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TERRITORIAL STUDIES ON THE EASTERN GOLDFINCH¹

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THIS study of the Eastern Goldfinch, *Spinus tristis tristis*, was made at the University of Michigan Biological Station near Cheboygan, Michigan, in the summers of 1937 and 1938. I arrived at the Station July 1, 1937, and remained until August 23. The following year, I arrived June 25 and left August 22. Goldfinches were an abundant species there at the Station. Since they nest late, I had a good opportunity to study their territorial activities before nest building began, as well as throughout the nesting period.

Very fine territorial studies have been made on certain species. Two notable examples are Mrs. Nice's work on Song Sparrows (1937) and Harry W. Hann's on the Oven-bird (1937). At the time no detailed study of this problem had been made on the Goldfinch. This species presented, it seemed to me, an unusually interesting problem, as Goldfinches, unlike many species, may be seen together throughout the summer, feeding and apparently enjoying each other's company, and by some authorities they have been considered to be a non-territorial species.

In considering this problem five questions interested me:

1. Do Goldfinches have territories with definite boundaries?
2. When are these territories established?
3. Are these territories defended from individuals of the same species?
4. How large are these territories?
5. What activities take place within the boundaries of these territories?

I have been able to answer some of these questions and throw light on others. No one realizes more than I how much remains to be done.

HABITAT

The Biological Station lies on the shore of South Fishtail Bay of Douglas Lake, Cheboygan County. There is a gentle slope back from the lake, extending from 50 to 100 feet. On this the laboratories and cabins are built. The slope then rises abruptly for 50 feet or more and levels out 100 feet to the east and 500 feet to the west. The slope is less steep on the other side of the hill and falls gradually into a

¹ Contribution from the University of Michigan Biological Station.

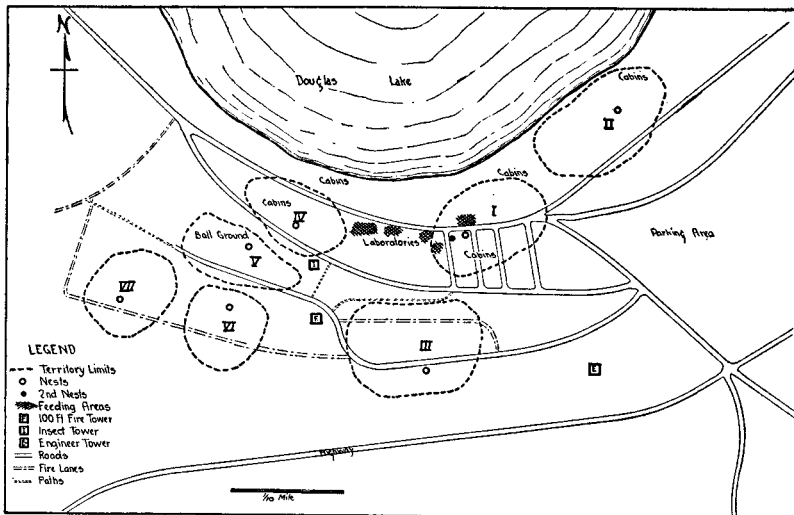
gorge, a mile south of which is Burt Lake. The area is largely a maple-aspen association with scattered pine, oak, and white birch. Pin-cherry, June-berry, and sumac are common. The ground cover is catchfly, pteris, and blueberry. It would be classified as an open woods.

Throughout the whole area are paths, fire lanes, and roads. A highway passes on the south side of the hill before it descends into the gorge. A 100-foot fire tower and two smaller towers, an insect and an engineer tower, are on the hill. (See maps.)

METHODS OF STUDY

I began my study each year by visiting every part of the camp area, going north as far as Pine Point, west to Grape Vine Point, and back from the lake to the highway. I checked this territory again and again. Every Goldfinch was recorded and its activity noted. Careful notes were kept in the field. Sketches were made of each day's trip and the exact time of each trip was recorded. Special attention was paid to flights of singing males. Rough diagrams were drawn to show how much territory they covered and where they alighted. Pairs seen together were of special interest.

I used no blinds until nest building began, but usually sat quietly, partly concealed by a shrub. I checked flights from the high fire tower and from the smaller engineer and insect towers. This method of observation enabled me with the aid of field glasses to see the whole field, to record the complete circle made by each singing male, and to note in what group of trees a pair most frequently alighted. I would follow these observations with a visit to these localities and remain quietly for several hours waiting for the birds to return.



