

THE BIRDS OF  
MORMON ISLAND CRANE MEADOWS

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# ABSTRACT

A total of 177 species of birds was recorded for M.I.C.M. between 24 Mar 1980 and 26 Jun 1981. Of these, 62 species are considered as either known or potential breeders. Two federally endangered species, the bald eagle and peregrine falcon, were encountered as well as 1 species on the state threatened list, the least tern. The most numerous species present was the sandhill crane. Mist-netting of birds supplemented field observations. A total of 336 individuals of 45 species were banded and released. The results are contained in an annotated checklist.

Breeding bird densities were estimated on 7 grassland plots. Approximately 90 nests were located in various habitats. Upland sandpipers were censused in the spring of 1980 and 1981. Populations of this species were comparable or above those reported in other locations. A ring-necked pheasant crowing count survey was conducted in the spring of 1981. Management recommendations for upland species, sandhill cranes in particular, are outlined.

Intensive study of sandhill crane populations, habitat-use, distribution and behavior was conducted from 15 Feb to 12 Apr 1981. Aerial counts, ground counts, and roost counts were used to estimate populations. Effects of human disturbance to cranes were studied. A maximum count of 31,420 cranes was recorded on the wetland meadows with a total of 453,110 crane-use *days* estimated for these areas. Nocturnal roosting populations approached or exceeded 40,000 cranes. Neck collars were read on 18 cranes. One color-marked individual stayed within the area *at* least 25 days.

## INTRODUCTION

In December 1979 a 2,000 acre preserve was purchased to protect habitat for migratory waterbirds, in particular sandhill cranes<sup>1</sup>. An inventory of the avifauna of Mormon Island Crane Meadows (M.I.C.M.) was conducted to provide baseline data to be utilized in the development of future management policies. This report presents the results of research conducted on breeding birds, migrants and winter residents, and sandhill crane use of M.I.C.M. and includes an annotated checklist of the birds of M.I.C.M.. Management implications based on the scientific literature and our findings are discussed.

## STUDY AREA

M.I.C.M. is located in Hall Co. approximately 2 miles north-northeast of Doniphan, Nebraska. M.I.C.M. forms the western end of Mormon Island and is bordered by two channels of the Platte River. The main channel of the Platte bordering M.I.C.M. was classified as "pristine" by Frith (1974) and is known to host some of the highest densities of roosting sandhill cranes found along the Platte River (Frith and Faanes 1980). Approximately 1,000 acres of prime wetland meadow habitat are located on the preserve; a habitat type which is rapidly being converted to row crops in the Platte River Valley. M.I.C.M. is in a transition

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<sup>1</sup>Scientific names of bird species used in this report are listed in the Annotated Checklist of the Birds of M.I.C.M. unless noted otherwise.



zone between the tall and mixed-grass prairie as described by Kuchler (1964). For the purposes of this study M.I.C.M. includes that portion of Mormon Island west of U.S. 281.

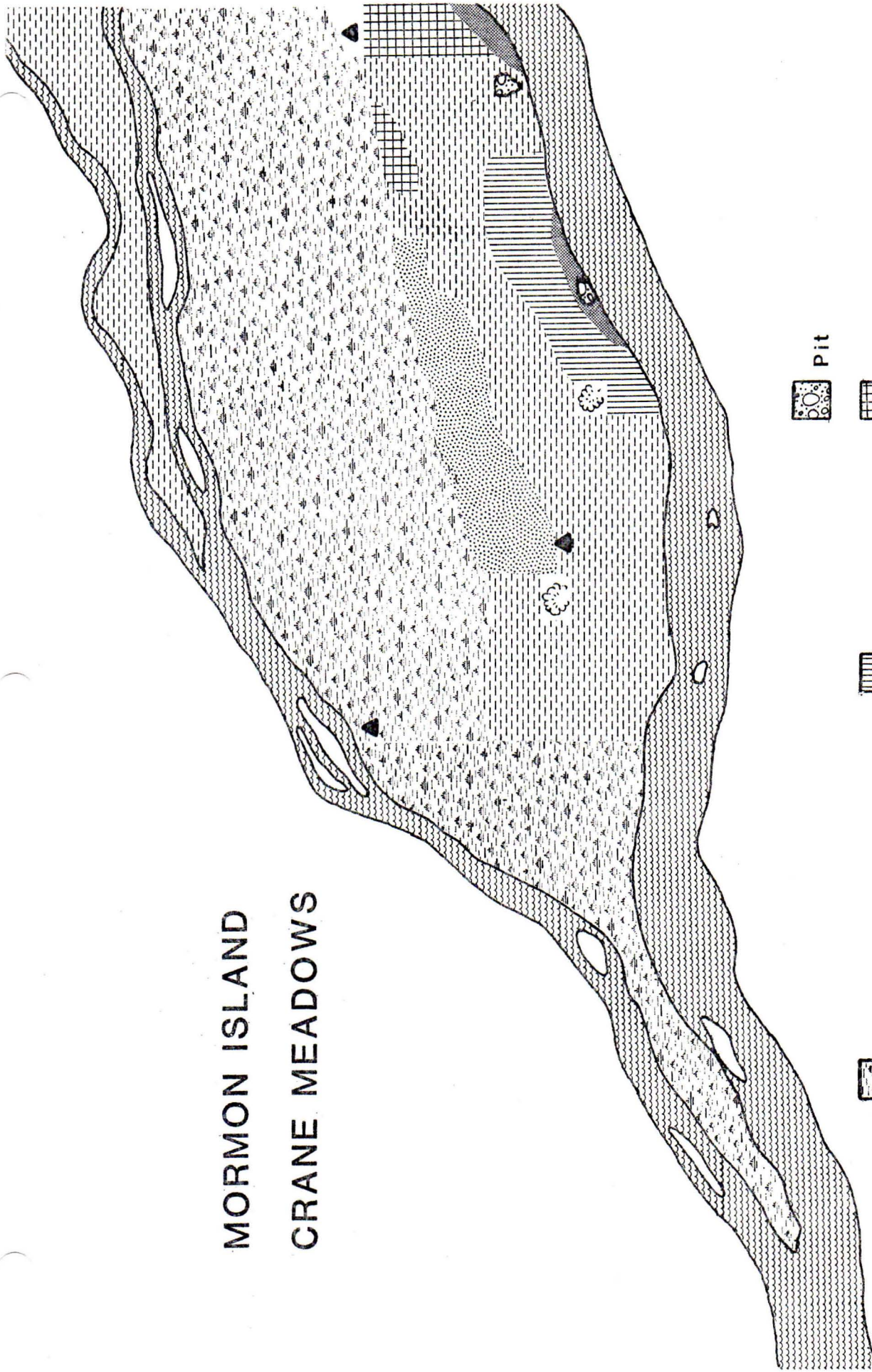
To determine habitat use by birds on M.I.C.M., seventeen habitat types were designated (Fig. 1). A brief description of the habitat types and their associated plant species follows:











- Alfalfa - A planted hay crop dominated by the legume alfalfa. . . . .  
Mowed each year. Approx. 107 acres (6%).
- Corn - A planted crop. Dominant species: Corn (Zea maize), Sandbur (Cenchrus longispinus). Approx. 72 acres (3%).
- Farmstead/ Barn - One farmstead and two barn sites are present on the preserve. Approx. 7 acres (0.4%).
- Fencerows - Fencelines, and the uncut grasses, forbs, and shrubs which often border them. Dominant species: Marijuana (Cannabis sativa), Goldenrod (Solidago spp.), Sweet Clover (Melilotus spp.), American Plum (Prunus americana), Rough-leaved Dogwood (Cornus drummondii), Russian Olive (Elaeagnus angustifolia).
- Hay - Native hay fields dominated by grasses, Mowed each year. Dominant species: Smooth Brome (Bromus inermis), Big Bluestem (Andropogon gerardi), Redtop (Agrostis stolonifera), Switchgrass (Panicum virgatum), Kentucky Bluegrass (Poa pratensis). Approx. 556 acres (29%).
- Idle - Small patches of unmowed, ungrazed and uncultivated land often dominated by tall forbs. Dominant species: Giant Ragweed (Ambrosia trifida), False Sunflower (Heliopsis helianthoides), Sunflower (Helianthus spp.), Russian Thistle (Salsola kali). Approx. 29 acres (1.5%).

Fig. 1. Habitat types of M.I.C.M.



# MORMON ISLAND CRANE MEADOWS



- |   |  |  |
|---|--|--|
|  Wetland meadow    |  Corn    |  Pit      |
|  Riparian woodland |  Alfalfa |  Idle     |
|  River channel     |  Hay     |  Woodlot  |
|   |  |  Farmyard |



Riparian Shrubland - Shrubs and small trees which border the island without an overstory. Dominant species: Willow (Salix spp.), Rough-leaved Dogwood, Russian Olive, False Indigo (Amorpha fruticosa), Red Cedar (Juniperus virginiana).

Riparian Woodland (overstory) - Narrow strips of woodland which border much of the island. Dominant species: Cottonwood (Populus deltoides), American Elm (Ulmus americana), Green Ash (Fraxinus pennsylvanica), Boxelder (Acer negundo).  
Approx. 29 acres (2%).

Riparian Woodland (understory) - The understory of the woodlands mentioned above. Dominant species: Willow, False Indigo, Rough-leaved Dogwood.

River Channel - The flowing channels of the Platte River, or the general physical area.

Riverine Island - Island in the Platte River dominated by woody vegetation. Dominant species: Willow, Cottonwood, Green Ash, False Indigo.

Sandbars - Open sandbars in the river channel lacking woody vegetation. Dominant specie: Cocklebur (Xanthium strumarium), and Lovegrass (Eragrostis sp.).

Wetland Meadow - Grazed grasslands with ribbons of wetland species in intermittent relic channel areas. Dominant species on mesic sites: Sedges (Carex spp.), Bulrush (Scirpus spp.), Spikesedge (Eleocharis spp.), Switch grass, Prairie Cordgrass (Spartina pectinata). Dominant species on xeric sites: Little Barley (Hordeum pusillum), Blue grama (Bouteloua gracilis), Japanese Brome (Bromus japonicus) and Downy Brome (Bromus tectorum).  
Approx. 1047 acres (55%).

Woodlots - Two woodlots are present on the preserve. Dominant species on "Woodlot West" (Fig. 1): Cottonwood, Green Ash, Mulberry (Morus alba). Dominant species in "Woodlot East": Cottonwood, Green Ash, Boxelder, Honey Locust (Gleditsia tricanthos). Woodlots combined approx: 11 acres (0.6%).

## METHODS

For analysis of the seasonal use of M.I.C.M. by birds the year was divided into four seasons: Spring - 1 March to 20 May, Summer - 21 May to 15 August, Fall - 16 August to 30 November, Winter - 1 December to 28 February. Daily observations were used to monitor migration, to determine winter residents and to supplement breeding bird surveys during summer. The term "daily observation" describes a periodic search of the island for birds and the recording of all species observed. The observation or capture of one individual was counted as one sighting. The date, time, hours of observation, weather conditions, species, number of individuals, and habitat use were recorded. A total of 134 days of observation were recorded from March 1980 to June 1981. The distribution of observation days was as follows: Spring 1980 - 14 days, Summer 1980 - 14 days, Fall 1980 - 35 days, Winter 1980-81 - 23 days, Spring 1981 - 34 days, Summer 1981 - 14 days.

Mist-netting and banding was used to supplement daily observations, especially useful for species which were secretive or difficult to identify. Twelve meter mist-nets were placed in locations where bird use appeared high. One net hour was the



operation of one twelve meter mist net for one hour. The total hours of operation and the location of each net was recorded. Captured birds were identified, aged if possible, and banded with U.S.F.W.S. metal leg bands.

Seven breeding bird plots were randomly selected, surveyed, and marked with flags and posts. Breeding birds were censused during June 1980 using the spot mapping technique described by Williams (1936). Methods followed the international standard for the mapping method in bird census work (Anonymous 1970). Each plot was censused seven times between the hours of 0600 and 1300 when wind speeds were less than 10 mph and there was no precipitation. In 1981, three of these plots were censused but the results are not included in this report.

Car censuses for upland sandpipers were conducted on 20 May and 28 May 1980 and on 26 May and 4 June 1981 on that portion of Mormon Island west of U.S. 281. The counts occurred between one half hour before sunrise and 0900. One or two observers drove down the main access road and stopped every 0.4 miles. All sandpipers observed were plotted on U.S.G.S. quad maps and recorded on a data sheet. Weather conditions were noted and counts were made only on days when wind speeds were less than 10 mph, the temperature was greater than 40°F, and there was no precipitation. This was a modification of the method described by Anderson (1978).

Pheasant crowing counts were conducted on 18 April and 22 April 1981. The method was the same as that used on the upland sandpiper censuses except that a three minute listening period

occurred at each stop and crowing roosters as well as those sighted were recorded.

Ground counts of sandhill cranes on M.I.C.M. were conducted from a vehicle on 35 days from 23 February to 12 April 1981 between 1300 to 1500 hrs (C.S.T.) using binoculars and/or a 25x spotting scope. The mean number of counts per week was 4.9, with a range of 3-6 per week. The size, location, and habitat type of each flock was recorded as well as the time, temperature, wind velocity, % cloud cover, and precipitation. Crane use of secondary roosts was recorded, primarily in fields 8 and 11 from the viewing bunker and from blinds located near the west woodlot (Fig. 1 ) on 25 mornings and 31 evenings from 22 February to 9 April 1981. The time of crane arrival and departure, number of cranes present, and general weather conditions were noted at secondary roosts. Time of arrival on riverine roosts was recorded on 25 evenings from 17 February to 11 April and roost departure on 28 mornings from 19 February to 5 April from various locations.

Counts of cranes departing from their roosts on the Mormon Island stretch of the Platte River were conducted on 25 February, 24 March and 2 April 1981. Roost counts began approximately 1/2 hr before sunrise. Three or four observers were assigned a section of river channel to cover. The section, time and number of cranes departing, and weather conditions were recorded. Some sections were counted as cranes arrived on the roost the previous night. Estimates as to the number of ducks and geese departing were also recorded.



Aerial ocular counts by two observers were conducted on 12 March at 1145 (C.S.T.) and 2 April at 1340 (C.S.T.) from a Cessna 182. On 12 March, flight altitude was approximately 800ft and an east-west transect across meadow areas was flown. On 2 April flight altitude was 500ft and north-south transects at 1.0 mile intervals were flown. Flight speeds were approximately 85 mph. The distribution of cranes was mapped.

Two adjacent 6.4 acre plots in the southwest portion of field 11 and one 6.4 acre plot on the east edge of field 3 were delineated by steel fenceposts with 12" diameter discs at the base. Plot boundaries were determined by pacing. The number of cranes on plots was estimated periodically.

To determine seasonal patterns in crane use the staging interval was divided into 7 weeks: Week 1 - 22 February to 28 February, Week 2 - 1 March to 7 March, Week 3 - 8 March to 14 March, Week 4 - 15 March to 21 March, Week 5 - 22 March to 28 March, Week 6 - 29 March to 4 April, and Week 7 - 5 April to 12 April. The extent of and differences in crane use of wetland meadows (Fields 1-4) was assessed by determining crane-use days. Crane-use days was calculated by multiplying the weekly mean number of cranes per census on each field by seven. These values were totaled for each field and all fields. To determine seasonal patterns, the relative frequency of cranes within fields was calculated where: Relative Frequency (RF) = crane use days per week/ total crane-use days x 100. The relative importance of fields 1-4 to cranes over the staging season was assessed by determining the relative frequency



of cranes between fields where:  $RF = \text{crane-use days per week of each field} / \text{crane-use days on all fields combined per week} \times 100$ . To assess the consistency of field use by cranes the frequency of occurrence (FO) was determined where:  $FO = \# \text{ of censuses with } 1000+ \text{ cranes per week for each field} / \text{total number of censuses per week}$ .

Vegetation height and density was measured on Fields 1, 2, 3, and 4 on 12 April 1981 using the Robel method described by Kirsch (1979). A north-south transect was selected in each field, and 100 height-density measurements, four at each of 25 stations were taken along each transect. The distance between stations was 30m. Measurements were read at a distance of 4 m and a height of 1 m. Vegetation density was measured at the lowest point where vegetation obscured 100% of the pole. Measurements were rounded to the nearest half decimeter. Vegetation height was the height of the tallest vegetation between the observer and the Robel pole. Each site was classified as upland or lowland based on topography and vegetation. A students "t"-test was used to compare vegetation parameters between fields. Correlation coefficients were calculated to compare crane use and the occurrence of lowlands.

Acreages used in the study area description were determined by drawing field boundaries on U.S.G.S. quad maps from aerial photos. Acreages were measured with a graphics calculator.

SANDHILL CRANES IN THE PLATTE VALLEY

## INTRODUCTION

Of the six subspecies of sandhill cranes which occur in North America, three are migratory and migrate through Nebraska. The Greater Sandhill Crane (Grus canadensis tabida) is the largest of the three subspecies. The "Greater" that migrate through Nebraska are from the Eastern population and nest in Minnesota, Wisconsin, Michigan, Ontario, and southern Manitoba (Lewis 1977). (Other populations of the Greater Sandhill Crane are the Central Valley, Colorado River Valley and the Rocky mountain population.) The Lesser Sandhill Crane (Grus canadensis canadensis) is the smallest of the three subspecies and nests in the tundra and boreal forests of Canada, Alaska and Siberia (Lewis 1977). The Intermediate or Canadian Sandhill Crane (Grus canadensis rowanii), as its name suggests, is intermediate in size and nests in west-central Alberta, Manitoba, and Saskatchewan (Lewis 1977).

The Greater Sandhill Crane nested in Nebraska until about 1884 (Walkinshaw 1949). Walkinshaw (1949) attributes the disappearance of the sandhill crane as a breeding species in Nebraska to wetland drainage and over hunting.

Frith (1974) described the present day range of the sandhill crane as having an "hourglass" configuration; the base representing the wintering areas of sandhill cranes in the southwestern United States and northern Mexico, the restricted middle area representing the spring staging range in the Platte River Valley and the top representing breeding grounds in the Canadian Provinces, Alaska



and Siberia. It is estimated that 70-80% of the continental population of sandhill cranes stage in the Platte and North Platte River Valleys each spring (Frith 1974, Krapu 1981a). This is one of the largest concentrations of sandhill cranes in the world (Wheeler 1973, Krapu 1981a). The strategic location of the Platte River Valley in relation to breeding and wintering grounds, the availability of extensive high quality roosting habitat, and the abundance of foods necessary to meet nutritional requirements are factors which attract cranes to the Platte River Valley each spring (Krapu 1981a).

Sandhill cranes typically occur in the Platte River Valley from mid-late February to late April, with large numbers present during March to mid-April. The length of time individual cranes stay in the valley varies as cranes continue to arrive from wintering areas throughout most of March.

The Platte Valley spring staging area provides a unique opportunity to census the Central Flyway population of sandhill cranes. The Annual Spring Survey of Sandhill Cranes in Nebraska, conducted by the U.S. Fish and Wildlife Service began in 1957 (Lewis 1979a) and continues to date. In 1974 a Coordinated Survey began in which sandhill cranes were censused simultaneously in other states in the flyway. The Annual Spring Survey has utilized three census techniques: an ocular count of cranes roosting in the Platte River or fields adjacent to the river between day break and one hour after sunrise, aerial line transects (one mile wide) along north-south section lines with complete coverage of the Platte River Valley, and line transect surveys of a systematic

random sample of transect line (ocular strip sampling; Lewis 1979a, Benning 1978, 1979).

Cranes proved difficult to census. Problems with the aerial counts included: the determination of when peak numbers of cranes were present, poor weather conditions, differences in observers, cranes leaving the census strip before the census (ocular roost count), and accurately estimating numbers in large flocks while traveling at high speeds (Frith 1974; Lewis 1977, 1979a). The year to year change in the count ranged from -32% to +42%, with an average yearly change of 19.7%, leaving the technique insensitive to population trends (Lewis 1979a). Ground observations suggested the survey was severely underestimating the population (Frith 1974, Lewis 1979a).

Estimates as to the size of the Central Flyway population of sandhill cranes have been quite variable. The maximum count of cranes in Nebraska on the Annual Cranes Surveys was 228,445 in 1980. The Annual Crane Surveys estimated the minimum continental population of sandhill cranes (including approximately 20,000 lessers in California) to be between 220,000 and 290,000 birds (Lewis 1979a), though Lewis (1979a) believed the count was an underestimate and that the population was closer to 400,000 cranes. A coordinated ground count on 20 March 1979 (the peak ground count for that year) estimated the crane population along the Platte at 258,112 cranes (Krapu 1981a). Tests conducted to evaluate the accuracy of previous ocular estimated found observers underestimated crane numbers by approximately 30%. Recent photographic surveys



(photographic strip sampling) estimated the maximum size of the crane population along the Platte at 306,000 in 1979 and 541,000 in 1980 (Krapu 1981a). In view of recent photographic surveys and evaluations, a figure of 400,000 to 500,000 is now commonly quoted for the central flyway population of sandhill cranes.

The number of sandhill cranes staging in the Platte River Valley generally peaks in late March or early April. The Annual Crane Inventories indicated sandhill cranes reached peak numbers along the Platte between the dates of 21 March and 8 April, with a mean census date of 27 March (Frith 1974, Lewis 1979a). Surveys indicated a peak on 24 March in 1979 and 4 April in 1980 (Krapu 1981a). If weather conditions are favorable for migration, large numbers of cranes may migrate north in late March. Unfavorable weather may delay crane migration into or out of the Platte Valley up to three or four weeks (Benning 1978).

Three major staging areas for sandhill cranes have been designated in the Platte and North Platte River Valleys (Krapu 1981a). Staging Area 1 extends from Grand Island to Kearney, encompassing 223 sq. miles, and including 45 miles of river channel. Staging Area 2 extends from Overton to Elm Creek, encompassing 99 sq.miles, and 24 miles of river channel; and Staging Area 3 extends from Sutherland to North Platte encompassing 71 sq. miles and 20 miles of the North Platte River. Approximately 103 miles of the Platte River channel are unused by cranes and occur between the three staging areas. Mormon Island lies at the eastern end of Staging Area 1.

Recent photographic surveys estimated that 2/3 of the sandhill crane population in the valley was located on Staging Area 1 (Krapu 1981a). The only "pristine" reaches (areas which have not noticeably changed over the past 42 years) of the Platte River remaining between Grand Island and Lexington as described by Frith (1974) are located within Staging Area 1. Frith (1974) found the pristine stretches of the Platte River and their associated wet meadow complexes had the largest sandhill crane roosts. Frith and Faanes (1980) reported that the Mormon-Shoemaker Island area had the highest crane density per linear mile of the known roosting areas along the Platte and North Platte Rivers in 1979. Roosting cranes averaged 3,994 cranes per linear mile on this stretch of river channel. Roosting densities of 11,000 cranes per 1/2 mile of river were found on the channel bordering Mormon Island (Frith 1980). The number of cranes censused on the Mormon Island stretch of the Platte River by the Annual Spring Sandhill Crane Survey from 1969 to 1980 is shown in Table 1.

Lewis (1974, 1979b) reported a gradient in the occurrence of the three subspecies along the Platte River. The Intermediate Sandhill Crane was more prevalent in eastern areas and the Lesser Sandhill Crane predominated on western areas. Lewis (1979b) reported a ratio of Lessers to Intermediates of 8:0 at Lewellen, 10:1 at North Platte, 14:7 at Overton, 14:3 at Gibbon, and 1:5 at Grand Island. These data indicate that the Intermediate or Canadian Sandhill cranes is probably the predominant subspecies on Mormon Island. The skewed distribution of the population and subspecies along the



Table 1. Number of sandhill cranes censused from Grand Island to Alda during Annual Spring Sandhill Crane Surveys from 1969 to 1980 (from Benning 1980).

Date	Alda to Grand Island	Total in Nebraska
2 April 1969 <sup>a</sup>	17,195	154,978
26-27 March 1970 <sup>b</sup>	22,300	193,600
30-31 March 1971	28,000	207,500
27-28 March 1972	18,600	183,600
27-29 March 1973	31,300	195,350
30-31 March 1974	16,859	171,570
29-30 March 1975	38,085	225,945
25-26 March 1976	2,550	150,264
17-19 March 1977	24,000	174,575
22-24 March 1978	25,540	152,021
4 April 1979 <sup>c</sup>	42,950	206,203
25-31 March 1980	23,500	228,445

<sup>a</sup>Survey conducted using aerial line transects with complete coverage of the Platte River Valley.

<sup>b</sup>All other surveys, unless noted, were conducted using aerial counts along the Platte River during presunrise period.

<sup>c</sup>Survey conducted using aerial count along the Platte River during presunrise period by Frith for Platte River Ecology Study (Annual Crane Survey count not included).

Platte suggested the Intermediate Sandhill Crane may be more numerous than previously thought (Buller 1967, Frith 1974, Johnson 1977, Aldrich 1978). Undetermined numbers of Greater Sandhill Cranes stage along the Platte, though their numbers appear to be very few (Frith 1974). (Most of the eastern population migrates through eastern North America and winters in Florida).

Nebraska is not a traditional fall staging area for sandhill cranes (Buller 1967). The fall migration of sandhill cranes occurs over a broad region of the Central Flyway with fall congregation or staging areas in Montana, North and South Dakota, Wyoming, Colorado, Kansas and Oklahoma (Buller 1967). Telemetry studies indicated that once sandhill cranes left fall staging areas in North Dakota they moved steadily to wintering areas, averaging an 8.5 day flight from North Dakota to south Texas (Melvin and Temple 1980). Choice of roost sites was described as "opportunistic" rather than traditional. One radio-marked crane made two overnight stops in Nebraska, one in Oklahoma and five in Texas during fall migration. Waterfowl and sandhill crane hunting was not found to affect the chronology of the southward migration (Melvin and Temple 1980). During fall, migrating sandhills occur in Nebraska from mid-September to mid-November (Buller and Boeker 1965) with a peak in migration during mid-October (Buller 1967).

#### HABITAT USE

Telemetry studies found that individual sandhill cranes utilized a relatively long segment of river channel for roosting



during their staging interval in the Platte River Valley. The average length of river channel utilized by 20 radio-marked cranes monitored in the Kearney-Shelton area in 1978 and 1979 was 7.3 miles (11.8km) (Krapu 1981a). Three other radio-marked cranes staging in the same area utilized an average of 7.4 miles (12km) of river channel for roosting in 1979 (Melvin and Temple 1980). Of the 20 radio-marked cranes monitored in 1978 and 1979 only two moved beyond the study area boundary indicating fidelity to a certain stretch of river following arrival by most cranes (Krapu 1981a).

The home range (total area encompassed by movements of an individual sandhill crane during the staging interval) of 20 radio-marked cranes averaged  $14 \text{ mi}^2$  ( $36 \text{ km}^2$ ) and ranged in size from  $4.5\text{-}26 \text{ mi}^2$  ( $12\text{-}67 \text{ km}^2$ ) during the spring of 1978 and 1979 (Krapu 1981a). Melvin and Temple (1980) reported a  $12.1 \text{ mi}^2$  ( $31.1 \text{ km}^2$ ) home range for one radio-marked crane and a  $22 \text{ mi}^2$  ( $57.0 \text{ km}^2$ ) home range for another crane during their staging interval along the Platte River in 1979. The spatial distribution of suitable roosting habitat, foraging habitats, the degree of disturbance and the associated need to shift activity centers are among the factors which may have influenced home range size (Krapu 1981a).

The habitat characteristics of radio-marked crane home ranges in the Platte Valley indicated that cranes selected areas with a diverse habitat base. The habitat composition of 20 radio-marked crane home ranges averaged 44% cropland, 20% native grassland and 10% hayland. Riverine habitat averaged approximately 18% of the home range (Krapu 1981a).



Preliminary analysis of the cumulative home range of spring staging cranes indicated that the home range was a composite of smaller activity ranges which shifted laterally along the Platte River. Approximately 39% of the cumulative home range was utilized in any five day interval (Krapu 1981a). Crane home ranges were found to be elongate with the long axis parallel to the river. The ratio of length to width was 1.8:1.0 (Krapu, In press).

Although the home range of spring staging sandhill cranes was found to be fairly large, the average daily movement by cranes was relatively small. The average distance that the 20 radio-marked cranes traveled daily was approximately 6.0 mi (9.7 km). The average move was 1.1 mi (1.8 km) with an average of 5.4 moves per day from the morning to the evening roost site. The average distance cranes moved per day decreased as the season progressed (Krapu 1981a).

Sandhill cranes typically feed in agricultural fields which are very close to the Platte River. The average distance of the diurnal locations of radio-marked cranes from their dawn roost site was 1.7 mi (2.8 km), and the maximum distance that radio-marked cranes moved from the channel averaged 2.6 mi (4.2 km) (Krapu 1981a). Photographic surveys found over 90% of the cranes within 2.8 mi (4.5 km) of the river channel (Krapu 1981) and telemetry studies reported that 94% of the diurnal locations of cranes were within 3.1 mi (5.0 km) of the channel (Melvin and Temple 1980). Wheeler and Lewis (1972) observed cranes feeding 7-8 miles from the river channel in the Overton area though photographic surveys in 1978-1980 revealed no cranes beyond 5.1 mi (8.3 km) from the river (Krapu

1981a). Roost to field distances traveled by cranes in the Platte River Valley are similar to those reported for cranes in North Dakota (Madsen 1967), Indiana (Melvin 1980) and Wisconsin (Crete and Toepler 1978) but slightly less than the 1.25 to 10.1 miles (2-16km) reported on wintering areas (Lewis 1974).

While staging in the Platte Valley sandhill cranes utilize a variety of agricultural habitat types during daylight hours. Early accounts described sandhill cranes utilizing corn, winter wheat, milo, alfalfa, hayland, pastures and wet meadows for feeding, resting, preening and interacting (Walkinshaw 1956, Wheeler and Lewis 1972, Frith 1974). Lewis (1979b) observed 45,308 cranes feeding and found 47% in corn and 45% in wet meadow, native grasses and hayland. The habitat use of 20 radio-marked cranes showed similar results. Of the 2972 locations 55% were in cropland and 42% in grassland and hayland (Krapu 1981a).

More than half of the cropland locations were in cornfields, primarily corn stubble. Fallow fields, winter wheat, and milo accounted for the remaining cropland use. Cranes spent 27% of their time in native grasslands. Ninety-four percent of the native grassland locations were in grazed pastures. Hayland use, primarily mowed alfalfa averaged 15% during 1978 and 1979. Crane use of cropland increased from 44% in 1978 to 61% in 1979, hayland use dropped from 27% in 1978 to 8% in 1979 and grassland use remained fairly constant (Krapu 1981a). Grassland use by radio-marked cranes was high in the early morning, mid-afternoon and late evening (Krapu 1981a) which concurs with earlier descriptions of crane



habitat use in the Platte River Valley (Walkinshaw 1956, Wheeler and Lewis 1972, Frith 1974). Crane use of croplands was highest during mid-morning and mid to late afternoon with hayland use remaining relatively constant throughout the day (Krapu 1981a).

Before and after roosting on the Platte River, cranes often gather in large flocks in pastures or hayfields adjacent to the river. Wheeler and Lewis (1972) termed such pastures or hayfields "secondary roosts" (the river roost being the "primary roost"), and stated that cranes may congregate there in numbers from 5,000 to 20,000. Cranes stayed on the secondary roost for 15 min. to 2 hrs or flew directly to more distant fields. Lewis (1979a), during the Annual Crane Surveys, noted that cranes used secondary roosts less from Grand Island to Shelton than in the North Platte-Sutherland area; differences he presumed were related to the availability of attractive wet meadow habitat. Cranes have also been reported to use secondary roosts while wintering in Texas, New Mexico and Florida (Walkinshaw 1949, Crete and Toepler 1979) and while staging in Indiana (Lovvorn 1980).

Sandhill cranes often congregate in large numbers in extensive grasslands or wet meadows during midday during their staging interval in the Platte River Valley (Frith 1974, Krapu 1981a). Walkinshaw (1956), in describing his visit to the Platte Valley stated; "Sometimes on warm, sunny days, large flocks congregated and much dancing ensued. On fewer occasions in mid-day, we found large groups, in a great grey mass just sitting down. These flocks were immense. One could not appreciate them without seeing them".



The concentration of large numbers of sandhill cranes during midday is also typical of cranes in Idaho (Drewien 1973), North Dakota (Madsen 1967, Johnson 1976), Indiana (Lovvorn 1980) and on wintering areas (Walkinshaw 1949, Frith 1974). Native grasslands, pastures, hayfields, or the primary roost site serve as congregation sites and are often described as midday loafing or resting areas, or midday roosts (Walkinshaw 1949, Madsen 1967, Lovvorn 1980, Melvin and Temple 1980, Krapu 1981a). Cranes in the Platte River Valley spent 24% of their time resting on grasslands compared to 12% and 11% on alfalfa and cropland respectively (Krapu 1981a).

Midday concentrations of cranes have often occurred in areas with standing water (Walkinshaw 1949, Bennett 1978). Single daily flights by cranes without a midday congregation has been reported at the Crex Meadows staging area in Wisconsin (Crete and Toepler 1979) and also in the Platte River Valley (Wheeler and Lewis 1972). Brotherson (1964; as cited in Lovvorn 1980) and Raveling (1969; as cited in Lovvorn 1980) noted that geese tended to return to night roosts for midday roosting when night roosts were large or close by but remained in outlying fields or ponds during midday when night roosts were small or far away.

