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2008

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Nesbitt, Stephen A. and Schwikert, Stephen T., "Timing of Molt in Florida Sandhill Cranes" (2008). *North American Crane Workshop Proceedings*. 192.
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TIMING OF MOLT IN FLORIDA SANDHILL CRANES

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Abstract: We observed feather molt in Florida sandhill cranes (*Grus canadensis pratensis*) between 1978 and 1997. We report data from 4 feather groups: remiges, rectrices, wing coverts and contour feathers. In all feather groups, the median date of ecdysis preceded endysis by about 30 days. Endysis in adults was generally later than it was in first- or second-year subadults. Remiges grew at a rate of 4.72 ± 1.56 SD mm per day. We estimated that primary and secondary wing feathers were usually regenerated within 45 to 70 days.

***PROCEEDINGS OF THE NORTH AMERICAN CRANE WORKSHOP 10*:125–127**

Key words: cranes, Florida, Florida sandhill cranes, greater sandhill crane, *Grus*, *Grus canadensis pratensis*, *Grus canadensis tabida*, molt, sandhill cranes.

The annual replacement of flight feathers in sandhill cranes (*Grus canadensis*) begins after the onset of nesting and precedes the replacement of the contour feathers (Tacha et al. 1992). In Florida the molt of flight feathers begins in April and the growth of new contour feathers ends in mid-October. The sequence of replacement for various feather tracks and difference in timing between age classes and subspecies of sandhill cranes has not been thoroughly documented. Personnel with the Florida Fish and Wildlife Conservation Commission have banded Florida sandhill cranes (*G. c. pratensis*) for more than 30 years (Williams and Phillips 1972, Williams and Phillips 1973, Nesbitt et al. 1992). During banding we noted the plumage characteristics of each bird we handled and found that differences in wing feather molt and wear patterns can be used to age birds until after their third year (Nesbitt 1987, Nesbitt and Schwikert 2005). We also found that plumage characteristics of the birds we handled varied among individuals. Here we are reporting our observations on the timing and duration of molt among Florida sandhill cranes. Additionally, we measured growth rates of incoming flight feathers in cranes that we recaptured during the molt period. Our goal was to describe the sequence, duration, and relative timing of flight and contour feather molt in adult and subadult Florida sandhill cranes.

METHODS

We used the oral tranquilizer alpha-chloralose (Bishop 1991) to capture cranes on and near Paynes Prairie State Preserve in north-central Florida (Alachua County; see Nesbitt and Williams 1990 for details). We distinguished cranes by age class based on previously described plumage characteristics (Lewis 1979, Nesbitt and Schwikert 2005). Feathers were separated into 4 groups: remiges (primaries and secondaries), wing coverts, rectrices, and all other feathers. We originally separated incoming and recovered feathers into 16 types (based on morphographic origin), but for comparison it was necessary to consider only the above 4 groups because we noticed no differences in any but these 4 groups.

Any cranes that died during capture or were found dead elsewhere were prepared as flat skins so that we could examine them for subcutaneous evidence (feathers with attached blood sheaths) of ongoing molt. At least once a week during the molting season we collected shed feathers at feeding, loafing, and roosting sites to document ecdysis. We did not use feathers found at bait sites after capture attempts because any birds handled during capture could lose feathers unnaturally. The time of year when molted feathers were collected corresponded to the time when the winter population of greater sandhill cranes (*G. c. tabida*) were absent from the state.

To determine growth rates for primary and secondary wing feathers we measured incoming feathers of each bird captured, then remeasured the same feathers if that individual was recaptured later in the same molt period. To get a standard length for fully developed wing feathers, we measured the lengths of each wing feather on 3 prepared skins of Florida sandhill cranes that died outside the molting period.

Cranes were separated into 3 age groups: first-year subadults (birds > 1 but < 2 years old), second-year subadults (birds > 2 and < 3 years old), and adults (birds 3 years and older). We used a 1-way ANOVA with planned pair-wise comparisons among age groups using Fisher's LSD test to compare age and timing of endysis as it related to age of cranes. We used the median molt date to describe timing of molt and mean molt date for comparing chronology in crane age groups and feather types.

RESULTS

From 1978 through 1997 we handled 408 Florida sandhill cranes. Another 35 specimens were prepared as flat skins, and we recovered 1,325 shed feathers.

Table 1. Median, earliest, latest, and mean date of ecdysis (recovered) and endysis (observed) by feathers group (*n*, number of individuals observed or feathers recovered) for Florida sandhill cranes, 1978–97.