MAP I CAMP AREA 1937

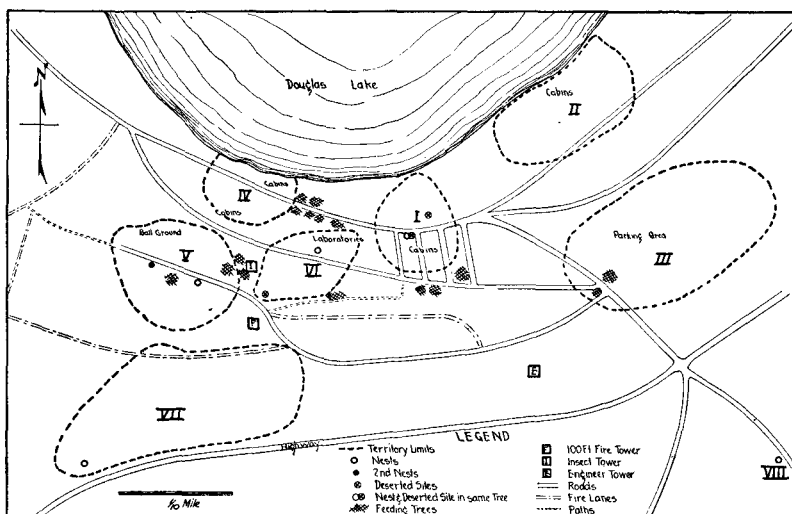
FEEDING GROUND AND TERRITORY

When I arrived on July 1, 1937, the Goldfinches were feeding in the birch trees near the laboratories (see Map I). At first only a few trees had catkins mature enough for food. Later there were a dozen or more, all confined to the center of camp. I checked 300 white birches outside this area and found only three with catkins. When I arrived the next year on June 25, none of the catkins were mature. The Goldfinches were feeding on chickweed, wild lettuce, and the seeds of June-berry. The fact that the feeding areas were widely scattered increased the difficulty of locating nesting territories. Even later when the food became largely birch catkins this fact remained true, as every small birch throughout the whole area was heavily laden with catkins. While this situation increased the difficulty of finding territories, it aided me in determining their exact boundaries as pairs of Goldfinches do not customarily feed in one another's territories.

FLIGHT AND SONG IN RELATION TO TERRITORY

I found songs and call notes second to flight in aiding me to discover territories. But these sounds and flight are so closely associated in this species that I will consider them together.

Goldfinches make periodic flights from their feeding areas to their nesting territories. Before nest building began pairs were seen feeding together. After nest building began the female was seen less often in the feeding area. Frequently a male would rise from the feeding area, circle once or twice, then fly directly toward his nesting territory, which



MAP II CAMP AREA 1938

might be a mile or more distant. Sometimes several males would rise at the same time, circle and sing the typical male song. Each would then fly to his nesting territory. I watched these flights with field glasses from hilltops, trees, tower blinds, the insect tower, the engineer tower, and the 100-foot fire tower. From these elevated positions I could see the flights of most of the pairs studied. I remained at these points of observation hours at a time, and sketched the flights of each bird in relation to fixed points as buildings, highways, fire lanes, and tall trees. The course of each flight was easy to follow because of the undulating flight and the *per-che-che* flight song, given at each upward bound. Later I would follow these paths of flight and watch and wait for the male or the pair to fly over. Occasionally these flights led to feeding areas, but when a single male or a pair flew again and again over a given path I could be sure it would lead to a nesting territory.

If the male was alone, he would seldom alight in his territory, but would circle over it several times, his flight roughly defining its boundaries, and then return to his feeding area. If accompanied by his mate or if the female was in the nesting territory, busy with building, he would circle the area, hover, sing the male song, and circle again. This performance might be repeated many times. He would then join his mate at the nesting site. The female, whether accompanied by the male or alone, flew directly to the group of trees where the nest was to be built. The exact location seems not to have been chosen until shortly before nest building began.

I have tried many times to record the song of the male phonetically, but it is so diversified, rapid, and canary-like that I have never succeeded in doing so. There was very little male singing during the last week of June. The songs that were heard were short. They became fuller and more varied as nest building time approached and were strongest the second and third weeks in July. During the egg-laying and brooding periods the songs are heard less often, but there is another period of singing when young are in their nests. These songs were seldom as varied and full as during the nest building period.

I was never able to recognize males by their warbling song, but I recognized several of them by their flight songs which were quite characteristic and varied as to number, spacing, and inflection of syllables. These songs are usually uttered at each upward bound, but one bird was frequently silent for a bound or two. The usual song was *per-che-che*. One varied this with a definite *per-chic-o-re* described by Chapman. One male interspersed the *per-che-che* song with a *per-che-ow* with a downward inflection on the last syllable. Another used a two-syllable song as *per-che, per-che, per-che-che, per-che*.

I have never noticed a female give any song but a soft *per-che-che* when in flight. But they gave varied and characteristic responses to their mates when they came into the territory. It was usually a variation of the *per-che-che* song or a rapid repetition of the syllable *we*

without change of tone, but with an increase in rapidity and a decrease in loudness as the male approached the nest.

