, N. J., August 11 of the same year.

We used to suppose that flocks of about 50 Purple Finches (*Carpodacus p. purpureus*) remained about our feeding stations a good part of the winter until banding showed that few of the individuals remained over a week, departures being offset rather evenly by new arrivals.

Not exactly *by-products* of banding are the unexpected, striking recovery records. A Crow (*Corvus b. brachyrhynchos*), banded as an adult by the writer, American Bird Banding Association band 23021, at Tabusintac, New Brunswick, June 22, 1917, was reported as found dead by Tice C. Lobbrecht at Paterson, N. J., October 21, 1924. A little more than seven years after its banding many hundred miles from the home of the bander, this Crow came to about fifteen miles from the bander's back doorstep to register its final record. Incidentally, this was perhaps the first definite record that a Crow summering in New Brunswick visited New Jersey on its winter journey.

Mr. and Mrs. Frank W. Commons placed band number 84691 on a Junco (*Junco h. hyemalis*) at Crystal Springs, Minnesota, October 13, 1923; this bird was taken in one of our traps, January 9, 1926, one of our first striking experiences of diagonal cross-country flights.

A quite puzzling question as to why Myrtle Warblers (*Dendroica coronata*) exceed in numbers almost all the other eastern warblers combined, or if they do not, why it appears that they do, is accentuated by banding. In an area not more than 100 feet square, Keahon Garland banded 714 of these birds in the single month of October, 1938. Myrtle Warblers were no more abundant in that one little area than they were over vast stretches of similar terrain.

Bearing much the same relationship to other finches that the Myrtle does to other warblers is the Purple Finch. Six hundred and sixty-one of these represent our banding record for one winter in the same small area referred to above. Other banders did much better and we could also, if other compelling matters permitted us to devote full time to it. Purple Finch 66137 was retrapped by us February 12, 1923, and 66146 March 12. Both were banded at the Connecticut Audubon Society's bird sanctuary at Fairfield on January 22. Obviously they did not travel from Fairfield to Demarest in the same company. The second bird could never have neglected sunflower seed bait so long. Yet, either they followed the same course or, at least, they arrived at the same destination. As a by-product, banding suggests many questions for which the answers are not yet possible!

B. S. BOWDISH.

Report on the Wyanokie Bird Census 1934 to 1940 Inclusive.—

In 1933, the late Warren F. Eaton made an excellent report (1934) on the Wyanokie Bird Census from the time it began in 1916 up to and including 1933. The following report completes the record for twenty-five years during which the census work has been carried on. As the popular names of birds mentioned conform to those in the A. O. U. Check-List, scientific names are omitted for those species discussed below.

ECOLOGY

Since Eaton's report (*op. cit.*) on the environmental conditions of the section in which the census has been taken, there has been little change. The major change before 1933 was the construction of the great Wyanokie reservoir and the destruction of farm buildings along the reservoir. Some of the land which had been cultivated was allowed to revert to a wilderness, and a considerable portion was covered by water. The only change which has taken place in the last seven years is the increased growth of the trees in the forested area and some more brush in the areas abandoned to the wild. There has been no decrease in the amount of land under cultivation.

CHANGE IN NUMBERS

The Eastern Purple Finch and the Black-bellied Plover are the only species added to the totals given in Eaton's report (*op. cit.*). These may be considered migrants. This makes a total of 116 breeding species and 26 migrants or non-breeders for the entire twenty-five years.

The effect of bad weather conditions on the number of individuals reported in 1938, 1939 and 1940 is very noticeable. In those years, during the hours devoted to the census, there was rain, fog or heavy clouds. In such weather birds do not sing to the extent they do in sunny weather. Since the census is based largely upon the number of birds heard singing on a single day, the effect of weather is easily understood. The number of species, however, is not changed appreciably. In the following tabulation both numbers of species and of individuals are shown for the seven years covered by this report:

Year	1934	1935	1936	1937	1938	1939	1940
Species	84	90	84	86	82	78	89
Individuals	2,029	2,538	2,536	2,424	1,724	1,417	1,788

In table I, a comparison has been made of average numbers of individuals of leading woodland species for the first eighteen years and the last seven years. An analysis of some of these comparisons may be of interest. The notable increase in Pileated Woodpeckers may be explained by the increase of woodland areas in much of northern New Jersey and adjoining New York State. Marginal lands have returned to brush; brush-land to forest and the trees have grown larger. This increase has been noted in other sections near the Wyano-kie area. The large increase in Scarlet Tanagers may be due to much the same reasons. The most striking change has been the loss of an average of 59 Oven-birds. This seems to indicate that they are more influenced by bad weather conditions than many other birds and do not sing as much. Only 92 were recorded in 1939 when the weather was very stormy as compared with 240 in 1935 when the weather was favorable. Ninety-six were noted in 1938 and 101 in 1940, both on bad weather days. The year 1939 was especially bad and affected the results of the census by making a new low record in number of species and of individuals in the case of most species.

TABLE I

Comparison of Average Numbers of the Leading Woodland Birds

	Average 18 Years	Average 7 Years	Gain	Loss
Ruffed Grouse	12.3	8.5	.....	3.8
Pileated Woodpecker	1.5	8.4	7.35	.....
Eastern Hairy Woodpecker	6.7	8.9	2.2	.....
Northern Crested Flycatcher	59.8	63.	4.8	.....
Eastern Wood Pewee	25.2	16.8	.....	8.4
Wood Thrush	37.7	41.7	4.	.....
Red-eyed Vireo	197.8	201.2	3.4	.....
Black and White Warbler	116.4	106.4	.....	10.
Worm-eating Warbler	61.1	58.5	.....	2.6
Oven-bird	219.	160.	.....	59.
Hooded Warbler	49.4	57.1	7.7	.....
American Redstart	100.4	92.	.....	8.4
Scarlet Tanager	81.	97.1	16.1	.....
Totals			45.55	89.2

A comparison of numbers of other birds shows few significant changes. Among them are the following: The Northern Cliff Swallow shows a loss of from 60.7 to 27.2. The 1940 count recorded only one pair. The barn on Noble Rhinesmith's farm has had most of these birds. As he encourages them to nest on his premises and other factors seem to be the same as for the previous years, I can offer no explanation of their disappearance. The Barn Swallows, on the other hand, have increased from an average of 31.6 to 69.8. While much of this increase has been very noticeable in the barn on the Rhinesmith farm, the increase is found in much of the open country covered by the census. The Eastern Crow shows a large decrease, perhaps due to the lessened area of farm land caused by the construction of the reservoir.

SOME SUGGESTIONS IN REGARD TO BIRD CENSUSES

A study of the Wyanokie Bird Census over a period of twenty-five years has given the writer some ideas in regard to methods of taking bird censuses.

1. The methods used at Wyanokie give a fairly accurate picture of the number of *species* in this area. The number of individuals is only approximately correct and may serve to show trends of bird populations when the census is taken over a long series of years as in this case.

2. A much more accurate count of *individuals* is possible if the following suggestions could be carried out:

(a) The census should be taken over a period of at least a week and on the *same* dates each year. This would, in large measure, do away with the variations due to weather conditions.

(b) The *same* observers should be used each day of the week and each year. These observers should be the best obtainable who can identify birds both by ear and by sight.

(c) Each group should cover the same section of territory each day of the week and each year.

(d) A census group, covering a fairly long trail, should consist of an observer, a guide and a recorder.

(e) There should be a sufficient number of census groups to cover the territory thoroughly.

It is realized that these suggestions are impossible to carry out under the conditions obtaining at Wyanokie. The census is made by volunteers and most of these have leisure for the purpose only on week-ends. The number of volunteers varies from year to year both in numbers and in quality. Probably only a paid body of observers, connected with some institution, such as the American Museum of Natural History, could carry out such a census.

———. 1931. *Check-List of North American Birds* (Fourth Edition).

EATON, W. F. 1934. Eighteen Years of Wyanokie (1916-1933). *Abst. Proc. Linn. Soc. N. Y.* 43, 44:14-26.

JULIUS M. JOHNSON.

Additional Remarks on the Wyanokie Census.—Warren F. Eaton in his report (1934) pays a tribute to the various participants in the Wyanokie Census. But, with the completion of the twenty-five year period inaugurated by Prof. Will S. Monroe in 1916, an additional word of appreciation should be expressed.

Year after year, a small group of enumerators has formed the nucleus for the census, thus, in a few instances, covering the same trails as they covered in previous years. But new recruits have necessarily been added to take the place of others who have been obliged to drop out. To the faithfulness and enthusiasm of these enumerators are due the reports of Warren F. Eaton (*op. cit.*) and Julius M. Johnson (1941).

Guides from the New York Section of the Green Mountain Club have kept each enumerator and his recorder to the allotted trail, so that

variations from year to year in this respect have been reduced to a minimum.

In recent years, as a memorial to Prof. Monroe, the New York Section of the Green Mountain Club has voted from its treasury funds sufficient to cover the expenses of the commissary department. This department, which for many years has included some former students of Prof. Monroe, has faithfully assumed responsibility for the Saturday evening meal, the three A.M. rising on Sunday morning, the breakfast served by candlelight, the start before dawn, the trail lunch, and the noon-day meal served after the trails have been covered. Without all this faithful service, the census as conducted for the twenty-five years would not have been possible.

After each census, a report has been sent to the United States Bureau of Biological Survey, and each year, an acknowledgment has been received, expressing appreciation of the work which has been carried on in the area covered. Frederick C. Lincoln, in charge of the Division of Wildlife Research, as the department is now designated, urges that we continue the census as many years more as possible, thereby adding to the value of the data thus collected.

The Wyanokie Census will therefore be continued with such improvements as can be made in its operation for one day in the year. The coöperation of the helpers who have so faithfully served in the past, with the addition each year of new enthusiasts, will insure such continuation.

EATON, W. F. 1934. Eighteen Years at Wyanokie (1916-1933). *Abst. Proc. Linn. Soc. N. Y.* 43, 44:14-26.

JOHNSON, J. M. 1941. Report on the Wyanokie Bird Census 1934 to 1940 Inclusive. *Proc. Linn. Soc. N. Y.* 52, 53:120-123.

LAURA WOODWARD ABBOTT.

A Breeding-Bird Census on the Adirondack Forest.—In 1933 and 1941 I took a breeding census of an area of perhaps 40 acres in the Canadian zone of the Adirondacks, altitude about 800 feet, near Elizabethtown, N. Y. The area is mixed deep woodland, second growth, and overgrown meadows with no water. Conspicuous trees are white birch, sugar maple, white pine, red spruce, hemlock, and poplar. In most cases the count showed very little change. Representative species follow, their popular names corresponding to those in the A. O. U. Check-List. This is not a complete list.