Feather type		Median day (*n*)	Earliest day	Latest day	Mean (SD) days
Remiges	Ecdysis	2 Jun (134)	21 Jan	21 Dec	17 Jun (59.4)
	Endysis	29 Jul (167)	23 Jan	10 Nov	25 Jul (53.2)
Remigial coverts	Ecdysis	26 Jun (124)	19 Jan	31Dec	7 Jul (77.0)
	Endysis	6 Aug (255)	25 Feb	21 Dec	11 Aug (53.2)
Rectrices	Ecdysis	19 Aug (16)	8 May	6 Sept	15 Aug (67.2)
	Endysis	11 Aug (116)	3 May	22 Dec	21 Aug (72.4)
Other contour feathers	Ecdysis	9 Jul (1,051)	4 Jan	31 Dec	2 Jul (95.6)
	Endysis	24 Aug (1,292)	25 Feb	31 Dec	21 Aug (50.8)

Ecdysis / Endysis

Timing of ecdysis, based on the recovery of molted feathers, was estimated for the 4 groups of feathers (Table 1). The median date for recovered remiges in north-central Florida was 2 June and for recovered remigial coverts it was 26 June. The median date for recovered contour feathers was 9 July and for rectrices it was 19 August.

Incoming feathers were visible in 283 sandhill cranes handled in Florida between 1978 and 1997 (Table 1). The median date when incoming remiges were observed was 29 July; for incoming remigial coverts, it was 6 August; for incoming rectrices, it was 11 August; and for contour feathers, it was 24 August.

In the prepared skins we examined, replacement of the upper neck feathers occurred throughout the year. When just neck feathers were considered, the median date when incoming feathers were noticed was 30 July (range 1 January to 31 December).

We captured 7 individuals more than once while their remiges were growing and measured the amount of intervening growth that occurred for 11 feathers. The mean growth rate was 4.72 ± 1.56 SD mm per day. Using the average length of the same mature remex and assuming a constant growth rate, from 45 to 70 days were required for an individual feather to be replaced, depending on the ultimate length of the feather.

Age and Timing of Molt

The mean dates when incoming remiges were observed in adults, or in first year or second year subadults (Tables 2) did not differ significantly ($P > 0.20$). For the other 3 feather groups, the mean dates for incoming feathers were significantly later in adults than in first-year subadults ($P < 0.001$). Adults molted remigial coverts and contour feathers significantly later than second-year subadults ($P < 0.04$), but there was no significant difference in the mean molt date of rectrices ($P > 0.20$). The mean date when incoming remigial coverts and contour feathers were observed was not significantly different between first- and second-year subadults ($P > 0.20$). The mean date when incoming rectrices were first noticed was significantly later in second- than first-year subadults ($P < 0.02$).

DISCUSSION

The date when wing molt began did not seem to vary with age, although in all age classes, remigial molt began before molting of any other feather types. There was an age-related difference in the onset of molt for feathers other than the remiges: adults began nonremigial molt later than younger birds. Wing-feather molt is perhaps the most significant aspect, from a survival perspective, of the feather replacement process. We found that the replacement of most of the other major

Table 2. One-way ANOVA comparison of the timing of incoming feathers between adult (A), first- (S1) and second-year (S2) subadult Florida sandhill cranes, 1978–97.

Feather type (*n*)	Crane age	Mean day	Age and date comparison (*P*)
Remiges (117)	A	24 Jul	A/S1 (0.319)
	S2	29 Jul	A/S2 (0.677)
	S1	10 Jul	S1/S2 (0.234)
Remigial coverts (142)	A	27 Aug	A/S1 (< 0.001)
	S2	29 Jul	A/S2 (0.031)
	S1	12 Jul	S1/S2 (0.215)
Rectrices (112)	A	9 Sep	A/S1 (< 0.001)
	S2	25 Aug	A/S2 (0.264)
	S1	23 Jul	S1/S2 (0.015)
Contours (217)	A	4 Sep	A/S1 (< 0.001)
	S2	1 Aug	A/S2 (0.017)
	S1	21 Jul	S1/S2 (0.378)

feather groups (except neck feathers) does not proceed until wing molt has begun, so we think that the onset of wing molt may set the stage for all subsequent feather replacement.

We found that neck feathers were being replaced throughout the year, which may be why the number of residual juvenile neck feathers declines throughout the fall and winter of a young crane's first year. It seems that contour-feather molt was interrupted during migration and was resumed only after the birds reached their winter quarters in Florida. This may explain why juvenile cranes from the greater sandhill crane population wintering in Florida appear to be inordinately younger than juveniles of the nonmigratory population, notwithstanding the typically later hatch date for the migratory population (1 May as compared to 1 April for Florida sandhill cranes). The suspension of molt during migration may also help explain why the lesser sandhill cranes (*G. c. canadensis*) appear browner in comparison to other subspecies on the wintering grounds and were originally named the little brown crane.

