

## OBSERVATIONS ON THE LAWRENCE GOLDFINCH

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My interest in the Lawrence Goldfinch (*Spinus lawrencei*) has been held by the small size of its range, the irregularity of its occurrence, its affinity for hot and dry situations, the prominence of seeds of native plants in its food, its dependence on water, the permanence of the flocks, the long period through which the birds are paired, and the peculiarities in its nesting that appear to be related to these traits.

This bird's range is restricted mainly to a small part of California. It nests southward from Shasta County to Lower California. In winter some flocks remain as far north as San Francisco and some move southeastward as far as western New Mexico. In summer it is not common, especially northward, and its numbers in one place vary considerably from year to year. Its distribution is discontinuous and the time and place of its movements are irregular.

On the Hastings Reservation in Monterey County, California, numerous observers have studied this goldfinch. The longest sessions of watching were by John A. Gray, Jr., Henry A. Hjersman, and David Lack. Our observations make us think that the kind and amount of seeds produced each year are important in determining the numbers of goldfinches and the length of their stay. The native plants in this instance seem to be eaten more than others, although a few introduced species have been eaten heavily. The changes in vegetation, especially the reduction in some of the weedy species, and the trend toward stabilization have paralleled the reduction in number of goldfinches. Search for particular kinds of seeds takes the birds to varied kinds of habitat. We see the species in winter in the chamisal and where there is water along intermittent creeks. In spring it ranges over open ground wherever abundant small seeds are produced. In the nesting season the birds go to the hills where there are oaks, mainly live oak and blue oak.

This goldfinch has a special predilection for seeds of the Boraginaceae. That family is represented by 21 native species on the Reservation. Some of these, especially the common fiddleneck, grew abundantly in the deserted hayfields for several years after the last cultivation. Those were the years when the Lawrence Goldfinch was most abundant. Recently, when the patches of fiddleneck became smaller, the number of nesting goldfinches also became smaller. Continuous watching from early April to late July indicated greater dependence on this one source of food than on any other. Almost invariably at that season a feeding goldfinch is on a fiddleneck plant.

Birds that feed so exclusively on dry seeds as the goldfinches do apparently have greater need for water to drink than other kinds. Between feeding periods they assemble at watering places where they drink, sing, bathe, preen, rest, and sun themselves. On the Reservation they go to the pools in creeks, to water troughs, and to springs. Usually there are trees closeby where they perch between trips to water. Willows and oaks serve most frequently.

Many kinds of sparrows flock for a part of the year, but few are so persistent in the permanence of their flocks as the Lawrence Goldfinches. Even in their nesting the flocking tendency is evident in the grouping of the nests and in the foraging of the males. Courtship serves to establish and maintain the bond between the members of the pair, and we see examples of it in many stages and under many conditions. Attachment to the flock and to the mate is exhibited at the same time in varying degrees in different stages in the nesting. The expression of tolerance and of intolerance is directed also toward closely related species.

Special conditions favored the watching of goldfinch behavior in the spring of 1938.

Favorable food plants in abundance on open ground previously cultivated attracted a large flock of foraging fringillids—mainly Lawrence Goldfinch, Green-backed Goldfinch, House Finch, Oregon Junco, and Lark Sparrow. From 50 to 200 Lawrence Goldfinches were present daily for nearly a month, beginning in the middle of March. The largest numbers of birds on this south-facing slope foraged in the afternoons. The foraging was interrupted at intervals when the whole flock would fly up to a fence or to a nearby, isolated blue oak. Most of the singing took place in the tree. There were indications that the goldfinches were already paired. When they rested in the tree, they usually faced the sun and sang, and the nearest bird to a perched male was usually a female.

When a feeding flock of 15 to 20 Lawrence Goldfinches with a few Green-backs was disturbed on a morning in May, the birds flew to a low bushy willow where they perched in pairs. Ten or more times males flew at other males in efforts to drive them from the near vicinity of a female. This was always a Lawrence driving away another male of the same species except once when a male Green-back was driven. Usually a move of only 5 or 6 feet was required for the pursued bird to avoid another drive. Both birds would then settle on perches again. This behavior occurred on the feeding grounds that were far from the nest sites. In another pair on feeding grounds in late May the male followed three feet behind the female. When they landed and began to eat fiddle-neck seeds, the male was more vigilant than the female.

There was further indication of courtship on June 1 among twenty goldfinches perched along a fence. In a pair on the top wire the male was twenty inches from the female, and he was singing a low song barely audible ten feet away. Another female lit on the wire fifteen feet away and immediately the male changed his behavior. He became attentive and assumed a pose in which the body was slender with neck and head extended in a line in striking attitude. He began to sidle toward the newly arrived female. The original female then began to pay attention to the performance and flew to a perch almost directly below the intruder, which departed. On another June morning a male and two females were together. The male sang to both females and both females postured. The females followed the male to a creek where all three drank. After one female flew off, the male continued to sing and posture before the other female.