	1933	1941
Broad-winged Hawk	1	1
Ruffed Grouse	3	3
Barred Owl	1	1
Whip-poor-will	1	2
Pileated Woodpecker	2	1
Hairy Woodpecker	1	1
Least Flycatcher	2	4
Black-capped Chickadee	8	5
Red-breasted Nuthatch	2	1
Wood Thrush	1	5
Hermit Thrush	3	1
Veery	4	3
Blue-headed Vireo	2	1
Red-eyed Vireo	11	13
Black and White Warbler	4	3
Nashville Warbler	2	3
Magnolia Warbler	4	3
Black-throated Blue Warbler	3	3
Chestnut-sided Warbler	6	6
Blackburnian Warbler	4	4
Black-throated Green Warbler	3	3
Oven-bird	8	10
Mourning Warbler	1	0
Redstart	3	6
Scarlet Tanager	2	2
Indigo Bunting	3	3
Junco	3	2
Chipping Sparrow	9	9
Song Sparrow	1	1

The area in general has become more deeply wooded, though this change is slight. The Redstart, inhabiting the edges of woods, has increased. The Wood Thrush has largely replaced the Hermit, which prefers secluded clearings. The tract is typical of the Adirondacks at an altitude of 800 feet.

GEOFFREY CARLETON.

Duck Hawk Killing American Egret.—On September 14, 1938, while the observer was watching a feeding American Egret (*Casmerodius albus egretta*) at Jones Beach Sanctuary pond, a low-flying Duck Hawk (*Falco peregrinus anatum*) winged its swift way over the white heron. The closeness of this falcon was immediately apparent to the Egret, for it froze in its tracks, and only relaxed when the dark hawk flew out of sight beyond the tall phragmites. However, the small shorebirds were distrustful of the hawk and flew silently to the other end of the pond. Upon going to the top of the highest

sand dune on the northwest side of the pond, the writer clearly saw the hawk fly by, swing about and again fly over the Egret. The second visit completely unnerved the heron, for it ran aimlessly in the shallow waters of the pond, with no eye for the food that had it so busy a few moments before. The hawk flew a hundred yards past the heron, and settled on the south end of the pond, among the deep grasses and mud clods, where it was completely concealed from view. The Egret now flew up and slowly traced the path that the hawk had taken a few moments before. The fine picture of an Egret in flight was uppermost in the observer's mind, and the hawk was forgotten, when the Egret suddenly careened and flapped madly, white wings flashing. Up from the deep grass like a dark rocket came the Duck Hawk at the Egret overhead. Just as it reached its prey the hawk rolled and struck the Egret full in the breast with its talons. So effective was this surprise attack that both birds plummeted to the deep grass. The only sign of the ensuing struggle was a broad, wildly waving white wing, that was instantly hidden by the grass.

Later, following directions, Mr. A. D. Cruickshank, chased a Duck Hawk off the half-eaten body of an American Egret.

WALTER SEDWITZ.

Feeding Habits of Black-crowned Night Herons.—*Nycticorax nycticorax hoactli* generally feeds by patiently waiting for small fishes to swim within reach of its quick, powerful bill. On the lower Hudson River, however, this species can be often seen coursing along near the shore, exactly as a Herring Gull (*Larus argentatus smithsonianus*) would in search of food. This is especially true along the Palisades Park in May and June and appears to continue throughout the summer. Birds seen doing this have so far all been adults and may possibly be non-breeding individuals. They appear to be searching for small dead fish floating on the surface. Occasionally these herons sit on the water, and one individual was seen to float in this position for about ten minutes. Mr. J. L. Bull, Jr., writes (*in lit.*) that he once saw a Night Heron which not only swam but also submerged itself beneath the surface of the Grassy Sprain Reservoir at Yonkers, N. Y.

At Hunt's Point in The Bronx, there is no question but that these birds will feed on sewage. In this locality immature individuals are more often present than adults . . . and they frequently feed directly at sewer outlets.

RICHARD A. HERBERT.

Golden-eyes Roosting in Spring.—Although *Glaucionetta clangula americana* is well known as a tree-nesting species. I think it unusual to record a pair of these birds roosting high up in a large oak late in the afternoon of March 12, 1937 at Tuckahoe, N. Y. Unfortunately both birds flushed from this tree so that their subsequent actions on their high perch could not be followed. Their identity was checked not only while they were on the wing but also when they settled on a near-by lake. In this region the Wood Duck (*Aix sponsa*) is the only hole-nesting *Anatidae*, and prior to this, the only one I have seen roosting on trees in this region.

JOHN L. BULL, JR.

Aggressive Incidents Relative to Marsh Hawks.—In many cases the Marsh Hawk (*Circus hudsonius*) seems to control the lowlands along the Long Island seashore against intruding hawks of other species during the winter months. Only some such method as banding could prove whether some of the more aggressive of these were raised in the vicinity. In all cases listed below, however, there was an ever-present Marsh Hawk throughout the winter hunting over the same area, and in one case, where gunshot had clipped several primaries from one wing, it was undoubtedly the same individual. The Marsh Hawk's method of slowly quartering the lowlands brings it within range of intruders quicker than if it remained perched so that indignation against the intruder on its winter range may impel it to fight. It is not surprising, therefore, to see an occasional attack made on an intruding hawk. In such attacks I have usually found the Marsh Hawk the aggressor.

On December 27, 1938, a Rough-legged Hawk (*Buteo lagopus s. johannis*) had recently taken up its quarters at Jones Beach. A Marsh Hawk quartering that portion of salt marsh strongly resented the intrusion. With a harsh cry it flew at the Rough-leg which began to circle upward. The broad wings of the latter permitted it to cut a much smaller arc, and it was quite amusing to see the Marsh Hawk, outwitted and outflown, attempt to make up for its lack of wing capacity by flying obliquely upward with several quick wing strokes and then soaring skyward on the momentum, while the Rough-leg circled ever higher. Even this procedure proved unsuccessful, and when some four hundred feet above the dunes, the Marsh Hawk flew off on a long downward slant while the Rough-leg went in the opposite direction. As winter progressed a more tolerant relationship developed and the birds paid little attention to each other.

In mid-January 1937, I was going along the Wantagh causeway when I saw two Duck Hawks (*Falco peregrinus anatum*) engaged in an aerial combat with a single Marsh Hawk. A full gale was blowing and the falcons were diving at the hawk with terrific speed. The Marsh Hawk occupying these meadows had been shot at earlier in the season, and several primaries were missing from one wing. In spite of this, it showed remarkable skill in avoiding the rapid lunging attacks. Dodging adeptly, it avoided injury but got no chance to get in an aggressive blow, and was driven inexorably out of the marshes across the bay to the east where all three birds passed out of sight.

Although resenting the quartering Marsh Hawk's presence, which generally spoils hunting for the perching bird of prey, I usually find single Duck Hawks leaving the scene as if their methods of hunting were interrupted. On an early April morning in 1937, I was examining the extensive Gilgo marshes when I saw a Duck Hawk coming like a streak out of the southeast. I had a full view of my surroundings and watched the magnificent flier swoop and alight, apparently adding an extra foot to a low stub with eye-deceiving rapidity. The bird seemed hungry and its head turned slowly, searching for some moving prey. Before long a Marsh Hawk came along, carefully quartering marsh and dune. As it approached, the big falcon tossed itself into the air and flew at high speed into the northwest. Up out of the marsh stretched the long black necks of a score of feeding Canada Geese (*Branta c. canadensis*) noting the falcon's approach. They immediately flew upward in a startled manner as if to get out of range. From their comparative sizes there should be little to fear, but terror seemed to reign in these birds as they flew with extremely fast moving wings ahead of their small pursuer. As the Duck Hawk reached the geese it dove at the end bird which shot downward for ten feet. The goose, however, recovered its balance and flew on untouched but badly scared. The falcon, not missing a wing stroke, disappeared rapidly from view, while the Marsh Hawk dropping lightly on a field mouse composedly settled itself to its meal.

JOHN JACKSON ELLIOTT.

Feeding Behavior of a Harassed Duck Hawk.—While watching migrants on the Newark (N. J.) marshes in September, 1935, the writers saw a Duck Hawk (*Falco peregrinus anatum*) plunge into a flock of feeding shorebirds and quickly bind to a victim. Without further ado, the falcon carried its prey to a dry part of the *spartina* meadows where it began feeding in the grass. This capture, however, had also been witnessed by a young Marsh Hawk (*Cirus hudsonius*)

which, to our surprise, winged its way over the falcon and dropped. The Duck Hawk eluded this maneuver and took its prize some hundreds of yards away where it recommenced its meal. The Marsh Hawk slowly followed and again attempted to drop on the falcon. The latter once more slipped away. But it had no peace. Chased from its third feeding position, it began to ascend in circles, with the harrier in determined but unavailing pursuit. At a height of perhaps 500 feet, the pursuer gave up the chase. The falcon continued to soar in greater and still greater circles. Finally it faced into the wind and with more or less motionless wings began feeding far above us. For some time we watched it, energetically tearing the carcass apart, drifting with the wind and sending a stream of feathers earthward. Ultimately it disappeared in this position in the haze to the eastward.

RICHARD A. HERBERT
JOSEPH J. HICKEY.

The 'Freezing' Reaction of a Ruffed Grouse.—The following incident, though unsatisfactory in some respects, is given as an interesting example of the 'freezing' behavior with which some birds react to the presence of enemies. It occurred in November, 1937, in Litchfield, Connecticut. I was driving a light truck and upon rounding a curve saw an object, apparently a stone, in the center of the narrow road. I drove to allow it to pass between the wheels. Just as it disappeared beneath the car, it became evident that this was not a rock, but a large bird. I stopped as quickly as possible, and while doing so noticed a hawk circling low above the road about seventy-five yards ahead. The bird in the road was still lying or crouching in the same position and I ran back to see if it was dead or only disabled. When about to pick it up, to my astonishment it sprang into the air in the vigorous manner typical of a Ruffed Grouse (*Bonasa umbellus*). It dodged off through the tops of a plantation of pines and disappeared over a ridge. My thoughts returned to the hawk. Already it was soaring a considerable distance off. Without a glass, I could only identify it as a large *buteo*, probably a young Red-tail (*Buteo borealis*). Apparently while crossing the road or while dusting, this grouse had been surprised by the sudden appearance of the hawk. It at once crouched or "froze" on the spot. Although the moving truck would have ordinarily caused the grouse to fly, in this case it completely failed to produce this reaction, for the bird remained immobile while the noisy vehicle passed directly over it.

DEAN AMADON.

