


1992

STATUS, PRODUCTION AND MIGRATION OF GREATER SANDHILL CRANES ON AGASSIZ NATIONAL WILDLIFE REFUGE, MINNESOTA

Jon J. Dimatteo
St. Cloud State University

Follow this and additional works at: <http://digitalcommons.unl.edu/nacwgproc>

 Part of the [Behavior and Ethology Commons](#), [Biodiversity Commons](#), [Ornithology Commons](#), [Population Biology Commons](#), and the [Terrestrial and Aquatic Ecology Commons](#)

Dimatteo, Jon J., "STATUS, PRODUCTION AND MIGRATION OF GREATER SANDHILL CRANES ON AGASSIZ NATIONAL WILDLIFE REFUGE, MINNESOTA" (1992). *North American Crane Workshop Proceedings*. 288.
<http://digitalcommons.unl.edu/nacwgproc/288>

This Article is brought to you for free and open access by the North American Crane Working Group at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in North American Crane Workshop Proceedings by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

STATUS, PRODUCTION AND MIGRATION OF GREATER SANDHILL CRANES ON AGASSIZ NATIONAL WILDLIFE REFUGE, MINNESOTA

¹JON J. (JEFF) DIMATTEO, *Department of Biological Sciences,
School of Graduate and Continuing Studies, St. Cloud State University,
St. Cloud, MN 56301*

Abstract: Greater sandhill cranes (*Grus canadensis tabida*) nesting at Agassiz National Wildlife Refuge (NWR) in northwestern Minnesota were studied from 20 April 1984 to 10 December 1985. Local birds were monitored to determine population size and age structure, reproductive success, and migration routes and wintering grounds. Forty-two pairs were identified. Thirty-four were breeding pairs and 3 were subadult (nonbreeding) pairs. Twenty nests were found; pairs at 13 of these hatched at least 1 young. Forty-three pairs hatched a minimum of 62 young, and 28 pairs fledged 42 of 47 young. Fifteen birds were color-marked, 8 of which were radio-tagged and followed through parts of their migration. Unlike cranes nesting in eastcentral Minnesota, these birds entered the Central Flyway. One bird was traced to east Texas wintering grounds.

Proc. 1988 N. Am. Crane Workshop

Once found throughout Minnesota, exclusive of the northeast (Johnson 1976a), greater sandhill cranes presently exist as 2 separate breeding populations within the state, one in the northwest, the other in eastcentral Minnesota. Both populations have expanded in recent years and the separation between them has become less distinct. Migrating cranes are also seen in Minnesota at traditional migration staging areas in northwestern and westcentral parts of the state.

A history of nesting sandhill cranes in Minnesota has been provided by Johnson (1976a), and accounts of their status and distribution have been given by Johnson (1976a), Grewe (1977), D. Murphy (Prelim. Rept. Sandhill Cranes in northwestern Minn., St. Cloud State Univ., St. Cloud, Minn., 1978), and C.L. Henderson (Minn. Sandhill Crane Rept., Minn. Dept. Nat. Resour., St. Paul, 1979). Most recently, the eastcentral population has been estimated at 87-109 pairs, and the northwest population at 760-1160 pairs (M. C. Tacha & T. C. Tacha, Status and Distribution of Sandhill Cranes in Minn., Minn. Dept. Nat. Resour., St. Paul, 1985).

Data on the ecology of summering cranes in Minnesota are limited. Johnson (1976b) studied the biology of nesting cranes in the eastcentral population. Crete & Toepfer (1978) determined the migration route and wintering grounds of this population, demonstrating their affiliation with the east-

ern (Great Lakes) population of greater sandhill cranes.

The affiliation of the northwest population has been less certain. The close proximity of the 2 populations could suggest that these birds are also a part of the eastern population, as has generally been assumed. This idea was supported by the sighting of 2 color-marked birds in Manitoba, and another in western Minnesota, that had previously been marked on Florida wintering grounds (Nesbitt & Williams 1979).

