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POTENTIAL IMPACTS OF WIND FARM ENERGY DEVELOPMENT ON UPLAND GAME BIRDS: QUESTIONS AND CONCERNS

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Abstract. Ecologists and wildlife managers have been concerned about the negative impacts of wind energy developments or wind farms on migratory birds such as passerines and raptors, as well as bats. However, we present a series of arguments that culminate in a plea to also consider the potential direct and indirect impacts of wind farms on resident and migratory upland game birds. We pose these arguments from both ecological and economic perspectives because economic impacts derived from hunters are a major driver that provides incentives for landowners to sustain habitats, not only for upland game birds, but also for scores of other terrestrial wildlife species as well. The primary concern regarding the impacts of wind farms on upland game birds seems to revolve around the widespread fragmentation that results, not only from placement of the wind turbine towers, but also from the infrastructure of roads needed to construct and service them and the transmission lines required to access the continental electrical power grid. We consider these issues from the standpoint of habitat resources needed to sustain both resident (Northern Bobwhite, *Colinus virginianus*; Wild Turkey, *Meleagris gallopavo*; prairie-chickens, *Tympanuchus* spp.; and migratory Mourning Dove, *Zenaida macroura;* and White-winged Dove, *Z. asiatica*) game birds. Implementation of policies and procedures, such as the 12-point position statement on wind energy development and wildlife as proposed by The Wildlife Society, is critically needed to conserve upland game birds and all wildlife populations during the course of planning and locating wind farms.

Key Words: Northern Bobwhite, Mourning Dove, Prairie-Chicken, White-winged Dove, Wild Turkey, Wind Farms

POTENCIALES IMPACTOS DEL DESARROLLO DE PARQUES DE ENERGÍA EÓLICA EN AVES DE CAZA DEL ALTIPLANO

Resumen. Ecologistas y gestores de vida silvestre han mostrado preocupación por los efectos negativos del desarrollo de la energía eólica o de parques eólicos, en aves migratorias como las paseriformes y rapaces, así también como en murciélagos. Sin embargo, presentamos una serie de argumentos que culminan en una rogativa a examinar los posibles impactos, directos e indirectos, de los parques eólicos, en aves de caza residentes y migratorias, que habitan en el altiplano. Esbozamos estos argumentos desde ambas perspectivas, ecológicas y económicas, puesto que el impacto económico que se deriva de la caza, es una de las principales fuerzas que incentiva a los hacendados al sostenimiento del hábitat, no sólo de aves de caza montañosas, sino también de decenas de otras especies silvestres terrestres. La principal preocupación respecto al impacto de los parques eólicos en zonas de aves de caza de montaña, parece giran alrededor de la extendida fragmentación que resulta, no sólo de la colocación de las torres de aerogeneradores, sino también de la infraestructura de caminos necesarios para construirlas y darles servicio, así como de las líneas de transmisión necesarias para acceder a la red eléctrica continental. Consideramos estas cuestiones desde el punto de vista de recursos del hábitat necesarios, para sostener tanto a las aves de caza residentes (Norte Bobwhite, *Colinus virginianus*; Wild Turkey, *Meleagris gallopavo*; prairie-pollos, *Tympanuchus* spp.; como a las migratorias Duelo Dove, *Zenaida macroura*; y White-winged Dove, *Z. asiatica*). La implementación de políticas y procedimientos, tales como la declaración de posición de 12-puntos, sobre energía eólica y vida silvestre propuesta por la Wildlife Society, es críticamente necesaria para conservar las aves de caza del altiplano y toda la población de vida silvestre, durante el curso de la planificación y ubicación de parques eólicos.

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INTRODUCTION

Wind energy has become one of the most quickly growing aspects of sustainable and alternative energy development in the United States and Europe (Kunz et al. 2007a). Unfortunately, the development of wind energy facilities, or wind farms, has resulted in some serious and unforeseen consequences for wildlife. Probably the most conspicuous of such cases involves the widespread raptor mortality caused by the Altamont facility in California (Kuvlesky et al. 2007). Two of many other unforeseen consequences have been unexpectedly high bat mortality from wind farms in the Mid-Atlantic Highlands (Kunz et al. 2007b), and a high degree of mortality inflicted on male Common Terns (*Sterna hirundo*) in Belgium (Steinen et al. 2008). The primary worry about these circumstances is that such losses may be significant at the population level.

A great deal of the data and related information on wildlife collisions with wind turbines exists in the form of unpublished reports and related forms of gray literature (Kuvlesky et al 2007), which makes it difficult to obtain and evaluate. However, it is clear from this body of information that the vast majority of attention has focused on raptors, passerines, sea birds and bats, all animals that fly at heights where they come into contact with turbine blades. In contrast, information on the indirect effects of wind farms on wildlife—the effects of the associated infrastructure of roads and power lines—is nonexistent. We know of no published study that has addressed this point.

