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Rare Occurrences of Ground-nesting in the Northern Flicker, *Colaptes auratus*

Jan G. Reese[1, 3] and David Bridge[2]

[1]*P.O. Box 298, St. Michaels, Maryland 21663, USA*
[2]*P.O. Box 4502, Alexandria, Virginia 22303, USA; bridgedavid@earthlink.net*
[3]*Corresponding author: reesejan@ymail.com*

Abstract: Northern Flickers (*Colaptes auratus*), cavity-nesting woodpeckers, typically excavate holes in tree trunks for nests but there are rare, documented reports of this species nesting directly on the ground. Here, we report a new record of a flicker incubating seven eggs directly on the ground in a saucer-like depression in a freshly tilled garden; the nest subsequently failed. Details on 16 additional ground-nests are summarized, and we briefly discuss possible causes of the behavior such as lack of suitable nest trees in a previously used territory, and/or recent eviction from a nearby cavity by another species during the egg-laying period.

Keywords: *Colaptes auratus*, ground-nesting, nest competition, nest site, Northern Flicker

Northern Flickers (*Colaptes auratus*) are generalist habitat users associated with a wide range of habitats including various types of forests, savannahs, parkland, orchards, cactus deserts, residential areas, and agricultural lands where they usually excavate nest cavities in trees (Bent 1939, Wiebe and Moore 2008). Nests are excavated in both live and dead standing wood with entrances typically located greater than 0.4 m [1.3 ft] above the ground (Raphael and White 1984, Wiebe 2001). The reuse of existing nest cavities is also common (Wiebe et al. 2007).

Although nests excavated in trees or poles are by far the most common, other types of substrates have been noted at wooden buildings among exterior wall cornices, siding, and insulating materials (Bent 1939, Dennis 1969, Reese, pers. obs.). Other nesting cavities have been reported as excavated into an old haystack and target butt at a shooting range, in a crevice of an old brick chimney, and in the hub of an old prairie wagon wheel sitting upright in weeds (Bent 1939). Open water seems no deterrent as nests have been found behind a hole in a bridge bulkhead, in a piling cavity beneath a pier (Bent 1939), and in an old piling offshore in tidewater where the cavity was appropriated by starlings in subsequent years (Reese 1977).

Nearly all species of woodpeckers nest in trees of forested regions of the world; however, three species have adapted to open unforested habitats for feeding and nesting. In South America there are two woodpecker species within the genus *Colaptes* that have adapted to unforested grasslands, savannahs, campo (grassland plain) and puna (high treeless plateau) habitats where nests may be found among crevices of rocky ledges or cliff faces, banks along streams or relief-cuts for terrestrial transportation routes, or in termite mounds (Short 1982). These elevated nest sites are seldom prone to flooding. In Africa, the monotypic Ground Woodpecker (*Geocolaptes olivaceus*) is restricted to similar unforested regions with cliff and bank type habitats used for nest sites (Short 1982). Northern Flickers occasionally use non-tree cavity nest sites, but it is rare. In areas lacking trees, Northern Flickers have been reported excavating cavities into vertical earthen banks within deep-cut riverine systems, steep canyon walls (Bent 1939) and/or relief-cuts for transportation routes (Gabrielson and Jewett 1940). Others have been reported using abandoned Belted Kingfisher (*Megaceryle alcyon*) or Bank Swallow (*Riparia riparia*) burrows (Bent 1939), or hollows among the roots of toppled trees or soil extending several centimeters below the ground surface (Dennis 1969).

Studies suggest reproductive success is higher for Northern Flickers that nest in tree or pole cavities (Dennis 1969, Wiebe 2003, Fisher and Wiebe 2006b), thus it is unclear why sometimes presumably suboptimal sites are chosen. Here, we report the rare incidence of a flicker nesting on the ground and summarize other ground-nesting Northern Flicker occurrences reported in the literature.

OBSERVATION

We received a report from two local birders, D. Terry Allen and Leslie A. Roslund, who had identified a Northern Flicker incubating eggs on the ground in Easton, Talbot County, Maryland (latitude 38.780253°, longitude -76.052869°). The nest site, located in a suburban residential area, was near the center of a recently tilled vegetable garden, about 800 m^2 (~8611 ft^2) comprised of sandy loam soil and situated within an area of mowed lawn over 1 ha (2.5 ac) in size. Both observers visited the garden on several occasions to photograph a clutch of seven eggs on barren soil on 18 May 2006 (Figure 1) and a male flicker incubating in the ground-nest on 21 May 2006 (Figure 2). However, the nest was found deserted with only three eggs on 2 June and empty on 10 June. The shallow, saucer-shaped nest scrape measured 41 cm (16 in) in diameter with the center 8.9 cm (3.5 in) deep. According to the landowner, when the two flickers were disturbed, the presumed mates, would vocalized with each other from the garden and/or nearby landscape trees. When the incubating bird was flushed from the garden it would return quickly to the eggs after the disturbance passed. A quick survey revealed that none of the trees within a 1 km (0.6 mi) radius of the site appeared large enough to accommodate a flicker nest cavity.

