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A SUMMER SURVEY OF THE BIRDS AT TWO EASTERN NEBRASKA WETLANDS

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ABSTRACT

This study compares the avian species diversity at two eastern Nebraska wetlands that differ in their relative isolation from an urban environment. Birds were surveyed by the point count method twice weekly at each site during June of 1998. Diversity was measured using species richness and species evenness. The percentage of bird species observed that depend on wetlands for breeding was also compared.

Results suggest that both species richness and evenness, as determined by the Shannon-Wiener index, were higher at the wetland located in a network of other marsh areas and agricultural land than at the suburban wetland. Immigration of species may be facilitated by closer proximity to other natural areas in general. However, the proximity to other marshes had little effect on wetland breeding species, as the difference between relative percentage of wetland birds present was small. Differences between species richness and evenness at the two sites may also be attributed to vegetative structure and varying levels of local traffic.

INTRODUCTION

According to the island biogeography model, the more isolated a habitat "island" is, the fewer species it receives from immigration and the lower the species richness (MacArthur and Wilson 1967). Habitat fragmentation has been shown to produce an island effect and lower avian species diversity in ecosystems such as forests (Lynch and Whigham 1984), parks (Gavareski 1976), prairie remnants (Herkert 1994), and wetlands (Brown and Dinsmore 1986). The effect of habitat fragmentation on birds has been little studied in Nebraska, aside from a study conducted on patch area and breeding birds in grasslands (Helzer and Jelinski 1999). The purpose of this study was to compare the avian diversity at two Omaha area wetlands that are similar in size but differ in their relative isolation from other wetlands. The freshwater wetlands at Heron Haven, west of 114th Avenue and Maple Street in Omaha, Nebraska, and at the "Y," the junction of Highway 275 and Dodge Street (hereafter referred to as the Y Marsh), approximately 11 kilometers west of Omaha city limits, were chosen because they are similar in area but differ in their proximity to an urban environment.

METHODS

Study Areas

Heron Haven is located in a suburban setting and is managed by the Audubon Society of Omaha for educational purposes. The 8.1 hectare portion of the area that was surveyed is bordered on the south by West Maple Road, on the west by Mulhall's Nursery, on the north by Old Maple Road and a golf course, and on the northeast and east by residences and 114th Avenue. The site consists of open floodplain forest, upland forest, two natural wetland areas, and two dredged, manmade ponds. The west natural wetland, located close to Maple Street, is disturbed and dominated by Arrowhead (*Sagittaria latifolia*), Cattail (*Typha latifolia*), and Reed Canary Grass (*Phalaris arundinacea*). The primary natural wetland to the east contains a variety of obligate wetland species such as Swamp Milkweed (*Asclepias incarnata*) and Blue Flag Iris (*Iris versicolor*) and attracts birds that are rarely seen in urban areas, such as Green Herons (*Butorides striatus*), and American Bitterns (*Botaurus lentiginosis*).

While the 9.3 hectare wetland at the Y Marsh is also bordered by major roads, it is located in a rural environment and there are approximately 25 wetlands within a one mile radius, compared to seven for Heron Haven (National Wetlands Inventory Maps, Irvington and Valley quadrants, 1992). The roadside wetland areas are dominated by Cattail and the inner portions of the wetland by shrubs and young Cottonwoods (*Populus deltoides*). No bird surveys had previously been conducted at the Y Marsh.

Survey Methods

In June 1998, the study sites were each visited twice a week, 15-30 minutes after sunrise. On average, visits lasted 1 1/2 hours and were made on days when it was not raining and when wind speeds did not exceed 30 kilometers per hour. The wetlands were surveyed by the point count method (Bibby et al. 1992) because their small size and the inaccessibility of much of the Y Marsh made transect counts unsuitable. Five points, located approximately 150 meters apart, were chosen at each site and were surveyed for 10-15 minutes. At each point, the species, their sex (if it could be determined), and the specific location were recorded. Migrants were not included in the species list and statistical analysis. Bird species richness at each site was the total number of different species observed (Ludwig and Reynolds 1988). Species evenness for each site was calculated using the Shannon-Wiener Diversity Index, which indicates the distribution of species in a sample. A high value occurs when species are distributed evenly and a value of 0 occurs when there is no diversity or if only one species is present.

(Ludwig and Reynolds 1988). The formula for the index is (Ludwig and Reynolds 1988):

$$H' = - \sum_{i=1}^S [(n_i/n) \ln (n_i/n)]$$

In the formula, n_i represents the number of individuals of the i th species (S total species) observed in the sample, and n denotes the total number of individuals in the sample (Ludwig and Reynolds 1988). For this study, the average number of individuals of each species observed per day and the average total number of individuals recorded daily were used for n_i and n , respectively.

Table 1. Avian species recorded at two eastern Nebraska wetlands, June 1998.