Conversely, there has been evidence to suggest that these birds are more accurately associated with the mid-continent population of sandhill cranes (includes *G. c. rowani* and *G. c. canadensis*). When *tabida* was first identified on east Texas wintering grounds, it was suggested that they may have come from southeastern Manitoba and northern Minnesota (Lewis 1974). Melvin & Temple (1980) later demonstrated that sandhill cranes from the Interlake Region of Manitoba do, in fact, migrate through the Central Flyway to winter along the Texas coast. However, the subspecific designation of those birds is not certain (Lewis 1977). The presence of the Canadian subspecies (*G. c. rowani*) in migrant flocks in Kittson County, Minnesota (Johnson & Stewart 1973), led Johnson (1976a) to suggest that local cranes in northwestern Minnesota would be unlikely to separate from migrant flocks

¹Present address: Minnesota Department of Natural Resources, Wetland Wildlife Populations and Research Group, Bemidji, MN 56601

to travel in a different direction. The major fall staging area for cranes from eastcentral Minnesota is Crex Meadows State Wildlife Management Area in Burnett County, Wisconsin (Crete & Grewe 1982), but peak fall numbers there do not account for the much higher number seen in northwestern Minnesota. In addition, there are no crane migration records that would link the northwest and east-central populations.

This study was initiated to provide information on the breeding biology of cranes in the northwest Minnesota population, and to identify the migration routes, stopover areas, staging grounds, and wintering grounds of this population. The study was done in partial fulfillment of the requirements for the degree of Master of Arts at St. Cloud State University.

Work on this study was done at Agassiz NWR, under a cooperative agreement (USDI No. 14-16-0003-84-926) with the U. S. Fish and Wildlife Service (USFWS) that provided refuge housing, office space, use of a refuge vehicle and some field assistance. St. Cloud State University (SCSU) Department of Biological Sciences provided miscellaneous field and laboratory equipment. Cedar Creek Bioelectronics Laboratory donated radio transmitters. The discovery of a dead color-marked bird on a crane wintering area was reported by T. Moran of Houston, Texas. Texas Parks and Wildlife Department flew an aerial telemetry search of crane wintering areas. Partial funding was provided by SCSU, SCSU Alumni Association, SCSU Foundation, Friends of Belwin, Minnesota Zoological Society, and International Wild Waterfowl Association. This manuscript was improved by the critical review of earlier drafts by R. T. Eberhardt, A. K. George, A. H. Grewe, Jr., B. K. Seefeldt, C. W. Seefeldt, Jr., and the workshop editors.

STUDY AREA

Agassiz NWR encompasses 24,868 ha of eastern Marshall County in the extreme northwestern corner of Minnesota. The refuge is situated in a relatively narrow aspen parkland transition zone, between prairie to the west and forest to the east. Located on the bed of a former bay of glacial Lake Agassiz, the terrain is extremely flat, varying only 20-40 cm/km. Originally the area contained prairie and marshes with scattered aspen (*Populus* spp.) islands, but massive drainage efforts in the early 1900s converted much of the land to agricultural purposes. By the early 1930s, high drainage costs, combined with poor economic conditions, threat-

ened the financial stability of Marshall County, allowing for governmental purchase of lands and eventual establishment of the refuge.

Marshes have been restored on the refuge through the construction of numerous dikes and water control structures. Approximately 2/3 of the refuge is now wetlands. Remaining cover types include a mix of grassland, brushland, woodlots, and a small amount of cropland. The refuge is bordered by extensive small grain farms, with the exception of adjacent State Wildlife Management Areas on the southern and southeastern boundaries. The primary objective of Agassiz NWR is waterfowl production and maintenance.

From the establishment of the refuge in 1937 and throughout the 1940s and 1950s, cranes were only known as spring and fall migrants. During the 1960s, cranes began to appear as rare to uncommon summer residents, but evidence of production was not detected until 1970 when 1 flightless young was observed. There was a slow increase in the number of local birds through the 1970s, reaching an estimated 6 breeding pairs in 1979. The first documented nest record was in 1980. That year also marked the beginning of a relatively rapid year-to-year increase in the number of summer residents. By 1983 an estimated 25 breeding pairs occurred on the refuge.

