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Putting Aeolus to Work Without the Death Toll: Federal Wind Farm Siting Guidelines Can Mitigate Avian and Chiropteran Mortality

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ABSTRACT

Wind energy will undoubtedly be a part of America's future, and this Article examines a set of federal guidelines for siting wind farms. The Wind Turbine Guidelines Advisory Committee Guidelines (WTGAC Guidelines) use an iterative decision-making process to help site wind farms while minimizing the negative impacts to avian

and chiropteran species. In particular, the Guidelines provide a head start on the data collection necessary for compliance with the Endangered Species Act and the National Environmental Policy Act. The Department of the Interior must accommodate the American Wind Energy Association's concerns with the Draft Land-Based Wind Energy Guidelines in order to push the Guidelines' voluntary label into obsolescence due to near uniform adherence. In addition, the Guidelines must incorporate environmentally friendly technologies into their recommendations or they risk inutility. If the Department of the Interior can produce a set of guidelines that contains the iterative decision-making process of the WTGAC's Guidelines and can be championed by the American Wind Energy Association (AWEA), then it augurs well for the future of the American wind industry and our nation's wildlife.

A mile up in the sky, a bald eagle spots movement on the banks of a small stream cutting across the canyon floor. The eagle turns along the ridge of the canyon to begin its descent upon its unsuspecting prey. With a quick adjustment in its flight path, the eagle positions itself for the kill and drops precipitously toward the canyon floor. Curved talons grip the flesh of a rabbit, and the eagle lurches skyward to enjoy its meal in its nest atop the canyon wall. Reaching the zenith of its flight takes several minutes, but little effort. The eagle, with blood dripping from the lifeless rabbit, itches with anticipation for its long awaited satiation. A blurred movement catches the eagle's eye, but only briefly. Suddenly, the eagle is wrenched from the sky by a force greater than any it has ever felt. A spinning blade shatters the eagle's wing and it plummets to the feet of a monster that even Don Quixote would have avoided. The eponymous talons of the raptor link eagle and rabbit together in death at the foot of this great leviathan. No, this is not the beginning of a work of fiction. Unfortunately, this scene is repeated all too often at American wind farms. To avoid the consequences of anthropogenic climate change, the American people must be weaned off of fossil fuels. Renewable energy sources like wind power can serve our needs with far fewer environmental detriments. It is incumbent upon us to minimize foreseeable and avoidable impacts on wildlife by responsibly siting the coming wind farms.

This Article argues that the best way to protect wildlife while producing wind-generated electricity, which is needed to displace

fossil fuels, is to create a set of regulations based on the Wind Turbine Guidelines Advisory Committee Guidelines/Recommendations' (Guidelines) iterative decision-making process. While the political climate today dictates that any wind farm siting regulations will have to be voluntary, this Article will argue that our best hope is to craft the Guidelines in such a way that the AWEA endorses their use. That endorsement should generate sufficient peer pressure among wind developers to make it an industrial *faux pas* to spurn the Guidelines.

The Wind Turbine Guidelines Advisory Committee Recommendations for wind turbine siting will serve as a framework for the analysis of a hypothetical wind farm. This Article will examine how these Guidelines mesh with the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA), including the ESA's required Incidental Take Permits and Habitat Conservation Plans. The Wind Turbine Guidelines Advisory Committee Recommendations are a step in the right direction because of their potential to reduce impacts on endangered and threatened species of birds and bats. However, there is a real need for policy incentives for the wider implementation of vertical axis wind turbines and other alternative designs. By examining the process of siting decisions through the lens of the Wind Turbine Guidelines Advisory Committee Recommendations, the Endangered Species Act's Section 10 Incidental Take Permits and Habitat Conservation Plans, and the requirements of the National Environmental Policy Act, this Article identifies shortcomings in this process and offers suggestions for implementing a framework that is more protective of wildlife. Used in conjunction, the Wind Turbine Guidelines, NEPA, and the ESA can have positive effects on the siting decisions facing our nation, but only if decision makers produce Guidelines that maintain the wildlife protection benefits of the iterative decision-making process and garner the full endorsement of the AWEA. Providing clean energy while minimizing avoidable impacts on endangered birds and bats is a laudable and attainable goal.

Humanity has harnessed renewable wind energy for thousands of years. Early Dutch windmills epitomize the horizontal axis wind turbine design.¹ That design has been updated with modern materials

¹ E.g., *The Land of the Windmills*, HOLLAND.COM (May 21, 2007 11:58 AM GMT), <http://us.holland.com/e/7779/The%20and%20of%20the%20windmills.php> (describing how water mills arrived in Holland from the Middle East in the early thirteenth century)

to achieve a renewable energy source that produces no direct carbon dioxide emissions.² As described above, the spinning blades of wind turbines kill birds in a gruesome manner,³ but these turbines are by no means the greatest source of avian mortality.⁴ The electricity generating efficiency of horizontal axis wind turbines is dictated by the height of the pole upon which the blades rotate; the swept area, which conceptually follows the blade tips in their circular path of rotation; and the wind's frequency, speed, and direction at the chosen site.⁵ Wind farm developers can achieve greater efficiency on a per

AD and crediting the Dutch with the development and popularization of windmills beginning in the fifteenth century AD).

² Cf. Robert Booth, *Micro-wind Turbines Often Increase CO₂, Says Study*, GUARDIAN (Nov. 29, 2007), <http://www.guardian.co.uk/environment/2007/nov/30/windpower.carbon> (exposing the hidden carbon cost of the manufacture and transportation of small wind generators and suggesting that these home systems may result in a net increase of carbon dioxide emissions unless they are located in an area with high wind resources). Carbon neutrality is only achieved when excluding materials production, transportation, and construction emissions from electricity generating wind turbines. *See id.*

³ *See* U.S. GOV'T ACCOUNTABILITY OFFICE, WIND POWER: IMPACTS ON WILDLIFE AND GOVERNMENT RESPONSIBILITIES FOR REGULATING DEVELOPMENT AND PROTECTING WILDLIFE 9, 14 (2005), *available at* <http://www.gao.gov/new.items/d05906.pdf> [hereinafter GAO WIND POWER IMPACTS] (providing an estimate that ranges from zero bats per turbine per year to thirty-eight bats per turbine per year and indicating that there are currently 16,000 wind turbines in operation in the United States); NATIONAL WIND COORDINATING COMMITTEE, WIND TURBINE INTERACTIONS WITH BIRDS AND BATS: A SUMMARY OF RESEARCH RESULTS AND REMAINING QUESTIONS 4 (Nov. 2004), *available at* http://www.nationalwind.org/assets/archive/Wind_Turbine_Interactions_with_Birds_and_Bats_-_A_Summary_of_Research_Results_and_Remaining_Questions__2004_.pdf [hereinafter BIRDS AND BATS FACT SHEET].

⁴ *See generally, e.g.*, U.S. FISH & WILDLIFE SERV., MIGRATORY BIRD MORTALITY: MANY HUMAN-CAUSED THREATS AFFLICT OUR BIRD POPULATIONS (Jan. 2002), *available at* <http://www.fws.gov/birds/mortality-fact-sheet.pdf> [hereinafter MIGRATORY BIRD MORTALITY] (estimating that building window collisions kill between 97 to 976 million birds each year, communications towers kill between four and fifty million birds annually, and estimating that cars may kill sixty million or more birds annually). The estimates for bird deaths have such an enormous range because of the sheer numbers of birds and structures in the country and the lack of monitoring and recording of bird deaths. *Id.*

⁵ *Swept Area and Rated Power*, POWER-TALK.NET, <http://www.power-talk.net/swept-area.html> (last visited Feb. 9, 2012) (delving into the mathematics behind wind power and also pointing out that air density—air is thinner as the altitude above sea level increases—plays a large role in how much power a turbine can generate); *Tower Height Can Make or Break Your Wind Generation*, POWER-TALK.NET, <http://www.power-talk.net/tower-height.html> (last visited Feb. 9, 2012) (stating that wind speeds increase with altitude and that a doubling of the tower height can put the turbine blades in wind that is ten percent faster and which has a thirty-four percent increase in expected power).

watt basis by erecting larger horizontal axis wind turbine towers. The efficiency of electricity generation, while a major concern in terms of the potential to reduce our nation's CO₂ emissions by narrowing the gap between the price of renewable wind energy and fossil fuel sources, should not be our exclusive concern.

The Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA) often rear their heads whenever a developer proposes a new wind farm. These two statutes have worked in concert for decades to help preserve and protect the nation's environment. There is no doubt that the United States needs to make a drastic shift in how it generates electricity if we are to avoid the negative impacts of global anthropogenic climate change. That shift will require that wind energy make up a much larger proportion of the American energy portfolio. However, there needs to be a reconciliation of our efforts to generate cleaner energy with the ideals expressed in the Endangered Species Act, which recognizes that species have aesthetic and moral value on their own.⁶

The Wind Turbine Guidelines Advisory Committee Recommendations provide a framework for future siting decisions. That framework includes a process of iterative decision making, which takes steps to actively anticipate such seemingly obvious considerations as the migratory path of birds. The Guidelines thereby provide multiple opportunities to make intelligent siting decisions at each Tier. However, these Guidelines contain an underlying bias in favor of horizontal axis wind turbines. That policy-based bias may put many more flying animals at risk than is necessary to achieve the essential shift away from carbon-emitting electricity sources.

I BACKGROUND

Human activity has undeniably changed the natural world during our geologically brief time on this planet. The impacts have been especially transformative since the Industrial Revolution brought

⁶ See *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 177 (1978) (citations omitted, emphasis in original) (stating that "the dominant theme pervading all Congressional discussion of the proposed [Endangered Species Act of 1973] was the overriding need *to devote whatever effort and resources were necessary* to avoid further diminution of national and worldwide wildlife resources. Much of the testimony at the hearings and much debate was devoted to the biological problem of extinction. Senators and Congressmen uniformly deplored the irreplaceable loss to aesthetics, science, ecology, and the national heritage should more species disappear").

mechanization to the everyday lives of the Earth's human citizenry. In the 1960s and '70s, the American public began to demand government action to protect human health and the environment from the scourge of industrial-scale pollution.⁷ Today, that same line of thought is driving environmentalists, politicians, engineers, and economists to push for a drastic change in how Americans produce and consume energy. Wind energy is not a panacea for our country's emissions of CO₂, but it is a much cleaner alternative than our current fuel of choice—coal—and it cannot be ignored if we are to achieve a more sustainable economy.

A. Avian and Chiropteran Mortality

Wind farm impacts on birds and bats are just that: impacts. Avian and chiropteran mortality is a seemingly unavoidable by-product of almost any large man-made structure. Bird and bat collisions with man-made structures occur in massive numbers on an annual basis.⁸ Wind turbines are no exception and kill an estimated 33,000 birds⁹ and 4.3 bats per turbine per year.¹⁰ While this is a much smaller number than those killed by the transportation sector or by buildings, we face a unique opportunity to minimize these deaths because the majority of this country's wind farms and concomitant turbines have not yet been erected.¹¹

⁷ See generally RACHEL CARSON, *SILENT SPRING* (1st ed. 1962) (telling a story of the devastating effects of pesticides and suggesting that the continued use of such chemicals could lead to a spring without any living creatures to fill the air with sound). This book is often credited with awakening the environmental consciousness of the American public at a time when the Earth's limits were beginning to come into focus.

⁸ See, e.g., *MIGRATORY BIRD MORTALITY*, *supra* note 4 (outlining and explaining the huge range in the estimates of birds killed each year by building collisions).

⁹ *Id.* (suggesting that this number is far less than the number of birds killed by domestic rural cats based on study data from Wisconsin that estimated that in that state alone, domestic rural cats killed thirty-nine million birds annually).

¹⁰ See GAO WIND POWER IMPACTS, *supra* note 3, at 14 (giving an estimate that ranges from zero bats per turbine per year to thirty-eight bats per turbine per year and indicating that there are currently 16,000 wind turbines in operation in the United States); BIRDS AND BATS FACT SHEET, *supra* note 3, at 4 (estimating bat mortality at 4.6 bats per installed megawatt capacity rating per year).

¹¹ See GAO WIND POWER IMPACTS, *supra* note 3, at 9 (calculating that in order to reach the Department of Energy's stated goal of generating five percent of American energy from wind power would necessitate the installation of an additional 62,000 1.5MW turbines).

The media has focused on bird fatalities at older wind farms that were poorly sited and used deadlier turbine designs to paint wind farms as the Cuisinarts of the air. Despite the skewed media coverage of avian mortality, bats are also killed in direct collisions with wind turbines and blades. Bats face an additional, and gruesome, threat that results in a bat's instantaneous death without any direct contact with a turbine blade—barotrauma. The speed of wind turbine blade tips is described by the tip speed ratio and can be many times faster than the wind blowing at the site.¹² The Bernoulli Principle,¹³ which stands behind modern air travel, sail-powered vessels, and wind-generated electricity, explains how the pressure differentials between a blade's flat edge and sloped airplane-wing-like curve of the top of the blade generate lift, which can convert kinetic energy into electricity.¹⁴ Wind turbines,¹⁵ sailboat sails,¹⁶ and airplane wings¹⁷ all share the same basic airfoil shape.¹⁸ On an airplane wing, air passes over the two different surfaces of the wing—the flat bottom and the teardrop

¹² *Tip Speed Ratio: How to Calculate and Apply TSR to Blade Selection*, WINDYNATION, <http://www.windynation.com/articles/wind/tip-speed-ratio-how-calculate-and-apply-tsr-blade-selection> (last visited Mar. 7, 2012) (adding that the optimal tip speed ratio for a two-bladed turbine is between six and seven, which means that in a thirty mile per hour wind the blade tips would be traveling at 210 miles per hour). By definition, Tip Speed Ratio is the speed of the blade at its tip divided by the speed of the wind. For example, if the tip of a blade is traveling at 100 mph (161 kph) and the wind speed is twenty mph (32 kph or 9 m/s), then the TSR is five (100mph/20 mph). Simply put, the tip of the blade is traveling five times faster than the speed of the wind.

¹³ *Airfoils and Lift*, THE AVIATION HISTORY ONLINE MUSEUM, <http://www.aviation-history.com/theory/airfoil.htm> (last updated Dec. 13, 2009) (“Bernoulli found that within the same fluid, in this case air, high speed flow is associated with low pressure, and low speed flow with high pressure.”).

¹⁴ *Wind Turbine Blades*, HOMEWIND.NET, <http://www.homewind.net/windturbine-blades.html> (last visited Feb. 9, 2012) (laying out Bernoulli's principle, which states that when a fluid is accelerated its pressure is lowered in a compensatory mechanism that leads to the pressure differentials that create lift force when the pressure approaches equilibrium, and identifying a two-way exchange in technological advances between wind turbine designers and wind-sport enthusiasts).

¹⁵ David Levin & Dan Hart, *Lift and Drag*, NOVA (Sept. 30, 2010), <http://www.pbs.org/wgbh/nova/space/lift-drag.html> (identifying the airfoil shape as the source of lift in wind turbines which turns the blades and spins the electric generator).

¹⁶ Robin C. Evans, *How a Sail Boat Sails Into the Wind*, REPORTS ON HOW THINGS WORK, http://web.mit.edu/2.972/www/reports/sail_boat/sail_boat.html (last visited Feb. 9, 2012) (describing how the sail acts as an airfoil and the boat hull acts as a hydrofoil that together allow the sail boat to sail into the apparent direction of the wind).

¹⁷ Mealani Nakamura, *Air Foil*, REPORTS ON HOW THINGS WORK, <http://web.mit.edu/2.972/www/reports/airfoil/airfoil.html> (last visited Feb. 9, 2012) (adding that the Euler Equation is also used to explain the fluid dynamics that create lift in airplane wing).

¹⁸ See Levin & Hart, *supra* note 15; see also Evans, *supra* note 16.

shaped curved top—at different speeds. The air passing over the bottom flat edge travels more slowly across the wing than the air passing over the curved top edge. The differences in air speed also create differences in air pressure. The bottom edge of an airplane wing is pushed upwards by the higher air pressure created by the discrepancy in air speed as it passes over the wing. A modern wind turbine blade is shaped much like an airplane wing and generates electricity by harnessing the phenomenon of pressure equalization—where air moves from areas of relatively high pressure to areas of relatively low pressure to reach a state of equilibrium—from differing air speeds and using it to propel an electric generator. The air pressure in the immediate vicinity of a spinning wind turbine blade is lower than that of the ambient air. Without air pressure differentials and the constant struggle toward equilibrium, wind turbines would not generate electricity efficiently. Barotrauma is an unfortunate result that occurs when an errant chiropteran comes in close proximity to the vortices and pressure differentials created by spinning turbine blades.

Death by barotrauma occurs in an almost unthinkable manner. When a bat enters a zone of air that has a drastically lower pressure than the surrounding air, the bat’s tiny lungs expand to the point that they literally explode. When scouring the ground at a wind farm, scientists often find the tiny carcasses of bats without any external physical injuries. Autopsies reveal that the bat’s lungs have huge lesions and have ruptured in the chest cavity.¹⁹ Barotrauma in bats is avoidable. To reduce chiropteran mortality, a wind farm must slow down or shut down its turbines at times that bats are active. This puts

¹⁹

Table 1. Injuries observed in bats killed at wind turbines in south-western Alberta, Canada.

	<i>L. cinereus</i>	<i>L. noctivagans</i>	<i>Other species</i>	<i>Total</i>
No external injury	38% (103)	55% (77)	75% (8)	46% (188)
Internal haemorrhage	90% (48)	96% (26)	100% (1)	92% (75)
Pulmonary lesions	100% (6)	100% (8)	100% (3)	100% (17)

Internal haemorrhage was detected by visual examination of dissected carcasses, while pulmonary lesions were detected using stained histological sections. Numbers in parentheses are sample sizes.

Erin F. Baerwald *et al.*, *Barotrauma is a Significant Cause of Bat Fatalities at Wind Turbines*, 18 CURRENT BIOLOGY R695, R696 (2008), available at <http://download.cell.com/current-biology/pdf/PIIS0960982208007513.pdf?intermediate=true> (last visited Feb. 10, 2012) (“Bats’ large pliable lungs expand when exposed to a sudden drop in pressure, causing tissue damage, whereas birds’ compact, rigid lungs do not.”).

bats in direct conflict with a farm's generating capacity, which greatly influences the price of the electricity generated and therefore the farm's overall viability. Policymakers can fill the lacunae between chiropteran barotrauma and a farm's generating capacity by incorporating incentives to site wind farms away from areas of high bat activity, operate turbines at slower speeds at night, or change the design of turbines. The two main types of vertical axis wind turbines—drag-based and lift-based turbines—operate close to the ground where slower wind speeds prevent the turbines from spinning fast enough to lower the ambient air pressure to a level that causes barotrauma. Policy incentives that support vertical axis turbines will help to avoid barotrauma in bats.

