

Virtual Forum on Prairie Grouse and Wind Energy: 2021 Synthesis

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Introduction

This document summarizes a series of conversations conducted in 2021, building on the synthesis of a Forum in 2020, among stakeholders representing federal and state agencies, conservation and science NGOs, academics, consultants, and the wind industry. Forum activities have been organized and facilitated by the American Wind Wildlife Institute (AWWI) and the National Renewable Energy Laboratory (NREL) with support from the U.S. Department of Energy (DOE)Wind Energy Technology Office.

In 2020, a white paper titled "Prairie grouse and wind energy: the state of the science" was drafted by John Lloyd and Taber Allison (AWWI); Cameron Aldridge (USGS); Chad LeBeau (WEST, Inc.); Lance McNew (Montana State University); and Virginia Winder (Benedictine College). Subsequently, AWWI and NREL held a cross-sector Forum on grouse and wind energy where conversations were informed by the results of the white paper. The paper was distributed to all forum attendees for comment and was discussed during an informational webinar presented by several of the paper authors, who discussed key findings and participated in an extensive question and answer session with participants. [1] A recording was shared with all Forum attendees. Following this webinar, sector-specific breakout calls were conducted where participants engaged in a facilitated discussion with other members of their sector (industry, NGO, and state/federal) about research needs, challenges in meeting those needs, and potential solutions to the identified challenges. A concluding session was held for Forum invitees to hear outcomes of sector-specific calls. Attendees discussed research interests, challenges, solutions, and potential pathways forward. Forum participants were not asked to reach agreement on any issue. After the Forum, a synthesis of the discussions was distributed to attendees, and they were asked to submit comments.

Given the new administration and proposed listing of Distinct Population Segments (DPS) for the lesser prairie-chicken, NREL and DOE asked AWWI to reach out to the key stakeholders who participated in the Forum and schedule follow up calls to see if research questions or priorities had changed. Calls were conducted with the same three sectors as well as a call with one scientist and written comments from a second scientist, both affiliated with universities. A series of questions drafted by AWWI and reviewed by NREL provided the basis for the calls with each sector (see Appendix A). AWWI did not seek consensus among call participants.

The synthesis centers on the intersection between wind energy development and conservation of grouse in the grasslands and shrub-steppe of the central and western United States. Many participants brought up interest in a broader understanding of cumulative impacts to prairie grouse from all anthropogenic sources, such as other renewable energy sources, ranching, oil and gas development, housing, wildfires, and climate change. Research questions around, and investigation into these topics can provide important context that should not be overlooked. However, these topics are outside of the

[1] The paper has been submitted to the *Wildlife Society Bulletin* and is under review.

scope of this document since the primary focus of the Forum and conversations is on challenges, solutions, and priorities for the wind energy-specific community.

Overview of Findings from Forum and Sector-Specific Calls

This section summarizes the priority research needs, research challenges, and potential solutions discussed on the 2021 sector-specific calls, organized around the main themes that emerged during the conversations and building on the conversations from the 2020 Forum.

Context: What's New in 2021?

- In January 2021, the Biden administration commits to a carbon pollution-free electricity sector by 2035, net zero emissions by 2050, and conserving 30% of U.S. lands and waters by 2030.
- In the spring of 2021, the U.S. Fish and Wildlife Service's (FWS) published a proposal in the Federal Register to list two DPS of the lesser prairie-chicken (LEPC), pursuant to the federal Endangered Species Act (ESA): "*Proposed Rule for Lesser Prairie-Chicken Threatened Status With Section 4(d) Rule for the Northern Distinct Population Segment and Endangered Status for the Southern Distinct Population Segment.*"

Priority Research Needs

Theme: Improve scientific basis for avoidance, minimization, and compensatory mitigation measures

Comments did not differ significantly from 2020. However, respondents were more direct with comments, perhaps due to the more specific questions developed for the 2021 calls. There was general recognition that a new approach/framework to conducting research – one that results in improved decision making and conservation outcomes for grouse as well as the wind power development needed to contribute to the Biden administration goals – was a priority. It was also recognized that a lot would need to change to accomplish these goals. An important first step is to clarify and get agreement among key decision makers representing relevant sectors on research priorities in the following areas: [2]

- Avoidance
    - Improve scientific basis for understanding disturbance thresholds, especially for lesser prairie-chicken and greater sage-grouse, via replicated, long term, studies using BACI (before-after-control-impact) design.
        - Some commented, consistent with the white paper, that studies that use gradient of distances away from turbines have some advantages to simple BACI studies that do not take gradient and longer distances into account.

