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ABUNDANCE AND HABITAT ASSOCIATIONS OF BIRDS WINTERING IN THE PLATTE RIVER VALLEY, NEBRASKA

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ABSTRACT—The abundance and habitat associations of overwintering birds in Platte River Valley of central Nebraska may influence their long-term survival. I observed a total of 51 species over a three-year period in shrub-grassland, forest, grassland, and cropland habitats during the winter. Grassland habitats had the lowest abundance of wintering birds, while abundances in shrub-grassland, forest, and cropland habitats were higher and similar. Species richness was highest in forests (\bar{x} = 2.97 species) and lowest in grasslands (\bar{x} = 0.73 species) and croplands (\bar{x} = 0.57 species). Overall, horned larks (*Eremophila alpestris*), American tree sparrows (*Spizella arborea*), black-capped chickadees (*Parus atricapillus*), dark-eyed juncos (*Junco hyemalis*), western meadowlarks (*Sturnella neglecta*), and red-winged blackbirds (*Agelaius phoeniceus*) were the most abundant wintering birds in the Platte River Valley. American tree sparrows (34%) accounted for most of the birds in shrub-grasslands, while black-capped chickadees (18%), dark-eyed juncos (11%), and American tree sparrows (10%) accounted for most of the birds in forests. Grasslands were dominated by American tree sparrows (39%) and western meadowlarks (27%), and croplands were dominated by horned larks (43%), red-winged blackbirds (25%), and western meadowlarks (16%). The winter bird community in the Platte River Valley is dominated by woodland-associated species. Many of the woodland-associated species that overwinter in the Platte River Valley have likely benefited from the development of woodlands in the region.

KEY WORDS: grassland birds, habitat association, Nebraska, Platte River Valley, shrubland birds, wintering birds, woodland birds

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Introduction

For many birds, winter may be the season that is most limiting (Kricher 1975; Rappole and McDonald 1994). This is especially the case for birds overwintering in northern latitudes where they encounter fluctuating food resources and severe weather conditions (Kricher 1975). Additionally, loss and degradation of habitats used by wintering birds may also be a limiting factor for some bird populations (Herkert and Knopf 1998). However, winter bird communities have received less attention compared to breeding bird communities during the breeding season (Rollfinke and Yahner 1990a). Because many avian species have exhibited population declines during the last 20 years (Sauer et al. 1999), more information on the ecology and habitat associations of overwintering birds is needed.

According to Christmas Bird Count data (Sauer et al. 1996), a wide variety of birds overwinter in the Platte River Valley of central Nebraska. Many of these species (e.g., horned lark, red-breasted nuthatch, song sparrow, dark-eyed junco, and western meadowlark [see Table 1 for scientific names]) are declining in population (Sauer et al. 1996, 1999). Consequently, a greater emphasis should be placed on the importance of the Platte River Valley for wintering birds. Past studies of wintering birds in the Platte River Valley have examined the distribution and abundance of wintering raptors (Lingle 1989) and the ecology of wintering mallards (Jorde 1981). However, little attention has been given to the importance of the Platte River Valley for the majority of wintering birds. Moreover, we need an understanding of what types of habitats these birds use during the winter season to assist us in developing conservation and management strategies, as well as to provide baseline information that may lend insight into the effects of future habitat changes in the Platte River Valley on wintering birds.

Currently, conservation and management of habitats in the Platte River Valley for wintering birds is hampered by a lack of basic information about these species during their stay in the region. In this paper, I report on the abundance and habitat associations of birds that overwinter in the Platte River Valley of central Nebraska.

Study Area and Methods

The study area is located within a 120 km long by 5 km wide stretch of the Platte River between Grand Island and Overton, NE (Fig. 1). The dominant habitat types along the Platte River are croplands, lowland grasslands

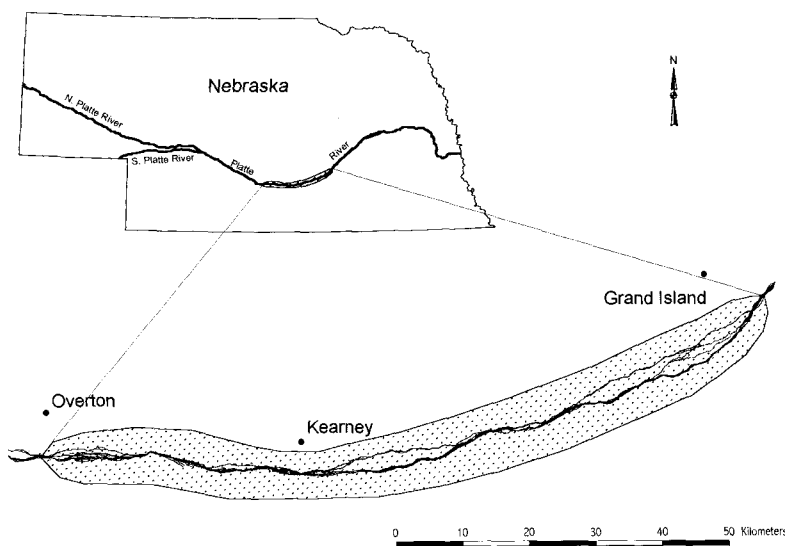


Figure 1. Location of study area in central Nebraska between Grand Island and Overton.