Data concerning the seasonal pattern of habitat use by cranes in the Platte Valley are somewhat conflicting. Frith (1974) believed that cranes preferred wet meadow complexes early in the spring but when food sources were utilized, cranes shifted to the corn stubble fields in mid-March. He observed extensive use of the "Whiskey slough" wet meadow only once after 15 March. Telemetry data indicated an

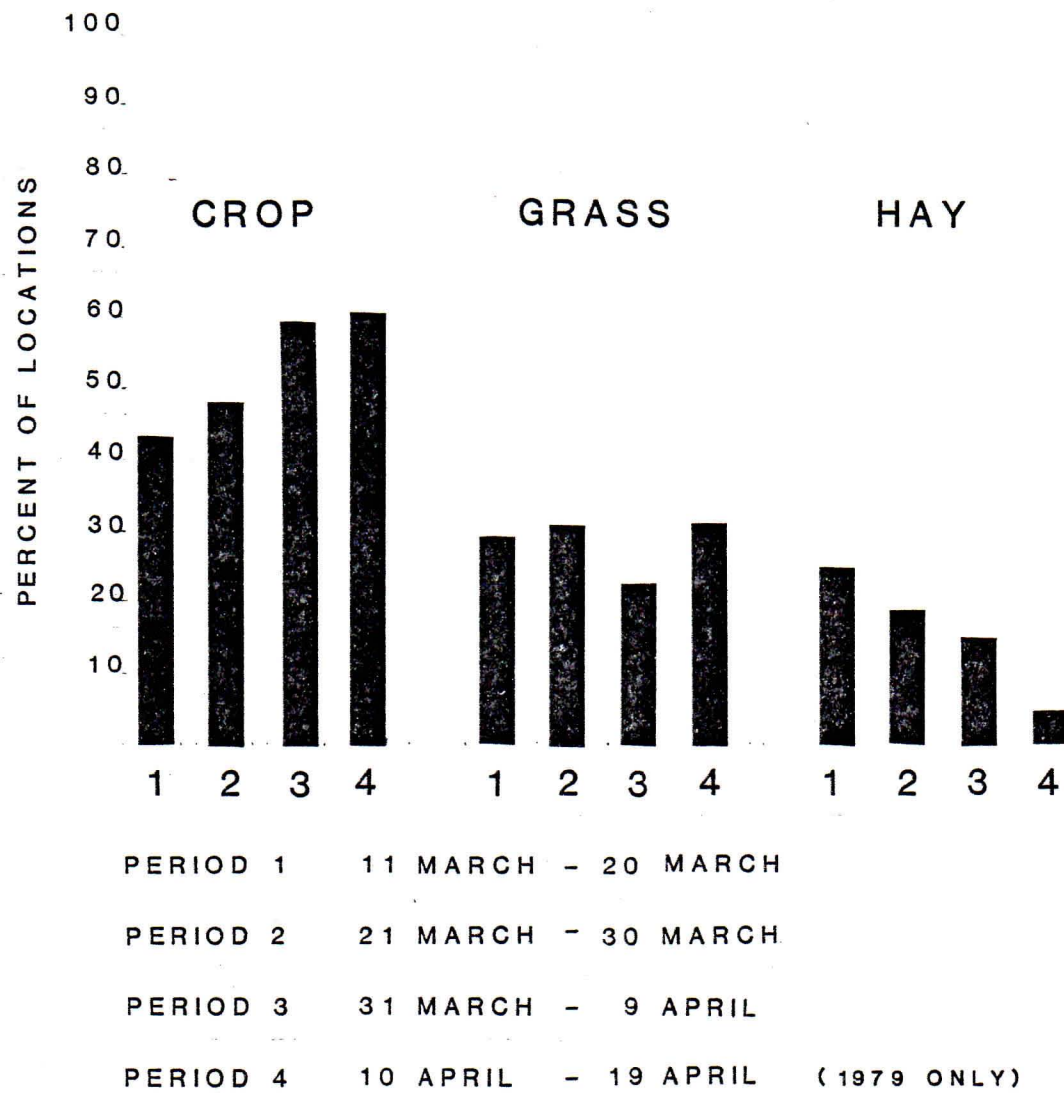
increase in crane use of cropland late in the staging interval and a decreased use of hayland, but grassland use remained fairly constant (Krapu, In press; Fig. 2 ).

#### FIELD USE BY SANDHILL CRANES

The term "tradition", often used to describe field use by sandhill cranes, refers to the continued use of certain fields day after day while seemingly identical nearby fields remain unused. Similar behavior has been reported for greylag (Anser anser) and pink-footed geese (A. brachyrhynchus) in Scotland (Newton and Cambell 1973 as cited in Lovvorn 1980), and Canada Geese in southern Illinois (Raveling 1969; as cited in Lovvorn 1980). Once geese were accustomed to using an area for feeding they were much less prone to constant alertness and the tendency to flee.

Within or between year tradition in use of fields by sandhill cranes has been noted in North Dakota (Madsen 1967), Indiana (Lovvorn 1980), Wisconsin (Melvin 1978), and Michigan (Walkinshaw 1949, Hoffman 1976). Hoffman (1976) described within year tradition as: "Even after most of the food appeared to be eaten cranes returned to certain fields where they were undisturbed.", and between year tradition as: "Some of these traditional high use fields attracted birds for several years in a row despite changes in crop type."

Lovvorn (1980) determined that tradition (past field use) explained 28% of the variability in relative fields use within a fall and 19% of the variability between falls. He noted that the effect of tradition increased the longer the cranes had been present. "Tradition" did not significantly affect spring use within or between





years in Indiana. Lovvorn (1980) attributed the lack of tradition in spring field use at Jasper-Pulaski to a shorter stay in spring and fewer sources of disturbance such as waterfowl hunting and harvesting activities.

#### FEEDING ECOLOGY

Sandhill cranes are quite omnivorous. Animal foods known in the sandhill crane diet include earthworms, crickets, grasshoppers, katydids, caterpillars, snails, Dipteron larvae, beetles, dragonfly nymphs, spiders, grubs, moths, frogs, lizards, snakes, minnows, carcasses of fish, nestling birds, and eggs (Walkinshaw 1949, Guthery 1976, Hoffman 1976, Bennett 1978, Lewis 1979b, Reinecke and Krapu 1979). Animal foods consumed by cranes in Nebraska are primarily invertebrates (Appendix A ).

Earthworms are often described as a "favored" food of sandhill cranes (Walkinshaw 1949, Hoffman 1976, Bennett 1978). Walkinshaw (1949) reported that a one month old captive crane chick ate 200 earthworms one morning and a similar number that evening. Bennett (1978) noted that crane parents with chicks spent 75% of their time probing for earthworms and that areas of pasture containing moist deposits of peat soil with high densities of earthworms were visited three or more times each day.

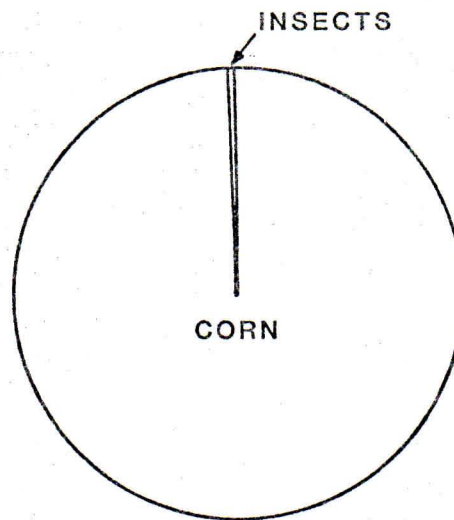
Sandhill cranes have also been reported to feed on the roots and tubers of native plants. In Texas, Guthery (1976) found the most abundant item in the diet of sandhill cranes to be the tubers of nut-sedges (Cyperus spp.), with tubers of arrowhead (Sagittaria

latifolia), waterlilly (Nymphaea elegans), and spiderwort (Tradescantia micrantha) also in the diet. Walkinshaw (1949) has observed cranes feeding on nut-sedges in Florida and on the roots of Carex spp., plaintain, and sorrel in Michigan. In Wisconsin, groups of non-breeding cranes fed primarily on tubers and rhizomes of arrowhead, and made limited use of burreed (Sparganium eurycarpum) and beaked sedge (Carex rostrata; Bennett 1978).

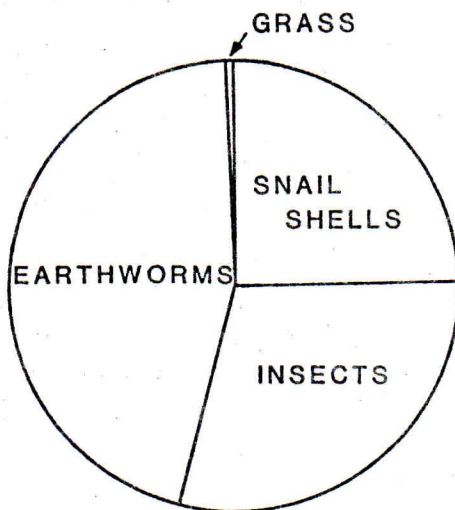
In the Platte River Valley, Wheeler and Lewis (1972) noted cranes eating earthworms and probing cowchips in search of larvae and undigested seeds. Frith (1974) believed cranes in wet meadows fed primarily on tender shoots of vegetation, especially Veronica spp.. Lewis (1979b) examined the gullets of 45 sandhill cranes and listed corn, sorghum, wheat seeds and forage, grass, earthworms, and grasshoppers as items in the diet

Reinecke and Krapu (1979) have refined the understanding of crane feeding ecology in the Platte River Valley by determining differences in foods consumed by cranes while foraging in corn, hayland or grassland. They found that cranes foraging in cornfields ate almost exclusively on waste corn, whereas cranes foraging in alfalfa fields and grasslands consumed primarily invertebrates (Fig. 3 ). Animal matter composed 99% of the diet of cranes foraging in grasslands, 82% in hayland and less than 0.5% in cornfields.

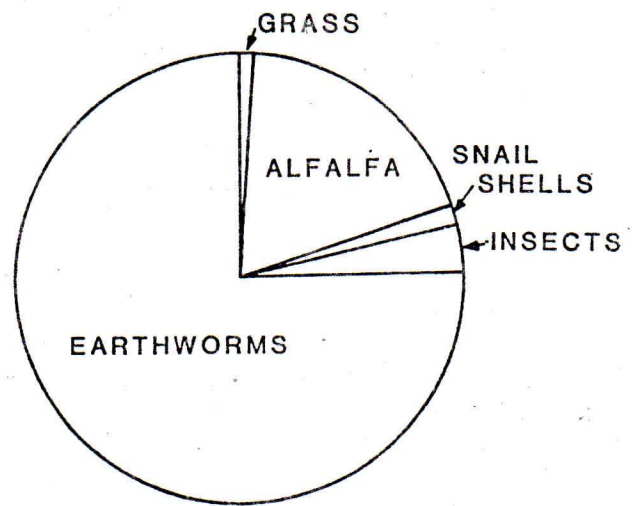
In grasslands, sandhill cranes consumed earthworms, snails, crickets, grasshoppers, sowbugs, spiders, and adult and larval beetles. Earthworms composed 46% of the crane diet in grassland, insects 29% and snails 24%. Grass leaves, found in just two cranes



CORNFIELDS



NATIVE GRASSLANDS



ALFALFA FIELDS



was the only plant food consumed on grasslands (Krapu 1981a).

The diet of cranes foraging in hayland was also primarily animal food. Earthworms (Lumbricidae: Aporectodea sp.) composed 75% of the diet in hayland, insects 5%, and terrestrial snails 2% while alfalfa leaves and stems composed 16% of the crane's diet (Reinecke and Krapu 1979, Krapu 1981a).

Cranes obtained 96% of their composite diet (by dry weight) from cornfields. However, the 4% of the diet obtained from grasslands and haylands increased the protein content of the crane's diet by 10-20% and increased the calcium intake by more than 500% (Krapu 1981a). More than 1/2 of the cranes collected in grasslands had ingested snail shells which contained 30-40% calcium. Evidence that cranes sought sources of calcium during spring was furthered by cranes digging in prairie sod for lime concretions in a pasture 5 miles (8 km) southeast of Grand Island. Five of the cranes collected in 1979 had ingested one or more lime pellets (Krapu 1981a).

When time budget, telemetry data, and food habits data were integrated the results indicated that cranes functioned at a net energy loss while foraging in grasslands and haylands in order to increase the protein and calcium content of their diet. Cranes spent over half of their daily foraging activity obtaining an average of 0.51 g of invertebrate protein and only short morning and evening periods gathering 26.6 g of waste corn (Reinecke and Krapu 1979).

McLandress and Raveling (1981) found Giant Canada Geese (Branta

canadensis maxima) increased their consumption of protein during spring and that the proteins and lipids stored during spring were adequate to supply energy and nutrient requirements for body maintenance after arrival on breeding grounds, egg laying and territorial defense, though females may have to obtain additional minerals and proteins for egg formation. They beleived that pre-breeding accumulated protein reserves were a major factor limiting clutch size. McLandress and Raveling (1981) also stated that carbohydrates were not fully assimilated by wintering geese restricted to a diet of corn because of inadequate dietary protein. Proteins for enzymatic activity were necessary for a more complete conversion of cornstarch to fat in spring.

#### LIPID STORAGE

The Platte River Valley serves as a major conditioning area for cranes during spring migration (Krapu 1981a). Though sandhill cranes were found to deposit lipid reserves throughout their spring migration through the Great Plains approximately 35-44% of the total lipid reserve was acquired in the Platte River Valley.

After leaving Nebraska sandhill cranes migrate across the Dakotas to central and western Saskatchewan and eastern Alberta where they stage until early May. There was a limited utilization of fat reserves during this migration but a substantial part of the fat reserve was utilized between departure from Canadian staging areas and arrival on breeding grounds. An estimated 40% of the lipid reserves of Lesser Sandhill Cranes were expended prior to



arrival on breeding grounds in western Alaska. The remaining lipid reserves were largely utilized during nesting. Female cranes expended lipids at a rate of 6.7 g/day during the nesting period but males did not undergo a similar decline in lipid reserves (Krapu 1981a).

The presence of substantial lipid reserves allows the female crane to search for high quality protein needed for egg formation although such a strategy may be inefficient energetically (Krapu 1981a). A similar strategy has been reported for mallards nesting in the Prairie Pothole region (Krapu 1981b). Stored nutrient reserves were also found to contribute substantially to the reproduction of arctic nesting geese which breed where food is scarce at the time of nesting (Barry 1962, Hansen 1962, Ankney and MacInnes 1978, Raveling 1979; as cited in Krapu 1981b). The magnitude of stored lipids was found to be positively correlated with clutch size in mallards (Krapu 1981b) and Lesser Snow Geese (Chen caerulescens caerulescens; Ankney and MacInnes 1979; as cited in Krapu 1981b).

#### SANDHILL CRANE HABITAT PREFERENCES

Preference indices for sandhill cranes in various regions have indicated that grassland and hayland are preferred habitat types during spring and the nesting season. In Indiana, Lovvorn (1980) found that grass and fallow areas (not fall plowed corn) were by far the most preferred cover types and that spring use of grass and fallow areas increased dramatically over that in fall.



Hoffman (1976) observed that cranes preferred pastures from March through July, but avoided pastures in September and October in Michigan. Hoffman (1976) reported that "haymarsh" had the highest preference index of all covertypes from March through May and the lowest in October and November. Radio-marked cranes in Wisconsin spent most of the time in grasslands, hayfields, and pastures from June through mid-August, and in harvested oats and cornfields from mid-August to September (Melvin 1978). Bennett (1978) reported grass and hay were preferred in Wisconsin in May and June but not in August and September. In North Dakota, Madsen (1967) found few cranes utilizing grasslands or pastures during fall even though they were the most prevalent habitat type in his study area, and he did not consider them in his preference indices because he beleived that cranes primarily loafed in grasslands.

Madsen's (1967) observations contrast to the spring habitat use of this same population in the Platte Valley where grassland and hayland use combined accounted for 42% of the total habitat use (Krapu 1981a). The preference for and increased use of grasslands and hayland during spring relative to fall by sandhill cranes is further evidence that the invertebrate foods which are consumed by cranes on these habitat types play an important role in the physiological conditioning of sandhill cranes prior to reproduction.

#### SANDHILL CRANES AND BURNS

Sandhill cranes are known to frequent burned areas. Walkinshaw (1949) stated: "On the Kissimmee Prairie in Florida, I found cranes

were fond of fresh burns, where they fed for several days together, often probing for roots of plants as well as seeking insects". He noted that the Cuban Sandhill Crane (Grus canadensis nesiotus), often fed on fresh burns and that this phenomenon was mentioned by nearly every author which had described this subspecies. Cuban Sandhill Cranes fed on the scorched reptiles, burned insects, roots, and beetle larvae found in the denuded soil (Walkinshaw 1949).. Wheeler and Lewis (1972) reported that during the dry spring of 1967 there were many grass fires and cranes were frequently observed feeding or loafing on burned areas during the Annual Sandhill Crane Survey in Nebraska. A 101 ha (250 acre) tract of tall grass prairie was burned on the Lillian Annette Rowe Sanctuary owned by the National Audubon Society on 9 April 1979, and 12 April 1980. The burned site received an immediate influx of sandhill cranes both years and on 17 April 1980 two Whooping Cranes (Grus americana) visited the site. Sandhill cranes collected on the site had consumed earthworms (Krapu 1981a). Labuda and Butts (1979) stated that Whooping crane use of recently manipulated (burned, mowed, grazed) upland areas from 1 week to 24 months after treatment has been documented but also reported no whooping crane use of one site for several years during prescribed burning management.

Burning, along with grazing and mowing is a management practice which is recommended on areas managed for sandhill cranes (Lovvorn 1980, Krapu 1981a) and whooping cranes (Labuda and Butts 1979).



## SANDHILL CRANE HABITAT REQUIREMENTS AND MANAGEMENT

One of the most basic habitat requirements for sandhill cranes in the Platte River Valley is a habitat complex which contains grassland, hayland and cropland. This has been documented by studies of the habitat composition of crane home ranges, crane habitat use and feeding ecology (Krapu 1981a). Corn provides cranes with an excellent energy source for the deposition of lipid reserves but the animal proteins consumed on grassland and hayland are especially important in the crane diet during spring.

On areas managed for cranes the provision of a secondary roost is desirable (Lovvorn 1980). Lovvorn (1980) recommended that the secondary roost be large (preferably 60 ha or greater), located close to the roost (within 1 km), and closed to public access other than discrete viewing facilities.

Cranes prefer fields with fairly low vegetation and tend to avoid tall rank stands of cover (Guthery 1976, Hoffman 1976, Bennett 1978, Melvin 1978, Lovvorn 1980, Krapu 1981a). Low vegetation allows cranes to move and feed freely, provides the open vista required for protection from predators and disturbance and increases the accessibility of prey items (Guthery 1976, Lovvorn 1980).

In Wisconsin, Melvin (1978) found that cranes foraging in pastures, hayfields, and other grasslands preferred vegetation less than 5.9-7.9 in (15-20 cm). Guthery (1976) noted that wintering sandhills in Texas preferred feeding sites where the



vegetation was less than 9.8 in (25 cm) tall. Lovvorn (1980) found vegetation 7.0 in (18.0 cm) tall was preferred by staging cranes in Indiana. Hoffman (1976) did not mention a specific vegetation height but stated that cranes preferred "short, sparsely vegetated fields" in Michigan. He observed that "most" crane use of alfalfa and hay marshes occurred just after the fields were cut or early in the year before much growth had taken place. Grassland use by radio-marked cranes in Nebraska was 94% grazed pastures, 4% mowed meadows and only 1% idle grasslands (Krapu 1981a).

Management recommendations for grasslands and haylands utilized by cranes often focus on the vegetation height issue. Bennett (1978) stated that the agricultural practices of mowing and grazing upland pastures were beneficial to cranes because they produced the favored low vegetation and prevented invasion by woody vegetation. Bennett(1978) found moderately to heavily grazed pastures were preferred over wild or lightly grazed pastures in Wisconsin. Lovvorn (1980) recommended that grassy areas managed for cranes should be mowed or burned periodically to preserve visibility and ease of movement. Hoffman (1976) stated that low vegetation was an "important" feature affecting field selection by sandhill cranes. Grazing and burning or a combination of both maintain grasslands in a condition suitable for cranes during their spring staging interval along the Platte (Krapu 1981a). Krapu(1981a) recommended that additional research be conducted to determine management practices which optimize the production of the invertebrate foods sought by cranes on grassland and hayland.

Cropland habitat types are utilized extensively by cranes especially during migration and on wintering areas (Madsen 1967, Stephen 1967, Lewis 1974, Fritzell et. al 1979, Krapu 1981a). Cranes utilized fields of corn, wheat, and oats in Michigan (Hoffman 1976) corn and oats in Wisconsin (Melvin 1978, Bennett 1978), wheat, oats and barley in North Dakota (Madsen 1967), corn wheat, and soybeans in Indiana (Lovvorn 1980), rice and sorghum in Texas (Guthery 1976), and almost exclusively corn in Nebraska (Fritzell et al. 1979).

Which of the cereal grains is most preferred by cranes is difficult to determine because of differences in cropland availabilities in different regions. Preference indices and observations suggest that wheat and corn are preferred over other cereal grains and corn may be preferred over wheat. In Michigan, winter wheat had the highest yearly preference index of all cover covertypes and was overwhelmingly preferred during harvest (July-September). However, once corn was harvested on October and November preference indices of corn surpassed those of wheat (Hoffman 1976). Madsen stated that although his data did not show it because of a low availability of corn in North Dakota, corn was probably "highly preferred" by cranes. Krapu (1981a) stated that none of the cereal grains provides comparable quantities of energy rich food as does corn. Because crane use of waste grain occurs during spring in Nebraska the over wintering capacity of different grains is a consideration as suggested by Hoffman (1976).



Although instances of cranes utilizing standing corn have been reported (Melvin 1978, Madsen 1967, Lovvorn 1980), researchers have reported a general avoidance of mature standing crops and a preference for harvested fields (Munro, Hoffman 1976, Bennett 1978, Melvin 1978, Lovvorn 1980). In view of this preference Madsen (1967) and Lovvorn (1980) suggested that corn managed for cranes should be mowed or chopped.

In Nebraska, cranes were found to feed almost exclusively on waste kernel corn, with no significant decrease in the availability of ear corn occurring during the staging interval. This suggests that management practices which produce an abundance of waste kernel corn would be best for cranes. Harvesting may be an acceptable management practice as long as harvesting efficiency is not 100% such that waste corn is available.

Fall plowing corn is not a good management practice for cranes and researchers recommend that fall plowing also be discouraged in surrounding areas (Lovvorn 1980, Krapu 1981a). In Indiana, Lovvorn (1980) found cranes preferred corn stubble over fall plowed corn during spring. In fall, he observed that cranes utilized fields immediately after plowing but stopped using them within several days; the attraction being only temporary. Lovvorn (1980) discouraged fall plowing because it decreases the over winter survival of invertebrates which are important to cranes in spring. Krapu (1981a) discouraged fall tillage in the Platte River Valley because fall plowing is known to reduce the availability of waste corn by approximately 90% (Frederick 1979,



as cited in Krapu 1981a). Krapu (1981a) predicted that if the crane population continued to shift and fall plowing approached or exceeded 50% crane food sources could be seriously affected. Grazing livestock is compatible with crane use because cattle eat primarily ear corn. Krapu (1981a) stated that the practice of grazing livestock on corn stubble was beneficial to cranes because it discouraged fall plowing and maintained the supply of waste corn.

Harvesting efficiency is presently about 93-94% in the Platte Valley (Krapu 1981a). At this harvesting efficiency and the acreage of corn present in the Valley in 1978 and 1979 it was estimated that cranes utilized only 10-20% of the waste corn available to them upon arrival and left behind a quantity equal to 3-5 times the requirement of the total population (Krapu 1981a). For this reason providing corn for cranes is not a management priority for cranes in the Platte River Valley. We recommend that on areas acquired for cranes management efforts be concentrated toward providing native grasslands or hay.

Suitable roosting habitat is a critical habitat requirement of sandhill cranes during spring and fall migration and on wintering areas. Sandhill cranes roost in a variety of aquatic habitats in North America all of which provide the essential feature of shallow water. Cranes roost in bogs, marshes, wetlands, flooded fields, waterfowl impoundments, beaver ponds, large shallow lakes, wet glades, bays, and shallow portions of rivers (Madsen 1967, Johnson 1976, Lewis 1976, Bennett 1978, Melvin 1978, Toepler and

Crete 1979, Lovvorn 1980). In Nebraska, cranes roost on the shallowly submerged sandbars of the Platte River (Frith 1974).

In Indiana, cranes preferred water 8 in (20 cm) deep (Lovvorn 1980). When cranes landed in deeper water they promptly waded to shallower areas. Lewis (1974) found water 4-8 in (10-20 cm) was preferred by cranes on winter roosts. Frith (1974) stated water 1-6 in (2.5-1.5 cm) was preferred by cranes for roosting on the Platte River. Generally, cranes prefer roosting in water that does not extend above their knee or lower tibio-tarsal joint.

Apparently, sandhill cranes require shallow water for night roosting to protect them from predators. Lovvorn (1980) and Lewis (1976) believed that it was the visibility over water which protected them and Wheeler (1973) suggested the sound of a predator's approach through water also provided protection.

Roosting considerations are critical to crane management as cranes generally will not remain in an area unless water roosts are available (Lewis 1974). Cranes have abandoned roosts which became dry or too deep (Lewis 1974) and have initiated use on dry roosts after flooding (Lovvorn 1980). Lewis (1974) recommended management for crane roosting habitat include maintenance of normal water flows, to provide shallow water roosts. Permanent modification in stream flow can have an unfavorable impact on crane roost sites and the frequent alteration of the locations of sandbars and shallows typical of a dynamic river system are beneficial to crane habitat (Lewis 1976).



A roosting requirement of sandhill cranes in the Platte Valley which is not often encountered in other regions, is a wide river channel. Frith (1974) first emphasized the preference of cranes for roosting in "open areas" where the channel was wide and island vegetation low. An analysis of approximately 192 miles of Platte River channel and the distribution of roosting cranes also indicated a strong preference by cranes for a broad river channel (Krapu 1981a). Sections of river channel 0.5 mi in length with an unobstructed channel width of at least 150m supported nearly 70% of all roosting cranes in 1979, although only 25% of the channel segments sampled has these characteristics. Over 20% of the river segments had a maximum unobstructed channel less than 55m wide, but less than 1% of the cranes roosted on them. Crane use of river segments in which the maximum channel width was 55-150m was less than expected except where the average bank vegetation was less than 0.5 m high. Lewis (1976) reported cranes stopped using a winter roost when encroaching vegetation left the stream channel less than 100m wide.

Sandhill cranes probably roosted throughout most of the "Big Bend " stretch of the Platte River (Krapu 1981a), but changing channel conditions, especially the reduction in channel width to 10-20% of its former size in many areas due to reduced flows (Williams 1978), has now restricted crane roosting to approximately 70 mi of river channel (Krapu 1981a).

Krapu (1981a) recommended that a long term management goal for crane roosting habitat on the Platte should be to prevent



further channel shrinkage and to maintain an unobstructed channel width of a minimum of 150 m in crane staging areas. River channel managed specifically for cranes should attempt to maintain channels at least 200 m to accomodate the needs of whooping cranes. The characteristics of channel segments in the Mormon Island stretch of the Platte River are found in Appendix B .

Typical crane roosts in the Central Flyway are bordered by a shoreline lacking vegetation or sparsely vegetated (Johnson 1976, Lewis 1976, Melvin and Temple 1980). Researchers have emphasized the openness and extensive visibilities characteristic of crane roosts in the Central Flyway (Frith 1974, Johnson 1976, Lewis 1976).

The detrimental effects of the encroachment of woody vegetation on previous channel areas of the Platte River to crane roosting habitat have been decribed by Frith (1974, 1976), Lewis (1976) and Krapu (1979, 1981a). An analysis of channel characteristics and crane roosting distributions showed that cranes along the Platte tended to avoid stretches of channel where the vegetation was greater than 8 m in height. The intolerance of cranes to woody vegetation is documented by the abandonment of two crane roost sites in Oklahoma where woody vegetation encroached during drought conditions (Lewis 1974), decreased crane use of "transitional" (degraded noticeably) and "degraded" (changed significantly) stretches of the Platte River (Frith 1974), especially in the Overton-Elm Creek area (Krapu 1981a), the documented abandonment of 23 miles of the Platte River in the Cozad-Lexington area, and the probable abandonment of approximately 2/3 of the original channel habitat

available in the Platte and North Platte Rivers (Krapu 1981a).

Cranes arriving on wetland or riverine roosts either land directly in the water or on beaches, mud flats or exposed sandbars (Wheeler 1973, Lewis 1976, Lovvorn 1980). Lovvorn (1980) observed that mudflats and shorelines were preferred landing sites. Lewis (1976) reported that on an unused roost which was surrounded by woody vegetation, a thicket 30 m wide was cleared extending from a wheat field to the roost, and the roost was subsequently used for roosting. Cranes often walk, dance or loaf on unvegetated sandbars during twilight (Wheeler and Lewis 1972). The loss of 45% of the open water and barren sandbar habitat between 1938 to 1965-1969 from Lexington to Chapman (U.S. Fish and Wildl. Serv., Grand Island; as cited in Frith and Faanes 1980) has probably also affected crane roosting distributions.

The detrimental effects of woody vegetation to crane roosting habitat on the Platte River include a reduction in the width of unobstructed channel, a decrease in openness and visibility, the stabilization of islands resulting in increased channelization and reduced alluvial shifting with a related decrease in the availability of shallowly submerged sandbars and a decrease in the availability of exposed sandbars for landing and loafing.

In view of the intolerance of cranes to woody vegetation Lewis (1976) and Krapu (1981a) recommended management to control woody vegetation encroachment by water flow manipulations or mechanical means on channel areas managed for cranes.



Cranes prefer to roost in locations isolated from human disturbance (Lewis, 1974, 1976, Johnson 1976, Aldrich 1979, Crete and Toepler 1979, Lovvorn 1980, Melvin and Temple 1980, Krapu 1981a). Bridges crossing the Platte River and roads immediately adjacent to the river had a significant negative effect on crane roosting (Krapu 1981a). The mean number of cranes roosting on stretches with bridges or adjacent roads was less than half the mean number on stretches without these disturbances. Melvin and Temple (1980) found that 74% of the roost sites utilized by migrating cranes in the Central Flyway had complete visual isolation from sources of human disturbance, and another 19% were judged to have at least partial visual isolation. Cranes migrating through eastern North America selected such secluded roosts that they were previously thought to migrate non-stop from wintering grounds in Florida to northern nesting areas (Walkinshaw 1949, Crete and Toepler 1979). Lewis (1976) found crane roosts in Texas and Oklahoma were often 1.6 to 5 km from the nearest road and a greater distance from the nearest house. In Indiana, Lovvorn (1980) found the minimum distance from human activity averaged 140 m for roosts surrounded by woods and 380 m for roosts without visual obstruction.

Hunting, a severe ~~from~~ of disturbance, has dramatic effects on crane use of roost sites. Abandonment of crane roosts disturbed by waterfowl or crane hunting has been reported by Hoffman (1976), Bennett (1978), Crete and Toepler (1979), Lovvorn (1980) and Melvin and Temple (1980). Waterfowl hunting and/or crane hunting



was found to affect the chronology of fall migration in eastern North America (Crete and Toepler 1979), but not in the Central Flyway (Melvin and Temple 1980).

Lovvorn (1980) believed that disturbance long before the roost arrival period caused avoidance of roosts. Wheeler (1973) believed that a rocket-net shot on a crane roost would affect crane use of the area for only a few days, though repeated shots would lead to abandonment. Lewis (1976), Crete and Toepler (1979), Lovvorn (1980), and Krapu (1981a) cite protection from excessive human disturbance as a management goal for crane roosting habitat.

SANDHILL CRANES ON M.I.C.M.

## INTRODUCTION

The spring of 1981 was early and mild. Average monthly temperatures for February, March and April were above normal. Precipitation was below normal in February and April and above normal in March (National Weather Service, Grand Island). Ice break-up on the Platte River occurred on 17-18 February as compared to the 12 March date considered normal for the Grand Island area (Benning 1978).

Sandhill cranes were first observed in the Mormon Island area on 14 February 1981. Early arrivals roosted in fallow fields south of Mormon Island as ice conditions prevented roosting on the river. Cranes first roosted in the south channel of the Platte River on 19 February 1981 and utilized fields on Mormon Island on 22 February 1981. Crane use of M.I.C.M. peaked on 25 March 1981 and 12 April was the last day that at least 1000 cranes were present. Cranes were first noted in North Dakota on 28 March 1981.

A visit to the area during March or early April revealed the Mormon Island Crane Meadows was aptly named. Scores of thousands of cranes congregated during midday on the extensive wetland meadows of Mormon Island during this period. The hayfields adjacent to the south channel of the Platte River were used extensively by cranes in both morning and evening as secondary roosts. This pattern of habitat use characterized crane use of M.I.C.M. during the spring of 1981.



## SANDHILL CRANE USE OF WETLAND MEADOWS

Periodic counts of cranes arriving in wetland meadows portrayed temporal patterns in crane use of meadow areas. Cranes utilized wetland meadows from dawn until dusk on some days. Generally, large numbers of cranes were present from 1000 to 1600 hrs (C.S.T.). Most groups of cranes arrived from 1100 to 1300 hrs and peak numbers were present between 1400 to 1500 hrs. Krapu (In press) reported similar patterns in afternoon grassland use. Soaring activity was greatest in the late morning although occasionally soaring occurred throughout the afternoon. The best time to census cranes on wetland meadows was from 1400 to 1500 hrs (C.S.T.).

The number of cranes utilizing wetland meadows varied daily but use by thousands to scores of thousands of cranes occurred from late February to mid-April (Fig. 4 ). These observations differed from observations by Frith (1974) who observed extensive use of the "Whiskey slough" wetland meadow only once after 15 March. On certain days late in March relatively few cranes were present on the wetland meadows but large numbers were observed in cornfields south of Mormon Island, which was similar to the phenomenon Frith (1974) described. However, the wetland meadows on Mormon Island were utilized extensively by cranes throughout March and into April.

The maximum count of 31,420 cranes on the wetland meadows of Mormon Island occurred on 25 March (Table 2 ). On 24 March, 26 March and 3 April crane numbers in meadow areas exceeded 20,000 birds. On ten other days crane numbers exceeded 10,000 birds. A total of

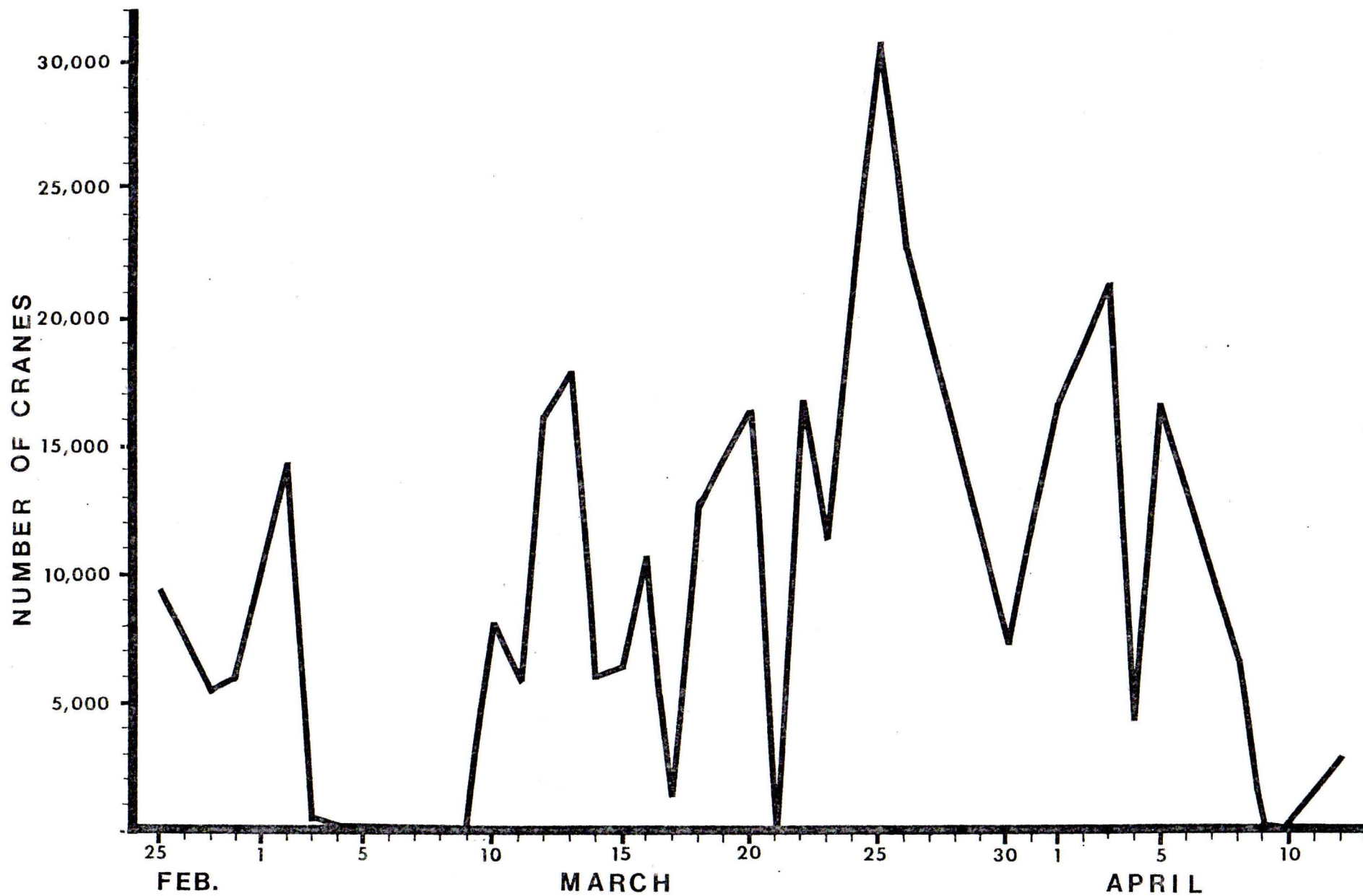


Table 2. Sandhill crane censuses of wetland meadows on Mormon Island in 1981.

