THE SANDHILL CRANE IN OKLAHOMA

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Sandhill cranes (*Grus canadensis*) migrate through Oklahoma in large numbers in fall and spring. Small populations winter in Jackson County and at the Washita National Wildlife Refuge, Custer County. Members of all three races of sandhill cranes occurring in the western United States winter in Oklahoma. The areas used by cranes, their populations, and the time periods when cranes are present are discussed. The heaviest migration appears to be over the extreme western edge of Oklahoma. Fall and spring migrations peak about the end of October and the end of March, respectively. Food habits, habitat use and harvest by hunters are discussed.

Three races of sandhill cranes are found in the United States west of the Mississippi River, the greater sandhill (*Grus canadensis tabida*), the Canadian sandhill (*G. c. rowani*) and the lesser sandhill (*G. c. canadensis*) (1). The greater sandhill was listed as a rare and endangered subspecies (2) when this project was initiated in 1968, but has since been removed from that category (3). The three subspecies differ mainly in their size; the greater is the largest, the lesser the smallest, and the Canadian is intermediate in size. The purpose of this paper is to report on the subspecies of cranes found within Oklahoma and to describe some aspects of the ecology of these birds.

METHODS

The Study Area

Field studies were limited mainly to Washita National Wildlife Refuge (NWR) in Custer County and Salt Plains NWR in Alfalfa County, Tillman County, and Jackson County. Between February 1968 and April 1971, 131 days were spent conducting field work in Oklahoma. Field observations were made first in areas where cooperators reported that sandhill cranes had been seen. Cranes were found by asking local residents for information, by driving country roads and watching for cranes feeding in fields or flying, by listening for vocalizing cranes, and by viewing the surrounding terrain from buttes and other high points.

Census

When flocks were located they were counted and their activities noted. In some cases flocks were observed until they took flight and were then followed to their roosts. Cranes were censused at feeding areas and by counting at daybreak or in late afternoon as cranes left or entered a roost. The census continued in mornings until all cranes had left the roost, and at nights until it was too dark to see. High bluffs overlooking the roosts at the Washita NWR and along the Red River made excellent observation points for these counts.

Personnel of the Oklahoma Department of Wildlife Conservation and members of the Oklahoma Ornithological Society cooperated by recording sightings of sandhill cranes during fall migration in 1969 and 1970. Data on populations of cranes using the national wildlife refuges were compiled from files at the refuges.

Food Habits and Subspecies Assignment

Some specimens were collected and weighed; standard ornithological measurements were taken of the wing, tail, culmen, and tarsus. These specimens are now deposited in the museum at Oklahoma State University. Food contents were removed from the gullet and gizzard. Vegetative materials were dried under heat lamps and stored in paper bags. Later the vegetative material was separated, identified, and the volume measured by water displacement in a volumetric cylinder. Animal matter was identified or stored in preservative.

Each specimen was assigned to a subspecies after measurements had been compared to records of average measurements of the three subspecies (4). Measurements are evaluated using a discriminant analysis (program BMD05M; 5). Specimens collected by Buller (6) are included in the discriminant analysis. The probability of a

specimen belonging to each of the three subspecies was computed for all individuals. Harvest estimates for Oklahoma are based on field observations, interviews with personnel of the U. S. Fish and Wildlife Service, and interviews with rangers of the Oklahoma Department of Wildlife Conservation.

RESULTS AND DISCUSSION

Distribution of races

All three races of cranes found in the western United States are present in Oklahoma during winter (Table 1), and this study provided the first documentation that greaters winter in the state. Buller's (6) greater specimens were collected during migration in the fall. The source of the wintering greaters is unknown, but they may nest in northwestern Minnesota and southeastern Manitoba. The literature indicates that greaters nesting in Michigan and Wisconsin winter in Florida (7, 8), greaters that nest in the northern Rocky Mountain States winter in New Mexico, Arizona and Mexico (R. C. Drewien, personal communication), and greaters that nest in the Pacific Flyway winter in southern California (C. D. Littlefield, personal communication).