The increase in summer residents coincided with an increase in the use of Agassiz NWR by migrating cranes. Prior to 1959, peak numbers of fall migrants were generally 200 or less. From 1959 through the late 1970s the number varied up to 1000 birds per year. In recent years up to 2000 cranes have used Agassiz NWR in the fall. Peak numbers of spring migrants are considerably less.

MATERIALS AND METHODS

Local cranes were studied from 20 April 1984 to 10 December 1985. Territorial pairs were located by random auditory censusing during daily peak vocalization periods, and by visual surveys of likely feeding and loafing areas. In addition to listening for spontaneous crane calls, responses were elicited by broadcasting tape recorded crane vocalizations (Bennett 1978). Birds exhibiting nesting behavior were considered breeding pairs, including pairs in which only a single bird was seen on the territory during the nesting period, pairs for which a nest was found, and pairs later observed with young. Pairs that occupied and defended a territory, but failed to initiate nesting, were considered subadult pairs.

Nest locations were determined by triangulation of unison calls, by visual observation of nonincubating birds returning to nest sites, and by searching areas known to have contained nests in previous years. Actual nest sites were found on foot or, in a few cases, with the use of an airboat. To avoid nest abandonment, only nest measurements, water depth, and egg dimensions were recorded during initial visits. After hatching, nests were revisited to determine success, to collect shell fragments, and to record information on surrounding vegetation and habitat types.

Pairs were periodically monitored for any indications of nesting attempts and subsequent production of young. Territories thought to contain young were searched on foot once the young were large enough to hold leg bands. As these birds had been included in the management plan for the eastern population (Coord. Comm. E. Sandhill Cranes, Manage. Plan E. Pop. Greater Sandhill Cranes, 1982), color marking per the protocol proposed by the Coordinating Committee for Eastern Sandhill Cranes (D. L. Shroufe, Chairman, A Proposed Color Marking Protocol for the East. Population of Greater Sandhill Cranes, Coord. Comm. East. Sandhill Cranes, 1984) was employed. In 1984 birds were marked with a 5 X 15 cm green vinyl leg streamer with a white alpha-numeric code. The streamer was attached with a split ring to a No. 9 USFWS locking leg band. Bands were placed above the tarsal joint. In 1985 leg streamers were complemented with more durable 50 mm tall green plastic leg bands, inscribed with the same alpha-numeric code, and attached above the tarsal joint of the other leg. Above each of these bands was placed a 20 mm tall plastic band of 1 of 7 colors. The color combination of the 2 short bands was coded to correspond to the alpha-numeric code on the tall band and streamer.

Selected birds were fitted with single pulse radio transmitters in the 164 Mhz frequency range. Selection was based on spacial distribution of a limited number of transmitters within the refuge. Transmitters used in 1984 were powered by lithium organic batteries, averaged 124 gm, and were attached in a backpack fashion similar to that described by Crete & Toepfer (1978). Two types of leg band transmitters were used in 1985, battery-powered transmitters averaging 46 gm, and solar-powered units with nickel cadmium battery backup, averaging 31 gm. Transmitters were attached to the tall plastic leg bands. Solar-powered transmitters had a shorter range than battery-powered units, but did function overnight and through

extended periods of overcast weather. Moreover, they had considerably longer life expectancy than the 240 days of the battery-powered transmitters. Radio transmitters and other telemetry components were obtained from Cedar Creek Bioelectronics Laboratory (Univ. Minn., Bethel, MN 55005).

Radio-tagged birds were monitored on the breeding grounds with standard telemetry triangulation techniques, using a receiver and hand held yagi antenna. Cranes leaving on their southerly migration were followed with an antenna-and-receiver-equipped private vehicle. A maximum (peak) signal antenna was used to track birds while they flew, and a null peak antenna system was used to locate and monitor birds after they landed. Flocks containing radio-tagged birds were kept in sight for much of the time while they flew, and locations were plotted on maps. When out of sight, locations were estimated from signal strength and direction.

