Cumulative Impacts Assessment for the Bluestone Wind Project Broome County, New York

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1.0 INTRODUCTION

Bluestone Wind, LLC (Bluestone) is developing the Bluestone Wind Project (Facility Site) in Broome County, New York). The term Facility will be used to describe the locations of infrastructure (i.e., wind turbines, access roads, etc.) and the term Facility Site will be used to describe all land parcels where infrastructure will be placed. The Facility will consist of up to 33 wind turbines, with an anticipated installed generating capacity of up to 124 megawatts (MW).

The Facility offers a number of environmental benefits, including generating electricity with zero carbon emissions; however, Facility construction and operating turbines may present potential risks to birds and bats. Per the Bluestone Wind Project Stipulations, the objectives of this Cumulative Risk Assessment is to evaluate the actual and expected impacts from the construction and operation of the Facility as they relate to other proposed and operating wind energy projects nearby the Facility and in the state.

2.0 FACILITY SITE AND FACILITY COMPONENTS

2.1 Facility Site

The Facility Site encompasses approximately 23 square kilometers (km^2; 5,652 acres [ac]) in Broome County in southcentral New York (Figure 2.1). The Facility Site lies within the Northern Allegheny Plateau Ecoregion, which is characterized by rolling hills, open valleys, and low mountains (USEPA 2010). The Facility Site also falls within the NYSDEC Central Appalachians Ecological Zone of New York (Edinger et al. 2014). Elevation within the Facility Site ranges from approximately 280 meters (m; 919 feet [ft) above sea level (ASL) in the lowest valley to 617 m (2,024 ft) ASL at the highest peak.

2.2 Facility Components

The Facility will include the construction and operation of up to 33 wind turbine generators (WTG) with a nameplate generating capacity of up to 124 MW. The height of a rotating turbine to be built at the Facility, or rotor swept height (RSH), is approximately 50.5 - 205 m (165.7-672.6 ft) above ground level (AGL). The Facility will include access roads, underground collection lines, point of interconnection, collector substation, battery storage, and Operations and Maintenance (O&M) building (Figure 2.2). Details describing the Facility can be found in the Exhibit 3 of the Article 10 application. In general, the array of 33 turbines includes turbines distributed throughout the Facility Site in a manner that optimizes power generation and minimizes impacts to identified sensitive resources (e.g., wetlands, woodlands, etc.).

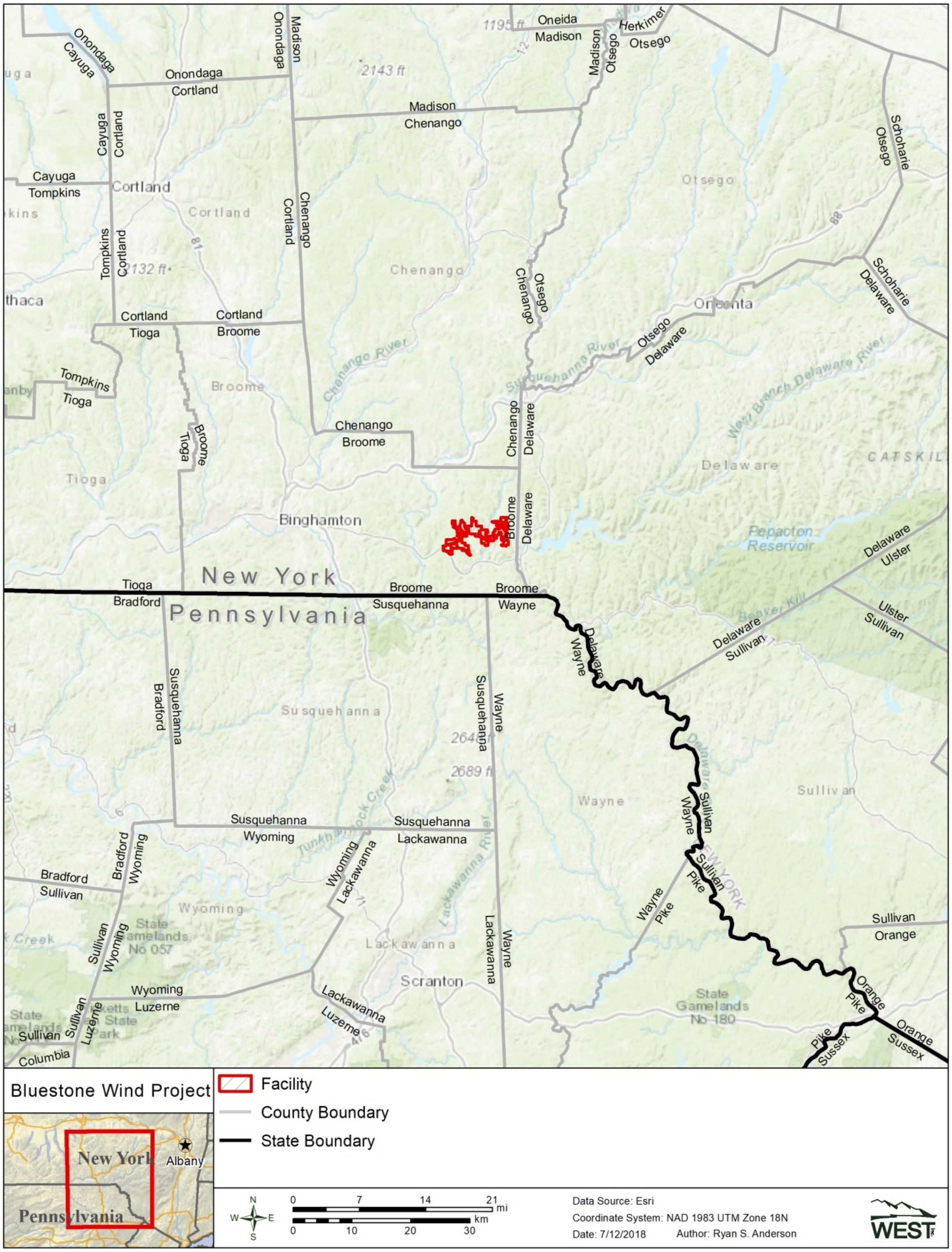

Figure 2.1 Location of the proposed Bluestone Wind Project Facility in Broome County, New York.

