STATE OF MAINE
DEPARTMENT OF CONSERVATION
LAND USE REGULATION COMMISSION

IN THE MATTER OF

TRANSCANADA MAINE WIND DEVELOPMENT INC.	)	PRE-FILED TESTIMONY
	)	MAINE AUDUBON
KIBBY EXPANSION WIND POWER PROJECT, DP4860	)	SUSAN M. GALLO
	)	
KIBBY AND CHAIN OF PONDS TWPS. FRANKLIN COUNTY	)	

I. Introduction

If TransCanada's application for the Kibby Expansion Wind Power Project is approved as proposed, the project will cause undue adverse impacts to several high-priority resource values. It therefore fails to meet the criteria for approval set forth in 12 M.R.S.A. §685-B.4.C, 35-A MRSA §3452, and LURC Land Use Districts and Standards Chapter 10.24. Specifically, the construction of the southern seven turbines in the project area and their associated roads will cause undue adverse impacts to breeding Bicknell's thrush (*Catharus bicknelli*), a species endemic to the northeast and one of the highest conservation priorities for the region, and to a large block of a rare natural community type, and will also cause an unreasonable adverse impact to the character of scenic resources of both state and national significance.

This testimony is presented on behalf of the Consolidated Interveners (Appalachian Mountain Club (AMC), Maine Audubon, and Natural Resources Council of Maine (NRCM)) and will focus on the value of wildlife habitat in the project area (particularly for Bicknell's thrush). Maine Audubon has grave concerns about additional undue adverse impacts in the project area, and will refer to and support testimony from Dr. David Publicover from AMC and Catherine Johnson from NRCM.

II. Biographical Info.

My name is Susan M. Gallo. I hold a Master's degree in Organismal Biology and Ecology from the University of Montana, and a Bachelor's of Science degree in Natural Resources from Cornell University. I have direct field experience working with amphibians, forest songbirds, seabirds, shorebirds and loons. Early in my wildlife career, I worked as a wildlife biologist for the state of Montana, Montana Audubon, and Plum Creek Timber Company, with a focus on forest breeding bird ecology, land management (ranching and logging), and conservation planning. Since coming to Maine Audubon as a Wildlife Biologist in 1998, I have worked on a variety of state-wide conservation issues, including coordinating state-wide surveys for amphibians, loons, and owls; coordinating Maine's limited Important Bird Areas Program; planning for Maine's Comprehensive Wildlife Conservation Plan; and participating in various stakeholder groups and task-forces for state government (e.g., Boat Access Task Force (DIFW, 2007), Migratory Songbird Working Group (DIFW, 2001), Surface Water Ambient Toxic Monitoring Program (DEP, 2006-present)). Through efforts to expand Maine's Important Bird Areas program to northern Maine in the last several years, I have become actively involved with issues pertaining to priority conservation birds and conservation planning for the northern forest region.

II. Support for the Northern Eight Turbines

Maine Audubon supports the development of wind power as a renewable energy source, and has supported wind power development in the past that was sited to avoid conflicts with high-priority wildlife and wildlife habitat. To that end, we supported the initial Kibby Wind Power project because it avoided prime habitat for Bicknell's thrush and Northern Bog lemming, eliminated turbines from high-elevation habitat, set aside development rights on 1,300 acres of higher-value Bicknell's thrush habitat, and provided $500,000 to off-site conservation of additional high-elevation habitat.

Consistent with our support of other wind power development projects in Maine, we support the construction of the eight turbines and their associated roads in the northern portion of this project area. Scenic impacts from this part of the project area meet the standards (see testimony of Catherine Johnson, NRCM) and no large blocks of unique natural community types have been identified[1] (see also testimony of Dr. David Publicover, AMC). This part of the project area is located outside of high-quality Bicknell's thrush habitat, so concern over both habitat loss and risk of collisions with turbines is minimal. If the application were amended to include development of only this portion of the project area, we would support the project.

III. Ecological Value of the Southern Project Area

The southern portion of the project area is ecologically different from the northern portion, and in contrast, provides higher-value habitat for wildlife. Although the applicant has attempted to address some of the concerns for wildlife and wildlife habitat by modifying turbine and road locations in the southern portion of the project area, these modifications have not resulted in elimination of undue adverse impacts to the resources in question. Therefore, the proposal for

[1] Pers. Comm., Sarah Demers at Maine Natural Areas Program, April 5, 2010.

wind turbine development in the southern portion of the project area still falls short of meeting the criteria of no undue adverse impacts, and should not be permitted.[2]

A. Bicknell's Thrush

Bicknell's thrush was documented above 3,200 feet in the southern project area by the applicant during the summer of 2009.[3] Bicknell's thrush is an extreme habitat specialist, restricted to balsam fir-dominated forests in the mountains of the northeastern United States and Canada, and preferring areas within larger forest patches that have long-term, on-going disturbance (damage from high winds, insects, disease, heavy ice, etc.) and dense re-growth of balsam fir in the understory.[4]

Bicknell's thrush habitat often overlaps with areas that have high wind resource values. A recent study overlaying a model of Bicknell's thrush habitat with areas of high wind resource values in the Northeast Highlands physiographic region of Vermont found that 94% of Bicknell's thrush habitat was in areas classified as having high wind power potential (Wind Power Class Four or higher).[5] However, only 7% of the landscape where wind power potential was high in this region overlapped with Bicknell's thrush habitat (See Exhibit A). In other words, most (93%) of the potential landscape with high wind power potential in the Northeastern Highlands of Vermont did *not* overlap with Bicknell's thrush habitat. Undue adverse impacts to

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[2] M.R.S.A. §685-B4C. Adequate provision has been made for fitting the proposal harmoniously into the existing natural environment in order to assure there will be no undue adverse effect on existing uses, scenic character, and natural and historic resources in the area likely to be affected by the proposal.
[3] Kibby Expansion Wind Power Project Application Volume II, page B.15-28.
[4] Rimmer, C.C., K.P McFarland, W.G. Ellison, and J.E. Goetz. 2001. Bicknell's thrush *(Catharus bicknelli). In* The Birds of North America, No. 592 (A. Poole & F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
[5] McFarland, K.P., C.C. Rimmer, S.J.K. Frey, S.D. Faccio, B.B. Collins. 2008. Demography, ecology and conservation of Bicknell's thrush in Vermont, with a special focus on the Northeastern Highlands. Vermont Center for Ecostudies, Norwich, VT. Technical Report 08-03.

Bicknell's thrush habitat from wind power development in Maine are entirely avoidable if projects are sited outside of this limited habitat.

It is critical that wind power projects be sited to avoid high-quality Bicknell's thrush habitat, as recommended by researchers working extensively with Bicknell's thrush throughout the northeast. Dr. Chris Rimmer and colleagues at the Vermont Center for Ecostudies have made explicit recommendations in two recent papers for "avoiding trail construction and widening in areas where natural disturbance is most likely to maintain suitable habitat for Bicknell's Thrushes (e.g., west-facing slopes, ridgelines, fir waves, and areas adjacent to fir waves)." [6,7] Wind power development as sited in the current application do not follow these guidelines. Proper siting is essential to reduce impacts to Bicknell's thrush.