RESULTS AND DISCUSSION

Breeding pairs began to return to Agassiz NWR by late March of both years, with most pairs on their territories by the first week of April. Forty-two territorial pairs were identified at Agassiz NWR (Fig. 1). At least 34 were breeding pairs and 3 were subadult pairs. The status of the remaining 5 pairs was uncertain. An additional 48 pairs, of which 27 were known to be breeding pairs, were located on adjacent and nearby state and private lands (Fig. 2).

Shortly after the return of breeding adults, small flocks of migrating cranes were seen, mostly around refuge agricultural units and in croplands off the western boundary of the refuge. Spring migrants peaked at about 200 birds in mid- to late April of each year.

Small groups of nonbreeders were occasionally seen into early May, but by mid-incubation only territorial pairs remained on the refuge. Other than rare, short appearances during the nesting season, groups of nonbreeding cranes were not seen on the refuge again until late summer after the young had fledged. It is not certain where these nonbreeding birds spend their summer, but several flocks of 20-50 birds were observed in croplands near the refuge in eastern Marshall and northwestern Beltrami counties.

Incubation began in mid-April and peaked by the end of April. Late nesting and renesting attempts began as late as early June. Approximately

10-16 days elapsed between nest failures and initiation of second attempts. Eight nests were found on the refuge in 1984 and 12 in 1985. Pairs at 9 nests were successful in hatching 2 young, 4 hatched 1 young, and 7 failed to produce any. The majority of clutches hatched by the end of May, but some late nests were still being incubated in early July. Of the 7 initial nest attempts that failed, 3 were abandoned before eggs had been laid, 2 were abandoned with eggs, 1 was destroyed, and 1 contained infertile eggs. At least 2 of these pairs successfully renested and produced young.

Sixty-two flightless young, and 47 fledged young, were observed on the refuge during 1984-85. Six breeding pairs failed to hatch any young, and 3 pairs that successfully nested failed to fledge any young. Hatching and fledging success were determined for 47 pairs that nested on, or near, the refuge (Table 1). Cranes at Agassiz NWR commonly fledge 2 young. Of 25 pairs known to have fledged young during this study, 17 fledged 2 offspring.

Fifteen flightless young were marked during this study. In 1984, 6 birds were color-marked with leg streamers, 3 of which were also fitted with backpack radio transmitters. One radio was removed prior to migration because the harness had been set too tight. The next year, 9 cranes were marked with a combination of the streamers and colored leg bands. Five of those were equipped with leg band transmitters.

Fall migrants began to arrive at Agassiz NWR in mid-August, reaching a peak of up to 2,000 by late September or early October. Local cranes varied in their reactions to the influx of migrants. Pairs on the perimeter of the refuge abandoned their territories and joined with migrant flocks as soon as they arrived. Pairs in the interior of the refuge remained on their territories longer and mixed with migrants gradually. Some interior pairs left their territories to feed with migrants during the day, but continued using territorial roosts for several nights before completely abandoning their territories. Other interior pairs began roosting with migrants at night, while returning to their territories to feed during the day. In some cases, local pairs did not mix with migrants prior to their own migration. One pair defended its territory up to, and including, the day it left.

On 22 October 1984, 2 local family groups, including 1 radio-tagged and 2 color-marked birds, left Agassiz NWR on their migration southward (Fig. 3). The first day, they flew 210 km to a staging area near Rothsay, Wilkin County, Minnesota.

They remained there for 5 days in the company of over 800 other cranes. On the morning of 28 October, the radioed bird and its family left Rothsay with several hundred other cranes and flew 130 km southwesterly before stopping for the night near Crandall, Clark County, South Dakota. The following day (29 October), they continued for 120 km, making an overnight stop near Miller, Hand County, South Dakota. The next day (30 October), the cranes were followed 400 km farther southward. Fifteen minutes after sunset, and after 10 hours of continuous flight, the birds were still flying high while passing over the Platte River near Gothenburg, Dawson County, Nebraska. Radio contact was lost at that point because of equipment failure. Areas to the south of the last radio contact were searched the next morning (31 October), as well as the Platte River between Hershey and Grand Island, Nebraska, but radio contact was not reestablished. It is likely that the birds continued for some distance before landing the previous evening.

