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RECOLLECTIONS OF THE PRAIRIE CHICKEN AND THE SHARP-TAILED GROUSE IN NORTHWESTERN MINNESOTA

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The particular locality here concerned lies in the southwestern part of Marshall County, Minnesota. What is referred to as the homestead is a quarter section of land (N. W. $\frac{1}{4}$, Sec. 20) situated about four miles northeast of the village of Warren in McCrea township. Its location is about two and a half miles east of the edge of the valley of the Red River of the North, and about the same distance north of the Snake River, a tributary of the Red.

In a previous paper (*Journal of Mammalogy*, Vol. XI, No. 4, 1930), on the mammals of Northwestern Minnesota, I have described the main physiographic features of the area, so that in the present article mention will be made of only such points as seem necessary for the immediate purpose.

The homestead is in the area of sandy loam stretching eastward from the valley of the Red River and which was, at the time referred to in this paper, characterized by a profusion of poplar-willow groves and thickets with intervening larger and smaller areas of open prairie covered with a luxuriant growth of grasses and flowering plants, and containing numerous sloughs and several coulees. On this homestead we lived continuously from 1889 to the close of 1902, the period with which the present account is particularly concerned. Larger areas of wild land bordered on the east, and less closely on the north, while cultivated lands and smaller areas of wild land lay on the other sides.

THE GREATER PRAIRIE CHICKEN

(*Tympanuchus cupido americanus*)

Arrival and Departure. The prairie chicken was a summer resident, only, in all the territory with which I was acquainted. Although I have no exact dates recorded, it arrived, as nearly as I can recall, about the middle of April. Its mating season came at about the time that the spring sowing was completed, and the newly seeded fields, particularly where these bordered wild prairie lands, were one of its

principal “dancing” or “playing” grounds, on and about our homestead. In addition to the fields, mowed areas of wild land, such as dry slough borders and coulee banks, were used for the same purpose. Every morning and evening at this season the booming of the prairie chicken could be heard at all points of the compass, the sound swelling to greatest volume in the stillness of the dawn.

The departure of the prairie chicken took place mainly in October, and the exodus was complete—at least I never saw a prairie chicken during the winter months in any of the territory with which I was familiar. While less noticeable southward movements doubtless had been going on earlier, it was toward the end of the season that definite migratory flights attracted my attention. These flights I observed particularly in the evening, from about sunset until dusk, but whether they extended farther into the night I do not know. Certain flights that occurred at other times of the day at that season may also have been part of the general migratory movement, though not certainly distinguishable from flights of purely local character. But there could be no question about the evening flights which I watched on many occasions. The direction was always straight southward, and the birds flew at a height that as a rule probably did not exceed fifty feet. At this height they cleared the tops of the taller groves in their path, but when passing between groves they often could be seen to be below the level of the tree tops. No sound came from the birds on these flights, other than the periodic whistle of their wings. In size, the migrating flocks varied considerably, from a few individuals to a score or more, just as flocks varied that were met with in the fields. Larger flocks were frequently so loosely grouped or strung out that many seconds might elapse before the last bird had passed a given point.

Although I watched many such passing flocks, and listened to many more that were not distinctly visible, I never happened to see or hear one alight in the period of the dusk. The distance or duration of these flights probably was considerable.

Nesting. Nests of the prairie chicken were to be found generally over the drier prairie areas. On our homestead one particular nesting ground that I remember, within the period that we lived there, was a tract of about ten or more acres bordering a coulee that traversed our land from east to west. Before this tract was broken up it was covered with a luxuriant growth of blue joint grass, amidst which the nesting birds ordinarily would not have attracted notice. But one season the dead grass—the accumulations of years—was set on fire, and

the greater part of the tract was burned over, revealing many nests of the prairie chicken, both old and new, the birds evidently having used this nesting site repeatedly. The damp nest materials next to the ground had resisted the flames more or less successfully, so that after the fire had passed one could stand in one's tracks and count the little heaps that represented the nests, over a considerable part of the area. Some of the nests of the season had been abandoned by their owners, while the eggs remained, more or less browned or scorched; but in a few instances the birds had returned and were found on their nests a day or two after the fire.