1. Wind Farm Impacts on Wildlife: Myths and Reality

The following will describe some of the extreme examples of wind farm impacts on wildlife. Beginning with the deadliest wind farm in the world, the Altamont Pass wind farm in California, we will explore some of the major findings on the impacts that wind farms have on wildlife. Next, this section will summarize several scientific studies that attempt to quantify the rate of avian and chiropteran mortality occurring at other large wind farms in the United States. Finally, this section will discuss additional major sources of avian and chiropteran mortality and will conclude with an attempt to contextualize these death tolls from wind farms.

a. Altamont Pass Wind Farm

Altamont Pass Wind Farm is located in the Altamont Pass in California and is one of the oldest and largest wind farms in the United States.²⁰ The turbines at Altamont Pass are constructed using latticed towers—resembling radio communication towers with turbine blades at the zenith of the tower—and are capable of generating 576 megawatts of electricity on an annual basis.²¹ The 5000–7000 turbines

²⁰ See, e.g., Melissa Lowitz, *Altamont Pass, California*, ENCYCLOPEDIA OF EARTH (last updated Aug. 18, 2011, 5:52 PM, http://www.eoearth.org/article/Altamont_Pass,_California (noting that Altamont Pass Wind Farm's 4800 small wind turbines are configured in the highest concentration of any wind farm in the world).

²¹ See *id.* (describing the towers as sixty to eighty feet tall, which is less than half the height of modern turbines, and indicating that these older turbines produce much less electricity; therefore many more turbines are required as compared to the taller modern turbines).

at Altamont Pass kill approximately 4700 birds each year.²² The incredibly high death toll at the Altamont Pass Wind Farm is a direct result of a poor siting decision coupled with both an inferior wind turbine design and a high prevalence of prey in an active raptor migratory route.²³

There is some cause for hope despite estimates that the Altamont Pass Wind Farm has taken the lives of some 22,000 birds during its years in operation.²⁴ The Altamont Pass Wind Farm is scheduled to have all of its outdated turbines replaced with more modern turbines that have taller, nonlatticed towers with blades that spin at a much slower velocity and that can generate more electricity than the existing turbines. This improvement will greatly reduce the concentration and number of turbines at the site.²⁵ The reduction in the number of spinning turbines will greatly diminish avian mortality

²² Jennifer Bogo, *How the Deadliest Wind Farm Can Save the Birds: Green Machines*, POPULAR MECHANICS (Sept. 14, 2007, 3:09 AM), <http://www.popularmechanics.com/science/environment/green-energy/4222351> (adding that of those 4700 annual avian deaths, nearly 1300 are raptors including the golden eagle, which is federally protected under the Endangered Species Act). *See also* CTR. FOR BIOLOGICAL DIVERSITY, FACT SHEET ON ALTAMONT PASS BIRD KILLS, http://biologicaldiversity.org/campaigns/protecting_birds_of_preym_at_altamont_pass/pdfs/factsheet.pdf (last visited Feb. 8, 2012) (providing estimates on the number of bird kills and stating that “[w]ind turbines at Altamont Pass kill an estimated 880 to 1300 birds of prey each year, including up to 116 golden eagles, 300 red-tailed hawks, 380 burrowing owls, and additional hundreds of other raptors including kestrels, falcons, vultures, and other owl species”).

²³ *E.g.*, Dan Fink, *Small Wind Turbine Basics: Part 3*, ENERGY SELF SUFFICIENCY NEWSL., Sept. 2005, at 11, 15, <http://www.green-trust.org/freebooks/wind1-3.pdf> (crediting the Altamont Pass bird kills for the genesis of the wind farm derisive phrase, “Cuisinart in the sky,” and pointing out that the largest sources of avian mortality are actually power lines, communications towers, pesticides, and domestic cats).

²⁴ *See* Frances Cerra Whittelsey, *The Birds and the Breeze: Making Wind Power Safe for Wildlife*, SIERRA MAG. (Jan./Feb. 2007), available at <http://www.sierraclub.org/sierra/200701/birds.asp> (citing Altamont Pass’s 22,000-bird death toll, which includes at least 400 federally protected golden eagles, as one of the reasons why wind turbines have earned the derogatory epithet, “Cuisinart of the air”). The author also pointed out that there were at least 22,000 bird deaths, which suggests that there could be many more kills than were actually documented. *Id.*

²⁵ Michael Distefano, *The Truth About Wind Turbines and Avian Mortality*, SUSTAINABLE DEV. L. & POL’Y, Fall 2007, at 10 (illustrating the potential reduction in bird collisions by citing a wind farm in New York that uses 195 modern wind turbines to produce 320 megawatts per year, which represents an efficiency ratio that is more than twenty times greater than what Altamont’s 7000 turbines generate (600 megawatts)). *See also* Whittelsey, *supra* note 24 (stating that one modern turbine will replace fifteen Altamont Pass wind turbines over the next decade while maintaining the total generative capacity of the wind farm).

due to a reduction in potential collisions. Additionally, modern turbines rotate at a much higher altitude than those previously used at Altamont, which will leave more room for raptors and other birds to fly beneath the blades of the new turbines.²⁶

b. Outdated Studies on Impacts

Turbine design has come a long way since the advent of the modern-era electricity generating wind turbines. It is that same advance in technology that should relegate early studies on avian and chiropteran mortality to an inutile corner of modern science. Unfortunately, wind energy critics have bandied about outdated studies that stem from a time when wind turbine technology might have fairly garnered the bird-killing reputation.²⁷ There is a vast difference in the mortality associated with wind farms of yesterday and today. This discrepancy can be explained by advances in turbine design;²⁸ the use and improvement of pre-siting environmental impact assessments; and the increase in turbine generating efficiency, which reduces the overall number of turbines required at a given site.

²⁶ See BIRDS AND BATS FACT SHEET, *supra* note 3, at 1 (noting that early turbines were mounted on towers sixty to eighty feet in height and had rotors fifty to sixty feet in diameter that turned sixty to eighty revolutions per minute (rpm)). Today's land-based wind turbines are mounted on towers 200–260 feet in height with rotors 150–260 feet in diameter, resulting in blade tips that can reach over 425 feet above ground level. *Id.*

²⁷ John Laumer, *Common Eco-Myth: Wind Turbines Kill Birds*, TREEHUGGER, (Apr. 6, 2006), <http://www.treehugger.com/renewable-energy/common-eco-myth-wind-turbines-kill-birds.html> (exposing the misconception about incredibly high bird mortality at wind farms by explaining how the older turbines with small blades—which have a lower surface area than modern high capacity turbines and therefore have to spin at a faster rate to generate the same amount of electricity—were the subject of pre-2000 studies on the mortality of flying species). Additionally, this Article points to siting decisions that situated older wind farms across migratory paths and in other areas that had a high incidence of birds. *Id.*

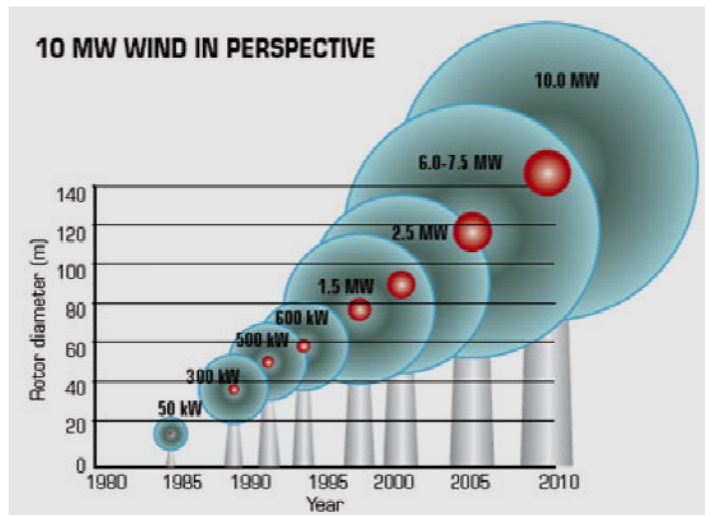
²⁸ See U.S. DEP'T OF ENERGY, 20% WIND ENERGY BY 2030: INCREASING WIND ENERGY'S CONTRIBUTION TO U.S. ELECTRICITY SUPPLY 25 (July 2008), available at <http://eere.energy.gov/wind/pdfs/41869.pdf> [hereinafter 20% WIND ENERGY BY 2030] (“Modern wind turbines . . . have three-bladed rotors with diameters of 70 m to 80 m mounted atop 60-m to 80-m towers . . . [t]ypically installed in arrays of 30 to 150 machines, the average turbine installed in the United States in 2006 can produce approximately 1.6 megawatts (MW) of electrical power”); see also *Wind Turbines Go Super-Sized*, ENERGY EFFICIENCY AND TECH. (Sept. 1, 2009, 12:00 PM), <http://eetweb.com/wind/wind-turbines-go-supersized-20091001/> (describing a ten megawatt wind turbine that would be as tall as a fifty story building).

The table below synthesizes the results of studies from the early 2000s on avian mortality at U.S. wind farms.²⁹

Table 1—Estimates of avian collision mortality by wind projects

Location of study ¹	No. turbines	No. MW	No. birds/ turbine/year	No. birds/ MW/year	No. raptors /turbine/year	No. raptors /MW/year
West (excluding California)						
Stateline, Oregon/Washington	454	300	1.69	2.56	0.053	0.080
Vansycle, Oregon	38	25	0.63	0.96	0.000	0.000
Klondike, Oregon	16	24	1.42	0.95	0.000	0.000
Nine Canyon, Washington	37	48	3.59	2.76	0.065	0.050
Footc Creek Rim, Wyoming	105	68	1.50	2.34	0.035	0.053
Subtotal	650	465	1.71	2.40	0.044	0.068
Upper Midwest						
Wisconsin (MG&E and PSC)	31	20	1.30	1.97	0.000	0.000
Buffalo Ridge, Minnesota	354	233	2.86	4.21	0.002	0.008
Subtotal	386	254	2.73	4.03	0.002	0.008
East						
Buffalo Mountain, Tennessee	3	2	7.70	11.67	0.000	0.000
Grand Total	1039	721	2.11	3.04	0.029	0.045
California (older projects)						
Altamont, California	~5400	548	na ²	na	0.100	na
Montezuma Hills, California	600	60	na	na	0.048	na
San Geronimo, California	~2900	300	2.31	na	0.010	na
Subtotal	~8900	878	na	na	0.067	na
Total fatality projections		Overall	Outside California			
Projected annual bird fatalities ³		20,000-37,000	9200			
Raptors ⁴		933	195			

¹We excluded studies of 4 small project sites in Vermont, Pennsylvania, Colorado, and Iowa that were conducted short-term and/or did not include adjustments for scavenging and searcher efficiency bias.
²Not available; data on scavenging or searcher efficiency or average MW of study turbines not available.
³The per turbine/year and per MW/year estimates applied to the number of MW in U.S. at the end of 2003.
⁴Based on the per turbine estimate in California (11,500 turbines) and the per MW basis outside California.



Id. (portraying both the increase in rotor diameter and the drastic increase in tower height since the genesis of the modern electricity-generating wind turbine).

²⁹ WALLACE P. ERICKSON ET AL., USDA FOREST SERVICE GEN. TECH. REP. PSW-GTR-191.2005, A SUMMARY AND COMPARISON OF BIRD MORTALITY FROM ANTHROPOGENIC CAUSES WITH AN EMPHASIS ON COLLISIONS 1035 (2005), available at <http://studentaffairs.case.edu/farm/doc/birdmortality.pdf>.

Another table³⁰ from Erickson's study projects the annual avian mortality from all anthropogenic sources.

Table 2—Summary of predicted annual avian mortality.

Mortality source	Annual mortality estimate	Percent composition
Buildings ¹	550 million	58.2 percent
Power lines ²	130 million	13.7 percent
Cats ³	100 million	10.6 percent
Automobiles ⁴	80 million	8.5 percent
Pesticides ⁵	67 million	7.1 percent
Communications towers ⁶	4.5 million	0.5 percent
Wind turbines ⁷	28.5 thousand	<0.01 percent
Airplanes	25 thousand	<0.01 percent
Other sources (oil spills, oil seeps, fishing by-catch, etc.)	not calculated	not calculated

¹Mid-range of fatality estimates reported from Klem (1990), 1 – 10 bird fatalities per house, extrapolated to 100 million residences

²Based primarily on a study in the Netherlands (Koops 1987), extrapolated to 500,000 miles of bulk transmission line in U.S.

³One study in Wisconsin estimated 40 million (Coleman and Temple 1996), there are 60 million cats claimed as pets in the U.S.

⁴Based primarily on one study in England (Hudson 1965, Banks 1979) that estimated 15.1 fatalities/mile of road each year, no searcher efficiency or bias adjustments in that study, updated based on increase in vehicle registrations

⁵Conservative estimate using low range of empirical fatality rate (0.1 to 3.6 birds/acre), studies typically adjusted from searcher efficiency and scavenging

⁶Estimates from models derived by Manville and Evans (M. Manville, pers. comm.)

⁷Mid-range of per turbine and per MW estimates derived from empirical data collected at several wind projects (table 1).

The incredibly low projected percentage of avian deaths stemming from wind turbines raises questions about the utility of implementing stringent wind farm siting guidelines. What distinguishes wind farms from many of the other anthropogenic causes of avian mortality is that the vast majority of U.S. wind farms have yet to be constructed.³¹ The 550 million annual bird deaths from collisions with buildings are bound by the constraints of human economics to continue.³² There is no great advance in building design that is currently within the realm of economic possibility that can protect birds from collisions. On the other hand, new wind turbine technology incorporates a panoply of advances that can reduce avian mortality. These bird-friendly technologies, discussed below, can be implemented in newer wind farms to reduce mortality. Bird and bat mortality stands to drop, in part, because the majority of wind farms have not yet been sited and are not yet in operation. In spite of Erickson's projected annual mortality from wind farms, there is a real need to better plan for avian

³⁰ *Id.* at 1039.

³¹ *E.g.*, 20% WIND ENERGY BY 2030, *supra* note 28, at 145 (stating that in order to reach the Department of Energy's Office of Energy Efficiency and Renewable Energy target of twenty percent of U.S.-generated electricity coming from wind power, the installation rate would need to be increased from three gigawatts per year in 2006 to sixteen gigawatts per year by 2018).

³² See Erickson, *supra* note 29, at tbl. 2 (ascribing the 550 million birds killed to 58.2% of the total projected anthropogenic avian deaths per annum).

and wind farm interactions because of the relative infancy of the U.S. wind energy sector.³³

c. Mitigation Technologies

There are several bird-friendly wind turbine technologies and wind farm siting methodologies that have real potential to reduce the impact that America's wind farms have on endangered birds. Using tubular turbine towers, as opposed to the latticed towers at Altamont Pass, is both an obvious and effective means of reducing the allure of wind farms to birds.³⁴ Another possible technique to reduce the impacts that wind farms have on birds is the use of micrometeorology—where scientists measure how wind flows across a given site and compare that data to how birds utilize the same area—which can help to place turbines in the most unobtrusive location at a given site.³⁵ Using micrometeorology, wind farms can be sited in a configuration that leaves enough space between turbines to allow birds to fly through the farm with a much lower risk of impacts.³⁶

Changing the predominant color of turbine blades is another tool that can help minimize bird kills by making the blades more visible to

³³ 20% WIND ENERGY BY 2030, *supra* note 28, at 133. In its Annual Energy Outlook 2007, the U.S. Energy Information Administration (EIA) estimates that U.S. electricity demand will grow by thirty-nine percent from 2005 to 2030, reaching 5.8 billion megawatt-hours (MWh) by 2030). *Id.* at 2. To meet twenty percent of that demand, U.S. wind power capacity would have to reach more than 300 gigawatts (GW) or more than 300,000 megawatts (MW). *Id.* This growth represents an increase of more than 290 GW within twenty-three years. *Id.*

³⁴ See generally AM. WIND ENERGY ASS'N, FACTS ABOUT WIND ENERGY & BIRDS, available at http://www.dmmv.virginia.gov/DE/Alternative_Fuels/AvianFactSheet.pdf [hereinafter FACTS ABOUT WIND ENERGY & BIRDS] (noting that several avian experts have suggested that reducing the number of available perches in a wind farm can reduce overall raptor activity at the site). *But see* U.S. FISH & WILDLIFE SERV., WIND TURBINE GUIDELINES ADVISORY COMMITTEE RECOMMENDATIONS 45 (Mar. 4, 2010), available at http://www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf [hereinafter GUIDELINES] (questioning whether tubular towers reduce collisions, but suggesting that “when practical use tubular towers or best available technology to reduce ability of birds to perch and to reduce risk of collision”).

³⁵ See FACTS ABOUT WIND ENERGY & BIRDS, *supra* note 34, at 3 (voicing an opinion found in a European study on wind turbine placement, which stated that if the turbines are spaced more widely apart as viewed from the direction of the migratory path of birds, then there would be fewer kills).

³⁶ *Id.*

birds and less attractive to insects. Most turbine blades are painted white or a light grey, colors which are not particularly visible to a bird's eye and that also attract insects, which in turn lures in the birds and bats that feed on them. In one study, scientists found that the color purple was the least attractive color to insects.³⁷ Several studies have sought out the perfect combination of ultraviolet paint, various patterns, and reflective strips on the turbine blades to reduce avian mortality. Unfortunately, the results have not yielded a surefire and cost-effective solution.³⁸

There is one final avenue that wind energy developers could explore to minimize the avian death toll at wind farms. Developers could use vertical axis wind turbines (VAWTs) in the interstices between the much larger horizontal axis wind turbines (HAWTs). Wind Harvest International produces a Darrieus wind turbine—which is a VAWT that looks like a giant eggbeater—that can be placed in groups of three or more between two HAWTs.³⁹ The three or more VAWTs are placed in close proximity to each other and aligned in such a way that the turbines' rotational axes spin in opposing directions.⁴⁰ The divergent rotation helps to create a vortex that

³⁷ Matt Walker, *Wind Turbines Wrong Colour for Wildlife*, BBC EARTH NEWS (Oct. 15, 2010), http://news.bbc.co.uk/earth/hi/earth_news/newsid_9067000/9067721.stm (cautioning that there should not be a rush to paint every turbine purple, but rather that findings do “imply that changing a turbine's colour could have a profound impact on the number of insects it lures in and therefore the number of birds and bats that follow”).