Date	Field 2	Field 3	Field 4	Total
Feb 25	0	6950	2400	9350
27	0	5300	200	5500
28	0	6000	0	6000
Mar 2	0	9700	4500	14,000
3	0	200	300	500
4	0	25	75	100
5-7	0	0	0	0
9	0	0	0	0
10	0	8000	0	8000
11	0	5100	800	5900
12	1000	15,000	0	16,000
13	1550	15,750	350	17,650
14	0	2700	3500	6200
15	0	6200	100	6300
16	6350	2200	2000	10,550
17	1200	200	0	1400
18	0	5925	4750	12,525
20	0	6250	10,000	16,250
21	0	0	0	0
22	6750	9500	350	16,600
23	3910	4550	2900	11,360
24	9550	10,250	1400	21,200
25	14,020	16,900	500	31,420
26	7410	14,450	850	22,710
30	5000	1585	600	7185
Apr 1	9100	5700	2000	16,800
3	12,600	6950	1735	21,286
4	3410	640	500	4300
5	11,786	3100	1680	16,566



Table 2. (continued).

8	5950	380	400	6730
9	0	85	324	409
10	150	0	20	170
12	2950	0	0	2950
<hr/>				
Total crane-use days	154,385	241,633	57,092	453,110

42,734

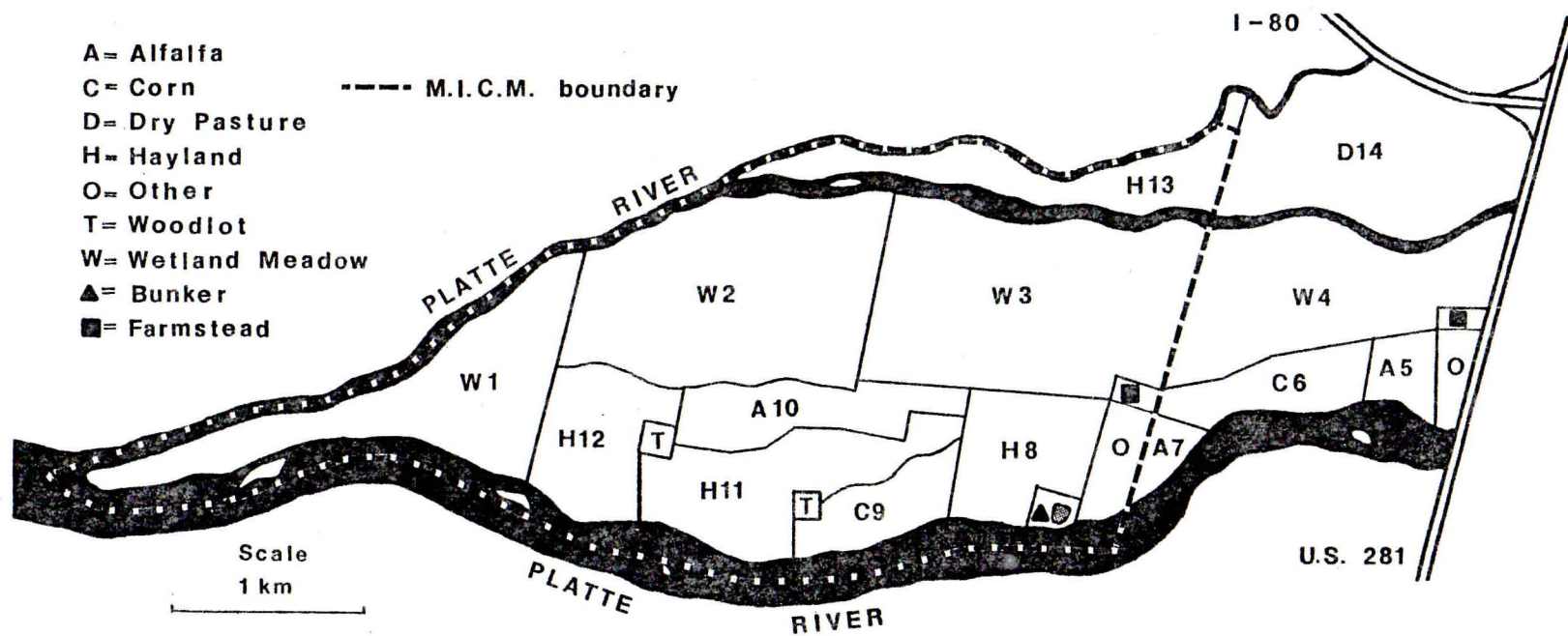
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453,110 crane-use days were recorded on the wetland meadows of Mormon Island during the spring of 1981. Field 2 had 154,385 crane-use days, field 3 241,633 crane-use days and field 4 57,092 crane-use days, comprising 34.1%, 53.3% and 12.6% of the total crane-use days respectively (Fig. 5 ). (Field 1 very rarely had any afternoon crane use. Crane use of each field on M.I.C.M. in 1981 is described in Appendix C.).

A comparison of roost counts and ground counts suggested that Mormon Island served as a major congregation area for cranes roosting between the U.S. 281 and Alda bridges. On 24 March, 47.8% of the number of cranes roosting on this stretch of the Platte River channel occurred on the meadows of Mormon Island that afternoon, and on 2 April, 48.8% of the mornings roost count was censused on the wetland meadows. Thus, nearly 50% of the total number of cranes roosting on the 6.5 miles of river channel between the U.S. 281 and Alda bridges may utilize the wetland meadows of Mormon Island during the afternoon. Crane numbers were frequently so high that wetland meadows resembled the "great grey mass" of cranes described by Walkinshaw (1956). Ferguson (pres. comm.) photographed 10,000 cranes/40 acres on field 3 in 1979 at a density of 250 cranes/acre. On 25 March 1981, 16,000 cranes were censused on field 3 at an average density of 40.9 cranes/acre. (Actual densities would be higher as crane distribution was "clumped".) Crane densities averaged 36.0 cranes/acre on field 2 on 25 March when 14,000 cranes were censused on this field.

Crane use of wetland meadows seemed to be influenced by weather conditions. The influence of weather on time of crane roost arrival





and departure and time spent on secondary roosts has been described (Wheeler and Lewis 1972, Lewis 1979, Bennett 1978, Melvin 1978). Lovvorn (1980) reported that cranes minimized the distance they flew to fields when temperatures were low or wind speeds high. Walkinshaw (1956) and Wheeler (1973), noted that large congregations of cranes often occurred on "warm, sunny days".

No cranes were observed on the meadows of Mormon Island from 4-9 March, a period of six days. On 4 March, 5.4 inches of snow fell and the temperatures were below normal for the next six days. The average minimum temperature for 4-9 March was 19.8°F (National Weather Service, Grand Island). On 17 March, a day with low crane use winds were recorded at 35-40 mph out of the NE. On 21 March a day with no afternoon crane use, 0.59 inches of rain fell. In contrast, weather conditions during high crane use were mild. The average temperature for 24-26 March and 3 April, days of high crane use, was 61.2°F, maximum wind speed recorded was 10 mph, and % cloud cover and precipitation were zero on all four days.

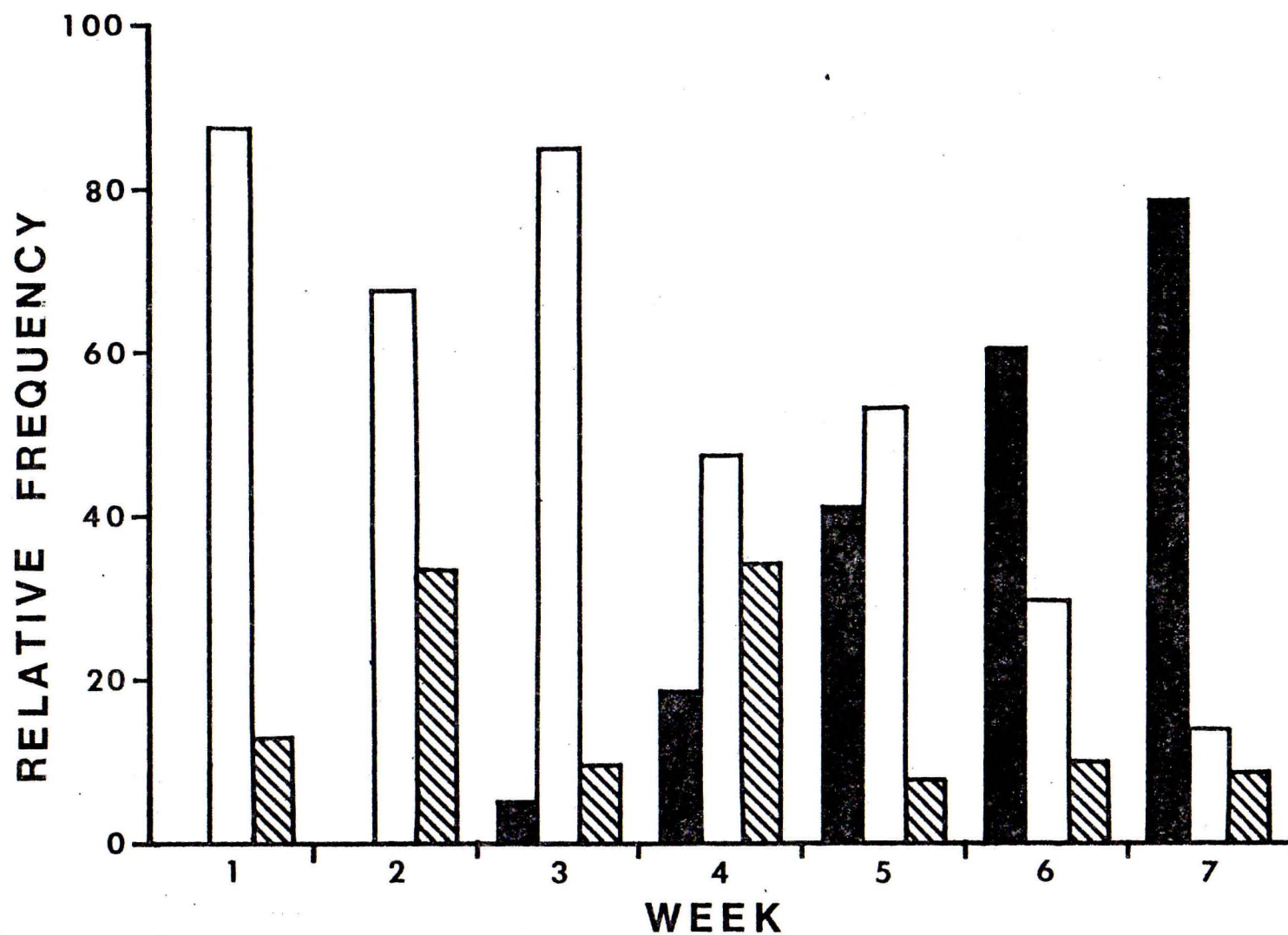
Much of the day to day variation in crane numbers occurring on Mormon Island in the afternoon was thought to be due to weather conditions (Fig. 4 ). High crane numbers were present on days with mild temperatures, light winds and little or no precipitation. Low numbers were present during adverse weathers such as high winds and/or precipitation. High winds, rain or snow apparently affected the daily pattern of habitat use and cranes often remained in outlying fields all day without making an afternoon flight to M.I.C.M.. Censuses to determine peak crane use or densities should be

conducted during mild weather.

A gradual shift from east to west in crane use of wetland meadows and within meadows occurred during the spring of 1981 (Fig. 6 ). The relative frequency of cranes in field 3 was high during weeks 1-3 and declined during weeks 4 through 7. Crane use of field 2 did not begin until midweek 3, and the relative frequency gradually increased during weeks 3-7. An east to west shift also occurred on secondary roosts (Fig. 7 ). Individual sandhill cranes were found to shift activity centers along the river during their staging interval in the Platte River Valley (Krapu 1981a) which may be associated with the shifts in field use by cranes on Mormon Island. The localized depletion of food resources in fields with consistently high crane use may be responsible for shifts in field use as suggested by Frith (1974) and Krapu (1981a).

The relative frequency of cranes within pastures (Table 3 ), indicated that crane use of field 3 and 4 was more evenly distributed over the staging season than crane use of field 2. In field 2, 71.9% of the crane use occurred during weeks 5-6, and a total of 90.8% of the crane use of this field occurred during weeks 5-7. Both fields 2 and 3 had most of their crane use during week 5 and field 4 had most of its crane use during week 4. The relative frequency of cranes in all meadows indicated that approximately one-third of the total crane use of wetland meadows occurred during week 5 (22-28 March).

The frequency of occurrence of at least one thousand cranes on wetland meadows by week is shown in Table 4 . The low frequency of occurrence values for week 2 was probably caused by the snow fall and



**FIELD 2**

**FIELD 3**

**FIELD 4**

WEEK 1 - FEB 22-28

2 - MAR 1-7

3 - MAR 8-14

4 - MAR 15-21

5 - MAR 22-28

6 - MAR 29-APR 4

7 - APR 5-11



Table 3 . Relative frequency of sandhill cranes within wetland meadows by week in spring 1981.

Week #	Relative Frequency			Total
	Field 2	Field 3	Field 4	
1	0	17.6	10.6	10.7
2	0	4.8	10.0	3.8
3	1.9	21.1	9.5	13.1
4	7.3	11.3	34.4	12.8
5	37.8	32.3	14.7	31.9
6	34.1	10.7	14.8	19.2
7	18.9	2.1	5.9	8.3
	154,385	241,633	57,092	453,110

Table 4 . Frequency of occurrence of 1000+ sandhill cranes in wetland meadows by week in spring 1981.

Week No.	Field 2	Field 3	Field 4	All fields
1	0%	100%	33%	100%
2	0%	17%	17%	17%
3	33%	83%	17%	83%
4	50%	67%	50%	83%
5	100%	100%	40%	100%
6	100%	75%	50%	100%
7	60%	20%	20%	60%
Total	49%	63%	31%	74%

cold temperatures during that week. Field 3 received the most consistent crane use throughout the staging season with a drop in use during week 7. Field 2 had fairly consistent crane use during weeks 4-7 but a fairly low overall frequency of occurrence value due to the lack of crane use during weeks one and two. Large numbers of cranes did not consistently occur on field 4. At least 1000 cranes were present on 74% of the days censused, which was the same as the grassland use by radio-marked cranes which occurred on 74% of the tracking days (Krapu, In press). The fairly low overall frequency of occurrence value for field 2 demonstrates the affect that within season tradition (continued use of certain fields while others remain unused) has on the occurrence of cranes in certain fields. These data indicate that weather and within season tradition should be considered when sampling crane use or densities on certain fields.

After intensive observation of cranes during the staging interval it appeared that the wetland meadows on Mormon Island served as a congregation area for cranes during migration. Lovvorn (1980) noted that it appeared as if the "Goose Pasture" ( a midday roost) was a gathering place for newly arriving migrants. He also observed that use of the Goose pasture was inconsistent until the peak of migration. The peak in crane use of M.I.C.M. on 24, 25, and 26 March, so close to the average date of 27 March for the peak in crane numbers in the Platte River Valley, supports our theory. Surrounding the overall peak in crane numbers would be days of migration into



and out of the Platte River Valley. Although the peak in crane use of meadows could have been due to larger numbers of cranes in the area, this is unlikely as crane numbers along the Platte were found to increase gradually during the spring staging interval (Krapu 1981a). Also, the days of peak crane use on M.I.C.M. occurred during mild weather and the congregation of unusually large numbers of sandhill cranes on warm, sunny days has been noted (Walkinshaw 1949, Wheeler 1973). Melvin and Temple (1980) reported that radio-marked cranes migrated only during favorable weather conditions i.e. warm, sunny days.

An increase in "migratory nervousness" (Zungunrhue) and frequent soaring activity were observed at this time. We believe that the increase in crane use of wetland meadows in late March occurred because cranes utilized this native area as a congregation site upon arrival to and departure from the Platte River Valley.

Incidental to crane censuses, 18 neck-collared cranes were sighted (Table 5 ). Most were banded in Texas, but one was banded in Oklahoma and one near Hershey, Nebraska. Of the 22 neck-collared cranes sighted during the coordinated ground count conducted by the U.S.F.W.S. in 1979, only one was observed on Mormon Island (Faanes, pers. comm.) and this individual (TJ94) was observed on seven occasions in 1981. TJ94 was first observed on 16 March and last on 9 April which is a minimum stay of 25 days. This is similar to the length of stay for radio-marked cranes of 26.2 days in 1978 and 31.7 days in 1979 (Krapu 1981a). Melvin and Temple (1980) reported a 28 day stay for a radio-marked crane in 1979 even though the crane did not arrive in the Platte River Valley until 25 March.

Table 5 . Neck-collared sandhill cranes observed on Mormon Island in 1981.

<u>Collar color</u>	<u>Collar number</u>	<u>Date(s) observed</u>	<u>Date banded</u>	<u>Age at banding</u>	<u>Banding location</u>	<u>Remarks</u>
Black on white	UC75	11 Mar	1-7-80	Adult	Rich Lake	
"	TX10	11 Mar	--	--	TX	
"	UJ14	11 Mar	3-19-80	Adult	Hershey, NE	Rare sighting.
"	TW15	13 Mar	--	--	--	
"	TK18	16 Mar	2-9-79	Adult	Rich Lake TX	
"	TJ94	16, 20, 21, 23, 24, 27 Mar 9 Apr	2-23-79	Adult	Rich Lake TX	Observed on Mormon Island in 1979
"	UK08	16, 23, 27 Mar	2-14-80	Adult	Muleshoe NWR TX	
"	UU62	16 Mar	2-6-80	Adult	Rich Lake	
"	UC20	16 Mar	1-1-80	Adult	Rich Lake, TX	Radio-marked
"	TE44	18 Mar	2-18-79	Adult	Muleshoe TX	Rare sighting
"	UP71	22 Mar	2-26-80	--	Rich Lake, TX	
"	UK09	22 Mar	2-14-80	Adult	Muleshoe NWR TX	
"	TJ78	31 Mar	1-22-79	Adult	Rich Lake Tx	
"	TE84	31 Mar	2-18-79	Adult	Muleshoe Tx	Rare sighting
"	UU24	25 Mar	2-5-80	Adult	Rich Lake, TX	
"	UC82	2 Apr	--	--	--	
White on green	UY04	7 Mar	10-27-79	Juvenile	Washita, NWR Oklahoma	Rare sighting
"	UA25	22 Mar	1-10-80	Adult	Rich Lake Tx	
Total	18 individuals					

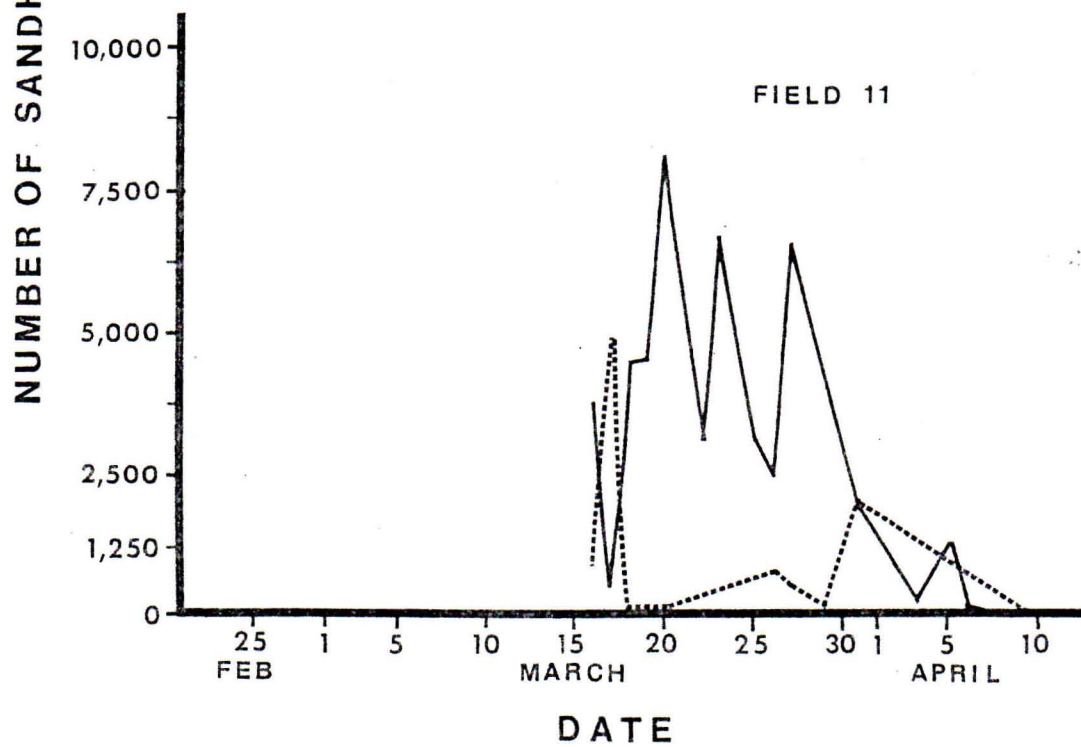
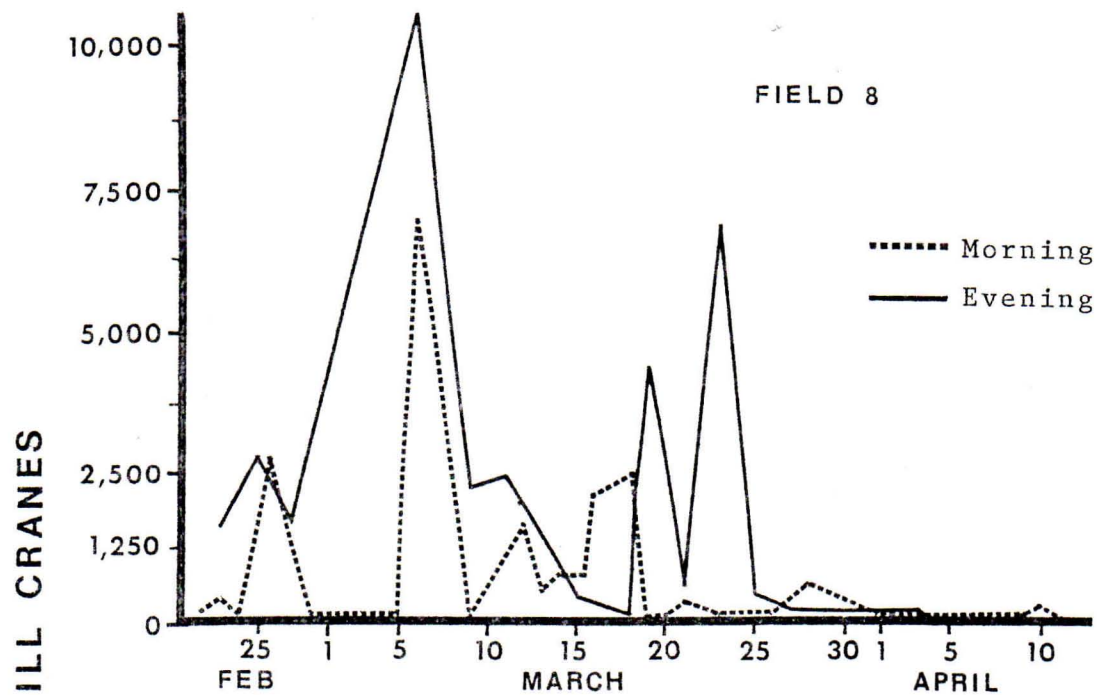
## SECONDARY ROOSTS

Sandhill cranes used the hayfields on M.I.C.M. in the morning and evening as secondary roosts. The number of cranes which utilized hayfields was generally greater in the evening than in the morning (Fig. 7 ). On the evening of 6 March 1981, 10,400 cranes were counted as they arrived in field 8 resulting in an average density of 94.6 cranes/acre. Field 8 had cranes on approximately 63% of the mornings and 86% of the evenings while field 11 had cranes on approximately 57% and 93% of the mornings and evenings respectively. Our data concur with Frith (1974) who believed secondary roosts were used more consistently in the evening than morning. Overall, crane use of secondary roosts seemed unpredictable which was also noted by Lovvorn (1980) in Indiana. Crane use of secondary roosts decreased as the season progressed.

Length of stay on secondary roosts was highly variable and no seasonal pattern was discerned. Prolonged use occurred on foggy or inclement mornings as described by Wheeler and Lewis (1972) but prolonged use up to 4.5 hrs after sunrise also occurred on clear days. Generally, adverse weather did not increase evening use of secondary roosts since cranes often landed directly on the river. The average length of stay on secondary roost sites was 54 min. in the morning (field 8) and 70 min. in the evening (field 11). Cranes began arriving on secondary roosts up to two hours before sunset. Hayfield crane densities were best assessed in the evening because use was more consistent and usually larger numbers of cranes were present.

During prolonged use of secondary roosts, cranes fed intensely (Fig. 8 ). Time budget data found cranes spent 50% of their time











feeding while in haylands (Krapu 1981a). Examination of hayfields revealed a high density of probes up to 4 inches in depth and evidence of raking and scratching. Cranes often congregated along the relic channel wetland in field 11 to drink (Fig. 9 ). Aerial photography of cranes in the Platte River Valley showed cranes often congregated near stock ponds or wetlands (Ferguson, pers. comm.). Johnson (1977) found cranes often returned to their wetland roosts to drink or sought freshwater seeps if roosts were saline. Walkinshaw (1949) reported that cranes at all seasons regularly visit marshes or streams for water.

At dusk, cranes on secondary roosts would often walk to the south edge of secondary roosts and depart in small flocks for the short flight to their night roost site. Often cranes flew well below tree level as they entered the river channel, and at times cranes appeared to seek areas without overstory vegetation for entry into the channel. These observation suggested that overstory vegetation may inhibit crane use of areas adjacent to the channel as secondary roosts. Crane use of certain areas might be enhanced by limiting bank vegetation to shrub height.

The number of cranes which utilized secondary roosts was generally less than the number which utilized wetland meadows during the afternoon. Lewis (1979) noted that cranes used secondary roosts more south of the Platte River than north of it. A wetland meadow south of Mormon Island ( Sec 3, T9N, R10W ) was utilized extensively by cranes as a secondary roost.



## ROOST COUNTS

Counts of departing cranes on the south channel of the Platte River between U.S. 281 and the Alda bridge were conducted on 25 February, 24 March and 2 April (Fig. 10 ). This stretch of river includes approximately 5 miles of river channel which border Mormon Island and approximately 1.5 miles of river channel west of Mormon Island. On 26 February, 26,292 cranes were censused on this stretch of river averaging 4,142 cranes per mile. On 24 March, 44,315 cranes were censused at an average of 6,818 cranes/mile and on 2 April, 34,410 cranes were censused averaging 5,294 cranes/mile. The maximum roost count of 44,315 on 24 March was 189% higher than the Annual Crane Survey count of 23,500 for this stretch of river in 1980. Our data compared favorably with Frith's (1980) counts of 42,900 on 4 April and 36,100 on 13 April on this stretch in 1979. In March 1981, the Annual Crane Survey clumped all cranes roosting between 1/2 mile east of U.S. 281 and the Wood River bridge. A total of 93,035 cranes were censused on this stretch, however, the number counted along Mormon Island is unknown.

The distribution of roosting cranes per 1/2 mile segment on the Mormon Island stretch of the Platte River in 1979 is shown in (Fig. 11 ). Roosting cranes were not assigned to the same half-mile segments in 1981, but the distribution appeared similar. The river channel 0 to 1.5 miles east of the Alda bridge, a wide, open stretch of channel, did not host extremely high densities of roosting cranes. The number of cranes roosting on this 1.5 mile stretch were 3,575 on 24 March and 3,960 on 2 April, with average densities







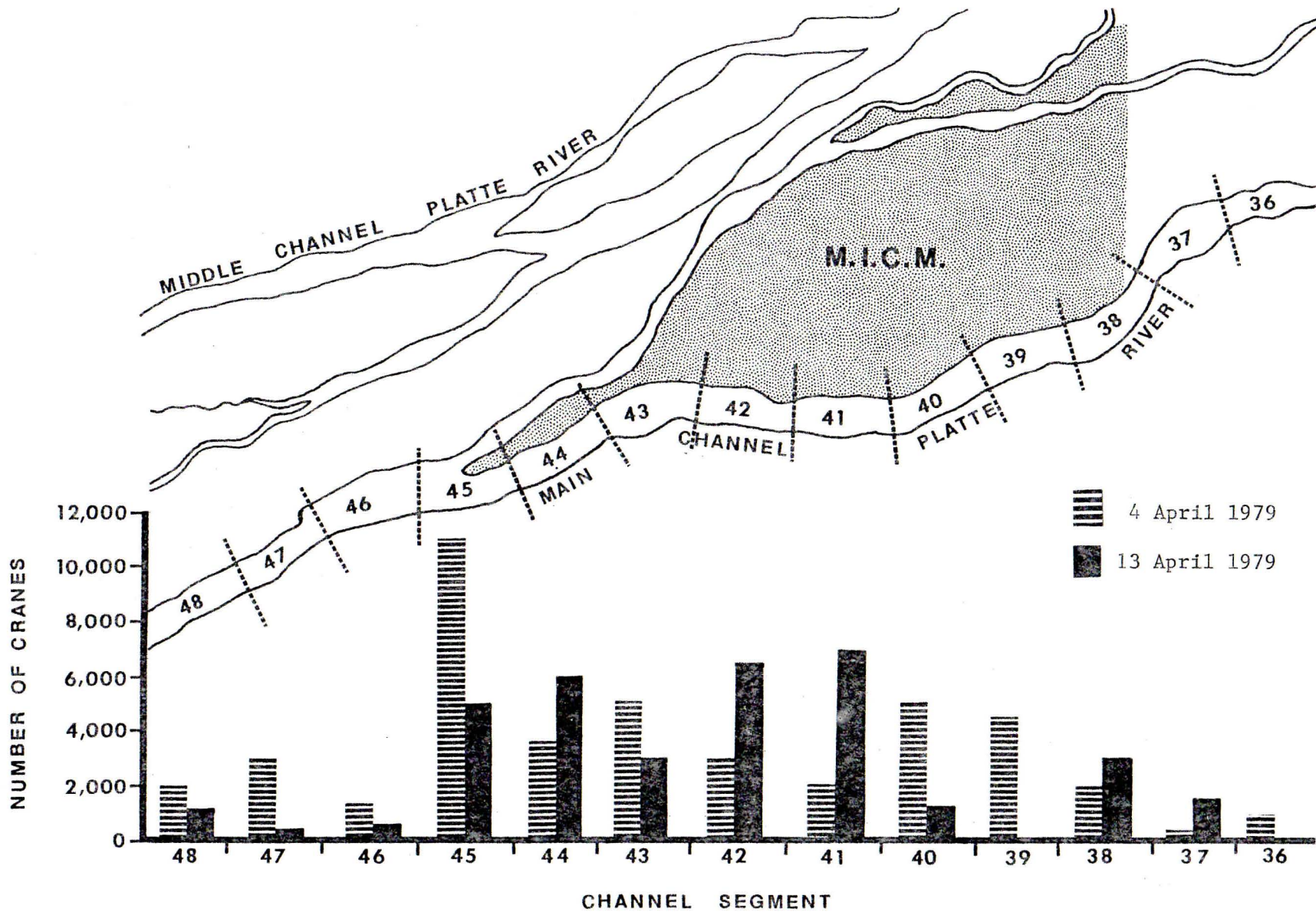




Fig. 10. Sandhill cranes roosting on the Platte along  
M.I.C.M. (Mar 1981).

Fig. 11. Distribution of roosting cranes along Mormon  
Island in 1979.

of 2,383 cranes/mile and 2,640 cranes/mile respectively. The relatively few cranes on channel segments near the Alda and U.S. 281 bridges was probably caused by the associated disturbance. Bridges has a significant negative on crane use of the Platte River (Krapu 1981a). Cranes roosting in the river channel just east of the Alda bridge may additionally be affected by the sand and gravel operation and residences on the north bank. The viewing bunker apparently did have a very localized negative affect on crane roosting as cranes rarely roosted within 150 yds of the bunker this year.

The river channel bordering the west half of Mormon Island from approximately mid-section 39 through section 45 attracted large numbers of roosting cranes in 1981, especially at the west tip of Mormon Island (Fig. 11 ). The west tip (sections 44 and 45) had 10,795 cranes/mile on 24 March and 15,905 cranes/mile on 2 April, 1981. Frith (1980) censused 14,500 cranes/mile and 11,000 cranes/mile on these sections on 4 April and 13 April 1979, respectively. The section of river channel immediately west of the west tip of Mormon Island has the widest unobstructed channel width in this 6.5 mile stretch of river (Krapu 1981a).

Cranes were also observed roosting in the north channel of the Platte up to 3 miles east of the west tip of Mormon Island. Crane numbers did not compare to those found in the main channel but use was fairly frequent and several thousand cranes roosted there on at least several occasions. Cranes were also observed on channels of the Platte during midday. This was observed during



Fig. 8. Sandhill cranes feeding in field 11 (Mar 1981).

Fig. 9. Sandhill cranes congregating near wetland  
to drink (Mar 1981).

photographic surveys in 1979 (Ferguson, pers. comm.), though day time use of the river is most frequent during fall.

A seasonal trend in the time of crane departure from roosts in the morning and arrival on roosts in the evening was noted in 1981 (Fig. 12 ). The first cranes departed between 15-45 minutes ( $\bar{x}$  = 34 min.) before sunrise. The time the last cranes departed from roosts averaged 13 minutes before sunrise prior to 15 March but averaged 50 minutes after sunrise after 15 March. The time span between the first and last crane departure increased from an average of 19 minutes before 15 March to an average of 67 minutes after 15 March.

