

NOTES ON THE GROWTH, BEHAVIOR AND TAMING OF
YOUNG MARSH HAWKS.¹

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THE Marsh Hawk or Harrier (*Circus hudsonius*) is an uncommon resident in this vicinity. In his 'A List of the Birds of New Hampshire,' (1903) Glover M. Allen cites it as "an uncommon local summer resident." Previous to the year 1929 I had only a few records of individual birds. So when a nest was found some twelve miles distant on July 2, 1929, containing four young, it seemed a good opportunity for an intimate study.

The nest was situated on the ground at the upper end of a three mile reservoir in the midst of a wild tract of withe-rod bushes (*Viburnum cassinoides*), interspersed with hardhack (*Spiraea tomentosa*), swamp grass and sedges. The nest proper when fresh had been built four inches in depth on a bed of sphagnum moss (*Sphagnum cymbifolium*), it was compactly made of grasses from the immediate vicinity with innumerable dead sticks and twigs from nearby elms and maples, and was about eighteen inches in diameter, slightly hollowed, and retaining its shape long afterward. Immediately in front was a space about two and a half feet square where the birds had trampled the vegetation flat and where the young birds evidently stayed when the nest became too small. While thickly surrounded by the screen of waist-high bushes, the nest was only about seventy-five yards straight in from a state highway.

The female flushed from the nest at eight feet and, instead of attempting to defend the young flew off after circling a few times. The young were balls of white down with eyes closed, apparently but a day or two from the egg. There were green oak leaves in the nest.

On July 11, the adults were not in evidence. A few days previous the female had been flushed from the nest late in the afternoon and on this occasion the feathers at the side of the head were expanded in such manner as to give a rounded look to her face astonishingly Owl-like. In the nine days since they were first seen the young had grown so that one bird was as large as all four together at that date; the white down was replaced by buff and gray with a white spot on the back of the crown, which remained white until the head was feathered. The feathers extended about an inch beyond the sheaths and down showed on wings and tail; on the shoulders a few dark feathers protruded just out of the down.

The young were brightly alert, all attentiveness in a wild sort of inquiry

¹ Thanks are due to Elmer Colwell for finding the nest. To W. L. McAtee for substantiating the identity of certain bones. And to Mr. George C. Atwell, of the Audubon Society of New Hampshire, for many valuable suggestions and criticisms.

at the observer's approach; they showed no sign of fear until an attempt was made to pick them up when they stood up on their wobbly legs and with the wings as means of locomotion scattered into the protection of the bushes at the nest rim. Replaced in the nest the two larger turned on their backs and attacked the proffered hand with both beak and talons, but without the strength to inflict a skin wound. The nest was trampled, filthy with excrement and over-run with carrion beetles. Cleanly in habit, the young backed away a foot or more from the spot they happened to be on and discharged excreta to a distance of two feet, so that it was difficult to understand the filthy condition in which I found the nest at this time. It is interesting to note that Urner,¹ in his studies of this species, found nest sanitation more clearly marked. There was a new batch of green oak leaves in the nest on this date, somewhat dried from the heat.

Three of the young were now taken from the nest and carried to my home. From their slight difference in size I numbered the birds 1, 2 and 3 respectively, and they are so referred to beyond. The youngest of the brood was left in the nest in the hope that the adults would not leave the vicinity.

From the first no restraint was placed upon the young birds except to confine them in a wire enclosed yard. They went whenever and wherever their inclinations directed them. In this wise the observations would seem to apply to a certain extent to their actions under natural conditions and for that reason together with the degree of their acquired tameness I offer these notes. Their development would seem to correspond very nearly to young in the wild state as observed by Dr. A. A. Allen.²

At four weeks of age Number 1 was given away since it showed signs of a fiercer nature and a greater tendency toward wildness than either of the other two and I disliked keeping it where its moods might tend to overshadow their more domestic ones. A week afterward it was taken to the woods and liberated.

