A study of radio-equipped flickers

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Introduction

From 18 February through 8 April 1976, we evaluated radio-telemetry as a method to gather field data on Common Flickers *(Colaptes auratus)*. We present some data obtained on four males to show the types of information that can be gathered and discuss problems we encountered.

Methods

The study area, on and adjacent to the Denver Federal Center in Lakewood, Jefferson County, Colorado, covers about 6 km^2 of office buildings, residential tracts, a public park, and fields and pasture. An intermittent stream known as McIntyre Gulch and an irrigation ditch, both interspersed with large cottonwoods *(Populus sargentii)*, cross the area.

We captured two flickers in mist nets and two at roost sites in avian nest boxes. They weighed an average of 140 g (range 131-144 g). All were *auratus* x *cafer* intergrades, predominately *cafer;* their hybrid scores ranged from 9 to 11 (Julian 1972). Each was fitted with a transmitter attached to the middle four rectrices by a tail clip (Bray and Corner 1972). The complete package containing transmitter, MS76T2 battery, 20.3 cm vertical antenna, 16.2 cm horizontal antenna, and tail clip weighed an average of 4.85 g and ranged from 3.2 to 3.8% of body weights. Receiving equipment included a portable receiver and various hand-held and vehicle-mounted directional antennas.

The 4 flickers were numbered 4, 5, 6, and 10, to correspond with the radio channels on which their transmitter signals were received. For individual birds, the number of days of radio-tracking ranged from 4 to 28, and the number of radio fixes ranged from 20 to 99 (Table 1). Each bird was located from 1 to 3 times a day on most dates, and its activities recorded whenever it could be seen. Most observations were brief, but occasionally a bird was tracked for extended periods. Roost locations were sought on 35 flicker-nights. Recorded flicker locations were consecutively numbered and plotted on an aerial photograph.

Table 1. Home ranges of flickers, Lakewood, Colorado, 1976.

Bird number	Study period	Number of fixes[1] Total	Average/day	Home range (ha)
4	18 Feb—13 Mar (25 days)	99	3.96	101
5[2]	12 Mar—8 Apr (28 days)	65	2.32	91
6	12 Mar—8 Apr (28 days)	53	1.89	53
10	23 Mar—26 Mar (4 days)	20	5.00	48

[1] Includes initial capture location.
[2] In addition, seven fixes were obtained from sight observations in 11 days, 9—19 Apr, after transmitter failed; no recorded increase in home range after 8 Apr.

Maximum home ranges were outlined by connecting the outermost telemetry fixes on the photograph to form a polygon. These areas were measured with a compensating polar planimeter.

Results and Discussion

Home Range. The calculated home ranges varied from 48 to 101 ha (Table 1). Flicker 10, tracked only 4 days and on which we have the fewest fixes, had the smallest calculated range, as expected. Among the other three birds, all monitored 25 or more days, the calculated range varied directly with the average number of fixes per day and total number of fixes. Yet, there must have been some true variation in home range size.

The cumulative home range of flicker 4 increased 7%, from 94 ha at 80 fixes to 101 ha at 99 fixes; that for flicker 6 rose only 2%, from 52 ha at 40 fixes to 53 ha at 53 fixes; and that for flicker 5 remained unchanged, 91 ha at both 60 and 65 fixes. It appears that we were approaching the numbers of fixes necessary for accurate determination of these three home ranges.

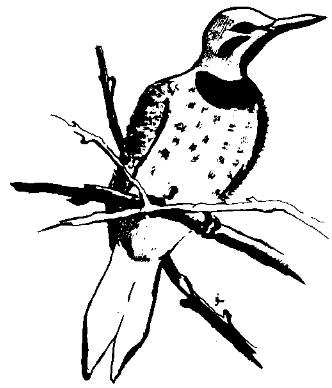
The mobility of flickers within their ranges varied among birds and also, for a given bird, between time periods. The distances between a given night's roost location and the following day's recorded locations ranged from 0 to 1.4 km. We figured the home range area that each flicker occupied during each successive 5-day segment of its monitoring period, and found that flickers 4, 5, and 6 occupied an average of only 44, 25, and 27%, respectively, of their maximum home ranges during any one 5-day period. Individual 5-day home range values overlapped widely among flickers, but it is noteworthy that the male with the largest range also occupied the greatest average portion of his range during 5-day periods.

Flickers were observed during 97 of 158 (61%) telemetry checks. In the other 61 instances, a bird's location was fixed well enough to map but the bird was not seen and therefore site use could not be identified. This was a frequent problem in tracking flicker 6 because visibility and terrain access were limited in the residential area he inhabited. Within their home ranges, flickers 4, 5, and 10 were most frequently associated with cottonwoods and ditchbanks. When not in flight during the day, flickers were recorded on trees, poles, and other elevated sites 70 times (77%) and on ground-level sites 20 times (23%).