Although there is no conclusive evidence of range-wide population declines, regional declines and local extinctions have elevated concern for Bicknell's thrush populations.[8] For example, between 2001 and 2004, a statistically significant decline of 9% per year was recorded for 47 mountaintop survey routes in Vermont.[9] An analysis of surveys in New Hampshire between 1993 and 2003 indicated a range wide decline of 7%, the first evidence of a sustained decline in a major population of Bicknell's thrush.[10] There is no published data supporting an increase in Bicknell's thrush in the northeast region.

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[6] Rimmer, C.C., K.P. McFarland, J.D. Lambert, R.B. Renfrew. 2004. Evaluating the use of Vermont ski areas by Bicknell's Thrush: applications for Whiteface Mountain, New York. Vermont Institute of Natural Science, Woodstock, VT

[7] Rimmer, C.C., J.D. Lambert and K.P. McFarland. 2005. Bicknell's Thrush Conservation Strategy for the Green Mountain National Forest. VINS Technical Report 05-5. Vermont Institute of Natural Science, Woodstock, VT.

[8] See studies cited in Rimmer, C.C., J.D. Lambert, and K.P. McFarland. 2005. Bicknell's thrush *(Catharus bicknelli)* Conservation Strategy for the Green Mountain National Forest. Vermont Institute of Natural Science Technical Report 05-5, Woodstock, VT.

[9] Lambert, J.D., M. P. McFarland, C. C. Rimmer, S.D. Faccio and J.L. Atwood, 2005. A practical model of Bicknell's thrush distribution in the northeastern United States. Wilson Bulletin 117(1):1-11.

[10] J. D. Lambert, D.I. King, J.P.Buonaccorsi, and L.S. Prout, 2008. Decline of a New Hampshire Bicknell's thrush Population, 1993–2003. Northeastern Naturalist 15(4):607-618.

1. Bicknell's Thrush is a Conservation Priority on Multiple Spatial Scales

As shown in Exhibit B, "Generalized Distribution of Bicknell's thrush in the Northeastern United States," suitable Bicknell's habitat is severely limited throughout its range. Bicknell's thrush does not breed anywhere in the world outside of this northeastern region, and is one of the most rare, range-restricted breeding birds in the Northeast. Its rarity and the importance of conserving its habitat are widely recognized:

- *The International Union of Concerned Scientists* classifies Bicknell's as globally "vulnerable", a category for species facing a high risk of extinction in the wild.[11]

- *The U.S. Fish and Wildlife Service's* 2008 "Birds of Conservation Concern" includes the Bicknell's thrush at multiple geographic scales (local, regional and national) as a species that, without additional conservation actions, is likely to become a candidate for listing under the Endangered Species Act.[12]

- *National Audubon's* 2007 Watchlist placed Bicknell's thrush in their red category, for species that are declining rapidly and/or have very small populations or limited ranges, and face major conservation threats. These typically are species of global conservation concern.[13]

- *The Maine Department of Inland Fisheries and Wildlif*e[14] classifies Bicknell's thrush as one of only 12 bird species of very high priority on their list of Species of Greatest Conservation Needs, indicating a high potential for state extirpation without management intervention and/or protection. The plan lists wind power turbines as a threat for the species, and identifies the following three relevant population and habitat objectives for Bicknell's thrush:
    1. Increase the population within the Atlantic Northern Forest Bird Conservation Region by 10%;
    2. Maintain existing range of breeding habitat; and
    3. Identify and secure habitat protection for core breeding areas in Maine.

- *The Partners in Flight* North American Landbird Conservation Plan lists the Bicknell's thrush as a species with multiple causes for concern across their entire range, with a

[11] BirdLife International (2009) Species factsheet: *Catharus bicknelli*. Downloaded from http://www.birdlife.org on 4/12/2010.
[12] U.S. Fish and Wildlife Service, 2008. Birds of Conservation Concern 2008. U.S. Dept. of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA.
[13] Butcher, G.S., D.K. Niven, A.O. Panjabi, D.N. Pashley, and K.V. Rosenberg. WatchList: The 2007 WatchList for United States Birds. American Birds 61:18-25.
[14] Maine Department of Inland Fisheries and Wildlife. 2005. Maine's comprehensive wildlife conservation strategy. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine.

combination of small populations, narrow distributions, high threats, and declining population trends, and a species of highest continental concern and priority for conservation action at national and international scales.[15]

- *The Partners in Flight* Bird Conservation Plan for the Eastern Spruce-Hardwood Forest states that Bicknell's thrush is the species of greatest concern, and by association the conifer habitats of mountaintops…ranks first in regional priority (p. 16). It also lists the loss of boreal-mountaintop habitats that are critical for Bicknell's thrush as "perhaps the most immediate threat to important bird populations in the planning unit". The plan supports the conservation goal of protecting all sites that support Bicknell's thrush "large enough to be considered source populations for other sites" and as many additional high-elevation habitat patches with smaller populations as possible.[16]

- *The U.S. Fish and Wildlife Service* lists Bicknell's thrush as one of only 17 species in the highest priority conservation category in Bird Conservation Region 14 (Atlantic Northern Forest) because of concern for its population within the region, the high responsibility of the region for the population, and either high or moderate continental concern for the species. The plan also lists wind power as a threat to Bicknell's thrush in the region.[17]

Despite the lack of state or federal listing as an endangered or threatened species, the above references make it undeniable that Bicknell's thrush is a high conservation priority at multiple spatial scales and with agreement among major bird conservation organizations and state and federal agencies across the northeast and the nation.

2. Loss of Bicknell's Thrush Habitat

The applicant asserts that the project area offers limited habitat for Bicknell's thrush but provides insufficient information to support these claims. Potential "suitable" habitat was identified through the use of "field surveys and aerial photo interpretation".[18] The applicant did not identify which "field survey" data was used for this delineation (vegetation surveys or point counts), or what characteristics on aerial photos were used to identify the habitat. No further

[15] Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2005. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY. Partners in Flight website. http://www.partnersinflight.org/cont_plan/.
[16] K.V. Rosenberg and T.P. Hodgman. 2000. Partners in Flight Landbird Conservation Plan: Physiographic Area 28: Eastern Spruce-Hardwood Forest
[17] Dettmers, R. 2006. A blueprint for the design and delivery of bird conservation in the Atlantic Northern forest. US. Fish and Wildlife Service/Atlantic Coast Joint Venture.
[18]Kibby Expansion Wind Power Project Application Volume II, page B.15-28

explanation of methods is given in the application. Therefore we have no way to assess the delineation of the “suitable” habitat block and cannot support the applicant’s claim that this is the limit of potential suitable habitat within the project area.

a. “Suitable” vs. “Core” Habitat

An additional concern is the inappropriate division of potential Bicknell’s thrush habitat into “suitable” vs. “core” habitat. “Core” habitat was delineated within suitable habitat based on spot-mapping methodology. Although we concur with the use of spot-mapping as a tool to gather more information about habitat use, there are many ways to interpret spot-mapping results. Given no methods for data analysis in the application, and the atypical and complex social system of Bicknell’s thrush (e.g., mates of both sexes having multiple partners, males with overlapping home ranges), we cannot evaluate or concur with the delineation of “core” habitat.