The radio-tagged crane from the family monitored in the fall of 1984 was seen at a Platte River staging area during the return migration the following spring. On 27 March 1985, the bird was seen with other cranes in a field near Wood River, Hall County, Nebraska (T. C. Tacha pers. comm.), and the following day (28 March) radio contact was established while the bird roosted in the Platte River (Fig. 3). Subsequent efforts to locate the bird after it returned to northwestern Minnesota were unsuccessful.

A family group with 2 radio-tagged siblings was followed southward from Agassiz NWR in the fall of 1985 (Fig. 3). On 14 October, the birds left, with another family group, and flew 37 km from the refuge, where they spent the night roosting in a wet drainage ditch. The following morning (15 October) they traveled another 92 km southward and merged with over 1000 other cranes staging near Ada, Norman County, Minnesota. They remained there for 9 days, during which time (19 October) another radio-tagged crane from Agassiz NWR arrived. On 24 October, the family with the radio-tagged siblings left Ada in the company of 19 other cranes and flew southeasterly, bypassing the point where the birds had flown into South Dakota the previous year. Covering 378 km in 8.5 hours, the birds landed 2 hours after dark in the southwestern corner of Minnesota near Windom, Cottonwood County. The following day (25 October), they backtracked 172 km northward to near Morris, Stevens County. The cranes headed south-

westerly the next morning (26 October). Vehicle delays, caused by road construction while still in Minnesota, allowed the birds to gain an insurmountable lead on the tracking vehicle. After 8 hours, covering 455 km across southwestern Minnesota, southeastern South Dakota, and central Nebraska, the signal was lost at sunset near Albion, Boone County, Nebraska. The next day (27 October), a ground search of the birds' expected path through central Nebraska and Kansas failed to re-establish radio contact. A quick return to Ada, Minnesota to locate the third radioed crane that had been there, was also unsuccessful.

Eleven days after radio contact was lost in Nebraska (6 November), 1 of the radio-tagged siblings was found dead at Katy, Fort Bend County, Texas. A subsequent (18-26 November) ground search of crane wintering areas in portions of Fort Bend, Waller, Austin, and Wharton counties, Texas, as well as the Texas coast from Galveston to Corpus Christi, failed to locate any radio-tagged or color-marked cranes from Agassiz NWR (Fig. 4).

On 9-10 December 1985, Texas Parks and Wildlife Department Wildlife Biologists searched for radio-tagged cranes while conducting the Mid-coast portion of the December Goose Survey (R. R. George, Tex. Parks Wildl. Dept., Austin, pers. comm.). Two observers were in the aircraft, each continually monitoring separate receivers. Unfortunately, the aircraft mounted antennae were not properly tuned for the frequency of the transmitters, and continued overcast weather resulted in unreliable reception conditions. In spite of this, both observers believed they heard brief, faint signals from separate birds in the area of Louise and Ganado, approximately 95 km from where the dead bird was found and 50 km from the nearest area ground searched in November (Fig. 4). These reports could not be confirmed.

Because of the results of the 1984 field season, the birds counted at Rothsay, Minnesota were not included in the 1984 Eastern Greater Sandhill Crane Census (L. E. Schumann, U.S. Fish Wildl. Serv., East Lansing, Mich., pers. comm.). The sample of marked birds in this study was small, but when combined with existing evidence, and lacking stronger evidence to the contrary, it would seem that nesting cranes in northwestern Minnesota should more appropriately be considered associated with the mid-continent population of sandhill cranes than with the eastern population of greater sandhill cranes. Four separate populations of greater sandhill cranes are currently recognized (Lewis 1977): Eastern, Rocky Mountain, Colorado

River Valley, and Central Valley. Birds from southern Manitoba and northwestern Minnesota are now considered part of the eastern population, but as new information accumulates, it may be advisable to recognize a fifth distinct population of mid-continent greater sandhill cranes.