On Piping Plover Feeding.—On June 15, 1941, at the west side of Moriches Inlet, Long Island, the tide on the ocean side of the beach was low, gradient at the water's edge slight, and the wash from the waves ran back leaving a glistening film of water which retreated more slowly from the belt of dark, soaked sand immediately above it. Piping Plover (*Charadrius melodus*) were feeding here, mostly on the bright film area, and at one time I counted some seven of them scattered along a relatively short space. They were moving about in characteristic plover manner, running a few steps, standing like miniature statues, then tipping forward, or turning to one side to do so, seemingly picking something up, and running on again. I noticed that when a bird was standing, its weight was supported on one leg, the other directed slightly more forward was vibrated rapidly with a treading motion, so that other parts of the bird sometimes seemed to quiver. After this had been noticed I found it was at least the rule with all the individuals watched for it. Once a bird did this, it then ran on a few steps and repeated before bending down, but it usually bent to pick something up after each such pause. The obvious conclusion is that the purpose of this 'treading' with one foot was to start small amphipods or what not into active movement at the surface within range.

It would be interesting to know how common such action is with plover. I had never noticed it before, but it is something that would be easily overlooked. Apparently at least one other shorebird feeds in this manner, since E. H. Forbush (1912) describes observing the Solitary Sandpiper (*Tringa s. solitaria*) stirring up algae at the bottom of a ditch or pond with the rapid and gentle movement of one foot in order to catch water insects as they darted away.

FORBUSH, E. H. 1912. *Game Birds, Wild-fowl and Shore Birds*, page 308.

J. T. NICHOLS.

Wilson's Plover Again Nesting in New Jersey.—On May 19, 1940, a number of observers (A. E. Eynon, J. F. Street, etc.) saw two Wilson's Plover (*Pagolla wilsonia wilsonia*) at Beach Haven Point, N. J. I missed seeing these birds at this time and also on a couple of days in June when I returned to search for them. However, on July 10 I saw a single adult Wilson's in such poor light that the sex could not be satisfactorily determined. On July 14 I again visited the Point with J. T. S. Hann of Plainfield, and we found the female with an unfledged young about five days old. They were observed for about 10 minutes under very favorable conditions. The female made no attempt to feign injury, but gave the alarm notes "kip" and

"kikip" repeatedly. As on previous occasions when I have seen young Wilson's in Virginia, I was impressed by the size of its bill. In fact this feature was more conspicuous in the unfledged bird at Beach Haven than in fledged birds I had seen at Cobb Island. No other Wilson's Plover was seen or heard near-by at the time of this last observation.

The unfledged condition of the young leaves no doubt that it was hatched at Beach Haven. This is the second breeding record of this species in New Jersey during modern times.

According to Wilson (1814), the first specimens ever collected were two males and a female which he and George Ord secured on May 13, 1813, at what is now Cape May City. Ord and Titian Peale subsequently found these plovers "pretty common" in the vicinity of Brigantine Beach (north of Atlantic City), observing them also at various places between Great Egg Harbor and Long Beach (Stone, 1937).

There were no New Jersey records between July 17, 1843, when William N. Baird collected a bird at Cape May (Stone, *op. cit.*), and September 15, 1933 when J. Fletcher Street saw a single bird at Sea Isle City (Street, 1935). Subsequent reports indicate that this species is now more or less casual as far north as Brigantine where on June 8, 1935, R. F. Miller, E. G. Reimann, and R. W. and Daniel Smith found a pair with one piped egg (Reimann, 1940).

Repeated efforts to find Wilson's Plover breeding at Beach Haven in 1941 failed, although other observers saw single individuals at various times, and two birds were reported on July 19 by E. and O. Kramer.

POTTER, J. K. 1935. Wilson's Plover at Brigantine, N. J. *Auk*, 42:80-81.

REIMANN, E. J. 1940. Wilson's Plover Nesting in New Jersey. *Auk*, 57:414-15.

STONE, W. 1937. *Bird Studies at Old Cape May* (pp. 378-79).

STREET, J. F. 1935. The Shorebirds of Sea Isle Beach. *Cassinia*, 29:1-17.

WILSON, A. 1814. *American Ornithology* (page 77).

GILBERT CANT.

A Curious Plumage of the Solitary Sandpiper.—On August 4th, 1941, while observing several varieties of shorebirds in the upper pond at Wantagh, L. I., our collective attention was suddenly drawn to a shorebird that flew in and alighted among the Killdeer (*Oxyechus v. vociferus*). We immediately noticed that here was an unusual bird, because its plumage was totally different from any in our memory or any species encountered in our experience. With the morning light at our backs and a battery of 8, 10, and 12-power binoculars focussed on the bird, little escaped our eyes. We approached within 15 yards

of the individual, and while the Lesser Yellow-legs (*Totanus flavipes*), Killdeer, Pectoral (*Pisobia melanotos*), and Semipalmated Sandpipers (*Eureunetes pusillus*) flew and scattered, our bird remained quiet and undisturbed. Generally the bird was dark slate gray on the back and dirty smoke brown on the breast and belly. The extreme underparts were dirty white. The crown was black or very dark grey, the cheeks plain gray. There were no lines, spots, or dots anywhere in the plumage, nor was there an eye ring or eye line visible. The bill of the bird was long and slender, the legs long and gray-green. The bird was the size of a Pectoral Sandpiper.

While straining our eyes for a clue to its identification, another bird flew in and landed within 3 feet of our enigma. This new individual was immediately recognized as a Solitary Sandpiper (*Tringa cethia alba*), but for no particular cause, all the birds flushed, and with them went the Solitary Sandpiper and our dark bird. They both showed the same tail barring, and flew out of sight together.

A little research on the European shorebirds revealed that the counterpart of our species abroad had white upper tail coverts, though being closer in plumage than our Solitary Sandpiper. What makes this bird so unusual is the rarity of either albinism or melanism in shorebirds. Apparently our bird showed presence of the latter. Shorebirds may vary in plumage, but there is always a precedent for this plumage, as in the Ruff (*Philomachus pugnax*) and Sanderling (*Crocethia alba*), but in a sober plumaged bird like the Solitary Sandpiper, we think it worth while to record this color phase of the species.

RUTH LEFFERT ALLYN

RICHARD ALLYN, M.D.

GEOFFREY CARLETON

WALTER SEDWITZ.

Visits to Gull Colonies in New York State.—During the early part of the summer of 1941, I visited two of the Herring Gull (*Larus argentatus smithsonianus*) colonies at which young birds had been marked with colored leg-bands during the 1937 to 1939 banding program sponsored by the Linnaean Society of New York and other organizations (Allen and Hickey, 1937).

The first of the islands visited was Wicopesset Island, which lies off the easternmost tip of Fishers Island, N. Y., close to the Connecticut shore near Stonington. According to Mr. Wilfred C. O'Brien, formerly Audubon warden of the colony (*in lit.*, 1941), "Wicopesset was mostly washed away in the storm of '38. The gulls moved to the

east end of Fishers Island, where the colony is growing stronger each year." Wicopesset now covers about one acre, is at the highest point only about five feet above water, and is chiefly rocky, with a few small salt pools bordered with salt grass, and much driftwood.

I visited Wicopesset on June 29, 1941. About 250 adult Herring Gulls and about 30 brown plumage sub-adults, presumably non-breeding, were on the island, as well as many juvenals in all stages of growth, and quite a few nests with eggs. No other species of birds nest upon the island.

The gulls were of course much alarmed when we landed on the island, but seemed to forget their fear quite soon, and approached us rather closely. I was able to observe five gulls bearing colored bands. Four of these wearing a white band over a blue band on one leg had hatched on Wicopesset in 1938. The fifth bird had a blue and a red band on the same leg, but the bands had slipped together, one inside the other, so that it was impossible to tell which one had been on top originally. This bird had hatched in 1937 on either Wicopesset or Penikese Island, Massachusetts.

On July 5, 1941, I visited two of the Four Brothers Islands, which are in Lake Champlain a mile or two offshore from Willsboro, N. Y. The Four Brothers Islands are very different from Wicopesset Island. Each of the Four Brothers is several acres in extent, rises twenty to forty feet out of the water, and is partly grass-covered and partly forested. Various land birds nest on the island, and a number of Spotted Sandpiper (*Actitis macularia*) nests with eggs were found. A Black Duck (*Anas rubripes* sbsp.) was flushed from a brush tangle on one island, and it is quite possible that this and other species of water birds nest here.

There were approximately a thousand Herring Gulls in the vicinity of the islands, about half of which were brown plumage birds. On the first island visited (the northernmost) were deserted nests, but no nests with eggs and no juvenal birds. On the island immediately south of this one were many more deserted nests, but none with eggs, and half a dozen or more juvenals, ranging in age from about a week old, I should guess, to just unable to fly.

The nesting season was so nearly completed that the adult birds had no incentive to stay on the islands, and those that were resting on the shore flew off at our approach. Thus all the gulls of flying age that we saw were either swimming in the water or flying about, either action effectively preventing observation of bands.

On returning to the mainland, I talked briefly with Mr. Hatch, who until recently owned the islands. Mr. Hatch told me that most of the nesting activity is in May.

It seems surprising that the breeding season on Lake Champlain should be concluded so early while it is in full swing along the Atlantic coast. Egg dates for Maine are given by C. W. Townsend in Bent (1921) as ranging from May 4 to August 8, half of the records being from June 12 to 30. Michigan egg dates checked by Townsend (*op. cit.*) varied between May 21 to June 24, half of them lying between May 27 and June 10. Chapman (1937) gives May 3 as the date of a complete clutch from Midriff Lake, N. Y.

ALLEN, R. P. and J. J. HICKEY. 1937. A Preliminary Announcement of Plans for a Coöperative Survey of the Herring Gull. *Bird-Banding*, 8:74-75.

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

CHAPMAN, F. M. 1937. *Handbook of Birds of Eastern North America*. D. Appleton-Century Co., New York, page 301.

HUSTACE H. POOR.

An Intoxicated Yellow-bellied Sapsucker.—On October 12, 1938, in some open woods at Tuckahoe, N. Y., I was attracted by a fluttering of wings and a gasping, choking sound. On the trunk of an oak I found a Yellow-bellied Sapsucker (*Sphyrapicus varius varius*) acting in the most peculiar manner. While endeavoring to retain a foot-hold on the bark, its head dropped back, its wings flapped, and the bird toppled to the ground below. When I rushed over to pick it up, this sapsucker flew feebly to an adjacent hickory and clung to the trunk less than a foot from the ground. It ultimately crawled up the trunk of the tree and remained out of reach. I left it a half-hour later.

In studying the oak tree from which this bird had fallen, I found typical sapsucker holes drilled into the cambium, and sap flowing slowly but freely. This sap was obviously in a state of fermentation, and I was therefore forced to conclude that the bird was intoxicated. Inebriety has apparently never been reported in this species, although Bendire (1895) felt that it probably occurred.

BENDIRE, C. E. 1895. *Life Histories of North American Birds*. U. S. Natl. Mus. Spec. Bull. 3.

JOHN L. BULL, JR.