[2] Does not reflect an order of priorities.

    - To produce the best conservation outcomes for the species, studies are needed that improve scientific understanding of cause-and-effect relationships between siting and operating wind power to inform avoidance, minimization, and compensatory mitigation decisions. For example, studies are needed to determine whether current buffer requirements are either sufficient or too broad.
- Minimization
    - Evaluate the effectiveness of current best management practices. What are we doing that works, and what are we doing that does not work?
- Compensatory mitigation
    - Identify evidence-based approaches for compensatory mitigation and conduct research into methods for determining locations where compensatory mitigation is best applied.
    - Evaluate the effectiveness of different compensatory mitigation options to expand available options that produce conservation outcomes.
    - In general, current research is heavily focused on assessing the impact of a project, but there was a recommendation to assess effectiveness and practicality of current mitigation practices being recommended and/or enforced.

Theme: Expand understanding of the causes of variation in behavioral or demographic response to development of including wind energy, and the importance of context

- Test existing hypotheses regarding mechanisms of effects and whether short and long-term effects are similar.
- Evaluate responses of grouse to different forms of infrastructure – such as wind turbines, power lines, conventional energy, climate-caused changes in grouse habitat (e.g., drought, increased fires) – and use data to inform risk assessment and mitigation at wind energy facilities.
- Understand differences among responses of different species to determine whether and how results from better-studied species might be extended to less well-studied species.
- Describe how responses by different species vary among landscapes, especially regarding degree of habitat fragmentation.
- Evaluate whether the response of species depends on the density or extent of existing infrastructure (e.g., wind turbines) or anthropogenic land uses.
- Conduct research in understudied regions to capture the full picture of response across the range of a species and habitats.

Theme: Population-level responses and cumulative effects

- Understand population-level effects of infrastructure construction including that associated with wind energy, as well as solar energy development, oil and gas infrastructure, agriculture, and wildfires.
- Conduct studies that would improve our understanding of habitat use, as well as impacts associated with wind energy development on fragmented vs. intact landscapes.
- Review effects of land cover changes resulting from wind energy development, looking both at local responses and species/population responses at a larger spatial scale.

- Study whether, and if so how, avoidance of wind turbines and supporting infrastructure affects species fitness.
- Assess whether climate change will influence distribution of grouse and how it may affect resiliency to construction of new wind energy facilities and land cover change.
- Consider whether wind development has an impact on access for hunters or affects hunters' perceptions of desirability of an area for hunting after development.

Research Challenges Raised

Theme: Regulatory uncertainty

- The lack of data about the risks and impacts of wind energy to grouse creates ambiguity about the best ways to assess and mitigate risk from wind project development and operations.
- Ensure "before" component of BACI design takes place; without certainty that a project will proceed, conducting research in advance of knowing a project will proceed inhibits support for research.

Theme: Increase the co-production[3] of monitoring and research studies that answer key questions for multiple stakeholders, that occur in a timely manner, and that are viewed as reliable by all stakeholders

- Build on existing institutions to foster ways to work together to generate and fund pre- and post-construction studies to identify priority research questions and scopes of work, incorporating adaptive management techniques, that produce results that decision makers will accept and that can apply to regulation and best management practices.
- Encourage/implement regulatory and management practices that support BACI or BAG (before-after gradient) studies, especially with lesser prairie-chicken.
    - In an ideal scenario, there would be replication across species and throughout the entire range of each species. It would be valuable to establish guidelines to inform study design, and statistical and methodological decisions during the scoping of new research efforts. This would allow for easy comparisons between studies and cumulative impact analyses.
    - However, recognizing that robust, well-designed BACI/BAG research is resource intensive and will take several years to execute on a species-by-species basis, some participants advocated continued exploration of alternative approaches. For example, one participant recommended a "habitat-based approach" to research the impacts of wind energy on vegetation communities (e.g., plant species richness and abundance) that support each grouse species.

[3] Defined here as an ongoing process among scientists and other stakeholders to define key research needs, formulate research questions, develop research and data-collection approaches, and disseminate findings.

