

ISSUE BRIEF

Prairie Grouse and Wind Energy

Background

Prairie grouse are a group of closely-related gallinaceous¹ bird species that occupy grassland and sagebrush steppe ecosystems. Available data indicate that two of these species, lesser prairie-chicken and greater sage-grouse (sage-grouse) have experienced substantial population declines, and it is hypothesized that these declines are owing to large-scale habitat fragmentation and loss from agriculture, increased fire cycles, invasive plant species, energy and infrastructure development, and urbanization.^{2,3}

The conservation status of both species is of considerable concern and has undergone review by the U.S. Fish and Wildlife Service (USFWS). Greater sage-grouse is an official candidate species with consideration for threatened status under the Endangered Species Act (ESA). In July 2016, [USFWS removed lesser prairie-chickens from the list of Threatened species per a court order](#). USFWS is currently undergoing a review of the bird's status to determine if re-listing under ESA is warranted.



GREATER PRAIRIE CHICKEN, PHOTO BY GREG KRAMOS, USFWS

Prairie Grouse and Wind Energy Development

Both lesser prairie-chicken and greater sage-grouse have been shown to be sensitive to disturbance from oil and gas development and have been displaced from otherwise suitable habitat.^{4,5} The ranges of these two species substantially overlap with areas of high resource potential for wind energy in the Great Plains and Intermountain West.⁶ It is hypothesized that disturbance from operating wind energy projects as well as avoidance of turbines perceived as predator perches will displace these species and/or reduce vital rates (e.g. survival, lek attendance, nest success) of birds in proximity to turbines.^{7,8} However, a recent study at a wind facility found that female greater sage-grouse did not avoid wind turbines and their survival was not affected by proximity to turbines, although nest and brood survival decreased in close proximity to wind turbines.⁹

The preferred research design for evaluating these potential effects is referred to as Before-After-Control-Impact (BACI), prefer-

ably using radio-telemetry or GPS tracking; replication of Control and Impact sites is recommended. By utilizing control sites and before and after construction data collection, the BACI design allows attribution of changes in pre- and post-construction grouse behavior and demography to the presence of turbines.

Greater Prairie-Chicken Research

In 2013, a research team led by Dr. Brett Sandercock (Kansas State University) completed and has published results of a seven-year study examining the effect of proximity to wind turbines on greater prairie-chickens using the BACI design. Supported by a consortium of wildlife agencies, conservationists, and wind energy companies under the auspices of the National Wind Coordinating Collaborative (NWCC), the study monitored local populations of this species at three study sites in northeastern Kansas — two sites intended as controls and one site in close proximity to a wind development built during the course of the study.¹⁰

Another potential wind energy project site to be included in the study was not developed. The study found little evidence for effects of proximity to wind turbines on most factors examined. Female survival showed a statistically significantly positive increase, and lek persistence showed a slight negative response in proximity to turbines, although this effect was not statistically significant. Proximity to wind turbines did not influence nest survival and nest site selection.¹¹ Females avoided wind turbines and the average home range size increased from the pre- to post- construction period.¹² The lack of treatment replication limits inferences that can be drawn from this study.



GREATER SAGE GROUSE, PHOTO BY DAN DZURISIN, FLICKR

Sage-Grouse Research Collaborative

Founded in 2010 by the NWCC, the Sage-Grouse Research Collaborative (SGC) supports a combined analysis of data from multiple studies to develop a more comprehensive understanding of the impacts of wind power on sage-grouse. The Collaborative funded three studies: two employed a BACI design and have been collecting pre-construction data and one study has been conducted at an operating wind energy facility. The studies are assessing survival, grouse movement, seasonal habitat use, lek dynamics, reproductive success, and other population dynamics. One of the BACI studies at China Mountain was ended when review of the project was suspended by the Bureau of Land Management (BLM) based on concerns about the project's impacts on sage-grouse.¹³ Remaining studies are ongoing with no results published to date (but see LeBeau et al. 2014 for preliminary results from studies conducted before the Collaborative was initiated).

Future Research Approaches

Conducting research on the effects of wind energy on these declining prairie grouse species using the preferred BACI design is challenging, in part, because of the difficulty in finding suitable sites for development of wind energy projects without putting undue risk on the target species. AWWI staff are working with prairie grouse experts to develop alternative research approaches including 1) robustly assessing impacts at operating projects using alternative designs such as gradient and resource selection analyses and 2) evaluating whether vegetation management can increase resilience of prairie grouse to disturbance.

Conservation Approaches

Great Plains Wind Energy Habitat Conservation Plan

The [Wind Energy Whooping Crane Action Group \(WEWAG\)](#) is a group of 15 wind energy companies working in coordination with the USFWS and nine state wildlife agencies to develop the [Great Plains Wind Energy Habitat Conservation Plan \(GPWEHCP\)](#), which addresses the potential take of lesser prairie-chicken and other federally threatened and endangered species in the Great Plains region of the United States by wind energy development. The HCP is intended to comprehensively address potential take of the covered species in the permit area by establishing consistent, scientific protocols for conservation of these species in a region of high potential for renewable energy development.