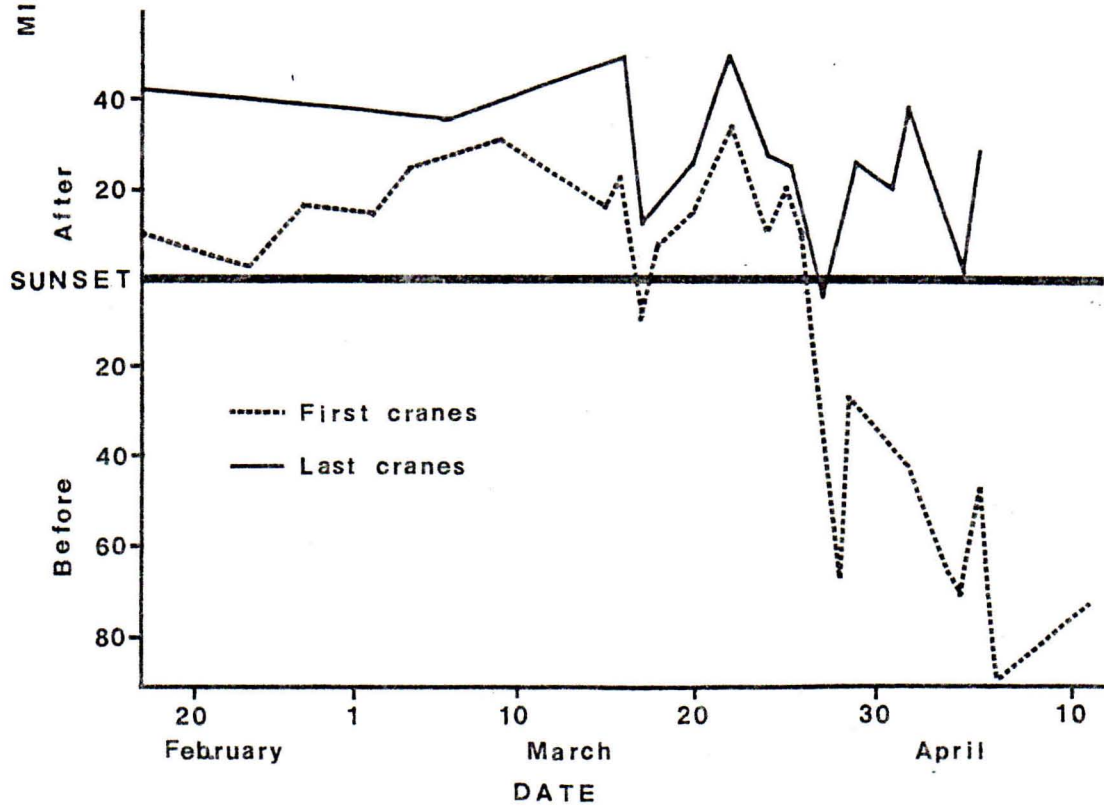
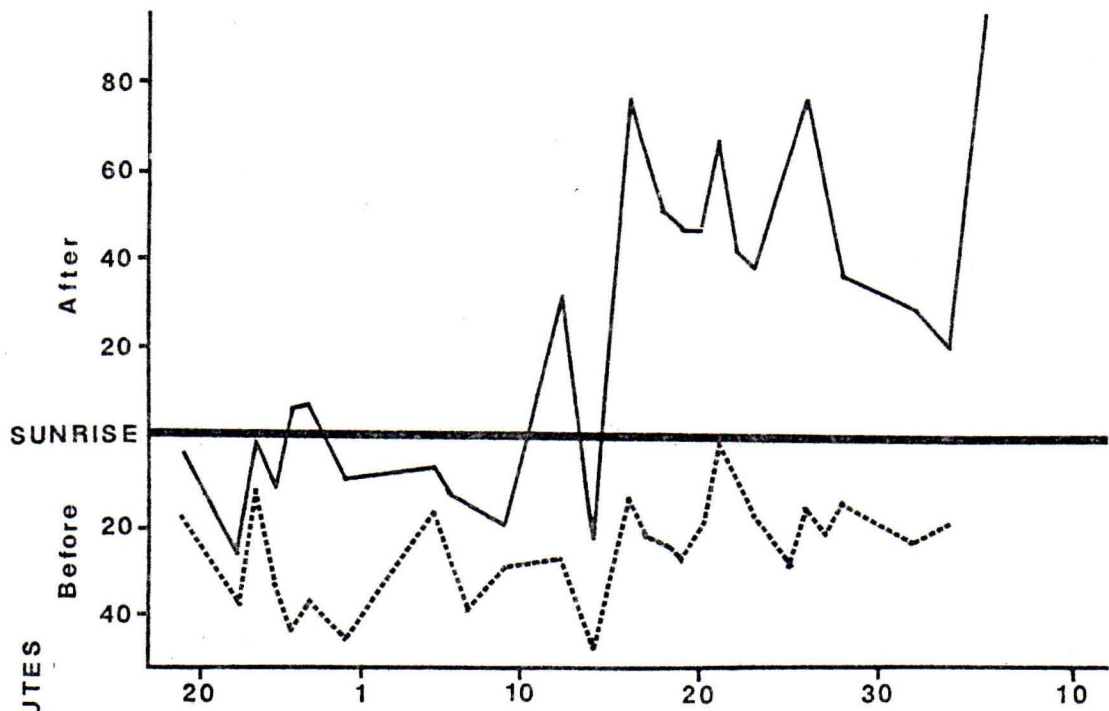
Similarly, the mean time cranes began arriving on the river roost was 15 minutes after sunset before 28 March and 58 minutes before sunset after 28 March. The time span between the first and last cranes to arrive on the roost increased from a mean of 26 minutes before 28 March to 68 minutes after 28 March.

Associated with changes in crane arrival and departure from the primary roost were changes in crane use of secondary roosts. When cranes began to linger on the the primary roost in the morning (approximately mid-March) morning use of secondary roosts decreased as many cranes flew directly to more distant fields (Fig. 7 ). Morning use of field 11 was not as great as field 8 because crane use of field 11 did not begin until mid-March. Evening use of secondary roosts declined by late March when cranes began to arrive on the river earlier.

The seasonal pattern of roost arrival and departure was

Fig. 12. Seasonal trends in time of crane roost  
arrival and departure in spring 1981.





accompanied by a change in behavior. Early in the staging season cranes often flew up and down the river channel in large (often several thousand strong), vocal and "nervous" flocks prior to and after roosting on the river. Later in the season, cranes often flew directly to and from their river roost site and small flocks became most common. Lovvorn (1980) noted that cranes left earlier and arrived later on disturbed roosts. Cranes apparently became accustomed to the area and felt more secure on their river roost sites as the season progressed.

#### AERIAL CRANE CENSUSES

On 12 March at 1145 (C.S.T.) 8,700 cranes were estimated from the air on that portion of Mormon Island west of U.S. 281; 7,500 were counted in field 3, and 1,200 in field 2 and none in field 4. A ground count that afternoon at 1655 (C.S.T.) estimated 15,000 cranes in field 3 and 1,000 cranes in field 2 for a total count of 16,000 cranes. Observations suggested that the aerial count was conducted before cranes had reached peak numbers.

On 2 April at 1340, cranes were again estimated from the air and at 1530 that afternoon, 2 observers ground counted cranes. A comparison of the three counts is shown in Table 6 . There was a 59.3% change in crane numbers between the aerial count and the mean ground count. Observations suggested that we had underestimated crane numbers. We found it very difficult to estimate crane numbers in the large flocks found on Mormon Island. This has been experienced during other aerial ocular crane counts

Table 6 . A comparison of sandhill crane counts on 2 April 1981.

Type of count	Number of sandhill cranes			
	Field 2	Field 3	Field 4	Total
Aerial	9,075	1,200	2,800	13,075
Observer 1	12,000	7,450	2,170	21,620
Observer 2	12,500	6,700	850	20,050



(Lewis 1979). An aerial view of a sandhill crane flock on M.I.C.M. is shown in Fig. 13 . Because of this difficulty aerial counts have a somewhat limited value in assessing crane numbers on Mormon Island, but accuracy would probably improve with additional experience.

Efforts to access crane numbers on study plots from an elevated ( $\approx$  15 ft.) blind in a windmill were unsuccessful. The blind was not nearly high enough to achieve an adequate view of the plots and plot boundaries were difficult to discern when large flocks of cranes were present. It was concluded that an accurate assessment of crane densities would have to be conducted with aerial photography, though the occurrence of cranes in control and study plots could be monitored from the ground.

Attempts to photograph cranes on sample study plots were also largely unsuccessful. Cranes were no longer using the areas and we experienced various photographic difficulties. This method holds promise however for assessing crane densities with the proper photographic techniques.

#### FACTORS AFFECTING SANDHILL CRANE USE OF WETLAND MEADOWS

Height and density measurements were taken on each wetland meadow to determine any differences between these fields and relate such differences to crane use. The data was analyzed using a Student's "T"-test (Tables 7 and 8 ). Fields 1 and 2 were not significantly different in either vegetation height or density, likewise, field 3 and 4 were not significantly different.

Fig. 13. An aerial view of a sandhill crane flock  
on M.I.C.M. in 1979.







Table 7 . Student "t"-test of vegetation density between wetland meadows (\*\*= highly significant,  $p \leq .01$ ; \*= significant,  $p \leq .05$ ; NS= not significant).

Field #	1	2	3	4
1	-----	.365 NS	2.711**	3.653**
2		-----	2.756**	2.475*
3			-----	1.069 NS
4				-----
$\bar{x} \pm s^1$	4.7 $\pm$ 3.4	5.1 $\pm$ 4.3	2.4 $\pm$ 2.5	1.6 $\pm$ 2.6
N	25	25	25	25

<sup>1</sup>Units are centimeters as measured by a Robel pole. The standard deviations (s) were large with respect to the means ( $\bar{x}$ ) due to the interspersed of heavily grazed and lightly grazed sites in each meadow.

Table 8. Student "t"-test of vegetation height between wetland meadows (\*\*= highly significant,  $p \leq .01$ ; \*= significant,  $p \leq .05$ ; NS= not significant).

Field #	1	2	3	4
1	-----	.317 NS	3.461**	2.870**
2		-----	2.918**	2.359*
3			-----	.767 NS
4				-----
$\bar{x} \pm s^1$	35.0 $\pm$ 20.4	33.1 $\pm$ 21.8	18.5 $\pm$ 12.3	21.2 $\pm$ 12.6
N	25	25	25	25

<sup>1</sup>Units are centimeters as measured by a Robel pole. The standard deviations (s) were large with respect to the means ( $\bar{x}$ ) due to the interspersions of heavily grazed and lightly grazed sites in each meadow.

Conversely, fields 1 and 2 were significantly different from fields 3 and 4 each. If cranes were showing a preference for a particular field due to its vegetation physiognomy, crane use in fields 1 and 2 and fields 3 and 4 should have been similar. They were not (Table 2).

Correlation coefficients were computed for several parameters. Vegetation height and vegetation density showed a high correlation ( $r^2=.93$ ). This essentially tells us that we need to take only one measurement of the vegetation. Vegetation density is suggested, using the Robel pole technique. When height and density were plotted relative to crane use, no correlation resulted. Therefore, some other factor was responsible for attracting cranes.

The occurrence of upland and lowland sites, noted during vegetation sampling was correlated to crane use. Field 1 had 12% lowland sites, field 2 had 44% lowland sites, fields 3 had 52% lowland sites and field 4 had 16% lowland sites. The correlation coefficient between lowland sites and crane-use days was high ( $r^2=.96$ ). There was a significant negative correlation between the occurrence of upland sites and crane-use days ( $r^2= -.97$ ). It appeared that the wetland area (lowlands) may have been the key variable influencing crane use.

#### EFFECTS OF DISTURBANCE ON SANDHILL CRANES

Sandhill crane reaction to disturbance (primarily 1 vehicle) was quite variable on Mormon Island in 1981. At times a vehicle approached within 75 meters of cranes and caused only an increase in alertness but on other occasions an entire flock of cranes flushed



at a distance of 300m. Large flocks of cranes often left fields en masse for no apparent reason.

An increase in alertness in crane flocks was noted at distances as great as 450-500m. Miller and Hatfield (1974) noted that in areas where they are hunted cranes will flush when approached within 400m. The greatest distance at which the entire flock left a field was at 300m. An increase in alertness, increased dancing and small flocks leaving was also noted at distances of 300-400m. The most common reaction, however, at distances greater than 100m was an increase in alertness. At distances of 50-75m the most common reaction was for cranes to make short flights away in a leap frog manner or for small flocks to leave the area, but also a common reaction was for the entire flock to leave the area. Cranes would not allow approach within 50m. Melvin (1978) reported that in areas where they are protected (refuge areas) cranes will allow approach within 150m or less. These observations in conjunction with the generally wary nature of cranes which is mentioned by nearly every author who has described them suggested that access to M.I.C.M. during the crane staging interval should remain limited.

Cranes seemed particularly susceptible to disturbance on certain fields and at certain times of the day. During short stays on secondary roosts cranes appeared especially alert and ready for flight. On four occasions bald eagles spooked cranes from secondary roosts but on three occasions bald eagles flew over wetland meadows spooking ducks and geese but not cranes. Late in the afternoon when cranes were beginning to leave wetland meadows and many were alert

or calling, a source of disturbance had a more dramatic affect than earlier in the afternoon when most cranes were feeding or loafing. Viewing cranes from a vehicle would be least disturbing in the early to mid-afternoon.

Cranes were apt to entirely leave fields with little or no topographic relief or buffer zone (haystacks or fencelines) such as field 7 and the north end of field 6, if disturbed. The haystacks bordering much of the north and southeast side of field 11 buffered cranes from disturbance. When a buffer zone of vegetation was present along the river bank roosting cranes could be approached within 100m, but where no bank vegetation was present cranes consistently flushed at distances of 250-400m. Shrub vegetation along the river should be maintained to buffer cranes from disturbance especially where roads are adjacent. Haystacks should be strategically placed when possible. Some means to decrease the conspicuousness of cranes in field 6 and 7 should be considered.

Crane reaction to disturbance was often subtle and was sometimes manifested by the absence of cranes. On at least three occasions people or small blinds were present at known roosting areas. On these occasions cranes "roosted down the river" The presence of activity was also thought to delay crane arrival on fields, or cause a lack of crane use. If cranes were disturbed or activity present during peak arrival periods the distribution of cranes was often affected for the remainder of the day in that field as later arrivals most often joined flocks already present in other areas. Traffic on the main road caused cranes to pack into more remote areas. Traffic



and activity should be limited if possible on days when study plots are censused or photographed to allow for a natural distribution of cranes. A small more primitive blind to accomodate small groups of people on the west tip of M.I.C.M. where waterfowl and crane roosting densities are tremendously high should be considered to reduce the impact of visitor use on the distribution of roosting cranes.

Cranes were successfully photographed on the river from duck blinds and a blind resembling a juniper tree. Photographing cranes on the river was easier than on meadows or hayfields because the occurrence of cranes was more predictable in time and space and blinds were less conspicuous. Morning was best (though cranes were photographed in both morning and evening) in the latter part of March and early April when cranes began to linger on the river. If possible entry into and out of blinds should occur without the photographer becoming visible to the cranes to prevent excessive disturbance to roosting cranes which could easily happen on an area such as M.I.C.M.

#### SANDHILL CRANES AND BURNS IN 1981

On 24 March 1981, the 101 ha (250acres) tall grass prairie on the Audubon area was again burned but in contrast to previous years no cranes were observed using the area on six occasions between 24 March and 11 April 1981 though large numbers of cranes were present in the vicinity. Twenty cranes occupied the burn site on 3 April 1981.



In the Overton area, an 8.1 ha (20acre) tract of drained wetland meadow habitat was burned in fall 1980, and a 14.2 ha (35 acre) tract of tame hay in the same section was spring burned on 10 March. No crane use of these sites was observed on two occasions and the land owner had not noticed crane use of the areas. This section recieved extensive use by cranes in other years.

The lack of crane use on burned areas in the Platte River Valley this spring adds to the complexity of the question as to why and when cranes are attracted to burned sites. The denuding of the soil on burned areas which increases the accessability of prey items has been sited as a factor attractive to cranes (Walkinshaw 1949, La buda and Butts 1979) but this factor would have been the same this year as in other years. It has been suggested that the heat from the fire and increased solar heating on burned sites warms the soil and may cause earthworms or other invertebrates to come nearer the surface which would be attractive during cold springs when most of the ground would be frozen. With this years mild temperatures soil temperatures may have been similar on burned and unburned sites and thus burned sites were not unusually attractive. Yet, cranes are attracted to burned areas in the mild climates of Florida and Cuba (Walkinshaw 1949). Cranes have also frequented burns during dry springs in the Platte River Valley (Wheeler and Lewis 1972) and on the dry savannahs of Cuba (Walkinshaw 1949) which questions this years low soil moisture as a factor which would have inhibited cranes use. Burning adds to the productivity of the area and improves plant root growth which is conducive to earthworm

production (Sam James, pers. comm.), but the attraction of cranes to burned sites appears to be rather immediate versus long term. Perhaps all or some of the factors are involved in the explanation of why cranes are often attracted to burned areas but apparently were not in the Platte River Valley in the spring of 1981, but at present this phenomenon remains an enigma which requires further observation and research.

BREEDING BIRDS



## INTRODUCTION

A total of 62 species of birds were considered potential or known breeders on M.I.C.M. during the summers of 1980 and 1981. This represents approximately 31% of the breeding avifauna of Nebraska (Johnsgard 1979). Nests or dependent young of 31 species were observed establishing them as known breeding species. An additional 31 species were considered potential breeders as the adults were observed on M.I.C.M. during their normal nesting season. A list of the breeding birds of M.I.C.M., their breeding status and primary nesting habitat is found in Table 9 .

The breeding avifauna of M.I.C.M. was diverse with 27 families represented. Icteridae (meadowlarks, blackbirds, and orioles) had the greatest number of breeding species with 8, followed by Anatidae (ducks and geese) with 6, and Fringillidae (grosbeaks, finches, sparrows, and buntings) with 5. Picidae (woodpeckers) and Tyrannidae (flycatchers) had 4 breeding species, and Corvidae (jays, magpies, and crows) and Hirundinidae (swallows) had 3 breeding species. The remaining 15 families were represented by 1 or 2 breeding species.

Since woodland and shrubland habitat types are found in small areas or narrow strips on M.I.C.M., breeding bird densities were assessed only on grassland and hayland habitat types. The breeding birds of other habitat types were determined from observations and summer mist-netting (Table 10 ). The breeding birds associated with each of the habitat types on M.I.C.M. are found in Appendix D.

Table 9 . The status and nesting habitat of breeding birds.

<u>Species</u>	<u>Status*</u>	<u>Nesting Habitat<sup>+</sup></u>
Mallard	K	W,H,A
Pintail	P	W,H,A
Green-winged Teal	P	W,H,A
Blue-winged Teal	K	W,H,A
Northern Shoveler	P	W,H,A
Wood Duck	P	T,O
Red-tailed Hawk	K	T,O
American Kestrel	P	T
Bobwhite	K	W,H,A,T,F,S
Ring-necked Pheasant	K	W,H,A
Sora	K	W
Piping Plover	K	B
Killdeer	K	W,C,B
Upland Sandpiper	K	W,H
Spotted Sandpiper	K	B
Wilson's Phalarope	P	H
Least Tern	K	B
Rock Dove	P	R
Mourning Dove	K	W,H,C,T,F,S,R,U
Yellow-billed Cuckoo	P	S,U
Black-billed Cuckoo	P	S,U
Great Horned Owl	K	T,O
Belted Kingfisher	K	Z
Common Flicker	P	T,O
Redheaded Woodpecker	P	T,O
Hairy Woodpecker	K	T,O
Downy Woodpecker	P	T,O
Eastern Kingbird	K	F,S
Western Kingbird	P	F,S
Great Crested Flycatcher	P	T,O
Willow Flycatcher	P	S,U
Rough-winged Swallow	K	Z
Barn Swallow	K	R
Cliff Swallow	K	R

Table 9 . (continued).

Blue Jay	K	T,O
Black-billed Magpie	K	F,S
Common Crow	K	T,O
Black-capped Chickadee	P	T,U
White-breasted Nuthatch	P	T,U
House Wren	P	T,U,O
Gray Catbird	P	F,S,U
Brown Thrasher	K	F
American Robin	K	T,R,O
Starling	P	T,O,R
Bell's Vireo	P	S
Warbling Vireo	P	U,O
Yellow Warbler	P	S,U
Common Yellowthroat	P	S,U
House Sparrow	K	R
Bobolink	K	W,H,A
Eastern Meadowlark	K	W,H,A
Western Meadowlark	P	W,H,A
Red-winged Blackbird	K	W,H,A
Orchard Oriole	P	O
Northern Oriole	P	T,O
Common Grackle	P	T
Brown-headed Cowbird	K	W,H,A,S,U
Cardinal	P	S,U
Dickcissel	K	W,H,A
American Goldfinch	P	S,U
Grasshopper Sparrow	K	W,H,A
Field Sparrow	P	S

TOTAL: P= 31 species; K= 31 species. 62 species altogether.

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\* P= Potential, K= Known Breeder.

† W= Wetland Meadow, H= Native Hay, A= Alfalfa, C= Corn, T= Woodlot, F= Fencerow, S= Riparian Shrubland, U= Riparian Woodland Understory, O= Riparian Woodland Overstory, B= Riverine Sandbars, Z= exposed banks, R= Manmade Structures/ Farmsteads.



Table 10. Birds banded on M.I.C.M. during summer 1980.

Species	Number banded	
	Summer 1980	All seasons
Common Flicker	1	1
Hairy Woodpecker	1	2
Willow Flycatcher	6	7
Blue Jay	1	4
Gray Catbird	3	8
Warbling Vireo	4	5
Yellow Warbler	8	16
Common Yellowthroat	3	6
Northern Oriole	2	3
American Goldfinch	9	56
Total Individuals	38	336
Total Species	10	45
Net Hours	33	230
Birds/net hour	1.2	1.5
Species/ net hour x 10	3.0	1.9

## BREEDING BIRD PLOTS

Breeding bird densities were assessed on 2 hayland and 5 grassland plots (Fig.14 ). A description of the 7 plots, and the breeding bird species and densities found in each are shown in Appendix E , and summarized in Table 11 . The past land use of each of the breeding bird plots is described in Appendix F .

Ten bird species were found breeding on the hayland and grassland plots; 9 species if the blue-winged teal is excluded. Grassland breeding bird communities are characterized by a small number of breeding species which are broad in their distribution (Wien 1969, as cited in Wiens and Dyer 1975). On a variety of grassland habitat types scattered over much of west-central North America, Wiens and Dyer (1975) found a range of 1-9 breeding species. The mean number of species per plot on M.I.C.M. was 5.4 which is slightly higher than the mean of 4.7 species found by Wiens and Dyer (1975) in mixed-grass prairies.

Wiens and Dyer (1975) found that eastern meadowlarks, dickcissels, grasshopper sparrows, and upland sandpipers formed a loosely associated group of breeding species. With the addition of the bobolink [which is very near the southern limit of its breeding range in central Nebraska (Johnsgard 1979)] and the ubiquitous red-winged blackbird, the species assemblage they described characterized the breeding avifauna of the grassland and hayland habitat types on M.I.C.M. This species assemblage was found to be negatively associated with a species assemblage of western meadowlarks, lark buntings, and horned larks, and was

Fig. 14. Location of breeding bird plots in 1980.



# MORMON ISLAND CRANE MEADOWS

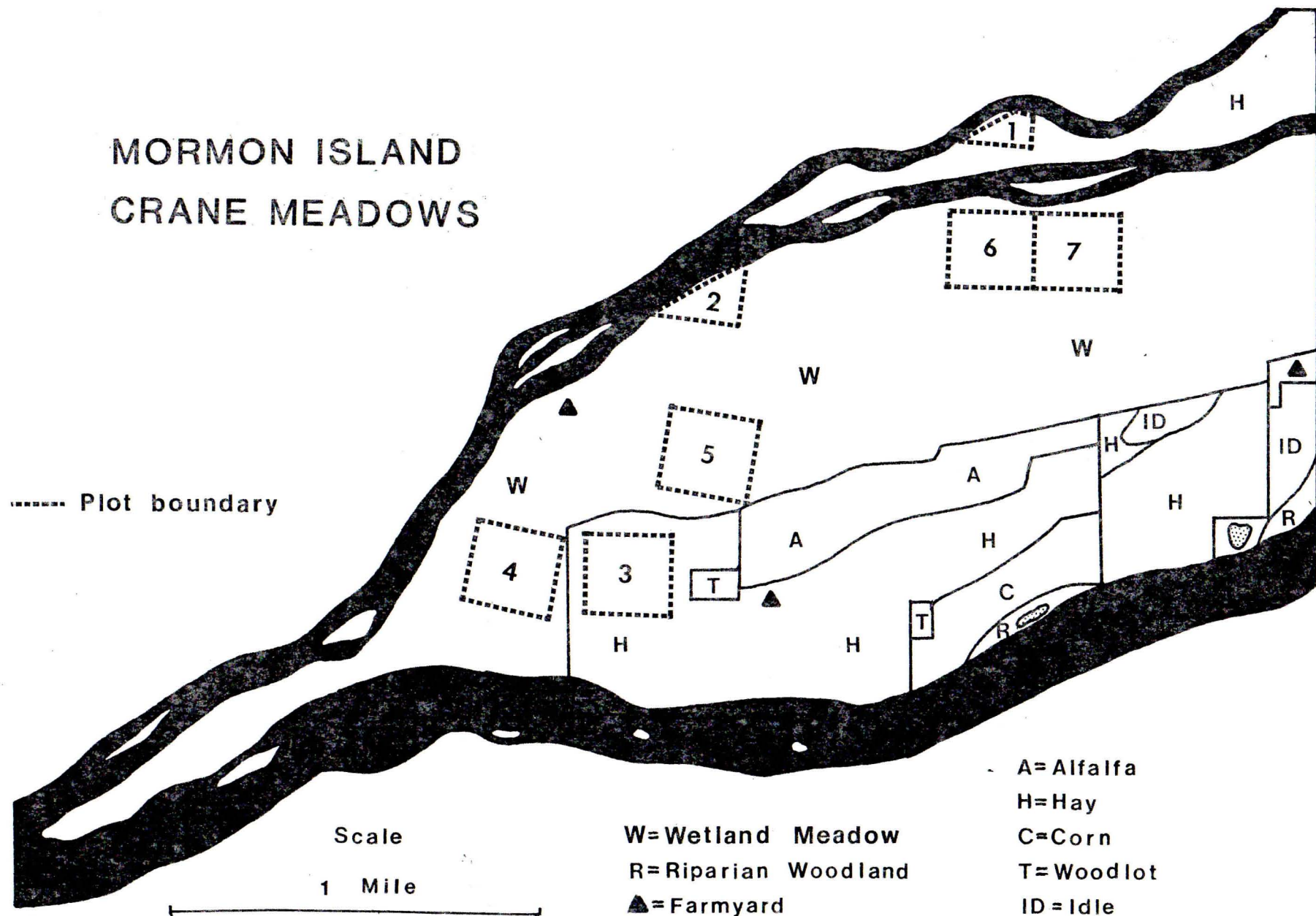


Table 11. Summary of breeding bird densities on seven plots on M.I.C.M. in 1980.

		Number of territorial males/100 acres						
Species	Plot #	Wet Hay	Grassland	Dry Hay	Grassland	Wetland Meadow	Wetland Meadow	Wetland Meadow
		1	2	3	4	5	6	7
Red-winged Blackbird	62		8	-	10	23	25	45
Bobolink	52		8	22	25	23	28	22
Upland Sandpiper	10		-	5	8	8	8	4
Grasshopper Sparrow	-		25	20	18	15	20	18
Eastern Meadowlark	-		8	8	8	8	5	10
Dickcissel	-		8	22	12	28	15	20
Mourning Dove	-		-	-	2	2	10	8
Killdeer	-		-	-	-	5	2	2
Wilson's Phalarope	10		-	-	-	-	-	-
Blue-winged Teal	-		5	-	-	2	-	-
Total Species		4	6	5	7	9	8	8
Total territories		15	15	31	33	45	45	52
Territories/100 acres	132		62	77	83	114	113	129

more closely associated with mesic tall grass situations than the latter species assemblage (Wiens and Dyer 1975). Species assemblages are determined by proximate species interactions (often referred to as "niche relationships") and the long term distributional history of the species or group (Wiens and Dyer 1975).

Grassland avifaunas with their low species diversity, tend to be strongly dominated, with 75-88% of the individuals being included in the two most abundant species (Wiens and Dyer 1975). On M.I.C.M., breeding bird plot #1 was dominated by red-winged blackbirds and bobolinks which composed 86% of the total territories (Table 11). Plot #7 was somewhat dominated by red-winged blackbirds, and plot # 2 by grasshopper sparrows, but none of the plots, with the exception of plot # 1, were as strongly dominated as those found by Wiens and Dyer (1975). With the exception of plot # 1, the two most abundant species composed approximately 50% of the total territories.

Plot #3, dry hay, had the lowest number of species per plot (excluding plot #1) though the number of species and territories per 100 ac was similar to that of the two dry grassland plots. Wiens and Dyer (1975) found no appreciable difference in overall species numbers between grassland-like agricultural types (such as native hay) and native prairie although they found breeding bird densities were relatively low on hayland habitat types. On M.I.C.M., the number of species was similar on the dry hay and dry grassland plots but so was the number of territories. Our data agree in that it appears that moisture conditions and



management practices may have a greater affect on breeding bird densities than specific habitat type (native hay or native grass). Dry grassland and hayland had a mean species number of 5.6/plot (blue-winged teal excluded) compared to 8.0 species/plot on wetland meadow. The mean number of territorial males was 119/100ac for the three wetland meadow plots compared to a mean of 74 territorial males/ 100 ac for the dry grassland or hayland plots. The low species number (4) of plot # 1, a wet hay meadow, was probably a result of its small size (11.3 ac or 4.6 ha) thus it was excluded from this comparison. Plot # 1 did have the highest number of territories/100 ac of any plot. Plot #2, a dry grassland, had the lowest number of territorial males/ 100 ac. This plot was entirely upland and the vegetation was very short and sparse due to intensive grazing.

Upland/sandpipers, bobolinks, and red-winged blackbirds reached their highest density on plot # 1. These data are probably real and not a function of the small plot size since dense colonies of boblinks as well as red-winged blackbirds were observed on this plot. Upland sandpipers were absent and bobolinks reached their lowest density on plot #2. The grasshopper sparrow was the only species which reached its highest density on plot #2. The grasshopper sparrow is known to prefer open, sparsely vegetated areas and often prefers grazed over idle grasslands (Blankespoor 1980). Red-winged blackbirds were absent from plot #3, dry hay, and densities were fairly low on the 2 grassland plots. Bobolinks and red-winged blackbirds both reached their highest density on plot #1 (wet hay) but the dickcissel was absent. Dickcissels reached their highest density on plot #5 which was the wettest

of the wetland meadow plots.

Eastern meadowlarks were also absent from plot #1 but had a similar density in each of the other 6 plots. The mourning dove and killdeer were absent from the hayfield plots probably due to their preference for bare open areas which were not present in the mowed hay. Mourning dove densities were highest in plot #6 and killdeer in plot #5. The bobolink was the only species which was found on all 7 plots.

Breeding bird densities for passerine species on M.I.C.M. are similar to those found on grasslands in North Dakota (Johnson and Springer 1972, Johnson and Krapu 1972) and Kansas (Zimmerman 1966, 1967). The species composition of grassland avifaunas is fairly stable but substantial annual differences in breeding densities especially of the dominant species often occurs (Wiens and Dyer 1975). Because of these marked annual variations, densities of most passerines found on M.I.C.M. cannot be closely or meaningfully compared to other areas.

#### UPLAND SANDPIPERS

Densities for the upland sandpiper were somewhat difficult to assess using the spot mapping technique. It was common to see 7 or 8 upland sandpipers in close proximity. Upland sandpipers are known to actively defend a territory around their nest site but feed or loaf on a community ground where other breeding pairs are tolerated (Mitchell 1967). They also occasionally make flights a mile or more from the nest site (Ailes 1976). We believe our data are fairly accurate however because territorial mapping was supplemented with an overall assessment of the



number of pairs in each plot.

Reported nesting densities of the upland sandpiper are variable, which may be due to their tendency to form loosely associated breeding colonies at times while others are solitary nesters (Mitchell 1967). In Wisconsin, Buss and Hawkins (1939 as cited in Mitchell 1967) have reported densities of 1 pair/ 1.5 to 15 ac, while in the Yukon 1 pair/ 380 ac has been reported (Buss 1951 as cited in Mitchell 1967). In North Dakota, Kirsch and Higgins (1976) found the highest density of 2.6 nests/40.5 ha (100 ac) on grasslands previously burned and a low of 0.4 nests/40.5 ha on annually tilled cropland. Grazed grassland had a density of 0.5 nests/40.5 ha. Lokemoen and Duebbert (1974) reported a density of 2.0 nests/40.5 ha on a mixed-grass prairie in north central South Dakota. Faanes (1980) found upland sandpipers average 4.0 pairs/40.5 ha on wet prairies in the Platte River Valley.

The highest density of upland sandpipers on breeding bird plots on M.I.C.M. of 10.0 pairs/40.5 ha on plot #1 may be due to some extent to the small plot size. The densities of 8.0 pairs/40.5 ha (3.0 pairs/40 ac), found on 3 plots, 5 pairs/ 40.5 ha (2.0 pairs/40 ac) on plot #3 and 4.0 pairs/40.5 ha (1.5 pairs/40ac) on plot#7 suggests that upland sandpiper densities on M.I.C.M. are high compared to other prairies in the Platte Valley and in North and South Dakota but are not as high as those reported in Wisconsin.