TABLE 1. *Subspecies of sandhill cranes collected in Oklahoma* (1, 6).

Location	Races of sandhill crane			
	Greater	Canadian	Lesser	Total
Central Oklahoma	2	1	0	3
Salt Plains NWR	3	0	2	5
Salt Plains NWR (6)	0	0	3	3
Tillman County	0	4	2	6
Jackson County	2	15	14	31
Washita NWR	7	5	7	19
Washita NWR (6)	2	2	0	4
Totals	16	27	28	71

Principal use areas and their populations

Flocks of cranes may stop almost anywhere in western Oklahoma during migration. However, the areas used most consistently by large numbers of migrating cranes are Salt Plains NWR, Washita NWR, southern Tillman, southern Jackson, and northern Beaver Counties.

The Salt Plains NWR, Oklahoma is used by cranes during both spring (peaks of 200 to 500) and fall migration (100 to 7,800). Most flocks apparently stay only one or two nights. The cranes roost at Sand Creek Bay, on salt flats 1 km south of Highway 11, and on the south end of the reservoir. They feed in wetlands and croplands of the refuge.

The Washita NWR is used heavily during fall migration (peak populations of 800 to 15,000) and is also a wintering area (23 to 1,300 cranes in some years) when habitat factors are suitable. Cranes have wintered there during 6 of the past 11 years (1963-64 to 1973-74). In some years (i.e. 1969-1970), cranes depart from the refuge before weather becomes severe, and in such circumstances the suitability of roosting sites may be the influencing factor. Peak populations during spring migration contain 400 to 4,000 cranes. Cranes generally roost on Joe Foss Reservoir within the refuge boundaries, but occasionally roost in wheat fields outside the refuge. These birds feed mainly on the refuge except during the peak of fall migration when feeding occurs on private grain fields as far as 8 km from the refuge.

Censuses of cranes on the Washita NWR indicate that major population declines or increases may occur in a few days or even in a 24-hr interval (1). In some years, such as 1968, few cranes were present there except in late October and early November.

Sandhill cranes regularly use an area in southern Tillman County during fall migration and are seen there briefly during spring (1). They roost on the Red River south of Hollister, Oklahoma, and feed in grain fields within a few kilometers of the roost on the north side of the river. Cranes arrive in early October and some are seen in the vicinity until late November. At the population peak as many as 2,500 cranes may be present in some years (1). The maximum number observed there by the author was 518 on 23 November, 1969.

Personnel of the Oklahoma Department of Wildlife Conservation report that a major migration pathway passes between Forgan and Buffalo, Oklahoma. Nice (9) indicated that sandhill cranes sometimes overwintered along this migration pathway near Gate, Beaver County, at the eastern

end of the Oklahoma Panhandle. I visited the area in November of 1968 and of 1969. None of the local people who were interviewed recalled that cranes had ever overwintered in the area. Cranes are seen migrating through the area for a 2- to 3-week period during fall. Some flocks stop for 1 or 2 days and then move south. Cranes roost in wheat fields and playa lakes and feed in fields of milo and wheat.

The favored crane habitat in Beaver County is located 6 km northeast of Forgan and includes an area 10 by 11 km that is used from mid-October to mid-November. At the peak of migration 1,000 to 2,000 cranes were reported in the area in 1968 (1). Few cranes are reported in this area during spring migration.

Cranes arrive in Jackson County in early October and depart in early March. Peak populations generally occur in early November and the population declines until late February when some early spring migrants bolster the wintering populations. I observed a peak population of 3,000 birds in November 1968 but populations of 5,000 to 8,000 (1964) have been reported by Wes Webb, Ranger, Oklahoma Department of Wildlife Conservation (personal communication). Cranes that roost along the Red River feed in Hardeman and Wilbarger Counties, Texas, as well as in Oklahoma.

