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BREEDING BIOLOGY OF RE-INTRODUCED NON-MIGRATORY WHOOPING CRANES IN FLORIDA

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Abstract: In the face of record-setting drought, the re-introduced flock of non-migratory whooping cranes in Florida has shown slow but steady progress toward achieving the first natural recruitment to the flock. Fourteen nests were initiated between 1999 and 2002. Two clutches have hatched a total of 4 chicks and 1 chick was raised to fledging. Captive-raised, soft-released whooping cranes have shown that they are capable of forming pair bonds, defending territories, building nests, laying fertile eggs, and hatching and rearing young. The key to the success of the project will be to have enough pairs producing enough young to offset annual flock mortality.

Key Words: breeding biology, Florida, Grus americana, whooping crane

A goal of the Whooping Crane Recovery Plan is to establish a self-sustaining population of 25 pairs of non-migratory whooping cranes in central Florida (in prep.). This necessitates long-term tracking of the flock to monitor for appropriate breeding behaviors. In this paper we describe the breeding biology of this re-introduced flock. Due to record-setting drought, the flock has yet to show significant natural recruitment. However, breeding behavior data that we have collected so far indicate that this is not an unreasonable goal.

METHODS

We tracked soft-released whooping cranes fitted with radio transmitters daily for the first 4-6 months post-release and 2-3 times per week thereafter. During the breeding season we monitored pairs more intensively in order to document breeding behaviors.

In this paper we describe the biological “steps” the cranes made as they progressed toward reproduction, beginning with pairing. For our purposes we identified a pair minimally as a male and female that consistently spent time together, were in close proximity, and whose behaviors were synchronized. Stronger behaviors indicating a pair bond included unison-calling, defending a common personal space or territory, and copulation. The most definitive indicators of a pair bond were nest-building through egg-laying, hatching, and brood-rearing.

RESULTS

Pairing

The first pairing of re-introduced whooping cranes took place in the 1994 breeding season (Table 1) when a female (USFWS band 629-16772) used pre-copulatory postures to attract a male (USFWS band 629-16780), who responded by mounting her back for a second or two (incomplete copulation).

Territory Establishment

In March 1996, the pair set up a territory near Moss Park in Southeast Orange County (just southeast of Orlando). On 3 April 1996 we witnessed and videotaped the pair in full copulation. Since then, observations of territorial whooping cranes showed that copulation took place one to several times each
day, most often early in the morning. After copulating, the pair unison-called to announce to neighboring cranes that they now occupied the territory.

Defended territory sites varied substantially in size. The smallest territories were < 40 ha while others covered > 200 ha. Territorial defense behavior also showed great variation. Some pairs defended their territories against all other cranes and even wading birds, while others tolerated sandhill cranes nearby. The pair that successfully hatched their eggs in 2000 nested within 100 m of an active sandhill crane nest. The close proximity of those nests was probably facilitated by the high quality of the habitat.

Nest-building

Re-introduced whooping cranes selected appropriate breeding habitats consisting of shallow marshes with emergent vegetation that allowed for nest-building. The first pair began building nest platforms on 1 April 1996. We routinely saw pairs build nest platforms a breeding season prior to laying their first clutch of eggs. Whooping crane pairs, like Florida sandhill crane pairs, often built several platforms (in the nest marsh) before egg-laying. In 2002 the pair (629-23800/629-23798) that fledged their chick (the first for the project) built a number of post-hatching platforms. This was the first time we’ve documented this behavior and, as far as we know, it has not previously been described. The post-hatching platforms were built in new locations as water levels declined in the nesting marsh. The platforms were primarily used by the crane family for nocturnal roosting (the chick rested at night on the platforms, often being brooded by the female). The platforms also allowed the female to brood the chick during cool or wet weather during daylight hours. Finally, the platforms served as places for the chick to rest during the day on dry substrate while the parents captured food items to bring the chick.

Egg-laying/incubation

The earliest egg-laying was by a 3-year-old bird (Fig. 1). Our sample size is not large (19), but it appears that Florida whoopers begin egg-laying at an age similar to birds in the Wood Buffalo/Aransas population. The whoopers laid eggs from 11 February – 11 May. Following nest failure on 26 March 2002, a female re-paired and re-nested (with her new mate) by 22 April 2002. Of 14 clutches we could determine the number of eggs in 10 clutches with some confidence. Seven clutches held 2 eggs and 3 held one egg.

It was not possible to determine fertility for 7 of 14 failed clutches due to lack of evidence (no egg remains were found at nest site). Based on hatching and evidence from eggs recovered from failed nests we determined that 5 of 7 eggs were fertile. Two of 14 clutches successfully hatched, resulting in 4 chicks.

We were able to precisely document the timing of nest initiation and hatch for the successful 2002 nest. The incubation period for the first egg laid was 29.5 days. The second egg hatched 2 days later.

A plot of the locations of whooping crane nests shows them clustered around release sites, especially those in south Osceola County (Fig. 2). A distant out-lying nest was along the SW edge of Lake Okeechobee. The pair nested 122 km from the release site of the male and 118 km from the release site of the female. Another pair nested in Pasco and Hillsborough Counties to the W of release sites. It is possible that drought conditions affected how far some pairs were forced to travel before

<table>
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<th>Year</th>
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<th>Nests built</th>
<th>Clutches laid</th>
<th>Clutches hatched</th>
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Fig. 1. Frequency of whooping cranes at age of first breeding in Florida (10 males, 9 females), Wood Buffalo National Park (WBNP, 33 males, 34 females) and Patuxent Wildlife Research Center (PWRC, 22 females). Data for WBNP are from B. Johns (this proceedings) and for PWRC are from J. Chandler.