## UPLAND SANDPIPER CENSUS RESULTS

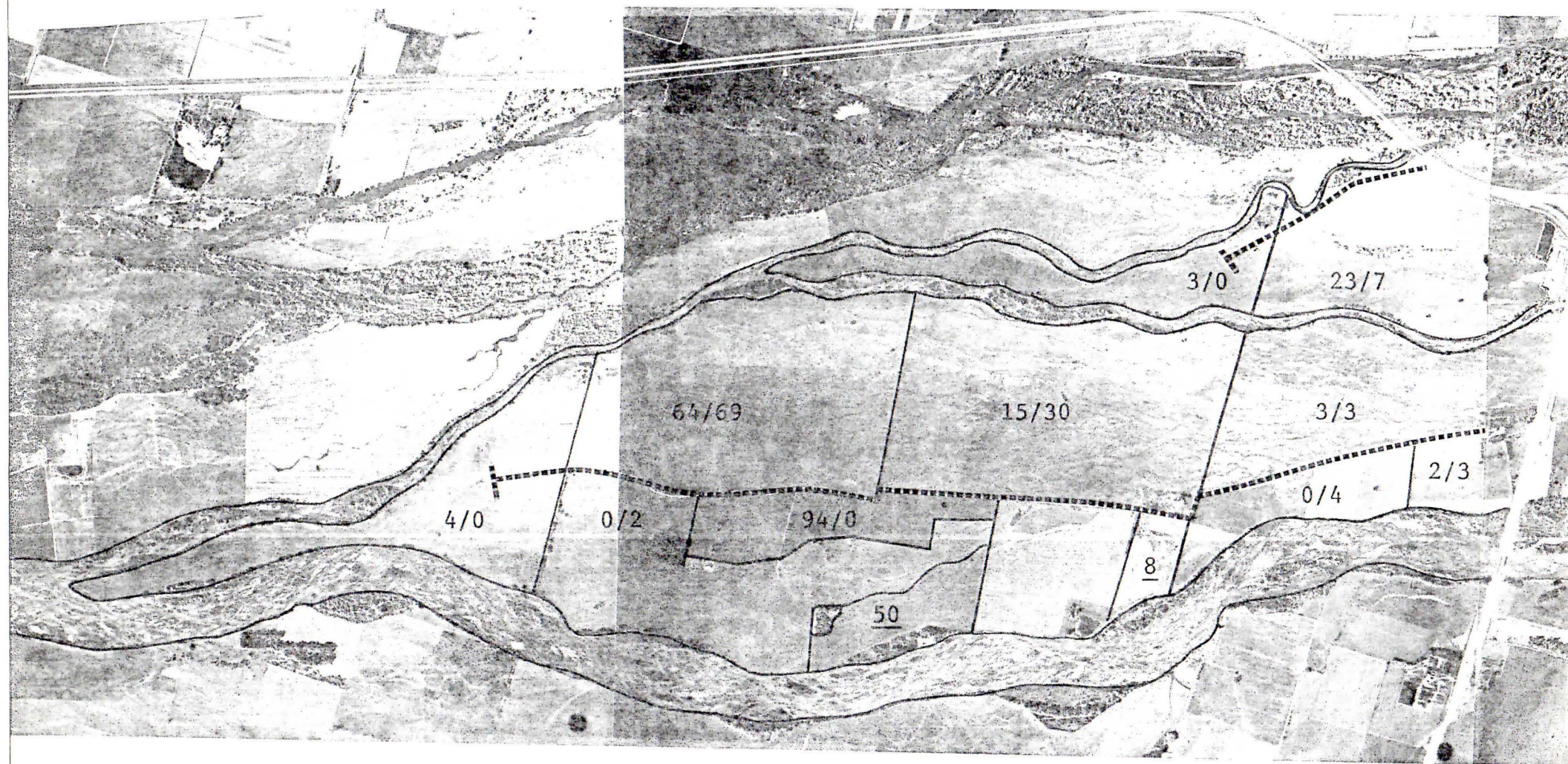
Results of the upland sandpiper censuses for 1980 and 1981 are shown in Fig.15 and summarized in Table 12. There was a 30% decline in the number of upland sandpipers observed in 1981. We do not believe this necessarily reflects a population decline but rather is due to habitat alterations along the census route. Half of field 10 (Fig. 5) was sown to alfalfa in fall 1979 and half in spring 1980. This area had little vegetation growth during the 1980 census and was heavily used by upland sandpipers (N=94). They were very visible while foraging in this field. In 1981, a good stand of 1 year old alfalfa was established which occluded any sandpipers from view and none <sup>were</sup> counted. If the number of sandpipers counted in field 10 during 1980 was <sup>+</sup>subtracted from the total, 114 birds were observed. This compares favorably to the 120 birds censused in 1981 (Fig 15, Table 12). Use in other fields was similar between the years. In 1981, an additional 50 sandpipers were counted in spring planted alfalfa fields outside the census route indicating their attraction to recently fallow sites in the spring. A total of 14 upland sandpiper nests was found on M.I.C.M. in both years combined. Active nest dates were from 14 May to 27 June. The earliest hatching date was 3 June.

## LEAST TERNS AND PIPING PLOVERS

High water levels of the Platte River in 1980 precluded the nesting of least terns and piping plovers as barren sandbars

Fig. 15. Distribution of upland sandpipers censused in 1980 and 1981.





..... Census Route

Numerator = 1980 totals (Census 20 and 28 May).

Denominator = 1981 totals (Census dates 26 May and 4 June).

N = Counted in 1981 but not included in census results.



Table 12. Spring census of upland sandpipers (1980-1981).

Date	No. of hours	No. of birds observed	No. of miles	Birds/mile
20 May 1980	1.6	113	5.4	20.9
28 May 1980	1.4	95	5.1	18.6
Total 1980	3.0	208	10.5	19.8
26 May 1981	1.0	58	3.8	15.3
4 June 1981	0.9	62	3.8	16.3
Total 1981	1.9	120	7.6	15.8

utilized for nesting were inundated. In 1979, 14 least tern and 16 piping plover nests were initiated but were later destroyed by rising water levels. In 1981, water flows in the Platte were low and both species nested on the barren sandbars of the Mormon Island stretch of the Platte. A total of 13 least tern and 4 piping plover nests were found. For a complete list of the number of eggs and nest status see the Annotated Checklist under those species.

The nesting habitat of the least tern and piping plover is becoming increasingly scarce with the encroachment of woody vegetation in the Platte River channel. The least tern is considered highly rare and local in Nebraska while the piping plover is considered rare and local (Johnsgard 1980).

## MANAGEMENT OF UPLAND NESTING BIRDS

Differences in nesting bird populations on grazed, mowed, and burned areas have been assessed in various regions for both game and nongame upland nesting birds. Most studies of direct habitat manipulation have focused on habitat management for upland nesting waterfowl and game birds but the effects on upland sandpiper and passerine birds nesting have also been reported. Grazing, mowing, and burning affect each species or group of birds differently.

Mowing, burning, and to a lesser extent grazing often have a direct effect on nesting bird populations. Labisky (1957) found that 78% of mallard and blue-winged teal nests in alfalfa fields were destroyed by haying operations at the Horicon National Wildlife Refuge in Wisconsin. Mowing also caused direct mortality to eggs, young, and hens of nesting waterfowl (Kirsch et al. 1978). Mowing operations in early June in Iowa, destroyed all pheasant nests present and killed 8 of 11 (73%) hens nesting in an orchardgrass/alfalfa field (George 1979). Smith (1963) observed that most nests of the grasshopper sparrow escaped destruction by mowing but some were crushed by implement wheels and the rest became more exposed to weather and predation.

To increase waterfowl production in North Dakota, Higgins and Kantrud (1973) recommended mowing be delayed until after most waterfowl nests have hatched. They found that <sup>by</sup> 15 May, 20% of duck nests were hatched; by 25 May, 50% were hatched; and by 5 June, 75% were hatched. Because of the detrimental effects of mowing on nesting bird populations, many state and federal wildlife



agencies recommend that roadsides be left unmowed until after most first nests have hatched. The policy of the Nebraska Game and Parks Commission is to leave roadsides unmowed until 15 July.

The immediate effect of burning is somewhat similar to mowing. Direct mortality to birds during burns has been reported (Hakala et al. as cited in Erwin 1979), though mortality of small mammals and snakes is more common (Erwin 1979). On a 65 acre area spring burned (4 May, 26 and 27 April) near Omaha, Nebraska, 38 ring-necked pheasant nests and nests of quail, mallards and meadowlarks were destroyed (Erwin 1979). Cover is drastically reduced after a burn and remaining nests and adults become more conspicuous to predators (Best 1979). Summer burns may also kill the helpless young of ground nesting grassland birds and may damage the local seed and fruit crop of the current year (Stoddard 1963). Due to the immediate effects of fires on resident nesting populations, summer burning is usually not a recommended wildlife management practice (Stoddard 1963).

The direct effects of grazing are considerably less dramatic than mowing or burning although Kirsch (1969) found waterfowl pairs tended to move away from areas where cattle grazed or concentrated. He also found the number of nests in a field was reduced after cattle were introduced compared to the control field.

Although high nesting densities of mourning doves have been found on the current years burn (Soutiere and Bolen 1972) populations of other nesting species which prefer an abundance of residual cover for nesting may be reduced in the year following a spring burn (Tester and Marshall 1962, Mitchell 1967, Kirsch 1974).

Some birds are especially attracted to recently burned prairie. Stoddard (1963) noted that burned sites attracted American robins,

bluebirds, mourning doves in flocks, native sp arrows both resident and migratory, flickers and other woodpeckers, black-bellied plovers, ruddy turnstones, dunlin, common snipe, American golden plovers and pectoral sandpipers. Walkinshaw (1949) and Krapu (1981a) reported that sandhill cranes are often attracted to recently burned sites. Burned areas have also attracted raptors (Lawrence 1966, Komarek 1969, Bock and Bock 1978), bobwhite quail, and American woodcock (Philohela minor) (Edwards and Ellis 1969).

The long term affects of mowing, grazing, and burning on upland nesting birds is reflected by their effect on the vegetation structure and composition. Vegetation physiognomy is thought to be more important in influenceing nest site selection than species composition (Miller 1963, Mitchell 1967, Komarek 1969). Many birds rely on residual cover for at least their initial nesting attempt (Komarek 1969). Numerous studies on upland game birds have found a strong preference for cover with an abundance of residual cover for nesting and brood rearing (Kirsch et al. 1978). Wiens (1969) suggested that residual cover is also important in the habitat preference of ground nesting nongame birds. The annual removal of cover by grazing and haying is generally considered detrimental to the production of most upland nesting birds though periodic treatments to remove litter by fire, grazing and mowing may be desirable to maintain upland nesting habitats in their best ecological condition (Kirsch et al. 1978).

One of the long term effects of fire is that it sets back plant succession (Komarek 1963) and many species of wildlife have shown an affinity for subclimax plant associations (Miller 1963). Many



desirable wildlife food plants are associated with subclimax successional stages (Givens 1962, Miller 1963, Ellis et al. 1969). Populations of many species are reduced if fire is excluded through the process of ecological plant succession (Komarek 1963). Prescribed burning on designated areas also gives a diversified pattern of vegetation (Komarek 1963). In managing for nongame species, management schemes which promote habitat diversity and complexity are best (Komarek 1963, Blankespoor 1980).

The literature on habitat preferences and the effects of mowing, burning, and grazing on the nesting populations of the upland game species which occur on M.I.C.M. and ground nesting nongame birds will be briefly reviewed. For extensive reviews of the effects of grazing, mowing and burning on upland nesting waterfowl see Kirsch (1969) and Kirsch et al. (1978).

#### GREATER PRAIRIE CHICKEN

The importance of abundant residual cover for nesting Greater Prairie Chickens has been stated by Yeatter (1963) in Illinois, Kirsch (1974) in North Dakota, Jones (1963) in Oklahoma, and Viehmeyer (1941) in Nebraska. Annually grazed, hayed or long term idle (more than 10 years) habitat are undesirable for prairie chickens. Heavily grazed pastures were deficient in tall grass cover and litter and were avoided by prairie chickens (Mohler 1952).

High quality prairie chicken habitat is grassland providing vegetation averaging 20 in (50.8 cm) in height in spring and sufficiently dense to completely conceal a nesting prairie chicken (Kirsch 1974). Kirsch (1974) stated that high quality habitat blocks for prairie chicken be at least 160 acres. Periodic prescribed burning has been recommended



to maintain grassland in a highly productive condition for prairie chickens (Tester and Marshall 1962, Miller 1963, Stoddard 1963, Mohler 1952, Chammarad and Dodd 1972, Wolfe 1972, Kirsch 1974). Miller (1963) stated that fire not only maintained proper cover conditions but also promoted the growth of desirable subclimax food plants. Burning is also beneficial to prairie chicken habitat as it controls woody vegetation growth. Prairie chickens thrive best where woody cover does not exceed 25% (Amman 1957, as cited in Miller 1963).

Kirsch (1974) recommended prescribed burning at 3-5 year intervals to maintain prairie chicken habitat. Burning for prairie chickens the preceding fall or early spring is preferred as burning in late spring may destroy nests (Stoddard 1963). Leaving areas unburned throughout the winter provides protection and winter cover (Stoddard 1963).

#### BOBWHITE

Klimstra and Roseberry (1975) found bobwhite nest densities about 3 times higher in idle fields than in either pasture or hay fields in Illinois. They also observed the highest nest success in idle fields. Ellis et al. (1969) stated that moderately open stands dominated by seed producing weedy forbs cannot be overemphasized in quail management. They stated that the bobwhite is a successional species and management should provide the appropriate pattern of succession which requires a system of periodic disturbance. Ragweed (Ambrosia artemisiifolia) is an indicator species of the early successional stage critical to quail management. Plants associated with the early and near climax stages such as Common Ragweed and Korean Lespedeza

(Lespedeza stipulacea) were the most important food sources for quail in Illinois (Ellis et al. 1969).

Population of bobwhites responded favorably to habitat management programs in southern Illinois based on a combination of share cropping and to prescribed burning alone (Ellis et al. 1969). Quail responded better to burning alone than to the intensive program based on food patches but the best response was to burning and sharecropping. An effective program for quail management can be conducted using only prescribed burning if sharecropping is not feasible (Ellis et al. 1969). Wolfe (1972) found quail responded positively to habitat created by burning on the more open portions of plantations near the Platte River in western Nebraska. Stoddard (1963) stated that controlled burning is frequently first in importance in maintaining habitat in optimum condition for bobwhites.

Suitable quail habitat must contain some type of brush or woody cover where quail can rest most of the day (Renwald et al. 1978). Stoddard (1963) recommended that small areas which are not frequently burned be well distributed near burned areas. The ideal height for night roosting for coveys was vegetation 30 to 60 cm (Ellis et al. 1969). The number of coveys that may be supported on any given unit may depend on the amount of winter cover (Burger and Linduska 1967).

#### RING-NECKED PHEASANT

The importance of undisturbed grassy or grassy and herbaceous habitat to the population of ring-necked pheasants has been emphasized by numerous authors including; Baskett (1947) and George et al. (1979) in Iowa, Dahlgren (1967) and Elliot and Linder (1972) in South Dakota,



and Frank and Woehler (1969) in Wisconsin.

In Iowa, George et al. (1979) found pheasant densities of 6.8 nests/10 ha on switchgrass compared to 4.0 nests/10 ha in alfalfa/orchardgrass sites. Nest success in switchgrass surpassed nest success in cool season hay meadows. Pheasants established more nests and hatched more young in switchgrass plots that were not mowed or grazed the previous summer. Switchgrass, big bluestem, and Indiangrass were recommended for pheasant nest cover in Iowa (George et al. 1979).

Native grasses should not be cut or grazed below 20-25 cm (8-10 in). Native prairie grasses managed specifically for nest cover should be left undisturbed as much as possible to produce maximum residual cover each spring. A prescribed burn in Apr or late summer hay harvest every 4 years is desirable to remove excess litter and control woody plant invasion (George et al. 1979).

#### MOURNING DOVE

Mourning doves prefer open cover, large amounts of bare soil, and little litter (Soutiere and Bolen 1972). They select nest sites which provide cover on at least one side though overhead cover is seldom an important feature. Soutiere and Bolen (1972) found high densities of ground nesting pairs on a current years burn with pairs decreasing with each successive year. The density of ground nests was least in the unburned areas. However, young doves were fledged from 47% of the ground nests in unburned areas compared to 29% of the nests located in burned areas. Nest success was similar within burns though the current years burn had the highest success. Bock and Bock (1978) in Arizona also found that total doves were significantly more common on the first year summer burn than on a 2nd summer burn, winter burn, or the control plot. The first year summer burn averaged 37 doves per census,



the second year summer burn 11, winter burn 3 and control 2. Soutiere and Bolen (1972) recommended one or two prescribed burns in meadows in the first 6-9 years after seeding for mourning doves.

#### UPLAND SANDPIPER

The uplands sandpiper is a species which is often associated with native prairie grasses. Vegetation height was found to be an important factor in nest site selection by upland sandpipers. Of nests in North Dakota, 12% were found in cover 0-15.4 cm tall, 62% in cover 15.5-30.8 cm (6.2 - 12.1 in )tall, and 1% in 61.5 cm or greater (Kirsch and Higgings 1976). In Minnesota, Lindmeier (1960) found 43 nests in cover 17.9 cm - 53.9 cm tall. Higgins et al. (1969), also in North Dakota, found 38 of 41 nests in cover 15.4 to 61.5 cm tall.

In North Dakota, the number of upland sandpiper nest hatched per 40.5 ha (100 acres) was five times higher in burned habitat than in grazed habitat and two times higher in undisturbed habitat than in grazed habitat (Kirsch and Higgins 1976). Hatching success differed little for nests on undisturbed grasslands compared to nests on grasslands managed by prescribed fires, but hatching success was considerably lower on grazed grasslands (Table 13). Higgins et al. (1969) found upland sandpipers raised 3.5 broods/40.5 ha on burned grass, 2.1 broods/40.5 ha on unburned grass, and 1.6 broods/40.5 ha on grazed grassland. Though production on grazed prairies was low it exceeded that of croplands and seeded grasses and legumes. Seeded domestic-grass-legume mixtures generally developed vegetation too tall and dense for upland sandpipers and were use little (Kirsch and Higgins 1976).

Kirsch and Higgins (1976) stated that management efforts for upland sandpipers should be concentrated towards native grassland. They

Table 13. Hatching success of upland sandpipers in North Dakota,  
1966-1974 (From Kirsch and Higgins 1976).

	No. of nests	No. hatched	% hatched
Grazed grassland	25	12	48
Undisturbed grassland	45	32	71
Burned grassland	102	72	71
Annually tilled cropland	6	0	0
Totals	178	116	65

recommended prescribed burning at three year intervals. Early May burns seemed the most effective in North Dakota (Kirsch and Higgins 1976). Leopold (1933) in Game Management stated that upland sandpipers would comeback with or without fire if grazing was of the right kind and closeness.

#### OTHER NONGAME UPLAND NESTING BIRDS

Upland nesting nongame birds are also influenced by the amount and quality of the vegetation available for nesting. Most studies compare differences in species composition and breeding bird densities between grazed and ungrazed grasslands. Very little has been reported about the effects of burning on passerine densities.

Wiens and Dyer (1975) found the number of species and individuals was greater on ungrazed than on heavily grazed mixed grass prairies in the Great Plains. Heavy grazing tended to decrease the number of nesting species and shifted species composition toward one more characteristic of xeric sites. Owens (1971) compared pairs of native passerines per 40.5 ha on undisturbed, hayed and grazed grassland in Alberta. Undisturbed grassland had the highest pair density with 54 pairs/40.5 ha, followed by 40 pairs/40.5 ha on hayed and 28 pairs/40.5 ha on grazed land. Karuziak et al. (1977), also in Alberta, found the species diversity was greater on grazed and lightly grazed grasslands and that these grasslands were preferred for early nesting habitat. Larson (1969, as cited in Kirsch et al. 1978) studied birds on a grazed wet-meadow habitat in Sweden and found that the breeding pairs was usually higher in ungrazed than in grazed meadow. Good and Drambach (1943) in Ohio, also found species diversity and nesting densities were



were greater on protected than on grazed grassland. Overmire (1963) in a north-central Oklahoma study found that the populations of Dickcissels and Bell's Vireo were 50% lower on grazed than on ungrazed lands.

In Alberta, Owens and Myers (1973) found that mowing and grazing of a native fescue (Festuca scabrella) grassland eliminated populations of Baird's Sparrow (Ammodramus bairdii) and Sprague's pipit (Anthus spragueii), permitted the ingress of the horned lark and chestnut-collared longspur (Calcarius ornatus), and did not affect populations of the savannah sparrow, clay-colored sparrow or western meadow lark. In Saskatchewan, Maher (1973) found that the Sprague's pipit, Baird's sparrow, western meadowlark and savannah sparrow preferred ungrazed prairie but that the horned lark, McCown's longspur (Rhynchophanes mccownii) were more abundant in the grazed prairie. Karuziak et al. (1977) in Alberta, found the Sprague's pipit, Baird's sparrow and grasshopper sparrow preferred lightly or ungrazed mixed grass prairie. The horned lark preferred heavily grazed ranges while the meadowlark was unaffected by grazing. In Arizona, Bock and Bock (1978) reported that the mean number of eastern meadowlarks censused was greatest in the first year burn, followed by second year summer burn, control and winter burn. The mean number of savannah sparrows was highest in the second year summer burn, followed by first year summer burn, winter burn and control. Blankespoor (1980) in South Dakota reported that a decrease in plant density and height was favorable only for the grasshopper sparrow and western meadowlark. The growth of luxuriant vegetation caused a decline in grasshopper sparrow populations in South

Dakota (Blankespoor 1980).

Although most studies of grassland birds agreed that grazing tended to decrease species numbers and total densities, there is some disagreement as to the effects of grazing on several species. All three Canadian studies (Owens and Myers 1973, Maher 1973 and Karuziak et al. 1977) found that grazing eliminated or reduced populations of the Baird's Sparrow and Sprague's pipit and favored the ingress of the horned lark. Owens and Myers (1973) and Maher (1973) found the chestnut-collared longspur also preferred grazed grassland. Karuziak et al. (1977) and Owens and Myers (1973) found the western meadow lark was unaffected by grazing, where as Maher stated that western meadow larks would increase with grazing. Karuziak et al. (1977) reported that the grasshopper sparrow preferred lightly or ungrazed prairie while Blankespoor (1980) reported that a decrease in plant density would favor the grasshopper sparrow. Maher (1973) stated that the savannah sparrow preferred ungrazed prairie but Owens and Myers (1973) reported grazing had no effect.

These studies seem to indicate that grazing is detrimental to some species, beneficial to some species, while others are unaffected or the effects may vary. The effect of grazing on the vegetation structure differs in various regions, climates or grassland communities which may make the response of borderline species unpredictable. Wiens and Dyer (1975) found that breeding bird communities differed markedly on heavily grazed vs. lightly grazed mixed - grass prairie where as bird communities on grazed and ungrazed short grass prairies was similar. If there is a marked change in vegetation structure due to grazing the breeding bird community will probably change or has been affected.



Based on the literature and additional observations the effect of current land use practices on M.I.C.M. on nongame upland nesting birds will be assessed.

Annual mowing is not beneficial to any upland nesting birds as it destroys nests, causes mortality to young and adults and removes residual cover. If mowing is necessary, the first cutting should be as late as possible. The current practice of heavy grazing is probably beneficial to the grasshopper sparrow, killdeer and mourning dove, probably has little effect on the eastern meadowlark and may be adversely affecting the upland sandpiper and dickcissel. Our data suggest that the bobolink may be limited by heavy grazing. The effect of grazing or burning on the bobolink, red-winged black bird and dickcissel may depend, to a large extent, on the effects of each on the occurrence of sturdy forb species which all three are known to prefer for nest support (Zimmerman 1971, Blankespoor 1980). A prescribed burning rotation would probably increase densities of upland sandpipers and mourning dove, killdeers and grasshopper sparrows and eastern meadowlarks may increase the first year and decline thereafter. The long term effects on populations of the bobolink, Dickcissel and red-winged black bird as well as other nesting species would largely depend upon the ultimate vegetation structure.



MIGRANTS AND WINTER RESIDENTS

The Platte Valley is a well known spring staging area for migratory waterfowl in the Central Flyway as well as sandhill cranes. It is estimated that 5-9 million ducks and geese use the Platte River or adjacent wetland basins during spring, including approx. 70-90% of the midcontinental population of white-fronted geese (Kroonemeyer 1979). The federally endangered whooping crane and bald eagle also utilize the Platte during migration and the bald eagle is a common winter resident in areas of open water.

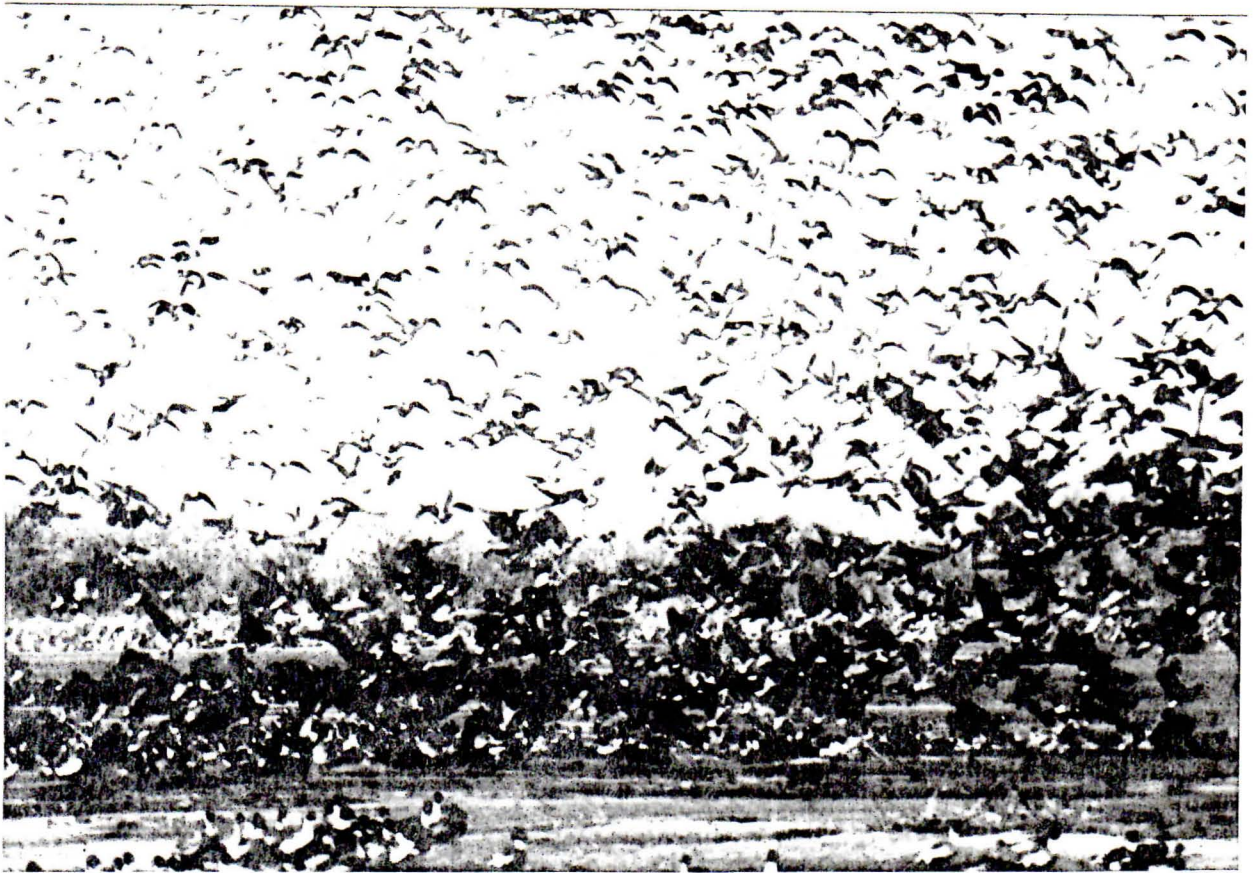
The number of ducks and geese in the Mormon Island area during the spring 1981 was unusually high (Ferguson, pers. comm.). This was probably due to the fact that most of the Rainwater Basins, used extensively by spring staging waterfowl, were dry this year; only Harvard Marsh and McMurtry Marsh held water this spring (Trout, pers. comm.). The Platte River apparently served as a buffer area for birds normally utilizing the basins.

Three species of geese were observed on M.I.C.M. this spring; Canada, white-fronted, and snow geese. Snow geese were fairly uncommon, the maximum count being only 56 on 22 Mar 1981. On 10 Mar 1981 it was estimated that 80,000 Canadas and white-fronts were in the area, and on 26 Feb there were 70,000 geese. The number of geese seemed to fluctuate but numbers in the 30,000 to 75,000 range were present during most of late Feb to early Apr. Geese roosted on the river at night and during midday (Fig 16). Up to several thousand geese utilized the wetland meadows on M.I.C.M. during midday. No Canada geese and only one flock of white-fronted geese (20) were observed during fall 1980.

Fig. 16. Diurnal roosting flock of geese on M.I.C.M.  
(March 1981).

Fig. 17. Pintails and mallards over the meadows (March 1981).







Sixteen species of ducks, 8 dabblers and 8 divers, were observed on M.I.C.M. in spring 1981. The number of ducks was also unusually high. On 10 Mar, an estimated 40,000 ducks, predominately mallards and pintails, were in the area and scores of thousands were present from late Feb to early Apr. Green-winged teal and American wigeon were quite abundant in late spring. Up to 7,000-8,000 ducks utilized the wetland meadows on M.I.C.M. for both day and night roosting (Fig 17). During fall, only 61 mallards and 40 pintails were sighted.

Unlike the sandhill cranes, waterfowl use of wetland meadows was very sensitive to daily changes in water levels (Fig 18 and Fig 19). Use declined in mid-March but increased after rainfall on 21 Mar. Annual spring waterfowl use will probably vary depending on water levels in the Rainwater Basins. Major disease outbreaks occur with some regularity among waterfowl in the Rainwater Basins and there is concern that disease outbreaks may also involve sandhill cranes (Krapu 1981a). Fowl cholera was positively identified by necropsy (white spots on the liver and cardiac hemorrhaging are characteristic) on the river this spring and carcasses were found on the river and in wetland meadows. The micro-environment of the river channel and wetland meadows may not be suitable for disease-causing organisms and they may additionally be diluted or flushed away by water flows. However, the possibility of a disease outbreak in the area exists and this should be monitored each spring.

The large numbers of waterfowl and carcasses of cholera killed birds this spring attracted bald eagles. During spring, 132 sightings of bald eagles were recorded and during winter 14

Fig. 18. An aerial view of the wetland meadows (March 1981).

Fig. 19. A relic channel wetland on M.I.C.M. (March 1981).







were sighted. The maximum count was 17 on 5 Mar.

In general, spring migration was characterized by more species and larger numbers of waterbirds than in fall. A total of 25 species of shorebirds (Charadriiformes) was observed during spring of 1980 and 1981 including 4 species of the family Charadriidae (Plovers), 19 in Scolopacidae (Sandpipers), 1 in Recurvirostridae (Avocets), and 1 in Phalaropodidae (Phalaropes). Six species of shorebirds; the spotted, Baird's, semipalmated, pectoral and least sandpipers and dunlin were captured during spring 1981. Shorebirds which utilized wetland meadows during spring were the lesser yellowlegs, common snipe, solitary sandpiper, pectoral sandpiper, willet, marbled godwit, and white-rumped sandpiper. The common snipe, greater yellowlegs, semipalmated sandpiper, spotted sandpiper and killdeer were the only shorebirds which were observed during fall. We had few observation days during late July and August when additional species or numbers may have migrated through the area. Again, the drought conditions in the Rainwater Basins in 1981 probably resulted in increased use of the Platte River by shorebirds.

The migration (numbers, arrival and departure dates) of other species was monitored with daily observations and supplemented by mist-netting and banding (Table 14). Mist-netting data indicated that species diversity was greater in spring than in the fall. Species per net hour was considerably less during spring of 1981 than in 1980. This may be due largely to the fact that efforts were focused on capturing shorebirds which were prevalent during spring 1981 but not in 1980. High water levels in 1980 precluded extensive use of the river channel

Table 14. Birds banded on M.I.C.M. during spring, fall and winter.

Species	Spring 1980	Spring 1981	Fall	Winter	Total
Rough-legged hawk			1	2	3
Spotted Sandpiper		2			2
Pectoral Sandpiper		2			2
Baird's Sandpiper		2			2
Least Sandpiper		20			20
Dunlin		1			1
Semipalmated Sandpiper		7			7
Hairy Woodpecker	1				1
Downy Woodpecker			5		5
Eastern Kingbird		1			1
Willow Flycatcher	1				1
Least Flycatcher	8				8
Rough-winged Swallow	10	3			13
Barn Swallow	1				1
Blue Jay		3			3
Black-capped Chickadee	2		4		6
House Wren	1	7			8
Gray Catbird		5			5
American Robin		1			1
Swainsons Thrush	1				1
Ruby-crowned Kinglet		1	1		2
Warbling Vireo	1				1
Orange-crowned Warbler			28		28
Nashville Warbler			1		1
Yellow Warbler	8				8
Yellow-rumped Warbler			1		1
Northern Waterthrush	1				1
Common Yellowthroat	3				3
American Redstart	1				1
Northern Oriole	1				1
Brown-headed Cowbird	1	2			3



Table 14. (Continued).

American Goldfinch	4		56		60
Savannah Sparrow			10		10
Grasshopper Sparrow			6		6
LeContes Sparrow			3		3
Vesper Sparrow			6		6
Dark-eyed Junco			5		5
Tree Sparrow			14	31	45
Chipping Sparrow	5				5
Clay-colored Sparrow	5				5
White-throated Sparrow			1		1
Lincoln's Sparrow			7		7
Swamp Sparrow			1		1
Song Sparrow			1	2	3
<hr/>					
Total Species	18	14	18	3	44
Total Individuals	54	57	152	35	298
Net hours	25	53	94	25	197
Birds/net hour	2.2	1.1	1.6	1.4	1.5
Species/net hour x 10	7.2	2.6	1.9	1.2	2.2

by shorebirds but may have increased numbers of flycatchers and warblers in the flooded willow shrublands due the abundance of insects.

Fall was characterized by large numbers of Fringillids. Eleven species of sparrows were captured during fall compared to 3 in spring (Table 14). The tree sparrow was an abundant winter resident. Sparrows, as well as other birds, were abundant in idle areas during fall, feeding on the seeds of weedy forbs and grasses (Table 15).

Wintering raptors were fairly common on the area. Rough-legged hawks and marsh hawks were the most common species (Fig20). The wetland meadows and haylands were constantly patrolled during daylight hours by these species. The open, mild winter provided suitable habitat for these diurnal hunters. Marsh hawks were observed attempting to capture pheasants but were unsuccessful in their efforts. Small mammals were probably the primary food items for raptors.

Table 15. Habitat of birds banded during fall 1980.

Species	Habitat type			Total
	Idle	Woodlot	Fencerow	
Downy Woodpecker	2	3		5
Black-capped Chickadee	4			4
Ruby-crowned Kinglet	1			1
Orange-crowned Warbler	20	8		28
Nashville Warbler	1			1
Yellow-rumped Warbler	1			1
American Goldfinch	22	34		56
Savannah Sparrow			10	10
Grasshopper Sparrow			6	6
LeConte's Sparrow			3	3
Vesper Sparrow			6	6
Dark-eyed Junco	4	1		5
Clay-colored Sparrow	1			1
White-throated Sparrow		1		1
Lincoln's Sparrow	6	1		7
Swamp Sparrow	1			1
Song Sparrow	1			1
Tree Sparrow	14			14
Total individuals	78	48	25	151
Total species	13	6	4	18
Birds/net hour	3.1	1.0	1.3	1.6
Species/net hour x 10	5.2	1.2	2.1	1.9



Fig. 20. A common visitor on M.I.C.M. in winter  
1980-1981, the rough-legged hawk.



AN ANNOTATED CHECKLIST OF THE BIRDS OF  
MORMON ISLAND CRANE MEADOWS



Notes on the occurrence of avifauna observed on the M.I.C.M. study area were recorded from 24 Mar 1980 to 26 Jun 1981. A total of 177 species was observed (43.6% of the 406 species recorded in Nebraska) which is surprising for an area of this size and relatively uniform habitat. Sixty-two species are considered either known or potential breeders. This represents nearly 31% of the 201 species breeding in Nebraska.

As with any bird list, these observations are preliminary and will undoubtedly need to be refined as more data is gathered. We have relied on Rapp et al. (1958) and Johnsgard (1980) for the Nebraska Status section. The general taxonomy of the birds observed, their breeding status, and their nesting habitat are listed in Appendix G, Table 9, and Appendix D respectively. See Breeding Birds section for details on nesting densities of grassland species. Our terminology has been modified slightly from that of Johnsgard (1980).

#### DEFINITION OF TERMS

##### Terms of occurrence

Permanent Resident- Present throughout the year though populations may vary.

Summer Resident- Present during summer, presumably breeding, but migrating out of the area for part of the year.

Summer Visitor- Occurs during summer but not nesting on M.I.C.M.

Winter Visitor- Present during winter months.

Migrant- Transient during spring and/or fall.

Straggler- Occuring subsequent to normal departure dates.

Vagrant- Species which tend to stray at certain times of the year and are not endemic.

Terms of Relative Abundance

Abundant- Present in such quantity that large numbers are likely to be seen daily during the proper season and in appropriate habitats.

Common- Present in such quantity that several are likely to be encountered daily during the proper season and in appropriate habitats.