Nesting on the Hastings Reservation extends from May to July. The birds go to hillsides a quarter to a half mile from the normal feeding areas. The nests usually are in blue oaks that are heavily festooned with lichens (*Ramalina reticulata*), and they are placed about twenty feet above the ground. Lichens make up most of the material in the nests.

Building is by the female only, but the male is nearly always close by. The birds of the pair are markedly aware of each other. The male sings while the female builds, and he nearly always follows her when she leaves the nest tree, but he does not go on trips to nearby trees. The male seems to know where the female is going, and he appears distressed when she is not close by. The trips are likely to be in a different direction each time. The lichen is picked from the branches of trees, sometimes from a part of the nest tree. One female took material from directly above her head while she was on the nest and then carried it around in the tree and back again. She repeated this twice.

Toward the end of nest building one female brought only very small objects, but she spent much time working around the nest and pressing her body against the sides. Once, she worked at the nest for five minutes before she came out on to a branch. Half an hour later she was collecting material from trees 30 to 50 feet away, and she returned quickly at 3-minute intervals. In midmorning she brought feathers to the nest; previously she had brought only plant material. A flight call by the female was the signal

that caused the male to follow her in trips from the nest. This call was uttered on distant flights, but not on ones to nearby trees. In one example the female left the nest, twittered twice, and was answered by the male; then the female flew off twittering, and the male followed her.

In the last days of nest building the male sang mainly while the female was working. He sang in flight when following the female, but more persistently when perched near her at the nest. On one morning the song was spontaneous and not in answer to any other male. It was delivered from many branches in the nest tree, but not from other perches. When a strange male followed the pair back to the nest, he settled and sang within a yard of the nest, but the nest male, only two yards away, paid no attention to the intruder.

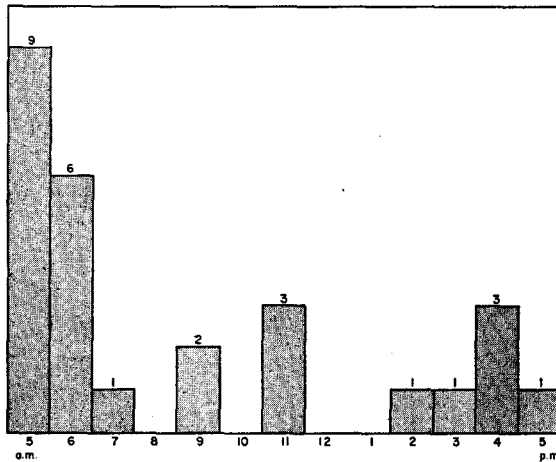


Fig. 44. Hourly occurrence of 27 trips away from nest by an incubating female Lawrence Goldfinch in period from May 26 to June 11, 1939.

The next morning the male had enlarged the space from which he attempted to drive off strange males. The chases were mild compared to those of some other species, but the results were alike. After the male fed the female three times, he went to the nest and sang quietly. The female went to the nest and the male sang close by. Then the male suddenly left the nest tree and flew, singing, to a bush twelve yards off. He chased another male from there and then drove him from another perch. The nest male returned and sang hard in the tree next to the nest. He then sang in flight to a tree ten yards in another direction and twice chased off a male that had settled there, singing at the same time. He had made two flights to separate trees to chase males from the vicinity of the nest and had left his mate to do so.

On these mornings there were numerous instances when a member of the pair drove off a strange goldfinch. The male was quick to chase other males. The female pursued other females and sometimes strange males. At least twice a male Green-backed Goldfinch came into the nest tree and neither member of the pair took notice of it. Sometimes the male flew off and there was a pursuit that could not be traced clearly. Such a flight might involve the four birds of two pairs, but usually it was mild and one bird or pair would leave. Sometimes another pair would be in the near vicinity of the nest for as long as five minutes and the owners fail to detect the intrusion.

The flocking habit of this species is so strong that a late nest-building pair was regularly followed to the nest tree by one or more goldfinches, usually of the same species but sometimes a Green-backed. After the arrival there would usually be some attempt to drive out the strangers, but these pursuits tended to be mild and not to extend far. Evidently the tendency to join a flock and to follow others in flight prevented the establishment of a rigid habit of isolation for the nesting pair and the exclusion of other members of the species or even of competing members of the same sex.