If I came upon them in their territory, both sexes gave a questioning *sweet*. It has the same notes as their *swe-et sweet* calls heard in the feeding trees, but of an entirely different tone. The more disturbed they were, the louder and harsher the notes. If their nests were disturbed, both sexes would utter a "cry-baby" call similar to that of a juvenile Baltimore Oriole. In fact one nest of young Orioles caused me a great deal of trouble, for at a distance I would mistake them for Goldfinches. This "cry-baby" call of the Goldfinch is plaintive, monotonous and nerve wearing. Mousley (1930:255) records this call as *bare-bee, bare be beeb, beeb, beeb, ba be*. If the cause for alarm disappeared, they would intersperse their *ba-be-be-be* notes with a *sweet sweet* and then forget all about it. I located most of the territories by the periodic flights of pairs or the singing males. The nests within the territory were located by the characteristic calls of the birds in the nesting trees.

EXTENT OF STUDY

I have records of 15 pairs of Goldfinches within the camp area, seven for 1937 and eight for 1938. Two pairs (I., 1937; V., 1938) re-nested when their first nest was destroyed. One territory (II., 1938) was studied, but the nest was never found. Four nests were found too late for study of territory or were located where close observation was not feasible (IV. and VI., 1937; IV. and VIII., 1938). The territory and nests of ten pairs were studied in detail. I spent about 450 hours in this study.

By the activity of the birds, I was able to locate most of the territories before nest building began and observed the carrying of first materials in four cases (I. and III., 1937; I. and V., 1938). Territory III., 1937 was definitely located fourteen days before any nesting materials were carried. It is interesting to note that the boundaries of three of the territories in 1938 (I., II., V.) were very nearly the same as three corresponding ones in 1937 and that Goldfinches built in the same tree in territory I. for three consecutive years. Since no banding had been done, there is no way to know whether these were returns.

SIZE OF TERRITORY

The territory defended by the male, in all cases observed, consisted of at least a few trees and in two cases was more than 100 feet long and 50 feet wide. I measured these distances by pacing. The flights of the circling male apparently define the boundaries of a territory fairly well and coincided with the territory defended in the four territories where defense was observed. The more distant the territory from the common feeding area and the more secluded the territory, the larger it

seemed to be, judging from the flights of the singing male. Territory III. and VII. in 1938 were at least 1,000 feet long and half that width (see map). Whether the males would have defended this large a territory is unknown, as no Goldfinches were seen to alight within their boundaries. On an average the territories were a half acre or more in extent. In Lawrence H. Walkinshaw's recent paper on this species (1938:5) he says, "Although I have spent many hours in the field, I have never observed conflict between birds. Nests after construction, have been found occupied at the same time only fifty feet apart and in one place there were seven nests on a small triangular area, the sides of which were 370, 150, and 240 feet distance." This seems to indicate that where areas are more congested, territories are smaller. No two nests in the region I studied were closer than 30 feet.

CHOOSING OF NESTING SITES

There seems to be no favorite location for the nest within the territory, nor was it placed with any relation to the feeding ground. Often it was placed near the center; twice they were placed very near one side and but a few rods from a common feeding ground. Twice they were placed at the other end of the territory as far distant from the feeding ground as possible.

In 1938 two pairs abandoned their original sites after carrying material. One pair had carried but a little web and had been observed at the site but three times. A few days later I found a partially constructed nest 30 feet up in a tree. I believe these sites belonged to the same pair, since the male at each site included both locations in his territorial flights and the new nest was begun at about the time the first nest was abandoned.

The other pair was recorded from the day of my arrival, June 25. The flights of the male was observed daily and its favorite trees noted. I observed the female carrying her first material July 6, and for two days she built industriously. By the morning of July 9 two limbs were well covered with web, but no birds were near. The next morning the female was building in a high limb of a maple about four rods from the deserted nest. I watched the female carry material. She was still building that afternoon. I did not check this area again until the next afternoon, July 11, when I found a nest being built on a limb ten feet lower, and five feet to the left. The female was busily working here and no other Goldfinches were about. The next morning I saw a female fly to the upper limb and at first I thought that two females were building in the same tree, but they proved to be the same bird. She was taking web from the deserted site to use in her nest. I believe the three sites belonged to the same pair not only because the flights of the male were the same, but also because only one pair was seen in this territory and the male of the third site drove out intruders from the tree into which the first material had been carried.