³⁸ Compare NAT'L RENEWABLE ENERGY LAB., COMPARISON OF AVIAN RESPONSES TO UV-LIGHT-REFLECTIVE PAINT ON WIND TURBINES 15 (Jan. 2003), available at <http://www.nrel.gov/wind/pdfs/32840.pdf> (concluding that further studies are needed because this study did “not provide strong evidence that there is a difference in bird use, mortality, or risk between turbine blades painted with a UV-light reflective paint and those painted with conventional paint”) with NAT'L RENEWABLE ENERGY LAB., MINIMIZATION OF MOTION SMEAR: REDUCING AVIAN COLLISIONS WITH WIND TURBINES 28–29 (Aug. 2003), available at <http://www.nrel.gov/docs/fy03osti/33249.pdf> (noting that a single turbine blade painted solid black reduces the problem of motion smear—the degradation of the visibility of rapidly moving objects—and makes the spinning turbine blade easier for birds to see).

³⁹ See Megan Treacy, *Vortex-Creating Wind Turbines Could Double Wind Farm Output*, ECOGEEK.ORG (Mar. 24, 2010), <http://www.ecogeek.org/component/content/article/3114> (indicating that the VAWTs are calibrated to operate in clockwise and counter-clockwise rotation, which in turn creates a vortex that can increase the localized wind speed by up to two times the rate of speed without the VAWTs).

⁴⁰ See Michael Kanellos, *Can This Egg Beater Double the Power Output of Wind Farms?*, GREENTECHMEDIA (Mar. 24, 2010), <http://www.greentechmedia.com/articles/read/can-this-egg-beater-double-the-power-output-of-wind-farms/> (observing that the localized wind speed increases when the VAWTs are placed as close together as one meter apart; that by placing VAWTs between HAWTs there is an increase in overall efficiency of energy capture, which in turn negates some of the problems inherent in the

increases localized air speed, which is then captured by the other turbines.⁴¹ By increasing the generative capacity at a given site—for example, by using three of Wind Harvest International’s seventy-five kilowatt VAWTs between every pair of 1.5 megawatt HAWTs—the total amount of acreage required is reduced, thereby diminishing the amount of habitat disrupted and the likelihood of bird strikes. Given this VAWT technology, there is a vast amount of unharvested wind blowing between each pair of HAWTs on every U.S. wind farm currently in operation. There should be policy incentives for developers to maximize the total electricity generated at each wind farm in a manner that reduces the likelihood of avian or chiropteran mortality.

d. Myths

With the increasing importance of a switch from carbon intensive fossil fuels to renewable energy sources such as wind, there has been an uptick in the NIMBY⁴² phenomenon. Fears of negative impacts from wind farms are wide-ranging and are fueled by high profile stories of turbine disasters.⁴³ There are commentators who have been

unpredictability of the wind; and that lower altitude VAWTs could help to boost wind speeds at the higher altitudes where the HAWTs collect kinetic energy from the wind). *See also* Hamish Pritchard, *Schools of Fish Help Squeeze More Power from Wind Farms*, BBC NEWS (Aug. 8, 2011), <http://www.bbc.co.uk/news/science-environment-14452133> (presenting the results of Caltech’s study on wind turbine alignment that based the configuration on the lessons learned from the fluid dynamics of schooling fish—which align themselves in the vortices of the other fish to maximize forward propulsion—and recording a tenfold increase in the amount of electricity generated with the new configuration).

⁴¹ *See* Kanellos, *supra* note 40.

⁴² *See NIMBY Definition*, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/dictionary/nimby> (last visited Mar. 7, 2012) (noting that the term, which stands for “not in my backyard,” had a first recorded usage dating back to 1980 and means: “opposition to the locating of something considered undesirable (as a prison or incinerator) in one’s neighborhood”). *See also* Erin McManus, *Renewable Energy is Great, Just Not in My Back Yard*, BNA STATE TAX BLOG (June 3, 2011), <http://www.bna.com/renewable-energy-great-b2147484831/> (lamenting the fact that most Americans are in favor of the expanded use of wind-generated electricity to reduce dependence on foreign oil but that when it comes to siting a wind farm near their own homes, those same people put up a monstrous fight to keep the turbines from dotting their views).

⁴³ *See, e.g.*, Dave Levitan, *Fears of Radar Interference Threaten Oregon Wind Farm, but Solutions Exist*, INSIDECLIMATE NEWS (Apr. 19, 2010), <http://insideclimatenews.org/news/20100419/fears-radar-interference-threaten-oregon-wind-farm-solutions-exist> (describing how the spinning blades of wind turbines interfere with older radar systems

trying to dispel some of the more specious and progress-blocking myths.⁴⁴ With any increase in the use of a relatively new technology there will be doubters sounding the clarion call for caution, whether or not their focus is turned upon the appropriate danger. It is certainly worth evaluating the potential risks that could stem from wind farms, but the trumped up claims of an endless array of dangers from wind power do not mesh with reality. The obstacles facing wind energy are many, but this Article will only attempt to address how to minimize wildlife impacts at wind farms.

B. Existing Federal Environmental Laws: ESA and NEPA

The following section will provide an overview of the portions of the Endangered Species Act⁴⁵ (ESA) and the National Environmental Policy Act⁴⁶ (NEPA) that are directly relevant to wind farm siting

and “lose” airplanes flying nearby but also noting that modern computer systems filter out the interference). The article also cited an American Wind Energy Association report that indicates that more than 9000 MW of wind power have been delayed, deferred, or abandoned due to issues with radar interference raised by the United States Department of Defense. *Id.* See also Simone Kaiser & Michael Fröhlingdorf, *The Dangers of Wind Power*, BLOOMBERG BUSINESSWEEK (Aug. 24, 2007), http://www.businessweek.com/globalbiz/content/aug2007/gb20070824_562452.htm (recounting a tale of malfunctioning turbines flinging turbine blades hundreds of feet in the German countryside); Margareta Pagano, *Are Wind Farms a Health Risk? U.S. Scientist Identifies ‘Wind Turbine Syndrome’*, INDEPENDENT (Aug. 2, 2009), <http://www.independent.co.uk/environment/green-living/are-wind-farms-a-health-risk-us-scientist-identifies-wind-turbine-syndrome-1766254.html> (ascribing heart disease, tinnitus, vertigo, panic attacks, migraines, and sleep deprivation to the noise created by a spinning turbine blade and applying the moniker, Wind Turbine Syndrome to “disruption or abnormal stimulation of the inner ear’s vestibular system by turbine infrasound and low-frequency noise, the most distinctive feature of which is a group of symptoms which [Dr. Nina Pierpont] calls visceral vibratory vestibular disturbance, or VVVD”).

⁴⁴ Laumer, *supra* note 27 (comparing avian deaths from wind farms to those caused by feral cats, phone towers, and other buildings and clarifying that much of the public misconception about bird deaths stem from the Altamont Pass and its outdated turbine design); Josh Kennedy, *Demystifying Common Myths of Wind Power*, CLEANTECHIES, (May 25, 2010), <http://blog.cleantechies.com/2010/05/25/demystifying-common-myths-wind-power/> (noting that modern asynchronous turbines spin at approximately twelve revolutions per minute, making them easier for birds to see and avoid, and also noting that highway noise is considerably louder than that encountered at a wind farm). It is important to note again that wind turbines do in fact cause avian and chiropteran mortality and that the reason this is an important avenue for meaningful policy changes is that the majority of the United States’ wind farms have yet to be erected. See textual discussion and GAO WIND POWER IMPACTS, *supra* note 3, at 9; see also textual discussion and 20% WIND ENERGY BY 2030, *supra* note 28.

⁴⁵ Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (1973).

⁴⁶ National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370h (1969).

issues. These provisions will be used as a backdrop for evaluating the efficacy of the Wind Turbine Guidelines Advisory Committee Recommendations in terms of compliance with existing environmental law and in terms of the protections afforded to birds and bats. It is apparent that wind farm developers have a preexisting obligation to adhere to the requirements found in the ESA and NEPA, but it is important to analyze whether the Guidelines, if adopted by the Secretary of the Interior, would proscribe activities with the same strictness as existing federal environmental law.

1. The Endangered Species Act

The Endangered Species Act is one of the most comprehensive and protective pieces of extant legislation.⁴⁷ What separates the ESA from other federal environmental laws is that it has the power to, and has in fact, overpowered and outweighed massive economic interests.⁴⁸ After the Secretary of the Interior lists a species as endangered or threatened, pursuant to ESA section 4, that species is afforded wide-ranging protections against actions by the federal government and private citizens.⁴⁹ Section 9 of the ESA prohibits the importation, taking,⁵⁰ possession, sale, and violation of any species-specific regulations for threatened and endangered species.⁵¹ “The term ‘take’ means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”⁵² Section 10 provides the basis for the Incidental Take Permits, which will be of

⁴⁷ *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978) (stating that “[a]s it was finally passed, the Endangered Species Act of 1973 represented the most comprehensive legislation for the preservation of endangered species ever enacted by any nation. Its stated purposes were ‘to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved,’ and ‘to provide a program for the conservation of such . . . species . . .’. In furtherance of these goals, Congress expressly stated in § 2(c) that ‘all Federal departments and agencies shall seek to conserve endangered species and threatened species. . .’” (citations omitted)).

⁴⁸ *See, e.g., id.* (granting an injunction halting the operation of a nearly completed 100 million dollar dam on the Tellico River because the impoundment of water above the dam would have destroyed the critical habitat of the snail darter, a three-inch-long fish thought to only exist in that section of the river).

⁴⁹ 16 U.S.C. § 1533 (noting that listing should be based on the best scientific and commercial data available).

⁵⁰ *Id.* § 1532(19) (“The term ‘take’ means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”).

⁵¹ *Id.* §§ 1538(a)(1)(A)–(G), (a)(2)(A)–(E).

⁵² *Id.* § 1532(19).

particular relevance in the wind farm context because farms may come into conflict with the migratory paths of endangered bird species.⁵³ The following subsections will describe in detail how ESA sections 7, 9, and 10 will affect the future development of wind farms in the United States.

a. Incidental Take Permits and Habitat Conservation Plans

ESA sections 9 and 10 serve respectively as the prohibition against detrimental activities to a listed species and as the exception to that prohibition. To obtain an Incidental Take Permit for nonmarine species, an applicant must submit an application to the United States Fish and Wildlife Service (USFWS).⁵⁴ The actual text of the ESA will serve as a useful point of reference for the discussion that follows.⁵⁵ Of particular relevance is the language contained in ESA §§ 10(a)(1)(B) and 10(a)(2)(A)(i)–(iv), which collectively provide the specific circumstances in which the Secretary of the Interior may issue an Incidental Take Permit.⁵⁶

As its name suggests, an Incidental Take Permit gives its holder permission to operate a facility that “takes” listed species as an attendant consequence of its operation.⁵⁷ That permission is granted only if the applicant submits a Habitat Conservation Plan⁵⁸ that specifies the likely impacts from the takings; the steps the applicant will take to minimize and mitigate the impacts (including making funds available to take such steps); the alternative actions that the

⁵³ *Id.* §§ 1539(a)(1)(B)–(a)(2)(A) (encompassing the Incidental Take Permit program and the Habitat Conservation Plans, which must accompany any application to the Secretary of the Interior (who has jurisdiction over terrestrial species) before he or she may issue a permit).

⁵⁴ *See id.* §§ 1539(a)(1)–(2).

⁵⁵ *Id.* The requirements for the issuance of an Incidental Take Permit can be found in Appendix A.

⁵⁶ *Id.* §§ 1539(a)(1)(B), (2)(A)(i)–(iv).

⁵⁷ Sabrina C.C. Fedel, *A Cause of Action for “Taking” of Wildlife under the Endangered Species Act of 1923 (ESA)*, in 13 CAUSES OF ACTION 2d 273. (1999) (“While taking is generally prohibited, exceptions are allowed both in the ESA and its implementing regulations . . . [t]he regulations specifically except takings that are ‘incidental.’ Incidental takings are defined as ‘takings that result from, but are not the purpose of, carrying out an otherwise lawful activity . . .’” (citations omitted)).

⁵⁸ *See* Jamison E. Colburn, *The Indignity of Federal Wildlife Habitat Law*, 57 ALA. L. REV. 417, 451 (2005) (“The Habitat Conservation Plan (HCP) has garnered much academic attention from habitat conservationists and property rights advocates alike. HCPs are created in exchange for permits to engage in otherwise prohibited activities (potentially reducing the species’ survival prospects), leading many to reject and others to applaud them on principle.”).

applicant considered and the reasons why the applicant decided not to implement those alternatives; and such other measures that the Secretary may require as being necessary or appropriate for the purposes of the Habitat Conservation Plan.⁵⁹ The Habitat Conservation Plan is the quid pro quo for the authorization to legally kill an endangered species.⁶⁰ Critics have pointed out that Habitat Conservation Plans do not independently work toward the recovery of a species and that issuance of a section 10 permit must only avoid appreciably reducing the likelihood of the survival and recovery of the species in the wild.⁶¹

The killing of birds and bats accompanies wind farm operation, but the deaths are neither an integral nor a desired part of the production of electricity. The taking of a listed endangered species at a wind farm is illegal absent a section 10 Incidental Take Permit.⁶² Therefore, the wind farm operator must possess authorization in advance via an Incidental Take Permit for takings of listed species that occur incidentally to the farm's operation.⁶³

⁵⁹ 16 U.S.C. §§ 1539 (a)(2)(A)(i)–(iv).

⁶⁰ See, e.g., J.B. Ruhl, *How to Kill Endangered Species, Legally: The Nuts and Bolts of Endangered Species Act "HCP" Permits for Real Estate Development*, 5 ENVTL. LAW. 345, 355 (1999) (pointing out that a project that will result in the taking of a protected species and which is not authorized, carried out, or funded by federal agency requires a Habitat Conservation Plan, and further noting that there is "mind-boggling complexity once one appreciates the difficulties of defining what constitutes take and what constitutes federal agency approval"). The Habitat Conservation Plan is one of two procedural requirements to obtain an Incidental Take Permit; the second requirement is that the reviewing agency must publish a notice of the Permit application in the Federal Register and to solicit written comments during a thirty-day public comment period. *Id.* at 377.

⁶¹ See LAURA C. HOOD, FRAYED SAFETY NETS: CONSERVATION PLANNING UNDER THE ENDANGERED SPECIES ACT 52–54 (1998) (pointing out that the ambivalence about whether Habitat Conservation Plans should contribute to a species' recovery is inapposite to the stated purpose of the Endangered Species Act).

⁶² 16 U.S.C. §§ 1540(a)–(b) (authorizing civil fines of up to \$25,000 per violation in subsection (a) and criminal fines of up to \$50,000 and imprisonment for one year in subsection (b)).

⁶³ See *Animal Welfare Inst. v. Beech Ridge Energy, LLC*, 675 F. Supp. 2d 540, 544 (D. Md. 2009) (describing how the Incidental Take Permits provide a safe harbor from civil and criminal penalties "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" and further noting that there are some wind energy companies that have obtained or are in the process of pursuing Incidental Take Permits, presumably to avoid federal prosecution and to receive the benefit of a defense to citizen suits under 16 U.S.C. § 1540(g)).

b. ESA Section 7 Consultation

Section 7 of the ESA requires that all federal agencies consult with the Secretary of the Interior (or the Secretary of Commerce in the case of marine species, which fall under the jurisdiction of the National Marine Fisheries Service) to ensure that any action authorized, funded, or carried out by that federal agency is not likely to jeopardize the continued survival of protected endangered or threatened species.⁶⁴ Section 7 consultations further require that the Secretary and the federal agency ensure that the federal action does not result in the destruction or adverse modification of the critical habitat of a listed species.⁶⁵ The backbone of the section 7 consultation process, and indeed the very foundation of the ESA as a whole, is that in fulfilling the requirements of section 7, each agency must utilize the best scientific and commercial data available.⁶⁶

The issuance of an Incidental Take Permit, which must contain a Habitat Conservation Plan,⁶⁷ is an instance of federal authorization for purposes of ESA section 7.⁶⁸ A federal authorization of an Incidental Take Permit triggers section 7 and thereby links the Habitat Conservation Plan requirement with the section 7 consultation requirement.⁶⁹ There has been at least one court case where the link between Habitat Conservation Plans and section 7 consultation led to a temporary restraining order, which, if it became the norm, could chill Incidental Take Permit applications.⁷⁰ Though any avoidable

⁶⁴ 16 U.S.C. § 1536(a)(2).

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ See 50 C.F.R. § 17.22(b) (2012) (containing the Fish and Wildlife Service's regulations on the issuance of incidental take permits).

⁶⁸ See generally Ruhl, *supra* note 60, at 387 ("Issuance of a [Habitat Conservation Plan] is, after all, a federal agency approval, and no provision in section 7(a)(2) exempts [Habitat Conservation Plan] permits from either the procedures or the scope of jeopardy/critical habitat consultations.").

⁶⁹ See, e.g., U.S. FISH & WILDLIFE SERV. & U.S. NAT'L MARINE FISHERIES SERV., HABITAT CONSERVATION PLANNING HANDBOOK AND INCIDENTAL TAKE PERMIT PROCESSING HANDBOOK 3-16 (1996), available at http://www.nmfs.noaa.gov/pr/pdfs/laws/hcp_handbook.pdf (stating that it is the policy of the Fish and Wildlife Service and the National Marine Fisheries Service "to begin integrating the section 7 and section 10 processes from the beginning of the HCP development phase, and to regard them as concurrent and related, not independent and sequential, processes").

⁷⁰ See generally *Envtl. Prot. Info. Ctr., Inc. v. Pac. Lumber, Co.*, 67 F. Supp.2d 1090 (N.D. Cal. 1999), vacated 257 F.3d 1071 (9th Cir. 2001). The court issued a temporary restraining order that enjoined the work on a project that had a pending Habitat Conservation Plan with an Incidental Take Permit until the Fish and Wildlife Service had completed the Section 7 consultation. *Id.* The court reasoned that the bar on commitment

bird or bat death is anathema to this author, a killing in violation of federal law becomes exponentially more abhorrent because it spurns the rule of law. It is important that developers adhere to the Incidental Take Permitting process because Habitat Conservation Plans can help prevent significant species loss.

2. *National Environmental Policy Act*

The National Environmental Policy Act of 1969 (NEPA) has been called the Magna Carta of environmental law.⁷¹ As one of this country's earliest pieces of environmental legislation, NEPA has imposed detailed procedural requirements on federal agencies since its enactment.⁷² Under NEPA, federal agencies must conduct a thorough environmental review of any proposed major federal action that significantly affects the quality of the human environment.⁷³ The Supreme Court has come to consider NEPA's environmental review process as a procedural and not a substantive requirement for federal agencies.⁷⁴ In other words, NEPA does not ever mandate that a federal agency choose the most environmentally friendly alternative, only that it consider that option before taking a major federal action.⁷⁵ The definition of a "major federal action" is of clear import as it

of resources is immediately applicable upon the filing of the permit application, because the Fish and Wildlife Service has to eventually comply with Section 7 before it can issue the permit. *Id.*

⁷¹ See, e.g., DANIEL R. MANDELKER, NEPA LAW AND LITIGATION, 2D § 1:1 (2011) (describing the environmental impact statement as the heart of NEPA's requirements); *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1215 (9th Cir. 1998) (calling NEPA "our basic national charter for protection of the environment" (citations omitted)).