Roosting and House-wrecking Downy Woodpeckers.—In the fall of 1936 two of the several bird houses in our garden were occupied by two Downy Woodpeckers (*Dryobates pubescens medianus*), a male and female. The male had the bird house about 20 feet from the sun-parlor window, and the female slept in the one 50 feet west of the male's winter abode. These two birds were not friendly toward each other. At times if one rested on the house belonging to the other, it was chased by its owner.

The night was spent in the bird house, each arriving at about 4:30 P.M. The approach to the bird house was rather cautious; short flights from the near-by tree, then a quick examination of the house and then back to the tree where several rapidly repeated call notes were uttered, and again a hurried hop to the house. Now the Downy would go all around its house, occasionally pecking at it. After this procedure, it would go to the opening, look in and then back out. This looking in and backing out would be repeated several times, when suddenly it would disappear into the house. Sometimes, however, it would reappear at the opening and look around for a few seconds before settling down for the night. The morning exit was always made between 7 and 7:30, according to the length of the winter days. Their arrivals and departures were almost as well regulated as the hands of a clock.

These two Downies spent practically the entire day in or near the garden. At times during the day, one of them would go to its bird house, apparently to assure itself that no invaders had preempted its house. On one of these daylight inspections, the male found an intruder, an English Sparrow (*Passer domesticus*). The Downy immediately entered the bird house and gave battle to the sparrow. After a few seconds, it reappeared at the opening with a tight hold on the neck of the invader. The Downy dragged it out through the opening and dropped it to the ground. For a few seconds the sparrow was somewhat bewildered, but recovered and flew away.

After some weeks of this routine by the Downies, one of my neighbors called to inform me that a small bird was damaging the shingles of the side wall of her dwelling. She asked what she could do to stop this bird from tearing down her house. Observations showed that this small house-wrecking bird was the female Downy. My neighbor was assured that so small a bird could do no real damage to a dwelling and that a hole or two through the shingles would be the limit of its destruction. This reply seemed to satisfy the neighbor. But a few days later she complained again that the situation had become serious, for the Downy was spending the whole day pecking

holes into the shingles, and that she wanted something done to prevent further marring of her house. She was told to complain to the New York Conservation Department. After such an appeal to the department, two wardens arrived, both of whom interestedly watched the actions of the Downy. My neighbor told the wardens that this particular bird roosted each night in one of our bird houses. So the wardens then called on me to see if I could catch the Downy and carry her to another locality. Otherwise, they would have to shoot this house-wrecking bird.

A day or two later, a ladder was placed at the bird house occupied by the female Downy. As the time approached for the Downy to enter its house, I hid near-by. When the bird had entered its house, I attempted to climb the ladder, but as soon as I had a foot on the step of the ladder, the bird stuck out its head and uttered several notes. As I climbed step by step, the Downy continued its scolding. When I was high enough so that I could reach the opening of the bird house with my hand, I remained still until nightfall when I quickly put my hand over the opening. With my other hand I arranged a small cloth bag to the exit, tapped on the house and the Downy flew into the bag. It spent the night in a small cage. The next morning, November 24th, band number 34-244204 was placed on its right leg, and Mr. Beals then took this bird to Van Cortlandt Park, some ten miles distant from our garden. Upon its release in the park, it flew from tree to tree, then took wing flying toward the hills along the Hudson River. This female Downy has not reappeared in our vicinity, and my neighbor's dwelling was repaired and is still standing.

Throughout that winter the male Downy continued to sleep in its usual house.

MARIE V. BEALS.

Purple Martin Notes at Rye, N. Y.—A colony of *Progne subis subis* was established in 1913 on the William H. Browning estate at Rye, N. Y. From several pairs at the start, this colony reached a maximum of about 140 pairs in 1932. A steady decline in numbers has been apparent since 1935. The remarkable sub-normal temperatures recorded in Florida and other parts of the southeast early in 1940 apparently caused many of these birds to perish. This disaster was further augmented a few days after the first four males arrived at Rye in 1940 (April 9) when a cold snap, accompanied by snow, killed these early arrivals and presumably others which had almost reached the colony-site. No other Purple Martins arrived for a week.

The arrival of these birds in the spring was carefully followed up in 1937 by the writer with the help of Allan D. Cruickshank. That each sex participated in two main flights at this time can be seen in

TABLE I
Arrival of Purple Martins in 1937

Date	Males	Females	Total
April 6	2	1	3
April 11	9	4	13
April 20	31	15	46
April 24	36	15	51
April 29	36	15	51
May 9	36	16	52
May 16	36	16	52
May 23	47	33	80
May 30	42	37	79

Table 1. No further counts were made after May 30 in order to avoid disturbing those pairs which were nesting. The low point in the Purple Martin population curve occurred in 1940 when only eight pairs nested although seventy-five per cent of their young successfully fledged.

In 1941 the colony had increased to fourteen pairs. Observations again indicated a slightly unbalanced sex ratio which can be seen in Table II. It should be stated that this colony is completely isolated from any other colonies of the same species.

TABLE II
Arrival of Purple Martins in 1941

Date	Males	Females	Total
April 7	1	—	1
April 14	2	—	2
April 20	4	—	4
May 4	8	2	10
May 11	14	10	24
May 18	14	12	26
May 25	15	12+	27+

MICHAEL OBOIKO.

On the Field Identification of the Immature Orange-crowned Warbler.—I wish to present some points which I have not seen in print regarding the identification of the immature Orange-crowned Warbler (*Vermivora c. cclata*). The bill of the Orange-crowned is thicker than the Tennessee Warbler's (*Vermivora peregrina*). The upper tail coverts of the Orange-crowned are olive-green, while those of the fall Tennessee are bright olive. The Tennessee has a thin but conspicuous silvery mark at the end of the wing. This is quite different

none have been seen since. Observation of Red Crossbills continued, however. There were two records of their occurrence in 1935, two in 1936, two in 1937, fourteen in 1938, one in 1939, and three in 1941. These twenty-four records over a seven year period ranged between mid-June and mid-September. The writer was seldom in the area at any other season. The birds were never seen feeding on anything other than seeds of the pitch pine, and in August, 1936, Charles A. Urner, Dr. Ernst Mayr and the author collected a number of these cones which the crossbills had opened in their quest for food.

On June 16, 1941, while taking a breeding bird census, I noticed a crossbill perched on the rim of a nest some twenty-five feet up a pitch pine. For the next half-hour this bird moved little except to twist its head. It was uniformly "mousey" gray in appearance. When I finally approached the tree, this bird flew, wobbling a bit but not too uncertainly. Coasting downward, it landed near-by at a tiny rainpool in the sand. It then proceeded to drink while I mounted the tree.

The nest was a work of art. It was about four inches wide and between two and three inches deep. The framework consisted of pine twigs with a few rootlets mixed in. The whole affair was constructed in a very loose manner, and, though more compact than that of the Mourning Dove (*Zenaidura macroura*), reminded one of the feeble attempts of that species. This nest was placed several feet out from the trunk on a limb which was quite thin. It contained no other birds nor any egg shells at the time of this inspection. When I withdrew to a distance of about fifty feet, the young crossbill made an uncertain flight back to the nest. Here it settled down and was still present when observation ceased at dusk. That night the nest was dashed to the ground by the worst electrical storm witnessed by local people in a decade. A nest of the Wood Pewee (*Myiochanes virens*), not far distant, came through in perfect condition. On June 17th, the immature bird and what was presumably a female remained on the nesting tree and adjacent pines throughout the day. Their cracking of the cones could be heard one hundred feet away. No crossbills were again recorded until August 22 when a single individual was noted.

This appears to be the first nesting record of the Red Crossbill in New Jersey. According to Griscom (1937), this species after big southern flights breeds casually on the Atlantic coastal plain from Massachusetts to Maryland. A male and one juvenile bird just able to fly were collected near the District of Columbia line on May 18, 1885 (Smith, 1885). The species also found nesting at Riverdale (now New York City) by Bicknell in 1875 and at Miller Place, Long Island, by Helme in 1883 (Griscom, 1923).

GRISCOM, L. 1923. *Birds of the New York City Region.*

1937. A Monographic Study of the Red Crossbill. *Proc. Boston Socy. Nat. Hist.*, 41:77-210.

SMITH, H. M. 1885. Breeding of *Loxia americana* in the District of Columbia. *Auk*, 2:379-380.

DAVID FABLES.

A Peculiar Oven-bird Song.—During June, 1941 we were attracted to a very peculiar warbler song in the woods at New Rochelle, N. Y. It suggested on off-colored song of the Prairie Warbler (*Dendroica discolor*) but ended in a lisp. Subsequent observation proved that the singer was an Oven-bird (*Seiurus aurocapillus*). This individual sang this same song throughout the month and never to our knowledge uttered the customary ringing song of its species.

JOHN L. BULL, JR.

ADDISON YOUNG.

Green-tailed Towhee in New Jersey.—While taking a Christmas Census of the Overpeck marsh area on December 23rd, 1939, Mr. Irving Cantor and I discovered a bird which was decidedly unfamiliar to us. It was in a wooded swamp, the floor of which consisted mainly of buttonbush, red maple, alders and scattered patches of cattails. The bird was with a flock of about thirty Tree Sparrows (*Spizella arborea*), a few Field Sparrows (*S. pusilla*), White-throated Sparrows (*Zonotrichia albicollis*) and Fox Sparrows (*Passerella iliaca*).

Mr. Cantor discovered it first and called it to my attention, and together we examined it. The bird was about eight inches long, considerably larger than the Fox Sparrow which was with it, and had a proportionately longer tail. It seemed obviously, from its bill and general structure, to be a member of the *Fringillidæ*. The crown and back of the head were a bright rufous color, similar to the crown of the Tree Sparrow. The back, most of the wings, and the tail were olive-greenish, the edge of the wing being bright yellow. There was also a white patch on the throat, reminding one of the Swamp (*Melospiza georgiana*) and White-throated Sparrows. The sides of the head seemed to be a dark gray, almost junco-like in color, so that the white throat patch stood out sharply. The underparts were gray, but lighter in color than the sides of the head, and became paler on the breast, shading into white on the belly. The sides were more buffy than grayish, and the under tail coverts were likewise buffy.

We were able to watch the bird but five minutes or so on this date, and as it was unfamiliar to us, we discussed the observation with

several other observers and consulted several books on the birds of the western United States. The species which seemed to fit our notes was the Green-tailed Towhee (*Oberholseria chlorura*) and subsequent examination of museum skins reinforced our opinion. Circumstances prevented our return to the locality until January 30th, 1940, when at the same place and with the same species of birds, Mr. Cantor and I found apparently the same bird again, and this time we examined it at much greater length and under the most ideal of conditions. The bird was silent at all times.

The breeding range of this species is described as the mountainous area of the western United States, extending westward from the eastern part of the Rockies, north to Montana and Idaho and south to southern California and western Texas. The winter range occupies the southern part of the breeding area and south to middle Mexico and southern Lower California. According to Chapman (1932), it is accidental in Virginia and South Carolina.

