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Authors: Vickery, Peter D., and Herkert, James R.

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*OVERVIEW*

# RECENT ADVANCES IN GRASSLAND BIRD RESEARCH: WHERE DO WE GO FROM HERE?

PETER D. VICKERY[1,2,4] AND JAMES R. HERKERT[3]

[1]*Center for Biological Conservation, Massachusetts Audubon Society, 208 South Great Road, Lincoln, Massachusetts 01773, USA;*

[2]*Department of Wildlife Conservation, University of Massachusetts, Amherst, Massachusetts 01003, USA; and*

[3]*Illinois Endangered Species and Protection Board, 524 South Second Street, Springfield, Illinois 62701, USA*

IT'S NO SECRET anymore. Populations of many species of North American grassland birds are declining and have been declining for at least the last 30 years. According to the Breeding Bird Survey (BBS), populations of 13 species of North American grassland birds declined significantly between 1966 and 1996, whereas populations of only 2 species increased during that period (Peterjohn and Sauer 1999). As a group, grassland birds have experienced ''steeper, more consistent, and more geographically widespread declines than any other behavioral or ecological guild'' (Knopf 1994:251). Those declines appear to be the result primarily of loss and degradation of grassland habitat (e.g. Noss et al. 1995).

Not surprisingly, such widespread and consistent declines have stimulated a great deal of recent research attempting to determine the underlying reasons for the declines. Interest in that research has been high, particularly because of the general view that a better understanding of the ecological requirements of grassland birds is needed to help land managers and planners mitigate or reverse some of those declines. Until recently, however, nearly all research has focused on breeding-season events; studies have examined habitat selection and response to management such as prescribed fire and grazing (e.g. Bowen and Kruse 1993, Johnson 1996, Zimmerman 1996, Griebel et al. 1998, Herkert and Glass 1999, Madden et al. 1999, Shriver et al. 1999, Temple et al. 1999, Winter 1999), nest success (e.g. Johnson and Temple 1990, McKee et al. 1998, Hughes et al. 1999, Rohrbaugh et al. 1999), Brown-headed Cowbird (*Molothrus ater*) parasitism (e.g. Zimmerman 1983, Robinson et al. 1999, Davis and Sealy 2000, Koford et al. 2000, Peer et al. 2000), edge effects (e.g. Helzer 1996, Delisle and Savidge 1997, Jensen 1999, O'Leary and Nyberg 2000, Winter et al. 2000), and area requirements (Herkert 1994, Vickery et al. 1994, Helzer and Jelinski 1999, Winter and Faaborg 1999, Bakker 2000).

The paper in this volume by Johnson and Igl (2001) is another important contribution towards a better understanding of how habitat area affects occupancy patterns of grassland birds. Working across a broad geographic region that spans from eastern Montana to western Minnesota, Johnson and Igl sampled breeding grassland birds on 303 grassland patches in 9 counties in 4 northern Great Plains states. Importantly, Johnson and Igl's study design included numerous replicates within each county so that species' area-sensitivity within each county could be assessed separately. Once the county-level analyses were conducted, Johnson and Igl performed a meta-analysis of their data, looking for geographical patterns in area sensitivity and evaluating the effects of species' regional density on patterns of area-sensitivity.

Although some of the species Johnson and Igl identify as favoring larger grass patches in one or more counties are the same as those identified in previous work (e.g. Bobolink [*Dolichonyx oryzivorus*], Baird's Sparrow [*Ammodramus bairdii*]), Johnson and Igl make the important point that for many of those species, the patterns of area sensitivity they observed differed among regions. For example, only four of six logistic regression coefficients were positive for Bobolinks, and optimal models for only three of six counties analyzed included patch size. Although one might expect habitat selection for species with broad geographic ranges, such as Savannah Sparrow (*Passerculus sandwichensis*; Wheelwright and Rising 1993) and Grasshopper Sparrow (*Ammodramus savannarum*; Vick-

[4] E-mail: pvickery@massaudubon.org

ery 1996) to differ from one end of their range to the other, Johnson and Igl's analysis shows that those differences can take place at a scale not previously considered to contain such variability. That variation in patterns of area sensitivity between regions also may explain why some grassland species have been found to be area-sensitive in some previous studies but not others. Understanding what causes differences in species' patterns of area sensitivity is a major conservation need.

The fact that Johnson and Igl's study was limited to fields that were part of the Conservation Reserve Program (CRP) underscores another important theme in grassland bird conservation. The CRP is a U.S. federal program to set aside farmland, usually in permanent grass and forb cover, for a period of at least 10 years. Approximately 13.7 million ha are presently enrolled in the CRP (U.S. Department of Agriculture 2000). CRP fields can provide potentially important habitat for grassland birds, but size of each field, seed mixture, and landscape configuration are all likely to influence species composition and may even influence reproductive success (e.g. McCoy 1996, McCoy et al. 1999).