Theme: Limited funding

- The high cost of multiyear studies and limited availability of funds further exacerbates difficulties in implementing BACI/BAG studies, especially for species of high conservation concern such as lesser prairie-chicken and greater sage-grouse.
    - A primary challenge is collecting pre-construction data, but barriers also exist to generate funding for long-term post-construction studies.
- For some respondents, public funding of grouse research is both desired and attractive; however, others expressed concern that constraints associated with public funding, including administrative costs and logistical complexities that come with broad research scopes, have been a significant inhibitor to producing timely results that are relevant and useful once completed. Additionally, some respondents are concerned that depending on who sponsors/is involved in research (public agency vs. private), there is a different standard applied to acceptance of and application of research results. This apparent tension inhibits some from leveraging public funding, reducing dollars available for research.
- Given limited funds, develop an effective process to agree on questions, study design, and application of results.
- Allocate resources for research among species to ensure that a solid scientific basis for conserving all species of prairie grouse is developed.
- Assess opportunities to enable cross-sectors funded studies between wind and other industries (e.g., agriculture, oil and gas, solar, etc.) that use grouse habitat.

Potential Solutions[4]

Improve coordination among stakeholders on research and monitoring

- Collectively identify challenges, such as those raised above, to early and ongoing collaboration on research and monitoring, and develop solutions to reduce these barriers.
- Co-create and implement a collaborative, standardized, and adaptive approach to research and monitoring that would fill data gaps and proactively inform mitigation.

Improve information sharing among stakeholders, including research community

- Standardize data collection efforts.
- Discover, share, and make use of existing data where possible, providing a safe harbor.
- Implement a central repository of data that can be mined to provide answers to questions.
    - Co-create “state of the art/state of the practice” synthesis documents that provide science-based, accessible information on conservation options.
    - Encourage consistent reporting by researchers regarding BMPs implemented at facilities they study so that we can learn what works, and what does not.

[4] Does not reflect an order of priorities. AWWI did not seek consensus among participants.

Consider a different framework

- Consider an adaptive management and monitoring approach so lessons learned from a project can be applied more readily and rapidly to subsequent projects.
- Explore ways to get agreement from key decision makers on research question priorities and acceptable study designs/methodologies so research project investors have confidence that results will be accepted and applied.

Identify funding sources

- Explore continued or new funding support from variety of sectors, such as Wind Wildlife Research Fund, higher education, charitable foundations, and federal and state agencies.
- Identify/explore with FWS investing in monitoring and research efforts that address shared research priorities.

Additional Questions, Challenges, and Potential Solutions

This section elaborates on ideas raised during the Forum on how scientific concerns and practical realities might be reconciled.

A key question raised during the discussion was how, as a community, to move forward and agree on shared goals with the understanding that many of the identified research needs cannot be addressed in the short term, even as additional wind energy development is likely to occur within habitat for most of the species of grouse. Although the prairie grouse and wind energy white paper expresses concern about the scientific basis for applying results of studies at oil and gas developments to wind energy development, practitioners from regulatory agencies and industry recognize that siting and permitting decisions for wind energy will proceed in the absence of data specific to wind energy, and that this will necessitate applying proxy information from studies of other forms of development.

An approach proposed in the 2020 Forum and repeated in the 2021 conversations is to embed research, monitoring, and mitigation (as defined by FWS to include avoidance, minimization, and compensation) within a system of adaptive management as intended by Tier 5 of the FWS Land-Based Wind Energy Guidelines.[5] Doing so treats each new development as an opportunity to test and refine hypotheses about the impacts of, and potential solutions for, wind energy development on grouse. It was beyond the scope of the Forum to develop this idea in detail, so here AWWI suggests a general approach that we think reflects the mode and intent of the concept proposed:

1) Engage the stakeholder community to clearly define priority questions. Identifying the goals and objectives of future research, and discussing feasible options (i.e., funding strategies) for securing funds to execute the studies necessary to answer outstanding questions.

[5] https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

2) Compile baseline data or use the best available data to predict how a particular development might affect parameters of interest – such as lek persistence or habitat availability, quality, and quantity – among grouse exposed to wind energy development.

   The best available science might include understanding gleaned from studies at other wind facilities or studies at other kinds of infrastructure. Baseline conditions would be informed by existing data from lek counts, telemetry studies, or habitat maps that could be supplemented with newly collected baseline data.

3) Collect data during the construction and operational phases of the development to assess potential changes in parameters of interest.

   Effects would be monitored and evaluated to determine the accuracy of predictions and would be used to update predictive models. Updated models can be applied to subsequent developments. The goal is to adapt monitoring, siting decisions, or minimization activities based on new research that improves the ability to predict impacts, reduce mismatches between impact and mitigation, decrease negative effects of new development, and shorten timelines for wind-facility construction.

This approach would represent a significant departure from current practice and would require a variety of supporting structures and processes. First, it would depend on a broader availability of data. For this approach to work effectively, baseline data on grouse populations and habitat conditions must be widely available. The lack of pre-construction data, which among other things is due to the lack of certainty about where projects will occur, is a significant obstacle. Two potential solutions were proposed by Forum participants: pooling all existing data into a central repository, and proactively collecting new data in areas of interest. Although studies of grouse at wind energy facilities are scarce, when including studies on other kinds of impacts, collectively the four grouse species of interest are well studied and regularly monitored.

