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# TRENDS IN HABITAT AND POPULATION OF FLORIDA SANDHILL CRANES

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**Abstract:** To map the areas of potential occupied habitat for Florida sandhill cranes (*Grus canadensis pratensis*) in Florida we used known habitat requirements and confirmed locations of occurrence in combination with a Geographic Information System. Using the map of potential habitat resulting from this process, we calculated the changes in the amount and distribution of crane habitat in Florida in 10-year increments since 1974. Based on annual home range sizes, age structure, and average flock size, we estimated the statewide population of Florida sandhill cranes in 2003 to be 4,594 individuals. Considering the area of crane habitat lost since 1974, this is 2,548 fewer cranes than should have been present in 2003. Suitable habitat declined an average of 16.6% during each of the 10-year increments between 1974 and 2003. Without a concerted effort to preserve and manage habitat for sandhill cranes in Florida, the species will not continue to be as common or as widely distributed as it is today.

## PROCEEDINGS OF THE NORTH AMERICAN CRANE WORKSHOP 10:40–42

**Key words:** Florida, Florida sandhill cranes, GIS, *Grus canadensis pratensis*, population estimates.

Florida has the largest and most stable population of nonmigratory sandhill cranes (*Grus canadensis pratensis*) within the species' range. Estimates in the 1970s were put at 4,000 to 6,000 individuals and it was felt the population was increasing (Lewis et al. 1977). Since that time, no additional information has been collected to refine this estimate or to estimate the size of the current population. Lewis et al. (1977) speculated that the loss of native crane habitat would be offset by increases in clearing of previously unusable habitat for livestock grazing. In this paper we report the results of using recently available Geographic Information System (GIS) analytical techniques and data concerning the distribution of the species in Florida to map area and distribution of sandhill crane habitat in Florida. Our goals were to estimate the extent of currently available Florida sandhill crane habitat and to compare that data from past years with comparable GIS data. Additionally, we hoped to use the data concerning available habitat and known home range requirements (Nesbitt and Williams 1990) to produce a more current estimate of the Florida sandhill crane population.

## METHODS

We knew from previous studies the types and amounts of habitats used by Florida sandhill cranes (Nesbitt and Williams 1990). We determined areas of occurrence statewide from the Florida Breeding Bird Atlas (Kale et al. 1992). We acquired data to estimate the area of potential suitable Florida sandhill crane habitat from the satellite land-cover imagery for 2003, provided by Florida Fish and Wildlife Conservation Commission (FWC) GIS staff. From this file containing 42 potential crane habitat categories we extracted the 6 habitats that are used by cranes (Dry Prairie, Grasslands, Improved Pasture, Unimproved Pasture, Shallow Freshwater Marsh, and Shrub Swamp). Because proximity of

crane habitats is as important as type, we created a buffering scheme that captured the minimum amounts of wetland and grassland habitats needed to make up a yearly home range. First we generated a polygon that included all wetlands and grasslands of sufficient size to be used by cranes. Then we created a 3-km buffer around all the marsh habitats to capture nearby grassland habitat; daily movement patterns found from previous studies (Nesbitt and Williams 1990) indicated that 3 km was about the greatest distance cranes would typically travel between roosting site, nesting sites and foraging sites. We further refined the wetland habitat coverage area to exclude areas more than 0.5 km from an interface with one of the grassland habitats. We believed that sandhill crane use of wetlands would be minimal beyond this distance. The result was a shape file layer that included grasslands and wetlands that were within 3 km of each other. We then superimposed the Florida sandhill crane area of occurrence from the Florida Breeding Bird Atlas (Kale et al. 1992) on this layer. When we measured the overlapping area, we got a statewide estimate of occupied Florida sandhill crane habitat (Fig. 1).

For historical habitat coverage we had equivalent land-cover type data available back to 1974, in roughly 10-year increments. We calculated the total area of the 6 pertinent habitat categories and compared the percentages of potential crane habitat (un-buffered) to the usable (buffered) crane habitat in 2003. We compared the un-buffered land-cover area for the 3 prior decades with the area from the 2003 data and then extrapolated the amount of potential crane habitat in each decade, assuming that the buffered to un-buffered ratio would have been equivalent. We think this approach provides a conservative estimate of how much total crane habitat was present for each decade.