Fairly Common- A few are likely to be seen daily during the proper season and in appropriate habitats.

Uncommon- A few are likely to be seen each year by visiting the appropriate habitats.

Rare- Two or less sightings in any season.

Local- A species which has very narrow niche requirements hence it is not uniformly distributed throughout a variety of habitats.

Occasional- Not observed every year.

Accidental- Unlikely to be seen (out of species normal range).

Seasons

Spring- 1 Mar to 20 May 1980 and 1981.

Summer- 21 May to 15 Aug 1980 and 1981.

Fall- 16 Aug to 30 Nov 1980 only.

Winter- 31 Nov 1980 to 28 Feb 1981 only.

Breeding Status

Potential Breeder- A species occurring on M.I.C.M. during its normal nesting season although no nests or dependent young were observed.

Known Breeder- A species where nests or dependent young were observed on M.I.C.M.

In addition, we have included notes on the Maximum Count. This is the date where the most number of individuals of a particular species was observed. Habitats in which a species was observed is mentioned as well any unusual notes.



## EARED GREBE

Podiceps nigricollis

Nebraska Status: Uncommon migrant. Fairly common summer resident in the Sandhill Lakes.

M.I.C.M. Status: Accidental spring migrant.

Spring 1981: 14 May (2).

Habitat: Sandpit.

## PIED-BILLED GREBE

Podilymbus podiceps

Nebraska Status: Common migrant and local summer resident.

M.I.C.M. Status: Rare spring migrant, rare summer visitor.

Spring 1980: 20 May (1), 15 Apr (\*)<sup>1</sup>.

1981: 12 Apr (1), 5 May (1), 14 May (1).

Summer: 28 Jun 1980 (1).

Habitat: Ephemeral pond, sandpit, river channel.

## WHITE PELICAN

Pelecanus erythrorhynchos

Nebraska Status: Common migrant and non-breeding summer resident on Harlan County Reservoir and Lake McConaughy.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 10 May (80), 19 May (100).

1981: 6 Apr (75), 21 May (15).

Habitat: River channel.

## DOUBLE-CRESTED CORMORANT

Phalacrocorax auritus

Nebraska Status: Uncommon migrant throughout the state. Local summer resident breeding in the western half of Nebraska.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 42 sightings on 4 days from 13 Apr to 14 May.

Maximum count: 19 Apr (20).

1981: 7 Apr (6), 11 Apr (11).

Habitat: River channel, sandpit.

## GREAT BLUE HERON

Ardea herodias

Nebraska Status: Common and local summer resident.

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<sup>1</sup>(\*) denotes species presence but numbers were unknown.



M.I.C.M. Status: Uncommon spring migrant, common summer visitor, and common fall migrant.

Spring 1981: 12 Apr (1), 18 Apr (1), 14 May (1).

Summer 1981: 7 Jun (1), 21 Jun (1).

Fall: 60 sightings on 15 days from 16 Aug to 10 Oct. Maximum count: 30 Sep (10).

Habitat: River channel, riverine island, sandbar.

#### GREEN HERON

#### Butorides virescens

Nebraska Status: Common migrant and summer resident, except in the Panhandle and western Sandhills.

M.I.C.M. Status: Rare migrant, rare summer visitor.

Spring 1980: 13 May (2).

1981: 8 May (1).

Summer 1980: 17 Jun (1), 16 Jul (1).

1981: 25 May (1).

Fall: 1 Sep (1).

Habitat: River channel.

#### LITTLE BLUE HERON

#### Florida caerulea

Nebraska Status: Occasional spring and rare fall vagrant.

M.I.C.M. Status: Rare spring and summer vagrant.

Spring: 29 Apr (2).

Summer: 23 May (3).

Habitat: River channel.

#### BLACK-CROWNED NIGHT HERON

#### Nycticorax nycticorax

Nebraska Status: Common migrant and local summer resident.

M.I.C.M. Status: Occasional spring migrant.

Spring 1980: 19 Apr (2), 22 Apr (1).

Habitat: River channel.

#### AMERICAN BITTERN

#### Botaurus lentiginosus

Nebraska Status: Common migrant and locally common summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring: 16 Apr 1980 (1).

Habitat: Sandpit.

## WHITE-FACED IBIS

Plegadis chihi

Nebraska Status: Rare spring vagrant and summer visitor.

M.I.C.M. Status: Rare fall migrant.

Fall: 26 Aug 1980 (10).

Habitat: In flight.

## CANADA GOOSE

Branta canadensis

Nebraska Status: Abundant migrant and local breeder in the Sandhills.

M.I.C.M. Status: Abundant spring migrant, local summer resident, and common late winter visitor.

Spring 1981: Observed on 16 days from 2 Mar to 18 Apr. Maximum count: 10 Mar (80,000, mixed with White-fronted Geese).

Summer 1981: 5 Jun (2), 13 Jun (2).

Winter: Observed on 10 days from 15 Feb to 28 Feb. Maximum count: 26 Feb (75,000, mixed with White-fronted Geese).

Habitat: River channel, wetland meadow.

Note: By 9 Apr 1981, few were present.

## WHITE-FRONTED GOOSE

Anser albifrons

Nebraska Status: Common migrant statewide and abundant migrant in the central Platte Valley.

M.I.C.M. Status: Abundant spring migrant, rare fall migrant, and common late winter visitor.

Spring 1981: Observed on 16 days from 2 Mar to 18 Apr. Maximum count: 10 Mar (80,000, mixed with Canada Geese).

Fall: 18 Nov 1980 (25).

Winter: Observed on 7 days from 19 Feb to 28 Feb.

Habitat: River channel, wetland meadow.

## SNOW GOOSE

Anser caerulescens

Nebraska Status: Migrant statewide, less common in the west. Abundant along the Missouri River Valley.

M.I.C.M. Status: Uncommon spring migrant, accidental late winter visitor.

Spring 1981: 16 Mar (27), 22 Mar (56, 1 blue phase), 5 Apr (2).

Winter: 27 Feb (7), 28 Feb (25).



Habitat: River channel, wetland meadow.

# MALLARD

## Anas platyrhynchos

Nebraska Status: Abundant migrant and locally common summer resident statewide. Common winter resident wherever open water exists.

M.I.C.M. Status: Abundant spring migrant and winter visitor, uncommon summer resident, fairly common fall migrant. Known breeder.

Spring 1980: Observed on 6 days from 19 Apr to 20 May.

1981: Observed from 2 Mar to 16 May. Maximum count: 10 Mar (40,000, mixed with Pintails).

Summer 1980: Observed on 5 days from 26 May to 17 Jun. Nest with 8 eggs located in breeding bird plot #5 in wetland meadow on 17 Jun. Fate unknown.

1981: 25 May (2), 26 May (4), 13 Jun (7 drakes).

Fall: 61 sightings on 9 days from 3 Sep to 25 Nov.

Habitat: River channel, sandbar, sandpit, wetland meadow, corn.

# GADWALL

## Anas strepera

Nebraska Status: Common to abundant migrant and common summer resident, primarily in the Sandhills.

M.I.C.M. Status: Uncommon spring migrant, rare fall migrant.

Spring 1980: 10 May (6), 14 May (\*), 13 May (2).

1981: Observed on 10 days from 16 Mar to 10 May.

Maximum count: 18 Apr (10).

Fall: 23 Sep (3).

Habitat: River channel.

# PINTAIL

## Anas acuta

Nebraska Status: Abundant migrant and common summer resident.

M.I.C.M. Status: Abundant spring migrant and late winter visitor, uncommon summer resident and fall migrant. Potential breeder.

Spring 1980: Observed on 4 days from 10 Apr to 10 May.

1981: Observed from 1 Mar to 26 Apr. Maximum count: 10 Mar (40,000, mixed with Mallards).



Summer 1980: Observed 3 days from 25 May to 11 Jun. Hen observed acting "broody".

Fall: 25 Sep (20), 26 Sep (20).

Winter: Observed from 15 Feb to 28 Feb.

Habitat: River channel, wetland meadow.

Note: By 9 Apr 1981, few remained in area.

#### GREEN-WINGED TEAL

#### Anas crecca

Nebraska Status: Abundant migrant and occasional summer resident in the Sandhills.

M.I.C.M. Status: Common migrant, rare summer resident and winter visitor. Potential breeder.

Spring 1980: 22 Apr (\*), 17 May (\*).

1981: Observed from 13 Mar to 26 Apr. Individuals not counted but present in large numbers.

Summer 1980: 7 Jun (1), 10 Jun (3).

Fall: 106 sightings on 5 days from 17 Sep to 3 Oct. Maximum count: 30 Sep (40).

Winter: 27 Feb (\*).

Habitat: River channel, wetland meadow.

#### BLUE-WINGED TEAL

#### Anas discors

Nebraska Status: Abundant migrant and common summer resident.

M.I.C.M. Status: Common migrant, uncommon summer resident.

Known breeder.

Spring 1980: Observed on 11 days from 22 Mar to 20 May.

1981: Observed from 27 Mar to 14 May. Maximum count: 18 Apr (50).

Summer 1980: Observed on 12 days from 25 May to 23 Jun. Nest #1- located in breeding bird plot #5 on 11 Jun with 3 cold eggs. 14 Jun nest had 6 eggs. Fate unknown. Nest #2- located in breeding bird plot #2 on 16 Jun with 10 eggs. 10 eggs present on 16 and 23 Jun. Fate unknown. On 23 Jun a hen was observed flying over wetland meadow with a hatched egg shell in bill.

1981: 13 Jun (1).

Fall: 55 sightings on 6 days from 18 Aug to 30 Sep.

Habitat: River channel, wetland meadow, sandpit.

AMERICAN WIGEON

Anas americana

Nebraska Status: Common to locally abundant migrant. Local and uncommon summer resident in the northwestern Sandhills.

M.I.C.M. Status: Common spring migrant, uncommon late winter visitor.

Spring 1980: 10 Apr (\*), 22 Apr (\*), 10 May (2).

1981: Observed on 9 days from 10 Mar to 26 Apr. Individuals not counted but present in large numbers.

Winter: 19 Feb (2), 27 Feb (\*).

Habitat: River channel.

NORTHERN SHOVELER

Anas clypeata

Nebraska Status: Common to abundant migrant and an uncommon to common summer resident.

M.I.C.M. Status: Fairly common spring migrant, rare summer resident and fall migrant. Potential breeder.

Spring 1980: Observed on 8 days from 10 Apr to 20 May.

1981: Observed on 9 days from 13 Mar to 29 Apr.

Maximum count: 18 Apr (10).

Summer 1980: 28 May (3).

1981: 3 Jun (1), 4 Jun (1).

Fall: 25 Sep (3).

Habitat: River channel, wetland meadow.

WOOD DUCK

Aix sponsa

Nebraska Status: Uncommon migrant and summer resident in eastern Nebraska, becoming more rare westwardly.

M.I.C.M. Status: Uncommon spring migrant, rare summer resident. Potential breeder.

Spring 1980: 19 Apr (1), 26 Apr (\*).

1981: Observed on 6 days from 16 Mar to 16 May.

Summer 17 Jun 1980 (1), 26 May 1981 (5). Maximum count: 26 May 1981 (5).

Habitat: Riparian overstory, sandpit, wetland meadow.

## REDHEAD

Aythya americana

Nebraska Status: Common migrant and locally common summer resident in the Sandhills and Rainwater Basins.

M.I.C.M. Status: Rare spring migrant and late winter visitor.

Spring: 12 Apr 1981 (\*).

Winter: 25 Feb 1981 (12).

Habitat: River channel, sandpit.

## RING-NECKED DUCK

Aythya collaris

Nebraska Status: Uncommon to common migrant and a rare breeder in the Sandhills.

M.I.C.M. Status: Rare spring migrant.

Spring 1981: 11 Mar (1), 4 Apr (2).

Habitat: Sandpit.

## CANVASBACK

Aythya valisineria

Nebraska Status: Uncommon to locally common migrant statewide.

M.I.C.M. Status: Rare spring migrant.

Spring: 14 Mar 1981 (6).

Habitat: Sandpit.

## LESSER SCAUP

Aythya affinis

Nebraska Status: Common to abundant migrant and occasional summer resident in the Sandhills.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1981: 11 Mar (15), 22 Mar (5), 26 Apr (2).

Habitat: Sandpit.

## COMMON GOLDENEYE

Bucephala clangula

Nebraska Status: Common to uncommon migrant statewide.

M.I.C.M. Status: Rare spring migrant and late winter visitor.

Spring 1981: 11 Mar (1), 18 Apr (1).

Winter: 25 Feb (5).

Habitat: River channel, sandpit.



## BUFFLEHEAD

Bucephala albeola

Nebraska Status: Common to uncommon migrant.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 22 Apr (1).

1981: 22 Mar (1), 18 Apr (1).

Habitat: Sandpit.

## HOODED MERGANSER

Lophodytes cucullatus

Nebraska Status: Uncommon to occasional migrant in eastern Nebraska and occasional to rare in western Nebraska.

M.I.C.M. Status: Rare fall migrant.

Fall: 14 Nov (2).

Habitat: Sandpit.

## COMMON MERGANSER

Mergus merganser

Nebraska Status: Migrant, varying in abundance from common to occasional.

M.I.C.M. Status: Common spring migrant, rare late winter visitor.

Spring 1980: 13 Apr (\*), 19 Apr (\*), 22 Apr (\*).

1981: Observed from early Mar to 21 Apr. Maximum count: 22 Mar (200).

Habitat: River channel.

## TURKEY VULTURE

Cathartes aura

Nebraska Status: Uncommon to common migrant, a local breeder along some river systems.

M.I.C.M. Status: Rare spring migrant.

Spring: 15 May 1980 (1).

Habitat: In flight.

## SHARP-SHINNED HAWK

Accipiter striatus

Nebraska Status: Uncommon to occasional winter visitor and spring migrant. Breeds regularly in Sioux Co.

M.I.C.M. Status: Rare spring migrant.

Spring: 10 Mar 1981 (1).

Habitat: Riparian understory.

## COOPER'S HAWK

Accipiter cooperii

Nebraska Status: Uncommon winter visitor and spring migrant.

M.I.C.M. Status: Rare migrant.

Spring: 25 Apr 1981 (1).

Fall: 14 Sep (1), 25 Nov (2).

Habitat: Riparian overstory.

## RED-TAILED HAWK

Buteo jamaicensis

Nebraska Status: Uncommon summer or permanent resident statewide and a common migrant.

M.I.C.M. Status: Common permanent resident. Known breeder.

Spring 1980: Observed on 5 days from 19 Apr to 15 May.

1981: Observed on 13 days from 7 Mar to 16 May.

Summer 1980: Observed on 4 days from 25 May to 10 Jun.

1981: Observed on 3 days from 25 May to 21 Jun. Nest #1- adult on nest on 24 Feb and 7 Mar. Nest in riparian overstory. Same nest occupied in 1980. Nest #2- In woodlot. Adult on nest during March. Nest occupied in 1979.

Fall: 31 sightings on 17 days from 3 Sep to 25 Nov.

Winter: 30 sightings on 10 days from 2 Dec to 24 Feb.

Maximum count: 2 Dec (10).

Habitat: Riparian overstory, woodlot, wetland meadow, hay.

## SWAINSON'S HAWK

Buteo swainsoni

Nebraska Status: Common to uncommon migrant and summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 10 May (1).

1981: 20, 21 Apr (1).

Habitat: In flight.

## ROUGH-LEGGED HAWK

Buteo lagopus

Nebraska Status: Uncommon migrant and winter visitor, being more common westwardly.

M.I.C.M. Status: Rare spring migrant, fairly common fall migrant,

common winter visitor.

Spring: 10 Mar 1981 (1).

Fall: 22 sightings on 11 days from 1 Oct to 28 Nov. 1 banded.

Winter: 44 sightings on 14 days from 4 Dec to 22 Feb. 2 banded.

Maximum count: 20 Dec (8).

Habitat: Wetland meadow, fencerow, riparian overstory, hay, woodlot, idle, alfalfa, corn.

#### FERRUGINOUS HAWK

#### Buteo regalis

Nebraska Status: Uncommon to occasional permanent resident in western portions and a summer resident in the northwest corner.

M.I.C.M. Status: Rare fall migrant.

Fall: 4 Oct (1).

Habitat: Wetland meadow.

#### GOLDEN EAGLE

#### Aquila chrysaetos

Nebraska Status: Uncommon migrant and winter resident, a permanent resident in western Nebraska.

M.I.C.M. Status: Rare spring migrant.

Spring 1981: 2,4-6 Mar (1 imm.)

Habitat: Wetland meadow.

#### BALD EAGLE

#### Haliaeetus leucocephalus

Nebraska Status: Uncommon migrant and locally common winter resident statewide. Formerly a regular breeder in eastern Nebraska, especially along the Missouri River.

M.I.C.M. Status: Common early spring migrant and late winter visitor.

Spring 1981: 132 sightings from 2 Mar to 25 Mar. Maximum count: 5 Mar (17).

Winter: 14 sightings (9 adults, 5 subadults) on 8 days from 24 Dec to 27 Feb. No eagles observed from 25 Dec to 5 Feb.

Habitat: River channel, riparian overstory, wetland meadow, hay, shrubland.

Note: Eagles concentrated in this area feeding on diseased waterfowl. Other high counts in 1981: 2 Mar (12), 13 Mar (16), 22 Mar (13), 24 Mar (11).



## MARSH HAWK

Circus cyaneus

Nebraska Status: Common migrant and permanent resident.

M.I.C.M. Status: Common early spring migrant, occasional winter visitor.

Spring 1980: 13 Apr (1).

1981: 22 sightings on 7 days from 2 Mar to 21 Apr.

Maximum count: 4 Mar (9).

Fall: 40 sightings on 11 days from 3 Sep to 19 Nov.

Winter: 36 sightings on 15 days from 4 Dec to 28 Feb.

Habitat: Wetland meadow, hay, alfalfa, corn, idle, fencerow.

Note: Few Marsh Hawks were observed on M.I.C.M. during winter 1979.

## OSPREY

Pandion haliaetus

Nebraska Status: Uncommon to occasional migrant.

M.I.C.M. Status: Rare migrant.

Spring 1981: 21 Apr (1), 29 Apr (1).

Fall: 5 Oct (1), 16 Oct (1).

Habitat: River channel.

Note: Observed eating a carp on barren sandbar on 21 Apr 1981.

## PRAIRIE FALCON

Falco mexicanus

Nebraska Status: Occasional to rare permanent resident in western areas, rare migrant and winter visitor in eastern areas.

M.I.C.M. Status: Rare migrant, uncommon winter visitor.

Spring: 23 Mar 1981 (1).

Fall: 14 Nov (1).

Winter: 13 Jan (1); 16, 22, 27 Feb (1).

Habitat: Wetland meadow, hay.

## PEREGRINE FALCON

Falco peregrinus

Nebraska Status: Rare to occasional migrant and winter visitor.

M.I.C.M. Status: Rare fall migrant.

Fall: 9 Oct (1).

Habitat: In flight over alfalfa.

1982: Oct 11 (1). Harassing Great Horned Owl on riverine sandbar in R3.

## MERLIN

Falco columbarius

Nebraska Status: Uncommon migrant and winter visitor. Extremely rare summer resident in the Pine Ridge.

M.I.C.M. Status: Rare spring migrant.

Spring: 12 Mar 1981 (1).

Habitat: Riparian overstory.

## AMERICAN KESTREL

Falco sparverius

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Common to uncommon permanent resident.

Potential breeder in woodlots.

Spring 1980: Observed on 3 days from 10 May to 15 May.

1981: 4 sightings on 4 days from 20 Apr to 10 May.

Summer 1980: Observed on 4 days from 25 May to 7 Jun.

Fall: 43 sightings on 20 days from 30 Sep to 4 Nov.

Winter: 15 sightings on 9 days from 2 Dec to 19 Feb. Maximum count: 20, 28 Dec (3).

Habitat: Wetland meadow, woodlot, fencerow alfalfa, hay, farmstead, corn riparian overstory.

## GREATER PRAIRIE CHICKEN

Tympanuchus cupido

Nebraska Status: Locally common to uncommon permanent resident, especially in the eastern Sandhills.

M.I.C.M. Status: Rare spring and fall visitor, occasional winter visitor.

Spring 1981: 4 Mar (3), 7 Mar (2).

Fall: 19 Nov (3).

Habitat: Wetland meadow, corn, riparian overstory.

Note: During the winter of 1979, approx. 40 individuals were observed on several occasions on M.I.C.M. budding on cottonwoods.

## BOBWHITE

Colinus virginianus

Nebraska Status: Permanent resident, becoming rarer westwardly.

M.I.C.M. Status: Common permanent resident. Known breeder.

Spring 1980: Observed on 8 days from 19 Apr to 17 May.

1981: 71 sightings on 15 days from 7 Mar to 14 May.



Summer 1980: Observed on 4 days from 25 May to 24 Jun. Several broods observed in late Jun.

1981: 25, 26 May (\*).

Fall: 262 sightings on 10 days from 1 Sep to 25 Nov.

Winter: 406 sightings on 7 days from 5 Dec to 16 Feb. Maximum count: 20 Dec (200).

Habitat: Woodlot, fencerow, riparian understory, shrubland, wetland meadow, farmstead.

#### RING-NECKED PHEASANT

#### Phasianus colchicus

Nebraska Status: Introduced permanent resident, fairly common statewide.

M.I.C.M. Status: Common permanent resident. Known breeder.

Spring 1980: 25 sightings on 8 days from 19 Apr to 17 May.

1981: Observed on 16 days from 7 Mar to 16 May.

Summer 1980: Observed on 4 days from 25 May to 28 Jun. Brood with 8 day old chicks observed in wetland meadow on 28 Jun.

2 nests located on hummocks in north pastures on 8 Jun. 1 nest had 14 hatched eggs and 1 nest had 10 eggs (fate unknown).

1981: Observed from 25 May to 21 Jun. Brood observed in alfalfa during early Jun.

Fall: 108 sightings on 8 days from 1 Sep to 25 Nov.

Winter: 144 sightings on 11 days from 5 Dec to 22 Feb. Maximum count: 12, 19 Feb (40).

Habitat: Wetland meadow, fencerow, corn, woodlot, alfalfa, hay, riparian understory.

Note: Rooster crowing counts in 1981 were: 18 Apr (26), 22 Apr (28).

#### SANDHILL CRANE

#### Grus canadensis

Nebraska Status: Abundant spring migrant in the Platte Valley from Grand Island to Lewellen, uncommon to rare elsewhere.

Generally less common in fall.

M.I.C.M. Status: Abundant spring migrant, uncommon fall migrant.

Spring 1980: 3702 sightings on 6 days from 10 Apr to 19 Apr.

1981: 355,811 sightings on 35 days from 2 Mar to 10 May.

Maximum count: 25 Mar (31,420).



Fall: 5,920 sightings on 6 days from 28 Oct to 19 Nov.

Habitat: River channel, wetland meadow, hay, alfalfa, corn.

SORA

Porzana carolina

Nebraska Status: Common migrant and locally common summer resident, being more local in the Panhandle.

M.I.C.M. Status: Rare spring migrant and summer resident. Known breeder.

Spring 1980: 10 May (1), 11 May (2), 17 May (2).

Summer 1980: 23 May (1), 10 Jun (1 downy chick in breeding bird plot #5 in wetland meadow.

Habitat: River channel, wetland, hay, alfalfa.

AMERICAN COOT

Fulica americana

Nebraska Status: Common to abundant migrant and summer resident. Occasional winter resident where there is open water.

M.I.C.M. Status: Accidental spring migrant and summer visitor.

Spring 1981: 4 sightings on 4 days from 18 Apr to 15 May.

Summer: 28 May 1980 (1).

Habitat: Sandpit, wetland meadow.

SEMIPALMATED PLOVER

Charadrius semipalmatus

Nebraska Status: Uncommon to occasional migrant.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1981: 15 sightings on 4 days from 18 Apr to 14 May.

Maximum count: 29 Apr (6).

Habitat: River channel.

PIPING PLOVER

Charadrius melodus

Nebraska Status: Occasional to rare migrant and local and rare summer resident.

M.I.C.M. Status: Occasionally common late spring migrant and summer resident. Known breeder.

Spring 1981: Observed from 20 Apr to 14 May.

Summer 1981: Observed from 25 May to 21 Jun. 4 nests found on 13 Jun; 2 with 4 eggs, 1 with 3 eggs and 1 with 1 egg.

Nests on barren sandbars 0.4 mi west of Mormon Island.

Maximum count: 13 Jun (10).

Note: In 1980, high water conditions inundated riverine islands typically inhabited by Piping Plovers and no birds were observed.

#### KILLDEER

#### Charadrius vociferus

Nebraska Status: Common to abundant migrant and summer resident.

M.I.C.M. Status: Common migrant and summer resident. Known breeder.

Spring 1980: Observed on 9 days from 9 Apr to 17 May.

1981: Observed on 17 days from 2 Mar to 16 May.

Summer 1980: Observed from 22 May to 8 Aug. 22 May 1 chick observed. 23 May 3 broods observed. 10 May 1 chick observed.

1981: Observed from 25 May to 26 Jun. 1 brood observed on 5 May and 14 May.

Fall: 96 sightings on 16 days from 1 Sep to 25 Nov. Maximum count: 30 Sep (14).

Habitat: Sandbar, wetland meadow, hay.

#### AMERICAN GOLDEN PLOVER

#### Pluvialis dominica

Nebraska Status: Uncommon to occasional migrant in the east, rarer in the west. More common in spring.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 19 May (30), 20 May (approx. 5).

Habitat: Newly seeded alfalfa.

#### RUDDY TURNSTONE

#### Arenaria interpres

Nebraska Status: Occasional to rare spring migrant in eastern Nebraska, rare elsewhere.

M.I.C.M. Status: Accidental spring migrant.

Spring: 14 May 1981 (3).

Habitat: River channel.



## COMMON SNIPE

Capella gallinago

Nebraska Status: Common migrant and a rare or local summer resident.

M.I.C.M. Status: Common spring and rare fall migrant.

Spring 1980: 13 Apr (\*), 19 Apr (\*), 22 Apr (2).

1981: Observed from 28 Mar to 21 Apr. Maximum count: 30 Mar (6).

Fall: 3 Sep (2).

Habitat: Wetland meadow, river channel.

## UPLAND SANDPIPER

Bartramia longicauda

Nebraska Status: Uncommon migrant and local summer resident. Most common in the Sandhills.

M.I.C.M. Status: Abundant late spring migrant and summer resident. Known breeder.

Spring 1980: Observed from 22 Apr to 20 May. Maximum count: 20 May (115).

1981: Observed from 18 Apr to 16 May.

Summer 1980: Observed from 25 May to 8 Aug. 11 nests or broods observed. Earliest 14 May, latest 27 Jun. Earliest chick- 16 Jun. Average clutch size- 3.5 eggs.

1981: Observed 12 days from 25 May to 26 Jun. 2 nests located on 2 Jun; 1 with 4 eggs and 1 with 3 eggs. 21, 26 Jun 1 chick observed in hay.

Habitat: Wetland meadow, hay, alfalfa, river channel.

Note: See Upland Sandpiper Census (Table 12).

## SPOTTED SANDPIPER

Actitis macularia

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common migrant and summer resident. Known breeder.

Spring 1980: Observed on 6 days from 10 - 20 May.

1981: Observed on 8 days from 20 Apr to 16 May.

Maximum count: 25 May (12).

Summer 1980: Observed on 5 days from 25 May to 8 Aug.

1981: Observed on 4 days from 25 May to 21 Jun.

On 21 Jun, 1 nest was found on barren sandbar. On same date 1 chick



was observed.

Fall: 1 Sep (2), 23 Sep (1).

Habitat: River channel.

Note: Nest records for 1978 and 1979 exist.

#### SOLITARY SANDPIPER

Tringa solitaria

Nebraska Status: Common to occasional migrant, most common eastwardly.

M.I.C.M. Status: Rare spring migrant.

Spring: 20 Apr 1981 (1).

Habitat: Wetland meadow.

#### GREATER YELLOWLEGS

Tringa melanoleuca

Nebraska Status: Common migrant.

M.I.C.M. Status: Uncommon spring and early fall migrant.

Spring 1980: 22 Apr (3), 10 May (1), 14 May (\*).

1981: Observed on 9 days from 27 Mar to 29 Apr.

Fall: Observed on 8 days from 16 Aug to 4 Oct. Maximum count: 1 Sep (11).

Habitat: River channel.

#### LESSER YELLOWLEGS

Tringa flavipes

Nebraska Status: Common migrant, usually more common than the Greater Yellowlegs.

M.I.C.M. Status: Common spring migrant and occasional early summer straggler.

Spring 1980: Observed on 6 days from 10 Apr to 17 May.

1981: 154 sightings on 6 days from 6 Apr to 26 Apr.

Maximum count: 25 Apr (74).

Summer 1980: 25, 26 May (\*).

Habitat: Wetland meadow, river channel.

#### WILLET

Catoptrophorus semipalmatus

Nebraska Status: Uncommon to locally common migrant and a locally common migrant in the Sandhills. The Sandhills are this species southern breeding limit.

M.I.C.M. Status: Rare spring migrant.

Spring 1981: 20 Apr (6), 26 Apr (1), 28 Apr (3).

Habitat: River channel, wetland meadow.

PECTORAL SANDPIPER

Calidris melanotos

Nebraska Status: Common to abundant migrant.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 10 May (\*), 11 May (4), 15 May (1).

1981: 11 sightings on 4 days from 21 Apr to 10 May.

Maximum count: 8 May (5). 26 Apr 2 banded.

Habitat: Wetland meadow, river channel.

WHITE-RUMPED SANDPIPER

Calidris fuscicollis

Nebraska Status: Fairly common spring migrant and much fewer records as a fall migrant.

M.I.C.M. Status: Abundant late spring and early summer migrant.

Spring 1980: 11 May (1), 19 May (25), 20 May (\*).

1981: Observed from 10 May to 14 May.

Summer 1981: 66 sightings from 25 May to 3 Jun. Maximum count: 25 May (40).

Habitat: River channel, wetland meadow.

BAIRD'S SANDPIPER

Calidris bairdii

Nebraska Status: Common migrant. Probably the most abundant "peep".

M.I.C.M. Status: Abundant spring migrant, occasional summer straggler.

Spring 1980: 10 May (3).

1981: 103 sightings on 6 days from 6 Apr to 10 May.

2 banded. Maximum count: 20 Apr (75).

Summer: 1 Jun 1980 (1).

Habitat: River channel, wetland meadow.

## LEAST SANDPIPER

Calidris minutilla

Nebraska Status: Common migrant.

M.I.C.M. Status: Abundant spring migrant and occasional early summer migrant.

Spring 1980: 11 May (25), 14 May (\*), 15 May (\*). Maximum count: 11 May (2)  
1981: Observed from 26 Apr to 14 May. 20 banded.

Summer: 26 May 1981 (5).

Habitat: River channel, wetland meadow.

## DUNLIN

Calidris alpina

Nebraska Status: Occasional spring migrant in eastern Nebraska, rare in western Nebraska. Rare fall migrant.

M.I.C.M. Status: Occasional spring migrant.

Spring: 14 May 1981 (3, 1 banded).

Habitat: River channel.

## SEMIPALMATED SANDPIPER

Calidris pusilla

Nebraska Status: Common migrant, locally abundant or uncommon, the latter in western Nebraska.

M.I.C.M. Status: Common spring migrant, uncommon fall migrant, and occasional summer straggler.

Spring 1980: 11 May (20), 14 May (\*), 15 May (\*). Maximum count: 11 May (20).

1981: Observed on 8 days from 11 Apr to 16 May. 7 banded.

Summer: 26 May 1981 (2).

Fall: Observed on 4 days from 1 Sep to 23 Sep.

Habitat: River channel.

## WESTERN SANDPIPER

Calidris mauri

Nebraska Status: Rare migrant in eastern Nebraska becoming more common westwardly.

M.I.C.M. Status: Rare spring migrant.

Spring: 4 May 1981 (1).

Habitat: River channel.



## SHORT-BILLED DOWITCHER

Limnodromus griseusNebraska Status: Occasional ro rare migrant.M.I.C.M. Status: Rare spring migrant.

Spring: 14 May 1981 (4).

Habitat: River channel.

## LONG-BILLED DOWITCHER

Limnodromus scolopaceusNebraska Status: Common migrant.M.I.C.M. Status: Rare spring migrant.

Spring: 25 Apr 1981 (3).

Habitat: River channel.

## STILT SANDPIPER

Micropalama himantopusNebraska Status: Common or uncommon migrant, becoming less common in the west.M.I.C.M. Status: Rare spring migrant, occasional summer straggler.

Spring 1980: 14 May (\*).

1981: 10 May (5).

Summer: 25 May 1981 (10).

Habitat: Wetland meadow, river channel.

## MARBLED GODWIT

Limosa fedoaNebraska Status: Uncommon to locally common migrant. Fewer sightings in the fall.M.I.C.M. Status: Rare spring migrant.

Spring: 13 Apr 1980 (1).

Habitat: Wetland meadow.

## HUDSONIAN GODWIT

Limosa haemasticaNebraska Status: Uncommon spring migrant in the east, rare in the west.M.I.C.M. Status: Rare spring migrant.

Spring: 10 May 1981 (3).

Habitat: In flight.

## AMERICAN AVOCET

Recurvirostra americana

Nebraska Status: Uncommon migrant in the east and in the Panhandle, becoming common in central Nebraska. Common summer resident in the Sandhills.

M.I.C.M. Status: Rare spring migrant.

Spring 1981: 28 Apr (14), 29 Apr (3).

Habitat: River channel.

## WILSON'S PHALAROPE

Steganopus tricolor

Nebraska Status: Common to abundant migrant and common summer resident, especially in the Sandhills.

M.I.C.M. Status: Uncommon spring migrant and rare summer resident. Potential breeder.

Spring 1980: 14 May (2).

1981: 17 sightings on 4 days from 4 May 14 May. Maximum count: 14 May (10).

Summer 1980: Observed from 25 May to 24 Jun. 1 pair thought to be nesting in breeding bird plot #1 in native hay.

1981: 3 Jun (3), 16 Jun (1), 21 Jun (1).

Habitat: River channel, wetland meadow.

## HERRING GULL

Larus argentatus

Nebraska Status: Uncommon migrant.

M.I.C.M. Status: Accidental fall migrant and late winter visitor.

Fall: 24 Oct 1980 (3).

Winter: 27 Feb (4).

Habitat: River channel.

## RING-BILLED GULL

Larus delawarensis

Nebraska Status: Uncommon migrant with stragglers remaining in summer.

M.I.C.M. Status: Uncommon fall migrant and late winter visitor.

Fall: 18 Nov (40), 20 Nov (45).

Winter: 25 Feb (10), 27 Feb (20).

Habitat: River channel.



## FRANKLIN'S GULL

Larus pipixcan

Nebraska Status: Abundant migrant and rare or accidental summer resident.

M.I.C.M. Status: Uncommon spring migrant, rare summer straggler.

Spring 1980: Observed on 4 days from 22 Mar to 17 May. Maximum count: 19 Apr (150).

1981: 77 sightings on 7 days from 27 Mar to 16 May.

Summer: 26 May 1981 (20).

Habitat: River channel.

## FORESTER'S TERN

Sterna forsteri

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Fairly common spring migrant.

Spring 1980: Observed on 5 days from 22 Apr to 14 May. Maximum count: 11 May (25).

1981: 9 sightings on 4 days from 26 Apr to 8 May.

Habitat: River channel.

