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Stephen A. Nesbitt

Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory

Paul S. Kubilis

Florida Fish & Wildlife Conservation Commission, Wildlife Research Laboratory

Stephen T. Schwikert

Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory

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INTERACTION OF YOUNG FLORIDA SANDHILL CRANES WITH THEIR PARENTS

STEPHEN A. NESBITT, Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory, 1105 S.W. Williston Road, Gainesville, FL 32601, USA

PAUL S. KUBILIS, Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory, 1105 S.W. Williston Road, Gainesville, FL 32601, USA

STEPHEN T. SCHWIKERT, Florida Fish and Wildlife Conservation Commission, Wildlife Research Laboratory, 1105 S.W. Williston Road, Gainesville, FL 32601, USA

Abstract: We studied the interactions of 46 Florida sandhill crane (*Grus canadensis pratensis*) chicks and their parents from hatching until the chicks left the family group. Our goal was to see if young remained closer to one parent than the other and if the distance between a chick and its parents increased as the young approached the age of independence. Using a population of individually marked adult pairs, we ranked the distance to and gender of the nearest parent during 233 30-minute observation periods. Between hatching and 180 days of age, chicks showed a greater tendency to be nearer the female than male parent. Before 265 days of age there was a greater probability that the chick would be within 5 m of its nearest parent. After 265 days of age the probability that a chick would be ≥ 20 m from its nearest parent increased. These 2 ages may represent developmental milestones that could have relevance for captive management and reintroduction strategies. By the end of the first stage (180 days), the benefits of being reared by their parents may have peaked for crane chicks and the end of the second stage (265 days) could be the optimal time for releasing captive-reared cranes into the wild.

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Key words: Florida, Florida sandhill cranes, *Grus canadensis pratensis*, natal dispersal, parental investment, parent-chick interactions.

Though young Florida sandhill cranes (*Grus canadensis pratensis*) can fly by the age of 70 days, families stay together until the young are an average of 327 days old (Nesbitt et al. 2002), so parental investment extends for most of the first year of a crane's life. This protracted period of dependence, which extends past the age of nutritional independence, may serve to protect the young from having to compete for resources (Clutton-Brock 1991). Prolonged parental care may also provide the young with protection from predators while they continue to mature. Young Florida sandhill cranes do not acquire their full adult weight until about 270 days of age (Nesbitt et al. 2008) and their adult voice until about 296 days (Nesbitt 1975). The cost to the parents of this continued involvement with their offspring, well after the time when those offspring have reached the level of self-sufficiency, is substantial and must have an evolutionary advantage. The value of an extended period of parental investment, compared to its cost, has not been fully explored, but it is likely there is a concomitant increased probability that the young will survive to reach the age of reproduction.

The behavioral advantage to parents of maintaining an association with fledged chicks has been demonstrated in other species (e.g., Canada geese [*Branta canadensis*], Raveling 1970). In sandhill cranes there may be a competitive benefit from an extended period of post-fledging parental association. Young of the year, even before they have acquired an adult voice or reached their full adult mass, will participate with their parents in aggressive encounters on and off the natal territory. And an adult pair with young can usually dominate another

adult pair without young; even though the now dominant pair had been the subordinate pair when both were without chicks (Nesbitt personal observations). Biparental care of precocial young is typical for cranes, though time spent by each may not be shared equally between the sexes. Females invest more time in the incubation of the eggs than males (Nesbitt 1988) and males spend more time in territorial defense (Tacha et al. 1992). But is there a difference in how the sexes care for pre- and post-fledging age young? If a gender related difference in chick care exists in sandhill cranes it could show up as a greater probability of a chick's showing a preference for being closer to one parent rather than the other.

To investigate the possibility of differences in parental-proximity-probability among sandhill crane chicks, we monitored family groups as they actively fed. Additionally, we were interested to know if the distance between a chick and its parents increased as the young approached the age when they would separate from their parents. We knew from a previous study (Nesbitt et al. 2002) that departure of the young from the family unit was more a function of when the parents would begin the subsequent year's nesting efforts than the age of the chick. If there are differences in the distance juveniles range from their parents as they age, it could give us a better understanding of the dissolution of the family bond. Consistent gender-related differences in parental proximity, if they exist, could be indicative of differences in parental care. Any knowledge we can gain about chick rearing under natural conditions could be applied to release strategies that might help improve the post-release survival of captive reared cranes.

