

it was all bright and ready for its meal. His captive also manifested the same tendency to hide surplus food.

Opinions differ as to whether Great Horned Owls can be tamed. The behavior of Numbers 1, 2, and 4 would lead to the belief that some individuals could easily be tamed. While no effort to tame was made in the case of these three, they showed gentle dispositions that could easily be cultivated. (Pl. IV, fig. 4.) As far as Number 3 was concerned the natural conclusion is that there are some individuals of the same species that are not easily if ever tamed. There are individual differences among birds as well as among members of the human race.

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NOTES ON TWO GROUND-NESTING BIRDS OF PREY.

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WITH PHOTOGRAPHS BY T. DONALD CARTER.

Plates V-VI.

DURING the breeding season of 1923 I had the good fortune to find on the salt marsh near Elizabeth, N. J. (in fact largely within the limits of that city) five nests of the Short-eared Owl (*Asio flammeus*) and two nests of the Marsh Hawk (*Circus hudsonius*). While my observation of the histories of these seven nests and their contents was very incomplete, being limited to visits at irregular intervals, some of the facts recorded seem of general interest. Those relating to the Short-eared Owl supplement previous notes on local nestings of that species in 'The Auk,' Vol. XL, No. 1, p. 30, and Vol. XXXVIII, No. 4, p. 602.

THE SHORT-EARED OWL.

A number of Short-eared Owls survived the 1922-23 hunting season on the broad salt marsh lying between the cities of Elizabeth and Newark, N. J., and I had hopes of discovering some of the 1923 nests before the eggs were laid, and of observing their con-

struction. But in the spare time at my disposal I found the job one of extreme difficulty. Early in April pairs of the birds were found frequenting certain areas on the marsh, but they seemed only casually interested when these areas were hunted over and hours of tramping and still-hunting brought no results. On April 7, I believe I was close to one nest. An adult followed me about at a distance, soaring high, but would not come close, nor did it call. On April 14, I found seven adults, but no nests, in spite of arduous hunting over the spongy surface of the marsh.

The First Nest.—On April 28, I discovered my first Owl's nest of the season, containing six eggs, one badly soiled, two slightly so, and three clean. The nest was on the ground in a small patch of standing salt hay that had escaped the prevailing winter fires. It consisted of a thin layer of dried grasses, barely half an inch thick. I had seen an adult Owl flying about the general locality and had spent hours in endeavoring to trace it to its nest. It showed no concern. Finally I withdrew and after it had soared about for an hour it made a shivering dive to the ground. I marked the spot but found no nest in the vicinity. Discouraged I struck out for some more fruitful area and I had gone some distance when an Owl arose, rather wildly, from a nest some distance before me. Neither the bird from the nest nor the other in the air called, though one did some exhibition diving, volplaning with quivering wings, checking itself each time well above the ground. The sitting bird, when flushed, probably purely through accident, carried one of the eggs in its feet or between its legs as it left the nest, dropping it unbroken on the grass several feet away. The actions of these two birds were very different from those observed in previous years when nests containing young were approached. Certainly in this instance their behavior added to the difficulty of locating the nest.

On April 30, a high tide flooded much of the marsh and inundated the nest. The high water continued for over a week and when I was able to visit the site on May 11, I found the nest empty. Some time later, within one hundred yards of the nest I found the broken remains of one egg. Two Owls, probably the adults, were on May 11 not very far from the old nest, but though I hunted that portion of the marsh nearby which had escaped the flood I could

find nothing to indicate that the birds had rescued any of the eggs.

The Second Nest.—On May 5, while much of the marsh was still under water from the April 30 flood I found, fully a mile from the first nest, in an unflooded portion of the meadow but not far from the inundated section, my second Owl's nest. It contained six uniformly dirty eggs, one just pipped. The sitting bird did not leave the nest until I was about to step directly upon her, and she then flew off without apparent excitement. Nor did the mate manifest much concern. He seemed indifferent, acting about as did the one found the previous week, though he indulged in no aerial dives. The nest, if such it could be called, was on a bare spot very lightly covered with dried grass, but no more than was found elsewhere about it. It was protected on two sides by standing dried salt hay.