Roosting. Flicker 5 arrived at his roost 4 to 9 minutes after sunset on 2 evenings and departed about 11 to 25 minutes before sunrise on 3 mornings. These flights were later in relation to sunset and earlier in relation to sunrise than those reported by Sherman (1910), who gave a half hour before sunset as the customary time of retirement and "soon after sunrise" as the general time of departure.

Roost sites were identified for 30 flicker-nights. Flickers roosted 10 nights on buildings, 7 nights on trees (including 1 night in a nest box on a tree trunk), and 3 nights under a concrete bridge over McIntyre Gulch. Roost niches on 5 buildings varied in design, materials, height, and exposure. Usually we could not tell if a flicker was roosting in a tree cavity or on the outside, but on 25 February, flicker 4 was well illuminated by a nearby sodium vapor street light as he roosted on an elm *(Ulmus)* trunk.

Two flickers, 5 and 10, were located at only one roost each. Number 5 roosted on the same spot under the eaves of a building on 12 nights from 18 March to 19 April. On 2 nights following its nest box capture, flicker 10 entered a large hole in a metal cylinder under the eaves of a building. The other 2 flickers were recorded at more than one roost. Flicker 6 was fixed at 3 locations but on 4 nights between 26 March and 6 April he roosted in precisely the same spot high on the south face of a brick church, just under the eaves. His roost niche was unidentified at the other 2 locations. Flicker 4, located on 13 nights from 18 February to 13 March, occupied 11 sites. These form an oblong polygon of about 0.6 km greatest diameter; 8 of the 11 sites were located close to McIntyre Gulch or the irrigation ditch. These sites included trees, buildings, and a bridge.



Behavior. While monitoring flicker 4, we observed how he behaved during adverse winter conditions. On 3 days during or just following a snowfall, when temperatures were −4° to −8° C, he took shelter under low evergreen cover or in a cottonwood cavity. On 6 March, he spent 14 minutes on a road shoulder where he pecked through a few centimeters of partly melted snow and dug a hole in the soil several centimeters deep. He left a large dropping composed of ant fragments.

We first recorded flickers giving location calls (keck-keck-keck) on 24 February and we noted self-announcing location calls (kleeyer), drumming, and aggressive-social displays beginning in early March (terms follow Lawrence 1966). The aggressive-social displays with noninstrumented males occurred along the edges of home ranges of flickers 4 and 10 at points where they were monitored only once.

On 9 and 11 March, we saw flicker 4 run very rapidly along limbs of a big cottonwood. He also drummed on these occasions. We have found no published reference to the rapid limb run, and without understanding the context in which it occurred we cannot interpret his excitement. No other flickers were visible to us.

Breeding versus migrant status. Flicker 5 was with a female on 29 March and we recorded copulation on 7 April. We were unable, however, to clearly establish breeding status for the other males because we lost contact with them on the 3rd to 28th day after instrumentation (Table 1). We suspect they might have migrated from the study area, but transmitter failure is an alternate reason for losing contact, especially with flicker 6; we first failed to receive 6's signal on 9 April, the date when 5's radio ceased transmitting. Flickers 5 and 6 were instrumented on the same day 4 weeks earlier and the battery for flicker 5 failed 1.5 months earlier than expected.

Johnston and Haines (1957), Stoddard and Norris (1967), and others listed flickers among birds killed during noctural migration. Burns (1900) reported that northern-bred flickers perform the spring migration largely nocturnally, at an average rate of 12 miles (19.3 km) and a range of 7 to 48 miles (11.3-77.2 km) per night. He did not explain how these distances were determined. In our casual monitoring, we failed to detect the departure, if it occurred, of migrants. More intensive day and night monitoring is recommended for clearly establishing dates and times of day of migrational departures.

Effects of radio-instrumentation. We could see no ill effects of radio transmitters on flight, even in strong wind. Nor did flickers appear to have any trouble in tail-spread during aggressive-social displays. When flicker 5 was recaptured a month after instrumentation, his weight had increased 5% from 131 g to 138 g, another sign that transmitters caused no problem with the birds' welfare. During one observation on 9 April, however, flicker 5 continually pulled on the vertical antenna which was bent into a crescent. We recaptured him on 12 April and found the rectrice shafts split open and badly mashed at the place of attachment. We believe this problem could be remedied by modifying the tail clip.