## LEAST TERN

Sterna albifrons

Nebraska Status: Uncommon migrant and rare and local summer resident.

M.I.C.M. Status: Rare spring migrant and occasional summer resident.

Known breeder.

Spring 1980: 15 May (1).

Summer 1981: 25 May (5), 26 May (4), 13 Jun (16 adults minimum), 21 Jun (10 adults minimum). On 13 June, 5 nests were located on barren sandbar 0.4 mi west of M.I.C.M. 2 nests had 4 eggs, 3 nests had 3 eggs. On 21 Jun, nests were marked. 13 nests were located including the ones on 13 Jun. 6 nests had 3 eggs, 2 nests had 4 eggs, 1 nest had 1 egg (abandoned), 1 nest had 2 downy chicks and 1 pipped egg, 1 nest had 3 downy chicks, 1 nest had 2 eggs, and 1 nest had 2 eggs in nest bowl with 1 cold egg approx. 9 m from nest.

Habitat: River channel.

Note: 24 July 1978, 25 terns were observed, 6 of which were juveniles. Nests were initiated in 1979 but were unsuccessful due to flooding. No nesting attempt was made in 1980 due to high water. Potential predators are garter snakes. This species is threatened in Nebraska (Lock 1977).

1981 1 fledling, no nests found. 26 May 1st arrival  
1983 High water. No nests initiated. 28 May 1st arrival.



## BLACK TERN

Chlidonias niger

Nebraska Status: Abundant migrant and locally common summer resident.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: Observed on 6 days from 10 May to 17 May. Maximum count: 17 May (30).

1981: 8 May (\*), 14 May (6).

Habitat: River channel.

## ROCK DOVE

Columba livia

Nebraska Status: Introduced permanent resident.

M.I.C.M. Status: Uncommon permanent resident.

Summer: 21 May 1981 (\*).

Fall: 1 Sep (20), 4 Sep (10), 20 Sep (20).

Winter: 20 Dec (3), 24 Dec (2).

Habitat: Farmstead, corn.

## MOURNING DOVE

Zenaida macroura

Nebraska Status: Abundant migrant and summer resident. Frequently overwinters during mild winters in sheltered areas.

M.I.C.M. Status: Abundant spring migrant and summer resident, common fall migrant. Known breeder.

Spring 1980: Observed on 8 days from 18 Apr to 17 May.

1981: Observed on 14 days from 6 Apr to 16 May.

Summer 1980: Observed on 13 days from 25 May to 8 Aug. 14 nests located from 14 May to 23 Jun. Average clutch size- 1.8 eggs.

1981: Observed on 10 days from 25 May to 21 Jun. 1 nest located on 8 May and 1 nest on 13 Jun.

Fall: 54 sightings on 12 days from 1 Sep to 9 Oct. Maximum count: 11 Sep (11).

Habitat: Wetland meadow, fencerow, alfalfa, woodlot, corn, shrubland, and hay.

## YELLOW-BILLED CUCKOO

Coccyzus americanus

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Uncommon summer resident, rare fall migrant.  
Potential breeder.

Summer 1980: Observed on 5 days from 25 May to 8 Aug.

1981: 2 Jun (1), 26 Jun (1).

Fall: 1 Sep (1).

Habitat: Shrubland, fencerow, farmstead.

## BLACK-BILLED CUCKOO

Coccyzus erythrophthalmus

Nebraska Status: Uncommon migrant and summer resident almost statewide, being absent in parts of the Panhandle.

M.I.C.M. Status: Rare summer resident. Potential breeder.

Summer 1980: 30 Jun (1), 26 May (1).

1981: 26 May (1), 10 Jun (2), 24 Jun (1).

Habitat: Riparian understory, shrubland, woodlot.

## GREAT HORNED OWL

Bubo virginianus

Nebraska Status: Uncommon permanent resident.

M.I.C.M. Status: Uncommon permanent resident. Known breeder.

Spring 1980: Observed 5 days from 22 Apr to 15 May.

1981: 9 sightings on 5 days from 7 Mar to 20 May.

Maximum count: 16 May (5 fledglings).

Summer: 26 May 1981 (1).

Fall: Observed on 5 days from 16 Aug to 31 Oct.

Winter: 10 sightings on 6 days from 4 Dec to 28 Feb.

Habitat: Woodlot, riparian woodland overstory and understory.

Note: In 1979 a stick nest and young were observed in riparian overstory.

## COMMON NIGHTHAWK

Chordeiles minor

Nebraska Status: Abundant migrant and summer resident especially around cities.

M.I.C.M. Status: Rare spring migrant and summer visitor, uncommon fall migrant.

Spring: 17 May 1980 (1).



Summer 1981: 25 May (1), 13 Jun (1).  
 Fall: 6 Sep (large numbers migrating over area).  
 Habitat: In flight.

## CHIMNEY SWIFT

Chaetura pelagica

Nebraska Status: Abundant migrant and summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 11 May (\*).

1981: 8 May (1), 16 May (1).

Habitat: In flight.

## BELTED KINGFISHER

Megasceryle alcyon

Nebraska Status: Common migrant and summer resident; uncommon winter resident.

M.I.C.M. Status: Uncommon permanent resident. Known breeder.

Spring 1980: Observed on 6 days from 10 Apr to 15 May.

1981: Observed on 14 days from 22 Mar to 16 May.

Maximum count: 16 May (3).

Summer 1980: 7 Jun (1).

1981: 25, 26 May (\*). Nest hole in bank near bunker entrance. 16 May egg shell beneath the hole. Hole excavated 28 Mar.

Fall: Observed on 6 days from 1 Sep to 14 Nov.

Winter: Observed on 4 days from 4 Dec to 19 Feb.

Habitat: River channel, riparian understory, sandpit, shrubland.

## COMMON FLICKER

Colaptes auratus

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Common permanent resident. Potential breeder.

Spring 1980: Observed on 9 days from 10 Apr to 17 May.

1981: Observed from 4 Mar to 16 May.

Summer 1980: Observed on 4 days from 26 May to 16 Jun.

1981: 25 May(\*), 16 Jun (2), 21 Jun (8). Maximum count: 21 Jun (8).

Fall: 188 sightings on 20 days from 22 Aug to 25 Nov.

Winter: Observed from 2 Dec to 19 Feb.

Habitat: Wetland meadow, riparian overstory, shrubland, woodlot,



fencerow, corn, hay, alfalfa.

RED-BELLIED WOODPECKER

Melanerpes carolinus

Nebraska Status: Common permanent resident in eastern Nebraska, extending westward along major rivers.

M.I.C.M. Status: Uncommon fall migrant and winter visitor.

Fall: Observed on 4 days from 30 Sep to 14 Nov. Maximum count: 14 Oct (2).

Winter: 5 sightings on 5 days from 2 Dec to 15 Feb.

Habitat: Woodlot, riparian overstory, shrubland.

REDHEADED WOODPECKER

Melanerpes erythrocephalus

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant and summer resident, uncommon fall migrant. Potential breeder.

Spring 1980: Observed on 6 days from 10 May to 17 May.

1981: 11 sightings on 8 days from 28 Apr to 16 May.

Summer 1980: Observed on 4 days from 25 May to 8 Aug.

1981: 26 May(\*), 21 Jun(5), 26 Jun (1). Maximum count: 21 Jun (5).

Fall: 25 Sep (1), 26 Sep (1).

Habitat: Woodlot, riparian overstory, fencerow, corn.

HAIRY WOODPECKER

Picoides villosus

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Uncommon permanent resident. Known breeder.

Spring 1980: 17 May (1 banded).

1981: 21 Apr (1) to 6 May (1).

Summer 1980: 25 May (\*), 13 Jun (2 fledglings).

Fall: 25 Sep (1), 26 Sep (1).

Winter: 12 Feb (1).

Habitat: Woodlot, riparian woodland.

## DOWNY WOODPECKER

Picoides pubescens

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Uncommon permanent resident. Potential breeder.

Spring 1981: 4 sightings on 4 days from 6 Apr to 10 May.

Summer: Observations incomplete.

Fall: 25 sightings on 13 days from 13 Sep to 25 Nov. 6 banded.

Maximum count: 11 Nov (4).

Winter: 10 sightings on 8 days from 2 Dec to 27 Feb.

Habitat: Woodlot, riparian overstory and understory, idle.

## EASTERN KINGBIRD

Tyrannus tyrannus

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common migrant and summer resident. Known breeder.

Spring 1980: Observed on 5 days from 10 May to 17 May.

1981: Observed on 6 days from 5 May to 16 May. 1 banded.

Summer 1980: Observed on 5 days from 25 May to Aug 8. Nest located in riparian shrubland on 13 Jun with 2 eggs. On 17 Jun this nest had 2 eggs. Pair used an old American Robin's nest.

1981: Observed from 20 May to 26 Jun.

Fall: 67 sightings on 4 days from 1 Sep to 10 Sep. Maximum count: 1 Sep (32).

Habitat: Fencerow, riparian shrubland, riparian woodland, farmstead, wetland meadow.

## WESTERN KINGBIRD

Tyrannus verticalis

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Uncommon migrant and summer resident. Potential breeder.

Spring 1980: Observed on 4 days from 10 May to 17 May.

1981: 6 May (\*), 8 May (1).

Summer 1980: 26 and 28 May (\*).

1981: 26 May (\*), 21 Jun (2), 26 Jun (1).

Fall: 4 Sep (1), 13 Sep (1).

Habitat: Wetland meadow, fencerow, shrubland, newly seeded alfalfa.



## GREAT CRESTED FLYCATCHER

Myiarchus crinitus

Nebraska Status: Common migrant and summer resident in the east.

M.I.C.M. Status: Uncommon spring migrant and summer resident.

Potential breeder.

Spring 1980: 13 May (\*), 15 May (\*), 20 May (\*).

1981: 16 May (1).

Summer 1980: 25, 28, 29 May (\*).

1981: 25 May (1), 26 May (2), 21 Jun (1).

Habitat: Woodlot, riparian woodland overstory, fencerow.

## WILLOW FLYCATCHER

Empidonax traillii

Nebraska Status: Common migrant, uncommon to rare summer resident.

M.I.C.M. Status: Uncommon migrant and summer resident. Potential breeder.

Spring 1980: 17 May (1 banded).

Summer 1980: Observed on 4 days from 25 May to 12 Jun. 6 banded.

1981: 26 May (1).

Fall: 1 Sep (1), 14 Sep (1).

Habitat: Riparian woodland understory, shrubland.

Note: Common in 1980 in flooded riparian shrubland. Rare in 1981.

## LEAST FLYCATCHER

Empidonax minimus

Nebraska Status: Common migrant and rare summer resident.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: Observed on 5 days from 10 to 17 May. 8 banded.

1981: Observed on 4 days from 5 to 16 May.

Habitat: Riparian woodland, shrubland.

Note: See Willow Flycatcher.

## OLIVE-SIDED FLYCATCHER

Nuttallornis borealis

Nebraska Status: Uncommon to occasional migrant.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 13-15 May (1 on each day).

Habitat: Riparian woodland understory, fencerow.



## HORNED LARK

Eremophila alpestris

Nebraska Status: Common to abundant migrant and summer resident.  
Common winter visitor.

M.I.C.M. Status: Uncommon fall migrant and winter visitor.

Fall: 21 Nov (5).

Winter: 4 Dec (3), 24 Dec (2), 22 Jan (10), 19 Feb (1).

Habitat: Wetland meadow, road, farmstead.

## TREE SWALLOW

Iridoprocne bicolor

Nebraska Status: Common migrant in eastern areas. Uncommon to rare summer resident in the Missouri Valley extending west along rivers to Hall and Cherry Counties.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 20 Apr (10).

1981: 10 Apr (2), 11 Apr (1), 21 Apr (1).

Habitat: In flight over river channel and hay.

## BANK SWALLOW

Riparia riparia

Nebraska Status: Common migrant and summer resident, becoming less common in the west.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 22 Apr (1), 10 May (2).

1981: 4 May (1), 8 May (\*), 16 May (\*).

Habitat: River channel

## ROUGH-WINGED SWALLOW

Stelgidopteryx ruficollis

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant, uncommon summer resident.

Known breeder.

Spring 1980: Observed on 6 days from 10 May to 17 May. 10 banded.

Maximum count: 13 May (16).

1981: Observed on 10 days from 21 Apr to 16 May. 3 banded.

Summer 1980: 25 May(\*), 7 Jun (\*).

1981: 25 May (\*). Observed freshly excavated cavities on 14 May.

Habitat: In flight, nests in exposed banks.

## BARN SWALLOW

Hirundo rustica

Nebraska Status: Common migrant and summer resident. Probably the most common swallow.

M.I.C.M. Status: Common migrant and summer resident. Known breeder.

Spring 1980: Observed on 6 days from 22 Apr to 17 May.

1981: Observed on 8 days from 21 Apr to 16 May.

Summer 1980: 25 May (\*), 8 Aug (\*).

1981: 25, 26 May (\*).

Fall: 216 sightings on 10 days from 1 Sep to 30 Sep. Maximum count: 23 Sep (55).

Habitat: Farmstead, fencerow.

Note: Nests in barns.

## CLIFF SWALLOW

Petrochelidon pyrrhonota

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Uncommon migrant, local summer resident. Known breeder.

Spring 1980: 15 May (20), 17 May (\*).

1981: 16 May (\*).

Summer: 28 May 1980 (\*). Nesting colony under I-80 bridge.

Fall: 3 Sep (6), 4 Sep (5).

Habitat: In flight over hay, river channel.

## BLUE JAY

Cyanocitta cristata

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Uncommon spring migrant and summer resident, common fall migrant. Known breeder.

Spring 1980: 10 May (5), 15 May (\*), 17 May (\*). 1 banded.

1981: Observed on 11 days from 20 Apr to 16 May. 3 banded.

Summer 1980: Observed on 4 days from 26 May to 7 Jun.

1981: 25 May (\*). Nest located in riparian woodland overstory on 8 May.

Fall: 216 sightings on 10 days from 1 Sep to 4 Oct. Maximum count: 25 Sep (73).

Habitat: Wetland meadow, riparian woodland, woodlot, shrubland, hay.



## BLACK-BILLED MAGPIE

Pica pica

Nebraska Status: Common permanent resident in western half of state becoming rarer in eastern half. A winter wanderer.

M.I.C.M. Status: Uncommon permanent resident. Known breeder.

Spring 1980: 15 May (\*).

1981: Observed on 4 days from 25 Apr to 14 May.

Summer 1980: 5 fledglings near nest in Russian olive on 13 Jun.

1981: Observed on 5 days from 21 May to 10 Jun. Same nest occupied as in 1980. 6 eggs in early May. 21 May hatchlings dead, nest abandoned.

Fall: 23 Sep (3), 18 Nov (1).

Winter: 20 Dec (7), 28 Dec (\*), 18 Jan (8), 15 Feb (2).

Habitat: Riparian woodland, shrubland, fencerow, river channel.

Note: Observed scavenging dead waterfowl on river in spring 1981.

Nest may be an eastern record for Nebraska.

## COMMON CROW

Corvus brachyrhynchos

Nebraska Status: Common to abundant migrant and common summer resident. Large numbers of northern migrants winter in Nebraska.

M.I.C.M. Status: Uncommon permanent resident. Known breeder.

Spring 1980: 3 sightings between 10 Apr to 17 May.

1981: Observed on 7 occasions between 10 Mar to 16 May.

Summer 1980: Fledgling observed 13 Jun. Sighted on 4 days from 28 May to 13 Jun.

1981: 25 May (5), 26 May (2).

Fall: 174 sightings on 12 days from 12 Sep to 26 Nov. Maximum count: 30 Sep (100).

Winter: 4 Dec (10), 20 Dec (4), 3 Feb (4), 12 Feb (1).

Habitat: Riparian woodland overstory, river channel, woodlot, wetland meadow, alfalfa, hay, shrubland, corn.

Note: Observed scavenging dead waterfowl in spring 1981.



## BLACK-CAPPED CHICKADEE

Parus atricapillus

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Common permanent resident. Potential breeder.

Spring 1980: Observed on 4 days from 10 May to 17 May. 1 banded.

1981: 15 sightings on 10 days from 10 Mar to 16 May.

Summer 1980: 25, 26 May (\*).

1981: 25 May (\*).

Fall: 42 sightings on 15 days from 1 Sep to 25 Nov. 4 banded.

Winter: 47 sightings on 9 days from 2 Dec to 15 Feb. Maximum count: 20 Dec and 12 Feb (10).

Habitat: Woodlot, riparian woodland, idle, fencerow, shrubland.

## WHITE-BREASTED NUTHATCH

Sitta carolinensis

Nebraska Status: Uncommon permanent resident in eastern Nebraska and Pine Ridge.

M.I.C.M. Status: Uncommon permanent resident. Potential breeder.

Spring 1981: 6 sightings on 6 days from 6 Apr to 16 May.

Summer 1980: 25 May (\*).

1981: 25, 26 May (\*).

Fall: 15 sightings on 12 days from 1 Sep to 25 Nov. Maximum count: (2) on several occasions.

Winter: 2 Dec (1), 20 Dec (2), 12 Feb (1).

Habitat: Woodlot, riparian woodland.

## HOUSE WREN

Troglodytes aedon

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common migrant and summer resident. Potential breeder.

Spring 1980: Observed on 6 days from 10 May to 17 May. 1 banded.

1981: Observed on 12 days from 20 Apr to 16 May. 7 banded.

Summer 1980: 25 May (\*), 7 Jun (\*).

1981: 25, 26 May (\*), 21 Jun (6).

Fall: Observed on 4 days from 3 Sep to 30 Sep.

Habitat: Woodlot, riparian woodland understory, shrubland, fencerow.

## MOCKINGBIRD

Mimus polyglottos

Nebraska Status: Uncommon migrant and summer resident in southern and eastern portions of the state.

M.I.C.M. Status: Accidental spring migrant.

Spring 1981: 2 May (1), 4 May (1).

Habitat: Fencerow, shrubland.

## GRAY CATBIRD

Dumetella carolinensis

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant, uncommon summer resident, uncommon fall migrant. Potential breeder.

Spring 1980: 13 May (1), 15 and 17 May (\*).

1981: 8 May (2), 10 May (3), 16 May (\*). 5 banded.

Maximum count: 10 May (3).

Summer 1980: Observed from 25 May to 13 Jun. 3 banded.

1981: 25, 26 May (\*).

Fall: 1 Sep (1), 14 Sep (2).

Habitat: Riparian woodland understory, shrubland, fencerow.

## BROWN THRASHER

Toxostoma rufum

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant and summer resident, uncommon fall migrant. Known breeder.

Spring 1980: Observed on 5 days from 22 Apr to 17 May.

1981: Observed on 9 days from 25 Apr to 16 May. Maximum count: (2) on several occasions.

Summer 1980: Observed on 4 days from 25 May to 8 Aug. Nest located on 12 Jun in fencerow with 4 eggs. 28 Jun nest had 1 hatchling and 1 addled egg.

1981: 25, 26 May (\*).

Fall: 1 Sep (2), 10 Sep (1), 23 Sep (1).

Habitat: Fencerow, shrubland, riparian woodland understory.

## AMERICAN ROBIN

Turdus migratorius

Nebraska Status: Abundant migrant and summer resident. Locally common winter resident.

M.I.C.M. Status: Common migrant and summer resident, uncommon winter visitor. Known breeder.

Spring 1980: Observed on 7 days from 10 Apr to 17 May.

1981: 63 sightings on 13 days from 10 Mar to 10 May.

1 banded. Maximum count: 10 Mar (21).

Summer 1980: 28 May (\*).

1981: 25, 26 May (\*). Nest located in riparian understory on 8 May.

Fall: 26 sightings on 7 days from 1 Sep to 4 Oct.

Winter: 25, 27 Feb (1).

Habitat: Shrubland, riparian woodland, woodlot, fencerow, farmstead, wetland meadow.

## SWAINSON'S THRUSH

Catharus ustulata

Nebraska Status: Common migrant and very rare summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 14 May (1 banded).

1981: 10 May (3), 14 May (1).

Habitat: Woodlot, riparian woodland.

## GRAY-CHEEKED THRUSH

Catharus minimus

Nebraska Status: Common migrant in the east and uncommon to rare in the west.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 10 May(1), 15 May (1), 17 May (1).

1981: 10 May (1).

Habitat: Woodlot.

## VEERY

Catharus fuscescens

Nebraska Status: Occasional to rare migrant.

M.I.C.M. Status: Rare spring migrant and summer straggler.

Spring: 17 May 1980 (1).

Summer: 25 May 1980 (1).

Habitat: Woodlot.



## EASTERN BLUEBIRD

Sialia sialis

Nebraska Status: Uncommon migrant in the east to rare in the west. Uncommon to rare summer resident in the east. Local winter resident.

M.I.C.M. Status: Rare spring, summer, and fall visitor.

Spring: 18 Apr 1981 (2).

Summer 1980: 3 Jun (2).

1981: 4 Jun (1).

Fall: 31 Sep (8).

Habitat: Riparian shrubland, fencerow.

## RUBY-CROWNED KINGLET

Regulus calendula

Nebraska Status: Common migrant and uncommon winter resident.

M.I.C.M. Status: Rare migrant.

Spring: 21 Apr 1981 (1 banded).

Fall: 30 Sep (2), 3 Oct (1). 1 banded.

Habitat: Woodlot, idle, riparian woodland understory.

## NORTHERN SHRIKE

Lanius excubitor

Nebraska Status: Uncommon to locally common winter resident.

M.I.C.M. Status: Rare winter visitor.

Winter: 28 Dec (1).

Habitat: Riparian woodland overstory.

## LOGGERHEAD SHRIKE

Lanius ludovicianus

Nebraska Status: Common migrant and summer resident. Rare winter resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 16 Apr (1).

1981: 4 Mar (1), 28 Apr (1).

Habitat: Hay.

## STARLING

Sturnus vulgaris

Nebraska Status: Introduced common to abundant permanent resident.

M.I.C.M. Status: Common permanent resident. Potential breeder.

Spring 1980: Observed on 8 days from 10 Apr to 17 May.

1981: Observed on 11 days from 12 Mar to 16 May.

Summer 1980: 25 May (\*), 7 Jun (\*).

1981: 25 May (\*).

Fall: 1248 sightings on 17 days from 1 Sep to 18 Nov. Maximum count: 4 Oct (450).

Winter: Recorded on 7 days from 4 Dec to 27 Feb.

Habitat: Woodlot, riparian woodland, wetland meadow, corn, hay, alfalfa, farmstead, river channel.

## BELL'S VIREO

Vireo bellii

Nebraska Status: Common migrant and summer resident in the east, becoming rare and local in the west.

M.I.C.M. Status: Rare spring migrant and summer resident. Potential breeder.

Spring 1981: 16 May (1).

Summer 1981: 26 May (2), 21 Jun (1).

Habitat: Shrubland.

Note: Observations incomplete.

## RED-EYED VIREO

Vireo olivaceus

Nebraska Status: Common migrant and a locally common summer resident.

M.I.C.M. Status: Occasional spring migrant.

Spring: 26 Apr 1981 (1).

Habitat: Woodlot.

## WARBLING VIREO

Vireo gilvus

Nebraska Status: Common migrant and local summer resident.

M.I.C.M. Status: Common spring migrant and summer resident, uncommon fall migrant. Potential breeder.

Spring 1980: Observed on 5 days from 10 May to 17 May. 1 banded.

1981: Observed on 7 days from 4 May to 16 May.

Summer 1980: Observed on 4 days from 25 May to 10 Jun.

1981: Observed from 25 May to 21 Jun. 4 banded.

Fall: 1 Sep (2).

Habitat: Riparian woodland, shrubland, woodlot, fencerow.

#### BLACK-AND-WHITE WARBLER

Mniotilta varia

Nebraska Status: Common migrant statewide and a local and uncommon summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1981: 5, 16 May (1).

Habitat: Riparian woodland overstory.

#### TENNESSEE WARBLER

Vermivora peregrina

Nebraska Status: Common and uncommon migrant in the east and west respectively.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 17 May (1).

1981: Observed on 5 days from 26 Apr to 10 May. 1 on each date.

Habitat: Riparian woodland, woodlot.

#### ORANGE-CROWNED WARBLER

Vermivora celata

Nebraska Status: Common migrant.

M.I.C.M. Status: Uncommon spring migrant and common fall migrant.

Spring 1980: 11 May (2), 13 May (1).

1981: Observed on 4 occasions from 20 Apr to 5 May.

Fall: 38 sightings on 9 days from 26 Sep to 7 Oct. Maximum count: 3 Oct (11).. 28 banded.

Habitat: Idle, fencerow, woodlot, riparian woodland.

#### NASHVILLE WARBLER

Vermivora ruficapilla

Nebraska Status: Common migrant.

M.I.C.M. Status: Rare migrant.

Spring 1980: 11, 13 May (1).

Fall: 10 Sep (1), 10 Oct (1). 1 banded.

Habitat: Idle, shrubland, woodlot.



## YELLOW WARBLER

Dendroica petechia

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant and summer resident.

Potential breeder.

Spring 1980: Observed on 7 days from 10 May to 20 May. 8 banded.

1981: Observed on 6 days from 4 May to 16 May.

Summer 1980: Observed on 3 days from 25 May to 13 Jun. 8 banded.

1981: 25, 26 May (\*).

Habitat: Shrubland, riparian woodland understory.

## YELLOW-RUMPED WARBLER

Dendroica coronata

Nebraska Status: Common to abundant migrant. Local summer resident in the Pine Ridge.

M.I.C.M. Status: Uncommon migrant.

Spring 1980: 10, 13 May (1).

1981: Observed on 6 days from 20 Apr to 10 May. Maximum count: 21 Apr (6).

Fall: 30 Sep (1), 3 Oct (1). 1 banded.

Habitat: Idle, shrubland, riparian woodland.

## BLACKPOLL WARBLER

Dendroica striata

Nebraska Status: Common to uncommon migrant in the east and west respectively.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 13 May (1).

1981: 10 May (3).

Habitat: Riparian woodland overstory, woodlot.

## OVENBIRD

Seiurus aurocapillus

Nebraska Status: Uncommon to common migrant and a local summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring: 15 May 1980 (1).

Habitat: Woodlot.

## NORTHERN WATERTHRUSH

Seiurus noveboracensis

Nebraska Status: Uncommon migrant.  
M.I.C.M. Status: Rare spring migrant.  
 Spring: 17 May 1980 (1 banded).  
 Habitat: Riparian shrubland.

## COMMON YELLOWTHROAT

Geothlypis trichas

Nebraska Status: Common to abundant migrant and summer resident.  
M.I.C.M. Status: Common spring migrant and summer resident, rare fall migrant. Potential breeder.  
 Spring 1980: 11 May (\*), 17 May (3). 3 banded. Maximum count: 17 May (3).  
     1981: Observed on 5 days from 26 Apr to 16 May.  
 Summer 1980: Observed on 6 days from 25 May to 13 Jun. 3 banded.  
     1981: 26 May (\*).  
 Fall: 10 Sep (2).  
 Habitat: Shrubland, riparian woodland understory, woodlot.

## AMERICAN REDSTART

Setophaga ruticilla

Nebraska Status: Common migrant and, in the east, a common summer resident.  
M.I.C.M. Status: Uncommon spring migrant.  
 Spring 1980: 13 May (\*), 17 May (1). 1 banded.  
     1981: 5 May (2), 8 May (1), 10 May (1).  
 Habitat: Riparian woodland understory, woodlot.

## HOUSE SPARROW

Passer domesticus

Nebraska Status: Abundant introduced permanent resident.  
M.I.C.M. Status: Common permanent resident. Known breeder.  
 Spring 1980: Observed on 3 days from 19 Apr to 13 May.  
     1981: Observed from 10 Mar to 16 May.  
 Summer 1980: Observed from 25 May to 7 Jun.  
     1981: 25 May (\*).  
 Fall: 58 sightings on 7 days from 1 Sep to 26 Sep.  
 Winter: Observed on 2 Dec (\*), 20 Dec (100), 22 Jan (\*).  
 Maximum count: 20 Dec (100).  
 Habitat: Farmstead, idle, fencerow. Nests in buildings.



## BOBOLINK

Dolichonyx oryzivorus

Nebraska Status: Fairly common migrant in central Nebraska, less common in the east and west. Summer resident in small numbers statewide.

M.I.C.M. Status: Common spring migrant and abundant summer resident. Known breeder.

Spring 1980: Observed on 5 days from 11 May to 19 May.

1981: Observed on 6 days from 4 May to 16 May.

Summer 1980: Observed on 12 days from 25 May to 8 Aug. Nest #1- 16 Jun in hay with 4 Bobolink eggs and 1 Brown-headed Cowbird egg. 27 Jun nest abandoned. Nest #2- 30 Jun in hay with 4 hatchlings and 2 cowbird eggs.

1981: Observed on 10 days from 25 May to 21 Jun. Nest #3- 21 Jun in hay with 3 Bobolink eggs and 2 cowbird eggs. 26 Jun nest abandoned. Nest #4- 21 Jun in pasture with cowbird hatchling.

Maximum count: 21 Jun (34).

Habitat: Wetland meadow, hay, alfalfa, fencerow.

## EASTERN MEADOWLARK

Sturnella magna

Nebraska Status: Common migrant in the east and local summer resident.

M.I.C.M. Status: Abundant migrant and summer resident, common winter resident. Known breeder. (See note).

Spring 1980: Sighted 10 days from 10 Apr to 20 May.

1981: Sighted 16 Days from 2 Mar to 16 May.

Summer 1980: Sighted on 10 days from 25 May to 24 Jun. 11 nests located, 10 in wetland meadows and 1 in hay. Average clutch size: 4.2 eggs. 45% of nests parasitized by cowbirds.

1981: Observed from 21 May to 21 Jun. 1 nest in wetland meadow with 3 cowbird eggs. 1 meadowlark egg pierced and pushed outside of nest bowl.

Fall: 322 sightings on 20 days from 1 Sep to 18 Nov. Maximum count: 30 Sep (60).

Winter: Observed on 10 days from 22 Jan to 28 Feb.

Habitat: Wetland meadow, hay, fencerow, alfalfa, farmstead.

Note: Breeding birds are predominately Eastern Meadowlarks.

Remaining sightings made up of both Eastern and Western Meadowlarks.



## WESTERN MEADOWLARK

Sturnella neglecta

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Potential breeder. See Eastern Meadowlark.

## YELLOW-HEADED BLACKBIRD

Xanthocephalus xanthocephalus

Nebraska Status: Common to abundant migrant and common local summer resident.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 11 May (100), 14 May (20).

1981: 22 Mar (1), 6 May (1).

Habitat: wetland meadow, river channel, farmstead, fencerow.

Note: 11 May 1980 birds contained sub-adult plumaged individuals.

These non-breeding flocks apparently wander until they reach sexual maturity.

## RED-WINGED BLACKBIRD

Agelaius phoeniceus

Nebraska Status: Common to abundant migrant and common summer resident.

M.I.C.M. Status: Abundant migrant and summer resident, fairly common winter visitor. Known breeder.

Spring 1980: Observed on 7 days from 4 Apr to 15 May.

1981: Observed on 18 days from 2 Mar to 16 May.

Summer 1980: Observed on 10 days from 25 May to 24 Jun. 20 nests located in hay and wetland meadows. 60% of nests parasitized by cowbirds.

1981: 25, 26 May (\*).

Fall: 924 sightings on 10 days from 2 Oct to 18 Nov. Maximum count: 3 Oct (430).

Winter: 121 sightings on 5 days from 2 Dec to 27 Feb.

Habitat: Wetland meadow, hay, alfalfa. Fall and winter- riparian woodland overstory, woodlot, wetland meadow, fencerow, corn, shrubland.

## ORCHARD ORIOLE

Icterus spurius

Nebraska Status: Common migrant and summer resident in the eastern two-thirds of the state.

M.I.C.M. Status: Rare spring migrant, uncommon summer resident. Potential breeder.

Spring 1981: 16 May (1).

Summer 1980: 25 May (\*), 17 Jun (\*).

1981: 25 May (1), 26 Jun (1).

Habitat: Riparian woodland overstory.

## NORTHERN ORIOLE

Icterus galbula

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common spring migrant and summer resident, uncommon fall migrant. Potential breeder.

Spring 1980: Observed on 6 days from 10 May to 17 May. 1 banded.

1981: 8 May (1), 10 May (1), 16 May (1).

Summer 1980: Observed on 7 days from 25 May to 13 Jun. 2 banded.

1981: 25 May (1), 26 May (5), 21 Jun (2).

Fall: 26 Aug (1), 10 Sep (1).

Habitat: Woodlot, riparian woodland overstory.

## RUSTY BLACKBIRD

Euphagus carolinus

Nebraska Status: Common migrant in east, rare or irregular in west. Frequent winter resident.

M.I.C.M. Status: Rare fall migrant.

Fall: Nov 1980 (4).

Habitat: Riparian woodland overstory.

Note: Mixed with Red-winged Blackbirds.

## BREWER'S BLACKBIRD

Euphagus cyanocephalus

Nebraska Status: Common migrant and, in the west, a summer resident. Infrequent winter resident.

M.I.C.M. Status: Rare spring migrant.

Spring: 22 Apr 1981 (22).

Habitat: Farmstead.

## GREAT-TAILED GRACKLE

Quiscalus mexicanus

Nebraska Status: Rare migrant and rare and local summer resident.

M.I.C.M. Status: Rare spring migrant and summer visitor.

Spring 1980: 11 May (1).

1981: 14 May (1).

Summer: 17 Jun 1980 (1).

Habitat: River channel, shrubland, alfalfa.

## COMMON GRACKLE

Quiscalus quiscula

Nebraska Status: Common to abundant migrant and summer resident.

Occasional winter resident.

M.I.C.M. Status: Common spring migrant, uncommon summer resident and fall migrant. Potential breeder.

Spring 1980: Observed on 6 days from 26 Apr to 15 May.

1981: Observed from 19 Mar to 16 May.

Summer 1980: 25 May (\*), 26 May (\*), 28 May (\*).

1981: 26 May (\*), 21 Jun (5).

Fall: 23 Sep (9), 25 Sep (8), 4 Oct (10).

Habitat: Woodlot, hay, farmstead.

## BROWN-HEADED COWBIRD

Molothrus ater

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Abundant migrant and summer resident. Known breeder.

Spring 1980: Observed on 9 days from 10 Apr to 15 May. 1 banded.

1981: Observed on 15 days from 26 Mar to 16 May. 2 banded.

Summer 1980: Observed from 25 May to 24 Jun on 13 days.

1981: Observed on 10 days from 25 May to 21 Jun.

Fall: 170 sightings on 9 days from 1 Sep to 31 Oct.

Maximum count: 25 May 1981 (75).

Habitat: Wetland meadow, hay, alfalfa, shrubland, riparian woodland, corn.

Note: Known to parasitize Red-winged Blackbirds, Bobolinks, Eastern Meadowlarks, Dickcissels, and Grasshopper Sparrows on M.I.C.M.



## CARDINAL

Cardinalis cardinalis

Nebraska Status: Common permanent resident in east and uncommon to occasional in west.

M.I.C.M. Status: Rare permanent resident. Potential breeder.

Spring 1980: 11 May (\*), 13 May (\*).

1981: Observed on 6 days from 23 Mar to 5 May.

Summer 1980: 26 May (\*).

1981: 25, 26 May (\*).

Fall: 14 Sep (1).

