THE IMPORTANCE OF CONSERVATION RESERVE PROGRAM FIELDS TO BREEDING GRASSLAND BIRDS AT BUFFALO RIDGE, MINNESOTA

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ABSTRACT

Nongame birds were surveyed during summer 1995 at Buffalo Ridge in southwestern Minnesota, to evaluate the importance of Conservation Reserve Program (CRP) grasslands to local avifauna. Bird abundance and composition were compared among 3 habitat types (CRP grasslands, pasturelands, and croplands) using an index to breeding bird density (i.e., number of singing males/transect area), percent species composition, and total species richness. Vertical height and density of vegetation were measured early in the growing season (mid-May) and during the peak of the growing season (mid-June) to determine whether vegetative structure was related to bird use of vegetation. Conservation Reserve Program fields had higher vegetation measurements and supported higher bird densities and species richness than pasturelands and croplands. Mean bird density (birds/100 ha) in CRP grasslands was 312.5 compared to 166.7 in pasturelands and only 75.0 in croplands. Ten bird species were present in CRP grasslands compared to 8 in pasturelands and 9 in croplands. The presence of 3 native bird species (sedge wren, dickcissel, and clay-colored sparrow) in CRP grasslands that were not found in pasturelands or croplands indicated that CRP grasslands were an important habitat type for maintaining avian diversity at Buffalo Ridge.

INTRODUCTION

Agricultural production has destroyed most grasslands that historically provided habitat for upland nesting grassland birds. Excessive grazing and invasive woody species have degraded many of the remaining grasslands. In response to grassland losses, several prairie grassland bird species have declined in abundance (Johnson and Schwartz 1993). The Conservation Reserve Program (CRP), Title XII of the Federal Food Security Act of 1985 (Public Law 99-
198), encourages land operators to restore croplands to perennial grassland cover through 10-year contracts with the U.S. Department of Agriculture. Although the CRP was primarily designed to limit crop surpluses and conserve soil and water resources (Young and Osborn 1990), the CRP also provides upland habitat for grassland nesting birds (Johnson and Schwartz 1993; Kennedy, 1994; Igl and Johnson 1995; Johnson and Igl 1995; King and Savidge 1995).

A wealth of research was conducted in the early 1990's to evaluate the importance of CRP grasslands to upland nesting birds before 10-year contracts with land operators began to expire in 1996. Research indicated that CRP grasslands supported diverse bird communities and that vegetative structure of grasslands influenced bird species richness and abundance (Johnson and Schwartz 1993; King and Savidge 1995). Despite the usefulness of this information, previous studies have not compared bird use of CRP grasslands to other herbaceous habitat types available to breeding birds in the northern Great Plains to determine the relative importance of CRP grasslands. Objectives of this study were to (1) assess bird species richness, composition, and density in 3 major habitat types, (2) to characterize the vegetative structure within each habitat type, and (3) to relate vegetative characters to bird habitat use. We hypothesized that CRP grasslands support a community of native bird species unlike that of surrounding habitat types.

STUDY AREA

Buffalo Ridge in southwestern Minnesota is a 100 km segment of the Bemis Moraine that begins 3 km northeast of Holland, Minn., and extends 10 km northwest of Lake Benton, Minn. Elevation is 546-610 m above mean sea level. Habitats on Buffalo Ridge consist primarily of corn (Zea mays), soybeans (Glycine max), small grains, pasture, hay, and CRP grasslands. The majority of the CRP fields on Buffalo Ridge were planted to a mixture of smooth brome (Bromus inermis)/alfalfa (Medicago sativa) or to switchgrass (Panicum virgatum). Scattered deciduous woodlands exist near farmsteads and in ravines. A variety of grassland bird species reside on Buffalo Ridge during the summer. Climate is temperate continental with cold winters and warm summers. During 1995, precipitation was above average (87.9 cm) and temperature was normal (6.2 C) (MN Dep. Nat. Resour., pers. comm., 1996).