(including sedge meadows), shrub-grasslands, and riparian forests. Croplands in the Platte River Valley are composed of corn, soybean, wheat, sorghum, and alfalfa, with corn accounting for nearly 88% of the croplands (Davis 2001). Lowland grasslands are dominated by big bluestem (*Andropogon gerardii*), Indian-grass (*Sorghastrum avenaceum*), switchgrass (*Panicum virgatum*), and sedges (*Carex* spp.). Shrub-grasslands are characterized by a mixture of lowland grassland plants and woody plants, such as buffaloberry (*Shepherdia argentea*), false indigo (*Amorpha fruticosa*), rough-leaved dogwood (*Cornus drummondii*), and eastern red cedar (*Juniperus virginiana*) (US Fish and Wildlife Service 1981). Riparian forests are dominated by eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), eastern red cedar, red mulberry (*Morus rubra*), rough-leaved dogwood, sandbar willow (*Salix exigua*), and American elm (*Ulmus americana*) (US Fish and Wildlife Service 1981).

I conducted point counts during the winter (30 January–6 February 1998 [winter 1998], 9 December 1998–19 February 1999 [winter 1999], 16 December 1999–9 February 2000 [winter 2000]) in four habitat types (shrub-grassland, woodland, grassland, and cropland) along the Platte River in

central Nebraska. Although soybean and alfalfa fields were surveyed, most (95%) of the point count stations for cropland were located in cornfields. During the winters of 1997-1999, I sampled a total of 65, 179, 249, and 146 points in shrub-grasslands (1997: 22, 1998: 27, 1999: 16), forests (1997: 33, 1998: 78, 1999: 68), grasslands (1997: 54, 1998: 98, 1999: 97), and croplands (1997: 17, 1998: 59, 1999: 70), respectively. Point count stations were systematically located ≥ 250 m apart along transects that were ≥ 250 m apart within each habitat. Point count stations were also located ≥ 150 m from habitat edges (e.g., woodland-grassland edge). Depending on the size of study fields, one to four transects were located within each study field. Generally, one point count station was located on each transect. Study fields ranged in size from 20 to 162 ha. Point counts were conducted from 0800 to 1130 A.M. CST when winds were ≤ 25 km/hr, temperatures were greater than -7°C , and little or no precipitation occurred. During each point count, I recorded all birds seen or heard within a circular plot with a 50 m fixed radius during a 10 minute sampling period (Ralph et al. 1993; Hamel et al. 1996). Point count stations were visited once during the winter. Most of the point count stations for 1998 were sampled in each of the subsequent years. For the additional point count stations established in 1999, nearly all of them were sampled again in 2000.

I used one-way analysis of variance to examine differences in total abundance and species richness among the four habitat types (SYSTAT 1992). I used a normality plot to test assumptions of normality and Levene's test to test for homoscedasticity (SYSTAT 1992). In order to make abundance and richness data meet the assumptions of normality and homoscedasticity, the data were square-root transformed ($[Y + 0.5]^{0.5}$) (Zar 1996). I pooled abundance and species-richness data across years because these data did not differ among years (species richness: $F_{2, 636} = 0.53$, $P = 0.949$; abundance: $F_{2, 636} = 2.49$, $P = 0.084$). Detection probability for each species was estimated as the proportion of the total point counts in each habitat that the species was detected (Gutzwiller 1993). For this paper, I use detection probability as a means to assess the distribution of each species within each habitat (i.e., frequency of occurrence). By using both a measure of abundance and a measure of frequency of occurrence, I was able to assess the importance of a habitat for each species, based on both its abundance and its occurrence within that habitat. To examine similarities in the bird communities between the habitats, I used Morisita's index (C_{λ}) of similarity (Brower and Zar 1984): $C_{\lambda} = 2\sum x_i y_i / (l_1 + l_2) N_1 N_2$, where x_i is the number of individuals in species i for community 1, y_i is the abundance of species

i , l_1 is Simpson's dominance index for community 1, l_2 is Simpson's dominance index for community 2, N_1 is the total number of individuals in community 1, and N_2 is the total number of individuals in community 2. The range of C_λ is from 0 (no similarity) to 1 (complete similarity).

Results

I observed a total of 51 bird species in the four habitats during the three winters (Table 1). Twenty-nine species occurred in shrub-grasslands, 37 in forests, 26 in grasslands, and 16 in croplands. Of the 51 species, 31 are year-round residents (breeding and wintering ranges overlap in central Nebraska), 14 are winter residents (breeding and wintering ranges are disjunct), and 6 are transients (winter range does not include central Nebraska) (Root 1988; Price et al. 1995). Of the 14 winter residents, 10 are short-distance migrants whose breeding ranges are relatively close to their winter ranges and 4 are long-distance migrants (rough-legged hawk, Harris' sparrow, American tree sparrow, and northern shrike). The breeding grounds of these 4 species are located in the Arctic (Price et al. 1995). Thus, their breeding ranges are markedly disjunct from their winter ranges.