LITERATURE CITED

- Bennett, A.J. 1978. Auditory censusing of greater sandhill cranes. *Auk* 95:411-413.
- Crete, R.A. & A. H. Grewe, Jr. 1982. Greater sandhill cranes of Burnett County, Wisconsin. pp. 281-287 in J.C. Lewis (ed.), *Proc. 1981 Crane Workshop Natl. Audubon Soc.*
- Crete, R.A. & J.E. Toepfer. 1978. Migration of radio-tagged eastern greater sandhill cranes. U.S. Fish & Wildl. Serv. Rept., Twin Cities, Minn., 42p.
- Grewe, Jr., A. H. 1977. The current status of eastern greater sandhill cranes in Minnesota. Pages 12-17 in *Proc. E. Greater Sandhill Crane Symp.*
- Johnson, D.H. & R.E. Stewart. 1973. Racial composition of migrant populations of sandhill cranes in the Northern Plains states. *Wilson Bull.* 85:148-162.
- Johnson, J.M. 1976a. Distribution of sandhill cranes in Minnesota. Pp. 59-68 in J.C. Lewis (ed.) *Proc. Int. Crane Workshop Okla. State Univ.*
- Johnson, J.M. 1976b. Territory, nesting, and habitat utilization of greater sandhill cranes in Morrison County, Minnesota. M.S. Thesis, St. Cloud State Univ., Minn., 47p.
- Lewis, J.C. 1974. Ecology of the sandhill crane in the southeastern Central Flyway. Ph.D. Thesis, Okla. State Univ., 213p.
- Lewis, J.C. 1977. Sandhill crane. Pp. 5-43 in G.C. Sanderson (ed.), *Manage. Migr. Shore Upland Game Birds N. Am.*, Univ. Nebr. Press.
- Melvin, S.M. & S.A. Temple. 1980. Migration ecology and wintering grounds of sandhill cranes from the Interlake Region of Manitoba. U.S. Fish & Wildl. Serv. Rept., Twin Cities, Minn., 60p.
- Nesbitt, S.A. & L.E. Williams, Jr. 1979. Summer range and migration of Florida wintering greater sandhill cranes. *Wilson Bull.* 91:137-141.

Table 1. Hatching and fledging success of greater sandhill cranes nesting on Agassiz NWR and adjacent areas of eastern Marshall and northwestern Beltrami counties, Minnesota, 1984-85.

Year	Location	No. pairs	No. hatched	No. fledged	No. hatched/ pair	No. fledged/ pair	% fledged
1984	On refuge	18	28	25	1.6	1.4	89.3
	Off refuge	8	11	11	1.4	1.4	100.0
1985	On refuge	16	19	17	1.2	1.1	89.5
	Off refuge	5	7	7	1.4	1.4	100.0
Total	On refuge	34	47	42	1.4	1.2	89.4
	Off refuge	13	18	18	1.4	1.4	100.0
	Combined	47	65	60	1.4	1.3	92.3