CHAPMAN, F. M. 1932. *Handbook of Birds of Eastern North America*, page 518.
WILLIAM J. NORSE.

A Tree Sparrow that Dropped Dead.—Several years ago a friend told me of an incident in which an observer—I believe he was a Linnæan member—was studying a Blue Jay (*Cyanocitta cristata cristata*) perched in a tree. To the observer's astonishment, the bird suddenly tumbled off the branch and fell to the ground, dead as the proverbial door-nail.

On the afternoon of February 21, 1939, I witnessed a similar occurrence which, however, was not quite so striking. During the course of a field trip in the Flushing Airport Marsh on that afternoon, I worked the north edge of the marsh which on that side changes abruptly from phragmites to a sparsely wooded slope. While walking along, I saw two Tree Sparrows (*Spizella arborea arborea*) get up in front of me and fly across the path. My attention was directed to the one which flew into the phragmites. The bird had apparently landed on the ground, and as I drew closer it sprang up again. The sparrow was about three feet above the ground when it suddenly collapsed and fell to earth again. I approached cautiously until about ten feet from where I judged the bird had fallen. There it lay, breast down, with its head on the ground. I drew closer but, in spite of the noise of snapping reeds, it made no attempt to escape. When I was only six feet away, it was easy to see that the bird was breathing convulsively. Suddenly all movement ceased; the bird was dead.

Since this Tree Sparrow had finally reached the "post mortem stage" in its life cycle, I sent the carcass to Dr. C. Brooke Worth at Swarthmore College, Swarthmore, Pa., for his diagnosis. Dr. Worth, who will gladly perform autopsies on recently dead birds sent to him from this region, gave me the following report:

TREE SPARROW, SEX?

History. Found dying in Flushing, N. Y. * * * Received Feb. 24; P.M. same day by C. B. W.

General. An adult bird in full plumage. No external evidence of injury.

Carcass. Decomposition moderate. Subcutaneous fat abundant. Nutrition good. No sign of injury.

Viscera. Both lungs markedly congested, one of them completely consolidated. Jugular veins engorged. Numerous hemorrhages visible through skull.

Heart. Pulmonic ventricle engorged. Systemic ventricle empty.

Proventriculus empty. Gizzard contains moderate amount of fine sand with very little admixture of organic material.

Intestines show hemorrhages in duodenal area; normal elsewhere. No gross parasitism.

Liver grossly normal. Pancreas liquifying. Spleen not found.

Gonads have liquified. Kidneys grossly normal. Sections of heart, both lungs, liver, kidney, and rectal caecae fixed in formalin.

Smear of heart and lung put on file.

Gross Diagnosis. Pneumonia, etiology not determined.

There are apparently rather few descriptions of wild birds dying as an observer watched. Stevenson (1941) once saw a Fox Sparrow (*Passerella iliaca*) succumb much as the bird above did. Huey (1924) also observed an Audubon's Warbler (*Dendroica auduboni*) act abnormally on a rose bush and then drop dead. Neither of these birds were autopsied.

HUEY, L. M. 1924 The Natural End of a Bird's Life. *Condor*, 26:194-195.

STEVENSON, H. M., JR. 1941. Natural Death of a Fox Sparrow. *Auk*, 58:266.

RICHARD B. FISCHER.

The Henslow's Sparrow on Long Island.—Having found the rather inconspicuous Henslow's Sparrow (*Passerherbulus henslowi susurrans*) an interesting addition to the breeding bird life on the south shore of Long Island, and living almost midway between the extremes of its limited nesting range there, I decided to study the bird, its habitat and locations containing summer residents. The last published summary of its distribution on the island is given by Griscom (1923): "Locally common summer resident at Mastic and probably at Orient."

Although a few may arrive in April and leave in late October—probably migrants—they usually do not appear on their nesting grounds before May 1 to May 5 in regular numbers. They may breed for a

number of years in the same area providing the ecological conditions remain the same. Nesting occurs almost, if not entirely, in that narrow belt along the south shore where upland meets the salt marsh. Although I have searched diligently and questioned many observers, I have not found a single authentic record of any breeding birds occurring along the entire north shore of Long Island or on either of the eastern flukes. Apparently the regular breeding range does not extend beyond the vicinity of Speonk where LeRoy Wilcox found at least two nests with young some years ago. Intermittently it extends westward to the Idlewild area of Jamaica Bay where a few birds usually summer and no doubt breed.

Singing birds into June may not indicate a nesting area. For example, in 1937 a bird sang during May and into early June almost on the present site of the new Seaford School, then an old dry field. No female was found. After June 10 the place was deserted.

In Dutchess and Columbia counties I have found colonies usually in large damp meadows ranging upland to the dry fields. On Long Island they may breed occasionally in the bordering dry fields but more commonly in extensive areas where upland edges are fringed with *Agrostis* or *Spartina pectinata*. From there the species ranges to the upper dryer borders of *Spartina patens*, but does not frequent the wetter Spartinas so attractive to the Seaside (*Ammospiza maritima*) and Sharp-tailed Sparrows (*A. caudacuta*). In these thick grassy situations an under bed of dry materials is essential, and burned over territory for several years later may be devoid of this species and Short-billed Marsh Wrens (*Cistothorus stellaris*), which often breed in the same areas. This has occurred in Massapequa at least five times to my knowledge. The site of a breeding colony, which had built itself up in four years to six pairs, burned over in 1939 and it has not been occupied since. The same conditions resulted after a fire partially burned over a regular breeding area in Merrick. The most widespread range of the bird in any one locality is at Massapequa where it usually breeds in three places. However, none of these can really be considered colonies, as in 1940 and 1941 there were less than a dozen pairs in all three.

Real estate developments along the upland edges have cut into the breeding range of the species, and now the more consistently occupied areas from Speonk to Idlewild are at Lindenhurst, Massapequa and Merrick, bordering Freeport. The largest single colony found in 1941 was on the east bank and 1,000 feet eastward of the Santapogue River in Lindenhurst, with six or seven pairs. No birds appeared in Merrick during 1941 because of the fire. Fairly good

margin lands where birds may breed in the future are to be found east of Patchogue, at Great River, Copaigue and Wantagh, head of Jackson's Creek. Apparently nests have been located only at Mastic, Speonk and Massapequa. As far as our records show the first nest on Long Island was found at Mastic, May 30, 1916, by John T. Nichols and Charles H. Rogers. Nichols claims (*in lit.*) that no summering birds have been located in this area for the last 15 years although they were formerly regular breeders. The nest containing four eggs in a grassy cup was located in an old dry field bordering the marshes. Heavy rains later destroyed the young. When located, Wilcox's nests at Speonk contained young which he banded. For 14 years, except when the area was burned over, a pair of Henslow's Sparrows spent the breeding season in a large tract composed almost entirely of *Spartina pectinata* at Massapequa. Massapequa was definitely established as another breeding location when on June 24, 1941, I flushed a Henslow's Sparrow out of a clump of *Spartina patens* intermingled with upland growth. Concealed was a nest containing four eggs. The male sang throughout my first brief visit (I could find only one pair in this area), but on subsequent trips and especially after the young were hatched, showed great agitation, following me to the extreme limits of the nesting grounds with his mate and remaining excited for some minutes after I had passed from view. Both birds were closely observed. The young hatched on July 2, and grew rapidly in spite of three days of heavy showers. On July 9 they were well fledged and on the morning of July 12 the nest was empty. Shortly afterward I presented it to the American Museum of Natural History where it was accepted as a rarity.

GRISCOM, LUDLOW. 1923. *Birds of the New York City Region.*

JOHN JACKSON ELLIOTT.

Alder Flycatcher Breeding on Long Island.—The Alder Flycatcher (*Empidonax trailli*) has long been known as a rare transient on Long Island (Griscom, 1923) and until the writer found a nest at Kissena Park, Flushing, in 1939, it was unknown as a resident species. From 1939 through 1941 eight nestings were observed in habitats of five different types. These types, arranged in a progressive order of dryness, are described in the accompanying table (p. 147). It will be noted that the author regards a bird present in any of the Kissena Park habitats after May as representing a breeding pair, for if, as Farley (1901) points out, the species has always reappeared on its breeding grounds in Massachusetts by the end of May, then the same is surely true for Long Island.

Observations of the Long Island Alder Flycatchers, part time

though they were, suggest that in the New York City region, as in Massachusetts (*ibid.*), the species is one of our latest nesting passerine birds. In many of the cases where singing males were found in early June, females did not appear until several days later. And when careful searches for nests were made before mid-June, none was ever found. In two cases it was possible to show that egg-laying took place after June 15. On July 7, 1939, I found, entirely by chance, an Alder's nest in one of the stand of red maples growing in the grassy field in habitat V. The nest, about $4\frac{1}{2}$ feet from the ground, was built in what amounted to a half-fork, and immediately impressed me as being in a precarious position. The whole affair was strongly suggestive of a carelessly-made, poorly-concealed Yellow Warbler's (*Dendroica aestiva*) nest. The two eggs it contained were laid between June 26 and 30. The young were almost ready to fly when they were banded on July 25; a week later they were seen in the nesting habitat being fed by the parents. It is interesting to note that, although habitat V is least typical of the species' preferred habitat (*ibid.*), it is the only one in which a nest was actually found. The second case concerns a young flycatcher captured and banded in habitat II on July 14, 1940. Judging from the bird's weak powers of flight, it had left the nest that day, thus placing the date of egg laying at about June 18.

Aside from the interest naturally attached to the breeding of this flycatcher on Long Island, I think the most fascinating aspect of the birds is their song and call. Both are surprisingly different from the vocal efforts described by writers like Forbush (1929). The only song I ever heard at Flushing was always a sudden, sneezy *fits-bew* which, according to Peterson (1939), is the Ohio song. I never heard Dawson's (1903) *sawc-chee* or *sawc-chu*, though his *sawc-bew* might be the song I hear as *fits-bew*. Nesting birds in the near-by Troy Meadows of New Jersey also sing a totally different song. Rather than ascribe these wide differences in syllabizing to individual hearers' impressions, I agree with Eaton (1910) that the species sings differently in different parts of the country. The song period on Long Island is short, lasting from their arrival in late May to sometime in the latter part of June. During this period the males peculiar *fits-bréws* may be heard at any time of day, the singer often selecting a rather high and exposed dead twig as his favorite song perch. Twenty feet appears to be the maximum height of this perch which, nevertheless, Farley (*op. cit.*) found to be as low as two or three feet. The male will suddenly appear on it and, throwing back his head each time, will gasp his song several times before plunging down into the shrubbery below.