Figure 1. Northern Flicker ground-nest with eggs. Easton, Talbot County, Maryland. Photographed by D. Terry Allen, 18 May 2006.

Figure 2. Male Northern Flicker incubating eggs in the ground-nest. Easton, Talbot County, Maryland. Photographed by Leslie A. Roslund, 21 May 2006.

DISCUSSION

A search of the literature revealed reports of an additional 16 ground-nesting flickers; all 17 records are summarized in Table 1. Flickers in 76% (13) of the incidences chose barren ground comprised of easily pliable substrates with 41% (7) located in association with standing utility poles, 24% (4) with residential gardens, 24% (4) with cotton fields, and 18% (3) with lawn grass (Table 1: Nest Location).

Descriptions for 16 nests (Table 1: Excavation) report 56% (9) as saucer-like depressions in the soil surface with three ranging 18-54 cm (7-21 in) wide and 7.6-9.5 cm (3-4 in) deep. Perpendicular excavations into the substrate characterized 31% (5) of the 16 nests with three ranging 17-25 cm (7-10 in) wide and 20-41 cm (8-16 in) deep. Eggs in the remaining two nests (13%) were simply deposited directly on soil or mowed lawn. Egg numbers in or lying near 16 individual nests ranged 2-9 (56% with 5-7 eggs). Egg-laying intervals and/or clutch-sizes, however, are uncertain since 15 of the 16 nests failed and/or were abandoned and subject to one or only a few casual observations. Eggs hatched in only one of the nests, but the fate of the hatchlings was unknown (Dorsey 1969). Causes of nest failure at the other nests could not always be determined, but flooding from precipitation, disturbance by human activity, and predators or scavengers were often implicated.

It is unknown which sex chooses the nest location for the flicker pair (Wiebe and Moore 2008), but the use of a simple depression in the ground appears to be an ineffectual nesting strategy. Studies have reported the proportion of conventional nests in which eggs hatched range from 64% to 100% (73-100% [Dennis 1969]; 64% [Ingold 1998]; 69% [Wiebe et al. 2007]), but in this sample eggs hatched in only one (6%) of the 16 described ground nests (Table 1: Nest Fate) and it is unknown whether the young fledged (Dorsey 1969). The low hatching success in ground-nests is not surprising given the visually obvious solid-white egg color and lack of nest cover. Additionally, nest failure may be related to lack of an egg retainer area or the shallow nest bowls failing to contain the eggs well. Indeed, one incubating flicker was observed on a ground-nest with three scattered eggs, first incubating one egg then another (Dorsey 1974).

Locating a nest on the ground with the probability of poor reproductive success suggests such nests may be the result of extenuating circumstances where absence of nearby conventional sites result in ground use as a last resort. Pairs are usually monogamous, often returning to nest in the same home range each year (Dennis 1969, Wiebe and Moore 2008). The landowner in the current study reported that a large dead maple tree 40 m (131 ft) from the ground nest and potentially containing a flicker nest cavity had been removed during the previous winter. Thus, the flicker pair with attachment to a previously used

TABLE 1. A chronological summary of Northern Flicker ground-nesting reports. Failed nests include those where it was not known if the eggs had already been abandoned before a possible predator or scavenger event. ND = no data provided. *Substrate data was obtained from United States Department of Agriculture county soils maps for individual nest locations (NRCS 2013).