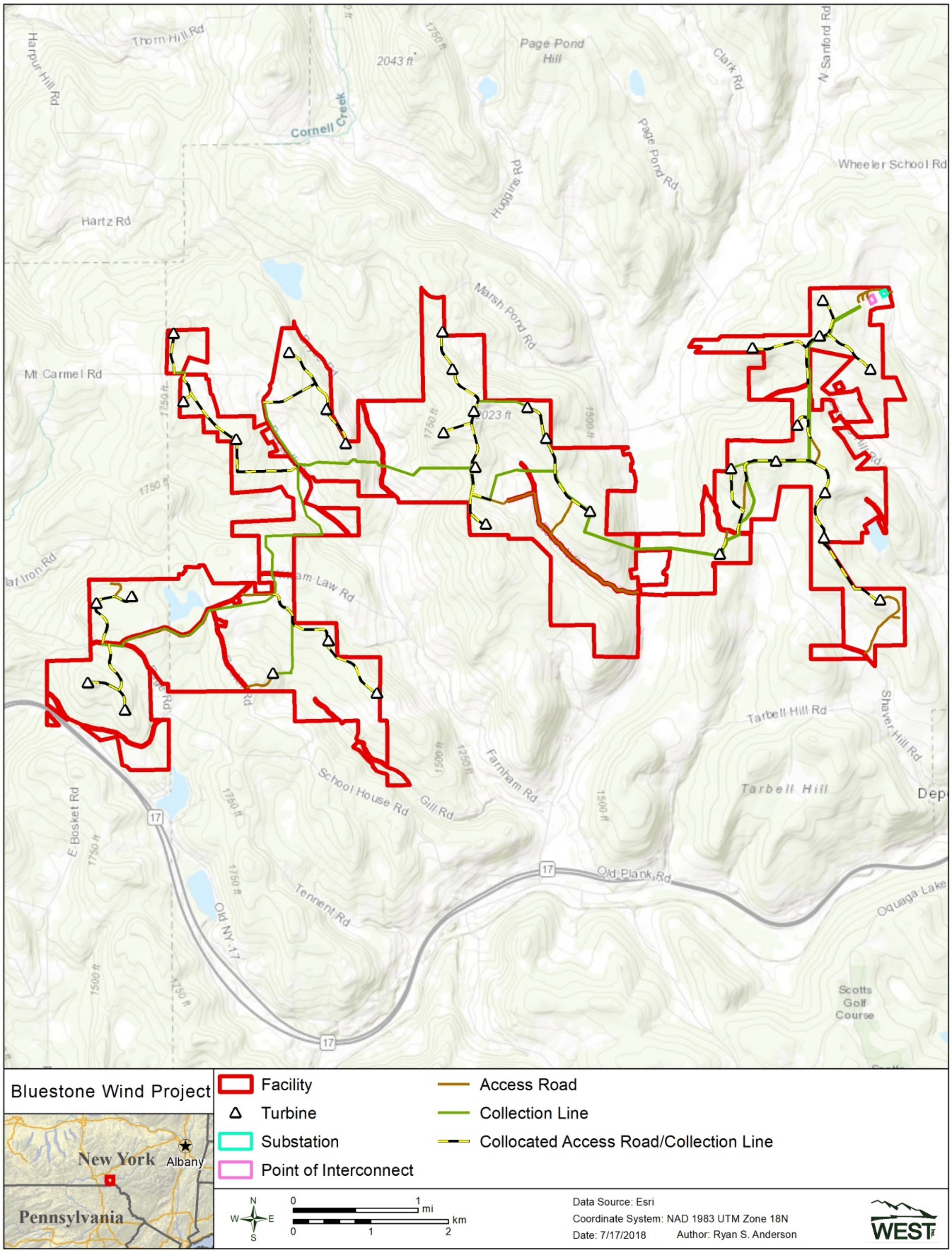

Figure 2.1 Location of the proposed Bluestone Wind Project infrastructure in Broome County, New York.

3.0 AVIAN FATALITIES

Nationally, wind turbines are estimated to be responsible for a nominal proportion of all avian fatalities resulting from anthropogenic causes; thus, wind energy is considered a minor contributor to bird mortality compared to other anthropogenic activities (Table 3.1). A recent analysis of fatality data from 116 studies at wind facilities across the US and Canada found that about 134,000 to 230,000 small bird fatalities from collision with wind turbines occur annually, or 2.10 to 3.35 small birds/MW/year of installed capacity (Erickson et al. 2014). When adjusted for species composition, to include large birds, it is estimated that 368,000 bird fatalities may occur per year nationally. These impacts are spread across many species and the effect on any given population is very small and likely negligible with respect to influencing population viability or stability. To assess population level impacts of avian fatalities at wind facilities across the US and Canada, Erickson et al. (2014) compared the estimated numbers of fatalities for small passerines at wind energy facilities to continent-wide population estimates and found that the cumulative mortality rate per year by species was highest for black-throated blue warbler (*Setophaga caerulescens*) and tree swallow (*Tachycineta bicolor*), estimated at 0.043% of the entire population of each species. For the 18 species with the next highest values, this estimate ranged from 0.008% to 0.038%.

In the northeastern US (New York, Maine, New Hampshire, and Pennsylvania) avian fatality rates have ranged from 0.7 to 6.95 birds/MW/year (1.3 to 10.42 birds/turbine/year) at 24 wind energy facilities (44 studies; Appendix A). On a state-level, at 17 post-construction monitoring studies at 10 facilities in New York, bird mortality averaged 1.68 birds/MW/year (2.65 birds/turbine/year) and ranged from 0.83 to 2.66 birds/MW/year (1.25 to 3.99 birds/turbine/year; Jain et al. 2009a, 2009b, 2009c, 2009d, 2010a, 2010b, 2010c, 2011a, 2011b, 2011c; Stantec 2009b, 2010, 2011; Tidhar et al. 2012b, 2012a, 2013b; see Appendix A). According to the publically available information, no bald or golden eagles fatalities have been found at any operational wind energy projects in New York.

Table 3.1 Estimated annual avian mortality from anthropogenic causes in the United States.

Mortality Source	Estimated Annual Mortality	Reference
Depredation by domestic cats	1.4 – 3.7 billion	Loss et al. 2013
Collisions with buildings	98 - 980 million	Klem 1990
Collisions with power lines	Tens of Thousands to 174 million	USFWS 2002b; Avian Power Line Interaction Committee (APLIC) 2006
Automobiles	60 - 80 million	Erickson et al. 2005
Pesticides	67 million	Pimentel et al. 1991
Communication towers	6.8 million	Longcore et al. 2012
Oil pits	500,000 - 1 million	USFWS 2009
Wind turbines	213,760 – 573,000	Smallwood 2013, Erickson et al. 2014
Aircraft	4,722	Dolbeer et al. 2009

4.0 BAT FATALITIES

Across the US and Canada, it's estimated that 500,000 bats are killed annually by wind turbines (Arnett and Baerwald 2013; Hayes 2013; Smallwood 2013) with a range of less than 1 bat/MW/year to 70 bats/MW/year (Cryan 2011). Of bat carcasses found at wind energy projects across the US and Canada, 24 unique species have been identified; however, three migratory bat species (hoary bat [*Lasiurus cinereus*], eastern red bat [*Lasiurus borealis*], and silver-haired bat [*Lasionycteris noctivagans*] have comprised 50-75% of all bat carcasses found at wind energy projects (Ellison 2012). Additional patterns of bat mortality have been observed at wind energy projects that include:

- More males are reported killed that females;
- Most bats are killed during the fall migration period; and
- Most bats are killed on low wind-speed nights.