The mean abundance of birds differed among the four habitats ($F_{3, 635} = 15.31$, $P < 0.001$), with highest abundance in shrub-grasslands, forests, and croplands and lowest abundance in the grasslands (Table 2). Mean species richness also differed among the four habitats ($F_{3, 635} = 100.63$, $P < 0.001$). The highest species richness occurred in the forest habitat, while the lowest species richness occurred in the grassland and cropland habitats (Table 2). The least overlap in species assemblages occurred between forests and croplands ($C_\lambda = 0.08$). Species assemblages between forests and grasslands ($C_\lambda = 0.28$), as well as grasslands and croplands ($C_\lambda = 0.34$), exhibited low overlap. The most overlap in species assemblages occurred between shrub-grasslands and grasslands ($C_\lambda = 0.71$), shrub-grasslands and croplands ($C_\lambda = 0.65$), and shrub-grasslands and forests ($C_\lambda = 0.64$).

The most abundant wintering birds in the Platte River Valley were horned larks, American tree sparrows, black-capped chickadees, dark-eyed juncos, western meadowlarks, and red-winged blackbirds. In shrub-grassland habitats, the most abundant birds were American tree sparrows, American goldfinches, dark-eyed juncos, and European starlings. In the forest habitats, the most abundant birds were black-capped chickadees, dark-eyed juncos, American tree sparrows, American goldfinches, and downy woodpeckers (Table 3). In grassland habitats, the most abundant birds were

TABLE 1

RESIDENCY STATUS AND SELECTED TRENDS FOR 51 BIRD
SPECIES DETECTED DURING WINTER BIRD SURVEYS ALONG
THE PLATTE RIVER IN CENTRAL NEBRASKA, 1997-2000

| Species | Year ^a | Residency Status in Nebraska ^b | Breeding Bird Survey ^c | Christmas Bird Count ^d |
|---|-------------------|---|---|---|
| Great Blue Heron (<i>Ardea herodias</i>) | 97, 98, 99 | B | 2.6*** | NR ^e |
| Canada Goose (<i>Branta canadensis</i>) | 97, 98, 99 | B, W | 11.4*** | NR |
| Mallard (<i>Anas platyrhynchos</i>) | 97, 98, 99 | B, W | 1.8*** | 28.4 |
| Ring-billed Gull (<i>Larus delawarensis</i>) | 97 | T | 3.1*** | NR |
| Bald Eagle (<i>Haliaeetus leucocephalus</i>) | 97, 98, 99 | W | 8.0*** | NR |
| Northern Harrier (<i>Circus cyaneus</i>) | 97, 98, 99 | W | -0.7 | -1.1 |
| Sharp-shinned Hawk (<i>Accipiter striatus</i>) | 97, 98, 99 | W | 3.8*** | 0.3 |
| Cooper's Hawk (<i>Accipiter cooperii</i>) | 99 | B, W | 6.0*** | NR |
| Red-tailed Hawk (<i>Buteo jamaicensis</i>) | 97, 98, 99 | B, W | 3.0*** | 3.1*** |
| Rough-legged Hawk (<i>Buteo lagopus</i>) | 97, 98, 99 | W | NR | 0.6 |
| American Kestrel (<i>Falco sparverius</i>) | 97, 98, 99 | B, W | -0.2 | 3.9*** |
| Prairie Falcon (<i>Falco mexicanus</i>) | 99 | T | 2.3 | NR |
| Greater Prairie-Chicken (<i>Tympanuchus cupido</i>) | 99 | W | 5.5 | NR |
| Northern Bobwhite (<i>Colinus virginianus</i>) | 97, 98, 99 | B, W | -2.7*** | -1.9 |
| Ring-necked Pheasant (<i>Phasianus colchicus</i>) | 97, 98, 99 | B, W | -1.1*** | 3.4 |
| Wild Turkey (<i>Meleagris gallopavo</i>) | 97, 98, 99 | B, W | 10.4*** | NR |
| Rock Dove (<i>Columba livia</i>) | 97, 98, 99 | B, W | 0.3 | NR |
| Short-eared Owl (<i>Asio flammeus</i>) | 99 | W | -4.9** | NR |
| Great-horned Owl (<i>Bubo virginianus</i>) | 97, 98, 99 | B, W | 0.1 | 0.2 |
| Belted Kingfisher (<i>Ceryle alcon</i>) | 98, 99 | B, W | -1.7*** | 2.4*** |
| Red-bellied Woodpecker (<i>Melanerpes carolinus</i>) | 97, 98, 99 | B, W | 0.6*** | 1.5 |
| Northern Flicker (<i>Colaptes auratus</i>) | 97, 98, 99 | B, W | -2.9*** | -1.7 |
| Downy Woodpecker (<i>Picoides pubescens</i>) | 97, 98, 99 | B, W | -0.2 | 0.7 |
| Hairy Woodpecker (<i>Picoides villosus</i>) | 97, 98, 99 | B, W | 1.5*** | -1.1 |
| Horned Lark (<i>Eremophila alpestris</i>) | 97, 98, 99 | W | -1.7*** | 0.1 |
| Blue Jay (<i>Cyanocitta cristata</i>) | 97, 98, 99 | B, W | -1.2*** | 3.6*** |
| Black-billed Magpie (<i>Pica pica</i>) | 97, 98, 99 | B, W | -0.6 | NR |
| American Crow (<i>Corvus brachyrhynchos</i>) | 97, 98, 99 | B, W | 0.9*** | 1.5 |
| Black-capped Chickadee (<i>Parus atricapillus</i>) | 97, 98, 99 | B, W | 1.5*** | 1.1 |
| Brown Creeper (<i>Certhia americana</i>) | 98 | W | 1.5 | -0.3 |