State: Town	Dates	Nest Location	Substrate*	Excavation	Nest Fate	Reference
Massachusetts: West Yarmouth	14-26 JUL 1906	forest road	sand	saucer-like depression	abandoned	Brewster 1909
New York: Fisher's Island	9 JUN-16 JUL 1916	bare ground in open area	sand	saucer-like depression	failed	Pearson 1916
Pennsylvania: Easton	21-28 JUN 1933	bare ground	silt loam	saucer-like depression	failed	Paff 1934
Massachusetts: Attleboro	Late MAY-9 JUN 1964	electrical substation	gravel sandy loam	saucer-like depression	disturbance precipitation flooding	Kinsey 1966
Virginia: Harrisonburg	1964	small vegetable garden	silty clay loam	on the ground	precipitation flooding	Murray 1965
Georgia: Elberton	19 JUN 1964	cotton field	sandy loam	ND	ND	Hopkins 1964
North Carolina: Raleigh	Early MAY-7 JUN 1965	electrical substation	gravelly sandy loam	saucer-like depression	failed	Wray 1965
Georgia: Dalton	31 MAY-11 JUN 1965	small sand pile in yard	gravelly sandy loam	saucer-like depression	failed	Hamilton 1965
Georgia: Dalton	10-20 JUN 1969	at base of utility pole in grass at edge of hatchery pond	silty clay loam	41 cm (16 in) deep cavity	failed precipitation flooding	Hamilton and Hart 1969
Georgia: Palmetto	23-24 JUN 1969	residential lawn near garden	sandy loam	28 cm (11 in) deep cavity	3 hatchlings, but subsequent fate unknown	Dorsey 1969
Georgia: Rome	21-22 JUN 1971	mowed athletic field	grass over silt loam	no excavation	grass mower	Dorsey 1974
Iowa: Des Moines	10-19 JUN 1972	vegetable garden	silt loam	saucer-like depression	failed precipitation flooding	Brown 1972
Mississippi: Hollandale	APR 1973	near utility pole in cotton field	silt and sandy loam	20 cm (8 in) deep cavity	failed precipitation flooding	Ganier and Jackson 1976
Mississippi: Hollandale	APR 1974	near utility pole in cotton field	silt and sandy loam	20 cm (8 in) deep cavity	failed precipitation flooding	Ganier and Jackson 1976
Mississippi: Hollandale	APR 1975	near utility pole in cotton field	silt and sandy loam	20 cm (8 in) deep cavity	failed precipitation flooding	Ganier and Jackson 1976
South Carolina: Anderson	8 MAY-23 JUN 1984	at base of utility pole in residential yard	sandy loam	saucer-like depression	abandoned	Wagner and Miller 1986
Maryland: Easton	15-27 MAY 2006	freshly tilled garden	sandy loam	saucer-like depression	failed disturbance	(this observation)

territory and nest site may have been forced to nest on the ground because there were no other trees in the vicinity large enough for nest excavation. Similarly, only two of the other studies report any trees nearby the ground nest that might have been large enough for excavation (Hamilton and Hart 1969, Brown 1972), while two pairs insistently made a nearby second excavation and/or laid a second clutch after the first attempt was flooded (Hamilton and Hart 1969, Ganier and Jackson 1976).

Competition with European Starlings (*Sturnus vulgaris*) for nest sites has been described (Howell 1943, Dennis 1969, Ingold 1998, Wiebe 2003). Flickers usually re-nest in a different cavity when the first nesting attempt fails by eviction or depredation (Ingold 1998, Wiebe 2003, Fisher and Wiebe 2006a, Wiebe et al. 2007); however, a complete lack of alternative tree substrates may lead to ground nesting, especially if there is little time to find a new site. Town and residential areas are the indicated locations of approximately 60% (10) of the ground-nesting flicker reports, the same areas commonly frequented by starlings (Table 1: Nest Location).

The ground-nesting flicker reports span a century of chronological time with nests found in ten states ranging from Massachusetts to Georgia and west to Mississippi and Iowa (Table 1). Clearly these nesting attempts represent many presumably unrelated flicker pairs. Yet the similar ground-nesting behavior emerged despite disparities in the time, location and generations. This suggests an embedded trait in Northern Flickers, but whether it is inherited or learned independently is unknown.

Flickers forage on the ground more than other woodpeckers with a diet purported to consist of about 40% plant matter (mostly berries) and 60% animal matter, with ants alone comprising nearly half the total diet (Beal 1911). Flickers may be largely dependent upon insect matter during egg laying and brooding of young during April–June, seeking out areas with abundant ant populations since berries have not yet formed. Indeed, 76% (13) of the ground-nesting flickers chose barren substrates (Table 1: Nest Location), a habitat also commonly utilized by ant colonies. Soil grubs of common garden pests may also be an abundant food source in those freshly tilled habitats. In view of the flicker's high dependency on ants, fearless adaptability to ground-feeding, and frequency of time spent on the ground in pursuit of ants, may predispose them to ground nesting behavior despite the unforeseen risks in the strategy.

Factors common in this study and most of the 16 documented reports of ground-nesting flickers fail to indicate any clear explanation for the observed behavior. Current observations suggest that nesting on the surface or excavating perpendicular into the ground is not beneficial for Northern Flickers. Future observations of unusual nest substrates in the species should carefully assess the

nesting situation, particularly the presence of nesting alternatives to try to determine potential benefits for this behavior.

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