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## TRANSLOCATION OF FLORIDA SANDHILL CRANES TO GEORGIA

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**Abstract:** Wild Florida sandhill cranes (*Grus canadensis pratensis*) were captured in Florida during 3 years and translocated to Grand Bay Wildlife Management Area (GBWMA), Georgia, in an attempt to establish a resident population of Florida sandhill cranes in a location with suitable habitat but no known population of resident sandhill cranes. Translocated second-year subadult cranes commingled with migratory greater sandhill cranes (*G. c. tabida*) yet remained on GBWMA each year after the migratory birds left the area. Twenty-one of 35 released cranes were visually identified at least 5 months after release, 3 cranes more than 15 months following release, and 2 cranes 28 months after release. Six radio-fitted cranes were monitored more than 28 months following release. Successful reproduction of translocated cranes was also observed on the area (as many as 4 pairs of cranes were observed with chicks) which likely indicated the beginning of a residential population of cranes. The methods developed for this project may be useful for translocation of wild sandhill cranes into formerly occupied suitable habitats.

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**Key words:** Georgia, *Grus canadensis pratensis*, Florida, Florida sandhill cranes, resident population, translocation.

The nonmigratory Florida sandhill crane (*Grus canadensis pratensis*) is found from the Okefenokee Swamp in southeastern Georgia south through the Florida peninsula (Greene et al. 1945, Burleigh 1958, Tacha et al. 1994). The Okefenokee Swamp annually supports 600–800 overwintering greater sandhill cranes (*G. c. tabida*) as well as a resident population of roughly 400 Florida sandhill cranes (Bennett and Bennett 1987 unpublished).

Greater sandhill cranes had been observed overwintering in the vicinity of GBWMA for a number of years; however, during the 2 years prior to 1993, the numbers of birds overwintering (present during December and January) had increased, reaching a high of 600–800 birds during the winter of 1991–92. More than 1,100 birds were observed in the Grand Bay locality in mid-February 1992 (T. Hon, Georgia Department of Natural Resources, personal communication). Evidently, Grand Bay was increasingly being used as a stopover area by cranes which had overwintered in the Okefenokee Swamp and/or Florida. Cranes utilized floating mats in the open marsh habitat for roosting, loafing, and feeding, and fed extensively in adjacent fields within a 5-km radius of the Grand Bay wetlands.

Habitat losses through drainage and filling of freshwater marshes as well as commercial development of adjacent uplands (Lewis 1977, Nesbitt 1996) have threatened much of Florida's crane habitat. Though much of the wetlands degradation has slowed due to increased wetlands protection, the value of important wetland habitat for sandhill cranes is easily damaged (Nesbitt 1996). Though these wetlands may continue, due to subtle changes in water level management,

the pickerel-weed (*Pontederia cordata*)–maiden cane (*Panicum hemitomon*) complex, 1 of the 2 most important habitat types for cranes, may be easily converted to a much less desirable community dominated by cattails (*Typha latifolia*) and willows (*Salix spp.*) or other woody plants. At the same time, loss of open upland habitat, which is critical to Florida sandhill cranes, continues (Nesbitt 1996). Nesbitt and Williams (1990) contended that the loss of these important open upland habitats near key wetland areas could have a great impact on the distribution and productivity of Florida sandhill cranes. The Florida Fish and Wildlife Conservation Commission (FFWCC) lists *G. c. pratensis* as a threatened species (FFWCC 1999:476). Bennett and Bennett (1987 unpublished) found that resident Florida sandhill cranes were found in highest densities in shallow water prairies in the Okefenokee Swamp. Because of the dynamic successional nature of swamp prairies and the absence of fire in the Okefenokee, the conversion of prairies to shrub or swamp forest could have an adverse affect on populations of resident sandhill cranes.

