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Guest Editorial, part of a Special Feature on Conservation of Grassland Birds: Causes and Consequences of Population Declines

Progress in Research on Grassland Bird Conservation and Ecology

Progrès dans la conservation et l'écologie des oiseaux de prairie

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Grasslands cover more than 40% of Earth's land surface and are the most converted, yet least protected, biome worldwide (Hoekstra et al. 2005). As a guild, grassland birds have declined more rapidly than birds of any other habitat type in North America (Herkert 1995). These statistics might be expected to generate a lot of attention to conservation in this biome; however, just as ignorance about one of the most strident prairie birds gave rise to its scientific name, *Sturnella neglecta* (Audubon 1840), knowledge regarding the ecology and conservation of grasslands and grassland birds lags behind that of other ecosystems.

For example, a search of ISI Web of Knowledge® research turned up less than one third the number of papers about grassland (1445) as forest (5200) birds. Given that 30% of Earth's surface is forested, but 40% is, or was, grassland, per unit area, almost five times more research has been reported about forest birds compared with grassland birds. Perhaps it is little wonder, then, that attributes of species' natural histories, such as territory size of Vesper Sparrows (*Pooecetes gramineus*; Jones and Cornelys 2002), remain unknown or uncertain.

Nonetheless, knowledge about the ecology and conservation of grassland birds is increasing. According to the ISI Web of Knowledge®, there was a steady increase in publications on birds generally between 1985 and 2010, from 3678 to 8171. Between 1985 and 1998, fewer than 100 papers on grassland birds were published each year; however, this number increased sharply in 1999 and has continued to increase (Fig. 1). Prior to 1991, less than 1% of papers on birds published annually used grassland as a keyword, but this rate at least doubled since 1999 (Fig. 1), suggesting a significant increase in effort and productivity since the mid-1990s. In particular, patch-size sensitivity (e.g., Winter and Faaborg 1999, Johnson and Igl 2001) and habitat selection (e.g., Madden et al. 2000) by grassland birds are now better understood.

This marked increase in research is intriguing for what it may reveal about the importance of key papers that stimulate interest in particular problems or groups of species. Just four years prior to this sharp increase in publications of grassland birds, roughly the minimum time to establish, conduct, and report new research, Herkert (1995) published *An analysis of Midwestern breeding bird population trends: 1966-1993*. With data from the Breeding Bird Surveys, he demonstrated that, as a group, abundance of grassland birds declined across Midwestern North America more than birds associated with any other type of habitat; among species, similar trends were both large and pervasive, with more than 50% of grassland bird species declining by more than 50% in abundance between 1966 and 1993.

A decade and a half has passed since Herkert's paper brought further attention to the plight of grassland

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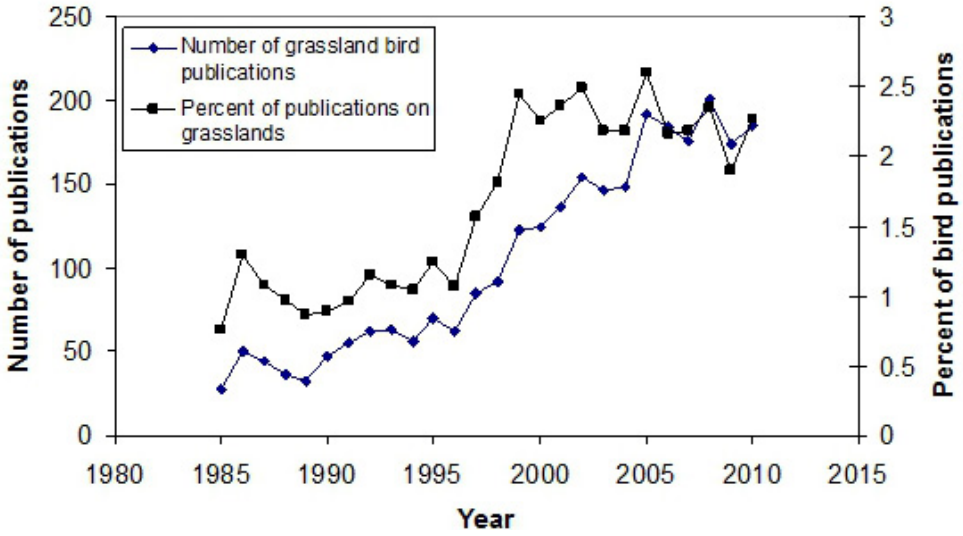
Fig. 1. Peer-reviewed publications on grassland birds between 1985 and 2010 as cited in ISI Web of Knowledge®.



birds, catalyzed an increase in research, and established a legacy of interest in the conservation of grassland birds. The time seemed right for *Avian Conservation and Ecology* to focus on a collection of recent research about the ecology and conservation of grassland birds, with the hope that the benefits of these publications would extend beyond the knowledge gained from any one study. The papers published in this special feature fall into two general categories: studies that (a) directly addressed effects of vegetation management on grassland birds, or (b) sought to fill some of the knowledge gaps that have hindered development of species-specific management plans for grassland birds.