On the wild lands to the east, north, and northeast of our homestead, also, I found nests of the prairie chicken from time to time, though I made no systematic search for them here. However, considerable numbers of the birds nested on these lands, as was evidenced not only by the many that yearly were seen on the dancing grounds in these localities, but more particularly by the numerous broods of young that made their appearance later in the summer. These larger areas of wild land were the principal nesting grounds of the prairie chicken population of our immediate territory. Many smaller patches of prairie were found on practically every quarter section of occupied land, also, and on these the species nested to some extent, but such areas were probably of minor importance in comparison with the larger tracts of virgin prairie, mainly because of the proximity of man or his live stock.

It may be supposed, perhaps, that the stubble fields left unplowed in the fall might have served as suitable nesting grounds for the prairie chicken the following season; but this could have been true only of those relatively few such fields that were not spring-plowed. Many of the stubble fields left for spring plowing were turned under before or at about the time that the nesting of the prairie chicken began; hence any nests that might have been started were foredoomed to failure. The fields that were summer-fallowed were plowed later in the season, at a time when the prairie chicken broods would have been hatched, in many cases at least. However, although I was given to much roaming about, I do not recall ever having found nests of the prairie chicken in the stubble fields in our general locality, and I believe that these fields were of little or no significance as nesting grounds for this species.

Hunting. The hunting season on the prairie chicken opened September first, and although I do not recall that any official closing date existed, it terminated automatically when the species departed for

points farther south. By the opening date of the season a certain percentage of the birds were only about two-thirds grown, and many such were shot. More or less pre-season shooting also was done in our territory, when half-grown birds were bagged, but this practice was confined largely to certain individuals among the hunters and for that reason did not reach serious proportions. Much more serious from the point of view of conserving the supply was the absence of all restrictions on the daily or seasonal bag limits. Reduction of bag limits as a means of maintaining the supply was an idea that apparently had not occurred to anyone in that section, if elsewhere. In the period of plenty it was a daily event throughout the hunting season to meet parties of hunters returning from the field with all available space in their double buggies or light wagons packed full of prairie chickens; and at the railway station were to be seen large heaps of hay-stuffed birds ready for shipment, which attested clearly enough the general success of the visiting hunters.

On our homestead, during the years that we lived there, it was seldom really necessary to go beyond the boundaries of our own land to secure a mess of prairie chickens in season. This enabled us to do a little shooting even during the busy week days of harvest time. In the early morning, before the day's work began, or toward sunset, at its close, our watchful eyes rarely overlooked any flocks of prairie chickens that might be in the stubble or on the grain shocks in some undisturbed corner of our fields, when a hurried trip with the shotgun frequently resulted in a mess of game for the table; and these birds as an article of food were always highly valued.

Most of the village sportsmen, as well as the visitors, hunted with trained bird dogs, which were, of course, an important factor in their quantitative results. On the other hand none of the farmers known to me in our particular territory owned such dogs. The farmer's hunting was generally done on foot, unassisted, although occasionally he might be accompanied—and perhaps more or less handicapped—by a farmyard canine of undetermined usefulness. He might, also, now and then, make a round of his fields on a hay-wagon, but his horses were almost invariably gun-shy to a high degree, so that any such excursion meant that a strong-handed driver must be available if the farmer himself wanted to participate in the sport of actual shooting.

Depletion. As probably was true of all other areas in this section, the prairie chicken population in our particular territory was composed, in the fall or hunting season, in part of locally hatched birds and in part of flocks that continually dribbled in from other breeding

grounds, perhaps especially from points farther north. Only on that assumption could the continuous supply of "chickens" during the height of the shooting season be accounted for. What proportion was represented by each of these groups is wholly conjectural, but when the southward drift began, by the middle of September, perhaps, it is quite probable that, at least in the closing years of the period in question, the invading birds far outnumbered the local prairie chicken population. Therefore the intensive hunting that each year took place in our own and many other parts of this general territory, affected not only the next season's local prairie chicken crop, but also that of more distant places. Fewer and fewer birds were left to breed each succeeding season. The result that followed was the only one that could have been expected.

But with the decline in numbers of the prairie chicken there came, also, so far as our own general locality was concerned, a large falling off of visiting hunters, so that even at the close of the period there still remained a fair supply of this game, although in the light of future events it was not sufficient to hold out for many more years against such shooting as continued thereafter.