We captured wild Florida sandhill cranes and translocated them to Grand Bay Wildlife Management Area, Georgia, in an attempt to establish a resident population of Florida sandhill cranes in a location with suitable habitat but no known population of resident sandhill cranes. The use of translocations is an important species conservation technique used to establish, reestablish, or augment populations (Scott et al. 1988, Griffith et al. 1989) and may be an important species conservation tool when patterns of habitat loss cause natural communities to become fragmented, thus disrupting

dispersal patterns and species interchange mechanisms. Translocations of Florida sandhill cranes into suitable habitat have been successful in Florida using wild-trapped birds (Nesbitt and Williams 1973, Wenner and Nesbitt 1984) and young birds reared in captivity (Nesbitt 1979), and on St. Catherine's Island, Georgia, by using young birds reared in captivity (Winn 1990). Also, captive-reared Mississippi sandhill cranes (*G. c. pulla*) released on Mississippi Sandhill Crane National Wildlife Refuge have demonstrated high survival, integration with wild birds, and breeding (McMillen 1988). Wenner and Nesbitt (1984) reported on the fate of 15 Florida sandhill cranes released in Payne's Prairie from 1971 through 1973 with 3 known to have survived to adulthood, including 1 that bred successfully. Wenner and Nesbitt considered these survival statistics to be comparable to those observed in natural populations.

Griffith et al. (1989) stated that to improve the chances of success for translocations of endangered, threatened, or sensitive species, even in the best habitat, translocations should be considered well before the technique becomes the last resort for that species. Therefore, to help preserve the Florida subspecies, there is a need to formulate and implement strategies and techniques for the development of viable populations in good quality habitat outside currently occupied Florida sandhill crane range.

## STUDY AREA

Grand Bay Wildlife Management Area, in Lanier and Lowndes Counties, Georgia is a 4,207-ha area situated on one of the largest Carolina bays known and as such contains a wide diversity of biotic communities (Wharton 1978). This Carolina bay (Grand Bay) is a portion of a 5,260-ha wetland complex of 4 interconnected Carolina bays and forested swamps. In general, habitat at GBWMA is similar to that found in Florida sandhill crane habitat in Florida and parts of the Okefenokee Swamp. Unlike the Okefenokee, however, uplands adjacent to the bay also provide quality foraging areas in a number of privately owned agricultural fields and pastures. On GBWMA, prior to and during the project, 60 ha of corn were managed as feed for cranes and other wildlife with 2 ha of wheat planted as supplemental winter feed.

## METHODS

### Pre-trapping Activities

Pre-trapping activities occurred in July 1993, August 1994, and July 1995 in central Florida. Pre-trapping activities included contacting landowners regarding crane sightings and securing access to private property to locate cranes and potential capture sites. Twenty-nine landowners were

contacted in 10 Florida counties—Alachua, Citrus, Hernando, Hillsborough, Lake, Marion, Orange, Polk, Putnam, and Sumter.

During the pre-trapping periods, crane activity was concentrated (by baiting technique) at potential capture sites (1 site in 1993, 2 in 1994, and 1 in 1995) situated 8.1 km south of Groveland, Lake County, Florida. Birds were conditioned to feed on shelled corn at 3 delineated feeding stations (A, B, and C) at the trap site locations. At each feeding station, corn was placed in individual 140-cc piles for a total of 1,960 cc to 2,800 cc per station. Cranes were baited in this fashion until conditioned to feed predictably in the early morning, consume all bait, and remain at the bait site for at least 2–3 hours each morning.

### Capture of Florida Sandhill Cranes

Corn, treated with alpha-chloralose (Williams and Phillips 1973, Nesbitt 1976, Bishop 1991) at a dosage rate of 0.21 gm per 140 cc of corn (bait for each bird), was placed at the bait site location in the morning prior to the arrival of cranes. Twelve 140-cc treated bait piles were dispensed at each station A and B and 20, 140-cc untreated bait piles were distributed at station C.

Drugged cranes were collected, placed in cloth wraps and hoods, and transported to the FFWCC Wildlife Research Laboratory in Gainesville for processing. All birds were classified by external characteristics for age (Nesbitt 1987) and sex (Nesbitt et al. 1992). Birds categorized as second-year subadults were banded with USFWS aluminum leg bands and combinations of colored plastic leg bands, placed in cloth wraps and hoods, and transported to the Grand Bay holding facility on the date of capture. To prevent free flight, wing brails (Ellis and Dein 1991) were placed on 1 wing of each bird prior to its release in a 30-m by 100-m holding pen at GBWMA.

The cranes not transported to Georgia were banded with USFWS leg bands, returned to the capture site, and released. Cranes were released at the capture site after they had recovered from the effects of the drug, either on the day of capture (alert birds) or on the day following capture. Baiting and bird observations continued at the capture sites for 7–10 days following release of the birds on the sites.