ACTIVITY OF MALE IN TERRITORY

There seems to be a great variation as to the amount of time males spend in their territories. Two males spent much of their time in white birch trees near their nests (I., 1937; I., 1938), where they could feel as well as watch. Most of the males made short visits to their territories every hour or so when their mates were building. On the whole they were less watchful during the brooding period. Sometimes they would only fly over the area as if to see that all was well. One male, in 1937 (VIII.), was very negligent of his duties. Although I made frequent visits and remained in the vicinity of the nest hours at a time, I did not see him from the time the first egg was laid until the young were hatched. A pair renested in 1938 (V.) after the first three eggs were tossed out of the nest by a storm. The following day a fourth egg was laid. That afternoon the nest was deserted and by noon the next day a new nest was begun. The male was most attentive at the first nest but much less so at the second. This is in contrast to a pair that renested in 1937 (I.) after their nest had been robbed. The male in this case was as attentive at the second nest as at the first. It is possible that the males at the second nests were not the same as at the first but I believe they were. Males were seen with the females during the short time between desertion of the first nest and beginning of the second. In both cases the songs and circling flights of the males were similar and they alighted in many of the same perching trees.

DEFENDING TERRITORY

The males do not allow other Goldfinches to alight in their territory. I have observed males defend their territories on many occasions and in four different territories. I have seen females drive out other females if the males are absent. The males usually have favorite perches from which they dart out at the intruders. Often after the intruder leaves, the male will circle above his territory and sing. While in a tower blind, I saw a fight which took place but a few feet from me. Two males were tumbling over each other making mouselike squeaks. The intruding male soon left and the other male came back to his tree. One fight I observed in the open. The males flew at each other again and again hovering in mid air, striking their bellies together and making sharp squeaks and calls. The ardor of the males wears off when they begin to feed the females and young. Dr. Walkinshaw (1938:5) says, "Many times from a blind, foreign males were seen very near to an occupied nest without causing any disturbance on the part of the rightful owner, but these were usually when nesting was advanced." My notes also indicate that there was little or no defense of the territory after the males began to feed the females at the nest and by the time the nestlings were ready to leave the nest several families might be enjoying each other's society.

Goldfinches seem to get along peaceably with all other species, differing from Mrs. Nice's (1937:67-8) findings on the Song Sparrows in that respect. Vesper Sparrows, Cedar Waxwing, Chipping Sparrows, Baltimore Orioles, Brown Thrashers and Towhees nested within the Goldfinches territories but no conflict was observed at any time.

The females gather most of the material for their nests from within the territory. However, if suitable material is not to be had within their boundaries the female may fly a considerable distance. I have traced several a half mile or more to their nearest source of thistle-down. To get this they flew over another's territory.

Dr. Gross (1938:253) states that "Sometimes the male brought nesting material but this was usually presented to his mate who packed it firmly into the growing walls of the structure." I did not observe this at any of my nests. The female alone gathered nest material and did all the building.

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SUMMARY

Much remains to be done on territory in Goldfinches. I draw the following conclusions on the basis of my observations on fifteen nests found in the open woods in the vicinity of the Biological Station in northern Michigan.

Feeding Area and Territory

1. Goldfinches have a common feeding area which may be a mile or more from their nesting site.
2. These feeding areas are scattered when the food is plentiful, but may be concentrated into a small area when food is scarce.

Flight and Song in Relation to Territory

1. Goldfinches choose their nesting territory two weeks or more before nesting begins, in northern Michigan at least as early as June 25.
2. This territory has definite boundaries that are roughly defined by the circling flight of the singing male.
3. The male begins singing the warbling song early in the season, but this song is fullest and most varied during nest building time.

4. The flight song in both sexes, uttered on the upward bound of its undulating flight, is a variation of the syllables *per-che-che*.
5. The female uses a variation of the *per-che-che* song in answering her mate when he comes into the territory.
6. The alarm call of both sexes when disturbed is *ba-be-be*. This is often combined with the *sweet-sweet* calls.

Choosing the Nesting Site

1. The site of the nest within the territory is not chosen until shortly before nest building begins and may be changed after a nest has been started.
2. The nest may be placed in any part of the territory. Boundaries or feeding area appear to play no part in the selection of the site.

Activity of the Male in the Territory

1. Males vary as to the amount of time they spend in the nesting territory, but usually make short visits every hour or so.
2. Some males begin feeding the females by regurgitation when incubation begins, others not until the eggs hatch.
3. The males continue to feed the female until the nestlings are five to eight days old.

LITERATURE CITED

- GROSS, ALFRED O.
1938 Nesting of the Goldfinch. *Bird-Lore*, 40: 253-7.
- HANN, HARRY W.
1937 Life History of the Oven-bird in Southern Michigan. *Wilson Bulletin*, 49: 145-237.
- MOUSLEY, HENRY
1930 A Further Study of the Home Life of the American Goldfinch. *Canadian Field Nat.*, 44: 204-12.
- NICE, MARGARET M.
1937 Studies in the Life History of the Song Sparrow. *Trans. Linn. Soc. N.Y.*, 4.
- WALKINSHAW, LAWRENCE H.
1938 Life History Studies of the Eastern Goldfinch. *Jack-Pine Warbler*, 16: 3-11, 14-15.
- OWATONNA, MINNESOTA.