Furthermore, the applicant has made a fundamental flaw by creating this type of delineation; it is inappropriate when assessing the impact of an industrial development on Bicknell’s thrush habitat. What has been identified as “core” habitat in the summer of 2009 may or not be “core” habitat in 2010 or into the future. The temporal nature of Bicknell’s thrush habitat is evident from multiple research perspectives. Analysis of high-elevation survey routes run by volunteers for the Vermont Center for Ecostudies’ Mountain Bird Watch program show apparent extirpations and recolonizations over time.[19] In other words, Bicknell’s thrush will “disappear” from a survey route one year, only to “reappear” one or several years later. An analysis of high-elevation point counts in the White Mountain National Forest illustrated similar patterns, with Bicknell’s thrush present at point counts in suitable habitat typically in only one of

[19] see McFarland et al., 2008 for examples in the Northeastern Highlands of Vermont.

five survey years.[20] Given the dynamic nature of high-elevation forests, and the likelihood that a small-scale disturbance like wind throw or ice damage will dramatically change the nature of habitat quality for Bicknell's thrush in a fairly short time-frame[21], it makes the most sense, ecologically and from a long-term conservation perspective, to treat *all* suitable Bicknell's thrush habitat, whether used in 2009 or likely to be used in 2010 or beyond, as an equally valuable resource worthy of protection.

The applicant refers repeatedly to avoiding "core" Bicknell's thrush habitat when siting crane roads and turbine pads, while minimizing to the "maximum extent practicable" [22] all Bicknell's thrush habitat. We urge LURC to use the scientific reports we cite and agree that *all* Bicknell's thrush habitat has the potential to be "core" habitat in the future, and in fact, the dynamic nature of the system assures that "core" areas of habitat will move over time. Impacts to *all* Bicknell's thrush habitat must be avoided in order to maintain viable habitat over the long term, and meet the standard of no undue adverse impact to this important natural resource.

b. Edge Effects and Fragmentation

The habitat lost from a wind power development goes beyond the actual footprint of roads, collector corridors and turbines. Aside from the direct loss of habitat, the creation of multiple and extensive openings in the forest can degrade forest habitat, creating "edge effects" that can degrade habitat beyond the physical boundary of the edge in question. Openings in the forest can change the character of habitat for wildlife species by changing light penetration, temperature, moisture and microclimate along the edge. Roads create long, linear edges through forested habitat and can change habitat in multiple ways, by altering the physical and chemical

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[20] S.R. Hale. 2006. Using satellite imagery to model distribution and abundance of Bicknell's thrush (*Catharus bicknelli)* in New Hampshire's White Mountains. Auk 123(4):1038-1051.
[21] Lambert et. al 2005
[22] e.g., Kibby Expansion Wind Power Project Application Volume II, B.13-9

environment, changing animal behavior and travel patterns, and acting as vectors for the spread of invasive species.[23] A recent review of avian studies of edge effects and predation confirm most studies of avian nest predation find edge effects up to but not more than 150 meters from the forest edge (approximately 492').[24] (Also see testimony of Dr. David Publicover, pages 9 and 10, for additional information on forest edge effects).

Predator-prey relationships may also be altered when a block of forest is fragmented by roads or other development like agriculture or logging. This may apply to "islands" of Bicknell's thrush on mountaintops surrounded by forest management activities that reduce habitat suitability at lower elevation. Red squirrels, a primary nest predator for Bicknell's thrush,[25] have been documented to be more abundant in isolated fragments of western boreal forests, possibly because interior forest predators like pine marten and barred owl are absent when forest fragments become too small.[26] This may have serious impacts on nesting songbirds in small patches of habitat, particularly for low-nesting species like Bicknell's thrush.

The Maine Natural Areas Program estimated that the applicant will be clearing 42 acres within the Fir-Heart-leaved Birch Sub-alpine natural community. To account for additional edge effects immediately adjacent to the cleared areas, MNAP added an additional 50' buffer around the cleared area, bringing the total area affected within this community type to 80 acres.[27] However, a 50' buffer is likely much too conservative in terms of the depth of impacts from edge effects, particularly for Bicknell's thrush. The area affected should be recalculated with at least a

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[23] Extensive review in S.C. Trombulak and C. A. Frissell, 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18-30.
[24] See review of studies in Laurence, W. F. 2000. Do edge effects occur over large spatial scales? Trends in Ecology & Evolution 15:134–135.
[25] Rimmer et al., 2001.
[26]E. Bayne and K.A. Hobson, 2002. Effects of red squirrel (Tamiasciurus hudsonicus) removal on survival of artificial songbird nests in boreal forest fragments. Am. Midl. Nat. 147:72–79
[27] Letter from Sarah Demers to Marcia Spencer Famous dated February 24, 2010, page 1.

100’ buffer (see page 9 of David Publicover’s AMC testimony). This will clearly yield a more substantial and undue adverse impact to this rare natural community.

The applicant has determined that only 12.4 acres of potential suitable Bicknell’s thrush habitat (14%) would be impacted by the project.[28] Since there is no discussion of the impacts beyond the footprint of the project area in the application, we can only assume this calculation is limited to direct clearing of roads and turbine pads and fails to include the multiple impacts to habitat beyond the actual cleared area. We believe the applicant has failed to include these edge effect impacts into the calculations of area affected.

Finally, the crane roads built for this project will be 34 feet wide, with graded areas on either side reaching well over 200 feet in total width in several places throughout the project area.[29] These are not temporary logging roads, and are significantly different from any kind of road clearing that has been in this area before (see Exhibit C for an example of a wind power access road through forested habitat). We therefore strongly disagree with the applicant’s assertion that “the proposed project will not create edges (and thereby edge effects) incongruous with those that are extant, being introduced, or are impending due to forestry practices in the region.”[30] The size and width of the access roads created for this project will be unlike anything currently in project area, particularly in the P-MA zone above 2700’ where roads are primarily temporary for forest management activities.

c. Winter Habitat

Although many conservation organizations believe that the loss of winter habitat pose the most immediate threat to Bicknell’s thrush survival,[31] evidence of winter limitation to the

[28] Kibby Expansion Wind Power Project Application Volume II, B.15-32 and B.15-11.
[29] Kibby Wind Power Expansion Application, Attachment B.13-1, Permit Plan Set.
[30] Kibby Expansion Wind Power Project Application Volume II, B.15-16
[31] For summary of winter habitat issues, see VCE website: www.vtecostudies.org/hispbird/

population is lacking, and studies are needed to quantify the extent and use of remaining winter habitat.[32] While we agree that winter habitat loss and degradation is a major concern for Bicknell's thrush, we do not see it as justification for ignoring the conservation needs on the breeding grounds. As efforts to purchase and protect additional habitat (e.g., the Hispaniola Conservation Fund at VCE[33]) move forward, we hope to see improvements in winter habitat quantity and quality. When the time comes that wintering habitat is less of an issue for Bicknell's thrush, we must be sure that we have been vigilant in protecting *all* potential breeding habitat in the northeast to assure long-term survival of wildlife using higher-elevation mountaintop habitat.