Common Name	Scientific Name	Heron Haven	Y Marsh
Canada Goose	<i>Branta canadensis</i>		x
Wood Duck	<i>Aix sponsa</i>	x	x
Mallard	<i>Anas platyrhynchos</i>		x
Killdeer	<i>Charadrius vociferus</i>	x	
Mourning Dove	<i>Zenaida macroura</i>	x	x
Belted Kingfisher	<i>Ceryle alcyon</i>	x	
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	x	x
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>		x
Downy Woodpecker	<i>Picoides pubescens</i>	x	x
Northern Flicker	<i>Colaptes auratus</i>	x	x
Eastern Kingbird	<i>Tyrannus tyrannus</i>		x
Tree Swallow	<i>Tachycineta bicolor</i>		x
Barn Swallow	<i>Hirundo rustica</i>	x	
Blue Jay	<i>Cyanocitta cristata</i>	x	
American Crow	<i>Corvus brachyrhynchos</i>	x	x

Common Name	Scientific Name	Heron Haven	Y Marsh
Black-capped Chickadee	<i>Parus atricapillus</i>	x	x
Carolina Wren	<i>Thryothorus ludovicianus</i>		x
House Wren	<i>Troglodytes aedon</i>		x
American Robin	<i>Turdus migratorius</i>	x	x
Gray Catbird	<i>Dumetella carolinensis</i>		x
Brown Thrasher	<i>Toxostoma rufum</i>		x
Cedar Waxwing	<i>Bombycilla cedrorum</i>		x
European Starling	<i>Sturnus vulgaris</i>	x	x
Warbling Vireo	<i>Vireo gilvus</i>	x	x
Yellow Warbler	<i>Dendroica petechia</i>		x
Common Yellowthroat	<i>Geothlypis trichas</i>		x
Northern Cardinal	<i>Cardinalis cardinalis</i>	x	x
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>		
Song Sparrow	<i>Melospiza melodia</i>	x	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	x	x
Common Grackle	<i>Quiscalus quiscula</i>	x	x
Baltimore Oriole	<i>Icterus galbula</i>	x	x
House Finch	<i>Carpodacus mexicanus</i>	x	
American Goldfinch	<i>Carduelis tristis</i>	x	x
House Sparrow	<i>Passer domesticus</i>	x	

RESULTS

During the study, a total of 28 species of birds were observed at the Y Marsh and 22 species at Heron Haven (Table 1). According to the Shannon-Wiener Diversity Index (H'), species evenness at the Y Marsh ($H' = 2.95$) was higher than at Heron Haven ($H' = 2.89$).

Of all the bird species observed at Heron Haven, five can be classified as wetland breeding species (Ehrlich et al. 1988) - Canada Goose (*Branta*

candensis), Wood Duck (*Aix sponsa*), Belted Kingfisher (*Ceryle alcyon*), Song Sparrow (*Melospiza melodia*), and Red-winged Blackbird (*Agelaius phoeniceus*). Five wetland species (Ehrlich et al. 1988) were also present at the Y Marsh - Canada Goose, Wood Duck, Mallard (*Anas platyrhynchos*), Common Yellowthroat (*Geothlypis trichas*), and Red-winged Blackbird. Converted to percentages, 22.7% of the total number of species observed at Heron Haven are wetland breeding compared to 17.9% at the Y Marsh.

DISCUSSION

Most of the species found at Heron Haven during this study had been previously observed there (Werthman 1998). I found a couple of migrants that were not included on the Audubon Society list: Yellow-bellied Flycatcher (*Empidonax flaviventris*) and Alder Flycatcher (*Empidonax alnorum*). Many common species to the area, such as the Great Blue Heron, were not observed in the course of this study. There have been no other bird surveys conducted at the Y Marsh.

There are several possible explanations for the lower avian species richness and evenness found at Heron Haven in this study. The most obvious may be related to the wetlands' locations. Heron Haven is an isolated wetland located in a suburban setting, while the wetland at the Y Marsh is surrounded by open farmland and several other wetlands. Another study on habitat fragmentation, conducted on Iowa wetlands, found an indirect relationship between isolation and species richness (Brown and Dinsmore 1986). However, it is difficult to explain the smaller percentage of birds that are wetland species at the Y Marsh since immigration from nearby wetlands can occur to a much greater extent than at Heron Haven. The difference may be partially explained by the presence of fish at Heron Haven, which attracts the Belted Kingfisher, and the denser vegetation, particularly trees, at Heron Haven may make it an attractive nesting site for larger wetland birds such as waterfowl (Ehrlich et al. 1988).

The difference in species richness and evenness may also have been related to the greater amount of traffic found on Maple road near Heron Haven than at the Y Marsh. According to Omaha City Traffic records, average daily traffic at the nearby intersection of 120th and Maple streets was 56,128 vehicles in 1995, the most recent year data is available (pers. comm., Glenn Hansen). In comparison, the Y, the junction of Highway 275 and Dodge, had an average of 8,495 vehicles per day in 1996 (pers. comm., Rick Ernstmeier, Nebraska Department of Roads). Reijnen et al. (1995), in their study of the effects of car traffic on breeding bird density in deciduous and coniferous woodland, found that areas with a high noise load from traffic had a greater reduction in species density than areas with a low noise load. They hypothesized that noise could interfere with bird communication. Other traffic-related factors, such as visibility of cars, direct mortality, and pollution were found to have minor effects on the bird populations.

My study gave an indication of the avian species present at Heron Haven and the Y Marsh during June and the relative diversity at each site. As the areas have been the subjects of little research, additional surveys conducted in the spring, fall, and winter are needed to give a better description of the avifauna.

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