The question may be raised whether the gradual reduction of nesting areas due to the breaking up of the wild lands was not equally responsible with the large-scale, intensive hunting for the great decrease of the prairie chicken during this period. There is hardly a doubt, of course, that even without any hunting at all the species would have been reduced following widespread elimination of its nesting grounds. However, the birds would not have been killed off by the thousands over all this territory, and in all probability would have occupied to a much greater extent those natural nesting grounds that remained untouched by man. For as it was, aside from the innumerable smaller patches that dotted the cultivated areas, very considerable tracts of wild land remained, so that nesting grounds were available for a vastly greater breeding population of prairie chickens than actually returned to the territory in the last few years of the period. The relative scarcity of the breeding birds can be explained, I think, only by the excessive killing. The depletion had progressed to the point where there were not enough birds left to occupy more than a small part of the nesting areas available. The conclusion seems unavoidable, therefore, that excessive killing by hunters was the principal factor in the depletion of the prairie chicken in this territory.

THE PRAIRIE SHARP-TAILED GROUSE
(*Pedioecetes phasianellus campestris*)

Arrival and Departure. The sharp-tailed grouse began to arrive in our area about the first of October and departed the following March, having disappeared about the time the prairie chicken returned. I never found any evidence of the sharp-tails nesting in the general territory here under consideration.

Upon its first arrival the sharp-tailed grouse was usually found in the stubble fields, where in habits and behavior it was essentially like the prairie chicken. As the fall plowing progressed it was to be seen more and more frequently in the open, on the plowed ground, but keeping as a general rule close to the edges of bordering stubble fields, thickets or wild grass lands. The birds were frequently to be seen, too, in larger or smaller companies, moving about or merely resting on the many little mowed sloughs or patches of dry prairie that adjoined the fields or nestled among groves in the vicinity of fields. On the wild lands more distant from field margins the sharp-tails were rarely seen at any time during the day; but night bedding grounds were numerous on such lands.

The sharp-tailed grouse in this territory was distinctly not a frequenter of the groves and thickets; it was a bird of the open fields, and with marginal preference only for the groves and thickets. This is not to say that it never entered groves or thickets, because in certain situations it often did, as will appear later; but in the average poplar-willow grove with its tangle of brush and dead sticks it was ordinarily not at home. The kind of habitat that here was ideal for the snowshoe rabbit, for example, was usually avoided by the sharp-tailed grouse.

In the late fall when frosty mornings became of regular occurrence, the sharp-tails began taking to the trees for a certain period of the day. This tree-perching took place mainly on clear mornings, just after sunrise. On cloudy mornings the grouse were to be seen in the trees less frequently, and then only provided the air was still. On breezy mornings, even though clear, it was as a rule useless to look for the sharp-tails in the trees; and if a breeze sprang up while they were in the trees, they soon flew down. The ideal morning for tree-perching was still and clear, with heavy white frost. The grouse were then sure to be found in the trees in numbers.

The length of the daily perching period, if the birds were undisturbed, varied considerably, from ten to fifteen minutes, perhaps, on some days, to an hour or more on the most favorable mornings. This

is without reference to individual birds that occasionally lit in the trees for a few moments before continuing their flight. On leaving the trees the birds might remain to feed in the immediate vicinity or fly away directly to more distant parts.

Occasionally a few sharp-tails were to be seen in the trees late in the forenoon, but I do not recall ever having seen one in a tree in the afternoon or evening. Their tree-perching was distinctly a "matutinal ceremony". It may have been an occasion for sunning and preening themselves, primarily, but their most notable performance during this perching period was a vocal one, leaving with the observer the impression rather that it was a "social hour". The birds kept up a continual cackle or chatter consisting of a variety of notes, some lower, some higher, shorter or longer, with now and then a more prolonged shriek. At a distance it all sounded much like a group of human beings engaged in desultory conversation or friendly argument. This vocalization was most lively on those clear, calm, and frosty mornings when the trees appeared most inviting to the birds, and it could then be heard at a distance of half a mile or more, coming from the groves in various directions and loudly advertising the whereabouts, its seemed, of every flock in the vicinity. In the leafless trees the birds could also be seen at long distances, and might have offered good opportunities for local population or census estimates if anyone had been interested in such an undertaking.