3. Undetermined Impact to local Bicknell's Thrush Population

The applicant's failure to meet its burden of demonstrating no undue adverse impact on Bicknell's thrush is illustrated by the lack of supporting documentation. The lack of data pertaining to Bicknell's thrush surveys in the permit application is striking. Unlike the extensive and detailed data summaries included for spring and fall raptor surveys, spring and fall migration surveys, and bat surveys in the project area,[34] there is little more than a page summarizing and interpreting Bicknell's thrush survey results.[35] This contrast in both the quantity and the quality of data is alarming. For the other surveys mentioned above, raw data that allows third parties to confirm and concur with the applicant's conclusions was provided. Similarly, the original application for the initial Kibby Wind Power Development included extensive information on migratory bird survey results. The fact that this information was not provided for Bicknell's thrush in the current application is a grave concern. Despite multiple attempts requesting

[32] Lambert et al., 2008, page 614.
[33] For more information, see: http://www.vtecostudies.org/hispbird/fund.html
[34] Kibby Expansion Wind Power Project Application Volume I, Sections A.3.3, A.3.4, and A.3.5.
[35] Kibby Expansion Wind Power Project Application Volume II, Sections B.15.28-29, B.15-32.

additional information from the applicant, no detailed information has been shared, so the burden of proof for undue adverse impacts has not been met by the applicant.

Some examples of the type of information we feel is critical for confirming a finding of no undue adverse impact include how many times each point count was surveyed, where Bicknell's thrush were located during spot-mapping exercises, and how many Bicknell's thrush (and other species) were detected at each point count. The conclusion that LURC must draw from the applicant's failure to provide this information is that the applicant has failed to meet their burden of proof that there will be no undue adverse impacts to Bicknell's thrush. Indeed, the limited information that they have provided indicates that building a commercial wind power facility within the southern portion of this project area will in fact result in undue adverse impacts.

4. Risks of Collision to Bicknell's thrush

There is a significant risk of collision to Bicknell's thrush from the placement of turbines directly in known breeding habitat. Male Bicknell's thrushes conduct a mating flight, which most commonly occurs at dusk and consists of 10- to 15-second flights that are 25 to 75 meters above the ground, often in large circles greater than 100 meters in diameter. Birds tend to rise rapidly from perches before circling and dropping abruptly back after completing this "flight song."[36] This behavior puts these birds well within the rotor-swept zone, which extends from 35 to 125 meters above the ground, at a time of low visibility (dusk). With five of the seven southern turbines in or within 100 meters of potential Bicknell's thrush habitat, the applicant severely underestimates the potential for direct collisions and in fact, fails to mention this potential cause of mortality in the application.

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[36] Rimmer et al., 2001

IV. Post-construction Issues

1. Bird and Bat Migration:

Birds and bats migrate through the project area, as documented by the applicant during the spring and fall of 2009.[37] A comparison with recent similar studies on forested ridgelines in the northeast as presented in the application is summarized in Exhibit D. Of note, the fall migration passage rate in the project area of 458 targets/km/hr was moderately high compared to other recent studies.[38] However, the altitude of passing targets for fall migration was substantially lower than in other similar studies, with 23% of targets flying below the rotor swept area. This translates to a very high rate of targets passing through the rotor swept area (>100 targets/km/hr) (See Exhibit D). Although these passage rates may not rise to the level of creating an undue adverse impact, the low altitude of flights over the project area is a concern in terms of the potential for direct mortality.

We encourage LURC to provide strong language if this project is approved requiring rigorous post-construction studies. Since the body of knowledge and the available technology around post-construction studies is rapidly evolving[39], we encourage the use of current, peer-reviewed guidelines for these studies as well as the employment of emerging technology (for example, guidelines outlined on pages 2474-2477 in Kunz. et al., 2007, attached in Exhibit E).[40] We also ask that the scope of post-construction studies be <u>determined</u> by DIFW, in consultation with the U.S. Fish and Wildlife Service, in order to assure third-party oversight of protocols,

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[37] Kibby Wind Power Expansion application, Vol. 1, Attachment A.3-3

[38] Kibby Wind Power Expansion application, Vol. 1, Attachment A.3-3

[39] For example, thermal infrared cameras have monitored direct bat mortality at wind turbines in West Virginia, see Horn, J.W., E.B. Arnett and T. H. Kunz. 2008. Behavioral responses of bats to operating wind turbines. J Wildl Mgmt 72(1):123-132.

[40] T.H. Kunz, E.B. Arnett, B.M. Cooper, W.P. Erickson, R.P. Larkin, T. Mabee, M.L. Morrison, M. D. Strickland, & J. M. Szewczak. 2007. Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats:A Guidance Document. J Wildl Mgmt 71(8): 2449–2486.

similar to the agreement reached for the original Kibby Wind Power project.[41] In the event that the post-construction studies find high mortality events for either breeding birds or migrating birds and bats, strong language in the permit for adaptive management of turbine operations is needed. For example, curtailing turbines during times of day and/or times of year that are likely to lead to high mortality events.

If the application is approved, we also encourage DIFW to investigate emerging RADAR technology for monitoring migration events. For example, the company DeTect, Inc. manufactures the MERLIN Avian Radar System which provides operational monitoring of migrating birds and bats, and has the potential to shut down turbines in the face of on-coming migration events.[42] If post-construction studies reveal issues for bird and bat mortality, this type of technology may provide needed mitigation to reduce the size and scope of mortality.

2. Golden Eagle Recovery:

Golden eagles have been extirpated from other northeastern states in recent decades, and the last confirmed golden eagle nest in Maine was in the vicinity of the project more than 20 years ago. However, interest in recovery efforts in the northeast is on-going though at the present time is not in any organized form.[43] Fueling this interest are the occasional observations of golden eagles that stay in Maine throughout the summer. One radio-tagged three-year old golden eagle was observed throughout the northwestern part of the state in 2009.[44] We raise this issue to highlight the need for on-going coordination with DIFW if this project is permitted, and

[41]From page four of the "Summary of Agreement Between Maine Audubon, Natural Resources Council of Maine and the Appalachian Mountain Club, and TransCanada" for ZP709, "Although the scope and extent of the post construction avian and bat studies have not been finalized, TransCanada has agreed that any such studies will include the following elements…c. Details of the scope will be determined by IF&W in consultation with USFWS and will include details related to searcher efficiency, scavenging rates, and carcass identification/storage/removal"
[42] http://www.detect-inc.com/avian.html
[43] Charlie Todd, MDIFW biologist, pers. comm., April 2010.
[44] Charlie Todd, MDIFW biologist, pers. comm., April 2010.

to keep in mind during post-construction studies that golden eagles may become a mitigation concern in the future.