On May 11 this nest contained four young and two eggs. At my approach the adult not on the nest made more excited demonstrations, uttering a whine (a note not heard before by me), but none of the usual distress notes. The female sat close with ears erect. I was struck by the appearance of her eyes, as she sat with her back to the sun, the black pupils so expanded that the yellow iris could hardly be seen, in striking contrast to the eyes of the mate who, as he finally alighted facing the sun, with feathers roughed and wings extended in a very belligerent attitude, showed the black pupils as mere dots and the eyes mostly yellow.

When the female finally arose, close to me, she knocked two young birds two feet clear of the nest, but without apparent injury. They were pink-skinned with inconspicuous buffy down. The largest, probably from the egg pipped on May 5, was about $3\frac{1}{4}$ inches long, with eyes shut. The three others were of fairly uniform size, about $2\frac{1}{2}$ inches long.

On May 18, my next visit, the nest contained five young Owls and an unhatched egg. The young birds had grown well. Four showed quill pin-feathers an inch long in the wings, and measured from $5\frac{1}{4}$ to 6 inches in length as they squatted in the nest. They were well covered with down. The fifth bird, hatched since the 11th, was $4\frac{1}{2}$ inches long, having apparently made a more

rapid growth than had the first bird hatched during its first week's existence. Both parents showed more concern and one, probably the male, as I bent over the nest swooped down twice and struck me on the hat with a resounding thump, leaving claw marks from which my scalp was fortunately protected. One called repeatedly the familiar "yak" in series. Pellets about the nest contained the remains of both mice and birds and there were some loose feathers of small birds. The nest was filthy with excrement.

On the next visit, May 26, the nest was empty except for the unhatched egg, the excrement and pellets, and a few Red-wing Blackbird feathers. The parents were not in sight, nor were the young. Finally I found, a few feet from the nest, in a shallow hole, a single young bird, fat and healthy, well covered with down and with wing quills fully one inch long. In its crouching position it measured $6\frac{1}{2}$ inches long, and it snapped its bill loudly when approached. Mr. T. D. Carter of the American Museum of Natural History, accompanied me. We handled and photographed the young bird, evidently the youngster of the brood, but the parents did not appear. Finally we flushed both old birds fully one hundred yards from the nest, but we were unable to find the other young which had apparently retreated to more favorable hiding places far from the nest. The parents, even when flushed, acted very differently than on my previous visit. One flew off without a sound. The other called but would not come near, hovering high up. No added interest was shown when we handled the young bird. I could not fully account for the difference in behavior unless the bird was awed by the two persons and the camera, or had learned to consider my visits harmless. But this would not explain its failure to be on guard as previously and its failure to appear as we approached the nest.

The adults were observed about this locality for several weeks following, but the young, evidently securely hidden, were not found again. These young birds, as appears customary with the species, remained in the nest for about two weeks, walking off to more secluded and more sanitary surroundings after that period. Considering the condition of their nest after two weeks' occupancy, instinctive love of birthplace would have to be uncommonly strong to hold them longer.

The Third Nest.—On June 8, on a portion of the marsh that had escaped the early May flood and about half a mile from the site of the first nest discovered, I found a third nest. It had recently contained young birds, judging from its littered condition. It was fully one-half inch thick, composed of dried grasses and weeds, and similarly located in standing grasses. Three adult Owls were about but I could not locate the young. In my search for them, however, when less than fifty yards away from the empty nest, I came upon another Owl's nest.

The Fourth Nest.—This nest, from which the sitting bird flew, was arched over with growing grasses. It contained three young and seven eggs. The young were small, one about $3\frac{3}{4}$ inches and two about $3\frac{1}{4}$ inches long,—only a few days old. The nest, of dried grass, was well formed though not so bulky as the two nests found the previous year. The adult Owls found here were not very demonstrative. One bird called frequently the usual "yak," but the others after calling a few times settled nearby looking on.