Plumage. Once begun the feathering was rapid. It seemed the more the birds ate the faster they developed both in size and strength. The feathers grew so fast that the daily progress could be noted. While the wing and tail quills were only an inch long, and only a few feathers showing on the back and auriculars, when the birds were taken, in a week's time feathering was one quarter complete, with the first rufous feathers showing through the down above the tail, on the breast and at the bend of the wings. A week later, at three and a half weeks, feathering was complete but for innumerable bunches of down on the wings, back and over the forward half of the crown; they were fully feathered with the juvenal plumage at four

¹ Urner, Chas. A. Notes on Two Ground-nesting Birds of Prey. Auk, Jan. 1925, Vol. XLII, No. 1, pp. 31-41. (p. 40).

² Allen, A. A. Mother Marsh Hawk Tells Her Story. Bird-Lore, Sept.-Oct. 1929, Vol. XXXI, No. 5, pp. 356-367.

weeks, when flying commenced. The upper parts were a deep fuscous, the wing coverts peppered with rufous spots, and the wing and tail feathers barred with ashy-brown-black and ochraceous-buff. The tail coverts were white, and now the sexes could be determined: Numbers 1 and 2 were males, Number 3 a female. Until feathering was complete all three birds spent hours preening to free their bodies from the sheath scales and to exercise the growing plumage. They seemed to enjoy the bright sunlight as though it advanced their growth. At six weeks Numbers 2 and 3 underwent a change in coloring. All the upper parts and wings, especially the nape, shoulder and bend of wing, took on a silver-gray sheen over the fuscous, slightly changeable in different lights, a color between ashy-gray and fuscous, not so light a pearl-gray as in the adult male; and dimmer in the immature female.

Until four weeks of age their feet and tarsi were cream-yellow in color, when they changed to a deep yellow, acquiring the adult shade at about eight weeks of age. The talons were deep black. The bill was black up to the cere, which became and maintained a greenish-yellow color.

Food Habits. It was noticeable that their greatest appetite was during the period of mass feather production, at from two to four weeks, self-preservation mastering any feeling of sharing the food. Obtaining a morsel, one would cover it with the wings, scold and complain, neck hunched ready for a possible fray, and at an opportune moment clutch the meat in the talons and carry it to a distance. At first, after losing innumerable feathers from vicious attacks by the older bird, the younger ones learned to wait, not without constant complaint, until the former had gotten a piece of food and satisfied his wants. However, they soon learned to spar back. They were as fond of kidney as the Owls reared by Reed.¹ It became their choice food, taken in preference to any meat except wild game, and continued to be as long as they remained with me.

When young they could not tear the food and I resorted to cutting it in pieces. No movement in the procedure escaped their notice and when I had finished, one bird could not be told from another in the struggling melee. From the first they were fed regularly three times a day and grew to expect food at regular hours as punctually as clockwork. If it were not forthcoming they would come to the house and call incessantly.

At three weeks they began to show a preference for tearing their own food, holding a large piece in one foot, usually the right, and ripping off small pieces. Later, when they had been on the wing some weeks and came to feed from meats I held on a board, a piece would be grasped in one foot as the bird took it in flight, a common practice. If taken

¹ Reed, Bessie P. *Growth Development and Reactions of Young Great Horned Owls.* Auk, Jan. 1925, Vol. XLII, No. 1, pp. 14-31, (p. 20).

in the beak it was sometimes grasped in the foot after flying. They would carry half a large beef kidney, an equivalent to the weight, approximately, of five or six field mice, with one foot held flexed beneath the tail and the one holding the meat hanging straight down. Any small food was carried up against the belly. Experiments at feeding showed that they would try to swallow pieces larger than would pass the gullet, when they would sit back on the hocks and gulp with a backward and forward movement of the head, jerking the wings, and when successful would "worm" the head and neck to aid in placing the food in the crop or in moving the crop itself. Even at ten weeks, they would gorge to the limit when fed. This would seem to be a characteristic of the wild Hawk to guard against a possible scarcity of food supply.

Food consumption varied in degree. Once two full grown frogs and fifteen pollywogs were taken by each of the three at one feeding, whereas, on the other hand, when grown to "juvenal" stage a third of a beef kidney sufficed for the two. Living pollywogs would be treated with a severe peck or two, or until subdued, and swallowed head first, often when still alive. As soon as they mastered the handling of their legs they carried food and preferably fed separately. Until then they had apparently enjoyed each other's company at all times. On one occasion they ate liver until they could swallow no more, later vomiting up a portion just as it had been swallowed, showing that in a half hour the digestive juices of the stomach had not worked upon this portion of the food although the outline of a filled crop had become obliterated.