IV. Conclusions

The applicant has failed to meet its burden of establishing no undue adverse impact to existing natural resources or scenic character. Despite the lack of adequate information provided in the application, it is clear that the southern portion of the project area comprises breeding Bicknell's thrush habitat. Such habitat is severely limited and Bicknell's thrush is one of the most rare, range-restricted breeding birds in the Northeast. Locating turbines and their accompanying roads within and adjacent to this habitat will cause conversion and direct loss of this habitat as well as direct mortality to singing males, therefore comprising a significant undue adverse impact. The applicant should amend its proposal to include only the northern eight turbines thereby avoiding undue impacts to important wildlife habitat.

VERIFICATION

Susan M Gallo

Signature of Witness: Susan M. Gallo

April 19, 2010

Before me appeared Susan M. Gallo, who, being duly sworn, did testify that the foregoing testimony was true and correct to the best of her knowledge and belief.

NOTARY PUBLIC

AARON C. SPLINT
Notary Public, Maine
My Commission Expires May 22, 2010

SUSAN M. GALLO

PRE-FILED TESTIMONY

DP 4860

EXHIBITS

EXHIBIT A. Wind power resources in the Northeastern Highlands of Vermont overlaid with Bicknell's thrush habitat model (Figure 3 from McFarland et al., 2008) Full text of article available at: http://www.vtecostudies.org/PDF/VCEBITHReport2008.pdf

EXHIBIT B. Range map of Bicknell's thrush in the northeast (from Lambert et al., 2005)

EXHIBIT C. Example of road corridor in the original Kibby Wind Power project (photo by Ken Kimball)

EXHIBIT D. Table summarized from Kibby Wind Power Expansion Application, Volume I, Attachment A.3-3, showing passage rates and altitudes recorded in recent migration studies on forested ridgelines in the northeast U.S.

EXHBIT E. Excerpt regarding pre- and post-construction guidelines, from Kunz et al., 2007. Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats:A Guidance Document. J Wildl Mgmt 71(8): 2449–2486. Available for download at: http://www.humboldt.edu/~jms139/download/Kunz_etal_JWM_07.pdf.

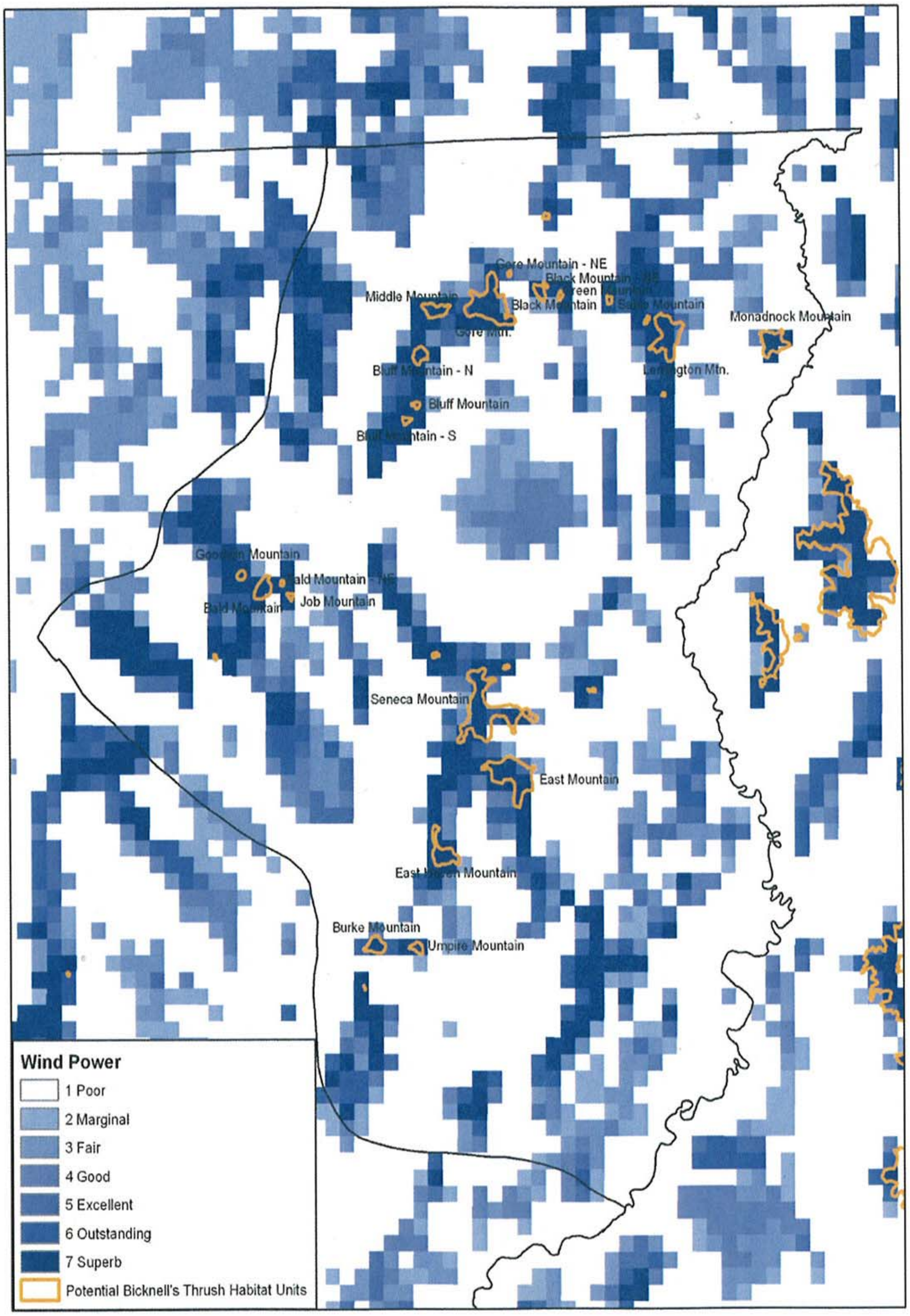

EXHIBIT A: Wind power estimates at 50m altitude in the Northeastern Highlands region, Vermont. Orange polygons indicate identified Bicknell's thrush high-elevation habitat units (Figure 3 in McFarland, K.P., C.C. Rimmer, S.J.K. Frey, S.D. Faccio, B.B. Collins. 2008. Demography, ecology and conservation of Bicknell's thrush in Vermont, with a special focus on the Northeastern Highlands. Vermont Center for Ecostudies, Norwich, VT. Technical Report 08-03)