Populations of several species of grassland birds appear to have benefited from the establishment of CRP habitat (e.g. Reynolds et al. 1994, Herkert 1997, Herkert 1998). Population trends for Bobolinks, Sedge Wrens (*Cistothorus platensis*), Dickcissels (*Spiza americana*), LeConte's Sparrows (*Ammodramus leconteii*), and Henslow's Sparrows (*Ammodramus henslowii*) in the United States were all positive since the inception of CRP (1986–1998), reversing earlier population declines in the pre-CRP era (1966–1985; Sauer et al. 1999). Populations of several other species (e.g. Grasshopper Sparrow, Eastern Meadowlark [*Sturnella magna*], Western Meadowlark [*S. neglecta*]), however, have continued to decline (Sauer et al. 1999), despite the fact that those species are known to make extensive use of CRP fields (Johnson and Schwartz 1993, Best et al. 1997). Those continued declines point to the complexities in diagnosing population declines and suggest one or more of the following: (1) that the CRP has not provided enough habitat to offset the amount of acreage lost in previous decades; (2) that some, perhaps many, CRP fields are generally too small to benefit certain grassland birds; (3) that although grassland birds occur in CRP fields, those fields may not be productive breeding habitats (i.e. they are possible population sinks); or (4) that problems for some of those species are not limited to the breeding grounds. Determining which of those potential factors continues to limit grassland bird populations should be a high priority for grassland bird conservation.

Although the CRP has provided a substantial amount of new grassland habitat, loss of other types of grasslands in the United States has continued unabated. For example, National Resources Inventory data show that between 1982 and 1997, nearly 10.5 million ha of pasture and rangeland were lost in the United States (Natural Resources Conservation Service 2000). Thus, nearly 75% of the current 13.7 million ha in the CRP would be needed to offset the losses that have occurred in other grassland habitats, whereas the net increase in U.S. grasslands as a result of the program has been a modest 3.2 million ha. Additionally, most CRP fields are small, possibly too small to benefit some species of grassland birds. For example, the recently completed 20th CRP sign up (18 January–11 February 2000) included 39,508 contracts comprising 996,047 ha, an average of just 25 ha per contract (U.S. Department of Agriculture 2000). Because some contracts contain more than one field, the mean field size of those contracts is $<$26 ha. As Johnson and Igl and others in different regions have shown, grassland birds do not generally use grasslands that are small (Herkert 1994, Vickery et al. 1994, Bollinger 1995, Swanson et al. 1999) or poorly configured (i.e. long and narrow; Helzer 1996). Thus, it is clear that many, perhaps most, CRP fields are of limited use to grassland birds because of their small size or poor configuration.

In addition to grassland-bird use of particular habitats, information on productivity is also needed to ensure that those areas are not acting as ecological traps (sensu Best 1986) or population sinks (Pulliam 1988). Although studies in other grassland habitats suggest that large sites may be more productive than small sites (e.g. Johnson and Temple 1990, Perkins 1999, Winter and Faaborg 1999, Davis and Sealy 2000), grassland bird productivity in CRP fields can be fairly high (e.g. Berthelsen and Smith 1995, Patterson and Best 1996, Delisle and Savidge 1997, McCoy et al. 1999, Davison and Bollinger 2000) despite their generally small

size, and is apparently comparable to that in other grassland habitats (e.g. Koford 1999).

## Future Directions and Research Priorities

Research directed at determining causes of grassland-bird population declines needs to consider the possibility that population problems may be occurring on winter grounds. The wintering ecology of many species is poorly known, however—especially in Mexico and Central and South America—and has been little studied since the work of Grzybowski (1976, 1982, 1983) in Oklahoma. For example, a recent volume on the ecology and conservation of grassland birds in the Western Hemisphere published only 3 winter-season studies versus 23 breeding-season studies (Vickery and Herkert 1999). This imbalance is being rectified, however. Recent published research on wintering grassland birds has covered a variety of issues and geographic regions, including abundance and distribution in CRP and row-crop fields in the Midwest (Best et al. 1998), distribution and habitat use in Mexico (Manzano-Fischer et al. 1999) and Texas (Igl and Ballard 1999), movement patterns and site fidelity in Arizona (Gordon 2000a), and response to management (Chavez-Ramirez and Prieto 1994, Reynolds and Krausman 1998, Gabrey et al. 2000, Gordon 2000b). Importantly, several species that are a high conservation priority, such as Mountain Plover (*Charadrius montanus*), Henslow's Sparrow, and Dickcissel, have also been studied on their wintering grounds (Chandler and Woodrey 1995, Knopf and Rupert 1995, Plentovich et al. 1998, 1999; Basili and Temple 1999). Although those studies demonstrate that grassland bird winter ecology is an active and important area of inquiry, they must be viewed as initial efforts in a vast, little-explored area of avian ecology.

Further studies on wintering ecology and habitat use remain high priorities for grassland bird conservation, as do studies of species that breed at temperate latitudes. Research on the winter ecology of arctic-nesting passerines is generally lacking, although initial efforts to study wintering longspurs (*Calcarius* spp.), notably Smith's Longspur (*C. pictus*), are underway (E. Dunn pers. comm.). We hope that work will be extended to Latin America and will incorporate the conservation needs of endemic grassland birds as well (Tubaro and Gabelli 1999).

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