On June 16, my next visit to this nest, it contained eight young ranging in length from $2\frac{1}{2}$ to 6 inches, and one bad egg. The missing bird was probably the oldest which had left for less crowded surroundings. One young bird had evidently just come from the egg, making a difference of fully ten days between the oldest and youngest in the brood. The five smaller birds all showed the "egg-tooth" as a small white protuberance near the tip of the upper mandible. It had disappeared from the bills of the three larger birds. The activity of the young bore no direct relation to their size. The oldest was the only one that snapped its bill, but it was otherwise sluggish. In fact all were sluggish except the fourth, a medium-sized bird measuring $4\frac{3}{4}$ inches long. This youngster called continually a peeping note (the only young Short-eared Owl I have ever heard call) and walked about making a ridiculous but very confident figure, perfectly secure on its feet. Apparently some young of this species acquire ability to walk when about a week old. The old birds flew about calling but were not at all aggressive.

I did not visit this nest again until June 30. It was then empty save for the unhatched egg and one pellet. One adult flew about

and was very demonstrative whenever I approached the nest but I could find no trace of any of the nine young or the other adult. I went about locating them in a systematic manner, starting at the nest and walking round and round in narrow but widening circles until I was over one hundred yards from my starting point. I hunted carefully but to no avail. I felt confident the birds were somewhere in the vicinity but they had evidently wandered well away from the old nest.

The Fifth Nest.—Another very interesting brood I found also on June 8, making three nests of the species located in one afternoon. Over a mile from the previously described nest I came upon an adult Owl which was very noisy and demonstrative, tumbling from the air and lying prone on the ground with wings outstretched, squealing much as did the birds found nesting by me the two years previous. After a long hunt I found the mate. She flew off calling, leaving five young, the smallest apparently helpless and with eyes hardly opened, the five ranging in length from $3\frac{1}{2}$ to $6\frac{1}{2}$ inches. The four larger birds were fairly lively and all looked well fed. Their ages apparently ranged from about five to ten days or thereabouts. The few pellets in the nest contained both bird and mouse remains and a mouse minus its head lay before them.

The spot on which these birds were huddled showed no indications of a constructed nest. The ground was partly covered only, with the bent stems of the growing salt grass and that below the birds was still partly green. It looked very much as if the eggs had not been laid and incubated on the spot where I found the young—the grass was not sufficiently bleached to make this seem possible. The question is, were the young birds carried or did they walk to the spot? The smallest seemed incapable of such exertion.

This nest was visited again June 16. By that time the grass composing it was completely bleached, though some of it was still attached to the ground and showing a trace of life at the base. The male Owl was as demonstrative as on the previous week. The female sat on the nest, which was empty except for a large number of pellets and considerable excrement. One young bird, about $6\frac{1}{4}$ inches long, probably the youngest of the brood, was

found nearby and was photographed and banded by Mr. Carter. The older birds of the brood had apparently wandered away from the nest.

The varied actions of these several nesting adults give an interesting picture of the individuality in temperament of different birds of the same species, and also seem to show a cycle in the development of the parental feeling as expressed in the demonstrativeness or pugnacity of the adults when nest and contents are exposed to danger. There was little outward evidence of concern on the part of either sex until the eggs were hatched and, at least in one instance, (that of nest Number 2) the watchfulness and aggressiveness of the male seemed to reach a climax when the young were about two weeks old, diminishing after the brood had left the nest to hide in the vicinity. This waning interest, however, is probably not the rule, but simply another indication of individuality.

It is impossible for me to say how many young from the five nests discovered reached maturity. In three nests nineteen young were hatched, and I am certain there were other nests undiscovered by me. The largest number of adults seen on one day during the breeding season was nine, and this number did not include both adults from all the nests discovered. If hunters can be prevented from wantonly destroying the species on this marsh (a difficult task) it should serve as a supply center for the establishment of other colonies in northern New Jersey.

While the 1923 observations have furnished no certain proof of the possibility mentioned previously by me, that the Short-eared Owl may carry its eggs or young from danger, there is some further supporting circumstantial evidence for this belief in the description of the second and fifth nests found. However the discovery of a broken egg shell not far from the first nest after the flood makes it appear doubtful that that clutch was salvaged.

THE MARSH HAWK.