Wind energy development has shown to result in higher direct impacts to bats than birds. However, obtaining accurate population estimates and demographic statistics for non-colonial migratory tree bats has proven difficult due to their nocturnal, cryptic, and solitary lives (Lentini et al. 2015). In addition to the difficulty in obtaining accurate population estimates for migratory tree bats, the overall migratory pattern of temperate zone bats is difficult because: 1) bats migrate at night, 2) bats are inactive during the day at roosts that are concealed and frequently inaccessible, and 3) there are few observations of bats actively migrating (Cryan 2011). Given the ecology of migratory tree bats, obtaining empirical estimates for these species populations will likely be unobtainable into the foreseeable future (Frick et al. 2017).

To combat these population estimate challenges, expert elicitation was used to estimate the population size of one migratory tree bat (hoary bat) and population projection models were applied to the estimated hoary bat population to determine how wind energy projects are impacting the estimated population currently and into the foreseeable future (Frick et al. 2017). Based upon the expert elicitation and the population projection models, the recruitment rate for hoary bat would need to be higher than what expert elicitation suggests to maintain or increase the estimated current hoary bat population (Frick et al. 2017).

In the northeastern US (New York, Maine, New Hampshire, and Pennsylvania) bat fatality rates have ranged from 0.12 to 21.4 bats/MW/year (1.36 to 42.7 bats/turbine/year) at 24 wind energy facilities (44 studies; Appendix A). On a state-level, at 17 post-construction monitoring studies at 10 facilities in New York, bird mortality averaged 6.05 bats/MW/year (9.45 bats/turbine/year) and ranged from 1.78 to 16.3 bats/MW/year (2.67 to 24.45 bat/turbine/year; Jain et al. 2009a, 2009b, 2009c, 2009d, 2010a, 2010b, 2010c, 2011a, 2011b, 2011c; Stantec 2009b, 2010, 2011; Tidhar et al. 2012b, 2012a, 2013b; see Appendix A). Wind energy projects in New York have recorded similar species composition as wind energy projects in other parts of the US with the three migratory tree bats comprising most of the recorded carcasses.

None of the wind energy projects in New York with publically available data implemented turbine curtailment. Curtailment has shown up to a 93% reduction in direct bat impacts by wind energy projects during the fall migration period (Arnett et al. 2011). Calpine plans to curtail all turbines from July 1 – September 30, the estimated fall migratory period for bats in New York, when wind speeds are below 5.0 meters/second (m/s; 11 miles per hour [mph]) from sunset to sunrise when temperatures are above 10 Celsius (C; 50 Fahrenheit [F]) to reduce impacts to bats and more particularly to reduce the estimated take of northern long-eared bat (*Myotis septentrionalis*), a New York state threatened species. This is expected to reduce the estimated take of northern long-eared bats by 80% (C. Herzog, NYSDEC, pers. comm.) and will benefit all other bats during the fall migration by reducing direct impacts by at least 60%. It is unclear if the curtailment will change the species composition of bats found at the Facility; however, it will dramatically reduce the number of all bats directly impacted compared to other wind energy projects in New York operating without curtailment.

5.0 CUMULATIVE IMPACTS

5.1 Avian Cumulative Impacts Assessment

An objective of the cumulative impacts analysis was to evaluate the potential effects of the Facility in combination with the effects of wind energy projects or turbines that are operating or proposed to be constructed at other sites nearby the Facility as of the date of this report. Assuming that impacts to avian species at the Facility would be similar to the average avian impacts reported at other wind energy projects in New York (average rate of 1.68 birds/MW/year), approximately 237 birds per year could be expected to be taken at the Facility during the life of the Facility (approximately 30 years) with the majority being migratory passerines spread across various species so no particular species would likely be affected in any significant way by the Facility itself.

Additionally, the planned curtailment regime may reduce the amount of direct impacts to all birds, reducing avian impacts below 1.68 birds/MW/year. Furthermore, the USFWS Bayesian collision risk model (CRM) was run using the two years of on-site data collected by WEST, and it's estimated at the 80^{th} percentile that 2.82 bald eagles (*Haliaeetus leucocephalus*) and 0.70 golden eagles (*Aquila chrysaetos*) may be taken annually during the life of the Facility. Based upon the publically available data from New York and the result of the CRM, the cumulative impact on bald eagles would comprise 0.8% of all bird mortality for wind energy projects in New York State that are operating or proposed to be constructed at other sites nearby the Facility as of the date of this report and the cumulative impact on golden eagles would comprise 0.2% of all bird mortality during the life of the Facility for wind energy projects in New York State that are operating or proposed to be constructed at other sites nearby the Facility as of the date of this report. .

From 2020 to 2050, the projected 30 year life of the Facility, on-shore wind development in New York is estimated to increase from 1.75 gigawatts (GW) to 5.61 GW (USDOE 2018). Based upon the average direct avian impacts per MW from New York wind energy projects operating as of the date of this report (1.68 birds/MW/year), in 2050 an estimated 9,500 birds per year will be directly impacted by wind energy projects in New York and the Facility (237 birds per year) will account for approximately 2.5% of direct bird impacts by wind project in New York, which is below all other forms of estimated anthropogenic bird mortality (Table 3.1).

5.2 Bat Cumulative Impact Assessment

An objective of the cumulative impacts analysis was to evaluate the potential effects of the Facility in combination with the effects of wind energy or turbines that are operating or proposed to be constructed at other sites nearby the Facility as of the date of this report. Assuming that impacts to bat species at the Facility would be similar to the average bat impacts reported at other wind energy projects in New York (average rate of 6.05 bats/MW/year), approximately 868 bats per year could be expected at the Facility with the majority likely being migratory tree bats as other wind energy projects in New York have reported. Assuming that 75% of those bats directly impacted are migratory tree bats, this would result in the direct impact to approximately 650 hoary bat, eastern red bat, and silver-haired bat combined.

The Facility is committed to curtailing turbines below wind speeds of 5.0 m/s (11 mph) from July 1 to September 30 from sunset to sunrise when temperatures are above 10 C (50 F) and this reduction migratory tree bat fatalities during the fall migration could be significant. The NYSDEC (C. Herzog, NYSDEC, pers. comm.) believes that this fall migration curtailment regime will result in an 80% reduction to northern long-eared bat fatalities in New York. In addition this curtailment regime may reduce direct impacts to all bats by 60%. Therefore, the estimated number of all bats directly impacted by the Facility could drop from 868 bats per year to approximately 347 bats per year. Assuming that the bat species composition remains constant after curtailment, this would result in a reduction of migratory tree bats directly impacted from approximately 650 to 260 per year.

From 2020 to 2050, the projected 30 year life of the Facility, on-shore wind development in New York is estimated to increase from 1.75 gigawatts (GW) to 5.61 GW (USDOE 2018). Based upon the average direct per MW bat impacts from New York wind energy projects (6.05 bats/MW/year), in 2050 an estimated 34,300 bats per year will be directly impacted by wind in New York if all wind projects are not curtailed. If a similar curtailment regime being employed at the Facility is utilized at most or all wind projects in New York by 2050, the estimated number of bats directly impacted by wind projects may drop from 34,300 bats per year to 6,860 bats per year. If species composition of bats found at wind energy projects remains consistent, estimated migratory tree bat direct impacts in 2050 could drop from 25,725 bats per year to 5,145 bats per year. Based upon the estimated annual take of bats at the Facility (347 bats per year) and assuming that in 2050 all other wind projects have similar bat direct impacts, the Facility may account for approximately 3.3% of all bat direct impacts from wind projects in New York.