⁷² 42 U.S.C. § 4331(a) (2011) (NEPA's enactment was the declaration of a far reaching policy "to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.").

⁷³ See *id.* §§ 4332(C)(i)–(v) (West 2011) (providing the substantive requirements of the environmental impact statement for major federal actions).

⁷⁴ *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 558 (1978) (holding that NEPA "does set forth significant substantive goals for the Nation, but its mandate to the agencies is essentially procedural").

⁷⁵ *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989) (reasoning that the required environmental evaluations on the potential environmental consequences of a federal action would "ensure[] that important effects will not be overlooked or underestimated" by the federal agencies).

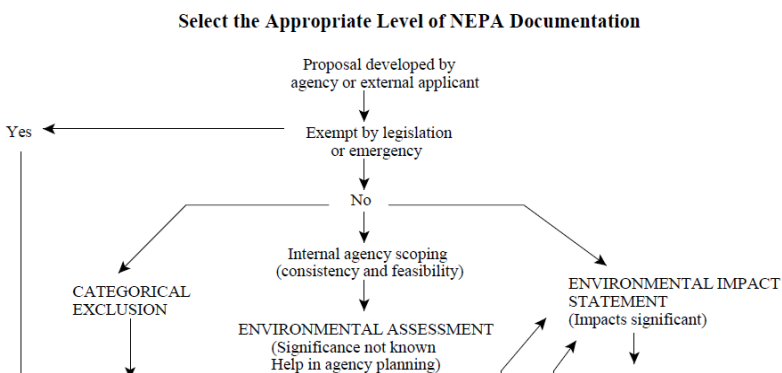
stands as the gatekeeper for NEPA's requirements.⁷⁶ NEPA is relevant to the development of American wind energy because many of the best wind resources are located in western states, which contain enormous swaths of land managed by the Bureau of Land Management (BLM).⁷⁷

NEPA requires an environmental review with three possible pathways⁷⁸ for a proposed major federal action: a categorical exclusion (CX),⁷⁹ an environmental assessment (EA),⁸⁰ or an

⁷⁶ See 40 C.F.R. § 1508.18 (2008) (stating that Council on Environmental Quality regulations define "major federal action" very broadly by saying that "[m]ajor reinforces but does not have a meaning independent of significantly" (citations omitted)); MANDELKER, *supra* note 71, at § 8:33 (noting that courts have interpreted the major federal action requirement to include wide-ranging activities from a fourteen million dollar bridge with sixty percent federal funding to a sixty-six-mile water channel project costing \$1.5 million with \$706,000 of federal funding).

⁷⁷ See U.S. DEP'T OF THE INTERIOR, WIND ENERGY DEVELOPMENT PROGRAMMATIC EIS, available at <http://windeis.anl.gov/eis/why/index.cfm> ("The BLM has determined that amending land use plans and the establishment of a Wind Energy Development Program would be major federal actions as defined by the NEPA, and, thus, the BLM has prepared an EIS.").

⁷⁸ The following image is the top portion of the EPA's NEPA Flowchart:



Select the Appropriate Level of NEPA Documentation, EPA, <http://www.epa.gov/reg3esd1/nepa/pdf/nepaflowchart.pdf> (last visited Mar. 7, 2012).

⁷⁹ 40 C.F.R. § 1508.4 (defining Categorical Exclusion as "a category of actions which do not individually or cumulatively have a significant effect on the human environment and ... therefore, neither an environmental assessment nor an environmental impact statement is required").

⁸⁰ *Id.* § 1508.9(a)(1) (defining an Environmental Assessment as a "concise public document" that succinctly "provide[s] sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact").

environmental impact statement (EIS).⁸¹ Unless and until the Department of the Interior or the Department of Commerce creates a CX for large wind farm siting,⁸² the focus shall properly remain on the EA and EIS. The following subsections will provide an outline of the basic requirements for an EA and an EIS and will describe the basic accompanying documents.

a. NEPA Documentation Requirements: Environmental Assessment

An Environmental Assessment (EA) is a document that occupies the middle ground⁸³ between a Categorical Exclusion and the much more detailed—and more time and cost intensive—Environmental Impact Statement.⁸⁴ A federal agency will perform an EA for the purpose of reaching either a Finding of No Significant Impact (FONSI) or a determination that a full EIS is required.⁸⁵ An agency

⁸¹ *Id.* § 1508.11 (“‘Environmental impact statement’ means a detailed written statement as required by section [4332](2)(C) of the Act.”).

⁸² See JANE W. STEIN ET AL., EASING THE WAY FOR MORE RENEWABLE ENERGY: DOE’S DRAFT ENVIRONMENTAL ACT EXCLUSIONS 1–3 (2011), http://www.pillsburylaw.com/siteFiles/Publications/EnergyAlertNewCategoricalExclusionsfromNEPA012511_final.pdf (announcing that the Department of Energy has proposed twenty new categorical exclusions, including one for “wind turbines if they are less than 200 feet high and do not have the potential to cause significant impacts on birds, bats, or people (through noise or visual impairments such as shadow flicker)”). The GE Energy 1.5 sle, and most turbines used at utility-scale wind farms, are over 200 feet tall and therefore would not fall within this proposed categorical exclusion. Furthermore, only turbines that do not have the potential to cause significant impacts on birds or bats will fit the proposed categorical exclusion, *ergo* even if this categorical exclusion makes it on the books, it will not impact the analysis below.

⁸³ U.S. FISH & WILDLIFE SERV., NEPA DOCUMENTATION REQUIREMENTS: CX VERSUS EA VERSUS EIS 7 (2008), available at https://docs.google.com/viewer?a=v&q=cache:rdmAODiWUocJ:training.fws.gov/EC/Resources/nepa/cd/CEQ%2520and%2520FWS%2520Regs/CX%2520vs%2520EA%2520vs%2520EIS%2520.doc+&hl=en&gl=us&pid=bl&srcid=ADGEESjC4gSCLIRw7wFQ2n0bzVEON0C5_ErjD8SDEyPszv19OwFaks5DHP_YudaiKPDW5RazvJZyuVC-OQGXDn4M49oXIopYArJ1MXGUTculnKL7q6Xx_LifInIiwAarreunucfc8fDt&sig=AHIEtbTT0Sh1I046qS_SFBUoquBCxUsZ8w&pli=1 [hereinafter CX v. EA v. EIS] (stating that the “purpose of an EA is to determine whether the proposed action is a major Federal action whose implementation would result in significant effects on the quality of the human environment”).

⁸⁴ See generally *City of Dallas v. Hall*, 562 F.3d 712, 717 (5th Cir. 2009) (“An EA is ‘a rough cut, low-budget environmental impact statement designed to show whether a full-fledged environmental impact statement—which is very costly and time-consuming to prepare and has been the kiss of death to many a federal project—is necessary.’” (citations omitted)).

⁸⁵ See *Sierra Club v. Espy*, 38 F.3d 792, 796 (5th Cir. 1994); 40 C.F.R. § 1508.9.

that reaches the decision that no EIS is required after it has conducted an EA must issue a FONSI in order to fully comply with NEPA.⁸⁶ A FONSI is a document prepared by a federal agency that states that the proposed action will have no significant effect on the human environment and therefore does not require an EIS.⁸⁷ The FONSI may address the steps that an agency is going to take to mitigate any potentially significant impacts arising from the proposed action.⁸⁸ There is no prescribed format that an EA must take, there are only requirements for what it must address.⁸⁹

b. NEPA Documentation Requirements: Environmental Impact Statement

NEPA requires that a federal agency prepare a detailed Environmental Impact Statement whenever a CX is inapplicable or when an EA does not lead to a FONSI determination.⁹⁰ An EIS, unlike an EA, has a specified set of content and formatting requirements.⁹¹ Again, major federal actions that significantly affect the human environment trigger an agency's duty under NEPA to produce an EIS.⁹² "The primary purpose of an [EIS] is to serve as an action-forcing device to [e]nsure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the

⁸⁶ Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 752–53 (2004).

⁸⁷ 40 C.F.R. § 1508.13 (a FONSI "briefly present[s] the reasons why an action, not otherwise excluded (§ 1508.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared.").

⁸⁸ *Basic Information*, EPA, <http://www.epa.gov/oecaerth/basics/nepa.html> (last updated Mar. 7, 2012) (noting that there are three levels of NEPA analysis beginning with the determination of whether the proposed action fits a CX).

⁸⁹ *Cf.* 40 C.F.R. § 1508.9(b) ("[An EIS shall] include brief discussions of the need for the proposal, of alternatives as required by section [102](2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.").

⁹⁰ *See* CX v. EA v. EIS, *supra* note 83, at 5; 42 U.S.C. §§ 4332(2)(C)(i)–(v) (laying out the specific statutory requirements for a compliant EIS); 40 C.F.R. § 1502.1 (delineating the requirements of an EIS and noting that a proper EIS should be analytic and not encyclopedic).

⁹¹ 40 C.F.R. § 1502.10(a)–(g) (requiring, *inter alia*, that each EIS contain a cover sheet, summary, table of contents, a statement of purpose of and need for the action alternatives, which must include the proposed action, and a "no action" alternative (40 C.F.R. §§ 1508.14, 1508.25), and a description of the affected environment and potential environmental consequences of the proposed action).

⁹² *See* 42 U.S.C. § 4332(2)(C).

Federal Government.”⁹³ An EIS should also provide a forum for the full and fair discussion of a project’s significant environmental impacts and should further provide the public and the ultimate decision makers with information on the reasonable alternatives available that would avoid or minimize adverse impacts on the human environment.⁹⁴ The heart of the EIS is the presentation of available options in a way that provides a clear basis for a choice from those options.⁹⁵ It is also important to note that EIS documents are meant to be prospective and should not be a retroactive justification of an already completed federal action.⁹⁶

The White House Council on Environmental Quality NEPA Regulations require that a federal agency issue a Record of Decision (ROD) to conclude the EIS process.⁹⁷ As the culmination of the entire EIS process, the ROD is preceded by rounds of public comments, countless hours and pages of scientific and economic studies, and is a publicly available document.⁹⁸ A critical part of the ROD is its discussion of the factors, including considerations of the project’s place in our national policy, that were utilized to reach the final conclusion on the action.⁹⁹ The ROD also discusses any environmental mitigation plans, including any enforcement and monitoring commitments that the project developer has made.¹⁰⁰

⁹³ 40 C.F.R. § 1502.1.

⁹⁴ *Id.* (adding that the proposed alternatives could include an option that enhances the quality of the human environment).

⁹⁵ *Id.* § 1502.14 (advising that an EIS “should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public”).

⁹⁶ *Id.* § 1502.2(g) (noting that or providing that or requiring that “Environmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made”).

⁹⁷ *Id.* § 1505.2(a)–(c) (requiring that a Record of Decision must state what the agency’s decision was, identify all of the alternatives considered by the agency, specify which alternative was the most environmentally friendly, state whether the agency adopted all practicable means to minimize or avoid environmental harm from the selected option, and if all practicable means were not adopted, a statement of why they were not).

⁹⁸ COUNCIL ON ENVTL. QUALITY, EXEC. OFFICE OF THE PRESIDENT, A CITIZEN’S GUIDE TO THE NEPA: HAVING YOUR VOICE HEARD 1, 19 (2007), available at http://ceq.hss.doe.gov/nepa/Citizens_Guide_Dec07.pdf.

⁹⁹ *See id.*

¹⁰⁰ 40 C.F.R. § 1505.2.

In sum, the NEPA process can take one of three¹⁰¹ initial steps after a federal agency makes a proposal to conduct a given action. For the purposes of evaluating the efficacy of the Wind Turbine Guidelines Advisory Committee Recommendations and their adherence to NEPA, this Article will forgo any exploration of a possible Categorical Exclusion for wind farm siting. Environmental Assessments and Environmental Impact Statements will undoubtedly play a role in the future of wind farm development in this country. Wind farm siting raises issues under the ESA and NEPA, and it is important to delve deeply into their treatment by the Guidelines.

C. Wind Turbine Guidelines Advisory Committee Recommendations

The following is divided into three subsections. The first subsection section provides a brief overview of the Federal Advisory Committee Act (FACA),¹⁰² which establishes the procedures for the formation of a federal advisory committee and the current legal status of the Committee's recommendations. The next subsection provides a description of the Wind Turbine Guidelines Advisory Committee (WTGAC), including a brief overview of its history and the composition of its membership. The final subsection delves into the WTGAC's recommendations and follows along through the recommended iterative process for future wind farm siting.

1. FACA and Advisory Committee Recommendations

The Wind Turbine Guidelines Committee, a federal advisory committee (FAC), developed the Draft Guidelines. Congress created the Federal Advisory Committee Act to control how federal advisory committees are established and to allow the public to monitor their cost, existence, and activities.¹⁰³ FACA includes several mechanisms

¹⁰¹ See *Select the Appropriate Level of NEPA Documentation*, *supra* note 78 (illustrating the choices facing anyone embarking on the path of NEPA compliance).

¹⁰² Federal Advisory Committee Act, 5 U.S.C. App. 2 § 2 (2007).

¹⁰³ See, e.g., *Animal Legal Def. Fund, Inc. v. Shalala*, 104 F.3d 424, 426 (D.C. Cir. 1997); *Judicial Watch, Inc. v. U.S. Dep't. of Commerce*, 736 F.Supp.2d 24, 28 (D.D.C. 2010) (clarifying that "Congress intended the FACA to ensure that new advisory committees be established only when essential . . . that their creation, operation, and duration be subject to uniform standards and procedures . . . and that their work be exclusively advisory in nature" (citations omitted)). See also *Wash. Legal Found. v. Am. Bar Ass'n Standing Comm'n on the Fed. Judiciary*, 648 F. Supp. 1353, 1358-59 (D.D.C. 1986) (FACA is meant to control the advisory committee process and to disclose to the public how government agencies get advice from the private individuals and groups making up the membership of advisory committees).

to address federal advisory committee accountability,¹⁰⁴ including opening meetings to the public¹⁰⁵ and providing timely notice of when and where the meetings will be held.¹⁰⁶ Section 3 of FACA dictates that an advisory committee may be created in one of three ways:¹⁰⁷

First, an advisory committee is defined as a committee established by Congress, by statute or reorganization plan. Second, an advisory committee may be a committee established by the President or one or more agencies. Third, an advisory committee may be a committee utilized by the President or one or more agencies.¹⁰⁸

As section 3 plainly states, FACA only applies to advisory committees established by the federal government.¹⁰⁹ FACA is meant to ensure open and balanced advice to government agencies.

Federal advisory committees created under FACA are meant to assist the convening entity by providing advice or recommendations on a given field of policy or on a specific question.¹¹⁰ Committees that do not serve an advisory function do not fall under FACA's domain.¹¹¹ Recommendations and advice stemming from a federal advisory committee cannot, on their own, be legally binding upon the

¹⁰⁴ Kurtis A. Kemper, *Construction and Application of Federal Advisory Committee Act* (5 U.S.C.A. App. 2 §§ 1–15), 160 A.L.R. Fed. 483 (2000).

¹⁰⁵ Federal Advisory Committee Act, 5 U.S.C.A. app. 2 § 10(a)(1) (1997).

¹⁰⁶ *Id.* § 10(a)(2).

¹⁰⁷ *Id.* § 3.

¹⁰⁸ Kemper, *supra* note 104, at 483 (adding that “FACA contains an additional proviso with respect to the definition of an advisory committee: the committee must be established or utilized in the interest of obtaining advice or recommendations for the President or one or more agencies or officers of the federal government” (citations omitted)).

¹⁰⁹ See *Pub. Citizen v. U.S. Dep’t. of Justice*, 491 U.S. 440, 442 (1989) (concluding that the definition of “established” found within section 3’s definition of “advisory committee” indicates a government-formed advisory committee); Steven P. Croley & William F. Funk, *The Federal Advisory Committee Act and Good Government*, 14 *YALE J. ON REG.* 451, 482 (1997) (identifying an Office of Management and Budget and Department of Justice joint guidance memorandum, which included guidelines for determining what qualified as an “established committee” and suggesting that only formal convention of a committee by the federal government would so qualify).

¹¹⁰ 5 U.S.C. app. 2 § 3(2)(C) (defining an advisory committee as a committee established or utilized by the President or an agency “in the interest of obtaining advice or recommendations” under section 3 of the Act).

¹¹¹ See *Natural Res. Def. Council v. EPA*, 806 F. Supp. 275, 276 (D.D.C. 1992) (citing FACA regulations, which state that “[a]ny committee which is established to perform primarily operational as opposed to advisory functions. Operational functions are those specifically provided by law, such as making or implementing Government decisions or policy” (quoting 42 C.F.R. § 101-6.1004(g)).

requesting party because that brings the output of the committee into the realm of operational conduct.¹¹² A committee that produces a set of operational procedures or dictates how an agency functions is not providing advice and is *ipso facto* not an advisory committee.

2. History and Membership of the WTGAC

The U.S. Fish and Wildlife Service developed Interim Voluntary Wind Turbine Guidelines in 2003 and gave notice of a two-year public comment period, which terminated in July 2005.¹¹³ The U.S. Department of the Interior (DOI) concluded, in light of the comments received in response to the notice in the Federal Register and the advances made in wind turbine technology, that further information would be beneficial to the goal of minimizing wind farms' impact on wildlife.¹¹⁴ In May 2007, the Department of the Interior announced that it was creating the WTGAC and sought nominations for committee members.¹¹⁵ The Department of the Interior created the Wind Turbine Guidelines Advisory Committee on October 26, 2007, under FACA, to "advise the Secretary and the U.S. Fish and Wildlife Service on measures to avoid or minimize impacts to wildlife and their habitats from land-based wind energy facilities."¹¹⁶ The WTGAC was created solely as an advisory body to provide recommendations on the preservation of wildlife and to coordinate reviews of wind farm sites by local, state, tribal, and federal

¹¹² See 42 C.F.R. § 101-6.1004(g).

¹¹³ Interim Voluntary Guidelines To Avoid and Minimize Wildlife Impacts from Wind Turbines, 68 Fed. Reg. 41174-01, 41175-01 (July 10, 2003) (notifying the public that the Voluntary Guidelines were available for public comment and stating that the guidelines were intended "to assist Service personnel in providing technical assistance to the wind energy industry to avoid or minimize impacts to wildlife and their habitats . . .").

