An Evaluation of Banding Sandhill Cranes with Colored Leg Bands

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Sandhill Cranes *(Grus canadaensis)* have been captured with projected nets, night lighting, oral drugs, and the chicks pursued via helicopter and on foot. Patagial tags, neck collars, radio transmitters, colored plastic leg bands and plumage dyes have been used to mark cranes. These techniques caused varying degrees of mortality and disrupted behavior. Tacha (1979) recommended caution and alternative methods after studying cranes captured with rocket nets and then attaching patagial tags and colored leg bands. He noted altered social behavior and difficulty flying in these cranes.

This paper evaluates the capture of young Sandhill Cranes *(G.c. tabidia)* via foot and banding them with colored plastic leg bands. Three specific aspects are addressed: the effect of this technique on young survival, the visibility and durability of several types of plastic leg bands.

Methods

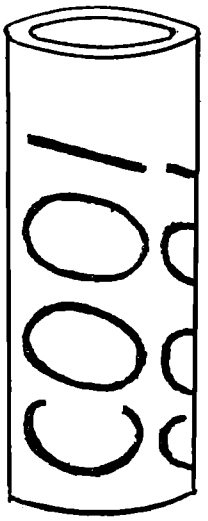
Adult cranes frequently take their flightless young from nesting wetlands to feed in upland areas. In southern Michigan (mostly northeastern Jackson County), the young were pursued on foot and usually captured after mid-June when they were about one month old and a size 9 band would remain on their leg. A lock-on U.S. Fish and Wildlife band plus one colored plastic band were placed at either of two positions on each leg — above the distal end of the tibia ("ankle joint") and/or above the distal end of the tarsometatarsus ("toes"). It was possible to individually mark cranes using these 4 positions. P.V.C. cement was applied with a cotton Q-tip to the area of overlap on the plastic band. It usually took 5-10 minutes to band a crane and make ten morphological measurements.

The first plastic bands were made from a white, single layer material, 0.8 mm × 2.5 cm × 17 cm called Darvec. L.E. Williams, of the Florida Game and Fresh Water Fish Commission, supplied these bands.

Later, a two-layered engraving stock plastic, 1.7 mm thick, named Gravoply was used. Engraving through a 0.3 mm black or green surface layer exposed a white background. White letters 22 mm high were made of 2 mm wide lines engraved in a green surface to make alpha-numeral bands 6 cm high. One letter and 3 numbers, e.g. C001, appeared vertically 3 times around the circumference of the band (Fig. 1). A striped band was made by removing the surface color to expose one or more horizontal or vertical, 8 mm white stripes on bands 2.5 cm high.

The plastic was warmed in an oven at 100°C until it became pliable and then formed around a dowel to the diameter of a number 9 band with a 2-3 cm overlap.

Fig. 1. A drawing of an alpha-numeral band.



Results

From 1969-80, 82 flightless young Sandhill Cranes were banded: 5 with alpha-numeral bands, 7 with a single-layered plastic, 45 with two-layered plastic, and 25 with no plastic bands. A U.S. Fish and Wildlife band was attached to each of the cranes. Evaluation of the plastic bands is based on 57 cranes seen 454 times from 1969-84.

Most of the young cranes were caught in agricultural fields with low or sparse vegetation. Cranes were caught in corn 38% of the time, pasture 19%, alfalfa 17%, marsh 12%, sedge meadows which were mowed for hay 4%, wheat stubble 4%, grass 4%, and fallow 2%. Young cranes were very elusive in dense vegetation, sometimes hiding and at other times running unobserved for great distances. The older juveniles were more apt to run than the younger ones. A labrador retriever, known to be a good hunter, was tried several times, but he was unable to locate the young in heavy cover.

