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TRACKING SANDHILL CRANE MIGRATION FROM SASKATCHEWAN TO THE GULF COAST

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Abstract: Four adult sandhill cranes (Grus canadensis rowani) were captured in east-central Saskatchewan, equipped with transmitters, and tracked by satellite to determine if their migration routes and wintering areas would allow their use as guide birds to establish a new migratory flock of whooping cranes (G. americana). Two birds captured near Yorkton died or their transmitters were lost before migration. Two adults from the Overflowing River moved to staging areas in southern Saskatchewan in September. By 29 September, Crane A left Saskatchewan and moved to North Dakota where it remained until late October. By 21 December, it arrived a few km inland from the Gulf Coast near McFaddin, Texas, 3,378 km from its capture location. It remained there until at least 9 March 1995. On 15 March, it was relocated near Grand Island, Nebraska, and by 20 April, it had returned to the Overflowing River area. Crane B spent most of September and October near the Quill Lakes, Saskatchewan, then migrated with brief stops in South Dakota and Kansas, arriving 29 November at its winter area near the northwestern corner of the Laguna Madre in Tamaulipas, Mexico, 3,998 km from its summering area. It remained there until at least 25 December, whereafter no further transmissions were received. Because both cranes wintered or migrated near the current whooping crane winter area at Aransas National Wildlife Refuge (Aransas), Texas, this population was judged unsuitable to provide guide birds for a new flock of whooping cranes.

Key words: Grus americana, Grus canadensis, Kansas, Mexico, migration, Nebraska, North Dakota, sandhill crane, Saskatchewan, satellite tracking, Texas, whooping crane.

In the 1990s, the Canadian Whooping Crane Recovery Team initiated actions to determine the potential to reestablish a migratory whooping crane population breeding in its traditional range in the Canadian Prairie Provinces. These actions included assessing potential reintroduction areas in Saskatchewan and Manitoba (Lyon et al. 1995, May and Henry 1995). One reintroduction technique being considered was using resident sandhill cranes as guide birds during migration for introduced whooping cranes. One action (2.4.3.2.1.2) of the Canadian Whooping Crane Recovery Plan called for studies to determine the migration, staging, and wintering range for summering sandhill cranes (Edwards et al. 1993). Contact between the Aransas-Wood Buffalo National Park (Wood Buffalo) Population of whooping cranes and the reintroduced population was to be minimized.

Sandhill crane migration routes from Saskatchewan have not been studied. However, the western subpopulation of the midcontinent population winters in Texas, northern Mexico, New Mexico and southeastern Arizona, with traditional stopover areas in western North Dakota during fall and along the Platte River, Nebraska, during spring migration (Lewis 1977, Tacha et al. 1992). In Manitoba, sandhill cranes stage during autumn at Big Grass Marsh, Lundar, and Gypsumville before moving south to stopover areas in North Dakota (Melvin and Temple 1982). Staging areas are sites where sandhill cranes gather during the first segment of their fall migration. Traditional stopover areas are sites where cranes stop for extended periods during migration, and nontraditional stopovers are overnight roost sites, usually used for only 1 night (Melvin and Temple 1982).

Satellite transmitters have only recently become light enough for use on cranes. In the first experiment, S. A. Nesbitt instrumented a greater sandhill crane which migrated from Florida to Michigan (Nagendran 1992). In Asia, common cranes (G. grus) were followed by satellite from western Siberia to Iran and Afghanistan (Ellis et al. 1992), and from India to Siberia (Higuchi et al. 1994a). White-naped cranes (G. vipio) and hooded cranes (G. monarcha) were tracked from Siberia to wintering areas in China and Japan (Higuchi et al. 1994b) and from Japan during spring migration to China and Russia (Higuchi et al. 1992). Satellite tracking has also been used to identify important migration stopover habitat for cranes in Korea (Chong et al. 1994). Our objective was to capture sandhill cranes at potential whooping

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crane reintroduction sites in Saskatchewan and Manitoba, Canada, and mark them with satellite transmitters to determine their migration routes and wintering areas.

**STUDY AREA**

Potential whooping crane reintroduction sites were identified near Yorkton, Saskatchewan (51°5'N, 102°30'W) and along the Overflowing River (53°10'N, 102°03'W) which crosses the Saskatchewan and Manitoba border northeast of Hudson Bay, Saskatchewan (Lyon et al. 1995, Hjertaas et al. 1997). Yorkton lies in a mixed farming area in the Aspen Parkland Ecoregion (Padbury and Acton 1994). A series of marshes provides habitat for a small population of sandhill cranes and historically supported breeding whooping cranes (Hjertaas 1994, Lyon et al.1995, Hjertaas et al. 1997).