Not every grove was a perching site for the sharp-tails. There were many groves in our area in the trees of which I never saw one of the birds light, but these groves were all surrounded by wild lands—prairie grass, brush, and shrub growth, with no fields, either plowed or stubble, close by. Location with respect to fields seemed to be the determining factor in the selection of perching sites, for in other respects the groves were much alike. Some groves adjoining fields were of larger size, extending back two or three hundred feet or more from the field margin; but the sharp-tails kept to the trees nearest the fields and were never seen in the more distant parts of these groves. The only exception to this, in the localities in question, was found in our pastured area, where, however, as will be pointed out later, the ground conditions were quite different from those in the groves on the natural wild lands. In their tree-perching habits, therefore, the grouse again exhibited their marginal tendencies.

Attractions of a Thicketed Pasture. In connection with the tree-perching habit of the sharp-tails reference was made above to our pastured tract. Aside from the attractions of its groves as perching

sites, this pasture presented also certain other features that evidently made it a particularly favored resort for the sharp-tails during the latter part of the fall, for the birds were to be found here with greater regularity than in any other area of similar size known to me in the territory in question. This pasture comprised about forty acres and included one larger and two smaller poplar-willow groves, joined to one another by a lower and sparser growth of poplar saplings, willows, red-ozier dogwood, service berry, choke-cherry, and smaller shrubbery consisting principally of the snowberry. A circular, relatively deep slough, about a hundred feet in diameter, occupied the southwest corner. This slough contained a thriving growth of willows, about six or seven feet high, with a canopy so dense that hardly any grass or other vegetation could grow on the deeply shaded, damp ground underneath. Parts of three larger grass- and willow-covered sloughs were included in another part of the pasture, while here and there were patches of upland prairie grass. The enclosed area was surrounded almost completely by poplar-willow groves and smaller thickets, grassy sloughs and upland, small strips of cultivated ground approaching it, merely, at three points.

The seasonal grazing, browsing, and ranging of the cattle kept the grass area cropped short, the understory of thicket more or less defoliated and most of the ground litter trampled flat. Cow trails led in all directions.

The sharp-tails began resorting to this pasture soon after their arrival in the fall. Although the birds did not show any pronounced shyness toward the cattle, the latter at this season were turned out to roam at large during much of the day and were returned to the pasture mainly for the night; the grouse consequently had the run of the area largely to themselves. The birds never spent the night anywhere within the pasture, its attractions being only such as concerned their daylight activities; but extensive bedding grounds lay immediately adjacent. Within the pasture a considerable amount of food was to be found, notably snowberry, with the fruit and leaves of which the crops of many grouse that I shot here each fall were filled. In addition to food, the birds found, especially in the sparsely thicketed part of the pasture, many dusting places in the dry, loose soil of cow paths and in the earth mounds around old badger burrows. These dusting places were much used.

Probably of equal importance with the food and dusting places, as an attraction, was the nature of the ground in the thicketed parts. As previously remarked, the surface here was free from the usual

tangle and litter, so that the birds could run about unhampered, and the cow paths offered inviting avenues along which they could travel in almost any direction. Visibility from the point of view of the birds on the ground was good, and the crown of the thicket was sufficiently dense, even after the leaves had fallen, to screen them rather effectively against sudden attack by enemies from above. The hunter, in order to get a reasonably clear view of the ground in his near vicinity, was obliged to stoop; and if he saw any sharp-tails at all, it was merely a passing glimpse of an individual here and there that already had become aware of his presence and at a safe distance was keeping close watch on his movements. Any birds that he might surprise in the open places were likely to scurry quickly into the thicket, filter through to some more open spot and fly away without exposing themselves again to his view.

During the tree-perching season the various groves in the pasture all became perching sites without apparent discrimination. Occasionally lesser flocks were to be seen in the different groves at the same time, but more generally the birds were congregated in some one part or another.