From the middle of June until the middle of July was the best time to catch young cranes in southern Michigan. Corn was still short enough to see the young and they were less apt to run then. Even so, it took an average of 5 hrs. to band a young crane during the best period, and over 25 hrs. either earlier or later in the season (Table 1). The young were usually about 1 month old by the middle of June. It was easier to catch cranes less than 1 month of age, but they were too small to retain a band. After 2 months of age the young were much more elusive.

Table 1. A comparison of the number of hours taken to band young Sandhill Cranes in southern Michigan.

	JUNE			JULY			AUG.
	1-10	11-20	21-30	1-10	11-20	21-30	1-10
Number of hours	26	133	133	116	63	80	80
Number of cranes banded	1	25	23	21	5	4	3
Hours/crane banded	26	5	6	6	13	20	27

Chasing young Sandhill Cranes on foot and banding them with plastic leg bands did not affect their fledging. There was no known mortality of the young due to catching or banding. No banding was tried before June and all of the young could fly by September. I was able to determine the survival rate of 60 young without the aid of bands for this June-August period during 1969-80 by repeatedly visiting their territories. There was no significant difference (Chi-square Test $p < 0.99$ between the 80% survival rate of 40 cranes without bands compared to the 85% survival of 20 banded ones during June-August.

The effect on behavior of catching and banding cranes in this manner is harder to assess. A pair with young typically avoided areas where they were chased. Also the young pecked at the bands for the first few days, but very little after the first week or so. In the few agonistic encounters between banded and unbanded cranes that were observed, banded cranes won many of these interactions. Banded cranes attracted mates, defended territories, raised young and migrated — indicating a minimal disruption of behaivor.

The mean age at which cranes were last seen wearing plastic leg bands is compared in Table 2 to estimate the durability of 4 band types. The age of cranes last seen wearing the double layer engraving stock plastic with part of the top layer removed in horizontal stripes was the oldest with a mean of 34.1 months while those with vertical stripes averaged only 8.3 months. The single layer bands and the alpha-numeral bands were seen 56% and 67% respectively, as long as the bands with horizontal stripes. In spite of a 4 year interval since the 1980 banding season, there still are some banded cranes being seen which makes the estimate of durability for the horizontal striped bands conservative.

Table 2. A comparison of the mean age of Sandhill Cranes when last seen wearing different types of plastic leg bands.

BAND TYPE	Sample: Age (months)			
	SIZE	MEAN	SD	RANGE
Single layer	7	19.3	20.6	0- 52
Double layer				
Horizontal stripes[1]	37	34.1+	30.5	0-129
Vertical stripes	8	8.3	6.4	0- 16
Alpha-numeral	5	22.6	30.1	0- 74

[1]Some of the cranes in this class are still being seen.

Another approach to estimating band durability is to compare the number of cranes encountered in various age classes (Table 3). Of 57 cranes banded, 79% were seen later during the same year. There was little difference in the percentage of cranes with different types of bands seen until they were 2 years old. After 2 years, the bands with vertical stripes were seen the least followed by single-layered bands, then alpha-numeral ones. Bands with horizontal stripes lasted the longest with one remaining 10 years before the crane was illegally shot. The band from this 10-year-old showed little sign of deterioration. I have not had any recoveries of cranes which had lost their plastic bands, but several lock-on bands did slip over the toes of cranes that were too young to retain them.

Table 3. A comparison by age class of the percentage of banded Sandhill Cranes resighted with different plastic bands.

BAND TYPE	Sample: Percent of banded cranes seen										
	Size: by year after banding										
	B[1]	1	2	3	4	5	6	7	8	9	10
Single layer	7	85	71	29	29	14	0	0	0	0	0
Double layer											
Horizontal stripes	37	76	54	32	38	22	29	21	21	15	13
Vertical stripes	8	88	50	0	0	0	0	0	0	0	0
Alpha-numeral	5	40	20	40	0	0	20	20	0	0	0
Overall	57	79	53	28	28	16	18	11	13	8	5

[1]Banding year

The average number of times a banded Sandhill Crane was seen during a year was used as an estimate of band visibility (Table 4). The single layer, one color bands were seen the most while the alpha-numeral bands were the hardest to distinguish. Even as close as 150 m, it was often impossible to read the letter and numbers with a 20x spotting scope, whereas solid colors and stripes could be distinguished at 400-500 m and usually at much greater distances.