¹¹⁴ See Press Release, U.S. Dep't of the Interior, Interior Secretary Kempthorne Names Members for Committee to Address Wildlife Impacts of Wind Turbines (Oct. 26, 2007), available at http://www.doi.gov/archive/news/07_News_Releases/071029.html.

¹¹⁵ *Id.* (announcing the criteria by which the nominees to the committee would be judged and with the intent to create a balanced cross section of members from the government, environmental organizations, and representatives of the wind farm industry). These criteria were that members be senior representatives of their respective constituent groups, able to represent the varied interests associated with wind energy development and its potential impacts to wildlife species and their habitats. *Id.* The criteria also require that nominees have knowledge of the following fields: wind energy facility location, design, operation, and transmission requirements; wildlife species potentially affected and the potential positive and negative impacts; wildlife survey techniques; applicable laws and regulations; and current research on wind/wildlife interactions. *Id.*

¹¹⁶ *Id.* (naming twenty-two individuals to the WTGAC).

agencies.¹¹⁷ The WTGAC is therefore not proscribing any operational conduct and is compliant with FACA.

The WTGAC has twenty-two members with backgrounds ranging from serious players in the wind industry to staunch environmentalists.¹¹⁸ The environmentalists on the committee come from several well-known wildlife and environmental nonprofit organizations.¹¹⁹ The wind energy industry has representatives from AES Wind Generation, Ridgeline Energy, and Florida Light and Power.¹²⁰ The federal government has representatives on the WTGAC from the U.S. Department of Energy and the U.S. Fish and Wildlife Service.¹²¹ State governments also have a voice on the committee, with officials from the Washington Department of Fish and Wildlife, the Texas Parks & Wildlife Department, and the Kansas Department of Wildlife and Parks serving as committee members.¹²²

The heterogeneity of opinions and expertise of the WTGAC's members gives the final Recommendations broader acceptability than if the committee had been comprised solely of environmentalists or wind industrialists. The WTGAC's diversity of opinion is patent in the Recommendations' final iterative process for wind farm siting. It is difficult to dispute the notion that the WTGAC would have had an

¹¹⁷ See U.S. DEP'T OF THE INTERIOR, WIND TURBINE GUIDELINES ADVISORY COMMITTEE CHARTER, 2-3 (Oct. 26, 2007), available at <http://www.fws.gov/habitatconservation/windpower/Wind%20Turbine%20Guidelines%20Advisory%20Committee%20Charter%2010-24-07.pdf> [hereinafter WTGAC CHARTER] (proclaiming that the Committee was created to help further the objectives of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, the Endangered Species Act, and the National Environmental Policy Act).

¹¹⁸ See U.S. Dep't of Interior, *supra* note 114 (enumerating the backgrounds of other committee members that included private law practitioners, a tribal representative, federal government officials, a university biologist, and a member of the Clean Energy States Alliance).

¹¹⁹ See *Wind Turbine Guidelines Advisory Committee*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee_information.html (last visited Mar. 7, 2012) (cataloging the Committee's environmental non-profit membership, which included Committee members from Defenders of Wildlife, the National Audubon Society, Conservation International, and the Nature Conservancy).

¹²⁰ See *id.* (including MAP Royalty, Inc., a company, that in 2004, expanded its portfolio from the acquisition and management of natural gas royalty interests in the onshore United States to include domestic wind power projects). In addition, the WTGAC had partners from the prestigious international law firms of Hogan and Hartson (now Hogan Lovells) and Crowell and Moring. *Id.*

¹²¹ *Id.*

¹²² *Id.*

asterisk firmly affixed to any final guidance it issued had the committee been a one-sided take on the issue of wildlife and wind farm interactions. Thankfully, the Secretary of the Interior had FACA in mind when convening the committee.

3. WTGAC's Final Recommendations

On March 4, 2010, the WTGAC transmitted its Guidelines¹²³ to the Secretary of the Interior.¹²⁴ A disclaimer is prominently displayed in the Guidelines' table of contents, which states that any legal conclusions found within the Guidelines do not necessarily reflect the position of the United States.¹²⁵ The ensuing discussion of the Guidelines' substantive provisions is undertaken in full recognition that they are not legally enforceable standards in their current form. The following discussion will first follow the Guidelines' iterative decision-making process for wind farm siting and then examine the WTGAC's Policy Guidelines.

a. The WTGAC Guidelines: An Iterative Approach

The premise underlying the Guidelines is to provide a mechanism for decision makers to be able to effectively "identify, evaluate and recommend approaches to assessing risk and impacts to wildlife associated with wind energy development that are useful regardless of the regulatory status of any particular species, and that are particularly focused on those species most likely to be affected by wind energy development."¹²⁶ Wildlife¹²⁷ is the primary concern of the Guidelines because the majority of utility scale wind farms are located in places where the impacts on humans are minimal.¹²⁸ The Guidelines include

¹²³ This article will attempt to consistently refer to the WTGAC's work product as "Guidelines," but the article may also use the term "Recommendations" to refer to the same document.

¹²⁴ See generally GUIDELINES, *supra* note 34.

¹²⁵ *Id.* at Overview, Table of Contents (issuing this disclaimer as an affirmative statement to indicate compliance with FACA's prohibition against federal advisory committees issuing an operational product).

¹²⁶ *Id.* at 1 (recognizing that different species and species groups have different levels of protection under tribal authority and federal and state wildlife statutes).

¹²⁷ *Id.* at app. A, A8 ("Birds, fishes, mammals, and all other classes of wild animals and all types of aquatic and land vegetation upon which wildlife is dependent.").

¹²⁸ *Windfarms: The Issue*, ATOMIK GREEN, <http://www.atomikgreen.com.au/pages/Windfarms%3A-The-Issue.html> (last visited Mar. 7, 2012) (listing the tendency of wind farms to be located away from cities as a "con" for the implementation of utility scale wind farms because there is an inherent inefficiency because of the electricity lost in long distance transmission).

several principles designed to minimize impacts on wildlife. The principles aim to make the Guidelines consistent to encourage open communication among stakeholders, to encourage broad adoption of the Guidelines, to be complementary to state and tribal efforts, to provide clarity of the liabilities that might arise under federal law, to reduce the risk of such liability, to provide mechanisms for calculating compensatory mitigation, to define scientifically rigorous study mechanisms, and to include a formal mechanism for revision of the Guidelines.¹²⁹ These principles, in this author's opinion, are a sound foundation for the Guidelines and were in fact incorporated into the final product.

The Guidelines' strength lies in their tiered approach to siting decisions for wind farms. The post-construction review step leads to an accumulation of data on wildlife impacts at wind farms. An increase in the data on wildlife mortality and other negative effects from wind farms can help decision makers avoid repeating siting mistakes on future projects if that data is incorporated into the best management practices accompanying the Guidelines. The following outline is from the Executive Summary of the Guidelines:¹³⁰

Tier 1 – Preliminary evaluation or screening of sites (landscape-level screening of possible project sites)

Tier 2 – Site characterization (broad characterization of one or more potential project sites)

Tier 3 – Field studies to document site wildlife conditions and predict project impacts (site-specific assessments at the proposed project site)

Tier 4 – Post-construction fatality studies (to evaluate direct fatality impacts)

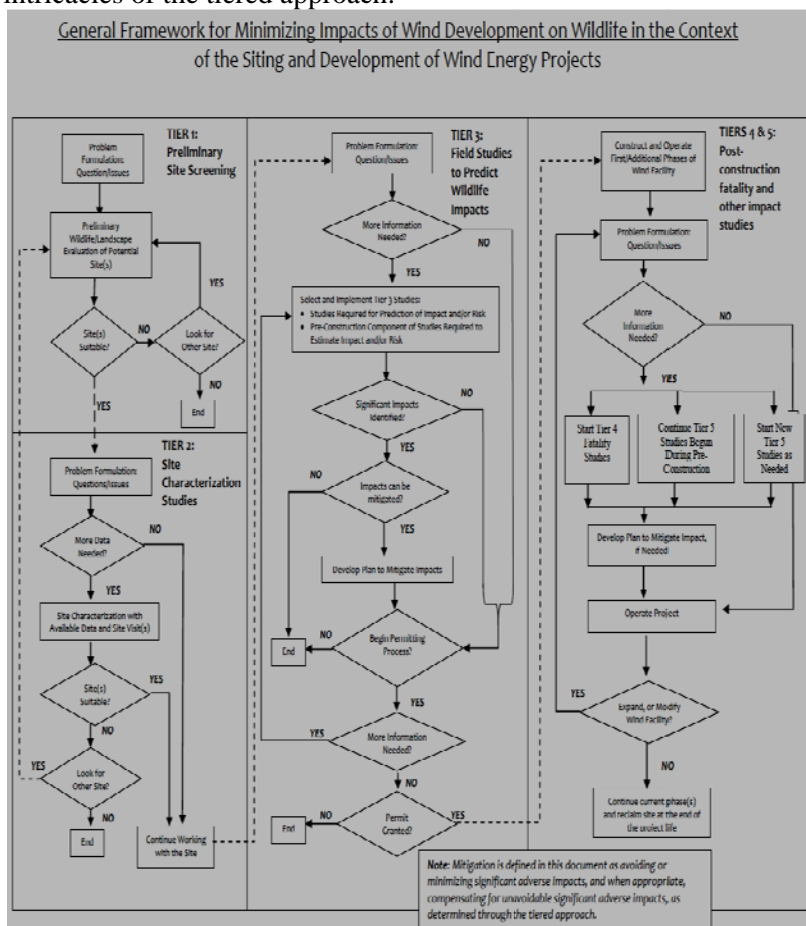
Tier 5 – Other post-construction studies (to evaluate direct and indirect effects of adverse habitat impacts, and assess how they may be addressed)

This rough outline is insufficient to gain a complete picture of how the Guidelines would operate in practice. Fortunately, the Guidelines

¹²⁹ GUIDELINES, *supra* note 34, at 2–3 (listing the principles, which are geared toward producing Guidelines that can effectively promote the responsible development of wind energy in the United States).

¹³⁰ *Id.* at ii.

provide a detailed flowchart, which graphically depicts the many intricacies of the tiered approach.¹³¹



Tier 1 provides a mechanism for developers to get a preliminary picture of a broad geographic area; an initial evaluation of the general ecology at a potential site; and can serve as a good starting point for future coordination with federal, state, tribal, and/or local agencies.¹³² The Guidelines suggest that Tier 1 can be used in one of three ways:

¹³¹ *Id.* at 10. Pay particular attention to the first three tiers as Tiers 1–3 are the most relevant to the scope of this Article.

¹³² *Id.* at 15 (encouraging developers to initiate contact with the U.S. Fish and Wildlife Service early on in the process to help manage wildlife risks and so “the developer can begin to identify broad geographic areas of high sensitivity due to the presence of: 1) large blocks of intact native landscapes, 2) intact ecological communities, 3) fragmentation-sensitive species’ habitats, or 4) other important landscape-scale wildlife values”).

(1) “[t]o identify regions where wind energy development poses a substantial risk to species of concern or their habitats, including the fragmentation of large-scale habitats and threats to regional populations of federal- or state-listed species”; (2) to provide a screening mechanism to evaluate a set of potential sites and to avoid sites with the highest value as habitat for species of concern; and (3) “to begin to determine if a single identified potential site poses serious risk to species of concern or their habitats.”¹³³ Every tier of the Guidelines frames several questions that each specific Tier should answer. A successful Tier 1 analysis will answer the following questions by looking to publicly available information:

1. Are there species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?
2. Does the landscape contain areas where development is precluded by law or areas designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to: “areas of scientific importance;” “areas of significant value;” federally-designated critical habitat; high-priority conservation areas for non-government organizations (NGOs); or other local, state, regional, federal, tribal, or international categorizations.
3. Are there known critical areas of wildlife congregation, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?
4. Are there large areas of intact habitat with the potential for fragmentation, with respect to species of habitat fragmentation concern needing large contiguous blocks of habitat?¹³⁴

As the preliminary step in the iterative process, Tier 1 serves as the gatekeeper for choosing wind farm sites by screening out those areas that are patently impractical for one or more reasons. If the answer to each of the Tier 1 questions is “no,” then a developer should move on

¹³³ *Id.* at 16 (suggesting that Tier 1 can help direct development away from sites with higher associated costs for studies or mitigation and that some sites should be excluded from development on the basis of ecological importance). In addition, some sites “may be inappropriate for large scale development because they have been recognized according to scientifically credible information as having high wildlife value, based solely on their ecological rarity and intactness (*e.g.*, Audubon Important Bird Areas, The Nature Conservancy portfolio sites, state wildlife action plan priority habitats).” *Id.*

¹³⁴ *Id.* at 17.

to Tier 2.¹³⁵ If the answer is “yes” to one or more of the Tier 1 questions, then the developer should either abandon that site or develop mitigation measures to avoid the worst impacts to wildlife at that site.¹³⁶ If there is insufficient data to answer one or more of the Tier 1 questions, then a developer should proceed to Tier 2 before making the decision to abandon the site.¹³⁷

At Tier 2, the developer has narrowed the potential sites down and will ask a series of site-specific questions and conduct a ground-level preliminary assessment of the site.¹³⁸ The site-specific questions focus on publicly available data to address whether there are species of concern at the site, such as birds and bats that have a history of being negatively affected by wind turbines, and whether the site has any legal obstructions or encumbrances that would prevent development.¹³⁹ Tier 2 does not entail any scientifically conducted studies by the developer, but rather relies on existing publicly available data to reach a decision on whether to proceed to the next tier.¹⁴⁰

Tier 3 is the first tier to require quantitative and scientifically rigorous studies at the site itself.¹⁴¹ All Tier 3 studies are utilized on a pre-construction basis to determine if the wind project should continue, to provide an operational plan that includes measures to reduce impacts on wildlife, to design compensatory mitigation measures if the site’s design cannot adequately reduce significant adverse impacts, and to determine if post-construction studies are warranted.¹⁴² Again, Tier 3 sets out the questions that a properly formulated study should answer at this stage in the process.¹⁴³

The Guidelines do not include any explicit endorsement of the horizontal axis wind turbine. However, the Guidelines’ Appendix contains a glossary where the definitions of rotor and rotor-swept area suggest a bias in favor of horizontal axis wind turbines.¹⁴⁴ In addition,

¹³⁵ GUIDELINES, *supra* note 34, at 18.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *Id.* at 19.

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.* at 25–27.

¹⁴² *Id.* at 25.

¹⁴³ *Id.* at 26–27; *see also infra* app. B.

¹⁴⁴ *Id.* (defining “rotor” as “[t]he part of a wind turbine that interacts with wind to produce energy. Consists of the turbine’s blades and the hub to which the blades attach

the Glossary defines tubular design as “[a] type of wind turbine support structure for the nacelle and rotor that is cylindrical rather than lattice.”¹⁴⁵ The nacelle sits atop the wind turbine tower and contains the generator, gearbox, controller, and the brake, which are used to keep the blades’ rotation at structurally acceptable speeds.¹⁴⁶ A nacelle is more commonly associated with horizontal axis wind turbines and the use of this term within the Guidelines’ Appendix suggests that there was an underlying assumption that this type of turbine would be utilized to the exclusion of VAWTs.¹⁴⁷ If wildlife preservation were the primary tenet of the Guidelines, it would be reasonable to expect some mention of the more wildlife-friendly VAWT as an option.¹⁴⁸

b. WTGAC’s Policy Recommendations

The WTGAC provided the Secretary of the Interior with three broad policy recommendations in regard to the implementation of the Guidelines.¹⁴⁹ First, the WTGAC recommended that the Secretary direct the U.S. Fish and Wildlife Service to adopt the WTGAC Guidelines and consistently implement them in the future.¹⁵⁰ The

. . .”). Rotor-swept area is defined as “[t]he area of the circle or volume of the sphere swept by the turbine blades.”) *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ See Wind Program, *How Wind Turbines Work*, U.S. DEP’T OF ENERGY, http://www1.eere.energy.gov/wind/wind_how.html (last visited Feb. 10, 2012) (depicting the nacelle, which is basically the housing for the parts of the turbine at the top of the tower that are not the blades, and noting that some nacelles are large enough to serve as a helicopter landing pad).

¹⁴⁷ Horizontal Axis Wind Turbines’ generators and electrical components are generally located at ground level rather than in a nacelle, which drives down maintenance costs.

¹⁴⁸ See, e.g., U.S. FISH & WILDLIFE SERV., ENVIRONMENTAL ASSESSMENT FOR THE CONSTRUCTION OF VERTICAL AXIS WIND TURBINES: ALASKA PENINSULA & IZEMBEK NATIONAL WILDLIFE REFUGES, 23, available at http://alaska.fws.gov/nwr/planning/nepa/pdf/wind_turbine_ea_nwrs.pdf (last visited Mar. 1, 2012) (stating that “...VAWT appear to be safe for wildlife because they spin at much lower speeds than horizontal turbines and appear as a solid mass rather than a sharp blurring blade that a bird or bat cannot see or detect. The compact design may also reduce harm to wildlife”).

¹⁴⁹ GUIDELINES, *supra* note 34, at xi–xii (counseling the Secretary to make three distinct policy changes to secure a prominent and consistent role for the Guidelines).

¹⁵⁰ *Id.* at xi (proclaiming that the Guidelines can serve as “a comprehensive and user-friendly risk assessment and decision-making tool that supports Department of the Interior (DOI) priorities with respect to renewable energy development, federal and state trust responsibilities, developer cost and confidentiality concerns, and the needs of federal or state listed wildlife and habitats, without creating new regulations”). The first policy

Guidelines framed the first recommendation in permissive terms, which reflects the WTGAC's stance that the Guidelines should be voluntary.¹⁵¹ Second, the WTGAC recommended that the Secretary require the USFWS to develop a landscape-level database, in consultation with the U.S. Geological Survey and state agencies, to be used as a tool to identify and assess development risks to the various ecosystems and habitats on which American wildlife relies.¹⁵² The second policy recommendation also advised the Secretary that the Guidelines' success depended upon the creation of meaningful incentives for the wind industry to voluntarily adopt the use of the Guidelines.¹⁵³ As a follow up to the suggestion for incentives provided or supported by the Department of the Interior, the WTGAC further suggested that the Secretary advance the use, cooperation, and effective implementation of the Guidelines.¹⁵⁴ The third policy recommendation focused on the future application of the Guidelines.¹⁵⁵ Policy recommendation number three also encouraged the Secretary to work toward increasing the assessment capability of USFWS personnel¹⁵⁶ and provided for a revision of the Guidelines at least every five years to reflect both technological advances of wind

recommendation also discusses the use of the Guidelines' tiered/iterative approach to "evaluate, predict, and minimize the risk of potential wind energy projects to wildlife and habitat, and to assess and, as appropriate, provide compensatory mitigation for significant adverse post-construction impacts." *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.* (advising that the national landscape database incorporate the scientifically-based research of existing and on-going landscape analysis and mapping efforts of the "California Renewable Energy Transmission Initiative, Western Governors' Association Wildlife Habitat Council, The Nature Conservancy, National Audubon Society, and American Wind and Wildlife Institute activities").

