Ecological Studies at the Woodworth Study Area

Terrestrial Bird Communities on the Woodworth Study Area

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Introduction

The mixed-grass prairie is one of the largest ecosystems in North America, with significant areas preserved for natural values in national wildlife refuges, waterfowl production areas, state game management areas, and nature preserves. Mixed-grass prairie evolved with fire, and fire is frequently used by managers to maintain the habitat. Despite the importance of the mixed-grass prairie to numerous species of birds, and the aggressive management applied to many sites, relatively little is known about the effects of fire on the suitability of the habitat for breeding birds. I conducted studies at the Woodworth Study Area (WSA) to determine the effects of prescribed burning on populations of grassland birds. Details of the results of that analysis are presented in (1); the present paper summarizes the key findings and also presents a more complete listing of the birds encountered.

Study Areas

Study plots were located in relatively homogeneous areas within seven different quarter-sections, the units that received various treatments under management at the WSA. Plots were situated to avoid large wetlands, in order to concentrate on upland bird communities. Six of the plots were subjected to burning under different regimes; the remaining plot served as a control. The seven study plots are denoted by the quarter-section in which they were located. Plot 13 served as a control, with no treatment applied to it. It had been grazed during 1906-61, but has been left idle subsequently. Originally 8.09 ha in size, it was increased to 10.12 ha in 1973. All or portions of eight seasonal and two temporary wetland basins lie within the plot, totalling about 1.2 ha. Common plant species in the uplands are Kentucky bluegrass (Poa pratensis), needle-and-thread (Stipa comata), stiff sunflower (Helianthus rigidus), and Canada goldenrod (Solidago canadensis). Wolfberry (Symphoricarpos occidentalis), silverberry (Eleagnus commutata), and Woods' rose (Rosa woodsii) form shrubby patches of various size. One thicket of chokecherry (Prunus virginiana), surrounded by wolfberry and silverberry, has become decadent during the years of the surveys.

Plot 2, 8.68 ha in size, was surveyed only during 1977-82, after which the trail to it became difficult to navigate. It had been grazed or hayed during 1906-67, then left idle except for five prescribed burns. It contains all or portions of seven seasonal wetlands, about 0.9 ha in total. Kentucky bluegrass is

abundant, and needle-and-thread, yarrow (Achillea lanulosa), fringed sage (Artemisia frigida), and prairie wild rose (Rosa arkansana) are common. Stands of wolfberry and silverberry also occur.

Plot 7, 6.07 ha in extent, was hayed during 1904-55. It had been plowed in 1956 for one year of crop production. Alfalfa (Medicago sativa) and possibly some tame grasses were planted in 1958, after which it was grazed or hayed until 1970. It has since been subjected to four prescribed burns. Six seasonal and two temporary wetlands, covering 1.1 ha, are included in the plot. Dominant upland plants are needle-and-thread, green needlegrass (Stipa viridula), alfalfa, Kentucky bluegrass, rigid goldenrod (Solidago rigida), and stiff sunflower. Patches of silverberry and wolfberry have increased during the study.

Plot 9 is also 6.07 ha. It consists of unbroken sod that had been hayed and probably grazed during 1908-65. It has been burned five times since then. Two small seasonal and one ephemeral wetland cover 0.2 ha. Dominant plant species are Kentucky bluegrass, needle-and-thread, yellow sweetclover (Melilotus officinalis), white prairie aster (Aster ericoides), and stiff sunflower. Wolfberry occurs in several patches.

Plot 11, 4.86 ha in size, had been cropped during 1917-27 and from 1934 to about 1940. It then reverted to grass and was grazed through 1970. Since then, it has been burned four times. It contains one ephemeral and portions of two seasonal wetlands, totalling about 0.5 ha. The uplands are dominated by Kentucky bluegrass and, to a lesser extent, smooth brome (Bromus inermis).