Fig. 2. Release sites (shaded circles) and nesting locations (asterisks) for 14 pairs of whooping cranes in Central Florida.
settling on a territory.

**Hatch and Brood-rearing**

A pair of re-introduced whooping cranes hatched two chicks in rural Osceola County in March 2000. This was the first hatch for the project. By 10 days post-hatch only one chick remained. The parents raised their chicks within a relatively confined area of the nest marsh, perhaps an area of 1 ha. On several occasions we observed the family making brief visits to a neighboring marsh. However, we never observed them foraging in uplands. The sandhill crane nest near the whooper’s nest hatched before the whooping crane nest; the sandhills daily brought their 2 chicks into adjacent uplands to forage. The male whooping crane interacted (defended an area of the marsh) with that sandhill family and other whooping cranes and sandhill cranes in the area.

By mid-May the nest marsh was nearly dry, the natural drying exacerbated by the continuing drought. The family began walking the chick to various marshes in the area in search of water. On 22 May we captured the chick in order to attach a small radio-transmitter. It was returned to its parents within 15 minutes. Tracking efforts over the next few days showed that the family wandered in search of water and food. By this time almost all marshes in the area were nearly dry. On 25 May we recovered the remains of the chick (68 days of age) which had apparently been killed by a bobcat (*Felis rufus*).

Another pair hatched 2 chicks in March 2002. The second chick survived for only a few hours before it was taken from the nest by a bald eagle. The parents were away from the nest with the first chick at the time. In contrast to the remote site selected by the pair that hatched a clutch in 2000, this pair selected an urban area (city of Leesburg, Lake County) for nesting. The pair nested in a high quality marsh (14 ha) that contained a diversity of wetland plants and water depths. The edge of the marsh bordered on residential yards and the birds did some foraging there, finding primarily earthworms and insects.

Rainy weather brought out nest-building behavior in the parents. Late in the pre-fledging stage (chick 70 days of age), the chick also participated in the nest-building, by positioning the nesting materials that the parents heaped onto the platform.

**Fledging**

The surviving chick from the 2002 hatch, given the name Lucky by project volunteers, took its first flight (30 m distance at 2m off the ground) at 77 days of age. Within 10 days it was an accomplished flier, capable of skillfully flying for several hundred meters. Several feral dogs tested the family on a number of occasions both before and after Lucky fledged. In fact it was on 7 June, when Lucky flew several hundred meters to avoid the attack of a dog that we felt confident that it was time to declare him “fledged”. This was the project’s first chick to be fledged by soft-released parents. It was also the first chick to fledge in the wild in the United States since 1939, when the non-migratory population in Louisiana produced the last chicks.

**DISCUSSION**

The Florida whooping cranes’ age at first egg-laying more closely mirrored what occurs in the Wood Buffalo-Aransas flock, than it does whooping cranes breeding in captivity. This is an important consideration when determining the potential for the population to become self-sustaining.

The breeding season for whooping cranes in Florida (laying date range 11 February-11 May) coincided, not surprisingly, with that of Florida sandhill cranes (1 February – 15 May, Nesbitt 1988). One benefit of a long season is the potential for re-nesting if a first attempt fails. We documented re-nesting in Florida whooping cranes in 2002. Our sample size for determining clutch size was small (n = 10 clutches) but the 7 clutches with 2 eggs and 3 with one egg compared with 454 nests with 2 eggs, 43 with one egg, and 3 nests with 3 eggs for the Wood Buffalo/Aransas flock 1966-1991 (Kuyt 1995).

The Kissimmee Prairie whooping crane flock came into breeding age about the same time that a prolonged drought period began in central Florida. Florida sandhill cranes, during drought, showed low recruitment levels (4% chicks in fall population vs. 13% chicks in non-drought years, unpublished data). During drought, older more experienced sandhill crane pairs probably were the ones that provided what little recruitment was seen. When typical nesting marshes were dry, Florida sandhill cranes nested in low-quality habitats (borrow pits, ditches, canals, lake edges, and even dry ground) or made no attempt to nest. The re-introduced whooping cranes had no prior breeding experience so it came as no surprise that they were unable to recruit new members into the population. First-time nesting attempts by sandhill cranes usually are unsuccessful (Nesbitt et al. 2001).

Several breeding seasons with normal wetland water levels or higher will be necessary before we can judge the breeding potential of the re-introduced flock. Despite the worse drought in historic times, which began in 1998 and continued into 2002, the central Florida flock showed slow but continual progress by demonstrating that captive-reared, soft-released whooping cranes were able to pair, set up territories in appropriate habitat, build nest platforms, lay fertile eggs, hatch young, and raise young to fledging. The key to the success of the project will be to have enough pairs producing enough young to offset annual flock mortality.

**ACKNOWLEDGMENTS**

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cal Survey’s Patuxent Wildlife Research Center, International Crane Foundation, Windway Capitol Corporation, Calgary Zoo, San Antonio Zoo, and the many private landowners in Central Florida that have allowed access to their properties.

LITERATURE CITED