¹⁵³ *Id.* at xi–xii (pushing for incentives that will result in the universal adoption of the Guidelines as the default tool for wind farm siting decisions).

¹⁵⁴ *Id.* at xii (adding that the Secretary should eventually create guidance on best management practices under the Guidelines, and should also promote the use of the Guidelines by federal and state agencies and the private sector).

¹⁵⁵ *Id.* at xiii (encouraging collaborative research in the future).

¹⁵⁶ *Id.* The Guidelines call for the Department of the Interior to work with the U.S. Fish and Wildlife Service to improve its capability to assess cumulative impacts by undertaking the following suggestions:

- Review the range of development-related significant adverse impacts.
- Review species of concern and/or their habitats within the landscape at the most risk of significant impacts from wind development, in conjunction with other reasonably foreseeable significant adverse impacts.
- Develop data that can be used to conduct regional or landscape level analysis. *Id.*

turbines and newly developed knowledge of wildlife interactions with wind farms.¹⁵⁷

Overall, the policy recommendations reflect the unanimity of the WTGAC members' belief that the Guidelines can serve as an effective tool for reducing and mitigating the harm to wildlife from wind energy. The policy recommendations underpin each Tier of the Guidelines. The Guidelines' policy recommendations also described the distinction between mitigation of wildlife harm and the provision of compensatory mitigation for significant adverse post-construction impacts that unexpectedly arise.¹⁵⁸

The voluntary nature of the Guidelines raises concerns because any deviation from them cannot give rise to a cause of action. That voluntary status will not change even if the U.S. Fish and Wildlife Service adopts its proposed Draft Land-Based Wind Energy Guidelines.¹⁵⁹ This Article will focus on the original Guidelines because the Draft Land-Based Wind Energy Guidelines were modeled after the WTGAC Guidelines and there are only minor deviations from its iterative process.¹⁶⁰ This Article will address

¹⁵⁷ See *id.* (acknowledging that the Guidelines cannot remain static if they are to retain their efficacy and relevance to the future development of the American wind energy industry).

¹⁵⁸ *Id.* at xi (envisioning a scenario where the iterative process of the Guidelines fails to predict a post-construction impact to wildlife and incorporating a safety valve in the form of compensatory mitigation to alleviate the pressure on impacted wildlife).

¹⁵⁹ U.S. FISH & WILDLIFE SERV., DRAFT LAND-BASED WIND ENERGY GUIDELINES 2 (July 12, 2011), available at http://www.fws.gov/windenergy/docs/WEG_July_12_%202011.pdf [hereinafter FWS DRAFT GUIDELINES] (basing its recommendations off of WTGAC's Guidelines). See also *Wind Energy Development Information*, U.S. FISH & WILDLIFE SERVICE, (last updated Sept. 20, 2011) <http://www.fws.gov/windenergy/index.html> (announcing that the FWS DRAFT GUIDELINES were published in the Federal Register on February 18, 2011, and the public comment period closed on May 19, 2011).

¹⁶⁰ See U.S. FISH & WILDLIFE SERV., DRAFT VOLUNTARY LAND-BASED WIND ENERGY GUIDELINES 1 (Feb. 2011), http://www.fws.gov/habitatconservation/Draft_Voluntary_Land_Based_Wind_Energy_Guidelines.pdf ("The working group used the recommendations as a basis to develop the Service's draft voluntary Wind Energy Guidelines.").

several possible options for the Department of the Interior vis-à-vis the voluntary nature of the Guidelines.

Comparison of the FAC Recommendations, Draft Service Guidelines, and Revised Working Draft – July 12, 2011			
Topic	FAC Recommendations	Draft Service Guidelines	Revised Working Draft
Target audience Terminology: Use of FAC terms such as "species of concern," "significant adverse effects," "communicate vs. coordinate"	Developer focused FAC created specific terms and defined terms	Field staff focused Field staff terminology; did not use "significant" with adverse effects	Developer & field staff Went back to FAC terms, including "significant adverse effect," "species of concern," and "communicate"
Introduction: change in format and sections	Background, Premise and Principles, Purpose and Benefits	History, Potential Risks to Wildlife, Relationship to Other Guidelines	Service expectations from both developers and field staff
MBTA and BGEPA enforcement- assurance language	Recommendation to use language that is different from typical Service LE language	Standard Service LE language and removed "significant" from "significant adverse impacts"	Reinstated FAC language with edits Specify that to get assurances for eagle take must not anticipate take during T 1-3 or get a take permit if takes anticipated
Voluntary adherence and communication	Developer has applied the guidelines and communicated with the Service and considered its advice	Developer has applied the guidelines and coordinated with the Service and followed its advice to maximum practicable	Developer has applied the guidelines, considered advice, and documented changes
Phase-in	24 months from final, developer demonstrates adherence to guidelines, communicated with Service and considered advice. For existing projects or those under construction, developer communicates early with Service in the process, produce records showing they have applied the appropriate tier.	Implement upon publication. For existing projects or those under development, developer has coordinated with the Service, can produce records of applied recommendations, and/or implemented adaptive management. Incorporated the best available guidance at the time.	Implement upon final publication, projects in construction will begin at the appropriate tier. Adapt Tiers 4 and 5 to operating projects If project ownership changes, operator assumes responsibility for adherence to earlier assessment
Scope of the Guidelines	All prospective commercial developers	Utility and community scale	All prospective developers, Specifically mention that Service will work to adapt the guidelines to community scale and distributed sources
Service review period	No specific timeframe, recommend that Service provide	Not included	60 days to review, comment or request extension.
	clear expectations & work within budget constraints to provide staff support for timely review		
Coordination with other federal agencies	Recommendations to the Service to ensure timely and consistent review of projects	Lead federal agencies may choose to incorporate guidelines into project design or review	Recommend developers contact other federal agencies, states and tribes for information
Tier 3 communication	Developer makes decision to proceed and maintains records	Developer check-in with Service prior to construction; decision to proceed will be made by the developer in coordination with the Service	Developer should work closely with the Service. The Service will provide written comments to a developer
Tier 3 pre-construction study duration and intensity	Based on risk, no specific duration recommendation	Minimum of 3 years pre-construction studies	Based on risk, not quantified
Tier 4 habitat fragmentation	Tier 4 only addressed fatality studies	Tier 4 was divided into fatality and habitat studies	Kept FAC format, but added two habitat questions from draft Guidelines
Tier 4 study matrix	Number of years of monitoring began with zero, went to 2 or more, depending on circumstances	Minimum of 2 years of studies	Not quantified, based on level of risk and results of post-construction monitoring
Updating the Guidelines	Service works with various experts to provide updated BMPs and science	Provide updates on the website	Service will work with other agencies, states and tribes to guide future development and conservation.
Conflict resolution	Resolve at field level first, elevate to a designated individual/team in RO and/or WO, use chain of command	Resolve at field level first, elevate using chain of command	Elevate using Service chain of command

Comparison of FAC Recommendations to FWS Draft Voluntary Guidelines, U.S. FISH & WILDLIFE SERVICE, http://www.fws.gov/windenergy/docs/047194_Side_by_side_comparison.FINAL.pdf (last visited Feb. 11, 2012) (laying out the differences between the WTGAC Recommendations and the Draft Land-Based Wind Energy Guidelines).

II
ANALYSIS

A. A Hypothetical Wind Energy Project: The Zephyrus Wind Farm

Fictional wind energy development company Aeolian Wind Power (Aeolian) will utilize the Guidelines to attempt to select a site for its Zephyrus¹⁶¹ Wind Farm. Zephyrus Wind Farm will be a 100.5-megawatt wind farm using sixty-seven 1.5-megawatt turbines. Between the years 2006 and 2009, the average wind farm constructed in the United States was roughly 100.5-megawatts.¹⁶² Aeolian Wind Power plans to use General Electric Energy’s 1.5sle (GE 1.5sle) wind turbines¹⁶³ for its Zephyrus Wind Farm. The GE 1.5sle wind turbine has three fiberglass blades measuring 126 feet long, mounted atop a 262-foot tower,¹⁶⁴ and with a 252-foot diameter.¹⁶⁵ A 100.5-megawatt

¹⁶¹ See, e.g., THOMAS BULFINCH, BULFINCH’S GREEK AND ROMAN MYTHOLOGY: THE AGE OF FABLE 55 (Paul Negri & John Berseth, eds., Dover Pubs., 2000) (describing Zephyrus as the Greek God of the West Wind).

¹⁶² See U.S. DEP’T OF ENERGY, WIND AND WATER PROGRAM, 2009 WIND TECHNOLOGIES MARKET REPORT 1, 23 (2010), available at http://www1.eere.energy.gov/wind/pdfs/2009_wind_technologies_market_report.pdf (reporting data on the average size of wind projects in the United States and noting an upward trend). The average wind farm installed between 2006 and 2009 had a rated capacity of 91.25 megawatts and this author believes that using a 100.5-megawatt wind farm is a fair representation of what today’s average might look like. *Id.*

¹⁶³ GE Energy 1.5sle, THE WIND POWER, <http://www.thewindpower.net/wind-turbine-datasheet-57-ge-energy-1.5sle.php> (updated Aug. 2011) (giving data on the GE Energy 1.5sle wind turbine and further noting that this model has been installed in sixty-six wind farms across the United States); *Wind Turbines*, GE ENERGY, <http://www.ge-energy.com/wind> (last visited Mar. 7, 2012) (announcing that GE’s 1.5 mw series of wind turbines are the “[m]ost widely deployed wind turbine [with] 16,500+ turbines installed globally”).

¹⁶⁴

model	capacity	blade *length*	†hub ht†	total ht	area swept by blades	rpm range	max blade ‡tip speed‡	rated wind §speed§
GE 1.5sle	1.5 MW	38.5 m (126 ft)	80 m (262 ft)	118.5 m (389 ft)	4,657 m ² (1.15 acre)	?	?	14 m/s (31 mph)

wind farm using the GE 1.5sle wind turbine would require a site ranging between 5000 to 20,000 acres.¹⁶⁶ For the purposes of this hypothetical, Aeolian Wind Power has constructed over twenty wind farms in the continental United States but has not yet utilized the Guidelines' iterative process. Aeolian Wind Power sought out the Guidelines after an environmental group brought a series of lawsuits arising under the Endangered Species Act for alleged takings of whooping cranes at one of its wind farms.¹⁶⁷

Aeolian Wind Power is searching for a 6000–8000 acre parcel of land in North Dakota, the state with the greatest wind energy potential in the country.¹⁶⁸ While Aeolian's primary focus will be on avoiding liability under the ESA for incidental takings of whooping cranes, it will also consider the impacts of a wind farm on the little brown bat, North Dakota's most common chiropteran.¹⁶⁹ Both NEPA and the

Size Specifications of Common Industrial Wind Turbines, AWE0.ORG, <http://www.aweo.org/windmodels.html> (last visited Mar. 7, 2012) (detailing the technical specifications of the GE 1.5sle).

¹⁶⁵ See *GE Energy 1.5sle*, *supra* note 163.

¹⁶⁶ *Areas of Industrial Wind Facilities*, AWE0.ORG, <http://www.aweo.org/windarea.html> (last visited Mar. 7, 2012) (presenting a series of industrial wind farm sites and the acreage required for the rated capacity, including acreages for several wind farms with a 100.5-megawatt rated capacity). The wind farm that utilized 20,000 acres was rated at 100.8-megawatts. *Id.*

¹⁶⁷ See *Listings and Occurrences for North Dakota*, U.S. FISH & WILDLIFE SERVICE (updated Mar. 7, 2012), http://ecos.fws.gov/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=ND&s8fid=112761032792&s8fid=112762573902 (stating that the whooping crane (*Grus Americana*) is a federally protected endangered species except where they are part of a non-essential experimental population). See also *North Dakota's Federally Listed Endangered, Threatened, and Candidate Species—1995*, U.S. GEOLOGICAL SURVEY (last modified Aug. 3, 2006), <http://www.npwrc.usgs.gov/resource/wildlife/nddanger/species/grusamer.htm> (listing the whooping crane and noting that its range is contiguous with the entire State of North Dakota).

¹⁶⁸ See *Top 20 States with Wind Energy Resource Potential*, AMERICAN WIND ENERGY ASSOCIATION, http://archive.awea.org/newsroom/pdf/Top_20_States_with_Wind_Energy_Potential.pdf (last visited Mar. 7, 2012) (recognizing North Dakota, with 1210 billion kilowatt hours of potential wind energy, as the state to beat). The American Wind Energy Association also stated that large wind systems requires the average wind speed to be six meters per second, or thirteen miles per hour. *Id.*; see also *North Dakota 80-Meter Wind Map and Resource Potential*, UNITED STATES DEPARTMENT OF ENERGY, http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=nd (last visited Mar. 7, 2012) (depicting North Dakota's wind resources at eighty meters of elevation, which is the exact height of the GE Energy 1.5sle hub, and showing that the majority of the State is suitable for large-scale wind farms in terms of wind energy potential).

¹⁶⁹ *Small Mammals of North Dakota*, U.S. GEOLOGICAL SURVEY (Aug. 3, 2006), <http://www.npwrc.usgs.gov/resource/mammals/mammals/brownbat.htm> (noting that the little brown bat is found throughout North Dakota and that bats are active at night, when

ESA will be relevant to Aeolian's siting process because of the presence of whooping cranes and the need to acquire a federal permit, which, when issued by a federal agency, constitutes a major federal action under NEPA.

1. Using the Guidelines to Site Zephyrus Wind Farm

a. Tier 1

Once Aeolian has secured the necessary funding and contracted with an electric utility to purchase the wind farm's output, the first step in the siting process is to consult Tier 1 of the Guidelines. Tier 1 is designed to give the developer a preliminary picture of a broad geographic area, in this case the majority of North Dakota, and to allow for an initial ecological evaluation of specific sites.¹⁷⁰ Aeolian's primary concerns are to maximize Zephyrus's electricity-generating potential while simultaneously reducing the risk of exposure to liability under the ESA by avoiding conflicts with whooping cranes and other listed species. Tier 1 also provides an opportunity for Aeolian to develop a working relationship with the regional office of the USFWS, local government agencies, and North Dakota's Game and Fish Department. Maintaining an open dialogue with these agencies will help Aeolian to stay abreast of the multitudinous regulatory requirements facing the Zephyrus project. Aeolian can use Tier 1 to identify regions where wind energy development would pose a substantial risk to whooping cranes or their habitats, including the fragmentation of large-scale habitats and threats to regional populations; to serve as a screening mechanism to evaluate a set of potential sites and to thereby avoid sites with the highest value as habitat for whooping cranes; and to start to determine if a single identified potential site poses serious risk to species of concern or their habitats.¹⁷¹

Tier 1 draws upon publicly available information to help determine if a given site meets the minimum requirements to merit moving on to Tier 2 in the iterative decision-making process. The Guidelines

the winds are at their strongest). Aeolian wants to avoid the negative publicity associated with bat deaths at wind farms and will therefore attempt to take mitigating steps.

¹⁷⁰ See GUIDELINES, *supra* note 34, at 15.

¹⁷¹ See *id.* at 15–16.

provide a list of potential data sources for the Tier 1 evaluations.¹⁷² North Dakota Parks and Recreation Department, like those in many other states, maintains a Natural Heritage Inventory that identifies North Dakota's natural features and then prioritizes their protection based on the importance of the species or habitat.¹⁷³ While Natural Heritage Inventories are generally kept to help identify land for potential inclusion in a nature preserve, they could serve as a crucial point of reference for developers engaged in Tier 1 analysis under the Guidelines. In addition, the information that a developer gathers at Tier 3, where they are conducting their own site specific studies, could be shared with the state to ensure that the Natural Heritage Inventory remains current.

Another resource that Aeolian should tap in Tier 1 is the Department of Interior's Landscape Conservation Cooperatives (LCCs).¹⁷⁴ The LCCs are public-private partnerships that work to conserve habitat and link together the entire United States through twenty-one geographic areas.¹⁷⁵ LCCs could serve as an excellent tool during Tier 1 because the LCCs will continuously sift and winnow "new scientific information, assess the effectiveness of conservation actions and make necessary adjustments as new information becomes available. This recurring feedback process will help scientists and

¹⁷² See *id.* at app. C (offering a table with publicly available scientific data compiled by the federal government, private groups, and non-profit conservation groups). Appendix C refers to several studies and databases that farmed information from State Natural Heritage Inventories. *Id.* Furthermore, the Guidelines reference the Department of the Interior's Landscape Conservation Cooperatives, discussed below.

¹⁷³ See *North Dakota's Natural Heritage*, NORTH DAKOTA.GOV, <http://www.parkrec.nd.gov/nature/heritage.html> (last visited Mar. 7, 2012) (noting that North Dakota's Natural Heritage Inventory began in 1981 and that it currently contains more than 5000 records of important habits and species).

¹⁷⁴ *Strategic Habitat Conservation: Landscape Conservation Cooperatives*, U.S. FISH AND WILDLIFE SERVICE, <http://www.fws.gov/science/shc/lcc.html> (last visited Feb. 11, 2012) ("As a collaborative, LCCs seek to identify best practices, connect efforts, identify gaps, and avoid duplication through improved conservation planning and design. Partner agencies and organizations coordinate with each other while working within their existing authorities and jurisdictions.").

¹⁷⁵ See, e.g., U.S. FISH & WILDLIFE SERVICE, LANDSCAPE CONSERVATION COOPERATIVES 1, (Mar. 2011), available at https://docs.google.com/viewer?v&q=cache:7nM6ReIMSHoJ:www.fws.gov/science/shc/pdf/LCC_Fact_Sheet.pdf+&hl=en&gl=us&pid=bl&srcid=ADGEESgzjFsnRP4dMxDVVC1a2wvncNo9lr6RuhTLn6pbVb6d0bx1XxBMEXa7SGpSuYzQMiumIleHFkr3RsNGhP52sZWYX_fGEQmIcxYIqCt1aWaZrPH_z6RRft64JQfm75qCMcVODFSK&sig=AHIEtbS6S1vs7vkYY1HYV-MfYTTrovBWfdg (recognizing that the primary goal of the LCCs is to combat the worst effects of climate change but also embracing the goal of supporting biological planning, conservation design and adaptive management as a tenet).

resource managers deal with uncertainties on the landscape and transform new knowledge into more effective conservation plans and actions on the ground.”¹⁷⁶ Aeolian could benefit from the work products of the Plains and Prairie Potholes LCC, which covers the entire landmass of North Dakota, because it is based on the cooperation of the LCC’s steering committee members. The steering committee is made up of resource management professionals; nongovernmental organization representatives; state federal, tribal, and local science agency members; university professors; and industry professionals.¹⁷⁷ The LCC steering committee, because it has a diverse and balanced membership similar to the WTGAC, produces reliable information that can serve as a critical component to a developer’s decision to proceed with the Guidelines’ process at a given site.

b. Tier 2

Aeolian will apply Tier 2 to those sites that made it through the initial review in Tier 1. Tier 2 involves site-specific analysis and is broadly referred to as site characterization.¹⁷⁸ A Tier 2 site characterization should contain three main elements: (1) a review of existing information, (2) direct contact with agencies and organizations that may have relevant scientific information, and (3) one or more reconnaissance level site visits.¹⁷⁹ Tier 2 contains a recommendation to use Natural Heritage Databases as a reference,¹⁸⁰

¹⁷⁶ *Id.* (adding that “[c]ollectively, LCCs form a network of land, water, wildlife and cultural resource managers, scientists, and interested public and private organizations—within the U.S. and across our international borders—that share a common need for scientific information and interest in conservation”).