### Care for Cranes in Holding Pen and Soft Release of Birds

The soft-release techniques we used to introduce cranes in Georgia (Fig. 1) had been used successfully to introduce cranes in several other programs (Ellis et al. 1992). Condition of the cranes was discretely checked each day following captivity. These daily observations were to detect overly aggressive behavior of the cranes toward each other, signs of



Fig. 1. Sandhill cranes from Florida were confined near Valdosta, Georgia, for 4–6 weeks prior to release. (Photo by W. A. Abler.)

injury, or sickness. After 2 weeks, to prevent wing atrophy, cranes were herded into a temporary catch pen at dusk and wing brails were switched to the opposite wing.

To supplement natural foods, cranes were initially fed shelled corn distributed on the ground and a granular Purina Game Bird Chow (Purina Mills, St. Louis, Missouri) which was fed on wooden feeding platforms. However, following problems with corn spoilage in 1993, all corn was removed from the pen and feeding of corn was discontinued. Purina Game Bird Chow or Nutrena Chick Starter/Grower Mix (Nutrena Feed Division, Minneapolis, Minnesota) was fed as supplemental feed in 1994 and 1995.

To initiate the "soft release" of cranes from the pen, wing brails were removed from the birds at approximately 1800 hr on the night prior to release. Birds were observed beginning at daylight on the release date and the pen was checked again during the afternoon of the release day to see if all birds had left.

#### Monitoring Released Florida Sandhill Cranes

Attempts were made by Georgia Department of Natural Resources (GADNR) Game Management personnel to observe marked Florida sandhill cranes on and around GBWMA following the release of birds from the holding pen facility. In 1993 an article was published in the local Valdosta, Georgia newspaper and a television news segment documenting the release program was aired on Channel 10 in Albany, Georgia. Through these media appeals the public was asked to report any sandhill crane with colored leg band markers observed in the GBWMA vicinity. During annual

helicopter surveys of Florida water rat (*Neofiber alleni*) houses on GBWMA in March or April of each year, GADNR Game Management personnel attempted to observe resident Florida sandhill cranes in the inaccessible wetland areas on GBWMA.

Leg-band radio transmitters (Advanced Telemetry Systems, Isanti, Minnesota) were attached to 5 cranes in September 1994 (Melvin et al. 1983). These cranes were monitored 5 days per week, just prior to daylight and just after dark, from 30 November through 16 December 1994. Crane locations were then monitored every 2 hours from before daylight until the birds went to roost at night 3 days per week from 19 December 1994 through 3 March 1995. Beginning on 13 March 1995, birds were only monitored on night roosts 3 days per week, continuing through April 1995. In October 1995, 6 cranes were fitted with radio transmitters furnished by Geo-Marine, a contractor working on an avian flight hazard study for Moody Air Force Base (MAFB). These birds were monitored on their nightly roost, 3 days per week, until the first week of March 1996 to determine if the birds remained in the area after greater sandhill cranes had departed on their migration north.

## RESULTS

### Trapping Effort

A total of 81 cranes were captured during the 3 years of the study. Thirty-seven second-year subadults were transported to GBWMA and 44 cranes were returned for release at the capture site locations. During the 3-year study 1 crane died as a result of the trapping efforts. The excellent capture success for all 3 years of the project was a direct result of the considerable pre-trapping effort.

### Care for Cranes in Holding Pen and "Soft Release" of Birds

**1993 Release.**—On 9 October a crane that had been missing from the pen since 1 October was recovered shot about 45 km NE of the holding pen near Guest Mill Pond in Clinch County, Georgia, and died from its injuries. The brail on the crane's wing had become detached, allowing the bird to freely fly.

Two cranes were found dead in the pen on 8 October and were taken to the Southeastern Cooperative Wildlife Disease Study (SCWDS) in Athens, Georgia for necropsy, which indicated, "The death of these birds is due to multiple factors. Pneumonia in bird A, and inflammation of the heart in bird B were due to infection with *Aspergillus*. This organism is ubiquitous, and the birds were probably carrying the fungus

at the time of capture. The stress of capture and confinement also may have contributed to the severity of disease. The liver lesions are most likely due to aflatoxin consumed in moldy corn. Aflatoxin is known to increase susceptibility to infectious diseases in some domestic animals. The aflatoxin level in the corn sample was extremely high." (Southeastern Cooperative Wildlife Disease Study 1993). A third crane was found dead in the pen on 9 October. Though necropsy results for this bird were not obtained, it was suspected that the cause of death was similar to that indicated for the 2 cranes in the SCWDS report.