As a locality in which to find the sharp-tails with regularity during the mid-day hours, until snow came, I knew of none better than this pasture. Two parts of the area were particularly frequented at these hours, namely, the central part with its low, sparse sapling and shrub growth and dusting places, and the willow-grown slough in the southwest corner. In the first mentioned place I occasionally surprised the birds while sunning and dusting themselves, which seemed to be their principal mid-day activity aside from more or less leisurely moving about and feeding. The slough offered a shady retreat with excellent protection from above, where the grouse could run about freely and noiselessly over the deep-worn cow trails among the hummocks, and could command a good view of any larger enemy approaching on the ground. Many times when I tried to stalk the birds here they did not immediately take to flight, but scattered over the trails and from various points kept watch on my movements, exposing themselves for an instant here or there yet offering scant opportunity for a shot. If the hunter made a rush, the birds darted to the edge of the cover and flew away before he could get clear. The result of the situation was that the sharp-tails were very often to be found but seldom to be shot in this particular place. There was practically no food for the birds here, so that they apparently sought the spot merely as an inviting retreat during their resting periods.

When snow and actual winter came the pasture presented an aspect almost as bleak and desolate as the earlier one had been attractive, and few were the times that a sharp-tail then was to be found within its borders.

Winter Season. The winters in this part of the state varied more or less with respect to the amount of snow. Some were open, so called, with relatively little snowfall, while in others the snow might lie two feet on the prairie areas and in the stubble fields. Drifting was the usual thing, so that along the weedy margins of the fields and around the thickets and groves the snow was piled high in solid drifts over which a man could walk securely without snowshoes or skis.

The temperature during the coldest spells not infrequently fell to 35 and 40 degrees below zero Fahrenheit, and occasionally to near 50 degrees.

When snow covered the ground the sharp-tails became conspicuous objects as they roamed about, in larger or smaller companies, over the stubble fields and the plowed ground or on the snow drifts along the field margins. Many of the straw stacks out on the stubble fields were now heavily blanketed with snow, their bases surrounded by deep drifts and hence inaccessible to the grouse; but others were drawn upon by the farmer for stock needs and therefore were periodically opened up. The sharp-tails were quick to take advantage of these opened stacks, at which they gleaned a certain amount of food in the intervals, usually weekly, between the farmer's visits.

It was our practice each fall to set up two or three straw stacks in our barnyard for the benefit of the cattle, and these stacks were continually visited by the sharp-tails throughout late fall and winter. The most distant of these stacks was usually not more than about a hundred and fifty feet from the stable, but the farther side of the barnyard was bordered by an open field, a small slough and some brush, so that the approaches to the stacks from this direction were accordingly favorable, and the birds came daily to feed despite the fact that many were shot here for our table. These visits were made most regularly in the early morning, at sunrise and soon after, but also at other hours of the day, until late afternoon or early evening. On stormy winter days troops of the ghost-like forms of the grouse, half crouching, their heads held low, could be seen at intervals through the drifting snow as they came in loose formation across the wind-swept fields. On such days the cattle were usually in the stable, and if no human activity disturbed them the birds remained for a longer or shorter time to feed around the stacks, then departed as unobtrusively as they had come.

The size of the flocks that thus came to our barnyard vicinity varied considerably. On some mornings there would be only three or four individuals, and occasionally but a solitary bird; at other times, flocks of a dozen and more. One of the largest flocks that I remember counting, and that came later in the day, numbered somewhere between sixty and seventy. Single flocks of such size were not, however, frequent; twenty to thirty was more nearly the size of the average larger flock.

Although these birds were not infrequently to be seen moving about over the fields during the middle of the day, there generally came a lull in their activities at this period and one would find them, in fair weather, at the edge of some field-bordering grove or thicket; or on the drifts along weedy field margins, some individuals huddled up, resting, others moving leisurely about, picking up a particle of food here and there, but not straying far from the rest of the flock. In stormy weather when much snow was falling, and drifting heavily—times when it was most interesting to go hunting—I frequently came upon the sharp-tails on the leeward side of some grove where a strip of field adjoined. Here, where the fine snow drizzled and settled heavily upon the low bushes, the grouse found shelter from the gale and sat at rest or moved about, keeping near the edge, however, and not entering farther into the thicket. One or more birds were as a rule in the open, and since the hunter was inclined to fix his attention mainly upon the objects at the edge of the thicket, these “outposts” frequently were overlooked until they suddenly took wing, thereby warning their hidden companions at the thicket edge so that these, too, frequently eluded the gunner. Although the poor visibility, the noise of the gale and the soft snow conspired to make a closer approach of the hunter possible at such times, the birds were, nevertheless, remarkably alert and were not easily caught napping.