¹⁷⁷ *See id.* at 2 (contending that the LCC might support staff such as experts in the applied sciences, biometricians, geographers, Geographical Information System specialists, outreach specialists, and cultural resource specialists).

¹⁷⁸ *See* GUIDELINES, *supra* note 34, at 19 (requiring at least one site-specific visit to augment the data available to the developer). The number of site-specific visits differs according to the variability of seasons, both in terms of weather patterns and the migratory influx of birds. *Id.*; *see also* *Climate of North Dakota*, USGS, <http://www.npwrc.usgs.gov/resource/habitat/climate/temp.htm> (describing that North Dakota has four distinct seasons, albeit with a very lengthy winter). Aeolian will therefore have to conduct site-specific studies in at least two seasons to accurately account for the presence of whooping cranes and little brown bats.

¹⁷⁹ *Id.* at 20.

¹⁸⁰ *Id.* at 20–21.

which can also be used in Tier 1. As Aeolian is focused on avoiding conflicts with whooping cranes in North Dakota, it would behoove them to consult with the appropriate Wetland Management District during Tier 2. By referring to the U.S. Fish and Wildlife Service's website, Aeolian would learn that North Dakota has eleven Wetland Management Districts and sixty-three National Wildlife Refuges.¹⁸¹

As in Tier 1, habitat fragmentation is a concern in Tier 2 and is addressed in the Tier 2 questions.¹⁸² If the relevant federal, state, or local agency has not used the best available scientific information to independently demonstrate that the chosen site is frequented by species of habitat fragmentation concern, then Aeolian would not need to assess any impacts of the Zephyrus Wind Farm on habitat fragmentation.¹⁸³ However, if the answer to Tier 2 Question 5 is "yes," then the Guidelines recommend a general framework for evaluating habitat fragmentation.¹⁸⁴ Tier 2's habitat fragmentation analysis can then serve as the basis for a Habitat Conservation Plan, required before the Secretary of the Interior may issue an Endangered Species Act Incidental Take Permit to Aeolian. The section following this hypothetical journey through the Guidelines will contain a more detailed examination of how well the tiers perform in terms of achieving compliance with NEPA and the ESA.

¹⁸¹ *National Wildlife Refuges in the Mountain-Prairie Region: North Dakota*, U.S. FISH & WILDLIFE SERVICE, <http://www.fws.gov/mountain-prairie/refuges/nd/> (last visited Feb. 9, 2012) (claiming North Dakota as the State with the most National Wildlife Refuges and noting that the eleven Wetland Management Districts comprise 254,000 acres of Waterfowl Production Areas).

¹⁸² GUIDELINES, *supra* note 34, at 17–19 (intimating that it is extremely important for developers to contact the federal, state, tribal, and local agencies with jurisdiction or management authority and over the potential project because of the chosen site). *See also infra* app. B.

¹⁸³ *Id.* at 19 (defining habitat fragmentation as "the separation of a block of habitat for a species into segments, such that the genetic or demographic viability of the populations surviving in the remaining habitat segments is reduced; and risk, in this case, is defined as the probability that this fragmentation will occur as a result of the project").

¹⁸⁴ *Id.* at 22 (outlining the general framework for evaluating habitat framework in four main parts). Aeolian should define the study area to include the Project Site for Zephyrus Wind Farm and extend the area studied to include the areas where the species of habitat fragmentation concern are found. Aeolian should also use recent aerial imagery to delimit the boundaries of distinct habitat patches and determine the contours and quality of the habitat's quality. Aeolian should then determine what effect Zephyrus would have on the habitat's configuration and quality. Aeolian should then transmit their findings from the habitat fragmentation analysis to the U.S. Fish and Wildlife Service so it can provide that information to all potential developers in the area.

c. Tier 3

As mentioned above, the first three tiers correspond to the pre-construction evaluation phase of wind farm siting.¹⁸⁵ In Tiers 1 through 3, the Guidelines provide a set of questions that a developer should strive to answer.¹⁸⁶ The Guidelines include recommendations on the methods and metrics that the developer should use to answer the questions at each tier.¹⁸⁷ As is evident in Tiers 1 and 2, certain questions crop up in multiple tiers. Each step in the iterative process requires a more complete set of data to answer those repeated questions.¹⁸⁸ It is important to keep this in mind as a Tier 3 analysis is undertaken. There may be certain issues identified in a Tier 1 question that have a tier-appropriate answer that is insufficient to answer an identically worded Tier 3 question. Such a situation would require a much more in-depth study to gather empirical data to adequately answer that same question at Tier 3.

If the Tier 2 site characterization leads Aeolian to believe that a particular site remains a potential candidate for development, then it could decide to proceed with Tier 3's quantitative and scientific studies. This Article will assume that Aeolian has reached the conclusion that several sites that it visited during Tier 2 merit the further scrutiny embodied in a Tier 3 study. A complete and thorough Tier 3 study should allow Aeolian to make the final decision about the appropriateness of a given site for its Zephyrus Wind Farm. At Tier 3's problem formulation stage,¹⁸⁹ a developer should include an assessment of which species identified in Tier 1 and/or Tier 2 require further study in a site risk assessment.¹⁹⁰ The developer will make this determination based on the analysis of existing Tier 1 data, existing site-specific data, Tier 2 Project Site visits, and "the likelihood of [the] presence and the degree of adverse impact to species or their habitat."¹⁹¹ No additional analysis is required if a species will not be present at the site or, even if they are present, if adverse impact is

¹⁸⁵ *Id.* at 15.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ *Id.* at 26–27 (framing the study requirement in terms of six questions). *See also infra* app. B.

¹⁹⁰ *Id.* at 26.

¹⁹¹ *Id.*

unlikely.¹⁹² A Tier 3 study may address many of the same questions raised in Tiers 1 and 2, but Tier 3 studies differ because they strive to quantify the prevalence, behavior, relative abundance, and site use by species of concern.¹⁹³ The developer should use its Tier 3 data to try and estimate the risk to the species at the site posed by the proposed wind energy facility.¹⁹⁴

Stakeholder involvement is a crucial component of Tier 3 because these studies can focus on federally protected endangered species, such as the whooping crane, which oftentimes carry additional protocols required by the federal, state, or local governments.¹⁹⁵ Aeolian should maintain consistent contact with the North Dakota Game and Fish Department in order to maximize flexibility in its studies and in making its final selection for a site for Zephyrus. After Aeolian completes its Tier 3 studies there are three possible outcomes: (1) development of the site has a high probability of acceptable environmental impacts based on new and existing information, (2) development of the site has a high probability of unacceptable significant adverse impacts absent sufficient mitigation measures, or (3) development of the site has a high probability of unacceptable environmental impact that cannot be satisfactorily mitigated.¹⁹⁶

If Aeolian has kept relevant stakeholders abreast of its studies and has been forthright in its transmission of data about the Zephyrus Wind Farm, then there is a reduced likelihood of being blindsided by litigation attempting to block the farm's construction. It stands to reason that the Guidelines were a boon to Aeolian's site selection process if they can increase the level of certainty that the specific site has an acceptable level of risk to wildlife. The subsequent section will assess the Guidelines' first three tiers in terms of how closely they got Aeolian to maintaining compliance with the ESA and NEPA. In order for the Guidelines to be truly valuable as a tool for developers, they must make adherence to federal environmental laws an inseparable

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ *Id.* at 27 (stressing the need for stakeholder involvement because Tier 3 studies may necessitate special study methodology to accommodate local and regional characteristics).

¹⁹⁶ *Id.* at 42–43 (expanding upon the second possible outcome by offering two probable scenarios: (1) that certainty exists regarding the development of the site with mitigation measures, or (2) there is uncertainty about how to properly mitigate the significant adverse wildlife impacts).

component. If a developer has to take huge additional steps to ensure compliance, then it is unlikely that the Guidelines will receive the industry's imprimatur.

2. *Do the Guidelines Help Maintain ESA Compliance?*

a. *ESA Incidental Take Permit and Habitat Conservation Plan*

The Guidelines help prepare Aeolian to comply with the Endangered Species Act¹⁹⁷ in an immediate way by taking some of the legwork out of an Incidental Take Permit application. Tiers 2 and 3 can offer crucial data for Aeolian to use in its application for a section 10 Incidental Take Permit.¹⁹⁸ As discussed above, Tier 2 requires at least one site visit by the developer so that it can make an informed evaluation about the potential wildlife and environmental impacts that a wind farm would have.¹⁹⁹ A Tier 2 study will evaluate whether there are species of concern at the site that may be susceptible to increased pressures from habitat fragmentation.²⁰⁰ An ESA section 10 Incidental Take Permit application must include a Habitat Conservation Plan, which in turn requires that the applicant specify the impacts that will likely result from the taking and what steps the applicant will take to minimize and mitigate such impacts.²⁰¹ The Guidelines' recommended habitat fragmentation analysis²⁰² suggests that Aeolian should determine what effects Zephyrus would have on the habitat's configuration and quality and that Aeolian should transmit its findings to the U.S. Fish and Wildlife Service. By attempting to determine Zephyrus Wind Farm's effects on its chosen site during Tier 2, Aeolian has at its fingertips part of the required information for a Habitat Conservation Plan.

Tier 3 offers even more of a head start on an Incidental Take Permit application. Tier 3 studies are calculated to provide

¹⁹⁷ See *supra* discussion in Part I.B.1.a. (outlining the substantive requirements of the Endangered Species Act's Incidental Take Permits, Habitat Conservation Plans, and consultation requirement).

¹⁹⁸ See 16 U.S.C. § 1539(a)(1)(B).

¹⁹⁹ See *supra* discussion in Part II.A.1.b.

²⁰⁰ *Id.*

²⁰¹ 16 U.S.C. § 1539(a)(2)(A)(iii) (requiring that the applicant's Habitat Conservation Plan also contain what alternatives the applicant considered and the reasons why those alternatives were not utilized and such other measures that the Secretary of the Interior may require as being necessary or appropriate for the plan).

²⁰² See *supra* discussion accompanying note 183.

information on the site use by and prevalence, behavior, and relative abundance of species of concern.²⁰³ If the developer is adhering closely to the Guidelines' recommendations, it should have used its Tier 3 data to estimate the risk to the species at the site posed by the proposed wind energy facility.²⁰⁴ That same data can serve as the linchpin of a Habitat Conservation Plan. Aeolian's adherence to the Guidelines will not completely obviate the need to complete a thorough application, but it will reduce the need to carry out additional studies. The U.S. Fish and Wildlife Service is required to publish a notice of the permit application in the Federal Register and solicit written comments during a thirty-day public comment period.²⁰⁵ A developer that has transmitted its Tier 2 and 3 data to the U.S. Fish and Wildlife Service prior to submitting a permit application may have an advantage during the public comment period. The Fish and Wildlife Service may make concessions to a candid developer because they have exhibited the same spirit of transparency emphasized in the Guidelines and embodied in the comment process itself. If the regulatory authority does show a preference for those entities that are forthright and provide information without prodding, then developers will likely adopt those behaviors to expedite wind farm projects.

b. ESA Section 7 Consultations

The Guidelines again prove their worth by fostering an open dialogue between the developer and the USFWS. When the USFWS issues an Incidental Take Permit, it is a federal authorization that triggers ESA section 7 consultation requirements.²⁰⁶ Section 7 consultations are thereby inexorably linked to the Habitat Conservation Plan.²⁰⁷ As discussed in the background section, ESA section 7 mandates that every federal agency consult with the Secretary of the Interior to ensure that any action authorized, funded, or carried out by that federal agency is not likely to jeopardize the continued survival of protected endangered or threatened species.²⁰⁸ Section 7 consultations also require that the Secretary and the federal

²⁰³ See *supra* discussion in Part II.A.1.c.

²⁰⁴ *Id.*

²⁰⁵ See Ruhl, *supra* note 60, at 377.

²⁰⁶ See *supra* discussion in Part I.B.1.a.

²⁰⁷ See *supra* notes 68–70 and accompanying text.

²⁰⁸ 16 U.S.C. § 1536(a)(2).

agency ensure that the federal action does not result in the destruction or adverse modification of the critical habitat of a listed species.²⁰⁹ In fulfilling the requirements of ESA section 7, each agency must utilize the best scientific and commercial data available.²¹⁰ The USFWS is therefore required to utilize the best scientific and commercial data available when it engages in a section 7 consultation with the Secretary of the Interior. In Tiers 1, 2, and 3, Aeolian will have produced a compendium of the best publicly available data. In Tiers 2 and 3, Aeolian will have commissioned up to date site-specific scientific studies. The Guidelines will only aid the USFWS if Aeolian has adhered to their suggestion of transmitting information gathered at each tier on a continuous basis. The Guidelines stand to benefit a section 7 consultation because the USFWS should have a nearly complete scientific picture of the developer's site.

c. NEPA's Documentation Requirements

There are three possible pathways for a proposed major federal action to take under NEPA: a categorical exclusion (CX), which as its name suggests, is a federal action that has been exempted from NEPA's documentation requirements because it does not individually or cumulatively have a significant effect on the human environment;²¹¹ an environmental assessment (EA);²¹² or an environmental impact statement (EIS).²¹³ As there is currently no categorical exclusion that covers wind farms that employ utility-scale turbines, the Guidelines will not appertain to the first NEPA pathway.

(i) Environmental Assessment

NEPA requires that a developer complete an environmental assessment if there is no applicable categorical exclusion. An Environmental Assessment is a "concise public document" that

²⁰⁹ *Id.*

²¹⁰ *Id.*

²¹¹ See 40 C.F.R. § 1508.4 (adding that a categorical exclusion is a category of actions "which have been found to have no [significant effect on the human environment] in procedures adopted by a Federal agency in implementation of these regulations (§ 1507.3) and for which, therefore, neither an environmental assessment nor an environmental impact statement is required").

²¹² *Id.* §1508.9(a)(1).

²¹³ *Id.* § 1508.11 ("Environmental impact statement means a detailed written statement as required by section 102(2)(C) of the Act.").

succinctly “provide[s] sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.”²¹⁴ The Guidelines again provide a head start in the process of compiling the needed documentation. Tiers 1 and 2 provide developers with a leg up over those who choose to forgo the Guidelines because they focus on gathering publicly available information and scientific information from site-specific visits to answer a set of core questions about the suitability of a given site. Again, the advantage of using the Guidelines is that a developer will have a fair amount of data that can easily translate into the seed of a NEPA environmental assessment.

(ii) *Environmental Impact Statement*

If an environmental assessment leads to a FONSI,²¹⁵ then the developer will not have to conduct an EIS.²¹⁶ The alternative determination is that a full EIS is required.²¹⁷ An EIS²¹⁸ is a detailed written statement that has a particularized array of content and formatting requirements.²¹⁹ As always in the NEPA context, major federal actions that significantly affect the human environment are the regulatory triggers that initiate the duty to produce an EIS.²²⁰ An EIS should provide a public forum for the full and fair discussion of a project’s significant environmental impacts.²²¹ No EIS is complete without providing the public and the ultimate decision makers with information on the reasonable alternatives available to avoid or minimize adverse impacts on the human environment.²²² An EIS

²¹⁴ *Id.* § 1508.9(a).

²¹⁵ *Id.* § 1508.13 (a FONSI “briefly present[s] the reasons why an action, not otherwise excluded (§ 1508.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared.”).

²¹⁶ *See City of Dallas*, 562 F.3d at 717; *see also* 40 C.F.R. § 1508.9(a)(1).

²¹⁷ 40 C.F.R. § 1508.9(a)(1).

²¹⁸ *Id.* § 1508.11 (“Environmental impact statement means a detailed written statement as required by section [4332](2)(C) of the Act.”).

²¹⁹ *Id.* § 1502.10 (requiring, *inter alia*, that each EIS contain a cover sheet, summary, table of contents, a statement of purpose of and need for the action, alternatives which must include the proposed action and a “no action” alternative (40 C.F.R. §§ 1508.14, 1508.25) and a description of the affected environment and the potential environmental consequences of the proposed action).

²²⁰ *See* 42 U.S.C. § 4332(2)(C).

²²¹ 40 C.F.R. § 1502.1.

²²² *Id.*

presents the available options in a way that provides a clear basis for making the choice to utilize one of those options.²²³

The Guidelines' iterative process also seeks to foster an open dialogue, although the public's role is not the same as it is in the NEPA process. Tier 3 again offers developers an advantage in the EIS context. The compilation of site data focusing on a proposed wind farm's impact on the environment and wildlife offers the developer a kernel from which a full EIS can grow. A complete Tier 3 study, even one that thoroughly answers every question that the Guidelines pose, will not be a substitute for an EIS. The WTGAC contemplated how the Guidelines would operate to achieve NEPA compliance:

The Guidelines are a tool for facilitating compliance with relevant laws and regulations by recommending methods for conducting site-specific, scientifically sound biological evaluations. Following the Guidelines is consistent with the National Environmental Policy Act (NEPA), namely, to provide full and fair discussion of significant adverse impacts of wind energy development upon wildlife arising from potential federal actions. The Guidelines are also consistent with the intent of NEPA to ensure full disclosure and consideration of any damage to the environment. The Guidelines facilitate achieving the NEPA objective of ensuring that environmental resources are given appropriate consideration in planning and decision-making processes. Using the methods described in the Guidelines will provide information for impact assessment and mitigation.²²⁴

As mentioned above, NEPA is a procedural statute and does not mandate any particular result. The Guidelines are also largely procedural and do not prescribe any particular result. This author believes that adherence to the Guidelines will put a developer in a place much closer to NEPA compliance than a developer that ignored the Guidelines. A developer benefits by adhering to the Guidelines because the first three tiers lead to site-specific data pertinent to an EIS.