Examples of data currently recorded include regular long-term databases of annual lek counts maintained by most states, and data held by both state and federal agencies on numerous baseline studies or habitat evaluations related to other proposed projects, such as from conventional energy development or surface mining. If these data could be digitized, centralized, and made available, they would serve as an outstanding resource for understanding baseline conditions across the range of each species. Furthermore, if existing data were pooled, they would be amenable to a gap analysis that could help identify regions where additional data should be collected. Gaps in the availability of existing data might be overlaid with information about where wind development is most likely to occur to further refine priority areas for collection of new data. However, identifying priority areas for new data collection would require some agreement on how to define areas where development is most likely to occur.[6] This might be accomplished by enhancing NREL's models of deployment potential and exposing

[6] For example, using output from Renewable Energy Zone (REZ) mapping projects or other similar efforts that identify where wind resources are abundant, transmission opportunities exist or are planned, etc.

resulting predictions to cross-sector consultation (e.g., a "ground-truthing" process whereby results are reviewed by industry and state and federal biologists and refined as needed). This approach may need to consider proposed regulatory changes, providing a "safe harbor" for participating companies.

A second obstacle noted in the Forum discussion to implementation of adaptive management is the need for an agreed-upon structure for collaboration. Any effort to centralize data and implement a common process for risk assessment and mitigation will require coordination. At present, based on opinions expressed by stakeholders during the Forum, coordination across sectors and geographies is lacking. Many models for coordination exist, ranging from the inexpensive and simple, such as ad hoc approaches that use existing forums, to the more elaborate and expensive, such as a community-supported mandate housed within an existing facility or organization, or a new and autonomous staffed partnership (i.e., a joint venture approach). A full analysis of possible collaborative structures was not explored during the Forum, however there are existing institutions or collaboratives carrying out applied research on bird conservation and energy development that could provide potential model structures.[7]

A challenge to implementing adaptive management that was noted by nearly all participants is financing. Obtaining funds to pay for studies at facilities has proven difficult, leading to the question of whether we reasonably expect to fund studies at all new facilities, along with supporting ongoing monitoring in undeveloped areas. To do so, the pool of funders would have to expand. It is also likely that the most intensive elements of monitoring, for example documenting space use and individual vital rates via telemetry, could not be implemented widely. This might mean settling on using crude indices of response and population change, such as lek persistence or estimated habitat quantity and availability, as the common standard for all studies. One suggestion would be to expand studies to evaluate other anthropogenic impacts on grouse as a mechanism to bring in other stakeholders to support a research program.

Overall, the adaptive approach to research and monitoring discussed during the Forum aligns with several recommendations presented in the white paper. In particular, the white paper envisions standardized, range-wide sampling of key population parameters for each grouse species as a means to understand population-level changes due to cumulative effects of all forms of development, and suggested that these analyses use "existing data through collaborations with state agencies, consultants, industry, and NGOs that maintain monitoring programs" to yield results quickly. Until an initial scoping of data availability and coverage is completed, it remains unclear whether this approach is feasible and how much additional data collection would be required. In addition to informing studies of cumulative effects of development on populations, this approach might also increase the availability of pre-construction data that could be used in BACI/BAG designs.

[7] One participant noted the Boreal Avian Modelling Project as an example of a similar endeavor that has been successful in carrying out applied research on bird conservation, energy development, and forest products extraction in Canada's boreal forest: https://borealbirds.ualberta.ca/. In addition, we note that AWWI's American Wind Wildlife Information Center has served a similar role in centralizing, maintaining, and catalyzing research on data from post-construction fatality monitoring studies at operating wind facilities: https://awwi.org/about-us/our-work/awwic/. Another is the Bats and Wind Energy Cooperative: https://www.batsandwind.org/.