METHODS

We monitored adult pairs and their chicks on Kanapaha Prairie and Paynes Prairie State Preserve in Alachua County, north central Florida. The Florida Department of Environmental Protection manages Paynes Prairie (7,300 ha) and Kanapaha Prairie (650 ha) is privately owned and managed. The crane habitat of both areas consists of open grassland and pasture mixed with emergent palustrine wetlands dominated by pickerelweed (*Pontederia cordata*) and maidencane (*Panicum hemitomon*) (Cowardin et al. 1979). On higher ground surrounding these prairies a wooded rim is dominated by live oak (*Quercus virginiana*).

Adult Florida sandhill cranes were individually color marked and their gender determined for several previously reported studies (Nesbitt 1988, Nesbitt et al. 1992 and 2002). We monitored marked pairs with chicks until the chicks left the family group in late winter. We knew the actual or approximate (± 3 days) hatch date for each juvenile crane in the sample population. Sex was determined for 21 of the chicks (see Nesbitt et al. 2008) that were banded or radio tagged at some time during the course of the study period (before or after fledging or occasionally after natal dispersal).

We used 20X or 15-60X telescopes to observe families while they actively fed or moved to and from feeding, loafing, or roosting sites. Observations periods lasted 30 minutes with data recorded every 60 seconds. We noted the gender of the nearest parent and ranked the distance between the chick and the nearest parent as one of 4 categories: <5 m, >5 to <20 m, >20 to <100 m, or >100 m. If the chick seemed equally proximate to both parents they were scored no preference. Intervals were timed using an auto-resetting alarm stopwatch.

To test for a parental-proximity-probability that differed significantly from random we used random effects multinomial logistic regression (SAS Institute Inc., Cary, N.C., USA), with individual modeled as a random effect to account for within-bird correlation of multiple observations of the same individual. We used the same process to see if the parental-proximity-probability changed as the chicks aged. We used linear regression to evaluate distance to nearest parent in relation to days since hatching.

RESULTS

From July of 1986 through October of 1993 we made 233 observations of 46 individual chicks. Sixty-six of the observations were of one or both members of 8 twin chick broods, and 167 observations were of members of 34 single-chick broods. We frequently made multiple observations of the same chick during the rearing period. The mean number of observations of the same individual was 5.1; maximum number was 22; and 16 chicks were observed only once.

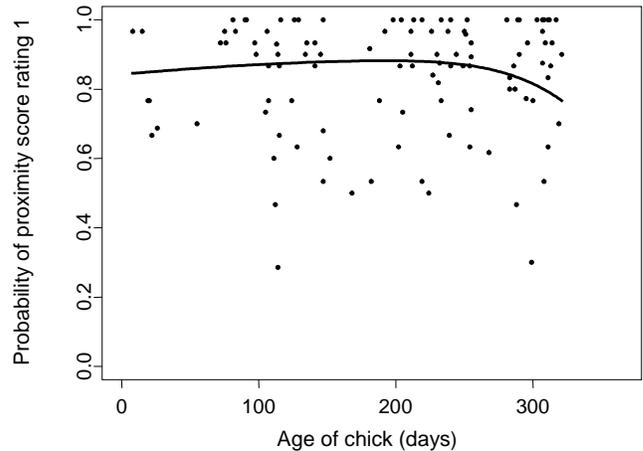


Figure 1. Probability that a Florida sandhill crane chick would be less than 5 m from its nearest parent/parents, 1986–1993.