EXHIBIT B

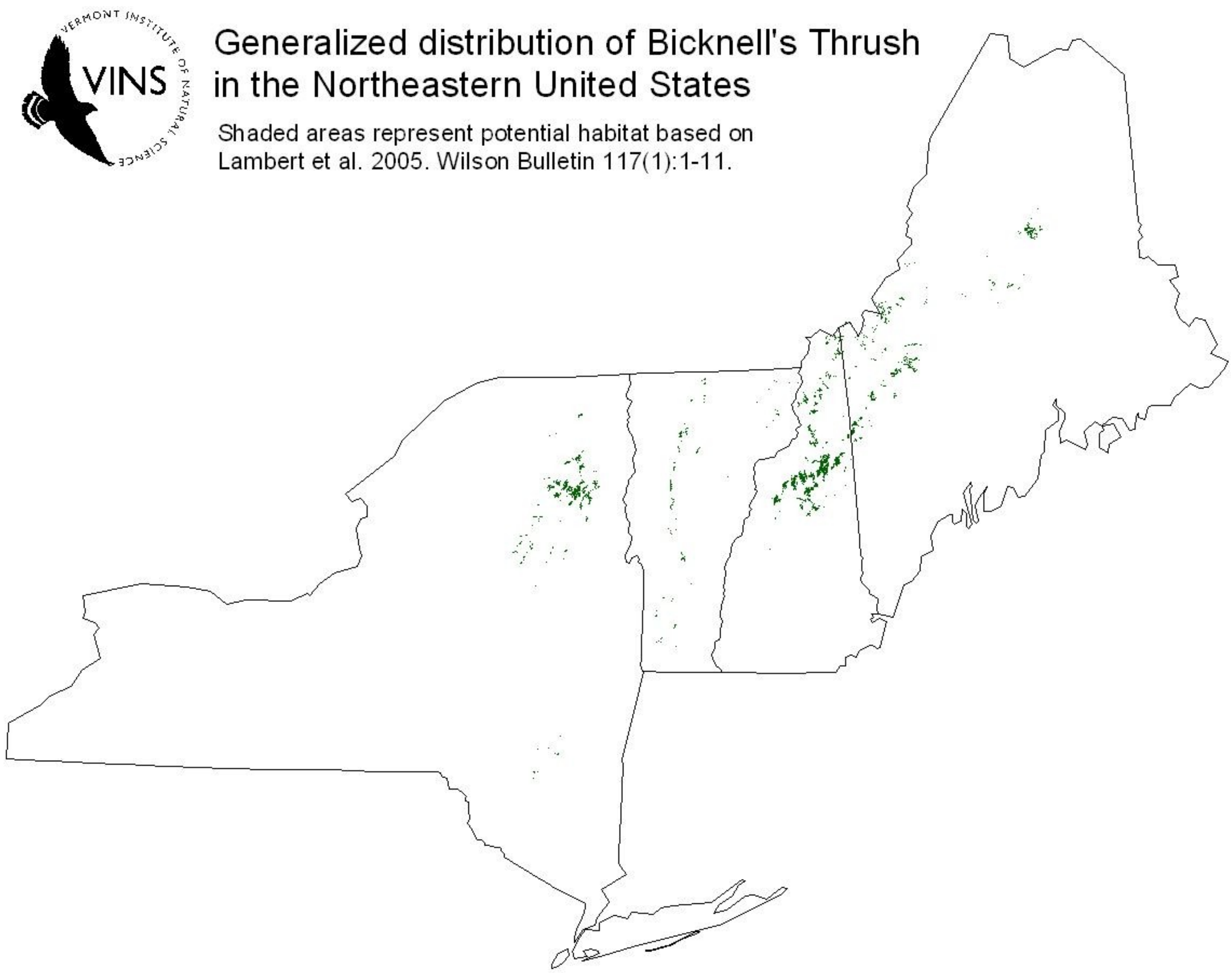
VERMONT INSTITUTE OF NATURAL SCIENCE
VINS
Generalized distribution of Bicknell's Thrush
in the Northeastern United States
Shaded areas represent potential habitat based on
Lambert et al. 2005. Wilson Bulletin 117(1):1-11.

EXHIBIT C. Example of road corridor in wind power development (photo by Ken Kimball). Note the width cleared extends far beyond the road itself.

EXHIBIT D. A sample of the most recent radar survey results conducted at proposed U.S. wind power facilities on forested ridgelines in the northeast U.S. From Kibby Wind Power Expansion Project Application, Attachment A.3-3, Appendix A, Table 5.

Site Name	Season	Year	# Survey Nights	Avg. Passage Rate (t/km/hr)	Average Flight Height (m)	%Targets Below Turbine Height	Avg. # of Targets in Rotor Swept Area (km/hr)
Laurel Mt., Barbour Co., WV	Spring	2007	20	277	533	3%	8
Laurel Mt., Barbour Co., WV	Fall	2007	20	321	533	6%	19
Georgia Mountain, VT	Fall	2008	21	326	371	7%	23
Kibby, Franklin Co., ME (Range 1)	Fall	2005	12	201	352	12%	24
Deerfield, Bennington Co., VT	Spring	2006	26	263	435	11%	29
Lincoln, Penobscot Co., ME	Spring	2008	20	247	316	13%	32
Kibby Expansion, DP4680	**Spring**	**2009**	**20**	**207**	**293**	**18%**	**37**
Mars Hill, Aroostook Co., ME	Fall	2005	18	512	424	8%	41
Kibby, Franklin Co., ME (Range 1)	Spring	2006	10	197	412	22%	43
Mars Hill, Aroostook Co., ME	Spring	2006	15	338	384	14%	47
Errol, Coos Co., NH	Spring	2007	30	342	332	14%	48
Lempster, Sullivan Co., NH	Fall	2006	32	620	387	8%	50
Franklin, Pendleton Co., NY	Spring	2005	21	457	492	11%	50
Allegany, Cattaraugus Co., NY	Spring	2008	30	268	316	19%	51
Errol, Coos Co., NH	Fall	2007	29	366	343	15%	55
Lincoln, Penobscot Co., ME	Fall	2007	22	368	343	15%	55
Roxbury, Oxford, ME	Fall	2007	20	420	365	14%	59
Stetson, Washington Co., ME	Fall	2006	12	476	378	13%	62
Allegany, Cattaraugus Co., NY	Fall	2007	46	451	382	14%	63
Kibby, Franklin Co., ME (Valley)	Spring	2006	6	456	368	14%	64
Kibby, Franklin Co., ME (Valley)	Fall	2005	5	452	391	16%	72
Dans Mountain, MD	Spring	2005	23	493	541	15%	74
Oakfield, Penobscot Co., ME	Fall	2008	20	501	309	18%	90
Kibby, Franklin Co., ME (Mountain)	Fall	2005	12	565	370	16%	90
Roxbury, Oxford, ME	Spring	2007	20	539	312	18%	97
Lempster, Sullivan Co., NH	Spring	2007	30	542	359	18%	98
Oakfield, Penobscot Co., ME	Spring	2008	20	498	276	21%	105
Kibby Expansion, DP4680	**Fall**	**2009**	**20**	**458**	**287**	**23%**	**105**
Kibby, Franklin Co., ME (Range 2)	Spring	2006	7	512	378	25%	128
New Creek, Grant City, WV	Fall	2007	20	811	360	17%	138

EXHIBIT E. Excerpt from Kunz et al. 2007, pages 2474-2477, relating to post-construction monitoring.

