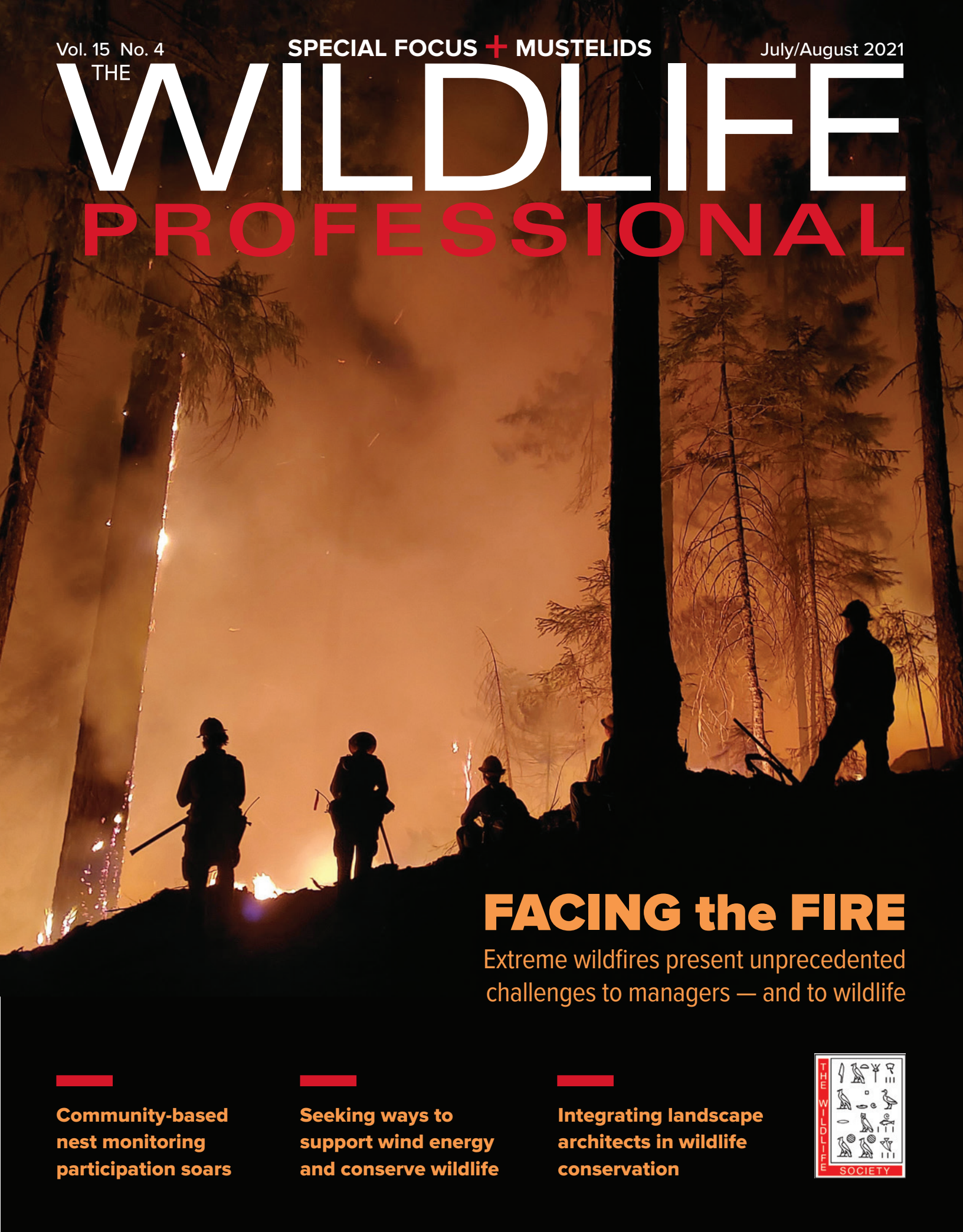


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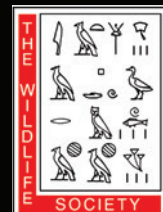
FACING the FIRE

Extreme wildfires present unprecedented challenges to managers — and to wildlife

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Is the Answer Blowing in the Wind?