The incubating female Lawrence Goldfinch remains on the nest almost continuously. She leaves for short intervals after some feedings by the male when the male waits for

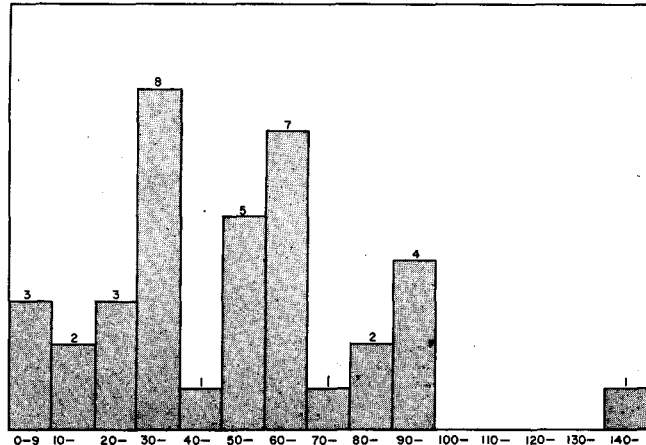


Fig. 45. Frequency occurrence of 37 complete intervals in minutes between visits of a male Lawrence Goldfinch to a nest with young.

her. At a nest where the eggs failed to hatch, the female was still incubating on the fifteenth day after watching started. An observer spent 56 hours at this nest, up to June 11. Altogether the female was off the nest only 27 times for a total of 117 minutes, or only 3.3 per cent of the time. Ten of the trips off the nest were for one minute or less, 7 for 2 minutes, one for 3 minutes, 2 for 5 minutes, 3 for 6 minutes, and one each for 7, 9, 13, and 33 minutes. The last one was late in the period when the attraction for the nest was being lost. All but two of the trips were for less than ten minutes. Sixteen of the trips were made in early morning, before 7:15. Two were between 9 and 10 a.m. and three between 11 a.m. and noon. Six were made in the afternoon between 2 and 6 p.m., with half of these between 4 and 5 o'clock (see fig. 44).

The male made 57 trips to the nest, an average of one per hour. The largest number in one day was 11 in 10 hours. Complete intervals away from the nest numbered 37. The shortest was 3 minutes long and the longest 144 minutes. These intervals showed a clear tendency to be 30, 60, or 90 minutes long. For these lengths, plus or minus 10 minutes, there were 11, 12, and 6 trips, a total of 29, or 68 per cent of all the trips (see fig. 45).

For most of the time the young were in one nest we spent from 9 to 11 hours daily watching their development and care. Although it was not determined for this nest, we assumed that the young birds hatched on July 2 and that they left on the 13th or 14th day after hatching. According to Walkinshaw (Jack-Pine Warbler, 17, 1939:3-11) the female American Goldfinch broods the young through their fourth day in the nest. Possibly our Lawrence Goldfinches hatched on July 3.

Feeding of the young in the nest is at fairly uniform hourly intervals. This might be determined by the time required to gather and prepare the food, and also it might be influenced by the hunger limits on the part of the bird to be fed. Through the 11 days before the two young left the nest on July 14, in 109 hours we recorded 139 feedings by a parent bird. On 19 occasions the male fed the female. These feedings on the first four days numbered 6, 7, 4, and 1, and there was one on the last day. This represents the time required to change from the program of incubation, in which all the food brought to the nest was delivered to the female and she ate it. For a few days after hatching the tendency was for the female to take the food and then deliver it to the young after the departure of the male. The male had great difficulty in reaching past the begging female to get food to the young. When it was no longer necessary for the female to brood the young, she accompanied the male on trips for food. The parents then tended to arrive at the nest together and to take turns in feeding the young. In the early days the male nearly always fed first, but later the female delivered food almost as often as the male did. The male fed the young 69 times; the female, 51 times. On 60 feedings only one parent fed the young. Sixty feedings took place when both parents came to the nest at the same time. The male fed alone 25 times, or one to five times daily. The female fed alone 35 times on seven days. She fed 11 times on the first day, and on the next four days 7, 7, 5, and 3 times. On the trips together the male fed young first on 44 times, but none on the first day; the female fed first 16 times, only twice in the first six days, and 14 times in the last five days.

This brief review of our observations and other evidence indicates how the traits listed earlier fit the Lawrence Goldfinch to occupy the peculiar habitat in which we find it. The type of food and manner of using it are prominent in determining much of the behavior. They appear to exert more rigid, though variable, control over the size of population than is the case with many other kinds of birds. This bird resembles numerous other species in its favorable response to the increased food made available by agricultural use of the land, especially in arid situations. My conclusion is that the population of Lawrence Goldfinches is greater now than it was before the development of agriculture in its range and that probably its range has been extended somewhat by that development.

*Hastings Reservation, Robles del Rio, California, April 6, 1950.*