Jackson *et al.* (1977) reported that the antenna of a radio-equipped Red-cockaded Woodpecker (*Picoides borealis*) was frequently caught in bark crevices as the bird hitched backwards down pine trunks. We witnessed no problem of this type, but in another study we conducted (unpublished), 6 of the 12 radio-equipped Starlings (*Sturnus vulgaris*) lost their transmitters. The loss evidently was caused by the antennas getting snagged and bent in nest cavities. Once the antennas were bent, they became caught more easily on branches as the birds moved through trees.

Inasmuch as these four flickers were definitely known to have entered tree cavities, nest boxes, and other confined niches only five times after capture, whereas they roosted frequently under eaves or on exposed tree trunks or brick walls, there is a possibility that the vertical antenna inhibited their use of the former niches. If so, the frequent noncavity roosting may be an artifact to some extent. This merits close attention in future studies.

Conclusions

Telemetry shows promise as an effective means of gathering field data on flickers in late winter and early spring. Accurate determination of home ranges, site preferences, mobility, and migrational versus residential status of radio-equipped flickers should be obtainable with at least one nocturnal and four diurnal radio fixes per bird per day. We believe that deficiencies in the transmitter battery, vertical antenna, and tail clip could be corrected by changes in materials and design.

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Summary

Four radio-equipped male flickers monitored in February — April 1976 in Lakewood, Colorado, covered maximum home ranges of 48 to 101 ha. Ranges varied directly with average number of fixes per day and total number of fixes, and over 5-day periods the birds covered only 25 to 44% of these maximum areas. During the day, no flicker was recorded over 1.4 km from the previous night's roost. When not in flight or at roost, flickers were recorded 70 times on elevated sites and 20 times on ground level sites. Individual flickers occupied from 1 to 11 different roost locations on trees and manmade structures. One flicker took shelter during inclement weather but was undeterred by light snow cover in ground feeding. Behavior possibly associated with approach of the breeding season was noted but loss of radio contact, unclear as to cause, prevented determination of the status of three males. With more intensive monitoring and corrections in equipment design, telemetry should be an effective means of gathering ecological data on flickers early in the year.

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Recapture encounters of American Goldfinches

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During the winter months, January through April 1978, 265 American Goldfinches *(Spinus tristis)* were captured, banded, and released at the author's home feeding station which is in Tomah, Wisconsin. Data were taken on the ages and sexes, time of retrieval from traps, and the lengths of wing chord, tail, tarsi, and beaks of each individual. A total of 54 recaptures involving 42 individuals were recorded. Thirty-three birds were recaptured once, seven were recaptured twice, a single bird was recaptured a third time and one a fourth time.

The recapture data was analyzed to study the time patterns of recaptured birds (Table 1). As expected, the number of recapture encounters diminished as the length of time, in days, since initial capture increased. This is demonstrated through the various categories in Table 1 (see n values).

A disparity existed between the times when initially captured birds (IC) and recaptured (RC) birds were encountered. Thirty-five percent of the ICs, as compared with 55 percent of the RCs, were encountered after 1200 hrs. A Chi Square analysis revealed that there was a significant difference in the AM-PM time of capture of IC's and RC's ($X^2 = 4.07$; $P<.05$). There was no significant difference between the AM-PM rate when traps were maintained and the AM-PM rate of encounters for IC's ($X^2 = 1.33$; $P<.25$). However, the difference between the AM-PM rate when traps were maintained and the AM-PM rate of encounters for RC's approached significance ($X^2 = 1.77$; $P<.15$). This observation adds further support to the fact that RC's tended to be encountered more frequently after 1200 hrs. Because 55% of the RC's were encountered after 1200 hrs and only 43% of the total trap-hours occurred after 1200 hrs, it can be concluded that some additional RC's were missed.

Table 1. Data on 54 recapture encounters of American Goldfinches captured, banded, and recaptured at Tomah, WI during winter 1977-78.

RC category	n	RCs±1 hour Frequency n	Ratio	F	Sex—Age SY-M	AST-M	U-AHY
1 24-hr period beginning with end of initial capture date	24	7	.29	8	4	1	11
> 1≤30 days	12	5	.25	3	4	1	4
>30≤60days	5	1	.20	1	4	0	0
>60≤90 days	4	1	.25	1	3	0	0
Total	45	14	.259	13	15	2	15

*n=those birds recaptured within ±1 hour of time period of previous capture. Ratio=those birds caught±1 hour of time period of previous capture/all recaptures.

Of particular interest was the relationship between the time of encounter of RC's and the time when they were previously encountered. A ratio was established (Table 1) to determine the frequency with which RC's were caught within ±1 hr of the time when they were last encountered in traps. This ratio remained remarkably consistent for each category (Table 1) and averaged 0.259 overall. No difference was observed between sexes.

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