METHODS

Bird surveys were conducted 15 May to 1 July 1995 in 3 habitat types (pastureland, cropland, and CRP grasslands) using 40-m fixed-width transects (Wakeley 1987). Fluorescent flagging was used to delineate transect boundaries. Inconsistencies in surveys attributable to periodic bird inactivity (Skirvin 1981; Verner and Ritter 1986) were minimized by conducting surveys between sunrise and 1000 hrs. Surveys were not conducted during heavy rain or high winds (≥ 20 km/hr) (Mikol 1980; Ralph et al. 1993). We recorded all birds seen or heard while walking transects at 1.0-1.5 km/hr (Mikol 1980; Wakeley 1987). Flushed birds seen leaving transects were recorded (Burnham et al. 1980) while birds seen entering transects or only flying overhead were excluded from surveys.
Each habitat type was represented by 3 fields ranging in size from 19 to 43 ha. One transect was established in each field. Transects that varied in length according to field size were placed ≥30 m from field borders and wetlands to avoid bias associated with edges (Arnold and Higgins 1986; Reese and Ratti 1988). An index to breeding bird density was calculated by dividing the number of perched and/or singing males by transect area. Percent species composition was calculated by dividing the number of a particular bird species by the total number of birds for that habitat type. Species richness was defined as the number of species in a given area (Koford et al. 1994).

Vegetation measurements were collected within habitat types early in the growing season (mid-May) and during the peak of the growing season (mid-June). A modified Robel pole was used to measure vertical density (visual obstruction) of vegetation (Robel et al. 1970; Higgins and Barker 1982). Visual obstruction readings (VOR) were taken at the lowest point where vegetation restricted 100% visibility of the pole from a sighting height of 1 m and at a distance of 4 m (Robel et al. 1970). Forty VORs per field (1 for each cardinal direction/10 sampling stations) were recorded to the nearest 0.25 dm. Vegetation height was estimated by measuring the tallest plant within a 30 cm radius of the pole to the nearest 0.25 dm (Higgins and Barker 1982). One height measurement was taken per sampling station, totaling 10 measurements per field. One-way Analysis of Variance was used to evaluate relationships between bird densities and the 3 habitat types.

RESULTS

Bird species richness and mean density were greater in CRP grasslands than in pasturelands or croplands (P<0.01) (Table 1). Ten species with a mean density of 312.5 individuals/100 ha were recorded in CRP grasslands (Tables 1,2). Three species comprised 80.0% of the bird species composition in CRP grasslands (Table 2). Eight species with a mean density of 166.7 individuals/100 ha were recorded in pasturelands. Two species comprised 76.3% of the bird species composition in pasturelands (Table 2).

Table 1. Mean density of male birds per 100 ha by habitat type during May-June 1995 at Buffalo Ridge, Minnesota.

<table>
<thead>
<tr>
<th>Breeding Males</th>
<th>Species Richness</th>
<th>Mean Density&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropland</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Pastureland</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>CRP grassland</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

<sup>a</sup> LSD<sub>0.05</sub> = 110.

<sup>b</sup> Means denoted by the same letter did not differ, (P ≤ 0.05).
mean density of 75.0 individuals/100 ha occurred in croplands. Six species constituted 77.7% of the cropland bird species (Table 2).

Mean VOR and vegetation height measurements differed by habitat type ($P<0.01$) (Table 3). A significant habitat by time interaction for VOR ($F=11.82; 3, 16$ df; $P<0.01$) and vegetation height ($F=9.96; 3, 16$ df; $P<0.01$) indicated that vegetation differed between mid-May and mid-June for each habitat type (Table 3). Visual obstruction readings in CRP grasslands and croplands were 3-6 times higher in June compared to May (Table 4). Visual obstruction readings in pasturelands were only 2 times higher in June compared to May (Table 4).