STATE AGENCIES SEEK WAYS TO SUPPORT WIND ENERGY AND CONSERVE WILDLIFE

By Brad Loveless, Mark Humpert, Sarah Reif, Karen Voltura, Jessica Wilkinson and Laura Zebehazy

Wind energy plays a critical role in addressing the global climate challenge. In 2019 alone, wind energy avoided the release of an estimated **198 million metric tons** of carbon dioxide. With over 67,800 turbines spinning across 43 states ([Hoen et al. 2018](#)), most states have some level of land-based wind energy infrastructure in place or planned for development.

As wind development has expanded, so too has our understanding of the short- and long-term effects on wildlife. Wind turbines can cause direct mortality to bats and birds, and they can lead to the loss and fragmentation of important wildlife habitats ([Allison et al. 2019](#)). However, the degree of these effects and the relationship between habitat impacts and species' responses remains uncertain.

▼ Wind energy is an important part of our clean energy future, and by following appropriate guidelines, its impact on wildlife can be minimized.

We know more wind development is on the way. A recent study suggested that in order for the U.S. to fully transition to renewables, wind and solar energy facilities could take up a land area as large as 590,000 square kilometers ([Larson et al. 2020](#)) —

about the size of Wyoming and Colorado combined. How do we move forward, ensuring that wind energy development — an important part of a clean energy future — does not produce undue effects on fish and wildlife species held in public trust?

Providing guidance

State fish and wildlife agencies strive to address this very important question by providing technical guidance to wind energy developers and regulatory agencies to inform siting and operational decisions. Because most state fish and wildlife agencies lack regulatory authority to require developers to avoid fish and wildlife impacts, the agencies rely on non-regulatory approaches and guidelines.

In 2007, the U.S. Department of the Interior established the Wind Turbine Guidelines Advisory Committee to develop voluntary guidelines for reducing adverse effects on fish and wildlife resources from wind energy projects. The committee, made up of key stakeholders from federal and state wildlife agencies, the wind industry and the conservation and science community, published the U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (WEG) in 2012.

The WEG promote compliance with relevant wildlife laws and regulations and encourage pre- and post-construction surveys and monitoring. They encourage gathering data to assist in impact assessments and contribute to adaptive management, and they emphasize avoidance, minimization and then compensation for adverse effects to species of concern and their habitats ([U.S. Fish and Wildlife Service 2012](#)).

The WEG have been effective in offering standardized approaches to address many wildlife conservation concerns across the country. Because they are voluntary, though, they allow for varying degrees of interpretation and implementation. State agencies also retain their own wildlife management authorities that can be complementary to federal authorities. Some states have developed their own



Credit: Joshua Winchell/U.S. Fish and Wildlife Service



voluntary wind energy guidelines or rely heavily on state-level reviews rather than developers' adherence to the federal WEG.

If and when wind developers consult with state agencies during project development, those agencies often communicate recommendations for avoiding, minimizing and compensating for impacts to fish, wildlife and their habitats. A recent survey of state agencies asked if this voluntary approach yielded the intended outcomes. Based on survey responses, we share the state agency experience in wind energy planning and development and offer some possible solutions that can advance both a renewable energy future and improve protection of at-risk species as well as intact, connected habitats for all fish and wildlife.