The Florida Natural Areas Inventory (FNAI [Florida State University, Tallahassee]) provided GIS data on *Conservation*

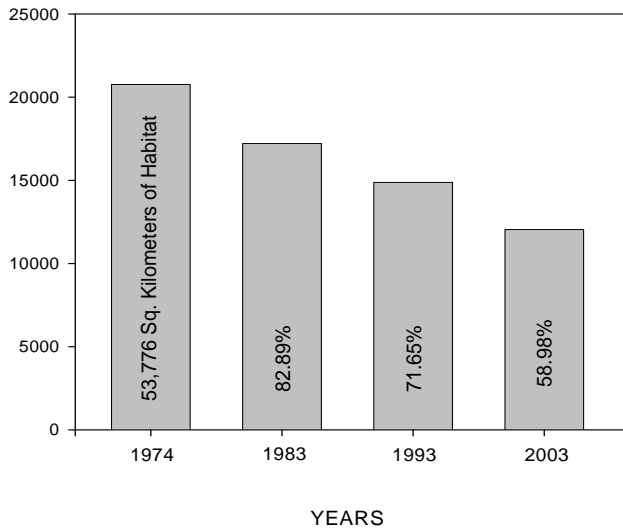


Figure 1. Changes in estimate of suitable Florida sandhill crane habitat in Florida by decade: 1974–2003.

*Lands in Florida.* These data (which “includes boundaries and statistics for more than 1,600 federal, state, local, and private managed areas” [www.fnai.org/conservationlands.cfm]) could be used to determine how much Florida sandhill crane habitat was in public ownership and therefore might be available to future crane populations.

We used the occupied Florida crane habitat, mean annual home range sizes for 3 social groups (subadults, unpaired adults, and paired adults [Nesbitt and Williams 1990]), and each group’s proportional contribution to the total adult plumage population (paired adults, 46.8%; unpaired adults, 19.2%; subadults, 34.0% [Nesbitt et al. 2001]) to extrapolate a statewide population estimate. The formula we used to generate the 2003 population estimate was  $p = a \cdot r / h \cdot s$ , where  $p$  = population estimate,  $a$  = hectares of occupied habitat,  $r$  = rate of each group’s occurrence in the population,  $h$  = mean home range for each group, and  $s$  = the average number of cranes of that group that share a home range. For paired adults that number was 2, for unpaired adults it was 1, and for subadults it was 3.4 (the mean number of subadults in 65 flocks [range 1 - 16] that we observed during the summer from 1989 through 1992). We estimated the number of juveniles in the population based on a mean annual production rate of 0.109 juveniles per 100 adult-plumaged cranes (Nesbitt et al. 2001).

**RESULTS**

The area of suitable (un-buffered) crane habitat identified in 1974 was 53,776.2 sq km. The 1985 coverage was

44,576.3 sq km, a 17.1% decline in suitable crane habitat from 1974. In 1995, suitable crane habitat was 38,528.7 sq km, a 13.6% decline from 1985. Suitable crane habitat in 2003 was 31,180.9 sq km, a 19.1% decline from 1995 and a 42% decline in suitable crane habitat since 1974 (Fig. 1).

We overlaid the area of occupied range identified in the Florida Atlas of Breeding Birds on top of the area of suitable habitat to produce an area of occupied suitable habitat of 20,554.146 sq km (Fig. 2). When we used habitat area in the population estimation equation, the number of Florida sandhill cranes present in 2003 (based on 2,055,414.6 ha of occupied habitat and assuming the area of occupation had not effectively changed since the data for the atlas were collected) was 4,594. This estimate represents 1,115 subadults, 887 unpaired adults, 2,152 paired adults, and 438 juveniles. If we employ the same process based on available habitat and assuming an equivalent area of occupied range, the hypothetical number of Florida sandhill cranes in 1974 was 7,142. The 2003 population reflects a 35.7% decline over 30 years.

The assumptions we are making (uniform distribution and occupation within the suitable habitat) would produce a best-case estimate; however, the true population may be even lower. Additionally, land-use data on the FNAI website in March of 2006 showed that only 12.2% of the occupied crane habitat identified from the 2003 imagery was included in areas of Conservation Lands. The situation is made worse because most of the crane habitat in these conservation lands is likely not being actively managed as crane habitat. Based on our estimation and assuming that the suitable crane habitat currently in conservation lands is of average quality, the maximum number of Florida sandhill cranes that are being sustained on public land would be no more than 263 breeding pairs and this is probable too few to guarantee the survival of the subspecies in the future.