The growth rate we estimated for Florida sandhill crane wing feathers was 45 to 70 days. This is longer than the length of time (38 to 46 days) during which whooping cranes (*G. americana*) remain flightless, during their normally triennial simultaneous remigial molt (see Folk et al. 2008), which exposes whooping cranes to a much greater risk of predation. The Florida sandhill crane pattern of interrupted wing molt carried on over several years; in contrast, (Nesbitt and Schwikert 2005) may be a better feather replacement strategy in Florida's predator rich environment.

Timing of ecdysis of wing feathers for Florida sandhill cranes in north-central Florida seems to correspond closely with the fledging dates of juveniles. The average egg-laying date of cranes nesting in north-central Florida is 3 March (Tacha et al. 1992). If we assume an average incubation period of 30 days and fledging occurs 67 to 75 days after hatching (Tacha et al. 1992), then fledging occurs about 9 to 17 June. These dates generally correspond with the median date we found for remigial ecdysis of 2 June (mean date 17 June; Table 1). If egg-laying dates of another population of sandhill cranes were known and using the days between laying and fledging, it should be possible to predict molt initiation dates. The age of sandhill cranes from many populations can be determined by wing-molt patterns (Nesbitt and Schwikert 2005). Since ecdysis, and subsequently endysis, closely track fledging dates, an aging technique based on wing molt pattern would be applicable after mid-September for sandhill cranes from any part of the species' range.

ACKNOWLEDGMENTS

Funding for this study came from the Florida Fish and Wildlife Conservation Commission, Nongame Wildlife Trust Fund, and the United States Fish and Wildlife Service through Section 6 of the Endangered Species Act (PL 93-205). P. S. Kubilis provided help with statistical analysis. We wish to thank G. L Ivey, J. A. Rodgers, and M. G. Spalding for review of and improvements to this manuscript. The Florida Department of Environmental Protection, C. L. Brice and Company, and Dr. W. P. Murphy allowed us access to their property.Funding for this work was supported in part by the USFWS via Cooperative Agreement No. 401814-J-035.

LITERATURE CITED

Bishop, M. A. 1991. Capturing cranes with alpha-chloralose (an oral tranquilizer). Pages 247–253 *in* J. Harris, editor. Proceeding 1987 international crane workshop. International Crane Foundation, Baraboo, Wisconsin, USA.

Folk, M. J., S. A. Nesbitt, J. M. Parker, M. G. Spalding, S. B. Baynes, and K. L. Candelora. 2008. Feather molt of nonmigratory whooping cranes in Florida. Proceedings of the North American Crane Workshop 10:128–132.

Lewis, J. C. 1979. Molt of remiges of *Grus canadensis*. Pages 255–259 *in* J. C. Lewis, editor. Proceedings of the 1978 crane workshop. National Audubon Society, Colorado State University, Fort Collins, Colorado, USA.

Nesbitt, S. A. 1987. A technique for aging sandhill cranes using wing molt: preliminary finding. Pages 224–229 *in* J. C. Lewis, editor. Proceedings of the 1985 Crane Workshop. Platte River Whooping Crane Habitat Management Trust, Grand Island, Nebraska, USA.

Nesbitt, S. A., and K. S. Williams. 1990. Home range and habitat use of Florida sandhill cranes. Journal of Wildlife Management 54:92–96.

Nesbitt, S. A., R. D. Bjork, K. S. Williams, S. T. Schwikert, and A. S. Wenner. 1992. An individualized marking scheme for sandhill cranes and its use to determine fall migration interval. Pages 43–46 *in* D. A. Wood, editor. Proceedings of the 1988 North American Crane Workshop. Florida Game Freshwater Fish Commission, Nongame Wildlife Program Technical Report 12. Tallahassee, Florida, USA.

Nesbitt, S. A., and S. T. Schwikert. 1998. Maturation and variation of head characteristics in sandhill cranes. Wilson Bulletin 110:285–288.

Nesbitt, S. A., and S. T. Schwikert. 2005. Wing-molt patterns – a key to aging sandhill cranes. Wildlife Society Bulletin 33:326–331.

Tacha, T. C., S. A. Nesbitt, and P. A. Vohs. 1992. Sandhill Crane. *In* The birds of North America, Number 31. American Ornithologists Union, Washington, D.C., USA, and The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

Williams, L. E. Jr., and R. W. Phillips. 1972. North Florida sandhill crane populations. Auk 89:541–548.

Williams, L. E. Jr., and R. W. Phillips. 1973. Capturing sandhill cranes with alpha-chloralose. Journal of Wildlife Management 37:94–97.