The estimated reduction in direct impacts to migratory tree bats may be offset by population growth of migratory tree bats; however, expert elicitation and population modeling of migratory tree bats would be required to estimate direct impacts to migratory tree bats. Genetic markers (e.g., nuclear and mitochondrial deoxyribonucleic acid [DNA]) show promise for determining potential migratory pathways and population sizes for species such as eastern red bat (Vonhof and Russel 2015, Sovic et al. 2016). Genetic markers were examined in hoary bats and eastern red bats that are associated with gene flow among each species and no evidence of recent population declines or population structure were detected. However, genetic monitoring of migratory tree bats to detect population level declines due to turbine mortality may be ineffective due to the large effective population sizes of each species and high levels of gene flow in each species (Korstain et al. 2015). Using current methods, it's not possible to assess regional population level impacts to migratory bats (Frick et al. 2017).

Wind energy projects have not been identified as the major contributor to bat population declines in New York, specifically cave-dwelling bats. Bats that hibernate in North America are being severely impacted by white-nose syndrome (WNS), an infectious mycosis, where bats are infected with a psychrophilic fungus that originated in Europe (*Pseudogymnoascus* [formerly *Geomyces*] *destructans*). WNS was first discovered in New York State in 2006. By 2013, it had spread rapidly to over 115 caves and mines, and now it is confirmed in 31 states. To date, WNS has spread north into five Canadian provinces, and reaches as far south as Alabama and as far west as Washington (Heffernan 2016).WNS is thought to act as a chronic disturbance to individual bats during hibernation (Minnis and Lindner 2013). Infected bats arouse frequently from hibernation, leading to premature loss of fat reserves and atypical behavior, which in turn leads to starvation prior to spring emergence (Boyles and Willis 2010, Reeder et al. 2012, Warnecke et al. 2012). It is estimated that between 5.7 and 6.7 million bats have died as a result of WNS (USFWS 2012). WNS is the primary reason the USFWS recently listed the northern long-eared bat as threatened under the Endangered Species Act (ESA; USFWS 2015). The NYSDEC has identified WNS as the primary threat to bat species in New York (Carl Herzog, NYSDEC, pers. comm.).

6.0 REFERENCES

Arnett, E. B., W. P. Erickson, J. Kerns, and J. Horn. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Prepared for the Bats and Wind Energy Cooperative. March 2005.

Arnett, E. B., M. R. Schirmacher, M. M. P. Huso, and J. P. Hayes. 2009. Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities: 2008 Annual Report. Prepared for the Bats and Wind Energy Cooperative (BWEC) and the Pennsylvania Game Commission. Bat Conservation International (BCI), Austin, Texas. April 2009. Available online: http://www.batsandwind.org/pdf/Curtailment_2008_Final_Report.pdf

Arnett, E. B., M. R. Schirmacher, M. M. P. Huso, and J. P. Hayes. 2010. Patterns of Bat Fatality at the Casselman Wind Project in South-Central Pennsylvania. 2009 Annual Report. Annual report prepared for the Bats and Wind Energy Cooperative (BWEC) and the Pennsylvania Game Commission. Bat Conservation International (BCI), Austin, Texas. January 2010.

Arnett, E. B., M. R. Schirmacher, C. D. Hein, and M. M. P. Huso. 2011. Patterns of Bird and Bat Fatality at the Locust Ridge II Wind Project, Pennsylvania. 2009-2010 Final Report. Prepared for the Bats and Wind Energy Cooperative (BWEC) and the Pennsylvania Game Commission (PGC). Prepared by Bat Conservation International (BCI), Austin, Texas. January 2011.

Arnett, E. B. and E. F. Baerwald. 2013. Impacts of Wind Energy Development on Bats: Implications for Conservation. Chapter 21. Pp. 435-456. *In*: R. A. Adams and S. C. Pederson, eds. Bat Ecology, Evolution and Conservation. Springer Science Press, New York.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, California.

Boyles, J.G. and C.K.R. Willis. 2009. Could localized warm areas in cold caves reduce mortality of hibernating bats affected by white-nose syndrome? Frontiers in Ecology and the Environment, doi:10.1890/080187.

Cryan, P.M., 2011. Wind turbines as landscape impediments to the migratory connectivity of bats: Environmental Law, v. 41, p. 355-370

Dolbeer, R. A., S. E. Wright, M. J. Begier, and J. Weller. 2009. Wildlife Strikes to Civil Aircraft in the United States 1990-2008. Federal Aviation Administration National Wildlife Strike Database Serial Report Number 15. Report of the Associate Administrator of Airports Office of Airport Safety and Standards & Certification, Washington, D. C.

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A.M. Olivero (eds.). 2014. Ecological Communities of New York State. Second edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation (NYSDEC), Albany, New York. 160 pp. Available online: https://www.dec.ny.gov/animals/97703.html

Erickson, W. P., G. D. Johnson, and D. P. Young. 2005. A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions. US Department of Agriculture (USDA) Forest Service General Technical Report PSW-GTR-191.

Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.

Frick, W. F., E. F. Baerwald, J. F. Pollock, R. M. R. Barclay, J. A. Szymanski, T. J. Weller, A. L. Russell, S. C. Loeb, R. A. Medellin, and L. P. McGuire. 2017. Fatalities at Wind Turbines May Threaten Population Viability of a Migratory Bat. Biological Conservation 209: 172-177. doi: 10.1016/j.biocon.2017.02.023.

Grehan, J. R. 2008. Steel Winds Bird Mortality Study, Final Report, Lackawanna, New York. Prepared for Steel Winds LLC. April 2008.

Hayes, M. A. 2013. Bats Killed in Large Numbers at United States Wind Energy Facilities. Bioscience 63(12): 975-979.

Heffernan, L. 2016. Map of White-Nose Syndrome (WNS) Occurrence by County/District, March 31, 2016. Pennsylvania Game Commission. Map dated August 2, 2016. Available online at: https://www.whitenosesyndrome.org/sites/default/files/wns_map_20160802.jpg

Hein, C. D., A. Prichard, T. Mabee, and M. R. Schirmacher. 2013a. Avian and Bat Post-Construction Monitoring at the Pinnacle Wind Farm, Mineral County, West Virginia, 2012. Final Report. Bat Conservation International, Austin, Texas, and ABR, Inc., Forest Grove, Oregon. April 2013.