Brailes were removed from the cranes on the evening of 20 October. Five of the 6 cranes had flown from the pen by 0800 the next day and all birds had left the pen by the afternoon.

**1994 Release.**—During the holding period (27 October through 28 November 1994), brailes failed on 4 of the cranes, allowing them to fly from the pen prior to the release date (29 November 1994). These birds, however, periodically returned to the pen during the remainder of the holding period.

Brailes were removed from the remaining cranes on 28 November 1994. The cranes were observed on 29 November from 0640 until 1145 hr and later at 1600 hr. At that time 1 bird, which appeared to have an injured wing, remained in the pen. On 2 December the bird flew from the pen and was considered released.

**1995 Release.**—During 1995, 1 crane was euthanized after breaking its leg in the holding pen facility and another was transported to GBWMA from a facility at White Oak Plantation near Jacksonville, Florida. This bird, also a second-year subadult, had been hatched and reared at the White Oak Facility. Brailes became detached from 7 cranes which were able to fly from the pen prior to soft release. Brailes were removed from the remaining cranes on 27 November 1995, all of which were observed to have left the pen by the afternoon of 28 November.

### Monitoring Released Florida Sandhill Cranes

**1993-94 Monitoring Activities.**—Color marked, released Florida sandhill cranes were observed periodically from 23 October 1993 through 5 April 1994. At least 4 of 6 individually marked birds were identified following their release. Other marked birds were seen; however, identification of the color band sequence was not possible. During a helicopter survey of the inaccessible wetlands on GBWMA on 30 March 1994, a sandhill crane and nest with 2 eggs was identified on the area. To avoid disturbance of the crane, the survey team did not approach near enough to determine if the crane was color-marked. Even if this bird was not one of the birds released during this study, this sighting was significant in that habitat and the presence of released cranes in the

GBWMA study area was sufficient to attract a pair of nesting Florida sandhill cranes.

In cooperation with FFWCC, 2 adult (brailed) and 2 immature Florida sandhill cranes were placed in the holding pen on 1 April 1994. On 5 April, 3 color-banded cranes and 1 non-banded crane were observed in the pen with the brailed family. Brailes were removed from the adult birds on 23 April. Because of the aggressive nature of the adult male crane, we tried to keep him in the pen by clipping the primary feathers on one of his wings. The female and both chicks were first observed flying outside of the pen on 1 June 1994. We presumed that these 3 birds became part of the release population.

**1994-95 Monitoring Activities.**—The 5 radio-monitored cranes roosted in 2 distinct locations. Three of the cranes stayed together and roosted northwest of the release site in Grand Bay. The other 2 cranes stayed together and roosted northeast of the release site in a part of Banks Lake known as "The Old Stump Field". Radio signals on 2 of the cranes ("Green Radio" and "White Radio") could not be picked up by either ground or aerial tracking after 16 January 1995 and it was possible they had left the area or the radio transmitters had failed. On 3 February, one of the missing cranes ("Green Radio") was visually observed with the "Yellow Radio" bird. The other missing crane ("White Radio") was visually observed with the "Blue Radio" and "Red Radio" birds. The signals from these 2 radio transmitters could no longer be received indicating they had failed.

From 19 December through 3 March 1995, attempts were made to obtain visual sightings of the radio-equipped birds with 11 of 13 cranes released in 1994 (which included the 5 radio-marked cranes) being sighted. One crane released during 1993 was also observed as were a number of greater sandhill cranes. As many as 1,500 migratory cranes (*G. c. tabida*) were estimated to have used the Grand Bay area during the winter migratory period.

An adult pair of cranes with 2 chicks was observed in July 1995 by a private landowner northwest of GBWMA and an adult pair with 1 chick was observed on GBWMA by T. Hon (GADNR) on 4 September 1995. No band identification was made for any of these adult birds.

**1995-96 Monitoring Activities.**—The 6 cranes fitted with radio transmitters remained in the Grand Bay area through the time when tracking of radio-fitted birds was completed during the first part of March. Visual observations of cranes were reported by GADNR personnel, private individuals, and personnel of Geo-Marine. One adult pair and a chick were observed at the holding pen facility on 22 November 1995. The adult male was identified by colored leg bands as a crane released in 1993. Leg bands were not observed on the female. On 12 March 1996, 11 cranes were observed in a cornfield on GBWMA with 4 identified by colored leg bands. One pair of