On only two occasions were they given birds. Besides kidney, frogs made up the bulk of their diet, mice coming next. A Sparrow found dead in the road and a Catbird were the sole feathered food they had until they began to hunt for themselves. At the age of five weeks Number 2 came one morning when called and refused to eat. The reason was evident as on the left foot were a few whitish feathers from a small bird and a spot of blood, testifying to his skill as a hunter. While she may have done so, Number 3 showed no evidence of catching wild game.

Pellets. The first pellet was found on the morning of July 12, the day after the birds were taken home, a second late in the afternoon, and a third the next morning, showing that a pellet may lie for hours after food is consumed before being ejected. This was later substantiated, with rarely a deviation. The first pellet contained much mouse fur and the lining of a Blackbird's gizzard, but there were no bones in evidence, which leads to the conclusion that up to this date the young had been fed little material with bones. The second pellet was largely of mouse fur and material that could not be identified. The third pellet had some mouse fur, small pieces of bone, and almost an entire Japanese beetle (*Popillia japonica*), besides a

red ant that had not been acted on by the digestive fluid but which had been taken before capture, a matter of some twenty-four hours. All three pellets had more or less grass and grass seed throughout, which had not been gotten in close proximity to the nesting site and had been taken probably the day of capture. The first pellet was the largest ever found, being two and a half inches long by an inch thick, rounded on one end and tapering to a point. None of these Hawk pellets had so much of a sticky mucous film covering them as I had found present in Owl pellets. In all three pellets the contents were from food taken previous to the time of capture late in the afternoon, at which time their crops were full. However, in a few hours, they readily took some small tadpoles. The first pellet to appear from food taken after capture was ejected the morning of the 14th, over two days later.

Five days after capture a small pellet was found, newly ejected, comprised of waste material taken both before and after capture. The former comprised a number of small white stones about half the size of a pea, which could not have been taken in captivity since until this date the Hawks were on a board flooring; likewise there seemed no chance of the young having picked up these stones near the nest. From this I conclude that the parent birds fed the material for the same reason a domestic fowl teaches her chicks to eat small stones and oyster shell. It is interesting to surmise the reason the stones remained in the gizzard approximately a week when some fed for experiment later were ejected with the next pellet. Why were these first stones ejected at this time and not in accord with the twenty-four hour period of later experiments? For about two weeks they continued to take stones furnished with the food, then discontinued their use as food grinders to any extent. This would seem to show that their need for grinding food was largely in the earlier weeks.

It has since been determined that after the first three or four weeks, food with bones furnish all the grinding matter that is necessary to a thorough disintegration of the food; but because they are not so sharp as small stones, unless crushed and splintered, a larger amount is necessary for the requirement of roughage such as fur and feathers, and this, in itself, would seem to furnish a sound reason for a pellet composed mostly of bones being ejected in precedence of one made up principally of feathers or fur as the case may be; and would explain the unjust accusation that pellets are misleading.

Experiments made by feeding entire skulls and jointed sections of mouse bodies brought pellets in which these pieces were disjointed and the skulls crushed to bits. How this mastication was accomplished is not clear. In a few instances skulls came up separated evenly along their seams. The pellets varied greatly as to size and shape, but all were solid and com-

pect in construction. When about to eject a pellet the bird would sit still and appear dull, but that was all. They were known to eat just before and after ejecting a pellet. Pellets were never found newly ejected save early in the morning. On one occasion house mice were fed for breakfast, a Sparrow two hours later, then, in the afternoon, a field mouse was fed. Examination of the three pellets next morning showed all three materials so mixed together that it was difficult to separate the two colored furs and feathers. Usually, however, a sharp line of cleavage showed between the materials fed at different hours. Especially was this noticeable with frog refuse. When mice and frogs were fed at one meal, the waste frog matter was invariably on the larger end of the pellet, even though fed at random. This was always so, whether because it was the heavier material could not be determined. It is certain that these Hawks did not require such an amount of roughage with their food as I had found necessary with a Barred Owl (*Strix varia varia*). They would feed on kidney for days at a time without any roughage whatever. All three would take a greater bulk of fur than of feathers, preferring to pluck the latter meats as clean as possible before swallowing.

