

Wind Power Generation: Biological Concerns

Generation of electrical power with wind turbines in Kansas has, until recently, been represented by small-scale domestic generation, often just one wind generator at a farmstead. The start up and early results from the commercial scale wind farm near Montezuma, coupled with financial incentives created by the Kansas legislature, has quickly created strong interest in wind power in the state. While power generation from wind has been generally regarded as a relatively benign form of energy production, recent studies, although limited, indicate that wind power development carries with it potentially serious threats to Kansas' wildlife resources. The following is a summary of potential threats to wildlife as they are currently understood.

Collisions: Perhaps the best recognized threat posed by wind farms is the potential for bird collisions with towers, turbine blades, and transmission lines. Raptor losses have occurred relative to wind power generation, but this has primarily been associated with power lines and generally not with turbines or the towers that support them. Power lines at the facility near Montezuma are mostly underground. It is possible that aircraft warning lights on towers or the sound associated with spinning turbine blades could disorient night-migrating birds. Studies done to date, however, do not indicate that collisions pose a substantial mortality threat to bird populations. Clearly, burying transmission lines associated with wind farms is desirable and siting wind farms away from migration corridors or areas of bird concentration (wetlands) would minimize potential for avian collisions.

Habitat Fragmentation: Many grassland species are associated with large, relatively unbroken expanses of grasslands or shrublands. Perhaps the species most recognized as having such requirements are prairie grouse (In Kansas, greater and lesser prairie chickens). While grassland species are able to tolerate a limited amount of habitat fragmentation, many factors (croplands, oil developments, dispersed residential developments, power lines, etc.) have already created a high degree of fragmentation in much of the state. Additional habitat fragmentation created by wind farms might exacerbate existing threats by further increasing predator access or opportunity (e.g., raptor perches) or by increasing nest parasitism.

Behavioral Avoidance / Habitat Abandonment: Work done at a wind farm in southwestern Minnesota showed a strong avoidance of turbine towers by songbirds. Breeding songbird densities were 4 times greater 180 meters from turbine towers than they were 40 meters from towers, in otherwise similar habitats. The specific mechanisms for this avoidance are unknown, but the researchers suggested that birds could be avoiding the increased human disturbance around towers and maintenance trails, sound created by moving turbine blades, or the turbine movement itself. Research in Europe has shown that the presence of wind turbines prevented the use of otherwise suitable habitat by shorebirds and waterfowl.

On a larger scale, recent telemetry work in southwestern Kansas has provided additional reason for concern. This work, conducted by graduate students of Dr. Robert

Robel (KSU), has shown that lesser prairie chickens avoid manmade structures, keeping anywhere from a quarter mile to one mile away, depending on the size and nature of the structure(s), during critical phases of their life cycle. Studies in the western U.S. have shown that sage grouse, a species with behaviors and habitat requirements similar to prairie chickens, have abandoned leks within 1.4 miles of power lines and sage grouse attendance diminished at leks as far as 3 miles away. While the specific mechanisms are unclear, this avoidance of tall structures may be an instinctive behavioral response that reduces the vulnerability of prairie grouse to avian predators that use elevated sites (natural and manmade) as hunting perches. This suggests that modification of wind turbine and transmission towers to prevent raptor perching would not prevent structure avoidance behavior. Prairie grouse may also react negatively to the sound produced by turbines that could interfere with their communication. A likely consequence of either mechanism is that prairie chickens could abandon extensive tracts around wind farms despite the presence of otherwise good quality habitat.

Potential habitat abandonment by songbirds or prairie chicken populations in Kansas is an unwelcome prospect, particularly given other habitat pressures negatively affecting grassland bird populations. Development of wind farms in Kansas would seem to have the most serious implications for lesser prairie chickens, given their lower overall population numbers and the high degree of overlap between their current range and the geographic availability of wind resources. Another point of consideration is the status of the lesser prairie chicken as a “candidate” species for listing under the Endangered Species Act. The U. S. Fish and Wildlife Service determined in 1997 that listing the species was warranted, but was precluded by higher priorities. Kansas has seen increases in its lesser prairie chicken range in recent years, but development of additional threats to the species’ existing populations could trigger listing. The large size of commercial wind turbines and the resultant need for highly stable foundations may function to prevent wind farm development in areas of deep sandy soils. This might reduce concerns relative to wind power in some sections of Kansas’ remaining sand and sandsage prairies, important but limited habitats for lesser prairie chickens and many grassland songbirds.

General Recommendations: Appropriate siting of any new wind power development is the most critical step that can be taken in addressing the biological concerns outlined above. Clearly, it is important not to place wind farms near bird concentration areas or migration corridors. Locating wind farms in areas that already predominantly consist of farmed cropland would seem most appropriate. Farmed areas are already biologically disrupted and, as a consequence, negative effects on wildlife from wind power generation would probably be less in such areas. If a minimum of 75% of the land within a 3-mile radius of each wind turbine were composed of farmed cropland, negative impacts to wide ranging species such as prairie chickens might be minimized. This 3-mile buffer should exclude any parts of large blocks of grassland, whether they be native prairie or seeded grasslands such as those established through the Conservation Reserve Program. As is the case at the Montezuma site, power lines within the wind farm should be buried. Towers should be designed to prevent perching by raptors. If wind farms are sited on extensive grasslands, mitigation should be considered.