TABLE 1 Continued

| Species | Year ^a | Residency Status in Nebraska ^b | Breeding Bird Survey ^c | Christmas Bird Count ^d |
|--|-------------------|---|-----------------------------------|-----------------------------------|
| White-breasted Nuthatch (<i>Sitta carolinensis</i>) | 97, 98, 99 | B, W | 1.9*** | 1.0 |
| Red-breasted Nuthatch (<i>Sitta canadensis</i>) | 99 | W | 1.9*** | -1.4*** |
| Carolina Wren (<i>Thryothorus ludovicianus</i>) | 99 | T | 0.9*** | NR |
| Golden-crowned Kinglet (<i>Regulus satrapa</i>) | 99 | W | -0.6 | 0.1 |
| Eastern Bluebird (<i>Sialia sialis</i>) | 97, 98 | B | 2.6*** | NR |
| American Robin (<i>Turdus migratorius</i>) | 97, 98, 99 | B, W | 0.8*** | 1.6 |
| Loggerhead Shrike (<i>Lanius ludovicianus</i>) | 97, 98 | B, W | -3.7*** | NR |
| Northern Shrike (<i>Lanius excubitor</i>) | 99 | W | NR | 2.7 |
| Cedar Waxwing (<i>Bombycilla cedrorum</i>) | 97, 98, 99 | B, W | 1.6*** | -0.3 |
| European Starling (<i>Sturnus vulgaris</i>) | 97, 98, 99 | B, W | -1.0*** | 2.3 |
| Northern Cardinal (<i>Cardinalis cardinalis</i>) | 97, 98, 99 | B, W | 0.0 | -0.6 |
| Eastern Towhee (<i>Pipilo erythrophthalmus</i>) | 99 | B | -2.0*** | NR |
| Song Sparrow (<i>Melospiza melodia</i>) | 97, 99 | B, W | -0.5*** | -3.5*** |
| American Tree Sparrow (<i>Spizella arborea</i>) | 97, 98, 99 | W | NR | -1.8 |
| Dark-eyed Junco (<i>Junco hyemalis</i>) | 97, 98, 99 | W | -1.9*** | -9.1*** |
| Harris' Sparrow (<i>Zonotrichia querula</i>) | 97, 98, 99 | W | NR | 0.3 |
| Western Meadowlark (<i>Sturnella neglecta</i>) | 97, 98, 99 | B, W | -0.6*** | -9.9** |
| Red-winged Blackbird (<i>Agelaius phoeniceus</i>) | 97, 98, 99 | B, W | -1.0*** | -6.6 |
| House Sparrow (<i>Passer domesticus</i>) | 97, 98 | B, W | -2.4*** | -1.4 |
| American Goldfinch (<i>Carduelis tristis</i>) | 97, 98, 99 | B, W | -0.6*** | 2.8* |
| House Finch (<i>Carpodacus mexicanus</i>) | 97 | B, W | 1.6* | NR |

^a 97 = winter 1997–1998 (30 January–16 February 1998), 98 = winter 1998–1999 (9 December 1998–19 February 1999), 99 = winter 1999–2000 (16 December 1999–9 February 2000).

^b B = breeding-season resident, W = winter resident, T = transient. Residency status based on range maps (Root 1988; Price et al. 1995) and personal observations.

^c North American Breeding Bird Survey (BBS) trends from Sauer et al. (1999). Trends are estimated as average annual percentage change during the survey period. Trends are for entire survey region from 1966 to 1998. Trend estimates follow statistical methods reported by Geissler and Sauer (1990).

^d Christmas Bird Count (CBC) trends from Sauer et al. (1996). Trends are estimated as average annual percentage change during the survey period. Trends are for Nebraska from 1959 to 1988. Trend estimates follow statistical methods reported by Geissler and Sauer (1990).

^e NR = Not reported during BBS or CBC for the survey period.

* = $P < 0.10$, ** = $P < 0.05$, *** = $P < 0.01$

TABLE 2

TOTAL ABUNDANCE AND SPECIES RICHNESS OF THE WINTER
BIRD COMMUNITY IN FOUR HABITAT TYPES ALONG THE
PLATTE RIVER IN CENTRAL NEBRASKA, 1997-2000

| | Shrub-grassland n = 65 ^a $\bar{x} \pm SE$ | Forest n = 179 $\bar{x} \pm SE$ | Grassland n = 249 $\bar{x} \pm SE$ | Cropland n = 146 $\bar{x} \pm SE$ |
|------------------|--|---------------------------------------|--|---|
| Species Richness | 1.86 ± 0.26A ^b | 2.97 ± 0.17B | 0.73 ± 0.06C | 0.57 ± 0.06C |
| Abundance | 9.62 ± 2.71A | 9.46 ± 1.02A | 3.88 ± 0.83B | 9.31 ± 2.74A |

Note: Total abundance = (mean number of total individuals/point).

^a Sample sizes are the total number of points surveyed during the study for each habitat type. Sample sizes for each habitat by year are: shrub-grassland (1998: 22, 1999: 27, 2000: 16), forest (1998: 33, 1999: 78, 2000: 68), grassland (1998: 54, 1999: 98, 2000: 97), and cropland (1998: 17, 1999: 59, 2000: 70).