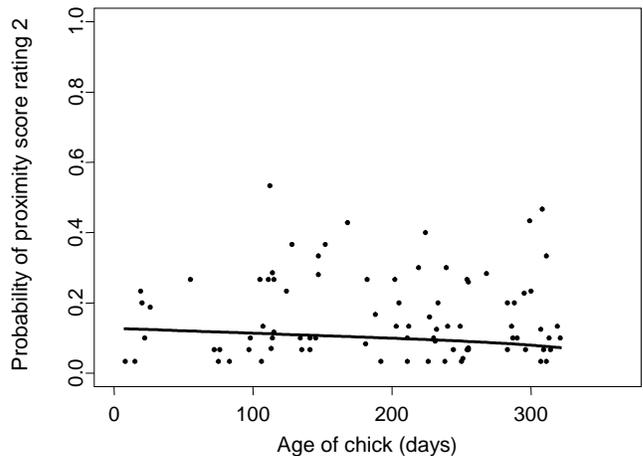


Figure 2. Probability that a Florida sandhill crane chick would be 5–19 m from its nearest parent/parents, 1986–1993.

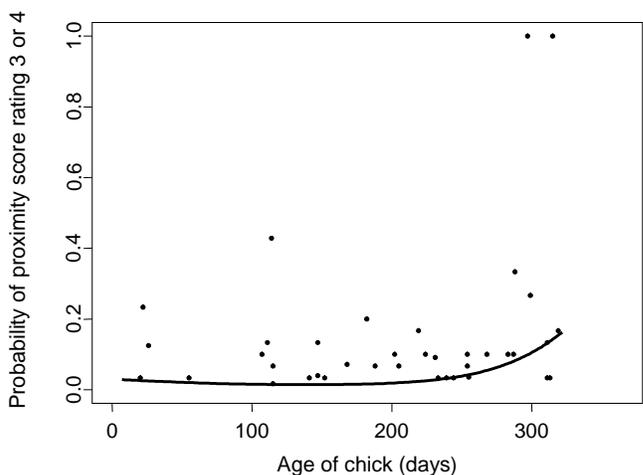


Figure 3. Probability that a Florida sandhill crane chick would be ≥ 20 m from its nearest parent/parents, 1986–1993.

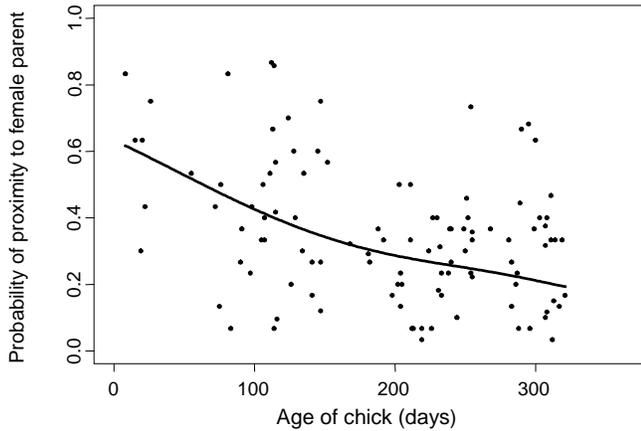


Figure 4. Probability that a Florida sandhill crane chick would be closer to the female parent as a function of age in days since hatching, 1986–1993.

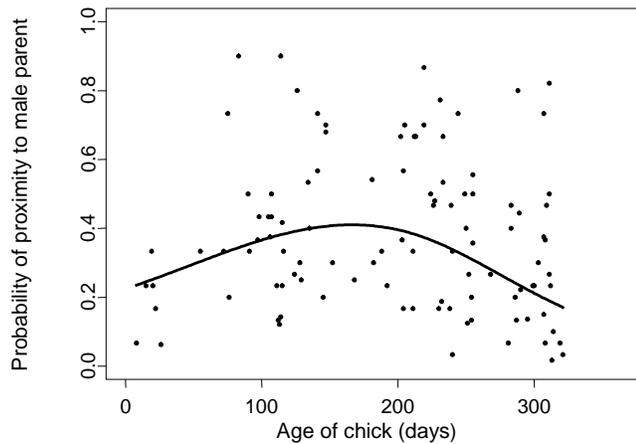


Figure 5. Probability that a Florida sandhill crane chick would be closer to the male parent as a function of age in days since hatching, 1986–1993.