The call note, too, is totally at variance with that described by numerous others. The most common syllabization is *pip* or *pep*. However, the only call note I ever recall having heard at Flushing is an emphatic *whit*, which is indistinguishable from the similar note of the Least Flycatcher (*Empidonax minimus*). F. H. Allen (1902) was aware of an emphatic one-syllabled note which he unfortunately did not transcribe. This one note apparently expresses a variety of moods, for individuals in the sexual chase utter it, and the birds use it as a scolding note. The writer is well aware of the incompleteness of these studies, but he believes that the interest attached to the breeding of this flycatcher on Long Island warrants their publication. Since there is still much to be learned, it is hoped that detailed studies of the birds will be possible in 1942.

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RICHARD B. FISCHER.

Acknowledgement

The Editor wishes to express his deep appreciation of the assistance rendered him in the publication of this issue of the *Proceedings*. Personal requests for General Notes met with a warm response from many members. Dr. Mayr, C. K. Nichols and Margaret Brooks critically read the more important manuscripts. Messrs. Carleton, R. B. Fischer, L. N. Nichols and Van Deusen read proofs on various articles. Miss Brooks read almost the entire issue. Dean Amadon prepared the index, and R. B. Fischer assumed the responsibility of mailing copies to out-of-town members.—J. J. HICKEY.

HABITATS	I	II	III	IV	V
General Type	Cut-over Wooded Swamp	Cattail Marsh and Field	Cattail Marsh and Field	Clearing in a Young Wooded Swamp	Field with a Moist Place
Trees - - - -	2 scrawny elms 25-30 ft. high, 1 fine oak 50 ft. high. The densest habitat.	1 large, old willow, 3 or 4 young willows. Third densest habitat.	1 willow 20 ft. high. Miscellaneous trees and shrubs occupied 35% of area. Fourth densest habitat.	3 red Maples average 25 ft. high. Second densest habitat.	1 oak 25 ft. high. Least dense habitat.
Shrubs and Underbrush	Red maple saplings dominant. New branches sprouting on many of old stumps. Much viburnum and elder around edges.	Viburnum dominant. A few alder, elder, and red maple saplings.	Dense tangle of elder, smilax, and blackberry occupied 10% of area.	Red maple saplings dominant, mixed with much Viburnum and elder. A few ash, elm, pignut hickory and tupelo saplings. Small amount of button hush & sweet pepperbush.	Small (25 ft. diameter) stand of red maple saplings mixed with a few viburnum. Small patch of willow saplings, a little elder and buttonbush in the moist place.
Ground Cover	Much skunk cabbage, jewelweed, cinnamon fern, & short, lush grass. Scattered cattails and phragmites, latter forming a small stand in one place.	Much skunk cabbage, jewelweed, cinnamon fern, & short, lush grass. Phragmites and a few cattails interspersed throughout.	15% fields. 40% cattails.	Much skunk cabbage, jewelweed, cinnamon fern, golden rod, and short, lush grass. Some blackberry and phragmites, very few cattails.	Some cinnamon fern, and skunk cabbage; a very few cattails, growing in the moist place. Tall grasses in the field.
Water	Water table near surface. Ground "mushy." Several small springs.	50% marsh. Wide, deep drainage canal occupied west edge.	40% marsh.	No marsh, but damp.	Dry—only water a shallow drainage ditch through the moist place.
Observed Size of Territory	Diameter 75 ft.	Diameter 60 ft.	Diameter 70 ft.	Diameter 70 ft.	Diameter 90 ft.
Associated Species	Robin, Yel. Warbler, Yel. - throat, Red-wing, Swamp & Song Sparrow.	Marsh Wrens (long-bill), Red-wing.	Brown Trasher, Robin, Red-wing.	Yellow Warbler, Yellow - throat, Red-wing.	Song Sparrow.
Surrounding Area	Surrounded by fields except for a small connection with a large marsh.	Field on 2 sides, thicket on 1, marsh on 1.	Marsh on 2 sides, fields on 2 sides.	Young wooded swamp, trees averaging 25 ft. high, on E., S., & W. Patch of scrub oak on N.	Surrounded by fields except for a wooded thicket on N.W. edge.
Observations	Singing ♂ on 6/6/37. Pair present in 1939. Scold-bird on 6/8/40 and 6/3/41.	Scolding bird on 7/7/39. Pair present in 1940. Apparent absence in 1941 due to insufficient field work.	♂ singing from willow on 5/26/38, 5/25/39. Pair present in 1939. Had no time to check habitat in 1940 or 1941—birds probably again present.	Appeared for first time in 1941. Singing ♂ on 6/3 and 6/10.	Pair present in 1939, 1941. Apparent absence in 1940 due to insufficient field work.
Singing Perch	Noted once on red maple 20 ft. high.	—————	The 20 ft. willow was the Singing Perch.	20 ft. red maple was the Singing Perch.	—————
Feeding Perch -	General	General	General	General	General
Nest and Young	Neither found.	1 young on 7/14/40.	Neither found.	Neither found.	Nest on 7/7/39.

The Linnaean Society of New York

Report of the Secretary for the Year 1940-1941

The Linnaean Society of New York has during the year held sixteen regular meetings and four informal summer meetings. The average attendance at the regular meetings has been thirty-five members and twenty-two guests. At the informal summer meetings the average attendance was fifteen.

The calendar for the year was as follows:

March 12, 1940—Annual Meeting. "Animals of Australia," by Mr. H. C. Raven.

March 26—"The American Cuckoos and Their Foreign Relatives," by Mr. Charles H. Rogers.

April 9—"A British Columbia Wilderness Study," by Mr. John F. Stanwell-Fletcher.

April 23—"Birds in War Torn China," by Mr. Edward V. Gerlick.

May 14—"Night Movies in the Wilds," by Mr. Howard H. Cleaves.

May 28—"Discussion of Spring Migration," by members.

October 8—"Problems of the Spoonbill Study," by Mr. Robert P. Allen.

October 22—"Discussion of the Fall Migration," by members.

November 12—"Quest of the Quetzal" or "Jungle in the Clouds," by Mr. Wolfgang Von Hagen.

November 26—"The Peregrine Falcon Population East of the Rockies," by Mr. Joseph J. Hickey.

December 10—"Current Traffic in Feathers for Millinery Purposes," by Mr. Richard H. Pough.

December 30—"General Discussion of the Recent Christmas Bird Census," by members.

January 14, 1941—"Symposium on Identification of the Rare Winter Species," led by Mr. Walter Sedwitz.

January 28—"Some Observations on the Coastal Population of the Peregrine Falcon," by Dr. William D. Sargent.

February 11—"Zonal Distribution of Arizona Birds," by Mr. Hustace H. Poor.

February 25—"A Movie on Nesting Birds of Maine and the Gaspé Peninsula," by Mr. John F. Porter.

At the Annual meeting March 12, 1940, the following officers were elected: President, Mr. Allan D. Cruickshank; Vice-President, Dr. E. R. P. Janvrin; Editor, Dr. Ernst Mayr; Treasurer, Mr. Irving Kassoy; Secretary, Mr. J. F. Mathews; Recording Secretary, Mr. Richard H. Pough.

During the year two resident members, Dr. Myron P. Denton and Mr. Albert R. Brand, passed away. Fifteen new members have been elected to the society and ten have resigned or been dropped. The total membership now stands at 203 members.

Numbers 50 and 51 of the *Proceedings* were published as a single issue and distributed to members late last fall. It contained several interesting articles of a diversified nature and also "Studies of the Nesting Behavior of the Black-crowned Night Heron" by Robert P. Allen and Frederick P. Mangels. This paper was awarded the Linnaean Prize for Ornithological Research in 1940.

According to a new procedure adopted by the society, proposals for membership must be submitted in writing to the secretary and must contain the name and address of the nominee and the name of the sponsor.

The secretary wishes to express his thanks for the coöperation and help received during the past year from various members of the society but especially Miss Margaret Brooks, Mr. Joseph J. Hickey and Mr. Irving Kassoy.

Respectfully submitted,

JOHN F. MATHEWS, Secretary.

The Linnaean Society of New York
Report of the Treasurer for the Year Ending March 1st, 1941

RECEIPTS

Annual Dues	\$517.50
Sale of Publications.....	85.03
Interest on the Savings Account.....	54.96
	\$657.49
Total	

EXPENDITURES

Publications (including Linnæan Prize).....	\$362.77
Membership in National Audubon Society, Cooper Ornithological Club, Eastern Bird Banding Assn., The N. Y. Academy of Sciences, and subscription to "British Birds".....	56.60
Motion Picture and Slide Operators.....	36.50
The Linnæan Field Work Committee.....	28.14
Secretary's Expenses	25.16
Contributions to The Albert R. Brand Memorial and to The Emergency Conservation Committee	20.00
Postage	14.81
Expenses of Guest Speakers.....	14.35
Treasurer's Expenses	10.11
	\$568.44
Total	
Total funds on hand March 1st, 1940.....	\$3,863.68
Surplus for the year ending March 1st, 1941.....	89.05
	\$3,952.73
Total funds on hand March 1st, 1941.....	\$3,952.73
Distribution of funds:	
On deposit with Emigrant Industrial Savings Bank.....	\$3,417.64*
On deposit with Irving Trust Co.....	535.09
	\$3,952.73
Total	

*Includes \$500.00 designated as The Charles A. Urner Memorial Fund.

Respectfully submitted,

March 11, 1941.

IRVING KASSOY, Treasurer.

March 20, 1941.

Approved by Auditing Committee:

E. R. P. JANVRIN, M.D.

HOBART M. VAN DEUSEN.

OBITUARY

HENRY ELIOT HOWARD

Eliot Howard, who in 1938 was elected an Honorary Member of the Linnæan Society of New York, died in England on December 26, 1940 at the age of sixty-seven. Educated at Eton, he entered business after some travels abroad and rose to become director of an important firm in Worcestershire. This career limited his observations of birds chiefly to those in his immediate neighborhood. It also reduced his contacts with professional ornithologists and rendered him a superb individualist in the pursuit of his hobby. The behavior of local birds he accordingly observed with unusual care, analyzed with unquestioned brilliance and systematically followed with considerable tenacity of purpose. Hypothesis after hypothesis was set up, tested and rejected. The tortured story of these found its way into Howard's books which, in time, became increasingly difficult to read. An amateur writer and scientist, the author made the unprofessional decision of forcing his readers to think! Many chapters thus have to be read twice, but his finely sculptured style lends itself well to re-reading and much of his prose is an admitted delight.