Natural Enemies. There is a very general notion that such predatory mammals as the coyote and the fox must find a ground-bedding bird like the sharp-tailed grouse an easy and frequent prey, even in winter when the bird buries itself in the snow. So far as my own experience and observations go this is by no means a certainty. Both foxes and coyotes were plentiful on our homestead as well as in all the surrounding territory and with little effort could be seen almost daily in late fall and winter. I hunted over these areas continually during these seasons, and in the winter on numerous occasions tracked both foxes and coyotes in an effort to discover what their prey might have been and how they had captured it. Tracks of one or the other

occasionally passed directly across the bedding grounds of a covey of sharp-tails, and sometimes within a few feet of the beds of individual birds; but the fact was plainly written in the snow that no capture had been made. Of course, even though signs indicated that the passage of the fox or the coyote and the bedding of the grouse were events of the same night, it does not necessarily follow that the birds were in their beds at the time of their enemies' visit. But the fact remains that the numerous snow beds of the grouse that I saw each winter revealed no telltale signs of tragedy for which either fox or coyote was clearly responsible. It is, of course, entirely probable that such evidence might have been found after more diligent and widespread search, but I believe it rather improbable that the capture of the sharp-tailed grouse by these carnivores was anything more than an occasional occurrence. Had it been common, signs undoubtedly would also have been common.

With regard to the question of the capture of bedded grouse, whether in the snow or on the ground, by fox or coyote, although it is one about which little is known that is based on actual observation, it seems likely that such capture is not the simple matter it might be thought to be. The birds, as I have found them, clearly are not given to heavy slumbers, and the approach of a larger enemy such as either of the two mentioned can hardly fail to reach their sharp ears; furthermore, it may be questioned whether it is within the powers of these mammals, wonderful though their noses be, to locate the exact spot on which the concealed bird lies before they have approached very near to it. The direction of the wind will, naturally, play an important part here, and also the matter of chance enters in. By the time the predator has approached dangerously near, the bird is probably fully aroused, and at the most unexpected moment bursts forth with such startling suddenness that neither the nimble-witted (so-called) fox nor the slower coyote would, I think, at that precise instant remain, as a rule, sufficiently self-possessed to make the properly timed pounce. If the snow should crust after the grouse had bedded, the situation might be different; but such crusting was not of common occurrence in this territory when the sharp-tails went under the snow.

Of other predacious species that might have preyed upon the grouse, goshawks and great horned owls were occasionally seen in winter, but in and about our homestead area neither was so much in evidence as the snowy owl. The snowy owl kept mainly to the open fields, where the straw stacks served as its perching or resting places, and I do not recall finding any certain evidence that it preyed upon

the sharp-tailed grouse. In the many instances where I examined its perching places on the straw stacks I found no signs that it had been feeding here. It would sometimes sit on a stack for longer periods—an hour or more—and was evidently only resting.

Neither do I recall any specific instances of capture of the sharp-tail by the goshawk or the great horned owl, yet it may be presumed that such captures were occasionally made by these powerful raptors, the numbers of which were, however, too few to be of any consequence in relation to the sharp-tailed grouse or other small game of the territory.

Night Bedding Places. The sharp-tailed grouse was a bird of the open by night as well as by day. I do not recall ever having found a night bedding place within a grove or a thicket, but frequently in grass patches among scant growths of low brush. In winter as in fall the bedding places were usually in the long grass on the upland prairie or in the sloughs. When a flock bedded for the night the individuals were well separated. On cold nights the birds buried themselves completely in the snow, if deep enough. Occasionally when skiing "across country" after nightfall I happened upon bedded sharp-tails, one or more of which then suddenly burst out from the snow almost under foot. This aroused other birds near by, which now likewise, one by one, whirred away, offering but a fleeting glimpse of their shadowy forms. But the entire flock of such bedded grouse apparently did not always depart, since the birds were sometimes scattered over a considerable area of the bedding ground, and some of the outliers might remain undisturbed. This was revealed at times as one continued on one's way after having started a flock from its bed. Just as one felt satisfied that the last bird had departed and that the bedding area had been passed, out bursts another, and perhaps still another, that happened to lie in his path.

How far the birds that thus are frightened from their beds at night may fly before again settling down, I sometimes thought to determine roughly by listening; but the sound of their wings died away gradually in the distance, and the question remained unanswered.