^b Means within a row denoted by the same letter are not different ($P > 0.05$).

American tree sparrows and western meadowlarks, and in cropland habitats the most abundant birds were horned larks, red-winged blackbirds, and western meadowlarks (Table 3).

The most frequently detected birds in shrub-grassland habitats were American tree sparrows (detection probability or, DP = 0.31), black-billed magpies (DP = 0.15), northern cardinals (DP = 0.15), and downy woodpeckers (DP = 0.14). The most frequently detected birds in the forest habitats were black-capped chickadees (DP = 0.54), downy woodpeckers (DP = 0.38), American goldfinches (DP = 0.24), and white-breasted nuthatches (DP = 0.21). The most frequently detected birds in grassland habitats were northern harriers (DP = 0.16), western meadowlarks (DP = 0.15), American tree sparrows (DP = 0.12), and ring-necked pheasants (DP = 0.12). Finally, the most frequently detected birds in cropland habitats were horned larks (DP = 0.28) and western meadowlarks (DP = 0.14).

Discussion

The Platte River Valley provides habitat for a diverse group of wintering birds. The winter bird community appeared to be dominated by year-

TABLE 3

ABUNDANCE AND DETECTION PROBABILITY OF 20 COMMON BIRD SPECIES DETECTED DURING WINTER BIRD SURVEYS CONDUCTED IN FOUR HABITAT TYPES ALONG THE PLATTE RIVER IN CENTRAL NEBRASKA, 1997-2000

| Species | Shrub-grassland n = 65 ^a | | Forest n = 179 | | Grassland n = 249 | | Cropland n = 146 | |
|-------------------------|--|-----------------|-------------------|------|----------------------|-------|---------------------|------|
| | $\bar{x} \pm SE$ | DP ^b | $\bar{x} \pm SE$ | DP | $\bar{x} \pm SE$ | DP | $\bar{x} \pm SE$ | DP |
| Northern Harrier | 0.08 ± 0.03 | 0.08 | 0 | 0 | 0.19 ± 0.03 | 0.16 | 0.01 ± 0.01 | 0.01 |
| Ring-necked Pheasant | 0.15 ± 0.06 | 0.12 | 0.02 ± 0.01 | 0.02 | 0.36 ± 0.11 | 0.12 | 0 | 0 |
| Red-bellied Woodpecker | 0.05 ± 0.03 | 0.03 | 0.23 ± 0.04 | 0.18 | 0 | 0 | 0 | 0 |
| Northern Flicker | 0.17 ± 0.10 | 0.06 | 0.23 ± 0.09 | 0.10 | 0.02 ± 0.02 | 0.004 | 0 | 0 |
| Downy Woodpecker | 0.14 ± 0.04 | 0.14 | 0.63 ± 0.07 | 0.38 | 0.01 ± 0.01 | 0.004 | 0.01 ± 0.01 | 0.01 |
| Horned Lark | 0.02 ± 0.02 | 0.03 | 0 | 0 | 0.27 ± 0.14 | 0.04 | 3.98 ± 1.10 | 0.28 |
| Blue Jay | 0.03 ± 0.03 | 0.02 | 0.14 ± 0.05 | 0.07 | 0 | 0 | 0 | 0 |
| Black-billed Magpie | 0.28 ± 0.09 | 0.15 | 0.17 ± 0.04 | 0.10 | 0 | 0 | 0 | 0 |
| American Crow | 0.03 ± 0.02 | 0.03 | 0.17 ± 0.05 | 0.09 | 0.01 ± 0.01 | 0.004 | 0.38 ± 0.35 | 0.01 |
| Black-capped Chickadee | 0.43 ± 0.18 | 0.12 | 1.74 ± 0.15 | 0.54 | 0 | 0 | 0 | 0 |
| White-breasted Nuthatch | 0.06 ± 0.05 | 0.03 | 0.40 ± 0.07 | 0.21 | 0 | 0 | 0 | 0 |
| American Robin | 0.22 ± 0.08 | 0.12 | 0.48 ± 0.24 | 0.16 | 0.01 ± 0.01 | 0.004 | 0 | 0 |
| European Starling | 0.74 ± 0.48 | 0.08 | 0.56 ± 0.18 | 0.11 | 0 | 0 | 0.14 ± 0.10 | 0.01 |
| Northern Cardinal | 0.28 ± 0.10 | 0.15 | 0.35 ± 0.07 | 0.17 | 0 | 0 | 0 | 0 |
| American Tree Sparrow | 3.25 ± 1.48 | 0.31 | 0.99 ± 0.27 | 0.14 | 1.53 ± 0.65 | 0.12 | 0.29 ± 0.24 | 0.08 |
| Dark-eyed Junco | 0.75 ± 0.60 | 0.08 | 1.01 ± 0.32 | 0.14 | 0.01 ± 0.01 | 0.02 | 0 | 0 |
| Harris' Sparrow | 0.08 ± 0.08 | 0.02 | 0.18 ± 0.10 | 0.05 | 0.01 ± 0.01 | 0.004 | 0 | 0 |
| Western Meadowlark | 0.12 ± 0.12 | 0.02 | 0 | 0 | 1.04 ± 0.36 | 0.15 | 1.50 ± 0.58 | 0.14 |
| Red-winged Blackbird | 0 | 0 | 0.34 ± 0.30 | 0.02 | 0.06 ± 0.03 | 0.02 | 2.30 ± 1.56 | 0.03 |
| American Goldfinch | 0.80 ± 0.47 | 0.08 | 0.72 ± 0.18 | 0.24 | 0.16 ± 0.06 | 0.06 | 0 | 0 |

Note: Abundance = (mean number of individuals/point).