Assessing Impacts of Wind-energy Development on Nocturnally Active Birds and Bats: A Guidance Document. T.H. Kunz, E.B. Arnett, B.M. Cooper, W.P. Erickson, R.P. Larkin, T. Mabee, M.L. Morrison, M. D. Strickland, & J. M. Szewczak. 2007. Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats:A Guidance Document. J Wildl Mgmt 71(8): 2449–2486.

CONDUCTING PRE- AND POSTCONSTRUCTION MONITORING

Many of the methods and metrics summarized above for monitoring nocturnally active birds and bats have been applied during pre- and postconstruction monitoring and research efforts. In this section, we describe basic approaches and protocols to perform pre- and postconstruction monitoring and research, discuss factors influencing and limiting protocol development and implementation, and offer considerations for future monitoring and research.

Preconstruction Studies

Preconstruction assessments at proposed wind-energy facilities generally are initiated from early project evaluations in consultation with state or Federal agencies with respect to wildlife, including potential direct impacts to bird and bat species, especially nocturnal migrants, and threatened and endangered species or species of special concern. Agencies generally request that data be used to characterize wildlife resources in the context of a proposed development, to evaluate the potential impacts from such development, and to the greatest extent possible, determine the location of turbines that will minimize risk to birds and bats. Although these objectives may provide useful information for designing a facility and siting specific turbines, or perhaps aiding in the decision to abandon a project altogether, each project may require a different sampling design, level of sampling intensity, and volume of data to be collected.

Multiple factors may influence preconstruction monitoring and confidence of the data collected as outlined in the original ‘‘Methods and Metrics’’ document (Anderson et al. 1999), as well as other works (e.g., Skalski 1994, MacKenzie et al. 2001, Morrison et al. 2001, Pollock 1991, Pollock et al. 2002). Designing a preconstrution study protocol should begin with clearly defined questions. Thus, a clear understanding of the relevant questions should dictate the sampling design and methods. An inappropriate protocol may result in low power to detect differences (Steidl et al.1997), failure to account for spatial and temporal variation (Hayes 1997), and pseudoreplication (Hurlbert 1984), all of which can lead to unreliable statistical and deductive inferences. Ultimately, when assessing risks to nocturnally active birds or bats at a proposed wind-energy site, failure to design an appropriate sampling protocol and account for the aforementioned factors may increase the likelihood of a Type II error (i.e., failing to reject a false null hypothesis and concluding no effect when, in fact, there is one).

A fundamental gap in our current knowledge of preconstruction assessment of risk is that no linkages exist between preconstruction assessments and postconstruction fatalities for nocturnal wildlife. Although intensive studies are underway (Arnett et al. 2006), it may be several years before methods described in this document can be used to predict fatalities with an acceptable level of precision, accuracy, and degree of confidence.

In the case of Federally endangered species, the course of action for decision-making is reasonably well-defined. For example, a developer who finds Indiana myotis (Myotis sodalis) during mist-net surveys on a project area may enter into voluntary negotiations with the United States Fish and Wildlife Service (USFWS) to receive an incidental take permit under the auspices of a Habitat Conservation Plan under Section 10 (a)(1)(B) of the Endangered Species Act or may chose to abandon the project due to high risk of taking additional endangered species (U.S. Fish and Wildlife Service 2003).

Currently, there is neither a framework nor empirically driven guidelines for agencies or developers to know what 39.7 (63.1 SD) bat calls per night gathered with acoustic detectors or a passage rate of 116.9 (68.6) targets/km/hour collected from radar actually mean compared to 119.1 (626.2) bat calls per night or 350.7 (677.1) targets/km/hour, except that the activity and variance is about 3 times higher in both cases. Thus, establishing linkages between preconstruction metrics and postconstruction fatality estimates is a vital next step toward being able to predict impacts and, thus, provide the context needed for decisionmaking. Until additional empirical data are gathered and a relationship between independent variables and the number of fatalities, establishing decision-making criteria will be far more challenging, controversial, and politically charged than improving the sampling designs and quality of information gathered. Considerable uncertainty and risk reside in existing decision-making frameworks, but to best utilize the information gathered during the preconstruction period, such frameworks are needed for stakeholders to agree upon and implement. Established quantitative criteria for decision-making should be based on the best available scientific information and subject to change as new information is gathered, following the fundamental principles of adaptive management (Holling 1978, Walters 1986).

Postconstruction Studies

Many of the methods and metrics described for preconstruction surveys may be used effectively during the postconstruction period, including visual, acoustic, radar, and capture methods. In addition, postconstruction studies require estimates of actual bird and bat fatalities.

Estimating presence and activity.— With few exceptions, postconstruction monitoring has centered on fatality searches. Five postconstruction studies have deployed ultrasonic detectors to record bat activity at operating wind facilities (Gruver 2002, Johnson et al. 2003, Fielder 2004, Jain 2005, Arnett et al. 2006). However, only one study in North America has used thermal imaging cameras to observe bat behavior and interactions with turbines (Horn et al. 2008). Efforts to deploy multiple tools (e.g., acoustic detectors, radar, and thermal imaging cameras) at proposed wind facilities, or those currently operating, are underway in an attempt to test various methods for evaluating preconstruction activity of birds and bats and establishing relationships between flight activity and fatalities (D. Redell, Wisconsin Department of Natural Resources, unpublished data; R. M. R. Barclay and E. Baerwald, University of Calgary, personal communication; A. Kelly, personal communication).

Postconstruction studies using multiple tools (e.g., acoustic detectors, radar, night-vision devices, and thermal infrared cameras) are needed to determine the context and relative exposure of nocturnal animals using the airspace in relation to observed fatalities. Numerous reports and environmental impact statements argue that fatalities of bats at wind-energy facilities are lower in the western United States and within agricultural regions, for example, compared to forested ridge tops in the eastern United States. However, fatalities could be proportionally the same in relation to regional populations or simply the numbers of animals using the airspace at the time fatalities occur. Until this context is established, we suggest that comparisons and extrapolations among regions, especially when varying methods are employed, be viewed cautiously.