Shustack et al. (2010) addressed an area of both current theoretical and empirical interest, and of conservation concern. They evaluated how agricultural practices, specifically mowing, mediated effects of vegetation and landscape structure on habitat selection by Bobolinks (*Dolichonyx oryzivorus*) and Savannah Sparrows (*Passerculus sandwichensis*), over time scales of just a few weeks. They found that the scale at which habitat structure was influential changed with field management practices and over time, adding to knowledge of variation in spatial (Wiens 1989, Johnson and Igl 2001) and temporal (Winter et al. 2005) scale on inferences about effects of landscape change on avian behavior. From a management perspective, the conclusions are enlightening and frustrating; if the management objective is to minimize risk to birds from anthropogenic activity throughout the breeding season, more detailed understanding of how birds respond to local environments may be required to develop robust recommendations appropriate at local spatial and short temporal scales.

Norment et al. (2010) and Harrison et al. (2010) both addressed the effects of a common, but surprisingly understudied, agricultural activity, livestock grazing, and did so in unique habitats. Effects of livestock grazing can vary regionally to the extent that some species select, avoid, or are neutral to grazing, depending on local conditions (Bock et al. 1993). The pastures and haylands of New York State (Norment et al. 2010) and the intermountain semidesert region of British Columbia (Harrison et al. 2010) differ from the Great Plains, where much of what is known about effects of livestock grazing on birds in North America originates. Nevertheless, Harrison et al. (2010) and Norment et al. (2010) concluded that livestock management is compatible with the conservation of a number of grassland bird

species, consistent with many studies from the Northern Great Plains (e.g., Bareiss et al. 1986, Kruse and Bowen 1996, Koper and Schmiegelow 2007).

From a scientific perspective, the implications of these results contrast with that derived from Shustack et al. (2010). Rather than necessarily requiring ever more detailed local information, in space and time, to derive robust management recommendations, these replicated studies across grazing systems in different ecosystems suggest basic principles that may transfer despite differences in details at local scales. From a practical perspective, this is important because grassland birds should benefit directly when agroeconomies are sound, such that landowners benefit from financial incentives or restored market signals that prevent conversion of grasslands to row crops. Livestock grazing may provide another example of win-win ecology (Rosenzweig 2003). Although the benefits of cattle grazing are now widely accepted among grassland ecologists, some ranchers, agronomists, and land managers remain distrustful of conservationists. Providing opportunities for broad-scale scientific collaborations with landowners might go some distance to building trust between conservationists and the users of prairie ecosystems.

Other papers in this special feature addressed population dynamics at the level of vital rates. Dinsmore et al. (2010) demonstrated that population growth by Mountain Plovers (*Charadrius montanus*) was most strongly influenced by adult survival, particularly perhaps during migration. Compared with nest and nestling survival, when individuals are relatively more sedentary, survival away from breeding areas is a difficult demographic parameter to estimate for many populations of small birds. With respect to conservation, the thought of addressing survival during migration is daunting, given vast areas, numerous jurisdictions, and diverse risks faced by migrating individuals.

Dreitz (2010) similarly addressed adult mortality in Mountain Plovers during the posthatching stage. Mortality risks were similar between sexes and among habitats, but plovers were more likely to move away from native than agricultural habitat. Typically, the opposite is the case (e.g., Fisher and Davis 2011), but there are other counterintuitive examples that non-native habitat may be similar or better than native habitat. For example, there was little difference across a range of reproductive parameters of Savannah Sparrows and other grassland passerines between native and non-native habitats (Kennedy et al. 2009); similarly, chick survival in Sharp-tailed Grouse (*Tympanuchus phasianellus*) was similar in landscapes dominated by native plants compared with landscapes dominated by crops (Manzer and Hannon 2008). In some instances, again, there may be opportunities to conserve species through collaborations with agricultural land users. Science can inform about which agricultural practices are beneficial or neutral, and why; among those agricultural activities that negatively affect grassland birds, it can inform societal choices about the nature of the available trade-offs.

Because not all agricultural practices are inevitably harmful (e.g., Harrison et al. 2010, Norment et al. 2010), knowing which practices are and might require intervention, can help to conserve the intellectual energy of the scientific conservation community to address other worthy and complex issues, such as those presented by migration mortality (Dinsmore et al. 2010) or intra-annual variability in land management (Shustack et al. 2010). Where a lack of information about natural history is needed to enable conservation, scientists need to work systematically to fill those knowledge gaps (Villard and Nudds 2009).