Appendix A: Questions Addressed to Sectors in 2021 Follow-Up Interviews

1. How important is additional empirical, field-based research for improving our understanding of potential impacts of wind energy generation on grouse populations? (High, medium, low)
2. Do you think that a lack of information or regulatory uncertainty, or other factors, hinders our ability to assess and mitigate risk to grouse from new wind energy developments? If yes, are there other factors, and why? If no, why not?
3. If additional investment was made in research on grouse & wind energy, should it be directed at a particular species, such as greater sage-grouse, sharp-tailed grouse, greater prairie-chicken, and lesser prairie-chicken? If so, which species? Why?
4. What kind of research do you think would be most valuable in advancing our ability to assess and mitigate impacts:
    a. Field-based experimental research (e.g., BACI studies of demographic rates and habitat use), and if so, what do you think is an appropriate study duration (i.e., x years pre-construction and y years post-construction)
    b. Retrospective analyses, e.g., comparing trends in lek counts in populations exposed to wind energy facilities with populations in undeveloped areas
    c. Construction of mapping or spatial-analysis tools, using existing data, to help identify high- or low-risk areas
    d. Geographically expanded monitoring studies to improve baseline estimates of population size and trends
    e. Technology development, e.g., to reduce weight or cost of GPS tags
    f. Something else
5. What specific research projects would you recommend?
6. Are there technological developments (e.g., camera, drones) that would help us better understand and mitigate impacts of wind on grouse? What would they be?
7. What are the primary constraints, e.g., financial, political, regulatory, lack of scientific consensus, to carrying out monitoring or research studies that produce results viewed as reliable and actionable by all stakeholders?
8. What do you believe are the most important next steps that this community can take to address what you see as the greatest hindrances to progress?
9. Would you support/participate in the development of a multi-sector grouse collaborative to help address wind energy and grouse issues, such as identifying research priorities, support research efforts, peer review reports?
10. Is there anything else that you would like us to know about research priorities involving grouse & wind?

Appendix B: List of Forum Participants in 2020 and/or 2021

Thank you to all who participated in the Virtual Forum on Prairie Grouse and Wind Energy and following discussions (includes participants of 2020 Forum and/or 2021 conversations – 2021-only participants are indicated by *, those who participated in both 2020 and 2021 are indicated by **).

Dave Anderson, The Conservation Fund
Grant Beauprez, New Mexico Department of Game and Fish
Alison Begley, Montana Fish, Wildlife and Parks
Jon Belak, National Audubon Society
Jocelyn Brown-Saracino, U.S. Department of Energy
Shawn Childs, PacifiCorp Wind Operations**
Brett Cooper, Oklahoma Department of Wildlife Conservation
Janine Crane, NextEra Energy Resources**
Jennifer Dean, Enel Green Power North America, Inc. **
Pat Diebert, U.S. Fish and Wildlife Service
Shawn Espinosa, Nevada Department of Wildlife
Shilo Felton, National Audubon Society
Sean Fitzgerald, NextEra Energy Resources*
Patrick Flowers, Xcel Energy
Kent Fricke, Kansas Department of Wildlife, Parks and Tourism**
Garry George, National Audubon Society**
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Yuki Hamada, Argonne National Laboratory
Steve Hanser, U.S. Geological Survey
Jonathan Hayes, Audubon Southwest
Cris Hein, National Renewable Energy Laboratory**
David Hillesheim, Xcel Energy
Chris Hise, The Nature Conservancy**
Matt Holloran, Operational Conservation/USGS**
Theresa Hyland, Missouri Department of Conservation
Jon Keheimer, SWCA Environmental Consultants
Stevee Kennard, EDP Renewables North America
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Laura Nagy, Avangrid Renewables**
Clay Nichols, U.S. Fish and Wildlife Service**
Brian Obermeyer, The Nature Conservancy
Chris O'Meilia, U.S. Fish and Wildlife Service**
Joy Page, Defenders of Wildlife*
Larkin Powell, University of Nebraska*
Karen Prentice, Bureau of Land Management**
Josh Richardson, Oklahoma Department of Wildlife Conservation
Liza Rossi, Colorado Parks and Wildlife
Rick Rosvold, Xcel Energy
Travis Runia, South Dakota Game, Fish and Parks
Brian Rutledge, National Audubon Society
Mark Salvo, Oregon Natural Desert Association**
Kate Schindler, Xcel Energy
Leslie Schreiber, Wyoming Game and Fish Department
Mike Schroeder, Washington Department of Fish and Wildlife
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Karin Sinclair, National Renewable Energy Laboratory
Shayna Steingard, Defenders of Wildlife**
Tyler Stuart, CORE Consultants, Inc.
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Raphael Tisch, Allegheny Science & Technology
Karen Tyrell, WEST
Tom Vinson, American Clean Power Association*
Karen Voltura, Colorado Parks and Wildlife
Wayne Walker, Common Ground Capital
Leroy Walston, Argonne National Laboratory
Amy Watrud, Invenergy
Kim Wells, NextEra Energy Resources
Stu Webster, American Clean Power Association*
Shannon Whiton, Xcel Energy
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Nathan Wojcik, SWCA Environmental Consultant