The Marsh Hawk or Harrier is a regular breeder on the local salt marsh, sharing the same hunting grounds with the Short-eared Owl, and apparently without serious friction. Frequently the two species nest in close proximity and while the Owl some-

times resents too close an approach to its nest by the Harrier, I have never seen the latter attack the Owl. The tolerance shown by the Harrier toward this Owl is not easily explained, for as a rule the Harrier is king of his domain. I have seen him drive off a poaching Duck Hawk from a favored hunting ground with no apparent regard for the vaunted reputation of the latter.

The following facts regarding the nesting of this species I have gathered from observation of three nests, found on the local salt marsh, two in 1923 and one in 1921.

Location of Nests.—The Harrier evidently prefers a less exposed location than does the Short-eared Owl. One nest found was in the center of a large clump of High-tide Bush (*Iva oraria*), and two were even more securely hidden in large beds of thick reeds (*Phragmites communis*). One was on dry, sandy ground, the other two on the wet marsh, occasionally flooded by tide.

Construction of Nests.—Here I found an interesting difference indicating that the Harrier varies the height of its nest with the danger of floods in its chosen location. A nest found on dry ground, above all tide levels, constructed of weed stalks and grasses, nicely lined, was only an inch or two thick. A nest located on the marsh over a mile inland from the shore of Newark Bay, but more or less exposed to floods and unusual tides, was similarly constructed but was about 5 or 6 inches thick. A third nest, found nearer the Bay shore and in a location frequently flooded, was remarkable for its greater size and bulk. It was built of weed stalks and finer material to a height of fifteen to eighteen inches, and it measured over three feet long and two feet wide. It was of uniform construction from the ground up with no indication of a "foreign" foundation. In none of these three nests was there evidence of enlargement from the time of their discovery until the young had departed. Compare this apparent adaptation of nest construction to hazards of location and the apparent lack of a similar faculty in the Short-eared Owl, which must suffer frequent losses by the periodical flood tides, unless the birds do in fact move eggs or young when threatened. Certainly the Owls show no ability to select nesting sites out of reach of the tides, nor to prepare against floods.

Actions of Adults.—There is, as with the Short-eared Owl, some

difference in the actions of individual Harriers when the nests are approached, but the actions of each individual observed here appear to be more constant. The male Harrier I have always found a valiant defender of his household and as pugnacious before the eggs are hatched as after. In fact some adults will continue to evidence displeasure when the nesting ground is approached after the young birds are competent on the wing and even in instances when they have disappeared. I saw an instance of this recently when one adult called and approached me as I neared the old nest on August 10, though the young, which had been flying since mid-July, had long since departed.

No one who has stood at a Harrier's nest as the male bird darts to the attack, his long flicker-like roll changing to a thin squeal as he sets himself for the final charge, can suppress a keen admiration for the bird. A charging Harrier in full plumage is worth going miles to see.

I have never known a Harrier actually to strike a human invader though several times birds have come within inches of my hat and all males I have had experience with were tireless in their demonstrations, charging in to very close range, then wheeling off only to charge again. The male I have found the more aggressive, though females feeding young are usually quite bold and noisy.