Notes and Calls. From the first they had two distinct calls or notes. One was a squeaky whistle uttered, usually, when they were hungry. This was habitual in an increasing degree of intensity until full grown. The other was a softer note, shorter in duration, a contented chittering heard after feeding or when they were hungry and during the night, like the noise young chicks make when the hen broods them. This note was confined solely to the first few weeks.

Accompanying feeding hours at the age of three weeks, a new note was originated by Number 1 and was in evidence from then on, taken up readily by the other two at the same age. It was a feeding call. That is to say, it would be uttered when the bird was shielding its food and voicing its authority. It was a note full of wrathful superiority, a subdued chuckling with a dash of braggadocio, as it were, from which any of the three would retreat hastily. It was toned to a guttural throaty cry, rolling to a diminutive ending, in a word the closest to a scream of any call yet attained, and was in fact the only feeding note with any semblance to a scream until the bird was eight weeks of age. While it was a screamed cry, it was not syllabled the same, nor did it mature into the later adult scream, differing distinctly in both pitch and tone, although it was occasionally heard when the birds were ten weeks old, along with the adult scream. This latest note (the adult scream) was first heard when the Hawks had been on the wing four weeks. It was a more moderate whistled scream, taking more time than the above mentioned to acquire a ripened perfection, like the vocal change of a boy's voice changing to manhood. Number 3's voice was always different than the male's. Her notes were not so modulated, and

while in a minor key were louder and uttered more rapidly than their calls. Also she had a habit of calling more continuously than they.

Sight. With age the Hawks showed an increased interest in the things about them. For instance, there were a number of black ants abounding over the piazza which they would watch sharply at the age of two weeks, cocking their heads in various attitudes of questioning doubt. They would follow a wagging finger in the same way, though more sternly. Later at the age of three or four weeks they got to associate a finger or the hand with food since they were fed in this manner a good deal, and if passed at them empty they would bite it just the same, as though they could not discriminate a finger from meat. Often, before they could fly, they watched the activities of Swallows sailing through the air, at a height greater than fifty feet. Like an Owl, they possessed the faculty of turning the head in a three-quarter circle to keep something of interest or doubt in the line of vision.

The study of their eyesight was very interesting. Having finished a meal they would scan the ground in anticipation of a stray bit of food, though full-fed. Often when searching like this they would grasp one of their toes. When in a fighting mood one bird would grasp his own wing if the wing bow suddenly crossed his line of vision. He apparently imagined it was one of the other bird's wings he was biting until the pain seemed to create the idea that one of them was biting him, when he would grip all the harder for revenge until release alleviated the pain. This was a common happening.

At feeding time if one bird lost his grip on his food and dropped it into the tall grass when flying to the woods, he was never observed to leave it but stopped in mid-air poised above the spot, at over ten feet, until the sharp eye detected it where it lay on the ground, and then, alighting, would eat it. On several occasions where I could not find a piece of meat about an inch square, after searching keenly, the Hawk would pick it up instantly. I believe this illustrates well the power of the eyesight when a foraging Marsh Hawk sails low over a mowing searching for field mice. Small chance a moving body has of escaping the piercing, keen eye!

The color of the eye had not changed from the first up to ten weeks except to grow from gray to a deeper shade of brown. The pupil could be enlarged or dilated at will and often was at feeding time when quarreling seemed to affect the mood and therefore the eyesight. A light suddenly thrust into the bird's face brought no response. When intently watching some moving object, the pupil might change in size, dilating and enlarging with a winking movement of the whitish eye film, that was all.

Hearing. That the hearing was acute goes without saying. The slightest noise would be heard and the direction from whence it came noticed unflinchingly. On moccasined feet I have tried to creep around the shed, where the

birds were often fed and came to roost, without their hearing me, but was never successful. My presence was detected and the Hawks would be looking my way when I peeped out at them, poised ready for flight if it were other than myself. A cricket chirping in the grass, my voice in the house, or any suspicious noise whatever brought instant response. At the age of two and a half weeks all three had shown an innate curiosity at the muffled sound produced by tadpoles jumping about inside a closed pail.