Mr. Howard wrote five notable books, all of them still first editions and unfortunately expensive to purchase: *The British Warblers* (1907-14), *Territory in Bird Life* (1920), *An Introduction to the Study of Bird Behavior* (1929), *The Nature of a Bird's World* (1935) and *A Water Hen's World* (1940). His most signal contribution was his success in convincing the scientific world that birds generally recognize certain territories as their own or as others' . . . and that they act and breed accordingly. This thesis struck a nearly mortal blow at Darwin's old explanation of the evolutionary survival for certain species—by means of sexual selection. It forced the re-writing of every song bird life history that had previously been published. It gave a new meaning to song and color in bird life, and provided bird watchers with a refreshing stimulus which they will feel for at least half a century to come. The vitality of Mr. Howard's thinking affected many branches of zoölogy, elevated his books to the level of classics, and marked him as one of the outstanding naturalists of the twentieth century. He is survived by his wife, the former Ann Stewart, together with one son and four daughters.—J. J. HICKEY.

WALTER GRANGER

Dr. Walter Granger, who became a member of the Linnæan Society in 1891, died at Lusk, Wyoming, on September 6, 1941 during his usual annual expedition for western fossils. Dr. Granger was born in Middletown, Vermont, on November 7, 1872. After attending high school in Rutland, he joined the American Museum of Natural History as an assistant in taxidermy. From 1894 to 1904 he served the Linnæan Society as secretary, and twice served one-year terms as vice-president. From 1921 to 1922 he acted as president. It was in recognition of his many years' service that the Society subsequently elected him a fellow. Whereas circumstances changed his professional field to palæontology in the nineties, he always retained a keen interest in living birds, mammals, and general natural history. He was an active participant in the Linnæan Society until prevented from being so by the press of other interests in recent years. Then when he met any of his old Linnæan associates his first words were apt to be of what

birds they or he had seen recently. Or he would speak of faunal changes since he first collected for the American Museum, when there was still much *usnea* moss on trees of eastern Long Island and the Parula Warbler was generally distributed as a breeding species there. These old associates will miss him greatly.

Dr. Granger was successively a field collector in zoölogy for the museum, an assistant curator, associate curator, and finally curator of fossil mammals. He participated in the first discovery of fossils in the Peking area in 1920 and in the great series of expeditions which the museum made to the wastelands of the Gobi, China and Mongolia. His trips to the western badlands began in 1894 and over 47 years created a superb picture of the ancient fossils of the continent.

One of the most interesting single specimens resulting from these expeditions was an almost complete giant fossil bird, *Diatryma*, the relationships of which gave rise to much speculation by his colleagues. But, he would say, what we need is not more theories but more specimens.

Dr. Granger was a member of the Palæontological Society of America, an honorary life associate member of the A. O. U., a fellow of the American Geological Society and a director and former president of the Explorers Club of New York. He is survived by his wife, the former Anna Dean, whom he married on April 7, 1894.—J. J. HICKEY AND J. T. NICHOLS.

ARTHUR H. HOWELL

Arthur H. Howell, who joined the Linnæan Society of New York in 1891, died July 10, 1941 at Washington, D. C. Mr. Howell was born May 3, 1872 at Lake Grove, New York, and was subsequently educated in the public schools of Brooklyn, New York. From 1892 to 1894 he served as Secretary of the Society, leaving the city a year later to accept a position as biologist in the Biological Survey. Near the beginning of the present century he began a series of notable faunal explorations in Texas, New Mexico, Louisiana, Tennessee, Missouri, Illinois, Kentucky, Arkansas, Alabama (1911-16), Georgia (1927-33), Florida (1918-39) and North Carolina. He was the author of *Birds of Arkansas* (1911), *Birds of Alabama* (1924) and *Florida Bird Life* (1932). In addition to this work in ornithology, Mr. Howell was a notable mammalogist, publishing revisions of the American skunks, harvest mice, marmots, flying squirrels, chipmunks, pikas and ground squirrels. He was a member of the Biological Society of Washington, the Cooper Ornithological Club, the American Society of Mammalogists and a fellow of the American Ornithologists' Union. He is survived by his wife, the former Grace Bowen Johnson whom he married in 1900, by two daughters and by one son, Elbert J. Howell.—J. J. HICKEY.

PHILIP BERNARD PHILIPP

When, from his New York home, on July 11, 1941, Philip Bernard Philipp passed into the great beyond, not only did the world of bird lovers and conservationists lose an earnest and forceful worker, but also a companion whose genial and generous personality never failed to register strongly with those who were privileged to enjoy intimate association with him. Mr. Philipp, son of Moritz Bernard and Abby Ann (Baker) Phillip, was born at Ipswich, Massachusetts, March 19, 1879. His father was of Danish descent, and "Phil" markedly showed the traits of the race. He acquired his education at Gibbens and Beech and Columbia Grammar Schools in New York, graduated with honors from Harvard, and took a post-graduate course at Columbia Law School from which he received

the degree of LL.B. in 1903. He thereupon took up patent law practise in the offices of his father's firm of Philipp, Sawyer, Rice and Kennedy, and in 1912 became a partner therein, continuing as a very able practitioner until his retirement from active business about 1931. On October 26, 1904, Mr. Philipp married Grace Kimball Ballard from whom he was subsequently divorced. His second wife was Bessie Adelaide Decker, whom he married on February 16, 1918, and who survives him together with two sons and a daughter by his first marriage and another daughter by his second.

At an early age Mr. Philipp became exceedingly interested in birds and particularly in the study of oölogy. By 1909, when the present writer met him, he had laid the foundations for what was to become one of the world's foremost collections of North American birds' eggs. He personally collected throughout the eastern states, Canada and the Magdalen Islands, and by exchange and purchase he added to his own results those of the foremost collectors of other regions.

In oölogical study and collecting, as in other pursuits to which he gave his interest, Mr. Philipp excelled. He had ability, confidence and optimism which easily triumphed over all obstacles. With several chosen companions he investigated the breeding habits of such birds as Cape May and Tennessee Warblers, Philadelphia Vireo and other little known species. The results of these studies were given to the ornithological world through *The Auk* and other publications. For twenty years he was president of the New Jersey Audubon Society and more recently was research associate in oölogy at the American Museum of Natural History. To this latter institution he presented his superb collection of nests and eggs on December 24, 1937. To his friends are left the memory of his thoroughly democratic character, his simple and wholesome tastes and the generosity and companionableness that made him a prince among men.—B. S. BOWDISH.

Constitution and By-Laws of the Linnaean Society of New York

(As of December 1, 1941)

SECTION 1. *General Organization.*

Article 1. This Society shall be composed of persons, amateur or professional, interested in some branch of natural history, with particular reference to the New York City region.

Article 2. It shall consist of Life, Active and Associate, and Honorary Members, and Fellows.

Article 3. Active Members, Life Members and Fellows only shall be entitled to vote, to hold office, to serve on committees and Council and to transact business. Associate Members and Honorary Members may attend the meetings and take part in the scientific discussions of the Society. Each class of members shall be entitled to receive the various publications of the Society.

Article 4. The officers of the Society shall be a President, a Vice-President, a Secretary, a Recording Secretary, a Treasurer, and an Editor. (With the exception of the Treasurer and Editor no officer shall hold the same office more than two consecutive years, but shall again be eligible for election one year after the expiration of such a term.) Such officers, together with nine members at large, shall form a committee for the management of the concerns of the Society to be called the Council. Councilors shall serve for a term of three years.

Article 5. By-Laws for the more particular regulation of the Society shall from time to time be made.

Article 6. This Constitution may be altered or amended by a vote to that effect of three-fourths of the Active Members, Life Members and Fellows present at any meeting of the Society; each Active Member, Life Member and Fellow having been notified in writing at least thirty days previous to action on the proposed change.

SECTION 2. *Of Members.*

Article 1. Active Members shall be persons who have shown an interest in some branch of natural history. Active Members may become Life Members upon the payment to the Treasurer of Fifty Dollars, at one time, which shall be in lieu of annual dues.

Article 2. Associate Membership shall be open to persons interested in some branch of natural history, residing 50 miles or more from New York City and unable to attend meetings of the Society regularly.

Honorary Members shall not exceed ten in number, and shall be persons eminent for their attainments in zoölogy.

Any Member may be elected a Fellow in recognition of distinguished service to the Society.

Article 3. All classes of Members shall be chosen by majority vote, after having been nominated at a preceding meeting and approved by the Council. Candidates for Active Membership must be known personally to at least two members of the Council.

SECTION 3. *Of Officers and Their Duties.*

Article 1. The President shall preside at meetings of the Society and of the Council; shall preserve order; regulate debate; and conduct all business proceedings, strictly in accordance with parliamentary usage.

Article 2. The Vice-President shall have charge of the archives of the Society, shall assist the Secretary and President in planning the programs of meetings, and shall perform the duties of President in the absence of the latter.

Article 3. The Secretary shall give notice to persons of their election as members, and to committees of their appointment; shall give notice of all regular meetings of the Society; shall call special meetings when directed by the President; shall give notice to all members of the Council of all Council meetings; shall inform officers of all matters requiring their attention; shall conduct the correspondence of the Society and prepare all letters to be written in its name, retaining copies of them; and shall with the advice of the President and Vice-President prepare the programs for meetings of the Society.

Article 4. The Recording Secretary shall take and preserve correct minutes of the proceedings of the Society and shall preserve and compile in systematic order all field notes presented by members.

Article 5. The Editor, with the assistance of Associate Editors, who may be appointed by the President when necessary, shall edit and supervise all publications of the Society, and shall exchange and distribute them.

Article 6. The Treasurer shall collect all moneys due; shall pay all bills against the Society when approved by vote of the Council; shall keep a correct account of all receipts and expenditures and shall make a detailed report of the same at the Annual Meeting.

Article 7. Officers shall be nominated by the Council and chosen at the Annual Meeting, and a majority vote of the Active Members, Life Members, and Fellows present shall be sufficient for a choice. The foregoing shall not be construed as precluding nomination of officers from the floor. Any office which becomes vacant during the year shall be filled at the next meeting of the Society in the same manner.

SECTION 4. *Of the Council and its Duties.*

Article 1. The Council shall pass upon all nominations of candidates for membership, and shall make such recommendations as it sees fit on new business initiated by properly qualified members. Its recommendations shall be presented by the Secretary at the next meeting whenever possible. A majority vote of the members present shall be sufficient to ratify favorable recommendations.

Article 2. It may initiate any new business, promoting the general interests and welfare of the Society, and a majority vote of the members attending the meeting at which such new business is presented shall be sufficient for ratification.

Article 3. It shall act as a nominating committee for officers and shall hold a special meeting for this purpose prior to the Annual Meeting of the Society.

Article 4. It shall hold regular meetings for the transaction of general business. Special meetings may be called by the President or upon the request of any three Councilors.

Article 5. Councilors shall be nominated by a committee to be appointed by the President at the Annual Meeting, such committee to consist of three members of the Society who are not members of the Council. This shall not be construed as precluding additional nominations from the floor. Councilors shall be chosen at the first regular meeting after the Annual Meeting, up to the number sufficient to fill the vacancies. In case the number of nominations exceeds the number of vacancies the election shall be by ballot. Those receiving the largest number of votes of Resident Members, Life Members, and Fellows present shall be elected. If, for any reason, a Councilor does not complete his term of office his successor for the remainder of the term shall be chosen at the next regular meeting by nomination from the floor and election as prescribed above.