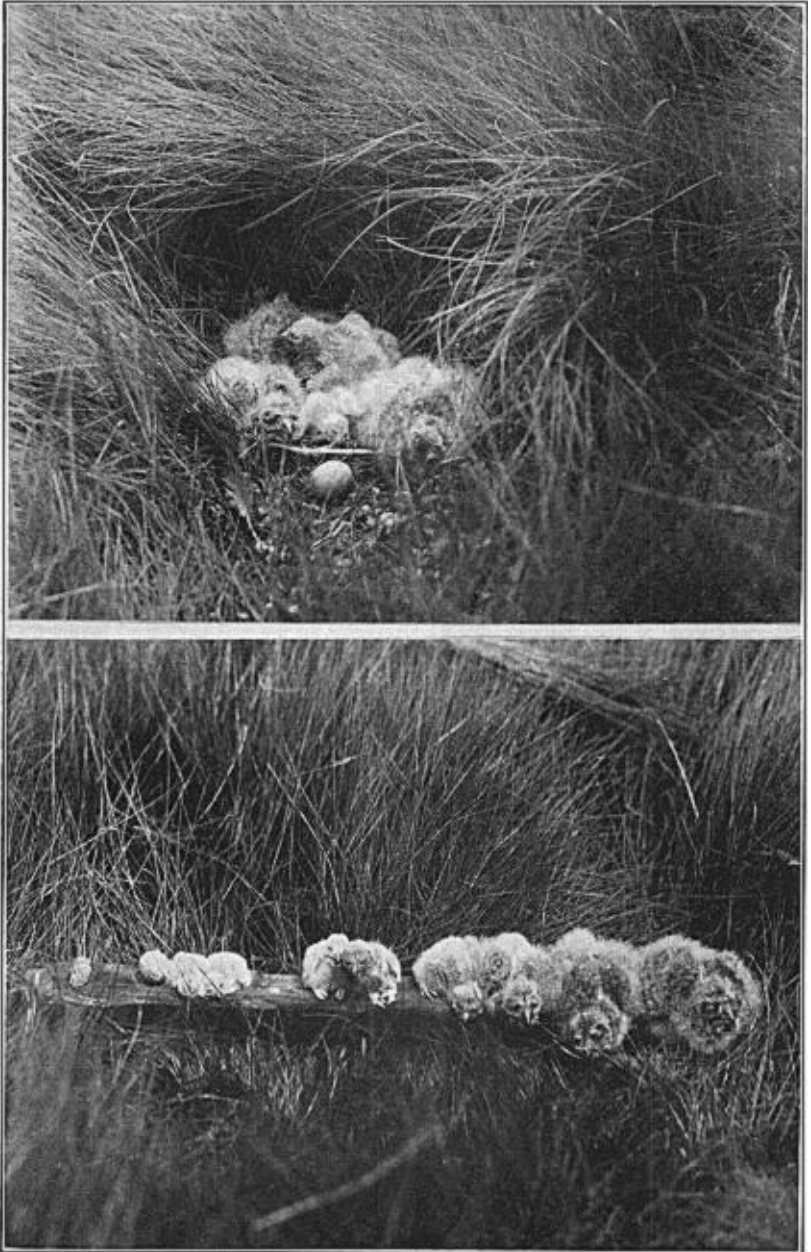
The Young.—I have never found the young Harriers as they came from the egg, but I have found them when apparently but a day or two old. They are then sturdy, fearless, wide awake, active, noisy and hungry youngsters—a long list of adjectives but they deserve them all. One young bird, apparently not over two days old, in a nest with five eggs, two of which were pipped, squealed and came toward me as the nest was approached, using wings and feet as instruments of locomotion and evidently taking any moving object as an indication of food. Its lack of fear, inherited from generations born in secluded nests, made a striking contrast to the actions of the young of some of our precocial ground-nesting birds whose early days are spent in localities exposing them more frequently to danger. The use of the wings as legs to aid in locomotion is an interesting remnant of a well-developed ancestral faculty.

When young the birds are sparingly covered with a light down. They grow rapidly but remain in and about the nest until ready to fly. The time from hatching to flight in the broods I have observed was about thirty to thirty-five days. Frequently the young remain in the general vicinity of the nest for two or three weeks after they have mastered the art of flying. Ability to fly comes relatively slowly and usually some days after the wings and wing feathers are well developed. The young birds are not uniformly courageous, the males I believe the more so, facing the intruder and ready to attack with lightning-like thrusts of the claws whenever closely approached.

The readiness with which the young imitate their parents is worthy of note. On July 7, I visited a brood which had left the nest and learned to fly, though still in the vicinity of the nesting site. They flew in all directions as I approached, uttering an immature peeping call. The adult male turned immediately to attack and I was surprised to see two of the young, probably males, follow suit, flying in very close and making a more or less unsuccessful effort to imitate the long rolling call. The darker backs and wings and more rufous underparts readily distinguish the full-grown young from the adults on the wing.

Nest Sanitation.—There is a sharp contrast between the nest sanitation of the local Harriers and Short-eared Owls, a fact which possibly accounts for the willingness of the young Harriers to remain longer on and about the nest, though cause and effect in such matters are easily confused. During the first three weeks of the brood's existence the Harrier's nest is kept scrupulously clean, but when the birds begin to wander about more or less, spending their time in retreats near the nest, less care is exercised and it is at that period that some interesting information as to food habits becomes available.