^a Sample sizes are the total number of points surveyed during the study for each habitat type. Sample sizes for each habitat by year are: shrub-grassland (1998: 22, 1999: 27, 2000: 16), forest (1998: 33, 1999: 78, 2000: 68), grassland (1998: 54, 1999: 98, 2000: 97), and cropland (1998: 17, 1999: 59, 2000: 70).

^b Detection probability (DP) for each species was estimated as the proportion of the total point counts in each habitat that each species was detected (Gutzwiller 1993).

round residents, e.g., black-capped chickadees, western meadowlarks, red-winged blackbirds, downy woodpeckers, and red-bellied woodpeckers. However, some of the species that breed in the Platte River Valley also breed in more northern latitudes, e.g., western meadowlarks, red-winged blackbirds, and American goldfinches (Price et al. 1995). Consequently, the winter bird community may be composed of a large proportion of individuals overwintering from northern latitudes. This makes it impossible to distinguish between those individuals that are year-round residents and those that are winter residents without further study.

Cody (1985) noted that during the breeding season, grassland habitats in North America generally support low bird-species diversity and densities, compared to other habitats such as forests and shrub-grasslands. In the case of overwintering birds in southern Texas, Igl and Ballard (1999) found the lowest number of bird species and densities in grasslands, while the highest number of bird species and bird densities occurred in habitats dominated by woody vegetation. In this study, I observed a similar trend: the lowest number of bird species and lowest abundances occurred in grasslands and the highest number of bird species and abundances occurred in shrub-grasslands and forests. The differences in number of bird species and abundances between shrub-grasslands, forests, and grasslands (Table 2) are related to the structural diversity among such habitats (Cody 1985). In the Platte River Valley, grasslands are less structurally diverse than either shrub-grasslands or forests (Currier et al. 1985; C. A. Davis unpublished data), resulting in fewer available niches for overwintering birds.

In general, forests in northern latitudes tend to be dominated by wintering birds in the bark-foraging guild (e.g., woodpeckers, nuthatches, and creepers) and the foliage-gleaning guild (e.g., chickadees, titmice, and kinglets) (Rollfinke and Yahner 1990b). Wintering birds in the ground-and-shrub-foraging guild (e.g., tree sparrows, juncos, and goldfinches) tend to be absent from forests in northern latitudes (Yahner 1986). In my study, the composition of the winter bird community in forest habitats was dominated by species in the bark-foraging guild (21%), foliage-gleaning guild (23%), and ground-and-shrub-foraging guild (30%). Most of the forests in the Platte River Valley are narrow in width (<200 m; Colt 1997) and are characterized by many tree-fall gaps and a high density of snags (64 snags/ha; Colt 1997). The open condition of the forests and numerous snags may provide habitat for a wider range of wintering birds than do more closed forests elsewhere. For example, species such as the American tree sparrow and dark-eyed junco, which tend to forage in open shrub habitats (Helms and

Drury 1960), were recorded in high numbers in forests in the Platte River Valley.

Over 75% of the native grasslands in the Platte River Valley have been converted to croplands, homesites, and commercial properties (Currier et al. 1985; Currier and Ziewitz 1987). Moreover, many of the remaining grasslands (50%-60%) are declining in habitat value because of habitat fragmentation (Helzer and Jelinski 1999), encroachment of woody vegetation (particularly eastern red cedar and Russian olive [*Elaeagnus angustifolia*]), and overgrazing (Currier et al. 1985; C. A. Davis unpublished data). The effects of declining grassland habitat quality on wintering grassland birds in the Platte River Valley are not well documented. However, studies in other regions have shown a negative impact of declining habitat quality on wintering grassland birds. For example, Igl and Ballard (1999) found that overwintering grassland birds in Texas generally avoided woodland habitats that contained dense shrubs, and occurred in lower densities in those areas.

During this study, I did record six grassland birds using grasslands: short-eared owl, northern harrier, western meadowlark, greater prairie-chicken, ring-necked pheasant, and horned lark. All of these species, except the greater prairie-chicken, have been undergoing long-term population declines (Table 1). Management of grasslands in the Platte River Valley should focus on improving the quality of the remaining grasslands for these species by reducing encroachment of woody vegetation and providing more structurally diverse grasslands to accommodate a greater variety of wintering grassland birds. For example, the implementation of rotational grazing systems could greatly benefit wintering grassland birds by providing three structurally different grassland habitats: short vegetation with sparse litter cover for horned larks; moderately high vegetation with moderate litter cover for western meadowlarks; and tall vegetation with dense litter cover for ring-necked pheasants, short-eared owls, and northern harriers. Additionally, using prescribed burning combined with rotational grazing would reduce encroachment of woody vegetation in grasslands.