Hein, C. D., A. Prichard, T. Mabee, and M. R. Schirmacher. 2013b. Effectiveness of an Operational Mitigation Experiment to Reduce Bat Fatalities at the Pinnacle Wind Farm, Mineral County, West Virginia, 2012. Bat Conservation International, Austin, Texas, and ABR, Inc., Forest Grove, Oregon. April 2013.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2009a. Annual Report for the Maple Ridge Wind Power Project: Post-Construction Bird and Bat Fatality Study - 2007. Final report prepared for PPM Energy and Horizon Energy and Technical Advisory Committee (TAC) for the Maple Ridge Project Study. May 6, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, and M. Lehman. 2009b. Maple Ridge Wind Power Avian and Bat Fatality Study Report - 2008. Annual Report for the Maple Ridge Wind Power Project, Post-construction Bird and Bat Fatality Study - 2008. Prepared for Iberdrola Renewables, Inc, Horizon Energy, and the Technical Advisory Committee (TAC) for the Maple Ridge Project Study. Prepared by Curry and Kerlinger, LLC. May 14, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, J. Quant, and D. Pursell. 2009c. Annual Report for the Noble Bliss Windpark, LLC, Postconstruction Bird and Bat Fatality Study - 2008. Prepared for Noble Environmental Power, LLC by Curry and Kerlinger, LLC. April 13, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, J. Histed, and J. Meacham. 2009d. Annual Report for the Noble Clinton Windpark, LLC, Postconstruction Bird and Bat Fatality Study - 2008. Prepared for Noble Environmental Power, LLC by Curry and Kerlinger, LLC. April 13, 2009.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2010a. Annual Report for the Noble Clinton Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 9, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2010b. Annual Report for the Noble Ellenburg Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 14, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, A. Fuerst, and A. Harte. 2010c. Annual Report for the Noble Bliss Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 9, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2011a. Annual Report for the Noble Altona Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2011b. Annual Report for the Noble Chateaugay Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and A. Harte. 2011c. Annual Report for the Noble Wethersfield Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Kerlinger, P. 2002a. An Assessment of the Impacts of Green Mountain Power Corporation's Wind Power Facility on Breeding and Migrating Birds in Searsburg, Vermont: July 1996-July 1998. NREL/SR-500-28591. Prepared for Vermont Public Service, Montpelier, Vermont. US Department of Energy, National Renewable Energy Laboratory, Golden, Colorado. March 2002. 95 pp. Available online: http://www.nrel.gov/docs/fy02osti/28591.pdf

Kerlinger, P. 2002b. Avian Fatality Study at the Madison Wind Power Project, Madison, New York. Report to PG&E Generating.

Kerlinger, P., J. Guarnaccia, L. Slobodnik, and R. Curry. 2011a. A Comparison of Bat Mortality in Farmland and Forested Habitats at the Noble Bliss and Wethersfield Windparks, Wyoming County, New York. Report Prepared for Noble Environmental Power. Report prepared by Curry & Kerlinger, LLC, Cape May Point, New Jersey. November 2011.

Kerlinger, P., D. S. Reynolds, J. Guarnaccia, L. Slobodnik, and R. Curry. 2011b. An Examination of the Relationship between Bat Abundance and Fatalities at the Noble Altona Windpark, Clinton County, New York. Report prepared for Noble Environmental Power. Report prepared by Curry & Kerlinger, LLC, Cape May Point, New Jersey, and North East Ecological Services. December 2011.

Kerns, J. and P. Kerlinger. 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Prepared for FPL Energy and the Mountaineer Wind Energy Center Technical Review Committee. February 14, 2004. 39 pp.

Klem, D. Jr. 1990. Collisions between Birds and Windows: Mortality and Prevention. Journal of Field Ornithology 61(1): 120-128.

Korstain, J.M., A.M. Hale, and D.A. Williams. 2015. Genetic Diversity, Historic Population Size, and Population Structure in two North American Tree Bats. Journal of Mammalogy 96(5):972-980.

Lentini, P.E., T.J. Bird, S.R. Griffith, L.N. Godinho, and B.A. Wintle. 2015. A Global synthesis of survival estimates for microbats. Biological Letters. 11:20150371.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D. G. Bert, L. M. Sullivan, E. Mutrie, S.A. Gauthreaux, Jr., M. L. Avery, R. L. Crawford, A.M. Manville, II, E. R. Travis, and D. Drake. 2012. An Estimate of Avian Mortality at Communication Towers in the United States and Canada. PLoS ONE 7(4): e34025. doi: 10.1371/journal.pone.0034025.

Loss, S. R., T. Will, and P. P. Marra. 2013. The Impact of Free-Ranging Domestic Cats on Wildlife of the United States. Natural Communications 4: 1396.

Martin, C., E. Arnett, and M. Wallace. 2013. Evaluating Bird and Bat Post-Construction Impacts at the Sheffield Wind Facility, Vermont: 2012 Annual Report. Prepared for Bat Conservation International and First Wind. Prepared by Department of Natural Resources Management, Texas Tech University, Lubbock, Texas. March 25, 2013.

Minnis, A. M. and D. L. Lindner. 2013. Phylogenetic Evaluation of *Geomyces* and Allies Reveals No Close Relatives of *Pseudogymnoascus Destructans*, Comb. Nov., in Bat Hibernacula of Eastern North America. Fungal Biology 117: 638-649.

New Jersey Audubon Society (NJAS). 2008a. Post-Construction Wildlife Monitoring at the Atlantic City Utilities Authority - Jersey Atlantic Wind Power Facility: Periodic Report Covering Work Conducted between 1 August and 30 September 2008. Submitted to New Jersey Board of Public Utilities, New Jersey Clean Energy Program, Newark, New Jersey. Submitted by New Jersey Audubon Society, Center for Research and Education, Cape May Court House, New Jersey. Available online: http://www.njcleanenergy.com/files/file/Renewable_Programs/Wind/ACUA_Interim%20Report_Jan-Sep08_all.pdf

New Jersey Audubon Society (NJAS). 2008b. Post-Construction Wildlife Monitoring at the Atlantic City Utilities Authority - Jersey Atlantic Wind Power Facility: Periodic Report Covering Work Conducted between 20 July and 31 December 2007. Submitted to New Jersey Board of Public Utilities, New Jersey Clean Energy Program, Newark, New Jersey. Submitted by New Jersey Audubon Society, Center for Research and Education, Cape May Court House, New Jersey. Available online: http://www.njcleanenergy.com/files/file/Renewable_Programs/CORE/ACUAReportwithimages123107LowRes.pdf

New Jersey Audubon Society (NJAS). 2009. Post-Construction Wildlife Monitoring at the Atlantic City Utilities Authority - Jersey Atlantic Wind Power Facility: Project Status Report IV. Available online: http://www.njcleanenergy.com/files/file/Renewable_Programs/Wind/ACUA_Quarterly%20report_to-date_Jan-Aug09_1c.pdf

New York State Department of Environmental Conservation (NYSDEC). 2016. Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects. Prepared by NYSDEC Division of Fish and Wildlife. June 2016. Available online: http://www.dec.ny.gov/docs/wildlife_pdf/winguide16.pdf

Normandeau Associates, Inc. 2010. Stetson Mountain II Wind Project Year 1 Post-Construction Avian and Bat Mortality Monitoring Study, T8 R4 Nbpp, Maine. Prepared for First Wind, LLC, Portland, Maine. Prepared by Normandeau Associates, Inc., Falmouth, Maine. December 2, 2010.