Of the 3 colors used (Table 4), solid white bands were easiest to see followed by a bright green and white. Black and white bands were the hardest to see. It was sometimes difficult to distinguish white plastic bands from metal bands at distances greater than 500 m, especially when heat rays affected visibility. Staining with iron oxide was a problem with some of the colors. Those with the top layer removed exposing a white layer were more apt to stain than the solid colors.

Table 4. A comparison of band visibility based on the mean number of resightings of Sandhill Cranes with various colored leg bands.

BAND TYPE	Sample:	Number of sights/crane by year				
	SIZE	B[1]	1	2	3	4
Single layer	7	6.2	3.1	1.7	0.4	0.7
Double layer						
Horizontal stripes	37	2.5	1.4	1.1	1.2	0.4
Vertical stripes	8	3.9	1.9	0	0	0
Alpha-numeral	5	2.6	0.2	0.4	0	0
Color						
White	7	6.2	3.1	1.7	0.4	0.7
Horizontal stripes						
Green & white	30	2.5	1.1	1.4	1.3	0.5
Black & white	7	1.0	2.7	0.1	0.6	0.1

[1]Banding year

Discussion

Capturing young Sandhill Cranes via foot and placing plastic bands on their legs, although time consuming, had little effect on their survival and provides an alternative to other techniques. Being able to catch the young when they are about 1 month old and while they are using uplands with sparse vegetation are 2 critical conditions which limit this method of capture. No evidence of mortality due to handling the 82 banded young was noted and a 79% resighting rate indicates that this method compares favorably to oral tranquilizers (Nesbitt, 1984) and rocket nets. Williams and Phillips (1973) reported a 17% mortality for alpha-chloralose, Nesbitt (1984) a 4.9% mortality, and Williams (1981) no deaths in trials with the optimum dosage. Wheeler and Lewis (1972) reported 6.9% mortality and 5.3% injury rate, Williams and Phillips (1973) 10% mortality, and Ramakka (1979) a 10.1% mortality for rocket nets.

Plastic leg bands did not appear to have a disruptive influence on crane behavior in this study. Wheeler and Lewis (1972) found that cranes with plastic bands and vinyl flagging laced to the Fish and Wildlife bands avoided, and were avoided by, other cranes. Adverse effects were associated with patagial tags (Tacha, 1979) and radio transmitters (Nesbitt, 1976). However, no aberrant behavior was noted in using patagial tags, plastic leg bands, radio transmitters, or dyes by Williams (1981) or with neck collars (Drewien, 1973). It is not clear how much of the disrupted behavior reported in the literature was due to capture techniques, banding when cranes were gregarious (Drewien, 1973), or the markers.

Bands made of thicker (2 layers) plastic which had horizontal stripes offered the best combination of visibility and durability of the bands tested. The thinner (1 layer) white plastic bands and the double-layered bands with green and white vertical stripes were easier to see, but they did not last as long as the thicker bands. The alpha-numeral bands were not useful because of the difficulty of reading the inscription. Visibility of bands with stripes can be improved by placing them above the tibia-tarsal joint, but this reduces the number of combinations available to mark birds as individuals. Confusion between white plastic and metal bands can be avoided by placing metal bands below the tibia-tarsal joint and plastic bands above.

Little about visibility or durability of patagial tags, streamers, neck collars, dyes, or radio transmitters has been reported in other studies. Boise (1979) was able to read neck collars at 500 m with a 30X scope. Williams (1981) reported that cranes behaved normally for up to 10 years with multiple leg bands and double patagial tags on the same birds.