Understanding state concerns

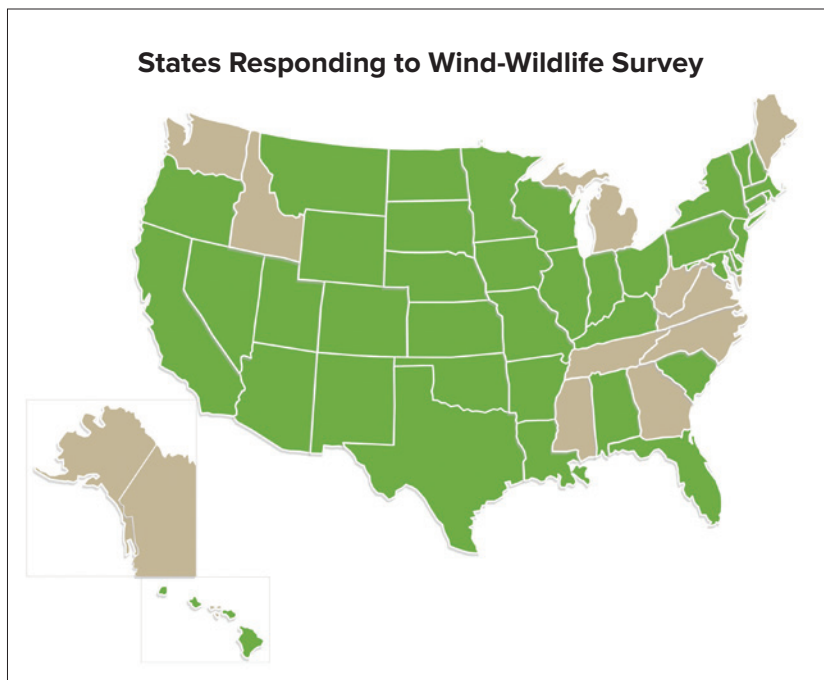
The Association of Fish and Wildlife Agencies, which represents provincial and state agencies, and its Energy and Wildlife Policy Committee work to reduce the impact of energy development and generation on fish and wildlife. In 2018, the committee established a State Wind-Wildlife Assessment Workgroup to better understand state agencies' concerns, needs and interests related to wind energy siting. The workgroup included representatives from six state agencies, AFWA and non-governmental organizations.

In July 2019, the workgroup sent a 44-question survey to the individual at each state agency responsible for wind project reviews and with the most knowledge regarding wind energy development and wildlife resources.

Staff from 39 state agencies completed the survey, representing the geographic range for 93% of the total megawatts of wind capacity currently installed, under construction or in advanced stages of development in the U.S. ([American Wind Energy Association 2019](#)). The workgroup presented the survey results to the committee at the 2019 AFWA Annual Meeting. A final report and recommendations are publicly available ([Association of Fish and Wildlife Agencies 2019](#)).

Using the guidelines?

State agencies ranked the most significant risks to wildlife and their habitats from wind energy as direct mortality from turbine collisions, habitat fragmentation, cumulative impacts, species dis-



placement and behavioral changes and habitat loss due to the footprint of the installed infrastructure. Most current wind-wildlife science focuses on direct impacts to wildlife, respondents reported, with less attention to indirect and cumulative impacts.

A large majority of state agencies reported that wind energy developers consult with them during project planning and development. However, almost a quarter of states reported that developers consult with them only once in the process, or never. The frequency and quality of consultation depended on the specific developer and was highly variable.

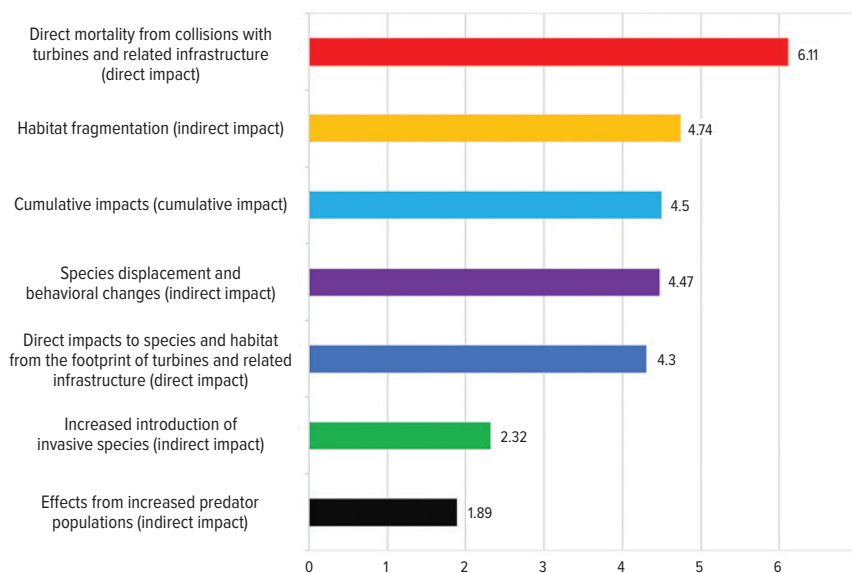
State agencies reported that developers provide little information on siting early in the development process, and the amount of information shared only increases as the process nears its final stages. Respondents indicated a strong desire for developers to consult with them earlier, particularly prior to site selection, when the opportunities to avoid wildlife impacts are greatest and projects are most able to respond to state agency input.