Winter: 2 Dec (1), 20 Dec (3). Maximum count: 20 Dec (3).

Habitat: Riparian woodland, shrubland, woodlot.

## ROSE-BREASTED GROSBEAK

Pheucticus ludovicianus

Nebraska Status: Common migrant and summer resident in east.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 10 May (5).

1981: 5 May (1), 6 May (1), 10 May (2).

Habitat: Riparian woodland.

## INDIGO BUNTING

Passerina cyanea

Nebraska Status: Uncommon migrant and summer resident in east.

M.I.C.M. Status: Rare spring migrant.

Spring 1980: 17 May (1).

Habitat: Shrubland.

## DICKCISSEL

Spiza americana

Nebraska Status: Abundant migrant and summer resident in the east and uncommon to rare in the west.

M.I.C.M. Status: Common spring migrant, abundant summer resident. Known breeder.

Spring 1981: 16 May (1).

Summer 1980: Observed on 10 days from 28 May to 10 Jun. Nest #1- 24 Jun in breeding bird plot #7 with 4 eggs. Nest #2- 17 Jun in breeding birds plot #3 with no eggs. Nest located in alfalfa clump. On 23 Jun there was 4 eggs. 30 Jun - eggs. Fate unknown. 50% of nests parasitized by cowbirds.

Summer 1981: Observed on 10 days from 25 May to 21 Jun. Maximum count: 21 Jun (27).

Departure dates unknown.

Habitat: Wetland meadow, hay, alfalfa.

#### HOUSE FINCH

Carpodacus mexicanus

Nebraska Status: Locally common permanent resident in Panhandle.

M.I.C.M. Status: Rare winter visitor.

Winter: 2 Dec 1980 (1).

Habitat: Idle.

#### AMERICAN GOLDFINCH

Carduelis tristis

Nebraska Status: Common permanent resident.

M.I.C.M. Status: Abundant permanent resident. Potential breeder.

Spring 1980: Observed on 5 days from 10 May to 17 May. 4 banded.

1981: Observed on 8 days from 26 Apr to 14 May.

Summer 1980: Sighted on 5 days from 25 May to 13 Jun. 9 banded.

1981: 26 May (20).

Fall: 505 sightings on 38 days from 30 Sep to 25 Nov. 56 banded.

Winter: 482 sightings on 10 days from 2 Dec to 16 Feb. Maximum count: 20 Dec (220).

Habitat: Idle, shrubland, riparian woodland, hay, woodlot, alfalfa, wetland meadow.

#### RUFIOUS-SIDED TOWHEE

Pipilo erythrophthalmus

Nebraska Status: Common migrant and summer resident in the east, local summer resident elsewhere.

M.I.C.M. Status: Uncommon spring migrant.

Spring 1980: 10 May (1).

1981: 6 sightings on 5 days from 20 Apr to 10 May.

Habitat: Riparian woodland understory.

#### LARK BUNTING

Calamospiza melanocorys

Nebraska Status: Common migrant and summer resident in western and central regions.

M.I.C.M. Status: Rare summer visitor.

Summer 1980: 30 May (3).

1981: 25 May (1).

Habitat: Fencerow.

SAVANNAH SPARROW

Passerculus sandwichensis

Nebraska Status: Common migrant, rare or uncommon summer resident.

M.I.C.M. Status: Common migrant.

Spring 1980: 22 Apr (1), 10 May (15).

1981: Observed on 12 days from 30 Mar to 16 May.

Fall: 99 sightings on 11 days from 10 Sep to 25 Nov. Maximum count: 30 Sep (40). 10 banded.

Habitat: Fencerow, corn, alfalfa, idle.

GRASSHOPPER SPARROW

Ammodramus savannarum

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Common migrant, abundant summer resident.

Known breeder.

Spring 1980: Observed on 3 days from 5 May to 11 May.

1981: Observed on 5 days from 6 May to 16 May.

Summer 1980: Sighted on 13 days from 25 May to 8 Aug. 4 nests located; 2 in wetland meadow and 2 in hay. Parasitism- 50%.

1981: Sighted on 10 days from 25 May to 21 Jun. Maximum count: 21 Jun (17).

Fall: 18 sightings on 9 days from 10 Sep to 10 Oct. 6 banded.

Habitat: Wetland meadow, hay, alfalfa, fencerow.

HENSLOW'S SPARROW

Ammodramus henslowii

Nebraska Status: Occasional migrant and summer resident in east.

M.I.C.M. Status: Rare fall migrant.

Fall: 25 Sep 1980 (2).

Habitat: Fencerow.



## LECONTE'S SPARROW

Ammospiza leconteii

Nebraska Status: Probably an uncommon migrant in east and rare or absent in west.

M.I.C.M. Status: Rare fall migrant.

Fall 1980: 8 Oct (1 banded), 9 Oct (2 banded).

Habitat: Fencerow.

## VESPER SPARROW

Pooecetes gramineus

Nebraska Status: Common migrant and regular summer resident.

M.I.C.M. Status: Common spring migrant, abundant fall migrant.

Spring 1980: Observed on 4 days from 16 Apr to 26 Apr.

1981: Observed on 10 days from 28 Mar to 10 May.

Fall: 115 sightings on 12 days from 17 Sep to 10 Oct. 6 banded.

Maximum count: 30 Sep (47).

Habitat: Fencerow, wetland meadow, riparian woodland understory.

## LARK SPARROW

Chondestes grammacus

Nebraska Status: Common migrant and summer resident, especially in the Sandhills and Panhandle.

M.I.C.M. Status: Uncommon spring migrant, rare summer visitor.

Spring 1980: 10 May (1), 11 May (\*), 13 May (\*).

Summer: 26 May 1981 (1).

Habitat: Fencerow.

## DARK-EYED JUNCO

Junco hyemalis

Nebraska Status: Common migrant and winter visitor. Local summer resident in Pine Ridge.

M.I.C.M. Status: Uncommon spring migrant and winter resident, common fall migrant.

Spring 1980: 10 Apr (4), 19 Apr (1).

1981: 22 Mar (2).

Fall: 13 sightings on 6 days from 30 Sep to 12 Nov. 5 banded.

Winter: 22 sightings on 6 days from 2 Dec to 3 Feb. Maximum count: 4, 20 Dec (5).

Habitat: Idle, woodlot, shrubland.

## TREE SPARROW

Spizella arborea

Nebraska Status: Common migrant and winter visitor.

M.I.C.M. Status: Uncommon spring migrant, abundant fall migrant and winter visitor.

Spring 1981: 2 Mar (1), 22 Mar (20).

Fall: 509 sightings on 9 days from 31 Oct to 25 Nov. 14 banded.

Winter: 889 sightings on 17 days from 2 Dec to 28 Feb. 31 banded.

Maximum count: 20 Dec (211).

Habitat: Idle, fencerow, riparian woodland understory, shrubland, woodlot.

## CHIPPING SPARROW

Spizella passerina

Nebraska Status: Common migrant and summer resident.

M.I.C.M. Status: Fairly common spring migrant, rare fall migrant.

Spring 1980: Observed on 5 days from 10 May to 17 May. 5 banded.

1981: Observed on 7 days from 20 Apr to 10 May. Maximum count: 6 May (40).

Fall: 10 Sep (1).

Habitat: Fencerow, corn, alfalfa, woodlot, riparian woodland.

## CLAY-COLORED SPARROW

Spizella pallida

Nebraska Status: Common migrant and accidental summer resident.

One nest record from Hall Co.

M.I.C.M. Status: Common spring migrant, rare fall migrant.

Spring 1980: Observed on 5 days from 10 May to 17 May. 4 banded.

1981: Observed on 7 days from 29 Apr to 14 May. Maximum count: 6 May (6).

Fall: 3 Oct 1980 (1 banded).

Habitat: Idle, fencerow.

## FIELD SPARROW

Spizella pusilla

Nebraska Status: Common migrant and locally common summer resident.

M.I.C.M. Status: Uncommon migrant and summer resident. Potential breeder.

Spring 1980: 22 Apr (1).

1981: Observed on 4 days from 21 to 29 Apr.

Summer 1980: 8 Jun (1).

1981: 26 May (1).

Fall: 25 Sep (1), 3 Oct (4).

Habitat: Shrubland, riparian woodland understory.

#### HARRIS' SPARROW

#### Zonotrichia querula

Nebraska Status: Common to abundant migrant. Winters regularly in southern parts of the state.

M.I.C.M. Status: Uncommon spring migrant and winter visitor, common fall migrant.

Spring 1980: 22 Apr (6), 17 May (2).

1981: Observed on 7 days from 18 Mar to 16 May.

Fall: 46 sightings on 7 days from 16 Oct to 25 Nov. Maximum count: 4 and 25 Nov (10).

Winter: 8 sightings on 6 days from 2 Dec to 28 Feb.

Habitat: Fencerow, shrubland, woodlot, idle.

#### WHITE-CROWNED SPARROW

#### Zonotrichia leucophrys

Nebraska Status: Common migrant and locally common winter visitor.

M.I.C.M. Status: Uncommon migrant, rare summer straggler.

Spring 1980: 22 Apr (1).

1981: Observed on 4 days from 5 May to 16 May.

Summer: 25 May 1980(1).

Fall: 23 Sep (1), 24 Oct (2), 4 Nov (10).

Habitat: Idle, fencerow, woodlot, shrubland.

#### WHITE-THROATED SPARROW

#### Zonotrichia albicollis

Nebraska Status: Common migrant and locally common winter visitor.

M.I.C.M. Status: Rare migrant.

Spring 1981: 20 Apr (1).

Fall: 7 Oct (1 banded), 14 Nov (2).

Habitat: Idle, woodlot, riparian woodland understory.



## LINCON'S SPARROW

Melospiza lincolniNebraska Status: Common migrant.M.I.C.M. Status: Uncommon fall migrant.

Fall: Observed on 5 days from 10 Sep to 17 Oct. 7 banded.

Habitat: Idle, fencerow.

## SWAMP SPARROW

Melospiza georgianaNebraska Status: Uncommon to rare migrant in east and west respectively. Rare and local summer resident.M.I.C.M. Status: Rare fall migrant.

Fall: 4 Oct (1 banded).

Habitat: Idle.

## SONG SPARROW

Melospiza melodiaNebraska Status: Common migrant and uncommon winter visitor. Local summer resident.M.I.C.M. Status: Common migrant, rare summer visitor, uncommon winter resident.

Spring 1980: 10 May (1), 17 May (1 banded).

1981: Observed on 10 days from 2 Mar to 10 May.

Summer: 25 May 1981 (1).

Fall: 15 sightings on 6 days from 4 Sep to 31 Oct. 1 banded.

Winter: 25 sightings on 7 days from 4 Dec to 28 Feb. 2 banded.

Maximum count: 27 Feb (10).

Habitat: Shrubland, fencerow, idle, riparian woodland.

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Scientific nomenclature for birds according to American Ornithologists' Union. 1957. Checklist of North American birds. 5th ed. A.O.U. Baltimore, MD. 691 pp. with supplements in 1973 and 1976.

MANAGEMENT RECOMMENDATIONS  
AND RESEARCH NEEDS

## MANAGEMENT RECOMMENDATIONS

Cranes

- 1) Control the encroachment of woody vegetation on the south river channel to maintain open channel conditions.
- 2) Maintain adequate flows in the Platte while the cranes are here (mid-Feb to mid-Apr) to provide roosting and wetland meadow habitat.
- 3) Manage for low grassland vegetation stature while the cranes are here.
- 4) Prohibit public use of areas other than the bunker during the crane staging interval.
- 5) Manage fields 9-11 as a single unit for use as a secondary roost which may require the removal of fencelines.
- 6) Encourage land-use practices in areas  $\frac{1}{2}$  to 5 mi south of the South Channel to remain agricultural in order to provide an adequate food base for cranes. Other types of development should be discouraged.
- 7) Minimize new fence construction.
- 8) The overstory vegetation along the river bank may inhibit crane-use of adjacent fields. The area south and west of the west woodlot could have this vegetation removed on an experimental basis to determine if crane-use increases on the adjacent fields. Shrubs along the banks should be maintained to buffer cranes from disturbance and to stabilize banks.
- 9) Leave a few scattered cottonwoods along the river to provide perches for bald eagles.
- 10) Access to the bunker should be made less conspicuous to cranes to assure continued use of this field.
- 11) Discourage the use of boats, canoes, and A.T.V.'s on the river while the cranes are present and also from late May to late July to protect nesting least terns and piping plovers.



- 12) If viewing cranes on the west end of Mormon Island for certain guests is desirable, a small blind should be constructed.
- 13) Control crane photography in areas outside of the bunker site.

#### Other birds

- 1) Postpone mowing of hayfields until mid-July to maximize production of hayfield nesting species.
- 2) Grazing pressure has varying effects on different breeding species therefore no general suggestions can be made unless a particular species is managed for.
- 3) Discourage hunting if the area is to provide a fall resting site for waterfowl and cranes. Otherwise, there is no documented adverse impacts on populations of game species due to hunting.
- 4) Non-consumptive human use is compatible with bird populations. This type of use could occur except when the cranes are present.
- 5) Maintain woodlots and sandpits to provide diverse habitat for birds.

## RESEARCH AND MONITORING NEEDS

Cranes

- 1) Conduct ground counts of cranes on M.I.C.M. twice a week from late Feb to early Apr to determine seasonal and yearly patterns of field use. Count on mild days between 1400 and 1500 hrs. Plot birds on field maps.
- 2) Conduct secondary roost counts on a schedule identical to ground counts beginning  $\frac{1}{2}$  hr before sunset.
- 3) Conduct roost counts once a week on the South Channel to assess changes in distribution and numbers of roosting cranes in relation to woody vegetation control. Begin counts 45 min before sunrise and plot departing cranes on field maps. Three to four observers are needed. Record waterfowl if possible, otherwise census them separately.
- 4) Census cranes from an aircraft at least 3 times; once each during late Feb to early Mar, the third week in Mar, and early Apr to determine distribution and complement ground counts. Fly in the early to mid afternoon on mild days.
- 5) Determine crane densities by aerial photography. This will provide data on crane densities relevant to upland habitat manipulation studies.
- 6) Conduct all counts on the same day for comparative purposes.
- 7) Read neck collars during counts to determine between year tradition in the use of staging areas and to assist other crane researchers.
- 8) Annually appraise vegetation density and wetland area in fields 1-4 relative to crane use.
- 9) The population ecology of invertebrates (primarily snails and earthworms) needs further research relative to habitat management practices.

Other birds

- 1) Determine breeding bird populations on upland study plots to record their response to various management techniques. Census in early June.
- 2) Search wetland meadows and river channels periodically for diseased waterfowl from mid-Feb to mid-Apr.
- 3) Conduct 2 early morning censuses of upland sandpipers in in late May to monitor population changes that may occur in response to land-use changes.
- 4) Assess nesting populations of least terns and piping plovers to monitor their response to river channel management. Visit nests weekly from early to mid Jun through mid July. Mark nests and determine production of young.
- 5) Count bald eagles weekly from mid-Feb to late Mar during midday. Locate nocturnal roosting sites. Once identified, efforts should be made to protect these roosts.
- 6) Count wintering raptors twice a month from Dec to Apr to determine the effects of upland habitat manipulation on raptor populations.

Additional areas that should be protected

To increase the value of M.I.C.M. for cranes and other migratory birds, the following areas should be protected from future development:

- 1) Lands  $\frac{1}{2}$  to  $\frac{3}{4}$  mi south of the South Channel from U.S. 281 to 1 mi east of the Alda Bridge.
- 2) Moeller's property.
- 3) The South Channel proper from U.S. 281 to the Alda Bridge and the river channel from the west tip of M.I.C.M. east to the middle of Sec 27, T10N, R10W.



- 4) The wetland meadow habitat in Sec 3, T9N, R10W and Sec 33, T10N, R10W.
- 5) Shoemaker Island in Sec 23, 26, 27, T10N, R10W. This area would require intensive management.

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APPENDIX



Appendix A. Animal foods found in 34 sandhill cranes collected during spring 1978 in the Platte River Valley (From Reinecke and Krapu 1979).

	<u>Common Name</u>	<u>Part ingested</u>
Oligocheata		
Lumbricidae	Earthworms	immatures
Insecta		
Orthopterata		
Acrididae	Grasshoppers	A <sup>a</sup>
Gryllidae	Crickets	A
Coleoptera		
Carabidae	Ground beetles	A,L
Scarabaeidae	Scarab beetles	L
Staphylinidae	Rove beetles	A,L
Cantharidae	Soldier beetles	A,L
Elateridae	Click beetles	A,L
Lepidoptera		
Noctuidae	Noctuid moths	L
Pyralidae	Pyralid moths	L
Gastropoda		
Pulmonata	Snails	
Arachnida	Spiders	
Isopoda	Sowbugs	

<sup>a</sup> A= adults, L= larvae.

Appendix B . Characteristics of river channel segments bordering Mormon Island  
(From Krapu 1981a).

ID	AREA	ROAD	BRIDGE	WIDTH	CHANNOW	BANKBANK	AREANOW	HTBANK	HTNORTH	HTSOUTH	I1	I2	I3	I4	I5	CRANES
36	1	1	1	194	200	212	30.6	2	5	5	0.0	1.1	0.2	0.0	1.5	1,000
38	1	0	0	171	209	234	41.7	2	5	4	1.7	3.0	2.5	0.0	0.0	5,000
39	1	0	0	216	250	330	49.7	3	1	4	0.9	3.6	5.1	0.0	0.0	4,500
40	1	0	0	196	193	257	41.3	3	4	2	1.0	4.2	4.9	0.0	0.0	5,000
41	1	0	0	200	225	319	37.5	3	3	5	2.2	1.5	6.8	0.0	1.0	7,000
42	1	0	0	214	170	297	48.0	3	1	1	0.5	0.5	6.3	1.7	4.1	6,500
43	1	0	0	254	195	250	39.0	3	4	5	0.9	0.4	3.9	0.8	0.0	5,000
44	1	0	0	213	213	213	36.6	4	4	1	0.2	0.1	0.6	3.5	3.1	6,000
45	1	0	0	316	189	189	47.9	2	1	3	0.2	1.3	0.3	0.0	0.0	11,000
46	1	0	0	248	300	367	59.2	2	1	3	1.2	4.3	3.1	2.0	0.0	1,200
47	1	0	0	236	244	250	59.6	2	3	1	0.7	1.8	0.8	0.0	0.0	3,000
48	1	1	1	223	196	227	29.4	3	5	5	0.3	0.2	0.9	0.6	0.0	1,900

<sup>a</sup>ID - identification number of half-mile segments; segments are numbered from east to west.

AREA - staging area in which river segment is located.

ROAD - presence (1) or absence (0) of road immediately adjacent to river.

BRIDGE - presence (1) or absence (0) of bridge crossing over the river segment.

WIDTH - width (m) of widest unobstructed channel within river segment.

CHANNOW - total width (m) of water at mid-point of river segment.

BANKBANK - distance (m) from North bank to South bank of present river channel at mid-point of segment.

AREANOW - area (acres) of water within river segment.

HTBANK - height class<sup>b</sup> of predominant vegetation along island banks.

HTNORTH - height class of predominant vegetation along North bank of channel.

HTSOUTH - height class of predominant vegetation along South bank of channel.

I1 - acreage of island vegetation of height class 1.

I2 - acreage of island vegetation in height class 2.

I3 - acreage of island vegetation in height class 3.

I4 - acreage of island vegetation in height class 4.

I5 - acreage of island vegetation in height class 5.

CRANES - maximum number of cranes seen roosting on river segment during 1979.

<sup>b</sup>Vegetation height classes are as follows:

(1) less than 0.5 m.

(2) 0.5 m to 1.9 m.

(3) 2.0 m to 3.9 m.

(4) 4.0 m to 7.9 m.

(5) 8.0 m and over.



## Appendix C .

## Description of sandhill crane field use on M.I.C.M.

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Field 1: Crane use was very light and inconsistent in this field (See Fig. 5 for field locations). Use was greatest as a secondary roost late in March and early April and occasionally throughout the season for cranes roosting in the north channel. Flock size was usually (if not always) less than 500 cranes. Two or three flocks of less than 100 birds were observed during midday. A flock of 800 cranes were photographed around the small wetland on the narrow west tip of this field in 1979 (Ferguson, pers. comm.). Approximately 150 cranes roosted on this wetland in April 1980. This field was recently classified by Currier (1981) as a grassland rather than a wetland meadow. A combination of lack of wetland area, slightly taller vegetation and the location of attractive wetland meadow habitat immediately north, east, and southeast of field 1 may have been responsible for the very light crane use.

Field 2: Cranes were first observed on field 2 on 11 March and consistent crane use did not begin until approximately 22 March. Thereafter, consistently high crane use occurred and field 2 surpassed field 3 in relative frequency values during weeks 6 and 7 (29 March - 11 April). The north pasture was used as a wind break by cranes during strong north winds, and occasionally as a secondary roost for cranes roosting in the north channel. Cranes reached densities of 36.0 cranes/acre in this field on 25 March 1981.

Field 3: This field had the highest number of crane use days of any field on M.I.C.M.. Crane use was concentrated on the east side before c. 13 March, on the west half after 1 April with the entire field receiving high crane use during mid-season. Crane use declined during week 7. Densities of 250 cranes/acre were photographed in this field in 1979 (Ferguson, pers. comm.), and reached an average density of 40.9 cranes/acre on 25 March 1981.

Field 4: "Moeller's pasture" received medium crane use throughout the season. Crane use was consistent, but 1000+ cranes occurred on only



## Appendix C. (continued).

juxataposition of three different habitat types, the riparian over-story to the south, and the location (not adjacent to the channel) may have also affected crane use of this portion of field 11.

Field 12: Cranes were first noted in this field on 16 March 1981. Crane use was concentrated on the north end of this field, and may have been affected by visitor use. Although regular counts of this field were not conducted, crane use was thought to be fairly high (500+) cranes and consistent after mid-March. An estimated 6,000 cranes were present on the evening of 23 March 1981.

Field 13: Crane use of this field was very light. A few birds were observed on one occasion and there was some evidence of crane use (scattered feathers). Light crane use of the grassland to the north of this field was noted and a few cranes were observed on the narrow channel north of this field during midday.

Field 14: Crane use of this pasture was inconsitent and fairly infrequent compared crane use of pastures on M.I.C.M. Occasionally large numbers (thousands) of cranes were present. Crane use declined late in the staging interval.

Appendix D. Habitat types of M.I.C.M. and their associated breeding birds.

Wetland Meadow	Native Hay	Alfalfa	Corn
Mallard	Mallard	Mallard	Killdeer
Pintail	Pintail	Pintail	Mourning Dove
Blue-winged Teal	Blue-winged Teal	Blue-winged Teal	
Northern Shoveler	Northern Shoveler	Northern Shoveler	
Bobwhite	Bobwhite	Bobwhite	
Ring-necked Pheasant	Ring-necked Pheasant	Ring-necked Pheasant	
Sora	Upland Sandpiper	Upland Sandpiper	
Killdeer	Wilson's Phalarope	Bobolink	
Upland Sandpiper	Mourning Dove	Eastern Meadowlark	
Mourning Dove	Bobolink	Red-winged Blackbird	
Bobolink	Eastern Meadowlark	Brown-headed Cowbird	
Eastern Meadowlark	Red-winged Blackbird	Dickcissel	
Red-winged Blackbird	Brown-headed Cowbird	Grasshopper Sparrow	
Brown-headed Cowbird	Dickcissel		
Dickcissel	Grasshopper Sparrow		
Grasshopper Sparrow			

Appendix D . (Continued).

Woodlot	Fencerow	Riparian Shrubland	Riparian Woodland (Understory)
Red-tailed Hawk	Bobwhite	Bobwhite	Mourning Dove
American Kestrel	Mourning Dove	Mourning Dove	Yellow-billed Cuckoo
Bobwhite	Eastern Kingbird	Yellow-billed Cuckoo	Black-billed Cuckoo
Mourning Dove	Western Kingbird	Black-billed Cuckoo	Willow Flycatcher
Great Horned Owl	Black-billed Magpie	Willow Flycatcher	Black-capped Chickadee
Common Flicker	Gray Catbird	Eastern Kingbird	House Wren
Red-headed Woodpecker	Brown Thrasher	Western Kingbird	Gray Catbird
Hairy Woodpecker		Black-billed Magpie	Warbling Vireo
Downy Woodpecker		Gray Catbird	Yellow Warbler
Great Crested Flycatcher		Yellow Warbler	Common Yellowthroat
Blue Jay		Common Yellowthroat	Brown-headed Cowbird
Common Crow		Brown-headed Cowbird	Cardinal
Black-capped Chickadee		Cardinal	American Goldfinch
House Wren		American Goldfinch	
American Robin		Field Sparrow	
Starling		Bell's Vireo	
Northern Oriole			
Common Grackle			



Appendix D . (Continued).

Riverine Sandbars	Exposed Banks	Man-made Structures/ Farmsteads
Piping Plover	Belted Kingfisher	Rock Dove
Killdeer	Rough-winged Swallow	Mourning Dove
Spotted Sandpiper		Barn Swallow
Least Tern		Cliff Swallow
Wilson's Phalarope		American Robin
		Starling
		House Sparrow

# Appendix E. Results of breeding bird census on 7 plots.

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## Breeding Bird Plot #1

Size: 11.3 ac (4.6 ha)                      Total Man Hours: 2.3

Dates Censused: 11, 13-17, 23, 24 Jun 1980

Habitat Type: Wet Hay.

Habitat Description:<sup>a</sup>

22% big bluestem (Andropogon gerardi), 14.1% Kentucky bluegrass (Poa pratensis), 9.3% horsetail (Equisetum sp.), 8.2% sedge (Carex spp.), 6.3% Indiangrass (Sorghastrum avenaceum), 5.6% redtop (Agrostis stolonifera).

Ground Cover: 91.1% litter, 6.1% plant, 2.9% bare.

Breeding Birds	Territorial Males		
	Species	#/Plot	#/40 ac (40 ha)      #/100 ac (100 ha)
Red-winged Blackbird	7.0	25 (61)	62 (152)
Bobolink	6.0	21 (52)	52 (130)
Upland Sandpiper	1.0	4 (9)	10 (22)
Wilson's Phalarope	1.0	4 (9)	10 (22)
Totals:	4 species, 15 territorial males (132 territorial males/100 ac).		

Visitors: Mallard, Barn Swallow, Eastern Kingbird, Common Grackle, Orchard Oriole, Eastern Meadowlark, Mourning Dove.

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<sup>a</sup> Habitat description based on work summarized by Dr. Hal Nagel, Dept. of Biology, Kearney State College, Kearney, NE.

## Appendix E . (continued).

## Breeding Bird Plot #2

Size: 23.5 ac (9.5 ha) Total Man Hours: 4.0

Dates Censused: 11, 13-17, 23, 24 Jun 1980.

General Habitat Type: Wetland Meadow (Grassland).

## Habitat Description:

29.9% sedge, 9.9% spikesedge (Eleocharis sp.), 7.5% big bluestem,7.8% rush (Scirpus sp.), 6.4% switchgrass (Panicum virgatum),5.8% prairie cordgrass (Spartina pectinata).

Ground Cover: 73.5% litter, 17.8% bare, 8.7% plant.

## Breeding Birds:

## Territorial males

Species	#/Plot	#/40 ac (40 ha)	#/100 ac (100 ha)
Grasshopper Sparrow	6.0	10 (25)	25 (62)
Red-winged Blackbird	2.0	3 (8)	8 (20)
Eastern Meadowlark	2.0	3 (8)	8 (20)
Dickcissel	2.0	3 (8)	8 (20)
Bobolink	2.0	3 (8)	8 (20)
Blue-winged Teal	1.0	2 (4)	5 (10)

Total: 6 species, 15 territorial males (62 territorial males/  
100 ac).Visitors: Barn Swallow, Eastern Kingbird, Wood Duck, Killdeer,  
and Ring-necked Pheasant.



## Appendix E . (continued).

## Breeding Bird Plot #4

Size: 40 ac (16.2 ha) Total Man Hours: 4.5

Dates Censused: 11, 13-17, 23, 24 Jun 1980.

Habitat Type: Wetland Meadow (Grassland).

## Habitat Description:

19.3% big bluestem, 13.6% redbud, 12.9% sedge, 9.4% Kentucky bluegrass, 9.6% smooth brome.

Ground Cover: 63.4% litter, 28.3% bare, 8.3% plant.

Breeding Birds Species	Territorial Males	
	#/40 ac (40 ha)	#/100 ac (100 ha)
Bobolink	10 (25)	25 (62)
Grasshopper Sparrow	7 (18)	18 (45)
Dickcissel	5 (12)	12 (30)
Red-winged Blackbird	4 (10)	10 (25)
Eastern Meadowlark	3 (8)	8 (20)
Upland Sandpiper	3 (8)	8 (20)
Mourning Dove	1 (2)	2 (5)

Totals: 7 species, 33 territorial males (83 territorial males/100 ac).

Visitors: American Goldfinch, Barn Swallow, Eastern Kingbird.

## Appendix E. (continued).

## Breeding Bird #5

Size: 40 ac (16.2 ha) Total Man Hours: 6.2

Dates Censused: 11, 13-17, 23, 24 Jun 1980

Habitat Type: Wetland Meadow

## Habitat Description:

29.9% sedge, 9.9% spikesedge, 7.5% big bluestem, 7.8% rush,  
6.4% switchgrass, and 5.8% prairie cordgrass.

Ground Cover: 73.5% litter, 17.8% bare, 8.7% plant.

Breeding Birds Species	Territorial Males	
	#/40 ac (40 ha)	#/100 ac (100 ha)
Dickcissel	11 (28)	28 (70)
Red-winged Blackbird	9 (23)	23 (58)
Bobolink	9 (23)	23 (58)
Grasshopper Sparrow	6 (15)	15 (38)
Upland Sandpiper	3 (8)	8 (20)
Eastern Meadowlark	3 (8)	8 (20)
Killdeer	2 (5)	5 (12)
Mourning Dove	1 (2)	2 (5)
Blue-winged Teal	1 (2)	2 (5)

Totals: 9 species, 45 territorial males (114 territorial males/  
100 ac).

Visitors: Pintail, American Goldfinch, Barn Swallow, Common

Flicker, Eastern Kingbird, Green-winged Teal, Sora (chick).

## Appendix E . (continued).

## Breeding Bird Plot #6

Size: 40 ac (16.2 ha)

Total Man Hours: 4.25

Habitat Type: Wetland Meadow

## Habitat Description:

28.5% sedge, 7.8% spikesedge, 7.8% bulrush, 6.5% switchgrass,  
5.2% Kentucky bluegrass.

Ground Cover: 73.5% litter, 17.8% bare, 8.7% plant.

## Breeding Birds

## Territorial Males

Species	#/40 ac (40 ha)	#/100 ac (100 ha)
Bobolink	11 (28)	28 (70)
Red-winged Blackbird	10 (25)	25 (62)
Grasshopper Sparrow	8 (20)	20 (50)
Dickcissel	6 (15)	15 (38)
Mourning Dove	4 (10)	10 (25)
Upland Sandpiper	3 (8)	8 (20)
Eastern Meadowlark	2 (5)	5 (12)
Killdeer	1 (2)	2 (5)

Totals: 8 species, 45 territorial males (113 territorial males/  
100 ac).

Visitors: Eastern Kingbird, Western Kingbird, Mallard, Starling,  
Blue-winged Teal, Ring-necked Pheasant, Common Grackle.



Appendix F . Past land use of breeding bird plots.

Plot #1. Size: 11.3 acres. The plot lies within a 130 acre native hay field. The field was never plowed or seeded. It was grazed intermittently prior to 1946 and only fall grazed intermittently within the past 20 years. It is currently used as a native hay field and floods in certain areas subsequent to the spring thaw. Carex and Equisetum typify this site.

Plot #2. Size 23.5 acres. The existing fences were erected in 1968. Originally was a 900 acre pasture. Grazing occurred between 15 May - 15 September. Since 1978, grazing occurred between 1 May - 1 October. The plot holds some water during late spring although zeric conditions are most typical due to a slightly elevated local relief. Boutelous gracilis occurs on the drier sites, while Carex and Spartina dominate the mesic sites.

Plot #3. Size: 40 acres. Approx. 10 acres were plowed here and seeded to smooth brome prior to 1946. It was periodically fall grazed during 1953-1960. In 1964, cattle were wintered here and fed alfalfa, thus some alfalfa has been established. It has been mowed as a native hay field since 1978 and native tall grasses and forbs occur here.

Plot #4. Size: 40 acres. Lies in a 300 acre pasture. About 60-70 acres were plowed around 1949 and seeded to corn and/or alfalfa and brome. A portion of this broken land is within the plot boundaries. The area was allowed to revert back to grass. Mr. Art Terry purchased the land in 1950. Prior to that time it was grazed. Art hayed the land and speaks of Big Bluestem extending 6 feet in height. It has been pastured and portions hayed to date.

## Appendix F. (continued).

Plot #5. Size: 40 acres. Occurs in the 900 acre pasture described in Plot #2. A portion of this plot was owned by another party until 1950. It was pastured and willows were allowed to grow profusely there on a 160 acre piece, a portion of which lies within this plot. Mr. Art Terry purchased this 160 acre piece in 1950 and cut back the willows by extensive mowing. About 5-6 trees remain in this pasture. The plot lies in a mesic area and held water throughout the 1980 census period in the low drainage areas.

Plot # 6 and 7. Size: 40 acres. These plots were located adjacent to one another in the 900 acre pasture described in Plot #2. Unlike plot #2, these areas are lower and held water throughout the 1980 census period. Art Terry harvested native grass seed in October 1953. This mesic site has been too wet to cultivate and has been used exclusively for pasture. Sedges are the dominant vegetation within these plots. Art used to harrow this pasture to break up cow chips which resulted in more uniform growth in vegetation. Approx. 1/2 of plot #6 and 1/8 of plot #7 is located in the more xeric sites typical of plot #2. Blue grama and downy brome dominate these dry sites.

Appendix G. Taxonomy of Mormon Island Crane Meadows Birds  
(16 orders, 43 families, and 177 species).

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Podicipediformes		Cuculiformes	
Podicipedidae	2 <sup>a</sup>	Cuculidae	2
Pelecaniformes		Strigiformes	
Pelecanidae	1	Strigidae	1
Phalacrocoracidae	1	Caprimulgiformes	
Ciconiiformes		Caprimulgidae	1
Ardeidae	5	Apodiformes	
Threskiornithidae	1	Apodidae	1
Anseriformes		Coraciiformes	
Anatidae		Alcedinidae	1
Anserinae	3	Piciformes	
Anatinae	8	Picidae	5
Athyinae	6	Passeriformes	
Merginae	2	Tyrannidae	6
Falconiformes		Alaudidae	1
Cathartidae	1	Hirundinidae	5
Accipitridae	9	Corvidae	3
Pandionidae	1	Paridae	1
Falconidae	4	Sittidae	1
Galliformes		Troglodytidae	1
Tetraonidae	1	Mimidae	3
Phasianidae	2	Turdidae	5
Gruiformes		Sylviidae	1
Gruidae	1	Laniidae	2
Rallidae	2	Sturnidae	1
Charadriiformes		Vireonidae	3
Charadriidae	4	Parulidae	11
Scolopacidae	19	Ploceidae	1
Recurvirostridae	1	Icteridae	12
Phalaropodidae	1	Fringillidae	25
Laridae	6		
Columbiformes			
Columbidae	2		

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<sup>a</sup>Number of species