Plot 16 is 6.07 ha in size. It was grazed from 1906 to 1968, after which it was treated with a total of six prescribed fires. Five seasonal wetlands and small portions of two seasonal to semipermanent wetlands lie within the plot, with a total area of about 0.6 ha. Common plants are Kentucky bluegrass, quackgrass (Agropyron repens), needle-and-thread, and little bluestem (Andropogon scoparius), as well as wolfberry and silverberry.

Plot 18, also 6.07 ha in size, is unbroken prairie sod that had been grazed from 1906 to 1968. The plot was burned seven times between 1969 and 1990. In addition, it was intensively grazed by sheep during 1973 and 1974. The plot contains four small wetlands--one ephemeral, two temporary, and one seasonal--covering <0.1 ha. At the beginning of the surveys, the plot had several thickets of chokecherry and hawthorn (Crataegus chrysocarpa). The various treatments, as well as nest-searching with a cable-chain device, have reduced the thickets considerably. Other common plants include Kentucky bluegrass, blue grama (Bouteloua gracilis), and fringed sage.

Plots were measured and marked by use of compass and pacing. Surveyor's flags were placed at 40-m intervals on a grid throughout each plot to facilitate recording of bird locations.

Field Methods

Each year during 1972-95 (1977-82 for Plot 2) the breeding bird community of each plot was estimated by conducting several surveys and mapping territories. Standard methods (2, 3) were used, and annual reports were submitted for publication in American Birds or the Journal of Field Ornithology (Appendix 1). About eight visits were made to each plot during late May through mid June each year. Surveys were done from just before dawn to late morning. Early-morning surveys emphasized concurrent registrations of indicated pairs of the same species, in order to define multiple territories. Surveys later in the morning, when vocalizations were reduced, focused on reflushing birds to delineate their territories (4).

In most years, one other observer and I conducted independent surveys and subsequently compared results. For consistency, I personally estimated the number of territories from the locations plotted on field maps.

Results

The species observed during these censuses and total numbers are given in Table 1. More detailed analyses (1) were conducted on 17 of the most common terrestrial species. The birds considered in these analyses can be grouped into three major categories, depending on their response to burning and successional changes in vegetation. In the first group are those species that respond positively and immediately to a burned area. Included are three of the common shorebirds at Woodworth: killdeer, marbled godwit, and upland sandpiper. All three favor open areas with sparse vegetation, where they forage. The killdeer and marbled godwit likewise nest in these open areas, but the upland sandpiper typically nests in heavier vegetation. Other species, not treated here in because of limited numbers observed, that likely would favor recently burned mixed-grass prairies include the horned lark and vesper sparrow.

The second category includes those species that use habitats enhanced by long-term protection from fire, specifically the woody vegetation that encroaches in unburned grassland. The most common species at Woodworth in this category are eastern kingbird, willow flycatcher, yellow warbler, common yellowthroat, clay-colored sparrow, and brown-headed cowbird. The red-winged blackbird also uses brushy vegetation, but at Woodworth relied more on wetland habitats.

In the third category are birds that avoid recently burned areas, but favor grassland with little or no woody vegetation. Several of these species are most common two to five years following a fire. These might be termed true grassland species. Included in this category are bobolink, western meadowlark, grasshopper sparrow, Baird's sparrow, and savannah sparrow.

Two species analyzed here did not fit neatly into any of the categories. The willet, although commonly seen in the uplands, uses mostly wetland habitat except for nesting. No evidence of a response to burning was detected. The sedge wren used upland habitats at Woodworth, but did so most often when long-term precipitation patterns resulted in luxuriant herbaceous growth. That species showed no response to grassland burning, except for a reduction immediately following a fire.

Conclusions

Management of mixed-grass prairies should emphasize those species of birds that require that type of habitat; these are the true grassland birds, many of which have suffered population declines during the past quarter-century. Maintaining populations of those species on mixed-grass prairie will be facilitated by a regime of prescribed burning.

Acknowledgements, References, and Appendix

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