(iii) Wildlife Harm Mitigation Strategies

During the WTGAC meeting to discuss the Department of the Interior's Draft Land-Based Wind Energy Guidelines on July 20, 2011, the WTGAC had an opportunity to amend the Guidelines to

²²³ *Id.* § 1502.14.

²²⁴ See GUIDELINES, *supra* note 34, at 4.

include specific endorsements of mitigation technologies and strategies.²²⁵ As discussed above, there are several technological and operational fixes that could help diminish the number of birds and bats killed at American wind farms.²²⁶ In the case of the Zephyrus Wind Farm, Aeolian is on the lookout for whooping cranes, a federally protected endangered species. Mitigation of harm on an individual basis takes second fiddle to the protections that the ESA affords the whooping crane.²²⁷

The Guidelines currently include a section on Best Management Practices (BMP) for the construction of wind farms.²²⁸ BMP number thirteen instructs developers to use, when it is practical, tubular towers in favor of latticed towers to reduce the number of roosting opportunities for birds.²²⁹ As stated in the background section, the use of tubular towers is an unmistakably good idea because reducing the number of places for a bird to perch also reduces the number of birds using a site. Fewer birds at a site mean fewer collisions.

Additionally, fewer wind turbines at a site lessens the likelihood of a collision. Vertical axis wind turbines placed between larger horizontal axis wind turbines could be the silver bullet that the wind energy industry needs.²³⁰ The two main advantages of using VAWTs in the spaces between HAWTs are that birds can see the VAWTs, and

²²⁵ *E.g.*, September 20–21, 2011: *Wind Turbine Guidelines Advisory Committee Meeting*, U.S. FISH & WILDLIFE SERVICE (last updated Sept. 14, 2011), <http://www.fws.gov/windenergy/news.html>. See also *Draft Agenda for Wind Turbine Federal Advisory Committee*, U.S. FISH & WILDLIFE SERVICE, http://www.fws.gov/windenergy/docs/FWSWinddraft_agenda%20_%204%20_clean.pdf (last visited Feb. 10, 2012).

²²⁶ See *supra* discussion Part I.C.2.a. (discussing multiple mitigation strategies including the use of vertical axis wind turbines in the lacunae between the larger horizontal axis wind turbines).

²²⁷ GUIDELINES, *supra* note 34, at 68 (“It may be possible to offset direct impacts of habitat loss to individuals, but this does not apply to federally listed threatened and endangered species. If a federal nexus exists, or if a developer chooses to seek an Incidental Take Permit (ITP), then impacts to listed species should be evaluated through the processes of Section 7 or 10 of the Endangered Species Act.”).

²²⁸ *Id.* at 44–46 (proffering a list of twenty-one Best Management Practices including taking such steps as instructing employees, contractors, and site visitors to avoid harassing or disturbing wildlife, especially during mating season).

²²⁹ *Id.* at 45.

²³⁰ See *supra* discussion in Part I.A.1.c (describing how smaller VAWTs can be placed between the larger HAWTs to both capture wind that escapes the larger turbines and to also increase the localized wind speed by being set in a counter-rotational configuration).

can thereby avoid colliding with them, and less land is needed to generate the same amount of power.²³¹

The Guidelines, out of necessity, speak in general terms about the types of technologies that may be used at a given site to protect against significant adverse wildlife impacts. It seems an attainable goal for the Guidelines to include a list of mitigation technologies and techniques. In order for the Guidelines to become the poster child of sustainable development in the renewable energy context, they must offer suggestions that a developer can utilize immediately to avoid avian and chiropteran fatalities. The Guidelines' Best Management Practices are ripe for additional wildlife-protective technologies and practices.

(iv) Voluntary Guidelines or "Voluntary" Guidelines

The Department of the Interior has decided that wind energy developers may voluntarily choose whether to use its Draft Land-Based Wind Energy Guidelines.²³² It bears discussing whether the Guidelines are truly voluntary or if external pressures make this a Hobson's choice. The first step is to ask whether the Department of the Interior could have made the Guidelines binding in the form of a rule; this question is aimed at determining whether a binding rule was within the realm of political possibility, not whether the Department of the Interior had the legal authority to write and promulgate the rule. Next comes an examination of the external pressures on developers that might force them to adopt the Guidelines. Are the Guidelines

²³¹ See *id.*

²³² See FWS DRAFT GUIDELINES, *supra* note 159, at 13 (recognizing that the Draft Guidelines only command voluntary adherence from a developer). The guidelines note that

[w]hile the advice of the Service is not binding, neither can it simply be reviewed and rejected without a contemporaneously documented reasoned justification, at least if the developer seeks to have the benefit of the enforcement discretion provisions of these guidelines. Instead, proper consideration of the advice of the Service entails contemporaneous documentation of how the developer evaluated that advice and the reasons for any departures from it. Although the guidelines leave decisions up to the developer, the Service retains authority to verify that developer efforts to avoid, minimize, and mitigate impacts are sufficient, and to refer for prosecution any take of migratory birds that it believes to be reasonably related to lack of responsiveness to Service communications or insufficient compliance with the guidelines.

Id.

truly voluntary, or are they “voluntary” in name only and in fact quasi-mandatory?

The Department of the Interior believed it had the power to draft the Land-Based Wind Energy Guidelines in the form of a binding rule, but instead it opted to make adherence entirely voluntary.²³³ As most industries are wont to do,²³⁴ the wind energy industry claimed that making the Guidelines mandatory would stretch the USFWS’s resources too far.²³⁵ It may be true that the Department of the Interior does not currently have the resources to manage the Guidelines as a mandatory program, but a reallocation of funds and/or personnel could make the wind energy’s reasoning specious. Is such a shift in funding even possible with a Republican-controlled Congress? The record of Republican opposition to almost any pro-environmental bill, rider, or administrative change indicates that the Obama Department of the Interior would face too much backlash to make the Guidelines binding.²³⁶ Republican lawmakers hear the wind energy industry’s

²³³ See *id.* at 8–12 (identifying the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act as the source of the Department of the Interior’s statutory authority to draft the Guidelines). *But see Comments of the American Wind Energy Association on the Draft Land-Based Wind Guidelines*, AMERICAN WIND ENERGY ASSOCIATION 2–3 (May 19, 2011), available at http://www.awea.org/issues/siting/upload/AWEA-Comments-on-USFWS-Wind-Energy-Guidelines_May-19-2011.pdf [hereinafter *AWEA Comments*] (accusing the DOI of exceeding its statutory authority and suggesting that making the Guidelines mandatory would mean that certain conservation benefits would be lost because neither habitat fragmentation nor most bats are covered under federal law and therefore could not be included in mandatory guidelines).

²³⁴ ROBERT L. GLICKSMAN ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 525 (5th ed. 2007), available at <http://web.ku.edu/~rglicks/envprot/6-motorv.htm> (describing how the automobile industry claimed that it was technologically infeasible to comply with new emissions limits under the Clean Air Act, only to invent the catalytic a short time after the limitations went into effect).

²³⁵ *AWEA Comments*, *supra* note 233, at 23 (offering skepticism about the USFWS’ ability to implement a mandatory program because “the USFWS does not have the resources—staff, time or money—to implement a mandatory program”).

²³⁶ See, e.g., Dina Cappiello, *House Republicans Propose \$1.9 Billion Cut To EPA*, HUFFINGTON POST (Feb. 9, 2011), http://www.huffingtonpost.com/2011/02/09/house-republicans-move-fo_n_820911.html (describing how House Republicans sought to gut the EPA’s budget under the familiar credo that environmental regulations are job killers); Mike Lux, *Blocking the Clean Air Act Helps Polluters, Hurts Kids*, HILL’S CONGRESS BLOG (Mar. 30, 2011), <http://thehill.com/blogs/congress-blog/energy-a-environment/152761-blocking-the-clean-air-act-helps-polluters-hurts-kids> (describing how the Republican-controlled Congress often sides with big business over environmental and public health concerns); Janet Hook et al., *GOP Wins Deep Cuts in Environment Spending*, WALL ST. J. (Apr. 13, 2011), <http://online.wsj.com/article/SB10001424052748703385404576258550820756980.html> (describing how Republican ultimately

cries of infeasibility and, based on their recent environmental track record, would likely fight tooth and nail to prevent the Guidelines from becoming enforceable.

The American Wind Energy Association (AWEA) is the national trade association for America's wind industry and has over 2500 member companies.²³⁷ AWEA has indicated that it supports the original WTGAC Guidelines. However, AWEA has some lingering reservations about the differences between the USFWS's Draft Land-Based Wind Energy Guidelines and the WTGAC's original Guidelines.²³⁸ The Guidelines' voluntary status will likely hinge on whether the AWEA supports the final Land-Based Wind Energy Guidelines. When a trade association that is indisputably the national voice for its industry endorses a set of federal guidelines, its membership is more likely to succumb to peer pressure and adopt their usage. Here, AWEA has voiced its concern with the Draft Guidelines because it believes that the Department of the Interior is seeking to expand its authority. However, AWEA had previously endorsed the WTGAC's Guidelines. If the AWEA does not endorse the Final Guidelines, then there is a high probability that the Guidelines will, in fact, be voluntary because the wind energy industry will not feel any external pressure from the AWEA to adopt them. However, if the Guidelines receive AWEA's imprimatur, then there will be a shift away from a voluntary toward a de facto obligation. A wind energy developer may treat the use of the Guidelines as a public relations hurdle in that developers that utilize the Guidelines may receive a boost in public perception. That boost in public perception, whether real or simply perceived by the developer, will drive developers to "check the box" and use the Guidelines. If that were the case, then the Guidelines would become "voluntary," or quasi-mandatory. The optimal role for the Guidelines would be for them to contain binding norms for all wind energy projects. However, the best politically feasible outcome to hope for is that the Guidelines

succeeded in eviscerating the EPA's budget but also mentioning that Democrats were able to preserve the EPA's authority to regulate greenhouse gases and other air pollutants).

²³⁷ *About AWEA*, AM. WIND ENERGY ASS'N., <http://www.awea.org/learnabout/aboutawea/index.cfm> (last visited Mar. 7, 2012).

²³⁸ *AWEA Comments*, *supra* note 233, at 1–2 (lamenting the fact that the USFWS attempted to expand its role in the Guidelines' iterative process).

become near binding through AWEA endorsement. Quasi-mandatory Guidelines are far superior to voluntary Guidelines.

III

RECOMMENDATIONS

A. DOI Should Adopt the WTGAC Guidelines

In order to maximize the efficacy of the Guidelines' iterative decision-making process, wind farm developers will need to use them. In order to get the wind energy industry to use the Guidelines, the DOI must have the support of the American Wind Energy Association. This is not a cave-in to industry pressure, but rather the recognition that voluntary Guidelines will only be effective if the private sector chooses to utilize them. No matter how much the government encourages the private sector to use voluntary guidelines, industry will always look to its peers and to trade organizations before adopting anything that could potentially cost additional money. Therefore, DOI should strive to draft a set of guidelines that ensure a workable process for protecting species that can also be endorsed by the American Wind Energy Association. The USFWS, by law, has to address the public comments it received on the Draft Land-Based Wind Energy Guidelines. The AWEA comments strongly suggest that it will not endorse the Draft Guidelines as currently written. Therefore, the DOI should adopt a set of voluntary guidelines that closely mirror those created by the WTGAC.

B. The Guidelines Should Promote Bird and Bat Friendly Technologies

The power-generating capacity of vertical axis wind turbines relegates them to the back burner of utility-scale wind farm developers. However, the Guidelines should promote the complimentary use of vertical axis wind turbines on wind farms for several reasons. VAWTs are much more visible to a bird's eye than the larger horizontal axis wind turbines, thereby reducing the frequency of collisions. The VAWT's configuration that Wind Harvest International designed also implicates an endorsement of VAWTs in the Guidelines. The Wind Harvest International three-turbine configuration, with counter-rotational axes, can be placed between the larger HAWTs at a wind farm. The benefits are threefold: first, by adding VAWTs, a wind farm can increase its generative capacity without the need to usurp any additional habitat;

second, the three-turbine configuration can capture wind energy at the lower altitudes where it was previously going unused by the larger turbines; and third, the VAWTs counter-rotation creates vortices that actually increase the localized wind speed at the site. The Guidelines could include a recommendation to add VAWTs in between the more traditional HAWTs.

In terms of chiropteran mortality, the Guidelines could include incentives to promote the use of bat friendly wind farm operational techniques. As discussed above, wind turbines can kill bats without ever coming into direct contact with them. A relatively simple fix exists. An operator must simply adjust the speed at which the turbine blades spin at night to a velocity that will not create the pressure differentials that cause barotrauma. A possible solution would be to relax the rigorosity of the Tier 4 and 5 post-construction studies if the wind farm operator agreed to adjust its operating speeds at night and at certain times of year. However, this step may not be sufficient to encourage developers to change speeds because violation of the Guidelines carries no real penalty. The only way to for a penalty to accrue is if the Guidelines are mandatory. The Guidelines' efficacy could be assessed while they remain voluntary and, if they prove to be ineffective, then those underperforming facets of the Guidelines would be integrated into a DOI mandatory rule.

The Guidelines must incorporate policy incentives for the use of VAWTs to maximize the amount of electricity generated at each wind farm. As previously mentioned, there is a lower likelihood of negative impacts on birds and bats at wind farm sites that combine VAWTs and HAWTs because that combination decreases the total number of HAWTs needed at a site. The VAWTs provide the dual benefit of being more visible to birds and generating more electricity in the previously unused interstices between the HAWTs. The Department of the Interior should offer a fast track siting program for those farms that incorporate design features that reduce the likelihood of negative wildlife impacts. Developers that implement wind turbine configurations like the mixed VAWT/HAWT should receive policy-based incentives for their use.

C. Voluntary in Name Only: Get AWEA's Endorsement

The endorsement of the leading wind energy trade association in the United States carries a lot of weight. In fact, AWEA's

endorsement carries so much weight that it could make the Guidelines the de facto tool for all future wind farms. It is the rare trade association that actually keeps environmental concerns at the forefront of its mission. The wind energy industry depends on people making greener choices for its continued existence. It is perhaps that green mindset that makes AWEA likely to endorse a set of Guidelines that are extremely protective of wildlife. The Endangered Species Act and the National Environmental Policy Act are two laws that are here for the long haul. The Guidelines are an effective tool because the tiers compile and create data on a given site that can then be used to comply with the various requirements of the ESA and NEPA. An AWEA endorsement is definitely necessary because the Guidelines are not binding. Those few non-AWEA members would be hard pressed to eschew a set of guidelines that the undisputed leader of the industry had adopted.

An AWEA endorsement would make the Guidelines voluntary in name only by making them quasi-mandatory through peer pressure. The birds and bats of the United States deserve a set of guidelines that protect them. That protection can only come if the Guidelines are utilized. A return to the original tenets of the WTGAC's Guidelines, which were wholeheartedly endorsed by the AWEA, would benefit wind developers and wildlife. Obviously, the wind energy industry cannot expropriate the USFWS's power directly or fully, but it is a political reality that industry holds great sway in how it is regulated. The USFWS must recognize this and put forth a set of Guidelines that will garner AWEA's endorsement. Without the AWEA behind them, the Guidelines will likely sit idle.

IV CONCLUSION

Wind energy will undoubtedly be a part of America's future. The Wind Turbine Guidelines Advisory Committee Guidelines use an iterative decision-making process to help site wind farms while minimizing the negative impacts to avian and chiropteran species. In particular, the Guidelines provide a head start on the data collection necessary for compliance with the Endangered Species Act and the National Environmental Policy Act. If we hope to leave more than a soupçon of today's existing bird and bat species, the Department of the Interior must accommodate the American Wind Energy Association's concerns with the Draft Land-Based Wind Energy Guidelines in order to push the Guidelines' voluntary label into

obsolescence due to near uniform adherence. In addition, the Guidelines must incorporate environmentally friendly technologies into its recommendations or it risks inutility. If the Department of the Interior can produce a set of Guidelines that contains the iterative decision-making process of the WTGAC's Guidelines and can be championed by the AWEA, then it augurs well for the future of the American wind industry and our nation's wildlife.

APPENDIX A
REQUIREMENTS FOR AN INCIDENTAL TAKE PERMIT

Permits

(1) The Secretary may permit, under such terms and conditions as he shall prescribe—

(A) any act otherwise prohibited by section 1538 of this title for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations pursuant to subsection (j) of this section; or

(B) any taking otherwise prohibited by section 1538(a)(1)(B) of this title if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

(2)(A) No permit may be issued by the Secretary authorizing any taking referred to in paragraph (1)(B) unless the applicant therefor submits to the Secretary a conservation plan that specifies—

(i) the impact which will likely result from such taking;

(ii) what steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;

(iii) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and

(iv) such other measures that the Secretary may require as being necessary or appropriate for purposes of the plan.

(B) If the Secretary finds, after opportunity for public comment, with respect to a permit application and the related conservation plan that—

(i) the taking will be incidental;

(ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;

(iii) the applicant will ensure that adequate funding for the plan will be provided;

(iv) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and

(v) the measures, if any, required under subparagraph (A)(iv) will be met; and he has received such other assurances as he may require that the plan will be implemented, the Secretary shall

issue the permit. The permit shall contain such terms and conditions as the Secretary deems necessary or appropriate to carry out the purposes of this paragraph, including, but not limited to, such reporting requirements as the Secretary deems necessary for determining whether such terms and conditions are being complied with.

APPENDIX B**TIER-SPECIFIC QUESTIONS UNDER THE WTGAC GUIDELINES**

The Tier 2 questions are as follows:

1. Are there known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?
2. Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to: “areas of scientific importance;” “areas of significant value;” federally-designated critical habitat; high-priority conservation areas for NGOs; or other local, state, regional, federal, tribal, or international categorizations.
3. Are there plant communities of concern present or likely to be present at the site(s)?
4. Are there known critical areas of congregation of species of concern, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?
5. Using best available scientific information, has the relevant federal, state, tribal, and/or local agency independently demonstrated the potential presence of a population of a species of habitat fragmentation concern? If not, the developer need not assess impacts of the proposed project on habitat fragmentation.
6. Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?

Tier 3 studies should be designed to answer the following questions:

1. Do field studies indicate that species of concern are present on or likely to use the proposed site?
2. Do field studies indicate the potential for significant adverse impacts on the affected population of the species of habitat fragmentation concern?
3. What is the distribution, relative abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to

what extent do these factors expose these species to risk from the proposed project?

4. What are the potential risks of adverse impacts of the proposed project to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible adverse impacts to entire species and their habitats?)
5. If significant adverse impacts are predicted to species of concern, can these impacts be mitigated?
6. Are there studies that should be initiated at this stage that would be continued in either Tier 4 or Tier 5?