Various areas of Texas such as the Gulf Coast, West Texas, and the Panhandle Plains have become attractive locations for siting wind farms. The combination of abundant and consistent wind, large areas of open space, and rangeland vegetation with few trees, has made these parts of Texas a magnet for wind farms. These areas of Texas also provide the backbone of the remaining habitat that sustains populations of several species of upland game birds that are declining throughout many parts of their geographic ranges. As wildlife scientists with keen interests in upland game bird conservation, we are concerned that the rapid and extensive development of wind farms across the Texas landscape will have negative consequences for species of game birds that were already facing a number of significant conservation challenges. One of the most significant of these challenges is habitat loss from fragmentation as a result of urban and suburban encroachment into rural areas, and the associated expansion of invasive exotic plants. The growing presence of wind farm energy developments likely will add to this expanding habitat fragmentation.

HABITAT FRAGMENTATION AND RESIDENT GAME BIRDS

Galliforms have a life history strategy whereby they spend most of their lives on the ground. Thus, the potential peril of collisions with rotating turbines for species like quails, turkeys and prairie-chickens is minimal and probably insignificant. For these species, the indirect effects of infrastructure development are likely to have the greatest impact on their populations.

Fox et al. (2006) estimated that wind turbine footprints—the area directly occupied by turbines—composes from 2% to 5% of a wind farm site. Thus, the remaining 95% to 98% of the impact results from the network of roads and power lines associated with the turbines. Habitat fragmentation is thought to be one of the factors currently responsible for the widespread declines we have observed in quails and prairie chickens throughout Texas (Brennan 2007). The extent to which wind farms will contribute to yet further fragmentation is not known. But clearly, further impacts are coming.

Northern Bobwhites have a propensity to nest near roads and other linear corridors especially if they are not paved (Rosene 1969). However, the impacts of road networks needed to construct and service turbines on nesting bobwhites is unknown. The impact of power lines, which may provide attractive perches for resident and migratory raptors, is unknown as well, but is likely to have a serious impact, which has been documented for male Greater Sage-Grouse (*Centrocercus urophasianus*) by Connelly et al. (2000).

Although Wild Turkeys may tolerate power line networks, (Beasom and Wilson 1992) it has been documented that they avoid roads during nesting (Still and Baumann 1990), that roads facilitate access for poaching (Hurst and Dickson 1992); and in general "Roadway development has been and will continue to be a negative influence in turkey habitats" (Beasom and Wilson 1992:330). However, in rangeland habitats, Wild Turkeys have been known to roost on power lines where suitable trees for roosting do not exist (Beasom and Wilson 1992:311). It is also important to consider that the past 40 years of Breeding Bird Survey data indicate that Wild Turkey populations in South Texas have been declining whereas they are stable or increasing throughout most of the rest of their geographic range. The reasons for this decline are not clear. However, South Texas is the only major region

in the geographic range of the Wild Turkey where populations do not seem to be stable or increasing.

In contrast, the effects of wind farm infrastructure will likely have dire consequences for prairie-chickens if turbines are located in their habitat because these species are highly intolerant of fragmentation and related human disturbances (Bidwell 2002a,b, Robel 2002). Both species of prairie-chickens in the U.S. (Greater Prairie-Chicken; *Tympanuchus cupido*, and Lesser Prairie-Chicken, *T. pallidicintus*) are on the Audubon WatchList of declining species, and the Lesser Prairie-Chicken is currently considered a candidate species for listing and protection under the Endangered Species Act. While current estimated population size of Greater Prairie-Chickens about 690,000 birds, Lesser Prairie-Chicken populations now total only about 20,000.

MIGRATORY COLUMBIDS

We find it curious that reports of mortality to columbids (in this case Mourning Dove and White–winged Dove) are largely lacking from the published and unpublished literature on bird collisions with wind turbines (Morrison and Sinclair 2004, Kuvlesky et al. 2007). As medium-sized birds, they should be relatively easy to find (Morrison 2002) if significant mortalities were inflicted by collisions wind turbines. However, both of these species are known to roam over relatively large areas (they can often move from 24 to 50 km in a day) in search of food (Howe and Flake 1988, Lewis and Morrison 1978). Also, during winter, cold weather and snow will force large numbers of morning doves to migrate south from the Midwest into Texas. Whether the increasing proliferation of windfarms in Central and South Texas will have any impact on long-distance migratory movements of doves remains to be seen.

ECONOMICS AND AESTHETICS

People in Texas spend more than $2.3 billion dollars annually on activities directly and indirectly related to hunting. In Texas, hunting activities support more than 47,000 jobs, and generate $262 million in state tax revenue and $310 million in federal tax revenue (Congressional Sportsmen's Foundation 2007) Although exact figures are not available on the proportion of this total from the pursuit of upland game birds, we believe it is substantial. For example, a recent survey by the National Wild Turkey Federation found that turkey hunters in Texas spend nearly $300 million annually.