Wintering populations for the Jackson County area in the three winters 1968-69, 1969-70, 1970-71 varied from 350 to 1,800 cranes. Weather and local habitat conditions apparently influenced the numbers of cranes that were present. During the fall of 1970, migrating cranes did not stop in normal numbers; they moved quickly through Oklahoma, perhaps in response to the unusually cold weather. October of 1970 was the coldest October on record for Oklahoma, and snow fell throughout northwestern Oklahoma (10). Another factor probably influencing population size in Jackson County in 1970-71 was the condition of roosting habitat along the Red River. The summer of 1970 was the driest since the early 1930's. The Prairie Dog Fork of the Red River was almost dry west of its confluence with the Salt Fork of the Red River. The roosts located west of the confluence with the Salt Fork received almost no use that year.

East-West distribution of migrating cranes

In 1969, cooperators reported 155 observations of cranes during fall migration (8 October to 17 November), and in 1970 they reported 133 observations (29 September to 27 November). These observations were grouped into four north-south tiers of counties: Area One between Longitudes 98°W and 98°30'W in Oklahoma, Area Two between Longitudes 98°30'W and 99°30'W, Area Three between Longitudes 99°30'W and 100°W, and Area Four between Longitudes 100°W and 103°W. Few cranes migrate east of Longitude 98°W in Oklahoma during either fall or spring.

The average number of cranes sighted per observation in 1969 is highest in the western edge of the main body of the state (Area Three, Table 2). In 1970, the average number of cranes observed migrating over Area Four (the Oklahoma Panhandle) exceeded that of Area Three. Migration over Area Four is in general probably the heaviest because it lies north of Muleshoe NWR, Texas where concentrations of 185,000 to 214,000 cranes have occurred in late October (6). Data from Area Four are limited because very few potential observers live there.

Phenology of migration

Migrating sandhill cranes enter Oklahoma in late September and migration continues until late November in most years. In both 1969 and 1970, migration peaked at the end of October; in 1970 another major peak occurred in mid-November. During these peaks several observers indicated that flocks of migrating cranes were in view or could be heard almost all day (i.e. 26, 29, and 30 October 1969 and 31 October and 18 November 1970), but the observers did not have time to record the size of all flocks. The migration during spring extends from about 20 February to 25 April and peaks in late March (1).

The same migration patterns are reflected in the census data collected at the Salt Plains NWR, and Washita NWR. The optimum time for a crane hunting season in Oklahoma would be late October and early November if the goal were to maximize recreation and harvest. The season opening, however, is delayed so that migrating whooping

TABLE 2. *The east-west distribution of observations on sandhill cranes during fall migration in Oklahoma, 1969 and 1970.*

Area	1969			1970		
	Observations	Cranes	Average Flock Size	Observations	Cranes	Average Flock Size
Area 1	40	3,375	84.4	15	992	66.1
Area 2	20	1,713	85.6	24	720	30.0
Area 3	78	9,272	118.9	71	9,103	128.2
Area 4	17	969	57.0	23	6,265	272.4
All Areas	155	15,329	98.9	133	17,080	128.4

cranes (*Grus americana*) will not be mistakenly shot by someone hunting sandhill cranes.

Food habits and feeding habitat

I analyzed the combined volumes of foods from the gullet and gizzard of 32 specimens collected in October and November. Wheat (*Triticum aestivum*) seed had been eaten by 28% of the cranes and made up 40% of the volume of food items. Haygrazer (*Sorghum bicolor* X *S. sudanensis*) and milo (*Sorghum bicolor*) seeds composed 28% and 20%, respectively, of the food volume. All domesticated grains (seed and forage) composed 92.9% of the total food volume (1). In addition, much of the unidentifiable vegetation in the gizzard probably came from domesticated grains. *Sagittaria latifolia* was the only wild plant contributing much to the crane's diet (2% volume). Insects, mainly grasshoppers (*Acrididae*) and beetles (*Coleoptera*), were 1.5% of the volume. Other studies of food habits of sandhill cranes during the fall months also indicate the importance of grains (11, 12).