Croplands (primarily corn) are considered an important habitat for wintering waterfowl in the Platte River Valley (US Fish and Wildlife Service 1981; Jorde et al. 1983), but use of this habitat by other wintering birds has not been well documented. In this study, I recorded 16 bird species using croplands during the winter. Although species richness in croplands was relatively low, abundance of these birds was high. In fact, bird abundance in croplands was similar to bird abundance in shrub-grasslands and forests

(Table 2). However, three species (horned larks, western meadowlarks, and red-winged blackbirds), each of which forms large flocks during the winter, accounted for most (84%) of the bird abundance in cropland habitat. Studies of wintering birds in Oklahoma by Grzybowski (1982) and throughout the Midwest by Best et al. (1998) also found that horned larks and meadowlarks extensively used croplands, perhaps reflecting lower seed availability in adjacent grasslands as well as a preference for sparsely vegetated sites. Klute et al. (1997), for example, found that grazed pastures in Kansas provided very little seed for wintering birds. Because most of the grasslands in the Platte River Valley are grazed (Davis 2001), these bird species may use croplands more extensively in order to exploit available waste grain. Also, use of croplands by horned larks may be related to their preference for sparsely vegetated, nearly barren fields (Grzybowski 1983). I observed horned larks mostly in cornfields that had been shredded (C. A. Davis unpublished data). Currently, the availability of waste grain likely is not limiting to wintering birds in this region. However, increased fall tillage, which has occurred in recent years during dry conditions, could dramatically reduce supplies of such grain for overwintering birds, as well as for other species that rely on waste grain for food (e.g., sandhill cranes [*Grus canadensis*] and various waterfowl). Thus, fall tillage should be discouraged in areas heavily used by wintering birds, sandhill cranes, and waterfowl.

Habitats of the Platte River Valley in central Nebraska have been significantly modified during the last 100-150 years (Currier et al. 1985; Sidle et al. 1989; McDonald and Sidle 1992; Johnson 1994; Currier 1997; Currier and Davis 2000; Johnson and Boettcher 2000). Specifically, the Platte River Valley has changed from a nearly treeless region of wet meadow grasslands and tallgrass prairies to a region of riparian forests bordered by expansive croplands (Currier 1997; Currier and Davis 2000). The impact of this change on the winter bird community is not well known; however, several authors have hypothesized that the development of riparian forests along the Platte River has increased the abundance of many woodland-associated breeding birds and likely facilitated their westward expansion throughout the Platte River Valley (Ducey 1988; Faanes and Lingle 1995; Knopf 1986). Currently, the winter bird community of the Platte River Valley is composed of nearly 80% woodland-associated species that are found primarily in eastern deciduous forests. It is likely that the habitat changes in the Platte River Valley have benefited those wintering birds that rely on woodland habitats (Currier and Davis 2000). In contrast, the habitat

changes may have been a detriment to some shrub-grassland birds and grassland birds that winter in the Platte River Valley. Future management of habitats in the Platte River Valley will need to consider balancing the needs of those species that have benefited from the habitat changes with those that have been harmed by the changes.

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References

- Best, L.B., H. Campa III, K.E. Kemp, R.J. Robel, M.R. Ryan, J.A. Savidge, H.P. Weeks Jr., and S.R. Winterstein. 1998. Avian abundance in CRP and crop fields during winter in the Midwest. *American Midland Naturalist* 139:311-24.
- Brower, J.E., and J.H. Zar. 1984. *Field and Laboratory Methods for General Ecology*, 2nd ed. Dubuque, IA: William C. Brown Publishers.
- Cody, M.L. 1985. Habitat selection in grassland and open-country birds. In *Habitat Selection in Birds*, ed. M.L. Cody, 191-226. Orlando, FL: Academic Press.
- Colt, C.J. 1997. Breeding bird use of riparian forests along the central Platte River: a spatial analysis. Master's thesis, University of Nebraska, Lincoln.
- Currier, P.J. 1997. Woody vegetation expansion and continuing declines in open channel habitat on the Platte River in Nebraska. *Proceedings of the North American Crane Workshop* 7:141-52.
- Currier, P.J., and C.A. Davis. 2000. The Platte as a prairie river: A response to Johnson and Boettcher. *Great Plains Research* 10 (1):69-84.
- Currier, P.J., and J. Ziewitz. 1987. Application of a sandhill crane model to management of habitat along the Platte River. In *Proceedings 1985 Crane Workshop*, ed. J.C. Lewis, 315-25. Grand Island, NE: Platte River Whooping Crane Maintenance Trust.

