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TIMOTHY A. DELLINGER

MIRANDA L. WATFORD

RONALD R. BIELEFELD

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TIMOTHY A. DELLINGER,[1] Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 1105 SW Williston Road, Gainesville, FL 32601, USA

MIRANDA L. WATFORD, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 1105 SW Williston Road., Gainesville, FL 32601, USA

RONALD R. BIELEFELD, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 1105 SW Williston Road., Gainesville, FL 32601, USA

***Abstract*:** Anecdotal accounts of birds moving their eggs to a new location have been reported in shorebirds, waterfowl, and woodpeckers. We report relocation of an egg, 2 days prior to hatching, by an adult Florida sandhill crane (*Grus canadensis pratensis*). We do not know why the egg was moved, but egg movement among other species appears to be associated with nest disturbance by humans, animals, or environmental conditions.

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Egg relocation during incubation has been reported in avian species after nest disturbance. For example, pintails (*Anas acuta*), gadwalls (*Mareca strepera*), and mallards (*A. platyrhynchos*) moved their eggs to a new nest site in response to biologists' trapping attempts at the nests (Oring 1964, Blohm 1981). A gadwall moved its clutch to a new nest on the opposite side of a chain-link fence, apparently because the original nest was disturbed by humans, and then moved the eggs back to the original nest after 2 of the 10 eggs which the duck left in the original nest were moved to the new nest by humans (Johnson and Kirsch 1977). A red-shafted flicker (*Colaptes auratus cafer*) was observed moving eggs after the entrance to its nest was disturbed by a human (Baker 1975). A wood duck (*Aix sponsa*) moved its eggs after some had holes pecked into them, presumably by a woodpecker (Strader et al. 1978). Finally, mallards, piping plovers (*Charadrius melodus*), and an oystercatcher (*Haematopus* sp.) have relocated nests because of rising water (Fleskes 1991, Wiltermuth et al. 2009, Kenyon 1949, respectively). Here, we report the relocation of an egg by a nesting Florida sandhill crane (*Grus canadensis pratensis*). To our knowledge, this is the first report of a Florida sandhill crane relocating an egg. A pair of Mississippi sandhill cranes (*G. c. pulla*) moved a nest, and 1 of the 2 eggs, approximately 2 m away; the egg in the first nest was abandoned (S. Hereford, U.S. Fish and Wildlife Service, personal communication).

Florida sandhill cranes generally nest in shallow water and use emergent vegetation to construct a platform for their eggs (Gerber et al. 2020). The bulky platform can be up to 16 cm above the water surface. Florida sandhill cranes can also nest on dry ground (Holt 1930, Layne 1982, Toland 1991), although this is not as commonly observed as in other subspecies (*G. c. nesiotes* and arctic nesting *G. c. canadensis*; Gerber et al. 2020). Dry ground nests have been found in open prairie (Holt 1930, Layne 1982) and in swales (Layne 1982) and tend to be sparse and with little structure.

Florida sandhill cranes are listed as threatened on Florida's Endangered and Threatened Species list (FFWCC 2011). Habitat loss and degradation is recognized as the greatest threat, and spatial models suggest the total available Florida sandhill crane habitat declined 42% between 1974 and 2003 (i.e., $\bar{x}$ =16.6% decline each decade; Nesbitt and Hatchitt 2008). As the amount of rural habitat has declined, an increasing number of Florida sandhill cranes inhabit suburban and urban areas (Toland 1991, Stys 1997). In these areas, cranes often use man-made ponds, highway medians, lawns, and golf courses as substitutes for prairie, pasture, and marshes (Toland 1999). Novel nesting behaviors include dry ground nests in suburban yards that are best described as devoid of any structure, unlike typical large, bulky nests built in water (Toland 1991; T. Dellinger, personal observation).