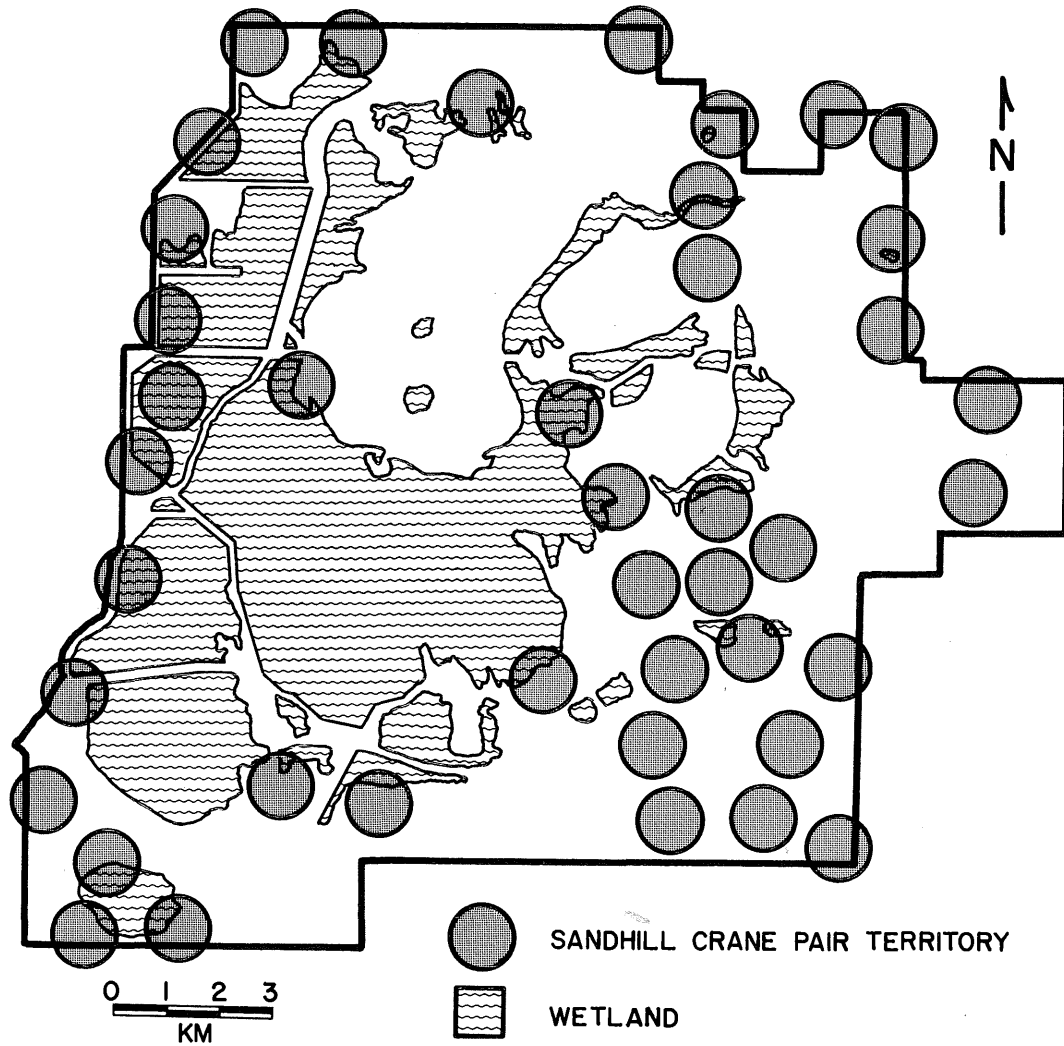


Figure 1. Distribution of sandhill crane pair territories on Agassiz NWR, 1984-85.

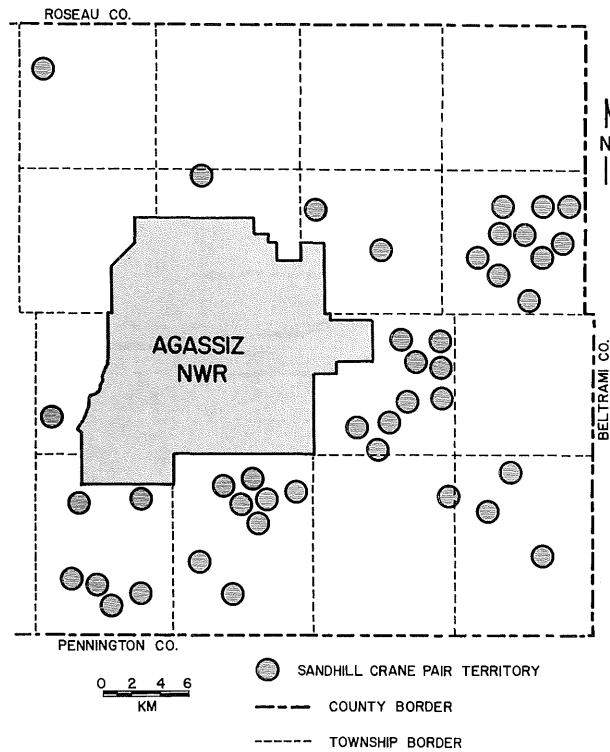


Figure 2. Sandhill crane pair territories in eastern Marshall Co., Minnesota, 1984-85.