adults and a subadult flew into the cornfield together and were identified as the banded adult male, released in 1993, and a non-banded female that were observed with a chick on 22 November 1995. On 14 March, 2 additional marked cranes were identified in the same cornfield on GBWMA. On 5 May, 1 adult with colored leg bands was reported in Echols County on Georgia Highway 135 approximately 6 km south of Howell. This observation was confirmed by a private landowner during a follow-up visit to the area on 10 May. Two adult cranes with colored leg bands and 1 downy juvenile were sighted approximately 25 km southeast of the GBWMA release site. On 10 May 1996, 2 radio-fitted cranes were located in a pasture west of GBWMA on the Bemis-Knights Academy Road. Two additional color-banded birds were positively identified along with the 2 radio-fitted birds. During this same time, 2 cranes were observed just southwest of GBWMA in a field along Studstill Road.

Personnel of Geo-Marine, began an avian flight hazard study at MAFB in 1995. Subsequently, they reported a number of visual observations of cranes in the Grand Bay/MAFB area on dates when migratory cranes would not have been the area. Eight sightings of 3 to 12 unidentified color-banded and/or unmarked cranes were reported from 6 May through 1 October 1996 and 17 and 18 March 1997.

It is probable that some, if not most, of these observations were of cranes that resulted from releases on GBWMA. We can account for sightings of 21 individual cranes greater than 5 months after their release at Grand Bay. This represented 60% of the birds released from 1993–95. The actual number of individuals sighted, however, was probably higher because a number of reported cranes, especially after the 1995 release, were merely identified as “cranes with colored leg bands.” Three cranes were visually identified over 15 months following release and 2 cranes 28 months after release. Additionally, Geo-Marine used remote telemetry receivers to monitor the radio-fitted birds released in 1995. Data from Geo-Marine monitoring stations indicated that each of these 6 cranes were still active in the Grand Bay area on 3 April 1998 when the stations were dismantled (more than 28 months following release). Relocation efforts by other researchers, using both adult and subadult birds (Nesbitt and Williams 1973, Wenner and Nesbitt 1984), did not experience as high of a success rate for translocated birds remaining in the relocation area.

## DISCUSSION

Based on radio tracking of cranes as well as visual observations during the 3 years of the study, the translocation effort was considered a success. Cranes released on GBWMA commingled with migratory cranes yet remained in the area after the migratory birds left. Throughout the 3 years of the

study, a number of color-banded cranes were observed on and around the Grand Bay area during different seasons of the year. Apparently, translocated Florida sandhill cranes between 12 and 36 months of age are capable of producing a resident population in suitable habitat with no recent history of nesting Florida sandhill cranes.

The subadult cranes translocated to the area probably had not formed permanent pair bonds nor established breeding territories prior to the translocation effort. As many as 4 pairs were observed with chicks in the Grand Bay area during 1995 and 1996. One pair, a male released in 1993 and a non-banded female, was observed with a juvenile in November 1995 and again observed with a subadult bird in March 1996. These observations confirm the ability of this pair to establish a breeding territory, successfully nest, and raise a chick through its first year of life. Colored leg band identifications were not verified on the adult pairs with chick(s) observed in July and September 1995 but represented at least 1, and perhaps 2, successfully reproducing pairs of cranes. Although the color band sequences were not identified for the pair of banded cranes observed with a chick during May 1996 in Echols County, these birds most likely were not the same pair of cranes identified in November 1995 and March 1996. Both cranes of this pair had colored leg bands and the location of the pair was not consistent with sightings of the pair identified in November 1995.

The primary objective of this study was to translocate Florida sandhill cranes to GBWMA and establish a resident population of the cranes. A second objective was to test whether subadult Florida sandhill cranes could be used to establish a population of cranes outside their current range. The observations of successful reproduction of translocated cranes indicated the possible beginning of a resident population of cranes in this area. Continued observations of cranes in the area will allow the further evaluation of this objective.

## MANAGEMENT IMPLICATIONS

Nesbitt and Williams (1973) concluded that since translocated wild-trapped subadult Florida sandhill cranes did not disperse widely nor attempt to return to their capture locations for up to 20 months following release, it was likely that such a technique could be used to restock suitable habitat with relatively few birds. The successful translocation of Florida sandhill cranes to GBWMA confirms that subadult cranes will remain in a relocation area and will likely form a resident breeding population. The technique can be applied in other situations to augment low populations or to reestablish cranes in areas from which the species has been extirpated. This approach may also work with other nonmigratory species of cranes as well.

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