When Sandhill Cranes can be viewed in short vegetation, such as farm fields, and when long lasting markers are required, bands made of engraving plastic can be effectively used to individually identify them. Preliminary results using different colors of engraving plastic bands stacked on top of each other indicates that they last longer than bands with part of the surface color removed. Stacking bands will require several more years of field testing before an evaluation can be complete that is comparable to this one.

Acknowledgements

I wish to thank Stephen Nesbitt, Anne Wenner, Lawrence Walkinshaw, Rita Halbeisen, Joan Hoffman, Allen King, Frank Radowski, Mark Weldon, and Harold Wing for reporting sightings of banded cranes. The last 6 individuals also helped with banding.

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(Inland)

Books

The care and breeding of seed-eating birds. Finches and allied species - doves, quail and hemipodes. Jeffrey Trollope. 1983. Blandford Press, Poole, Dorset, England. Distributed in U.S.A. by Sterling, New York. 336 pp. $17.95 U.S., $22.95 Can.

Trollope has drawn on years of personal experience in combination with extensive literature research to produce a book that is both authoritative and easy to read. The eleven chapters are divided into two parts - general care (accomodation; nutrition and food; obtaining stock and management; breeding), and species accounts (7 chapters with a family per chapter). Although intended primarily for aviculturalists, some of the cages and catching methods in the introductory chapters are of interest to banders, and the book is highly recommended to those banders who (by design or default) wind up running bird "hospitals", and those researchers who combine studies in the wild with observation on birds in captivity.

The seven chapters of species accounts cover the 4 "finch" or "sparrow" families (Emberizidae, Fringillidae, Estrildidae, Ploceidae), smaller quail, hemipodes ("button quail", related to cranes), and pigeons and doves. Pheasants, grouse, partridge, turkey and aquatic seed-eaters are not included. Each species account includes a combination of behavior/habitat/distribution material from the wild and information on care and breeding in captivity. Similar accounts cover the family as a whole and often other groups of birds (genera, subfamilies, etc.) Trollope repeatedly stresses the importance of basing captive conditions on knowledge of the birds' natural behavior and habitat, and notes the converse benefits that studies of many species in the wild can receive by close observation of captive birds.

Beyond nit-picking, one can find few faults in this book. Trollope is a little too inclined to lapse into climatic conditions in southern England in a book intended for wider distribution when he discusses care of the birds, and the reader must keep in mind that "first breeding", "few known breeding records", etc. generally refers to breeding in captivity, not in natural conditions. His reference to an avian disorder as probably analogous to that of animals (p.33) unfortunately implies that birds are not animals. The only error of substance that I noted was his description of the range of the House Finch omitting the well established and expanding eastern population. Although he regards taxonomic controversy as a subject "avoided by all sensible people . . .just as they avoid pestilence, poverty and death" (p.127), Trollope supplies alternate avicultural and "ornithological" names for most species, and generally uses the most current name accepted by ornithologists, Virginian Cardinal being among the few exceptions. Reference to "temperature zone" birds (p.76) was the only typographical error of note, and although the author is inconsistent in use of literature citations, the book includes a large number of sources.

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Distribution of Oklahoma birds. D. Scott Wood and Gary D. Schnell. 1984. University of Oklahoma Press, Norman. xxi + 209 pp. $14.95.

The bulk of this paperback book is a series of maps showing the distribution by county of all species recorded in Oklahoma more than 5 times since 1900. Two species are treated per page, with a calendar bar below the map indicating times of occurence, and letter symbols indicating state status. A five-page section at the end of the book briefly discusses one extirpated and 3 extinct species, and outlines records for 54 "accidental" species, including a banding record for White-throated Swift. An index of English and Latin names adds to the utility of the book. Avian researchers and environmental consultants in Oklahoma and surrounding states will find this book indispensable, while visiting "birders" can determine at a glance where and when to look for whatever species they seek.

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