During February-June 2020, we monitored breeding, color-banded Florida sandhill cranes as part of an ongoing survival and movements study. We surveyed wetland areas for nests of color-banded cranes and also used crane sighting information from the public to help locate nests. We monitored nests at

[1] E-mail: tim.dellinger@myfwc.com

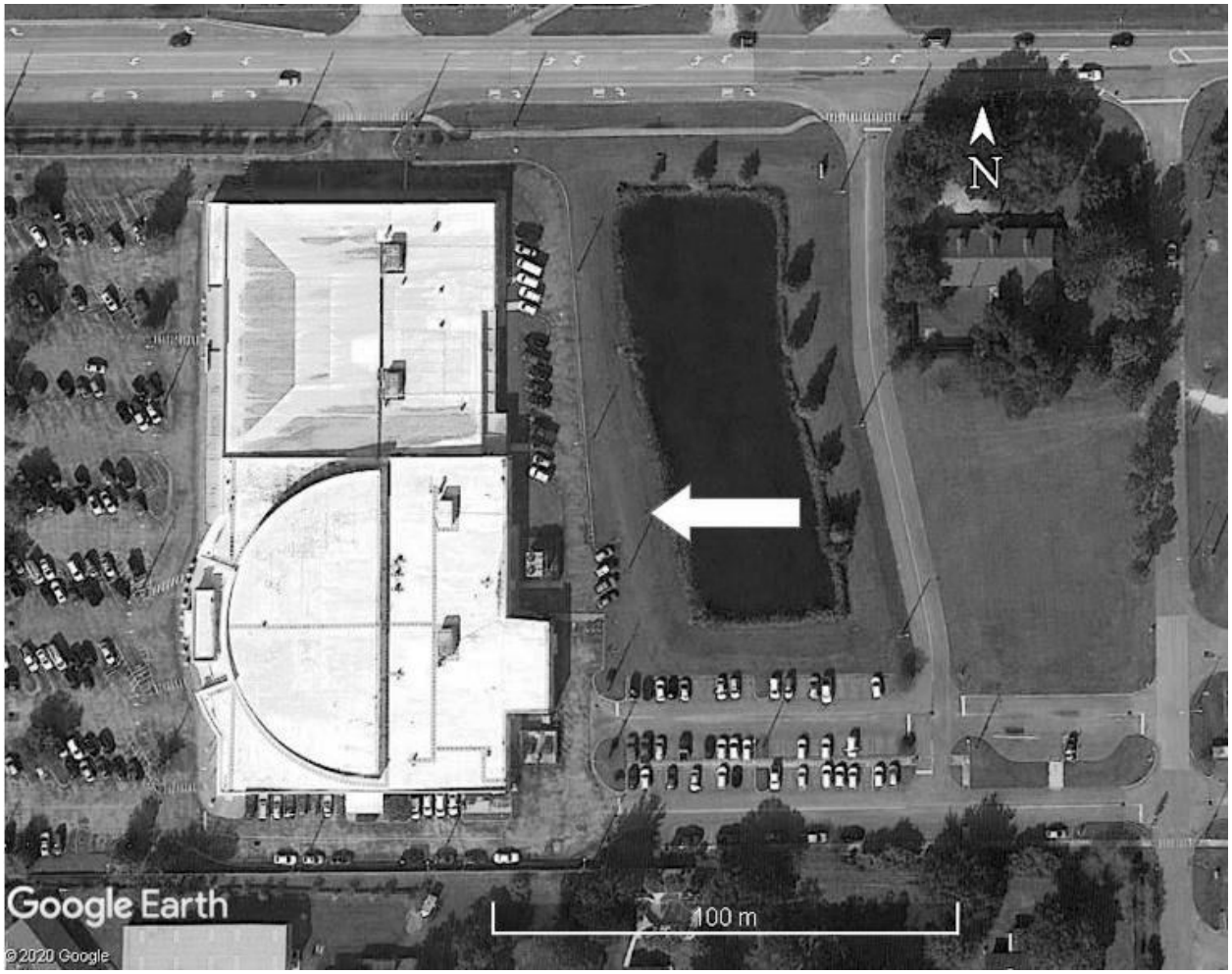

Figure 1. Retention pond and surrounding area where a Florida sandhill crane nested in Kissimmee, Florida; arrow indicates first nest location.