**DISCUSSION**

Bird surveys in the 3 habitat types used by breeding birds indicated that CRP grasslands supported a community of native bird species unlike that of surrounding habitat types. Differences in vegetative structure of herbaceous cover in pasturelands, croplands, and CRP fields played a key role in determining bird species composition. Vegetation in CRP grasslands typically was tall and dense compared to that in pasturelands and croplands. Conservation Reserve Program fields had higher vegetation measurements and supported a higher density and diversity (i.e., species richness) of birds than pasturelands and croplands. More importantly, CRP grasslands provided habitat for bird
species that required idled grasslands with tall dense herbaceous growth. Sedge wrens, dickcissels, and clay-colored sparrows were recorded only in CRP grasslands and bobolinks densities were 12 times higher in CRP fields than in pasturelands. Sedge wrens and clay-colored sparrows used dense stands of switchgrass while dickcissels and bobolinks usually used stands of smooth brome and alfalfa.

Vegetative height and VOR measurements indicated that season-long grazing reduced the height and density of vegetation in pasturelands throughout the growing season. Croplands on Buffalo Ridge also were characterized by low levels of ground cover and short vegetation despite abundant weed growth that occurred before crops were planted. Grasshopper and savannah sparrows, the 2 bird species most abundant in pasturelands in our study, are generalist species that typically inhabit sparsely vegetated areas (Wiens 1969).

| Table 3. Mean visual obstruction readings (VOR) and Vegetation height (VH) measurements (dm) during May-June 1995 at the Buffalo Ridge, Minnesota. |
|---|---|---|---|---|---|
| Habitat | N | Mean VOR<sup>a</sup> (dm) | SE | Mean VH<sup>b,c</sup> (dm) | SE |
| Cropland | 3 | 240 | 0.2 | 0.02 | 60 | 0.6 |
| Pastureland | 3 | 240 | 0.6 | 0.03 | 60 | 1.7 |
| CRP grassland | 3 | 240 | 3.7 | 0.19 | 60 | 5.0 |

<sup>a</sup> Visual obstruction reading LSD<sub>0.05</sub> = 1.0253  
<sup>b</sup> Vegetation height LSD<sub>0.05</sub> = 1.165  
<sup>c</sup> Means denoted by the same letter did not differ, (P ≤ 0.05).

| Table 4. Mean vegetation height (dm) in habitat types (cropland, pastureland, Conservation Reserve Program grasslands) in mid-May and mid-June at Buffalo Ridge, Minnesota, 1995. |
|---|---|---|---|---|---|
| Habitat | N | mid-May<sup>a</sup> | SD | mid-June<sup>a</sup> | SD |
| Cropland | 30 | 0.15 | 0.17 | 0.96 | 0.80 |
| Pastureland | 30 | 1.15 | 1.00 | 2.26 | 1.87 |
| CRP | 30 | 2.16 | 0.56 | 7.88 | 1.99 |

<sup>a</sup>Vegetation height differed (LSD<sub>0.05</sub> = 0.8238) between mid-May and mid-June.
We recorded additional generalist species such as killdeer and vesper sparrows that typically nest in sparse vegetation with low ground cover (Johnsgard 1980; Best and Rodenhouse 1984). Although pasturelands and croplands supported numerous generalist bird species, the absence of sedge wrens, dickcissels, and clay-colored sparrows from habitats other than CRP fields indicated that CRP grasslands were an important habitat type for maintaining avian diversity at Buffalo Ridge.

ACKNOWLEDGMENTS

We thank G. Arnold, L. Flake, and C. Gritzner for early reviews of our manuscript. P. Evenson provided statistical support. V. Swier and R. Osborn assisted with field work. We also thank landowners that granted access to private property. The project was funded by Kenetech Windpower, Inc., and South Dakota Department of Game, Fish and Parks. Additional support was provided by the Natural Resources Conservation Service and the South Dakota Cooperative Fish and Wildlife Research Unit, in cooperation with the National Biological Survey, Wildlife Management Institute, U.S. Fish and Wildlife Service, U.S. Geological Survey/BRD, and South Dakota State University.

LITERATURE CITED