A noise like this which could not be detected and its presence ascertained caused suspicion, which is the forerunner to fear.

I tried whistled calls at various pitches to see what response they might bring. A sharp, concise whistle brought them screaming in a rushing expectancy directly at me; a low, long-drawn-out whistle seemed not to unduly excite but brought them in a circuitous, unhurried flight overhead where they would circle questioningly, turning the head from side to side to see what I might want; a spasmodic, modulated whistle was known to be an answer to their calls and brought no response except the usual whistled scream in answer. They soon learned what whistles at various pitches and tones meant and responded accordingly.

Perching and Repose. Before their legs had become strong enough to bear their weight, the Hawks usually rested on the tarsi, in a sitting posture. Until the time of flight, when handled they would relentlessly grip for a secure footing. With the art of flying and perching mastered they gradually lost this death-grip hold. When three weeks old they had become proficient in standing upright with any degree of equilibrium on a flat surface; but up until four and a half weeks could not perch on any sized branch without falling. It was noticeable that prehension was more marked when food was being held, at which times I could not open the closed claws without using both hands, with birds five weeks of age. If a piece of meat was covered with the hand, the grip of the foot on the hand was severe enough to cause pain although the talons passed around a finger without puncturing the skin. When a piece of kidney was placed on a post and fastened by a string to the camera shutter, Number 3 would grasp the meat so quickly and surely in flight as to entirely impale the meat on the talons in such a way that the bird was often thrown to the ground in an effort to release its hold when the string did not give way.

Actions, Reactions and Behavior. The Hawks were given a large, roomy dry-goods box, open on one side, for a nest when young, and treated it as such, going into it whenever they were sleepy and desired to rest, or to escape the bright sunlight on hot days. They also showed a tendency to enter the lawn shrubbery apparently for the same purpose. It was surprising what an amount of strong sunlight they could stand at times. Even though the heat would be so intense that they gaped and panted, there were intervals when to bask became an apparent enjoyment.

They used both wings and feet as means to further locomotion and when not sitting down used the wings spread out for balance, even before these members had become feathered. At three weeks of age they began to exercise the wings by beating them as in flight, and possessed the power to raise their bodies, but not the toes, clear of the ground. Many times a day they exercised either in this manner or by running over the ground and at the same time beating the wings above the back. The first flight made by each was not by way of being preparatory flying. Except for hop-flying from the ground to the top of their dry-goods box, they simply lifted themselves with one stroke and sailed off when the time came, or, I should say, flapped away. Number 1 went from the yard into the road passing the house when the automobile leaving the garage frightened it, and thence into the garden on its first flight. Number 2 went into the garden, twenty-five yards distant, at one hop. And Number 3 flew approximately a quarter-mile in a wide circle, having stopped momentarily on the garden fence to get second wind, so to speak. The first few days following the initial flight a good share of the day was spent on a brush heap by the garden fence, where they practiced balancing, grasping and clutching small limbs by rising a few feet in air and in descending grasping a secure footing, and hopping about. The order of their practice was methodical. For a few nights they returned to the nest-box, then for a time perched in the grass and in the trees at the edge of the woods across the lot back of, but within good view of, the house, later going deep into the woods out of hearing from the house. They would be gone after the evening meal at about 6:00 p. m., for the night, and could not be heard to respond to calls until their appearance early the next morning. Some mornings they would come soon after six o'clock, again not until eight or nine, or whenever hungry.

For two weeks following the initial flight, the Hawks had wallows in the tall herdsgrass across the brook back of the house where they stayed during the day when not flying and where they carried food to eat it. Later they began perching in trees, and when they had food to tear up might alight either on the ground or on a limb. As a rule they flew lower or just above the tree-tops, except when carrying food or responding to calls. They were never observed to glide over the ground in evident watch for food, probably because they did not have to. Once Number 3 was seen to flap just over the grass tops for a distance trying to detect where a piece of wood which I had tossed aside landed. What hunting they did was never seen. They were not known to do any high sailing, nor did they sail at all to any extent, until about four weeks after the initial flight. On brisk, windy days after that they would frequently mount high in air by spiralling and soar long at a time.