SECTION 5. *Of Meetings.*

Article 1. A meeting shall be held annually for the choice of officers and for other general purposes. At this meeting the Secretary shall present a report upon the publications, meetings, membership, etc.; the Treasurer upon the receipts and expenditures. Previous to the Annual Meeting the President shall appoint a committee of two members, neither of whom shall be a member of the Council, to audit the accounts of the Treasurer.

By-Laws

SECTION 1. *Of Members.*

Article 1. Every Active Member shall be subject to annual dues of three dollars (\$3.00) and every Associate Member to annual dues of one dollar (\$1.00), payable at the first regular meeting in March. No dues shall be required of any member until one month succeeding his or her election, and then only on a pro-rated basis for the remainder of the Society's fiscal year. Any Member absent on a scientific expedition, on military service, or engaged in academic studies during an entire year may, upon application to the Treasurer and with the approval

of the Council, be excused from payment of dues for that year. Upon recommendation of a majority of the Council, a person who has been an Active Member of the Society for twenty-five consecutive years may be considered a Life Member.

Article 2. Any member who shall neglect to pay his regular dues for one year, upon receiving due notification from the Treasurer, shall have his or her name erased from the roll of members.

Article 3. Any Active or Associate Member may withdraw from the Society, by giving written notice of this intention and paying all arrearages due the Society.

Article 4. Any undesirable member may be expelled from the Society upon recommendation of the Council by a three-fourths vote of the Active and Life Members and Fellows present at any regular meeting, notice having been sent to each Active Member, Life Member and Fellow, and to the person accused at least 30 days previously.

SECTION 2. *Of Meetings.*

Article 1. The Annual Meeting shall be held the second Tuesday in March.

Article 2. Regular meetings shall be held on the second and fourth Tuesdays of each month from October to May inclusive, except when suspended by a majority vote of the Society at a preceding meeting.

Article 3. Nine Active Members, Life Members and Fellows shall form a quorum.

Article 4. The order of proceedings at meetings shall be at the discretion of the presiding officer.

1. Reading of minutes of the previous meeting by the Recording Secretary.
2. Reading of correspondence received by the Secretary.
3. Proposal of candidates for membership.
4. Election of members.
5. Business (a) Unfinished; (b) New.
6. Presentation of formal papers.
7. Presentation of field notes.
8. General discussion.
9. Adjournment.

SECTION 3. *Of Changes of By-Laws.*

Article 1. The By-Laws of the Society may be altered or amended by a three-fourths vote of the Active Members, Life Members and Fellows present at any meeting, notice of the proposed change having been sent out to each 30 days previously.

SECTION 4. *Of Committees.* The President shall appoint such Committees as he or the Society may deem necessary to conduct its affairs and interests.

Article 1. A Conservation Committee shall be appointed annually by the President to investigate such matters involving the preservation of the fauna and flora of the New York City region as may arise from time to time; and to represent the Society on conservation matters in general.

Article 2. An Editorial Committee, with the Editor acting as chairman, shall be appointed annually by the President to read and prepare papers for the Society's publications. Such Committee shall publish, annually if possible, and with the consent of the Council, an issue of the Society's *Proceedings*, which shall contain the annual reports of the Secretary and Treasurer, reports of pertinent Committees, general notes, and such scientific papers as may be available on the birds of the New York

City region, or otherwise written by Members of the Society. The Editorial Committee shall also recommend to the Council, for inclusion in the Society's *Transactions*, publication of extensive papers that are submitted to it from time to time and which, by reason of their length, are disbarred from the ordinary channels of scientific communication. Upon recommendation by the Council, the publication of each volume of the *Transactions* shall be subject to the approval of a majority of the Fellows, Life Members, and Active Members present at a regularly scheduled meeting of the Society.

Article 3. A Field Work Committee shall be appointed annually by the President to encourage and conduct constructive field work in the New York City region; and to promote the discussion of local faunal problems at meetings of the Society.

SECTION 5. *Of Funds and Prizes.*

Article 1. A prize of twenty-five (\$25.00) dollars, to be known as the Linnæan Prize for Ornithological Research, shall annually be awarded at the discretion of the Council to that Member of the Society who submits the best paper which embodies the results of ornithological research not previously published and not undertaken in the course of professional duties. The Council shall fix the conditions of the prize, shall act as final judge, and shall announce such awards as are made at the annual meetings of the Society.

Article 2. The Society shall administer a fund to be known as The Charles A. Urner Memorial Fund,* the principal and interest of which is to be used for the promotion of field ornithology in New Jersey, New York and Connecticut, and for the publication of studies made in said areas.

Article 3. The Treasurer is authorized to accept from Members and other interested persons contributions to a Publication Endowment Fund, the income of which is to be devoted primarily to the publication of worthy scientific papers.

*The sum of \$500.00 has been appropriated toward this fund by the Society.

Membership Miscellany

MISS ELEANOR HERRICK is now MRS. ALBERT STICKNEY, JR. Seven members of the Society are now reported in military service. As a rule, mail addressed to their homes will reach them with the quickest dispatch. Corporal ROBERT ARBIB, JR., is a member of the 36th Engineers Regiment, Plattsburgh Barracks, N. Y. Private IRVING CANTOR is stationed at Fort Slocum, N. Y. Corporal HARRY N. DARROW is in Headquarters Co., 39th Infantry, Fort Bragg, N. C. JOHN J. FISCHER is reported to be a member of the Army Air Corps at Randolph Field, Texas. THOMAS IMHOF is temporarily training with the 7th Medical Battalion at Camp Lee, Va. Private ARTHUR T. SKOPEC is in Company B, 12th Battalion, A. F. R. T. Co., at Fort Knox, Ky. DANIEL D. STREETER is also said to be in military service.

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

OFFICERS, 1941-42

<i>President</i>	CHARLES K. NICHOLS
<i>Vice-President</i>	RICHARD H. POUGH
<i>Secretary</i>	MARGARET BROOKS
<i>Recording Secretary</i>	HUSTACE H. POOR
<i>Treasurer</i>	SAMUEL C. HARRIOT
<i>Editor</i>	JOSEPH J. HICKEY

COUNCIL, 1941-42

Ex-Officio

The five officers above

Term 1939-41

Gladys Gordon Fry	Christopher K. McKeever	Dean Amadon
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Term 1940-43

Hobart M. Van Deusen	Roger T. Peterson	William D. Sargeant, Ph.D.
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Term 1941-43

Allan D. Cruickshank	Irving Kassoy	Ernst Mayr, Ph.D.
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CONSERVATION COMMITTEE

John F. Mathews, Chairman

William O. Astle	Marc C. Rich
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EDITORIAL COMMITTEE

Joseph J. Hickey, Chairman

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Geoffrey Carleton	Hobart M. Van Deusen

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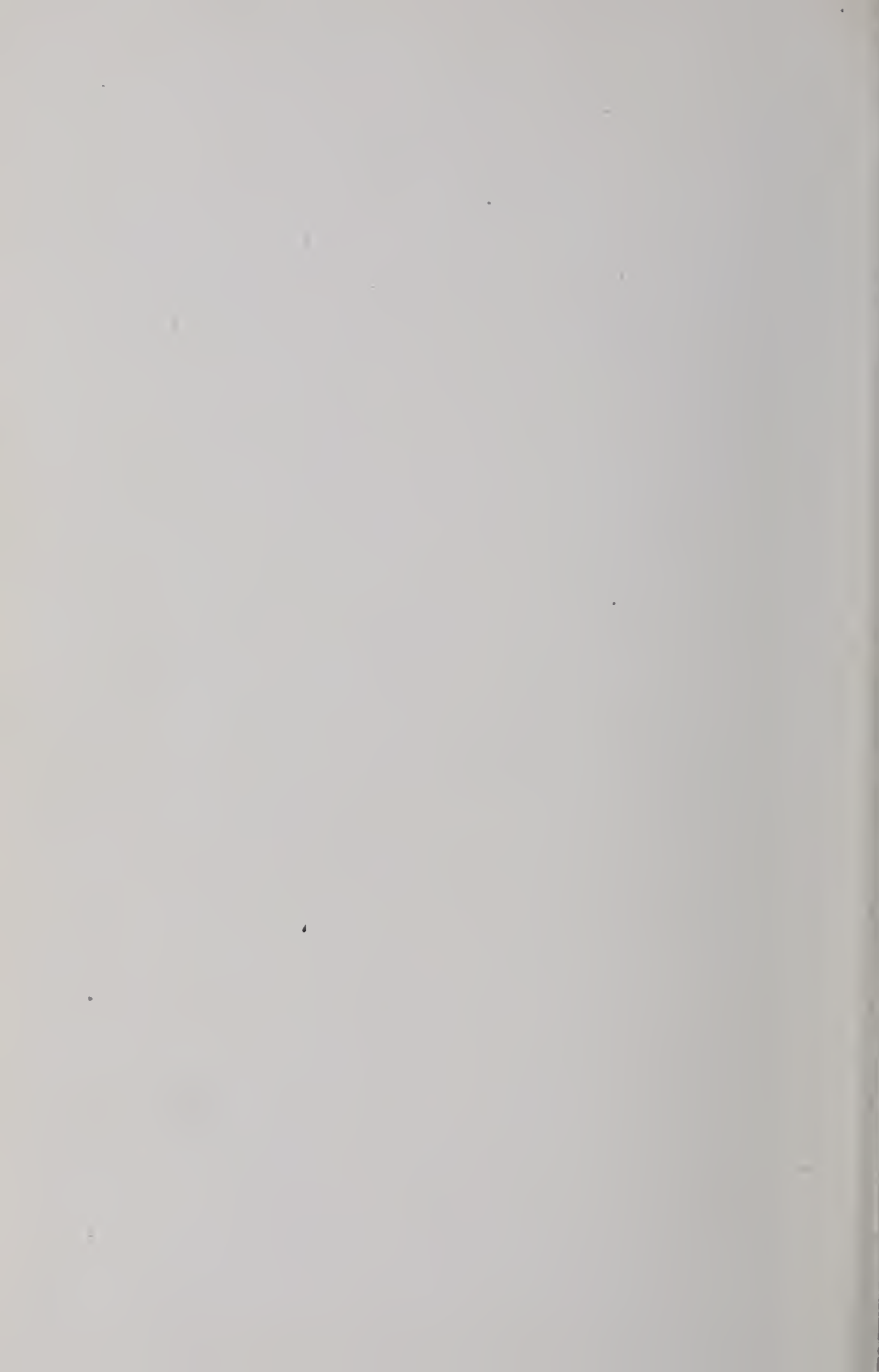
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