Hunting. Upon their first appearance in the fall the sharp-tails kept mainly to the stubble fields, where, like the prairie chicken, they were inclined to lie close before the approaching hunter. Later they became shyer and as a rule retreated openly, so that it was much more difficult to get within effective range. When flocks were trooping over the plowed ground they could be seen at a considerable distance, and the hunter then lost no time in the mere search for his game. If he

drove a horse or a team he was able to approach fairly close to the birds, but hunting on foot was a different matter.

In late fall and winter, because of their shyness, stalking the sharp-tails was generally necessary in order to get within shotgun range. When the birds were on the open fields, but near the edge of bordering wild land, it was frequently possible to get within range by making a longer detour and then crawling on hands and knees through some convenient grove, or even flat on one's stomach through the prairie grass, taking advantage of any taller shrubbery in one's path. It was rarely possible completely to surprise the birds by this method, but even after they had become aware that something was approaching, the ill-defined form of the hunter or the slight agitation of the vegetation was apparently not a recognizable cause for alarm, and the sharp-tails often reacted merely by retreating leisurely farther afield. When the hunter finally reached the edge of his cover, one or more of the birds might be within range and fall prey to his gun; but many were the occasions also when he got nothing for his pains—in the literal sense of the word.

When the grouse began perching in the trees the hunter was accommodated to the extent that the position of this game remained fixed. Stalking was then, too, the necessary procedure. Tedious detours again brought the hunter up, perhaps, on the far side of the grove, and from there it was hands and knees for the rest of the way. As soon as the grouse in the trees became aware of the hunter's presence, any cackling that had been going on ceased, and a silent alertness settled over the group. The hunter having now, perchance, got within satisfactory range of the nearest bird, finds himself confronted by a baffling assortment of tree trunks, boughs and twigs that obstruct his view. Then, just as he finally has succeeded, all tense and eager, in maneuvering into position for a clear line of sight, the intended victim, as likely as not, finds it just the right moment to depart. It was these difficulties in hunting the sharp-tailed grouse that made it, in my own estimation at least, the most thrilling sport to be had locally at that season.

Status. At the close of the period here under review the sharp-tailed grouse in our territory was in a comparatively better position, numerically, than the prairie chicken, although through the previous years its numbers at no time had been so great as those of the other species. There was now, however, a marked decline in the sharp-tails, too, but it could not well be attributed to local shooting. The species in this territory had been the subject of relatively light hunt-

ing, because it arrived, as before remarked, towards the close of the prairie chicken season, when the great majority of our hunters were turning their attention to the next number on their seasonal program, namely, waterfowl shooting. The fact that the sharp-tail was with us only during late fall and winter, therefore, saved it from such wholesale destruction as befell the prairie chicken; but elsewhere, in the territory whence our local sharp-tails came, these birds had, perhaps, become more and more a substitute for the prairie chicken in the sportsmen's quest, and this may possibly have been one reason for the reduced numbers of the sharp-tails wintering in our section.

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INCUBATION PERIOD OF THE KILLDEER

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The unusually long incubation period of the Killdeer (*Oxyechus vociferus*), as well as other members of the plover family, has long been a matter of interest among ornithologists. When the bird student is first told that so small bird as the Killdeer has to incubate its eggs a week longer than does the ordinary hen, as likely as not he will ask, "What is the joke?" It may then be explained to him of course, that the process yields probably the most precocious day-old chick of any of our native birds.

Although I have found some thirty or forty Killdeer nests, it was not until 1929 that I had opportunity to personally make notes on their incubation period. The Knapp Farm pair is quite well known among our local bird group, some of whom might even claim to know them by their first names. Be that as it may, these Killdeers, year after year, nest on a rocky ledge in a well grazed pasture within 100 feet of a busy road. The nest can always be found within a space of thirty feet wide by 150 feet long and these birds are less wary than elsewhere.

The nest covered by the following observations was the third brood of the season and was found on June 13, at 6 P. M., when it held three eggs. The parent ran from the nest and the eggs were warm. On June 14, at the same hour, I visited the nest and found it to contain four eggs. These, when held in the cupped hand against the sun, showed only a trace of transparency, due to the very opaque nature of the shell. On my visit to the nest a week later this slight transparency had disappeared. I ceased my visits to the nest until the