Normandeau Associates, Inc. 2011. Year 3 Post-Construction Avian and Bat Casualty Monitoring at the Stetson I Wind Farm, T8 R4 Nbpp, Maine. Prepared for First Wind Energy, LLC, Portland, Maine. Prepared by Normandeau Associates, Inc., Falmouth, Maine. December 2011.

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Pimentel, D., L. McLaughlin, A. Zepp, B. Lakitan, T. Kraus, P. Kleinman, F. Vancini, W. J. Roach, E. Graap, W. S. Keeton, and G. Selig. 1991. Environmental and Economic Impacts of Reducing U.S. Agricultural Pesticide Use. Pp. 679-718. *In*: D. Pimentel, ed. Handbook of Pest Management in Agriculture. Second Edition. CRC Press, Boca Raton, Florida.

Reeder, D. M., C. L. Frank, G. G. Turner, A. Kurta, E. R. Britzke, S. R. Darling, C. W. Stihler, A. C. Hicks, C. U. Meteyer, R. Jacob, L. A. Grieneisen, S. A. Brownlee, M. E. Vodzak, L. K. Muller, and D. S. Blehert. 2012. Frequent Arousal from Hibernation Linked to Severity of Infection and Mortality in Bats with White-Nose Syndrome. PLoS ONE 7(6): e38920. doi: 38910.31371/journal.pone.0038920.

Smallwood, K. S. 2013. Comparing Bird and Bat Fatality-Rate Estimates among North American Wind-Energy Projects. Wildlife Society Bulletin 37(1): 19-33.

Sovic, M.G., B.C. Carstens, and H.L. Gibbs. 2016. Genetic diversity in migratory bats; Results from RADseq data for three tree bat species at an Ohio windfarm. PeerJ:e1647 https://doi.org/10.7717/peerj.1647

Stantec Consulting, Inc. (Stantec). 2008a. 2007 Spring, Summer, and Fall Post-Construction Bird and Bat Mortality Study at the Mars Hill Wind Farm, Maine. Prepared for UPC Wind Management, LLC, Cumberland, Maine. Prepared by Stantec (formerly Woodlot Alternatives, Inc.), Topsham, Maine. January 2008.

Stantec Consulting, Inc. (Stantec). 2009a. Post-Construction Monitoring at the Mars Hill Wind Farm, Maine - Year 2, 2008. Prepared for First Wind Management, LLC, Portland, Maine. Prepared by Stantec Consulting, Topsham, Maine. January 2009.

Stantec Consulting, Inc. (Stantec). 2009b. Post-Construction Monitoring at the Munnsville Wind Farm, New York: 2008. Prepared for E.ON Climate and Renewables, Austin, Texas. Prepared by Stantec Consulting, Topsham, Maine. January 2009.

Stantec Consulting, Inc. (Stantec). 2009c. Stetson I Mountain Wind Project: Year 1 Post-Construction Monitoring Report, 2009 for the Stetson Mountain Wind Project in Penobscot and Washington Counties, Maine. Prepared for First Wind Management, LLC. Portland, Maine. Prepared by Stantec, Topsham, Maine. December 2009.

Stantec Consulting, Inc. (Stantec). 2010. Cohocton and Dutch Hill Wind Farms Year 1 Post-Construction Monitoring Report, 2009, for the Cohocton and Dutch Hill Wind Farms in Cohocton, New York. Prepared for Canandaigua Power Partners, LLC and Canandaigua Power Partners II, LLC, Portland, Maine. Prepared by Stantec, Topsham, Maine. January 2010.

Stantec Consulting, Inc. (Stantec). 2011b. Cohocton and Dutch Hill Wind Farms Year 2 Post-Construction Monitoring Report, 2010, for the Cohocton and Dutch Hill Wind Farms in Cohocton, New York. Prepared for Canandaigua Power Partners, LLC, and Canandaigua Power Partners II, LLC, Portland, Maine. Prepared by Stantec, Topsham, Maine. October 2011.

Stantec Consulting, Inc. (Stantec). 2012. 2011 Post-Construction Monitoring Report, Kibby Wind Power Project, Franklin County, Maine. Prepared for TransCanada Hydro Northeast, Inc., North Walpole, New Hampshire. Prepared by Stantec, Topsham, Maine. March 2012.

Stantec Consulting, Inc. (Stantec). 2013a. Record Hill Wind Project Post-Construction Monitoring Report, 2012. Prepared for Record Hill Wind LLC, Lyme, New Hampshire. Prepared by Stantec, Topsham, Maine. March 2013. Available online: http://www.maine.gov/dep/ftp/WindPowerProjectFiles/PostConstructionMonitoring/RH%202012%20PCM%20Report_031313.pdf

Stantec Consulting, Inc. (Stantec). 2013b. Rollins Wind Project Post-Construction Monitoring Report, 2012. Prepared for First Wind, Portland, Maine. Prepared by Stantec, Topsham, Maine. March 2013.

Stantec Consulting, Inc. (Stantec). 2013c. Steel Winds I and II Post-Construction Monitoring Report, 2012, Lackwanna and Hamburg, New York. Prepared for First Wind Management, LLC, Portland, Maine. Prepared by Stantec, Topsham, Maine. April 2013.

Stantec Consulting, Inc. (Stantec). 2013d. Stetson II Wind Project Post-Construction Monitoring Report, 2012. Prepared for First Wind, Portland, Maine. Prepared by Stantec, Topsham, Maine. March 2013.

Stantec Consulting, Inc. (Stantec). 2014. Stetson I Wind Project 2013 Post-Construction Wildlife Monitoring Report, Year 5. Stetson I Wind Project, Washington County, Maine. Prepared for First Wind, Portland, Maine. Prepared by Stantec, Topsham, Maine. February 2014.

Stantec Consulting, Inc. (Stantec). 2015. Record Hill Wind Project Year 2 Post-Construction Wildlife Monitoring Report, 2014. Prepared for Record Hill Wind LLC and Wagner Forest Management, Ltd., Lyme, New Hampshire. Prepared by Stantec Consulting, Topsham, Maine. March 2015.

Stantec Consulting Ltd. (Stantec Ltd.). 2010a. Wolfe Island Ecopower Centre Post-Construction Followup Plan. Bird and Bat Resources Monitoring Report No. 1: May - June 2009. File No. 160960494. Prepared for Canadian Hydro Developers, Inc.'s wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Ltd., Guelph, Ontario. February 2010.

Stantec Consulting Ltd. (Stantec Ltd.). 2010b. Wolfe Island Ecopower Centre Post-Construction Followup Plan. Bird and Bat Resources Monitoring Report No. 2: July - December 2009. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Ltd., Guelph, Ontario. May 2010.