Fatality assessment.—Experimental designs and methods for conducting postconstruction fatality searches are well-established (Anderson et al. 1999, Morrison et al. 2001). Although the statistical properties for at least some common estimators have been evaluated and suggested to be unbiased or close to unbiased under the assumptions of the simulations (W. P. Erickson, WEST, Inc., unpublished data), important sources of field-sampling bias should be accounted for to correct estimates of fatalities. Important sources of bias include 1) fatalities that occur on a highly periodic basis, 2) carcass removal by scavengers, 3) searcher efficiency, 4) failure to account for the influence of site conditions (e.g., vegetation) in relation to carcass removal and searcher efficiency (Wobeser and Wobeser 1992, Philibert et al. 1993, Anderson et al. 1999, Morrison 2002), and 5) fatalities or injured bats that may land or move outside search plots.

Temporal distribution of fatalities.—Most estimators assume that fatalities are uniformly distributed, and at independent random times between search days. However, if the distribution of fatalities is highly clustered, then estimates may be biased, especially if carcass removal rates are high. Most estimators apply an average daily rate of carcass removal expected during the study. If most fatalities occur immediately after a search, they would have a longer time to be removed before the next search, resulting in higher scavenging rates than the average rate used in the estimates. This would lead to an underestimate of fatalities. On the other hand, if most fatalities occur before but close to the next search, the fatalities may be overestimated. Potential biases are minimized by ensuring that some searches are conducted most evenings during the survey period and that they are well-distributed throughout the area of interest (Fig. 21).

Scavenging rates.—The second source of bias in fatality estimation relates to assessing carcass removal rates by scavengers. All wind-energy facilities will be inhabited by a variety of potential avian (e.g., cervids [Corvidae], vultures [Ciconiidae]), mammalian (e.g., skunks [Mephitidae], raccoons [Procyon lotor], and coyotes [Canis latrans]), and insect (e.g., burying beetles and ants) scavengers, and searches, especially those conducted at less-frequent intervals, may result in highly biased estimates of fatality (Morrison 2002). Past experiments that have assessed carcass removal using small birds as surrogates for bats may not be representative of scavenging for bat carcasses. Two studies conducted by Erickson et al. (2003) and Johnson et al. (2003) used bat carcasses (estimated to be killed the previous night when found) and found similar or lower scavenging rates on bat carcasses compared to small bird carcasses. However, small sample sizes may have biased estimates and limited the scope of inference of these 2 studies. Fiedler (2004) and Fiedler et al. (2007) conducted 6 bias trials during the first phase of development at the Buffalo Mountain Energy Center in Tennessee and found no difference between bird and bat carcasses for searcher efficiency or scavenging time. Notwithstanding, Kerns et al. (2005), however, reported significantly lower scavenging rates on birds compared to both fresh and frozen bat carcasses at the Mountaineer Wind Energy Center in West Virginia. Scavenging should be expected to vary temporally (e.g., seasonally) and spatially from site to site and among both macroscale habitats (e.g., forests vs. grasslands or agricultural landscapes) and microscale vegetation conditions at any given turbine (e.g., bare ground compared to short grass or agricultural stubble).

Searcher efficiency.—It is well-known that searcher efficiency or observer detection (i.e., the rates at which searchers detect carcasses) varies among individuals (Morrison et al. 2001). Searcher efficiency also can be biased by other factors including topography, vegetation, condition of carcasses (e.g., decomposed remains compared to fresh, intact carcasses), weather, and lighting conditions. Searcher efficiency and carcass scavenging should be expected to vary considerably within and among different vegetation cover conditions (Wobeser and Wobeser 1992, Philibert et al. 1993, Anderson et al. 1999, Morrison 2002, Arnett et al.2008). The use of trained dogs can increase the recovery rate of carcasses, especially in heavy vegetation cover, and offers promise for addressing many questions surrounding bat fatality at wind facilities (Arnett 2006), although dogs undoubtedly vary in their ability to detect carcasses.

Size of search plots.—Sizes of plots have varied among studies. Many recent studies used rectangular search plots with edges of plots a minimum distance from the turbine equal to the maximum tip height of the turbine. Observed spatial distributions of fatalities suggest that most, but not all, fatalities occur in this general area. However, topography, maturity of vegetation, size of carcass, wind direction, and other factors likely affect the distribution. This distribution can be used to approximate the number of fatalities missed (Kerns et al. 2005; Arnett et al. 2008; W. P. Erickson, personal communication). Most studies have shown a tighter distribution of bat fatalities around the turbine compared to birds (Kerns et al. 2005). Additional factors affecting the precision and accuracy of fatality estimates include search effort, including the number of turbines searched, intensity of searches within search plots, and the experience of observers (Anderson et al. 1999).

Search protocols.—Fatality search protocols have varied considerably among studies. Sampling methods and duration for 21 postconstruction studies conducted in North America are summarized by Arnett et al. (2008). Fatality searches usually are conducted on a systematic schedule of days (e.g., every 1 d, 3 d, 7 d, or 14 d) but rarely have daily searches been employed (Kerns et al. 2005). More intensive searches often are performed during the spring and autumn migratory periods, whereas summer breeding surveys sometimes are less frequent or not conducted at all. By contrast, when they are conducted, most spring and autumn postconstruction carcass searches at communication towers are performed nightly (Manville 2005).

Although there are multiple approaches to performing searches (e.g., line transects, circular plots), any protocol that is used must thoroughly quantify the aforementioned sampling biases to obtain reliable estimates. Most fatality studies to date have poorly accounted for searcher efficiency and removal by scavengers, especially for bats (NRC 2007, Arnett et al. 2008). Some studies adjusted fatality estimates based on a single trial for searcher efficiency and scavenger removal using small samples of bird and bat carcasses, and on >2 occasions these trials occurred outside of the migratory periods.

There is a clear need for rigorous implementation of search protocols that can yield reliable estimates of bird and bat fatalities. We recommend that all postconstruction monitoring be designed to address >2 common objectives. First, search protocols should be conducted so that estimates of fatalities can be compared across different landscapes and habitats both within and among regions. By standardizing protocols for fatality searches, comparable estimates can be achieved and will be useful for understanding different levels of risk. Search intervals could vary from 3 days to 7 days, as long as standard search methods (we suggest line-transect sampling) are employed and sampling biases (e.g., search efficiency and scavenger removal) are adequately accounted for. The total area searched also should be accounted for and similar visibility classes need to be established (see Kerns et al. 2005).

Second, establishing patterns of fatalities in relation to weather variables, turbine characteristics (e.g., revolutions/min) and other environmental factors is fundamental to understanding wildlife fatality and developing solutions (Kunz et al. 2007). Thus, more intensive (nightly) postconstruction sampling should be conducted at sites where relatively high bat fatalities are expected for !33% of all turbines, to gather data required to meet this objective. Specific methods and suggestions for establishing and conducting sampling protocols are summarized in Kerns et al. (2005) and Arnett et al. (2008).