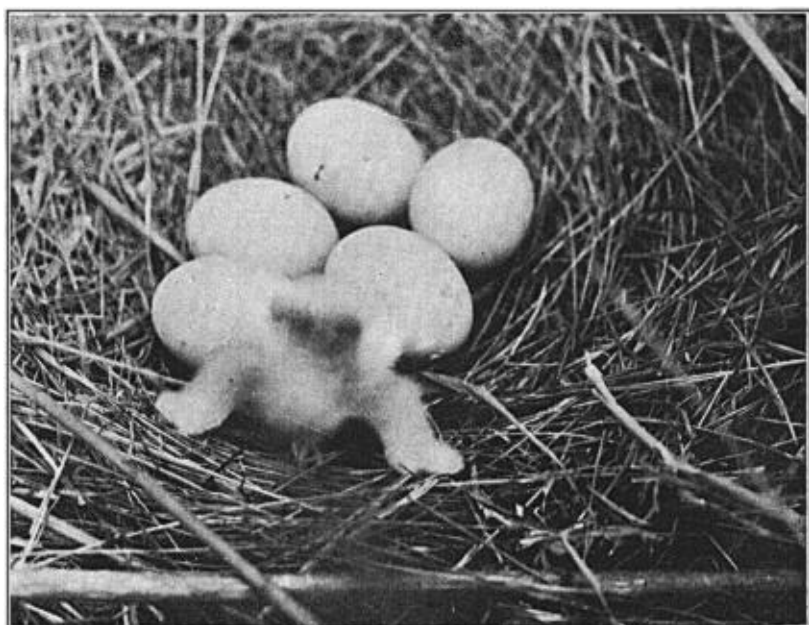
The Young Harriers' Diet.—As the young Harriers grow toward maturity their demands for food become relatively enormous. It is therefore natural that the adults, when called upon to supply these growing appetites, should become bolder and strive to secure their prey in larger units. This is apparently the usual tendency. As far as I can judge from remains picked up in the general vicinity of the nests, mice and small birds, supplemented



SHORT-EARED OWLS.

Fig. 1. Young in Nest.

Fig. 2. Pellet, Egg, and Young of Various Ages from Same Nest.



MARSH HAWK.

Fig. 1. Eggs and One Young in Nest.

Fig. 2. Brood of Young in Nest.

with insects, constitute the principal fare during early life. But as the birds grow, rats assume a more important role, and in or near two different nests I found remains, picked clean, of practically full-grown American Bitterns (*Botaurus lentiginosus*). Now the young American Bittern is no mean antagonist, and the fact that such large birds are actually killed and carried to the nest indicates the calibre of the Harrier as a hunter. I recall, once before in the later fall, flushing a Harrier from the half-consumed remains of an adult Green Heron. This bird had possibly acquired a taste for *Ardeidae* in earlier life.

During the fourth week of the young Harrier's life pellets of fur and feathers, containing some bone, begin to appear about the nest. These pellets are often as large, as compact and as well formed as those of the Short-eared Owls, constituting an interesting similarity between the two species. It is probable that the failure to find pellets about the nests earlier in the young brood's growth is due to the thorough removal of waste by the adults, rather than any change in feeding habits.

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THE SECONDARY REMIGES AND COVERTS IN THE MANDARIN AND WOOD DUCKS.

BY W. DE W. MILLER.

THE most striking peculiarity of the male Mandarin Duck is the remarkable sail- or fan-like expansion of the twelfth secondary, an ornament unique among birds. Correlated with this are other equally unusual features, evident only on close inspection. The thirteenth secondary is reduced to a mere hidden vestige much shorter than its greater coverts, and the fourteenth, though twice as long, is of far less than normal size.

Comparison of the wing with that of the Wood Duck (*Aix sponsa*) proves of great interest. In the latter there are several remarkable features, notably the abbreviation of the twelfth secondary which is only four-fifths as long as the remex on each side of it. The peculiarities in the remiges of this species were pointed out by Mr.