Whenever the screened side porch door was opened and the Hawks were

at the edge of the woodland in a favorite apple tree which commands an unobstructed view across the back lot, they began to call and fly to the house expecting food, but would wheel back again if any other member of the family than the one who fed them, appeared. Number 3, however, has been known to alight on the head of the lady of the house. I have started from the village store with kidney, whistled the call notes which meant food, and watched the Hawks come screaming. Seeing the food that I would hold out toward them they would invariably keep along with me at a height of thirty feet, dipping as though to alight and wheeling at and around me until we reached home, eagerly wistful in their haste to be fed.

Number 3 showed a trait bordering on abhorrence at having a kitten eat alternate pieces of kidney with her. The Hawk would show an almost vengeful hatred. This same trait has been observed to some length with a captive Barred Owl in connection with a black-and-white cat; but whereas the Owl would always attack, the Hawk did not. I have wondered if this reactive trait could be an inbred hatred toward the skunk.

At about eight weeks of age both birds were decidedly lame in the left foot, which perhaps can be accounted for by the fact that young Hawks often miscalculate in judging their distance when launching at prey and thereby the legs may be injured.

Until about eight weeks of age they spent a stated period of time at play after having been fed. A piece of bark or a stick of wood would be played with, pounced upon, worried, picked up and tossed about and grasped in the talons, as a cat will play with a mouse. Serious as were their activities, there were times when they touched on the absurd, the blasé or the humorous. The tall swale grass growing along the stream was a source of constant delight as a place to frolic as well as a place of concealment during the day.

There were very few instances when water was provided that they drank; but once on the wing it became a habit to alight along the stream to drink after meals. At one spot where muskrats had a "bed" consisting of grasses and lily-pod leaves, the Hawks would alight up to their bellies in water, where they might wade about, perhaps drink, sometimes bathe, or remain standing still for some time. When bathing, they invariably waded in up even with the wings and dipped and ducked and splattered the wings in complete abandon of enjoyment. Once Number 2 alighted in the middle of the stream in four feet of water and bathed "on the wing," as it were. With such an excess buoyancy to its light body it could float quite easily with wings and tail spread to their utmost extent upon the water.

Fear was shown more as distrust. This is illustrated by their dread of the camera toward the last of their presence with me. It became customary for the Hawks to sit on a post at a distance and watch the camera intently if it were in evidence, distrustful of its presence, yet assured that while I

held it no great harm pended. Let me lay it down and they would fly off in haste screaming loudly. When hunger reigned over this fear, as it did occasionally, and they conceded themselves to partake of food, the muscles of the legs could be seen to work and the wings quiver in readiness to take flight upon any slight suspicious movement with the camera.

Some humans are prone to look upon predacious birds as fierce, cruel demons from which all the lesser beings flee in fear of their lives. It gave me the greatest consolation, therefore, to see the fall migrants—Vireos, Warblers, and Sparrows of many species—feeding contentedly in the very tree, on the same limb with one of the Hawks. Nor have I ever seen an attempt to attack this their natural food as one might suppose they would. On the other hand, on a few occasions, Starlings and Kingbirds have been known to give chase to the raptors, who paid no more attention to their serious attack than they would to a butterfly.

Tameness. At the age of two weeks the Hawks had learned to distinguish from the other members of the family the one who fed them. So they also learned to set up a clamorous din whenever I came in sight. Looking back, I believe that because only one person fed them, (except for a brief interval of several days), because they learned to come to me for food when hungry rather than my taking it to them, and because when out of sight they learned to come to a certain whistle,—these things brought about their taming to a state where I could handle them, whereas they were afraid of any other human being. Early they learned to fear an automobile, a fear that never lessened.