7- to 12-day intervals after nests were located. One of our color-banded cranes had a dry ground nest on the edge of a retention pond in Osceola County, Florida. The rectangular pond was 0.3 ha and had cattails (*Typha* spp.) growing up to 2 m outward from the shoreline on all sides (Fig. 1). The sloping bank was covered with St. Augustine grass (*Stenotaphrum secundatum*) that was approximately 5 cm tall. The grassy area was 8-24 m wide and it created a buffer between the pond and parking lots, roads, and a sidewalk upslope. The nest was composed of a few dead cattail leaves making a semicircle on the downslope side and had a maximum diameter of 30.5 cm. Bare ground and dead grass replaced the St. Augustine grass in the nest center after a week of incubation.

We first recorded the color-banded crane incubating 2 eggs on 4 March 2020. We observed an adult incubating both eggs during subsequent monitoring on 13 March and 24 March. On 2 April at 1051 hours EDT, we observed 1 adult standing over a single egg among sparse nest material, 5.9 m south of the original nest location. The new nest was upslope and farther from the pond edge (4.1 m) than the first nest. The widest diameter of the few cattail leaves defining the downslope semicircle was 30.7 cm. We scanned the area around the nest for the other egg and looked for a hatchling near the adult but were unsuccessful. We examined the first nest and noted the substrate was scattered, and other than the bare ground, it would be difficult to ascertain that a nest had existed. While onsite that day, an employee working in the neighboring building reported that she had observed the adult crane rolled the egg with its beak across the slope and away from the first nest to the new location on the previous day at approximately 1330

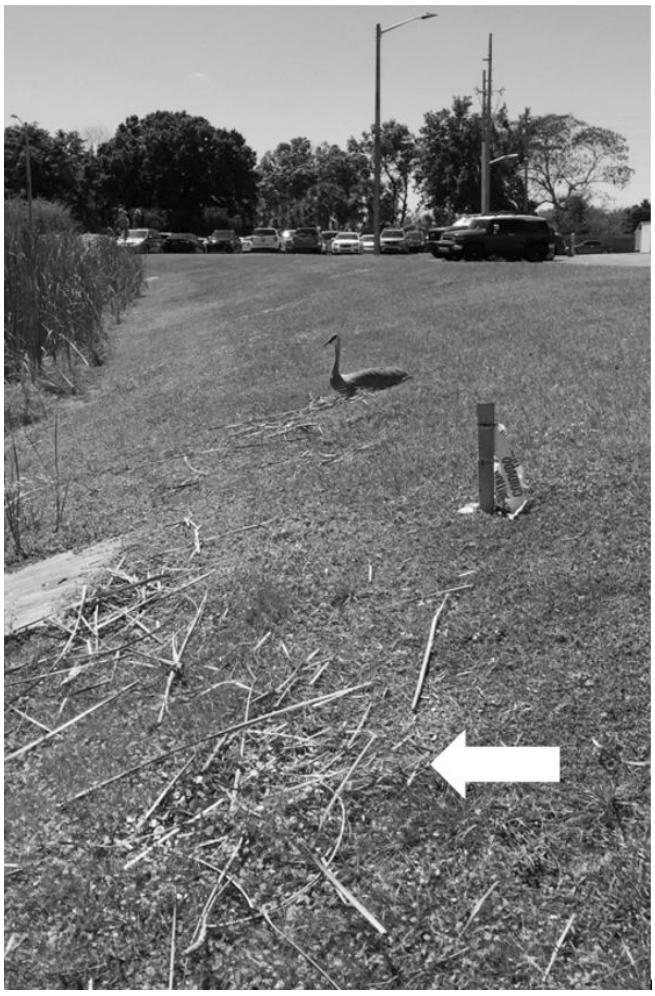

Figure 2. Original Florida sandhill crane nest location indicated by arrow and relocated nest with an incubating adult in a suburban area, Kissimmee, Florida. Photo by Miranda Watford.

hours. She reported that the cattail leaves of the first nest appeared strewn about at the time the bird moved the egg. She said she left the area and returned at 1415 hours to witness the adult placing nest material near the egg's new location. At 1600 hours the adult continued to add cattails to the new nest and position the remaining egg. During each observation only 1 crane was reported to be present.