While we do not have numbers on economic impacts of quail and dove hunters in Texas, given the widespread pursuit of these activities, it is probably safe to assume that quail and doves have at least a combined annual economic impact between 500 and 750 million dollars.

Nevertheless, a landowner may find it much more economically attractive to lease land for the placement of wind turbines by energy companies than to lease land for hunting. The problem, however, is that even if the impacts of turbine placement end up being relatively minimal for species such as quail, turkeys and doves, the aesthetic qualities of the landscape may be significantly compromised.

In Texas, rangeland dominated largely by native vegetation is rapidly becoming an ever more valuable commodity. Curiously, virtually all of the wind farms developed in Texas have been placed in rangeland vegetation (Brennan pers. obs.). We find it curious that turbines have largely not been located in croplands. Kuvelesky et al. (2007) noted that there are at least 5 points that support the siting of wind turbine in croplands: (1) there are millions of acres of cropland available, especially acres that are dry land farmed, (2) much of these acres of cropland are in suitable wind corridors, (3) virtually all native vegetation has been removed from these areas, making them largely unsuitable as habitat for most wildlife, (4) these areas already have an existing network of roads, and (5) many such areas are already dotted with wells and pipelines used for oil and gas extraction, indicating that the landowners have experience working with the energy industry.

LACK OF REGULATIONS

Probably the most amazing aspect about the development of the wind energy industry in Texas is that it is completely unregulated. As property owners, we are required to obtain a permit to make even a moderate repair such as remodeling or reroofing to our houses. In contrast, energy companies are allowed to place hundreds of turbines, some more than 100 m tall, without the review or approval of a single state or federal agency. Granted, the associated power lines needed to tie turbines to the electrical grid are subject to permitting processes, but in general such permitting processes are treated as a *fait accompli* by regulatory agencies. The associated fact that federal tax subsidies are needed to make most, if not all, wind energy project economically viable also calls into question whether we should so blithefully subsidizing the potential losses of our wildlife heritage.

A PLEA: SITING WIND FARMS MORE WISELY

In May 2008, The Wildlife Society released a position statement on wind energy development (www.wildlife.org). It is our view that these 12 points, if implemented, would allow us to proceed with wind energy developments in a manner that should minimize the impacts of wind farms on most wildlife species, including upland game birds.

1. Encourage greater coordination among states and provinces and their agencies responsible for wildlife and energy development to ensure consistency in permitting requirements, monitoring and research efforts, and acceptable mitigation, especially for migratory wildlife.
2. Encourage development and consistent implementation of guidelines for siting, monitoring, and mitigation strategies among states, provinces, and federal agencies that establish standards for conducting site-specific, scientifically sound and consistent pre- and post-construction evaluations, using comparable methods as much as is feasible, depending on site characteristics.
3. Advocate for the inclusion of guidelines in the permitting process to further strengthen agency participation and implementation of guidelines.
4. Advocate for the avoidance of siting wind facilities in high-risk areas that are determined based on the best science available.
5. Encourage implementation of on- and off-site habitat mitigation to reduce habitat-related impacts.
6. Encourage priority research that is properly designed and conducted to ensure unbiased data collection that meets peer review and legal standards.
7. Encourage more consistent, longer-term studies that utilize standardized protocols to address specific questions and improve comparability of studies and credibility of efforts.
8. Encourage publication of research results.
9. Encourage regional assessments and forecasting of cumulative land-use and impacts from all sources of energy development, and development of regional conservation strategies among industries, agencies, and private landowners to reduce conflicts and increase options for mitigation and conservation.
10. Educate the public and decision-makers about the natural resources implications of different forms of energy production and encourage efforts to conserve energy.
11. Advocate that decision-makers address impacts of wind energy development on wildlife when approving wind energy projects.
12. Encourage the establishment of cooperative relationships between states, provinces, and federal agencies and wind energy companies.

If the 12-points outlined above were implemented in the process of determining placements and permits for wind energy projects, we would be in a far better position than where we are today with respect to minimizing and mitigating the potential effects of these alternative energy developments on not just upland game birds, but virtually all wildlife. This is especially the case when it comes to identifying the indirect effects of placing wind farms in areas with relatively intact native rangeland vegetation, as well as the contribution of cumulative impacts of wind farms in the greater context of landscape fragmentation and wildlife habitat deterioration.

Whether upland game birds will or won't be negatively impacted by the proliferation of wind farms in states like Texas remains to be seen. However, we see potentially significant causes for concern because: (1) most species of galliforms in the United States are exhibiting long-term population declines related to habitat loss; (2) some species, such as Greater and Lesser prairie-chickens, are potential candidates for listing as threatened or endangered species, and (3) even a widespread and relatively common species such as the mourning dove appears to be exhibiting an incipient downward population trend for unknown reasons. All we are asking is that these species of birds receive some consideration and attention, along with other resident and migratory birds and other wildlife, during the course of planning and developing wind energy projects.

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