Whether conservation progress follows, based on what scientists learn, is likely to depend on building trust between the conservation science community, landowners, managers, and other stakeholders. One reason for lack of trust may be that prescriptive management recommendations made by well-meaning conservationists have sometimes been widely adopted by equally well-meaning ranchers, only later to be questioned by ecologists. For example, rotational grazing programs have been introduced across North America by a range of conservation organizations and through government prairie revitalization programs (e.g., Alberta Riparian Habitat Management Society 2011, Wildlife Conservation Society 2011). However, a recent, widely cited literature review demonstrated that the weight of evidence suggests that rotational grazing is not necessarily superior to continuous grazing, a position expressed in the literature since at least 1951 (Briske et al. 2008). Unfortunately, the potential conservation benefits of rotational grazing were presented to the ranching community, not as hypotheses to be tested, but as known facts; it is perhaps little wonder that confusion and lack of trust

results when such "facts" turn out not to be facts after all.

Perhaps if the conservation science community recognizes, embraces, and communicates the means to reduce uncertainty through research, in the form of active adaptive management, it will go a long way to opening doors for meaningful two-way conversation and respectful dialogue (McCarthy and Possingham 2007; e.g., Koper et al. 2008). It will only be through development of collaborations with the communities who own and manage the habitat used by the majority of North American grassland birds that complex hypotheses about factors affecting grassland birds can be addressed and resolved.

One day, *Grass, Sky, Song*, by award-winning naturalist and author Trevor Herriot (2009) may prove to be the catalyzing force for grassland bird conversation that Rachel Carson's (1962) *Silent Spring* proved to be for the environment generally. In any case, the relatively stable numbers of publications about grassland birds since the mid-1990s suggest that biologists are continuing to focus attention on this group of species.

Responses to this article can be read online at:
http://www.ace-eco.org/vol6/iss1/art6/responses/

LITERATURE CITED

Alberta Riparian Habitat Management Society. 2011. *Grazing management.* Alberta Riparian Habitat Management Society, Lethbridge, Alberta, Canada. [online] URL: http://www.cowsandfish.org/riparian/grazing.html. http://dx.doi.org/10.1016/j.livsci.2006.09.011

Audubon, J. J. 1840. *Birds of America.* First Octavo Edition. National Audubon Society, New York, New York, USA. [online] URL: http://web4.audubon.org/bird/BoA/BOA_index.html.

Bareiss, L. J., P. Schultz, and F. S. Guthery. 1986. Effects of short-duration and continuous grazing on Bobwhite and Wild Turkey nesting. *Journal of Range Management* 39:259-260. http://dx.doi.org/10.2307/3899063

Bock, C. E., V. A. Saab, T. D. Rich, and D. S. Dobkin. 1993. Effects of livestock grazing on neotropical migratory landbirds in western North America. Pages 296-309 *in* D. M. Finch and P. W. Stangel, editors. *Status and Management of Neotropical Migratory Birds.* General Technical Report RM-229, U.S. Forest Service, Fort Collins, Colorado, USA.

Briske, D. D., J. D. Derner, J. R. Brown, S. D. Fuhlendorf, W. R. Teague, K. M. Havstad, R. L. Gillen, A. J. Ash, and W. D. Willms. 2008. Rotational grazing on rangelands: reconciliation of perception and experimental evidence. *Rangeland Ecology and Management* 61:3-17. http://dx.doi.org/10.2111/06-159R.1

Carson R. 1962. *Silent spring.* Houghton-Mifflin, New York, New York, USA.

Dinsmore, S. J., M. B. Wunder, V. J. Dreitz, and F. L. Knopf. 2010. An assessment of factors affecting population growth of the Mountain Plover. *Avian Conservation and Ecology* 5(1): 5. [online] URL: http://www.ace-eco.org/vol5/iss1/art5/.

Dreitz, V. J. 2010. Mortality of parental Mountain Plovers (*Charadrius montanus*) during the posthatching stage. *Avian Conservation and Ecology* 5(1): 4. [online] URL: http://www.ace-eco.org/vol5/iss1/art4/.

Fisher, R. J., and S. K. Davis. 2011. Post-fledging dispersal, habitat use and survival of Sprague's Pipits: are planted grasslands a good substitute for native? *Biological Conservation* 144:263-271. http://dx.doi.org/10.1016/j.biocon.2010.08.024

Harrison, M. L., N. A. Mahony, P. Robinson, A. Newbury, and D. J. Green. 2010. Vesper Sparrows and Western Meadowlarks show a mixed response to cattle grazing in the intermountain region of British Columbia. *Avian Conservation and Ecology* 5(1): 1. [online] URL: http://www.ace-eco.org/vol5/iss1/art1/.

Herriot, T. 2009. *Grass, sky, song.* Harper Collins Canada, Toronto, Ontario, Canada.