- Currier, P.J., G.R. Lingle, and J.G. VanDerwalker. 1985. *Migratory Bird Habitat on the Platte and North Platte Rivers in Nebraska*. Grand Island, NE: Platte River Whooping Crane Habitat Maintenance Trust.
- Davis, C.A. 2001. Nocturnal roost site selection and diurnal habitat-use by sandhill cranes during spring in central Nebraska. *Proceedings of North American Crane Workshop* 8:48-56.
- Ducey, J.E. 1988. *Nebraska Birds: Breeding Status and Distribution*. Omaha, NE: Simmons-Boardman Books.
- Faanes, C.A., and G.R. Lingle. 1995. Breeding birds of the Platte River Valley of Nebraska, version 02SEP99. US Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, ND. Retrieved 17 March 2000, <http://www.npwrc.usgs.gov/resource/distr/birds/platte/platte.htm>.
- Geissler, P.H., and J.R. Sauer. 1990. Topics in route-regression analysis. In *Survey Designs and Statistical Methods for the Estimation of Avian Population Trends*, ed. J.R. Sauer and S. Droege, 54-57. Washington, DC: US Fish and Wildlife Service.
- Grzybowski, J.A. 1982. Population structure in grassland bird communities during winter. *Condor* 84:137-52.
- Grzybowski, J.A. 1983. Patterns of space use in grassland bird communities during winter. *Condor* 95:591-602.
- Gutzwiller, K.J. 1993. Refining the use of point counts for winter studies of individual species. *Wilson Bulletin* 105:612-27.
- Hamel, P.B., W.P. Smith, D.J. Twedt, J.R. Woehr, E. Morris, R.H. Hamilton, and R.J. Cooper. 1996. *A Land Manager's Guide to Point Counts of Birds in the Southeast*. Washington, DC: US Department of Agriculture-Forest Service.
- Helms, C.W., and W.H. Drury Jr. 1960. Winter and migratory weight and fat: Field studies in some North American buntings. *Bird-Banding* 31:1-40.
- Helzer, C.J., and D.E. Jelinski. 1999. The relative importance of patch area and perimeter-area ratio to grassland breeding birds. *Ecological Applications* 9:1448-58.
- Herkert, J.R., and F.L. Knopf. 1998. Research needs for grassland bird conservation. In *Avian Conservation: Research and Management*, ed. J.M. Marzluff and R. Sallabanks, 273-82. Washington, DC: Island Press.
- Igl, L.D., and B.M. Ballard. 1999. Habitat associations of migrating and overwintering grassland birds in southern Texas. *Condor* 101:771-82.

- Johnson, W.C. 1994. Woodland expansion in the Platte River, Nebraska: Patterns and causes. *Ecological Monographs* 64:45-84.
- Johnson, W.C., and S.E. Boettcher. 2000. The presettlement Platte: Wooded or prairie river? *Great Plains Research* 10 (1):39-68.
- Jorde, D.G. 1981. Winter and spring staging ecology of mallards in south central Nebraska. Master's thesis. University of North Dakota, Grand Forks.
- Jorde, D.G., G.L. Krapu, and R.D. Crawford. 1983. Feeding ecology of mallards wintering in Nebraska. *Journal of Wildlife Management* 47:1044-53.
- Klute, D.S., R.J. Robel, and K.E. Kemp. 1997. Seed availability in grazed pastures and Conservation Reserve Program fields during winter in Kansas. *Journal of Field Ornithology* 68: 253-58.
- Knopf, F.L. 1986. Changing landscapes and the cosmopolitanism of the eastern Colorado avifauna. *Wildlife Society Bulletin* 14:132-42.
- Kricher, J.C. 1975. Diversity of two wintering bird communities: Possible weather effects. *Auk* 92:766-77.
- Lingle, G.R. 1989. Winter raptor use of the Platte and North Platte River Valleys in south central Nebraska. *Prairie Naturalist* 21:1-16.
- McDonald, P.M., and J.G. Sidle. 1992. Habitat changes above and below water projects on the North Platte and South Platte Rivers in Nebraska. *Prairie Naturalist* 24:149-58.
- Price, J., S. Droege, and A. Price. 1995. *The Summer Atlas of North American Birds*. New York: Academic Press.
- Ralph, C.J., G.R. Guepel, P. Pyle, T.E. Martin, and D.F. Desante. 1993. *Handbook of Field Methods for Monitoring Landbirds*. Albany, CA: US Department of Agriculture-Forest Service Pacific Southwest Research Station.
- Rappole, J.H., and M.V. McDonald. 1994. Cause and effect in population declines of migratory birds. *Auk* 111:652-60.
- Rollfinke, B.F., and R.H. Yahner. 1990a. Effects of time of day and season on winter bird counts. *Condor* 92: 215-19.
- Rollfinke, B.F., and R.H. Yahner. 1990b. Community structure and composition of breeding and wintering birds in a wastewater-irrigated oak forest. *Journal of Wildlife Management* 54:493-500.
- Root, T. 1988. *Atlas of Wintering North American Birds: An Analysis of Christmas Bird Count Data*. Chicago: University of Chicago Press.
- Sauer, J.R., J.E. Hines, I. Thomas, J. Fallon, and G. Glough. 1999. *The North American Breeding Bird Survey, Results and Analysis 1966-*

- 1998, version 98.1. Laurel, MD: US Geological Survey Patuxent Wildlife Research Center.
- Sauer, J.R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count home page. US Geological Survey Patuxent Wildlife Research Center, Laurel, MD. Retrieved 17 March 2000, <http://www.mbr.nbs.gov/bbs/bbs.html>.
- Sidle, J.G., E.D. Miller, and P.J. Currier. 1989. Changing habitats in the Platte River Valley of Nebraska. *Prairie Naturalist* 21:91-104.
- SYSTAT. 1992. *SYSTAT for Windows: Statistics*, version 5. Evanston, IL: SYSTAT, Inc.
- US Fish and Wildlife Service. 1981. *The Platte River Ecology Study*. Jamestown, ND: US Fish and Wildlife Service.
- Yahner, R.H. 1986. Structure, seasonal dynamics, and habitat relationships of avian communities in small even-aged forest stands. *Wilson Bulletin* 98:61-82.
- Zar, J.H. 1996. *Biostatistical Analysis*. Upper Saddle River, NJ: Prentice Hall.