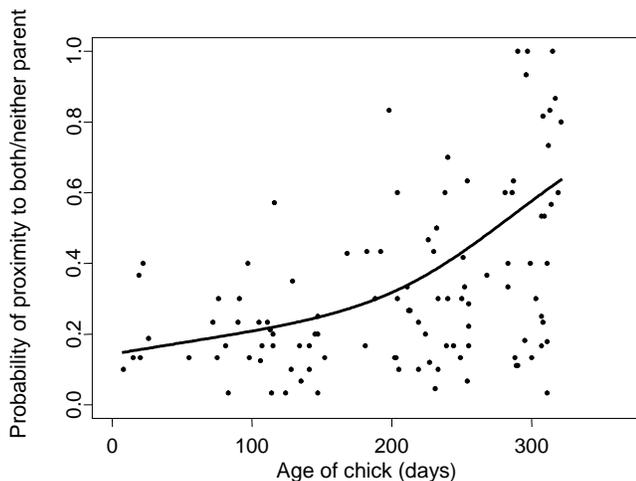


Figure 6. Probability that a Florida sandhill crane chick would be equidistant to both parents as a function of age in days since hatching, 1986–1993.

The mean age of the chicks we studied was 195.4 days (SD = 91.5). Thirty-two observations were of pre-fledging chicks (cranes 8-90 days old), 108 were of chicks that had fledged but were still growing (chicks between 91 to 240 days of age; Nesbitt et al. 2008), and 93 were of chicks about the age when they left the family unit (cranes 241-338 days old; see Nesbitt et al. 2002).

The number of observations scored at the largest distance from the parents was so low (only 6% of the observations contained a score of 4, and only 4% of all 6095 data points were scored a 4) that for analysis purposes the 4 and 3 scores were combined. After combining the two categories, 44% of the observations had distance scores of 3.

To determine if chicks increased the distance they stayed from their nearest parent as they age, we modeled the 3 distance categories and each chick's age in weeks (Figs. 1-3). The probability that a chick would be <5 m from its nearest parent/parents decreased after the bird reached 265 day of age (Fig. 1). The probability of a chick being 5 – 19 m from its nearest parent/parents did not change with age (Fig. 2). The probability that a chick would be 20 m or farther from its nearest parent/parents increased after age 265 days, $P \leq 0.0012$ (Fig. 3).

Additionally, we examined the proximity probability of the chick and its male or female parent. Initially, there was a three times greater likelihood that the chick would be closer to its female parent than to its male parent (Figs. 4 and 5). This tendency of greater proximity probability to the female parent persisted until approximately day 180. At this age the chicks were more likely to be equidistant from either parents (Fig. 6).

DISCUSSION

The reason chicks tended to be closest to their female parent for the first 6 months may simply be because the female parent was the one doing most of the feeding during this time. This would be consistent with the division of roles within the pair bond: females doing more of the overall incubation and males doing more territorial defense. The most interesting thing we found was that the probability of the chick demonstrating a preference for being closer to one parent rather than the other decreased by about age 180 days. This is well after the age (67 to 75 days) when chicks have fledged (Tacha et al. 1992) yet before the average age (327 days) of natal dispersal (Nesbitt et al. 2002). At 180 days old chicks are still increasing in mass (Nesbitt et al. 2008, shows that chicks continue to increase in mass until about 240 days of age) and presumably still have a high nutrition demand. The age of 180 days could be an important milestone in the behavioral interactions of a chick with its parents and might be indicative of the end of an important phase in sandhill crane chick development.

The other age milestone elucidated during this study (265

days of age) may represent the end of another developmental plateau. Perhaps this later age was when chicks gained a level of independence from their parent, although still well before (by nearly 2 months) the age it was fully ready for life on its own.

These two ages may have relevance in captive management and reintroduction strategies for cranes, particularly when we are augmenting existing or trying to establish new crane populations. Age 180 days may be a time when the benefits of being reared by their parents cease to increase. Age 265 days may be the age when chicks no longer need the protection of their parents and might be the best age for releasing captive-reared cranes into a new environment.

In Florida's efforts to establish a nonmigratory population of whooping cranes (*G. americana*), our objective was to release cranes at an age equivalent to the time when they would naturally be separating from their parents. Preliminary analysis of post-release survival data for whooping cranes has shown better survival odds for chicks released at less than the 300 days old: the mean age at time of release was 278.8 days within a range of 152 to 600 days. Perhaps a captive-reared chick's ability to adapt to a new environment is greatest before the age when it would be leaving the company of its parents under natural conditions.

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