It was not uncommon for one or both Hawks to be gone a day at a time. On August 24 after a heavy thunder shower the night before, Number 2 did not return and was gone for a thirty-six hour period; Number 3 did not put in her appearance until the 29th. She could barely fly due to injuries sustained to both wings, and was in a starved condition insensible to anything but the craving for food, while her monotonous pleading calls expressed her pleasure at being back. And after that date she was tamer than ever before. It is such instances as this that bring about perfect tameness in birds as well as in mammals.

On several occasions Number 2 has followed me quite a distance, returning home when I entered a building or went out of sight. Both Numbers 2 and 3 began to call and came to me whenever I came in sight at all times, and we "talked" through the whistled notes. I have watched to see if they would answer another person, but they never did.

While I did not try particularly to tame them, the Hawks arrived at this point as a natural conclusion from environmental freedom and from the care they had. I know of no published instance of this kind where Marsh Hawks were tamed. To have them come from the woodland in response to

a whistle they recognized as far as it could be heard, was indeed full recompense for the time and money required. Once they flew nearly a half mile from me and just as they were disappearing from sight I whistled once, twice, and they turned and came back, circling above me in expectancy, since I made it a rule never to call them without a reward of some kind. The perfect trust they placed in me, the perfect freedom with which they answered, was enough to make one feel veritably like Saint Francis of old.

Since the foregoing was typed, the Hawks have answered to a call and broken the ties that bound them through their taming. Both birds on each occasion showed a restlessness a day or two before leaving, and the last day would fly high in the air, and when fed took the food to the woods to eat. They were erratic in behavior, but would respond instantly when called. Number 2 left September 4 during the night. Its behavior as it left after feeding that evening was no different than formerly, nor was that of Number 3 on like occasion. It was simply an uneasiness they did not understand or, understanding, could not bring themselves to resist. Number 3 was fed rabbit for the last meal, as it happened, over which it showed a ferocious feeding reaction not evidenced before, and appeared more restless than hungry. It left that night, September 15. An odd coincidence is that both left on a night of very low temperature. It may have been that they had a forewarning of the coming cold. I have little doubt but that they went south and that Number 3 remained longest because of its very marked tameness and desire for companionship.

On September 15, a visit was made to the nest site. Evidence showed conclusively that the fourth young Hawk had been reared to maturity. Two pellets were found. One had been composed almost wholly of bones—the femur and tibia, humerus, metacarpal and digits of a cotton-tail rabbit (*Sylvilagus transitionalis*). The other, a very large pellet, contained six small pieces of broken bone and two chisel teeth from a meadow mouse (*Microtus pennsylvanicus*), a three-sixteenth inch circular piece of mica, the wing and black shell-like segments of a wasp, and two shades of fur. The two teeth show plainly that they were firmly imbedded in the skull when swallowed. Yet the absence of skull and any pieces of bone larger than the teeth prompts me to suggest a theory I have been propounding from observations on pellets ejected by the tame Hawks; namely, that when an excess of bone matter is taken together with fur and other refuse, the bones come up in one pellet with just enough other material to ease ejection, while the larger mass of waste comes later in a separate pellet. When frogs and furred food were taken at one time, the frog matter being of tough skin to which the backbone adhered, came first in one pellet, then the remaining materials in another. There were instances, however, when the two weighty components were in one pellet, but always the frog matter came first at the larger end.

Returns.—It might seem unfortunate that these three Hawks were not banded with Biological Survey bands. But there can be no question, even so, but that they afforded returns.

From April 14, 1930, to about the middle of May three Marsh Hawks (two males and a female) were about my home, the males in complete adult plumage. On May 8 the female first answered my whistled calls. Their actions and familiarity with the surroundings and apparent unconcern as they almost daily visited near the house seemed convincing beyond question, especially since the species is rare at this vicinity, while breeding on the river flats.

One, and possibly two, returned in 1931. On April 13 a male was perched on a fence post at the house, calling. He showed no sign of fear as I approached, gave the old familiar call once, then turned and took wing, leisurely, still watching me. He lingered for a few days at a nearby swamp-meadow through which coursed a brook, as the female and a male did in 1930, and I suspect would have nested (both seasons) had it not been for numerous fishermen.

Only one male returned in 1932, on April 3 when he came to the house for a short period then flew out to the swamp-meadow. He showed but little interest in my whistling the old calls.

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