State agencies shared that developers frequently request information on regulated species. However, information on other species of greatest conservation need was only requested occasionally, and information on factors such as areas of intact habitat sensitive to the effects of fragmentation or high-priority conservation areas were far less

▲ Responses from 39 states informed a survey on wind energy development and wildlife resources conducted by a working group of the Association of Fish and Wildlife Agencies' Energy and Wildlife Policy Committee.



Ranked Risks to Wildlife & Habitat from Wind Energy



▲ State agencies were asked to rank several types of risks to wildlife and habitat from wind development, with 1 being the highest risk and 7 being the lowest risk. Weights are applied in reverse. The highest risk has the largest weight. The lowest risk has the lowest weight.

frequently included in requests. They also reported that data sharing is not always two-way. Some developers express reluctance to share results of their pre- and post-construction monitoring.

The WEG identify all of these as important aspects to consider during early siting analyses. Nearly 40% of the reporting states shared that the wind industry use the WEG sometimes or rarely. Less than 20% reported that they were used always. The word “use” was not defined in the survey, however, and state agencies’ experiences may have varied in regard to how closely the guidelines were adhered to. They also reported that the WEG have been somewhat effective in supporting low-impact wind development.

Overall, state agencies were overwhelmingly positive about the prospects for improving early consultation with wind energy developers. Over 70% of the respondents thought the WEG could be more effective with changes to their specificity and application.

Identifying challenges

Over the past 15 years, the wind industry, scientists and state agencies have collaborated to advance approaches to minimize wildlife collisions, such as auditory or visual signals to keep wildlife away from turbines, and smart curtailment — temporarily shutting down turbines under certain wind conditions or when at-risk wildlife is nearby.

Improved monitoring of wildlife movements in relation to wind energy infrastructure — through radio- and GPS-collared raptors, grouse and pronghorn (*Antilocapra americana*) and video imaging of bat movements — has also contributed to more accurate risk assessment for some species. This has helped focus attention on those species most at risk from direct mortality.

While minimization technologies are receiving significant research attention, there has been less investment in understanding the cumulative impacts of wind development on wildlife populations and habitat and on ways to improve siting at the landscape scale. Micro-siting or assessing the position of an individual turbine, is considered after project sites are selected and can reduce localized impacts.

These measures, however, do not replace the importance of identifying and avoiding habitats for rare and imperiled species during early project planning and facility siting. For a species in decline, such as the lesser prairie chicken (*Tympanuchus pallidicinctus*), any direct habitat loss from or behavioral shifts in habitat use in response to wind energy infrastructure would further constrain populations.

Avoiding development within core habitats may be the only option for supporting their long-term conservation. It is critical that the wind industry assess and address how multiple projects in an area can lead to significant habitat loss, particularly for rare and imperiled species.

Providing compensation

When a proposed wind energy project cannot avoid or minimize impacts to wildlife or their habitats, some state agencies recommend compensatory mitigation. This can take many forms, such as restoring lower-quality habitat or preserving high-value habitat. However, regulatory requirements for compensatory mitigation vary by state, and may be nonexistent.

Compensatory mitigation programs also present technical challenges, such as determining the amount of appropriate compensation. The conservation actions needed to offset impacts can be expensive and are not without risk. We recognize it



is not possible to avoid all impacts to wildlife and that the wind industry must weigh multiple considerations when making siting decisions.

However, avoiding and compensating for impacts to wildlife and habitats should be a priority. Without progress on these steps, the impacts of habitat loss, habitat fragmentation and direct mortality will make it harder for state agencies to meet their public trust obligations to safeguard fish and wildlife resources for future generations.

Since they often lack regulatory authority to require avoidance, minimization and compensatory mitigation for species and habitats, state agencies strongly support the voluntary federal WEG. However, as made clear by the survey results, the WEG framework for evaluating risk to wildlife and habitat is not always ensuring good siting outcomes.

Agencies indicated that it matters when the WEG siting analysis is undertaken, what information is analyzed and how the results of the analysis guide siting decisions. If, for example, wildlife habitat concerns are not identified until late in the project development process — such as after land interests have been secured or power purchase agreements are signed — or if impacts to non-regulated species are not considered at all, there is very little incentive or opportunity for project developers to reconsider or redesign projects. This is even the case for projects likely to have significant adverse impacts, which reinforces the importance of early, substantive consultation with state agencies.