Lesser Prairie-Chicken Range-Wide Conservation Plan

The five states within the range of lesser prairie-chickens (Texas, New Mexico, Oklahoma, Kansas, and Colorado) developed the [Lesser Prairie-Chicken Range-Wide Conservation Plan](#) in order to improve habitat conditions for the species, increase populations, and provide for long-term conservation planning. The plan includes a framework for mitigating impacts from a wide range of activities, including wind energy development. USFWS endorsed

the plan in December 2013 as an effort that will “address the conservation needs of the species.”¹⁴ The endorsement was reaffirmed in the final listing decision in March 2014, when the lesser prairie-chicken was listed as a threatened species, with a special rule stating that incidental take occurring by participants “enrolled in and operating in compliance with the...Range-Wide Conservation Plan...will not be prohibited.”¹⁵



LESSER PRAIRIE CHICKENS, PHOTO BY LARRY LAMSA, FLICKR

Habitat Exchange

Multiple efforts are underway to support lesser prairie-chicken mitigation efforts. These efforts are designed to achieve landscape-scale conservation through incentivized participation of landowners and land developers (e.g. wind energy developers) and are intended to work in concert with other tools such as conservation banking. Energy companies that are faced with unavoidable impacts to a species or habitat are able to purchase credits through an exchange from landowners who create, maintain, or improve habitat through modified grazing practices, prescribed burns, restoration of previously converted agricultural lands back to native grass habitat, and other management changes.



GREATER PRAIRIE CHICKEN, PHOTO BY ANDY REAGO AND CHRISSY McCLARREN, FLICKR

Endnotes

- 1 The order [Galliformes](#) includes heavy-bodied, largely terrestrial birds such as pheasants, turkeys, grouse, and the common domestic chicken.
- 2 Lesser Prairie-Chicken Range-Wide Conservation Plan (http://www.wafwa.org/html/rangewide_lpc_conservation_plan.shtml)
- 3 Lebeau C. 2012. Evaluation of greater sage-grouse reproductive habitat and response to wind energy development in south-central Wyoming. Masters thesis, University of Wyoming, Laramie, USA.
- 4 Hagen CA. 2003. A demographic analysis of lesser prairie-chicken populations in southwestern Kansas: survival, population viability, and habitat use. Dissertation, Kansas State University, Manhattan, USA.
- 5 Holloran MJ. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. Dissertation, University of Wyoming, Laramie, USA.
- 6 National Renewable Energy Laboratory: Wind Resource Maps (<http://www.nrel.gov/gis/wind.html>)
- 7 Pruett CL, Patten M, and Wolfe DH. 2009. Avoidance behavior by prairie grouse: implications for development of wind energy. *Conservation Biology*, 23(5): 1253-1259.
- 8 Walters K, Kosciuch K, and Jones J. 2014. Can the effect of tall structures on birds be isolated from other aspects of development? *Wildlife Society Bulletin* 38(2): 250-256.
- 9 LeBeau C, Beck J, Johnson G, and Holloran J. 2014. Short-term impacts of wind energy development on greater sage-grouse fitness. *Journal of Wildlife Management* 78(3): 522-530.
- 10 NWCC: Greater Prairie-Chicken Research (<http://nationalwind.org/research/collaboratives/prairie-chicken/>)
- 11 McNew LB, Hunt LM, Gregory AJ, Wisely SM, and Sandercock BK. 2014. Effects of wind energy development on the nesting ecology of Greater Prairie-Chickens in fragmented grasslands. *Conservation Biology*, in press.
- 12 Winder VL, McNew LB, Gregory AJ, Hunt LM, Wisely SM, and Sandercock BK. 2014. Space use of female Greater Prairie-Chickens in response to wind energy development. *Ecosphere* 5: 1-17.
- 13 [BLM News Release, March 8, 2012](#)
- 14 [US DOI \(2014\): Federal Register Vol. 78 No. 238](#)
- 15 [US DOI \(2014\): Federal Register Vol. 79 No. 69](#)

Resources

- [U.S. Fish and Wildlife Service News Release: Endorsement of Lesser Prairie-Chicken Range-Wide Conservation Plan](#)
- [Lesser Prairie-Chicken Range-Wide Conservation Plan](#)
- [U.S. Fish and Wildlife Service Endangered Species Act Fact-sheet](#)
- [Great Plains Wind Energy Habitat Conservation Plan](#)
- [National Wind Coordinating Collaborative — Greater Prairie-Chicken Research Brief](#)
- [The Habitat Exchange — Lesser Prairie-Chicken](#)
- [National Wind Coordinating Collaborative — Sage-Grouse Collaborative](#)

Species Profiles

- [Greater sage-grouse](#)
- [Lesser prairie-chicken](#)

US Fish and Wildlife Service Species Information

- [Greater sage-grouse](#)
- [Lesser prairie-chicken](#)

AWWI combines the power of science with the voice of collaboration to facilitate wind energy development while protecting wildlife and reducing environmental impacts.