**DISCUSSION**

The decline in suitable habitat between 1974 and 2003 is striking but understandable given the growth in development that has occurred in Florida over that same period. The decline in suitable crane habitat averaged 16.6% for each 10-year increment from 1974 to 2003. It is likely that the disparity between suitable crane habitat (and population) in 1974 and in 2006 is even more pronounced because the human population growth and the attendant rate of habitat conversion have, if anything, accelerated between 2003 and 2006. The future security of the Florida sandhill crane may be in jeopardy if this loss of habitat continues. It is likely that losses of suitable crane habitat will continue because the easiest habitats to develop in central Florida are the open grasslands. Currently there is far too little crane habitat in

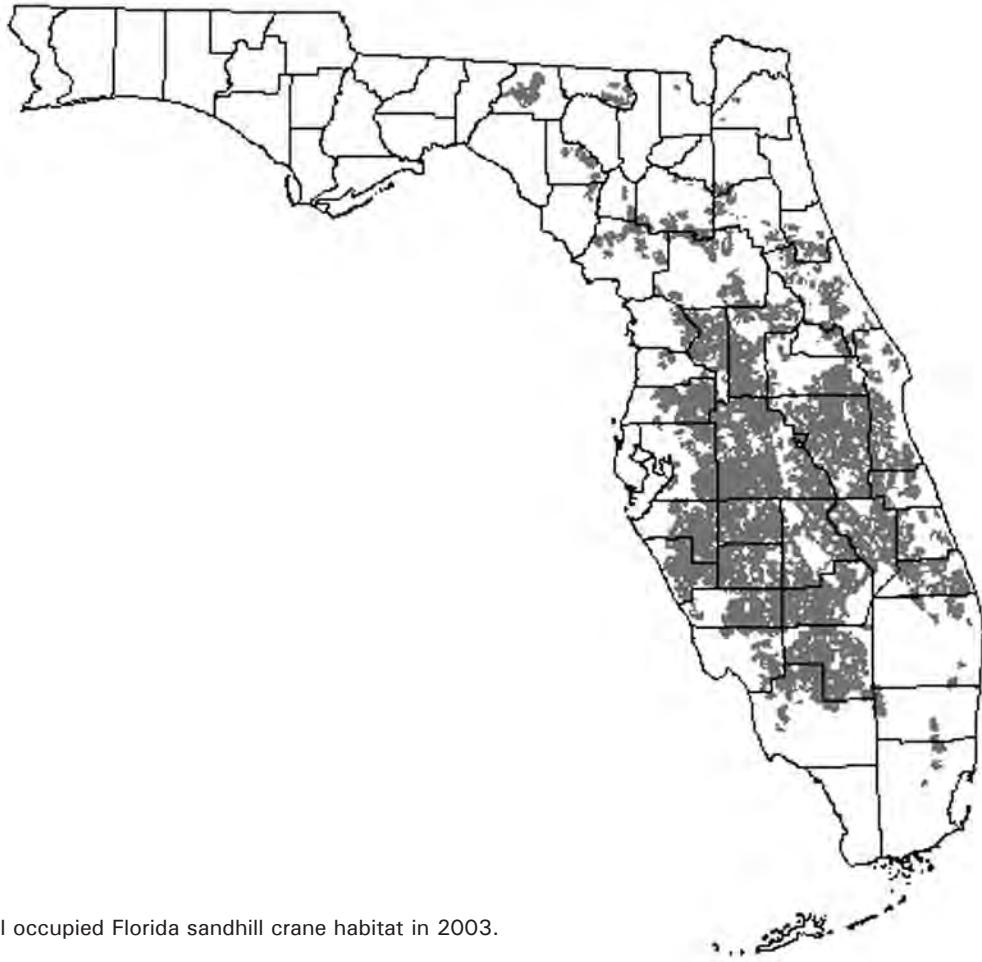


Figure 2. Potential occupied Florida sandhill crane habitat in 2003.

conservation lands to sustain a population at present numbers and distribution. In our opinion, it will require 2 to 3 times the current amount of publicly owned habitat that is managed for cranes to ensure the stability of the Florida’s sandhill cranes. Without a concerted effort in Florida to acquire and manage suitable crane habitat, the once thriving population of Florida sandhill cranes face an uncertain future.

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