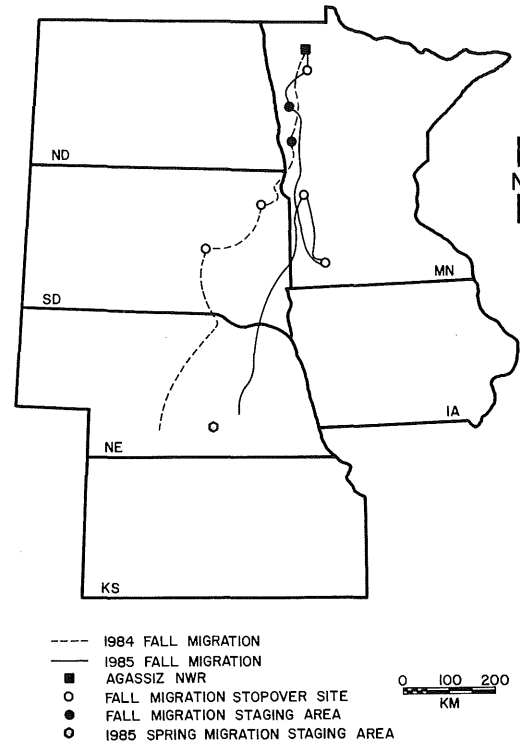


Figure 3. Migration routes of radio-tagged sandhill cranes from Agassiz NWR, 1984-85.

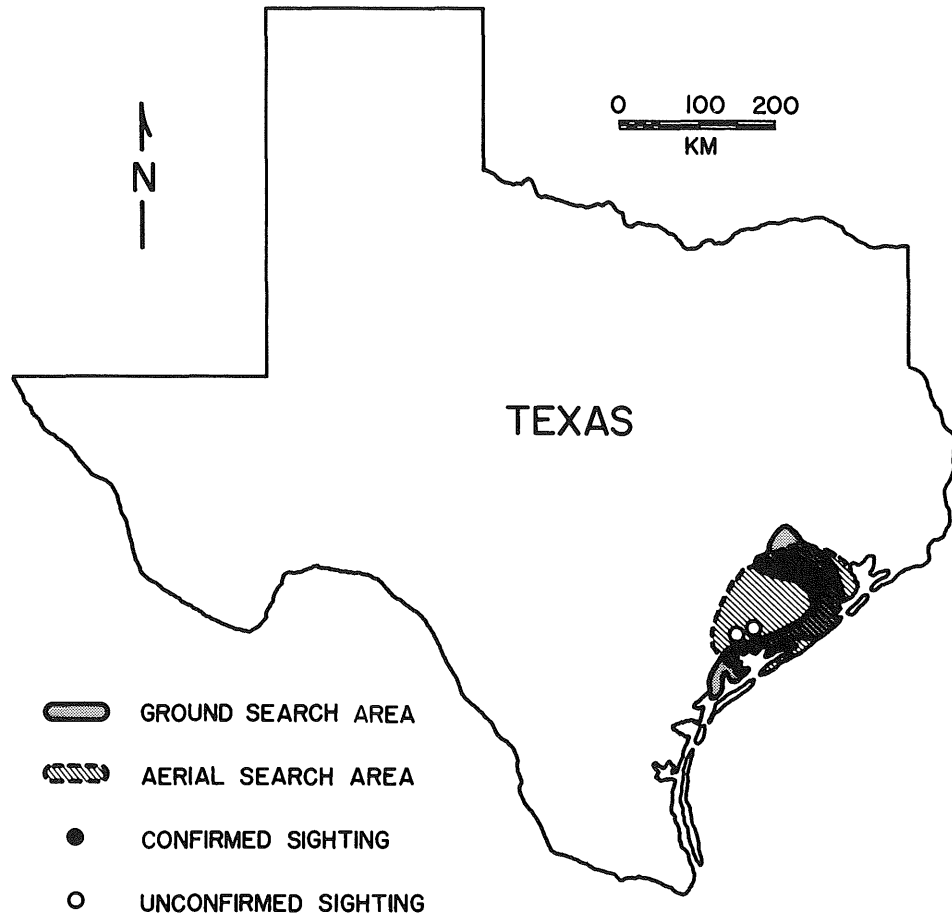


Figure 4. Search areas and locations of radio-tagged sandhill cranes on east Texas wintering areas, 1985.