The Overflowing River lies in the Mid Boreal Lowlands Ecoregion, an area of extensive boreal forest (Padbury and Acton 1994). This area includes 2 large wetlands, Plumbers Marsh in Manitoba and Leaf Lake in Saskatchewan, which are connected by the Overflowing River. The area surrounding the Overflowing River is flat and is characterized by black spruce (Picea mariana) bogs interspersed with string fens (Lyon et al. 1995, Hjertaas et al. 1997).

**METHODS**

We located sandhill cranes (hereafter, cranes) near Plummers Marsh and Leaf Lake by aerial surveys and at Yorkton by ground searches. Cranes were captured from a helicopter (Ellis et al. 1998) in July 1994. Cranes captured at the Overflowing River were from pairs, but cranes captured at Yorkton were from a flock of 50± nonbreeders.

Captured cranes were color banded and equipped with a satellite-monitored 95 g backpack transmitter (Microwave Telemetry Inc., Model 100, 10280 Old Columbia Road, Suite 260, Columbia, MD 21046 USA). Transmitters were programmed to send signals at 4-day intervals during spring and fall and at 10-day intervals during winter. Satellite location data were transmitted to the Argos Satellite Network and then to the authors over the Internet.

Data scored as 1, 2, or 3 in reception quality were judged high and were treated separately from low-quality data scoring 0, A, or B. However, all location data were used to map migration routes. Low-quality location data were judged appropriate if they fell within the movement pattern shown by the high-quality data set. To assess subspecies, we report in Table 1 morphometric data as defined by Baldwin et al. (1931).

### Table 1. Morphometric data (g, mm) of 6 sandhill cranes captured in July 1994 near the Overflowing River and at Yorkton, Saskatchewan.

<table>
<thead>
<tr>
<th>Location</th>
<th>Sex</th>
<th>Mass</th>
<th>Wing Chord</th>
<th>Tarsus</th>
<th>Mid Toe</th>
<th>Exposed Culmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overf. River M</td>
<td>M</td>
<td>4085</td>
<td>504</td>
<td>240.5</td>
<td>88.8</td>
<td>128.1</td>
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<tr>
<td>Overf. River M</td>
<td>M</td>
<td>4235</td>
<td>252.0</td>
<td>81.1</td>
<td>123.6</td>
<td></td>
</tr>
<tr>
<td>Overf. River F</td>
<td>F</td>
<td>3885</td>
<td>490</td>
<td>239.0</td>
<td>73.0</td>
<td>116.2</td>
</tr>
<tr>
<td>Overf. River F</td>
<td>F</td>
<td>3735</td>
<td>222.0</td>
<td>72.0</td>
<td>114.1</td>
<td></td>
</tr>
<tr>
<td>Yorkton F</td>
<td>F</td>
<td>3685</td>
<td>222.0</td>
<td>77.0</td>
<td>109.1</td>
<td></td>
</tr>
<tr>
<td>Yorkton M</td>
<td>M</td>
<td>4235</td>
<td>494</td>
<td>226.0</td>
<td>77.0</td>
<td>116.3</td>
</tr>
</tbody>
</table>

*Sex was tentatively assigned based on size but was not confirmed.

**RESULTS**

### Number of Cranes Captured and Transmitter Performance

Six cranes were captured, 4 at the Overflowing River and 2 at Yorkton, and satellite transmitters were placed on 2 from each location. Data reception commenced 10 September 1994. Morphometric data (Table 1) indicated these birds belong to the subspecies *rowani* (Walkinshaw 1965, Johnson and Stewart 1973, Schmitt and Hale 1997).

The 2 cranes at Yorkton either lost their transmitters or died. Satellite relocations were insufficient to find these birds on the ground. Plotting of several relocations indicated that 1 transmitter remained in the immediate capture area, suggesting that the crane either lost its transmitter or may have died due to capture effects (Ellis et al. 1998). The general location of the second transmitter was several km from the capture area suggesting this crane had moved before it died or lost its transmitter. Only 2 radiotagged cranes, A and B, were available to track seasonal movements.

### Seasonal Movements

By 10 September, Crane A had moved 50 km south of its capture site to the edge of the boreal forest where it may have fed on agricultural fields. By 19 September, it had moved 225 km south of its breeding territory to Yorkton, Saskatchewan (Table 2), a fall staging area. By September 29, Crane A moved 410 km south and spent most of October at traditional stopover areas in North Dakota (Table 2). Between...
22–26 October, it migrated 1000 km to the vicinity of Partridge, Kansas where it remained at least until 13 November. On 18 November, it appeared to be in northern Texas, but this location was not plotted as it was well west of the identified flight line and the location data was of low quality. On 21 December, Crane A was near McFaddin, Texas, inland from Aransas. The crane wintered in this area, 3,378 km from its breeding area, until at least 9 March.