Stantec Consulting Ltd. (Stantec Ltd.). 2011a. Wolfe Island Wind Plant Post-Construction Follow-up Plan. Bird and Bat Resources Monitoring Report No. 3: January - June 2010. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. January 2011.

Stantec Consulting Ltd. (Stantec Ltd.). 2011b. Wolfe Island Wind Plant Post-Construction Followup Plan. Bird and Bat Resources Monitoring Report No. 4: July - December 2010. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. July 2011.

Stantec Consulting Ltd. (Stantec Ltd.). 2011c. Wolfe Island Wind Plant Post-Construction Followup Plan. Bird and Bat Resources Monitoring Report No. 5: January - June 2011. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. December 2011.

Stantec Consulting Ltd. (Stantec Ltd.). 2012. Wolfe Island Wind Plant Post-Construction Follow-up Plan. Bird and Bat Resources Monitoring Report No. 6: July-December 2011. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. July 2012.

Stantec Consulting Ltd. (Stantec Ltd.). 2014. Wolfe Island Wind Plant Post-Construction Follow-up Plan. Bird and Bat Resources Monitoring Report No. 7: January - June 2012. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. April 2014. Available online: http://www.transalta.com/sites/default/files/WolfeIsland_TransAlta_PostConstruction_BirdBat_Report_7.pdf

Tetra Tech. 2013. Spruce Mountain Wind Project Post-Construction Bird and Bat Fatality and Raptor Monitoring: Year 1 Annual Report. Prepared for Patriot Renewables. Prepared by Tetra Tech, Portland, Maine. May 2013.

Tidhar, D., W. Tidhar, and M. Sonnenberg. 2010. Post-Construction Fatality Surveys for Lempster Wind Project, Iberdrola Renewables. Prepared for Lempster Wind, LLC, Lempster Wind Technical Advisory Committee, and Iberdrola Renewables, Inc. Prepared by Western EcoSystems Technology Inc. (WEST), Waterbury, Vermont. September 30, 2010.

Tidhar, D., W. L. Tidhar, L. McManus, and Z. Courage. 2011. 2010 Post-Construction Fatality Surveys for the Lempster Wind Project, Lempster, New Hampshire. Prepared for Iberdrola Renewables, Inc. and the Lempster Wind Technical Committee. Prepared by Western EcoSystems Technology, Inc., Waterbury, Vermont. May 18, 2011.

Tidhar, D., L. McManus, Z. Courage, and W. L. Tidhar. 2012a. 2010 Post-Construction Fatality Monitoring Study and Bat Acoustic Study for the High Sheldon Wind Farm, Wyoming County, New York. Final Report: April 15 - November 15, 2010. Prepared for High Sheldon Wind Farm, Sheldon Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Waterbury, Vermont. April 15, 2012.

Tidhar, D., L. McManus, D. Solick, Z. Courage, and K. Bay. 2012b. 2011 Post-Construction Fatality Monitoring Study and Bat Acoustic Study for the High Sheldon Wind Farm, Wyoming County, New York. Final Report: April 15 - November 15, 2011. Prepared for High Sheldon Wind Farm, Sheldon Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Waterbury, Vermont. April 25, 2012.

Tidhar, D., M. Sonnenberg, and D. P. Young, Jr. 2013a. 2012 Post-Construction Carcass Monitoring Study for the Beech Ridge Wind Farm, Greenbrier County, West Virginia. Final Report: April 1 - October 28, 2012. Prepared for Beech Ridge Wind Farm, Beech Ridge Energy, LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), NE/Mid-Atlantic Branch, Waterbury, Vermont. January 18, 2013.

Tidhar, D., J. Ritzert, M. Sonnenberg, M. Lout, and K. Bay. 2013b. 2012 Post-Construction Fatality Monitoring Study for the Maple Ridge Wind Farm, Lewis County, New York. Final Report: July 12 - October 15, 2012. Prepared for EDP Renewables North, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), NE/Mid-Atlantic Branch, Waterbury, Vermont. February 12, 2013.

US Department of Energy (USDOE). 2018. Projected growth of the Wind Industry from now until 2050. Accessed on May 1, 2018. https://www.energy.gov/maps/map-projected-growth-wind-industry-now-until-2050

US Fish and Wildlife Service (USFWS). 2002b. Migratory Bird Mortality: Many Human-Caused Threats Afflict Our Bird Populations. USFWS Division of Migratory Bird Management, Arlington, Virginia. January 2002.

US Fish and Wildlife Service (USFWS). 2009. Migratory Bird Mortality in Oilfield Wastewater Disposal Facilities. Wyoming Ecological Services Field Office - Environmental Contaminants Program. Available online: http://www.fws.gov/mountain-prairie/contaminants/documents/COWDFBirdMortality.pdf

US Fish and Wildlife Service (USFWS). 2012. White-Nose Syndrome in Bats: About WNS. Accessed June 2012. Revised October 2014. Available online at: https://www.whitenosesyndrome.org/about-white-nose-syndrome, Current WNS map available at: https://www.whitenosesyndrome.org/resources/map

US Fish and Wildlife Service (USFWS). 2015. Northern Long-Eared Bat (*Myotis septentrionalis*). USFWS Endangered Species Program: Midwest Region. Updated March 13, 2015. Available online at: http://www.fws.gov/midwest/endangered/mammals/nlba/index.html

USA Topo. 2017. USA Topo Maps. US Geological Survey (USGS) topographical maps for the United States. ArcGIS. ESRI, producers of ArcGIS software. Redlands, California.

Vonhof, M.J. and A.L. Russel. 2015. Genetic approaches to the conservation of migratory bats: a study of the eastern red bat (Lasiurus borealis). PeerJ:e983. https://doi.org/10.7717/peerj.983

Warnecke, L., J. M. Turner, T. K. Bollinger, J. M. Lorch, V. Misra, P. M. Cryan, G. Wibbelt, D. S. Blehert, and C. K. R. Willis. 2012. Inoculation of Bats with European *Geomyces Destructans* Supports the Novel Pathogen Hypothesis for the Origin of White-Nose Syndrome. Proceedings of the National Academy of Sciences 109(18): 6999-7003.

Young, D. P., Jr., K. Bay, S. Nomani, and W. Tidhar. 2009a. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: March - June 2009. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. August 17, 2009.

Young, D. P., Jr., W. P. Erickson, K. Bay, S. Nomani, and W. Tidhar. 2009b. Mount Storm Wind Energy Facility, Phase 1 Post-Construction Avian and Bat Monitoring, July - October 2008. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. February 17, 2009.

Young, D. P., Jr., K. Bay, S. Nomani, and W. Tidhar. 2010a. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: April - July 2010. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. August 27, 2010.

Young, D. P., Jr., K. Bay, S. Nomani, and W. Tidhar. 2010b. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: July - October 2009. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. February 12, 2010.

Young, D. P., Jr., S. Nomani, Z. Courage, and K. Bay. 2011a. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: April - July 2011. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. August 29, 2011.

Young, D. P., Jr., S. Nomani, W. Tidhar, and K. Bay. 2011b. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: July - October 2010. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. February 10, 2011.