Observations of 3,543 cranes in fields at the Washita NWR indicated the following percentages of birds using various habitats in the fall: 33.7% in recently planted wheat fields, 48.5% in fields where wheat plants were well established, 3.7% in corn (*Zea mays*) fields, 0.2% on fallow ground, 2.5% in fields of milo, and 11.3% on mowed native prairie.

Similar observations on 6,685 cranes in southwestern Oklahoma indicated the following use of habitat: 16.4% in recently planted wheat, 61.0% in fields of well-established wheat, 19.1% in fields of milo, 3.4% in native pasture, and 0.1% in fields of haygrazer. The haygrazer fields were not attractive feeding areas until after cattle had thinned the vegetation while feeding and walking about.

For the 23 specimens available from Jackson and Custer counties, during the period 1 December to 28 February, seeds of haygrazer and milo represented 94% of the volume. Wheat seed and forage constituted another 3.7%. The remaining 2.3% consisted of vegetative debris and unidentified seeds. Domesticated grains continued to be the major source of food. The *Sorghum* spp. seeds ingested by cranes were mostly waste grain remaining in the fields after mechanical harvest or after grazing by cattle.

Observations on 6,632 cranes feeding during winter in southwestern Oklahoma indicated that 23.3% were in wheat fields, 23.7% in milo, 21.3% in fields of haygrazer, 3.0% in mesquite (*Prosopis glandulosa*) grassland, 10.6% in guar (*Cyamopsis tetragonoloba*), 1.5% in alfalfa (*Medicago sativa*), 0.8% in cotton (*Gossypium herbaceum*), 3.6% in native grassland and 12% in recently planted wheat. Fields of haygrazer and guar, and of grasslands were used more in winter than during fall in the same area.

The foods of five sandhill cranes collected during March and April consisted of 95.1% haygrazer seed and 4.8% wheat forage.

Records on 1,714 cranes feeding during spring in southwestern Oklahoma indicate that 39% of them were feeding in fields of harvested milo, 11.7% in guar, 7.8% around cattle feed troughs, 2.6% in fields of haygrazer, 23.6% in wheat and 15.3% in

upland native pasture. Compared to cranes in the same area in winter, there was a decline in use of fields of haygrazer and increased utilization of grassland and areas around cattle feed troughs.

Crop depredations

When this project was initiated, game managers in Oklahoma seemed concerned about crop depredations by cranes, but in typical years little damage occurs. Occasionally, due to climatic or habitat conditions, unusually large numbers of cranes stop in Oklahoma during migration and stay longer than normal. In years with insufficient rainfall in September, wheat is planted late. The economic loss due to depredations may be significant when planting coincides with migration of cranes because cranes will eat the seeds and pull up young tender shoots. In years with normal rainfall, wheat is planted in September and plants are well rooted and less attractive as food when cranes migrate through.

Hunting

Hunting for sandhills began in western Oklahoma in 1968. The season opens about 1 December to avoid jeopardizing migrating whooping cranes. Allen (13) reported that whooping cranes have usually arrived at their wintering area on the Texas coast before 1 December. The only areas in Oklahoma usually containing sandhills on 1 December are Jackson County and Washita NWR. The cranes at the refuge seldom feed on private land where they would be subject to hunting. Most hunters were not aware that cranes wintered in Jackson County; some equated cranes with fish-eating wading birds and were not interested in pursuing them. The roosts and feeding fields were on private property and in many cases these lands were not open to hunting. Most roosts were in isolated areas that were difficult to reach and few hunters knew the location of these roosts.

I know only one person from Jackson County who has hunted cranes. The other hunters were military personnel from Altus Air Force Base and residents of El Reno, Elk City, Oklahoma City, Norman, and Stillwater. The number of sandhill cranes known to be harvested in any one year (1968-1973) in Oklahoma has never exceeded 20. With the existing season dates, crane hunting in Oklahoma has had no significance in terms of harvest or recreation for hunters. Likewise, the existing harvest in Oklahoma has had no influence on the stability of the wintering populations.

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