By 15 March, Crane A was migrating north and was relocated 1370 km from its wintering area near the Platte River by Hastings, Nebraska where it remained until at least 24 March. It was detected on 7 April in North Dakota, 780 km from Hastings, and returned to its capture location in Saskatchewan by 20 April 1995 (Table 2, Fig. 1).

By early September, Crane B moved 190 km southeast from its breeding area to a staging area at Little Quill Lake, Saskatchewan, where it remained until at least 20 October (Table 3, Fig. 1). On 25 October, it was relocated 925 km south near Vivian, South Dakota and by 2 November, was near Partridge, Kansas, 670 km south of Vivian, where it remained at least until 6 November. A relocation on 11 November was not plotted due to low quality location data, but suggested that it was in northern Texas. Crane B was relocated on 29 November near Venustiano Carranza, Tamaulipas in northeastern Mexico, near the Laguna Madre and approximately 60 km south of Brownsville, Texas. It was last recorded there on 25 December 1994. This was presumably its winter area, but no further signals were received. This wintering area in northeastern Tamaulipas was identified during U. S. Fish and Wildlife Service waterfowl surveys (Drewien et al. 1996). This site was 4000 km from the crane's summer area (Table 3, Fig. 1).

### DISCUSSION

Melvin and Temple (1982) suggested that cranes stop at only 1 traditional stopover area each migration, but they indicated that it was not known if northern cranes use traditional stopover sites in Saskatchewan and North Dakota. The 2 cranes in our study utilized the North Dakota or the Saskatchewan site, but not both. Crane B moved south of the boreal forest by early September to the Quill Lakes (part of the well known, traditional staging area for cranes in Saskatchewan which includes Last Mountain Lake and Kutawagan Lake) and remained there until late October. Crane A stayed longer near its breeding area, but moved quickly to traditional stopover areas in North Dakota (Melvin and Temple 1982) after a brief stop near Yorkton, Saskatchewan, a staging area which attracts up to 1,500 cranes during fall migration (Lyon et al. 1995). Both cranes remained at these traditional stopover areas until late October, then moved independently during the last 10 days of October to a site near Partridge, Kansas where Crane A remained at least 2 weeks and Crane B about 4 days. The Kansas site fits Melvin and Temple's (1982) definition of a traditional stopover in terms of time spent there by the cranes, and therefore both cranes visited 2 traditional staging/stopover areas. Our findings contradict Melvin and Temple’s (1982) suggestion that only 1 traditional stopover is used along each seasonal migration route.

The Kansas stopover area is of recent origin. The large increase in cranes stopping during fall migration began in 1992 during a wet cycle when agricultural fields were unhar-
VESTED AND FLOODED. THE CRANES CONTINUED TO STOP THERE IN SUBSEQUENT YEARS, AND BY 1997, AN ESTIMATED 94,000 WERE AT QUIVERA NWR. THE PEAK FALL POPULATION IN 1998 WAS 56,000, AND IN 1999, IT WAS ESTIMATED AT 250,000 (M. J. KRAFT, KANSAS DEPARTMENT OF WILDLIFE AND PARKS, PERSONAL COMMUNICATION).

THE SPRING MIGRATION FOR CRANE A WAS MORE RAPID THAN THE FALL MIGRATION AS MIGHT BE EXPECTED FOR AN ADULT RETURNING TO ITS BREEDING TERRITORY. IT SPENT ONLY ABOUT 1 WEEK ALONG THE PLATTE RIVER, NEBRASKA.

MANAGEMENT IMPLICATIONS

THE MIGRATION ROUTE AND WINTER AREAS OF THESE CRANES OVERLAPPED MUCH OF THE MIGRATION ROUTE OF THE ARANSAS-WOOD BUFFALO WHOOPING CRANE POPULATION (KUYT 1992) FROM NORTH DAKOTA TO ARANSAS, AND 1 CRANE WINTERED NEAR THE REFUGE. THIS POPULATION OF SANDHILL CRANES, THEREFORE, DID NOT MEET THE CRITERION OF MINIMAL CONTACT WITH THE ARANSAS-WOOD BUFFALO WHOOPING CRANE POPULATION, SO IT WAS JUDGED NOT SUITABLE TO
provide guide birds to establish a new migratory population. Reintroductions will therefore require more eastern or western locations or alternate techniques to teach migration routes.

**ACKNOWLEDGMENTS**

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**LITERATURE CITED**