Young, D. P., Jr., S. Nomani, Z. Courage, and K. Bay. 2012a. Nedpower Mount Storm Wind Energy Facility, Post-Construction Avian and Bat Monitoring: July - October 2011. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. February 27, 2012.

Young, D. P., Jr., M. Lout, Z. Courage, S. Nomani, and K. Bay. 2012b. 2011 Post-Construction Monitoring Study, Criterion Wind Project, Garrett County, Maryland: April - November 2011. Prepared for Criterion Power Partners, LLC, Oakland, Maryland. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Waterbury, Vermont. April 20, 2012. Revised November 25, 2013.

Young, D. P., Jr., C. Nations, M. Lout, and K. Bay. 2013. 2012 Post-Construction Monitoring Study, Criterion Wind Project, Garrett County, Maryland. April - November 2012. Prepared for Criterion Power Partners, LLC, Oakland, Maryland. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Waterbury, Vermont. January 15, 2013.

Young, D. P., Jr., M. Lout, L. McManus, and K. Bay. 2014a. 2013 Post-Construction Monitoring Study, Beech Ridge Wind Energy Project, Greenbrier and Nicholas Counties, West Virginia. Final Report: April 1 - November 15, 2013. Prepared for Beech Ridge Energy, LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Burlington, Vermont. January 28, 2014.

Young, D. P., Jr., M. Kauffman, M. Lout, and K. Bay. 2014b. 2013 Post-Construction Monitoring Study, Criterion Wind Project, Garrett County, Maryland. April - November 2013. Prepared for Criterion Power Partners, LLC, Oakland, Maryland. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Waterbury, Vermont. February 18, 2014.

Appendix A. List of Studies at Wind Energy Facilities in the Northeast Reporting Comparable Bird Fatality Rates and Data on Bird Species found as Fatalities

Appendix A. Studies at wind energy facilities in the northeast reporting comparable bird and bat fatality rates and data on bird species found as fatalities.

Wind Energy Facility	Study Reference	Wind Energy Facility	Study Reference
Beech Ridge, WV (12)[A,B]	Tidhar et al. 2013a	Noble Altona, NY (11)	Kerlinger et al. 2011b
Beech Ridge, WV (13)[A,B]	Young et al. 2014a	Noble Bliss, NY (08)[A,B]	Jain et al.2009c
Casselman, PA (08)[A,B]	Arnett et al. 2009	Noble Bliss, NY (09)[A,B]	Jain et al. 2010c
Casselman, PA (09)[A,B]	Arnett et al. 2010	Noble Bliss/Wethersfield, NY (11)	Kerlinger et al. 2011a
Cohocton/Dutch Hill, NY (09)[A,B]	Stantec 2010	Noble Chateaugay, NY (10)[A,B]	Jain et al. 2011b
Cohocton/Dutch Hills, NY (10)[A,B]	Stantec 2011b	Noble Clinton, NY (08)[A,B]	Jain et al. 2009d
Criterion, MD (11)[A,B]	Young et al. 2012b	Noble Clinton, NY (09)[A,B]	Jain et al. 2010a
Criterion, MD (12)[A,B]	Young et al. 2013	Noble Ellenburg, NY (08)[A,B]	Jain et al. 2009e
Criterion, MD (13)[A,B]	Young et al. 2014b	Noble Ellenburg, NY (09)[A,B]	Jain et al. 2010b
High Sheldon, NY (10)[A,B]	Tidhar et al. 2012a	Noble Wethersfield, NY (10)[A,B]	Jain et al. 2011c
High Sheldon, NY (11)[A,B]	Tidhar et al. 2012b	Pinnacle, WV (12)[A,B]	Hein et al. 2013a
Jersey Atlantic, NJ (08)	New Jersey Audubon Society (NJAS 2008a, 2008b, 2009)	Pinnacle Operational Mitigation Study (12)	Hein et al. 2013b
Kibby, ME (11)[A]	Stantec 2012	Record Hill, ME (12)[A,B]	Stantec 2013a
Lempster, NH (09)[A,B]	Tidhar et al. 2010	Record Hill, ME (14)[A,B]	Stantec 2015
Lempster, NH (10)[A,B]	Tidhar et al. 2011	Rollins, ME (12)[A,B]	Stantec 2013b
Locust Ridge, PA (Phase II; 09)[A,B]	Arnett et al. 2011	Searsburg, VT (1997)	Kerlinger 2002a
Locust Ridge, PA (Phase II; 10)[A,B]	Arnett et al. 2011	Sheffield, VT (12)	Martin et al. 2013
Madison, NY (01-02)	Kerlinger 2002b	Sheffield Operational Mitigation Study (12)	Martin et al. 2013
Maple Ridge, NY (06)[A]	Jain et al. 2007	Spruce Mountain, ME (12)	Tetra Tech 2013
Maple Ridge, NY (07)[A,B]	Jain et al. 2009a	Steel Winds I, NY (07)	Grehan 2008
Maple Ridge, NY (07-08)[A.B]	Jain et al. 2009b	Steel Winds I & II, NY (12)	Stantec 2013c
Maple Ridge, NY (12)[A]	Tidhar et al. 2013b	Stetson Mountain I, ME (09)[A,B]	Stantec 2009c
Mars Hill, ME (07)[A,B]	Stantec 2008a	Stetson Mountain I, ME (11)[A,B]	Normandeau Associates 2011
Mars Hill, ME (08)[A,B]	Stantec 2009a	Stetson Mountain I, ME (13)[A,B]	Stantec 2014
Meyersdale, PA (04)	Arnett et al. 2005	Stetson Mountain II, ME (10)[A,B]	Normandeau Associates 2010
Mount Storm, WV (Fall 08)[A]	Young et al. 2009b	Stetson Mountain II, ME (12)[A,B]	Stantec 2013d
Mount Storm, WV (09)[A,B]	Young et al. 2009a, 2010b	Wolfe Island, Ont (May-June 09)	Stantec Ltd. 2010a
Mount Storm, WV (10)[A,B]	Young et al. 2010a, 2011b	Wolfe Island, Ont (July-December 09)[A]	Stantec Ltd. 2010b
Mount Storm, WV (11)[A,B]	Young et al. 2011a, 2012a	Wolfe Island, Ont (January-June 10)	Stantec Ltd. 2011a
Mountaineer, WV (03)[A,B]	Kerns and Kerlinger 2004	Wolfe Island, Ont (July-December 10)[A]	Stantec Ltd. 2011b
Mountaineer, WV (04)	Arnett et al. 2005	Wolfe Island, Ont (January-June 11)	Stantec Ltd. 2011c
Munnsville, NY (08)[A,B]	Stantec 2009b	Wolfe Island, Ont (July-December 11)[A]	Stantec Ltd. 2012
Noble Altona, NY (10)[A,B]	Jain et al. 2011a	Wolfe Island, Ont (January-June 12)	Stantec Ltd. 2014

A =Studies with comparable fatality rate data for bats; B= Studies with comparable fatality rate data for birds; all reports in this table also report other fatality data.