We observed an adult resume incubation at the new nest site before leaving on 2 April. The following day the egg was still being incubated. A newly hatched chick was observed with the parents downslope of the new nest location on 4 April at 1245 hours. The chick had labored breathing and was standing in grass approximately 20 cm tall near the edge of the retention pond. We observed fire ants (*Solenopsis* spp.) on the chick's legs through binoculars. Both adults were closely guarding the chick and would not allow us to approach it. Within minutes of our arrival, the chick fell over and stopped moving. One adult began nudging and poking the lifeless chick while the other adult moved between the chick and us. After approximately 15 minutes the adults momentarily backed off enough to allow us to get within a few meters of the hatchling. The chick appeared dead, and the agitated pair continue pacing about to protect the chick, so we left the area. While retreating we located the remains of another crane chick, presumably from the missing egg. It too was in taller grass near the edge of the retention pond and between the 2 nest sites. No eggshell fragments were found near the remains. The dead chick was small, consistent with being ≤1 days old. It was intact, except soft tissue was absent from the legs and malar region, and the proximal end of the right femur and upper mandible were broken. We suspect this chick may have hatched and died soon afterward due to debilitation or other trauma, e.g., attacked by a crow (*Corvus* spp.) and then by fire ants or attacked by fire ants and injured and moved by excited parents trying to help.

Observational data suggest that nesting birds sometimes move eggs because of human disturbance. This pair seemed habituated to the presence of people. At the time of its capture in April 2018, the marked adult male and his mate had 2 young colts and were foraging in and looking for handouts among vehicles in a busy parking lot. We confirmed the 2019 nest location of this pair to be on dry ground at the same retention pond and near the locations of the 2020 nests. The 2019 nest was <0.5 m from the pond edge and consisted of approximately twice as many cattail leaves as the 2020 nests. The pair hatched 2 chicks that year but neither survived to fledge. The grass surrounding the retention pond was mowed weekly and to identify the nest to lawn care employees, concerned citizens placed various nest markers in 2019 and a ground stake with caution flagging in 2020 within 2 m of the nest (Fig. 2). Sporadic to steady human activity near the incubating cranes occurred during workdays as people walked to and from their vehicles or exited the parking lot <12 m from the nest. In addition, we typically had to be within 2 m of the nest to flush an adult from it when we were checking the nest contents, and the adult would remain close to the nest and return to it immediately afterward. Although the adults were habituated to day-

to-day human activity and defended the nest vicinity when necessary, it is possible that a human may have disturbed the adults perhaps during the hatching of the first egg and thus causing the second egg to be relocated.

It is unlikely that changing water levels caused this egg relocation. Pond habitat conditions remained stable while the nest was being incubated and there was no measurable precipitation during the 30-day incubation period (<accuweather.com/en/us/kissimmee/34741/april-weather/332324?year=2020&view=list>, accessed 15 Aug 2020). Given the nest was a dry ground nest, it did not face new threats like cranes incubating eggs in marshes that dry down as rainfall decreases and temperatures rise.

We cannot rule out that disturbance by an animal caused the egg relocation. The nest material, albeit sparse, was scattered about, suggesting some disturbance occurred at the nest site. However, locating the first chick near the water's edge, between both nests, indicates it hatched and died soon afterward, but that it was not consumed. Upon hatching, it too may have strayed near a fire ant nest downslope in the taller grass. We inspected the first nest and the ground around it for fire ant mounds, but none were found, and given the adults incubated the eggs nearly 28 days before relocating, we doubt fire ants played a role in the relocation.

The nest's construction and location could have played a role in the egg relocation. The few cattail leaves used as nest material did not make a level platform or a cup for the eggs on the sloping ground next to the pond. Typically, an incubating crane will continue to add material to wetland nests (Gerber et al. 2020); however, we did not observe new material added to the sparse, dry ground nest. During hatching of the first chick or possible fire ant attack soon after its hatching, it is plausible the egg was knocked outside of the sparse nest vegetation and the parents rolled the egg until they found a level spot on the sloping ground and then added nest material around it.

Ultimately, we do not know why this pair moved their egg. Nonetheless, Florida sandhill cranes can be added to the list of species that relocate their eggs. Because they are a long-lived species with low annual fecundity and are now nesting in developed areas with new threats to nest survival, this may be an especially adaptive behavior.

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