Key recommendations

The survey provided insight into state agencies' perceptions on wind energy development and its relationship to their missions of conserving and sustaining wildlife and their habitats. Based on the state agencies' survey responses, we provide four recommendations for stakeholders to consider.

Enhance interstate coordination. Participation in multi-state forums, such as flyway councils or [North American Bat Program hubs](#), can address regional, national or international issues and leverage resources to increase state agency effectiveness. Regional forums are important for identifying range-wide population trends and conservation solutions for species such as the lesser prairie chicken, greater sage-grouse (*Centrocercus urophasianus*),

migratory birds and bats. These forums may be the best venues for state agencies to improve existing measures or develop new state wind energy guidelines and compensatory mitigation solutions and identify shared research and landscape-level conservation priorities. They also provide a platform to develop consistent recommendations on monitoring protocols, fatality thresholds and other mechanisms that improve the effectiveness of state and federal guidelines and recommendations.

Increase collaboration between state agencies, industry and conservation organizations. Improved collaboration between stakeholders would help avoid and minimize conflicts with wildlife, improve predictability and consistency in wildlife guidance and reduce industry risk. Forums provided by AFWA, the American



Credit: Kansas Department of Wildlife, Parks and Tourism

Wind Wildlife Institute and regional fish and wildlife associations can engage stakeholders in shared problem solving. We recommend these forums address issues of two-way data sharing, timing and substance of consultation and siting. Reduced conflict regarding wind energy development and wildlife impacts requires increased collaboration and good faith participation by all stakeholders.

Place more emphasis on measuring cumulative effects, as well as avoiding population-level impacts, species displacement and behavioral changes. State agencies have benefitted from research focused on the design

▲ Lesser prairie chickens are in decline, making them particularly vulnerable to habitat loss or behavioral shifts in response to wind energy infrastructure.



Credit: Keith Kohl/Oregon Department of Fish and Wildlife

▲ Data from collared pronghorn have helped managers better understand the risks posed by wind energy infrastructure.

of robust wildlife fatality estimators and wind turbine collision minimization technologies. Both help at the project level, and continued improvements in collision-minimization technology are needed. While individual projects may not have significant population-level impacts, the cumulative effects of wind energy infrastructure across the landscape may contribute to population declines.

We need to shift resources toward research and monitoring that measures cumulative effects, indirect impacts and behavioral changes, especially for bats and birds. State agencies should identify and share the highest and most critical research needs on population-level impacts and participate in decisions about investments in wind-wildlife research. It is essential that the wind industry recognize that avoiding impacts to rare and sensitive species must become an industry standard. When that is not possible, compensatory mitigation that achieves a no-net-loss standard must be implemented.

Improve implementation of the WEG. Much science, collaboration and compromise went into developing the WEG and the framework has benefited wildlife and our understanding of wind-wildlife issues. Since 2012, some wind energy companies have voluntarily adopted and consistently used the guidelines. The WEG have helped guide the collection of important biological information and impact assessments, and some companies have voluntarily committed to minimizing and offsetting impacts.

While the framework is still sound, we have advanced our scientific understanding of wind-wildlife interactions over the years. In addition, the survey showed that strong collaboration with states is not consistent across the industry. The WEG specifically calls for early and effective communication with states, along with federal agencies, conservation groups and tribes, during the development process. Improvements are needed in the timing, frequency and duration of communication and coordination between the wind industry and states. In the spirit of adaptive management, we recommend reconvening a group that includes federal and state wildlife agencies, industry and conservation organizations to develop a supplement to the WEG that reflects new science and resets expectations for effective application of the framework.

This survey presented a unique opportunity for state agencies to share their experiences and opinions related to wind siting issues and where they see room for improvement. State agencies genuinely want to engage the wind industry and other stakeholders in collaborative discussions of the issues raised by the survey. They welcome the opportunity to create beneficial change for wildlife conservation, wildlife management and our shared climate future.

There is reason for optimism. The goals of conserving wildlife and transitioning to renewable energy are not mutually exclusive. Both are essential to help ensure a sustainable future for wildlife. ■



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