Herkert, J. R. 1995. An analysis of midwestern breeding bird population trends: 1966-1993. *American Midland Naturalist* 134:41-50. http://dx.doi.org/10.2307/2426481

Hoekstra, J. M., T. M. Boucher, T. H. Ricketts, and

C. Roberts. 2005. Confronting a biome crisis: global disparities of habitat loss and protection. *Ecology Letters* 8:23-29. http://dx.doi.org/10.1111/j.1461-0248.2004.00686.x

Johnson, D. H., and L. D. Igl. 2001. Area requirements of grassland songbirds: a regional perspective. *Auk* 118:24-34. http://dx.doi.org/10.1642/0004-8038(2001)118[0024:AROGBA]2.0.CO;2

Jones, S. L., and J. E. Cornelys. 2002. Vesper Sparrow (*Pooecetes gramineus*). Pages 1-28 *in* A. Poole and F. Gill, editors. *The birds of North America*. No. 624. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D. C., USA. http://dx.doi.org/10.2173/bna.624

Kennedy, P. L., S. J. DeBano, A. M. Bartuszevige, and A. S. Lueders. 2009. Effects of native and non-native grassland plant communities on breeding passerine birds: implications for restoration of northwest bunchgrass prairie. *Restoration Ecology* 17:515-525. http://dx.doi.org/10.1111/j.1526-100X.2008.00402.x

Koper, N., D. C. Henderson, J. F. Wilmshurst, P. J. Harvey, and R. A. Sissons. 2008. Design and analysis of rangeland experiments along continuous gradients. *Rangeland Ecology and Management* 61:605-613. http://dx.doi.org/10.2111/08-046.1

Koper, N., and F. K. A. Schmiegelow. 2007. Does habitat management for duck productivity affect songbird nesting success? *Journal of Wildlife Management* 71:2249-2257.

Kruse, A. D., and B. S. Bowen. 1996. Effects of grazing and burning on densities and habitats of breeding ducks in North Dakota. *Journal of Wildlife Management* 60:233-246. http://dx.doi.org/10.2307/3802221

Madden, E. M., R. K. Murphy, A. J. Hansen, and L. Murray. 2000. Models for guiding management of prairie bird habitat in Northwestern North Dakota. *American Midland Naturalist* 144:377-392. http://dx.doi.org/10.1674/0003-0031(2000)144[0377:MFGMOP]2.0.CO;2

Manzer, D. L., and S. J. Hannon. 2008. Survival of sharp-tailed grouse *Tympanuchus phasianellus* chicks and hens in a fragmented prairie landscape. *Wildlife Biology* 14:16-25. http://dx.doi.org/10.2981/0909-6396(2008)14[16:SOSGTP]2.0.CO;2

McCarthy, M. A., and H. P. Possingham. 2007. Active adaptive management and conservation. *Conservation Biology* 21:956-963. http://dx.doi.org/10.1111/j.1523-1739.2007.00677.x

Norment, C. J., M. C. Runge, and M. R. Morgan. 2010. Breeding biology of grassland birds in western New York: conservation and management implications. *Avian Conservation and Ecology* 5(2): 3. http://dx.doi.org/10.5751/ACE-00399-050203

Rosenzweig, M. L. 2003. *Win-win ecology: how the Earth's species can survive in the midst of human enterprise*. Oxford University Press, New York, New York, USA.

Shustack, D. P., A. M. Strong, and T. M. Donovan. 2010. Habitat use patterns of Bobolinks and Savannah Sparrows in the northeastern United States. *Avian Conservation and Ecology* 5(2): 11. http://dx.doi.org/10.5751/ACE-00423-050211

Villard, M.-A., and T. D. Nudds. 2009. Whither natural history in conservation research? *Avian Conservation and Ecology* 4(2): 6. [online] URL: http://www.ace-eco.org/vol4/iss2/art6/.

Wiens, J. A. 1989. Spatial scaling in ecology. *Functional Ecology* 3:385-397. http://dx.doi.org/10.2307/2389612

Wildlife Conservation Society. 2011. The grass gets greener for cows and jaguars. Wildlife Conservation Society, Bronx, New York, USA. [online] URL: http://www.wcs.org/new-and-noteworthy/grass-is-greener-in-pantanal.aspx.

Winter, M., and J. Faaborg. 1999. Patterns of area sensitivity in grassland-nesting birds. *Conservation Biology* 13:1424-1436. http://dx.doi.org/10.1046/j.1523-1739.1999.98430.x

Winter, M., D. H. Johnson, and J. Shaffer. 2005. Variability of vegetation effects on density and nesting success of grassland birds. *Journal of Wildlife Management* 69:185-197. http://dx.doi.org/10.2193/0022-541X(2005)069<0185:VIVEOD>2.0.CO;2