

9 ADAPTIVE MANAGEMENT STRATEGY

Studies and evaluations relevant to the Antrim Wind Energy Project to date have not indicated a need for Tier 5 study per the USFWS guidelines. However, given the dynamic nature of the environment and technology, unforeseen future circumstances could arise which may require further consideration. This adaptive management plan provides a framework for revisiting tiers of evaluation, or proceeding with Tier 5 consultation and study, if warranted.

The state of knowledge regarding avian and bat interactions at wind farms on the forested ridges of the northeast is still evolving. Likewise, the technology available to mitigate risks to birds and bats at wind farms is continuously developing as the science matures. Furthermore, the population status of a given species is dynamic, as exemplified by the population impacts to bats incurred by white-nose disease and the increase in bald eagle populations in the northeast in recent years. As such, the biological significance of individual losses can change over time.

In order to continuously address changing circumstances in the area of avian and bat interaction at wind farms, and potentially changing circumstances at the proposed Project, AWE will implement an adaptive management strategy for managing risk to birds and bats over the life of the Project. Adaptive management allows decisions and actions to be tailored to specific problems and circumstances (e.g., a specific species, location, weather pattern, wind speed, or season) at the specific point in time at which they occur.

The adaptive management process needs to take into account impacts to Project operations. Any additional controls will need to be supported not only by science, but by economic considerations that ultimately determine the Project's viability. Project adaptation should not only be geared toward additional controls, but also should take into account positive outcomes such as the documentation of minimal impacts to wildlife.

Adaptive management will be guided by: formal post construction study results documented during the year-one Evaluation Phase; a continuous Wildlife Mortality Monitoring Program (WMMP), equipped with an Immediate Alert Procedure (IAP) for reporting of unusual mortality events; and a phased consultation strategy. The WMMP, the IAP and the phased consultation strategy are described in detail in the following subsections.

9.1 Wildlife Mortality Monitoring Program

After formal monitoring is complete, AWE will implement a Wildlife Mortality Monitoring Program (WMMP) for all project site personnel. This program will provide for the proper identification, handling and reporting of dead or injured birds and bats that are found during Project operation. The WMMP will be described in a stand-alone document that will be developed during the Evaluation Phase. The WMMP document will describe, in detail, the actions to be taken upon discovery of any dead or injured bird or bat at the Project. The WMMP will also incorporate the Immediate Alert Procedure described in this ABPP (see Section 9.2, below).

The WMMP will also include: provisions for cataloging and reporting annual findings; a list of key contacts; a training initiative for wind farm personnel; detailed handling and documentation forms and procedures; and provisions for permit compliance. The WMMP will be an evolving document, subject to annual updates.

9.1.1 Training

Under the WMMP, all appropriate personnel (including managers, supervisors, inspection and maintenance crews, etc.) will be trained in the identification, handling and reporting of dead or injured avian and bat species. This training will encompass the reasons, need, and method by which employees should report an injury or mortality, dispose of carcasses, and comply with applicable regulations, including the consequences of non-compliance.

All appropriate new-hires will be trained to execute the WMMP prior to working on-site. Appropriate staff will be subject to annual refresher training. Supplemental training also may be appropriate where there are material changes in regulations, permit conditions, or internal policies. Any updates to the WMMP will be distributed and discussed during annual training.

9.1.2 Key Resources

AWE will maintain a list of key resources to address avian and bat injury or mortality issues. This list will include a list of experts who may be called upon to aid in resolving various issues. Listed parties may include: Internal contacts, avian and bat study consultants, state and federal agency contacts, and local wildlife rehab facilities. The key resources list will be updated annually and presented during annual training.

9.1.3 Reporting

All injuries and mortalities discovered at the Project will be documented in an electronic database developed to serve the needs of the WMMP. Each year, these data will be compiled into an annual summary report. This annual report will assess the year's injury and mortality data, and will include a discussion, as appropriate, on other performance indicators relevant to this ABPP. If necessary, the report will also make recommendations for improvement. This ABPP summary report will be provided annually, by January 30, to the USFWS and NHFGD.

The WMMP will also include an Immediate Alert Program (IAP) which will inform regulating agencies of significant mortality events within 24 hours of discovery. Reports made under the IAP will trigger a phased process of consultation under the adaptive management process. The IAP and the phased consultation strategy it activates are described in detail, below.

9.1.4 Quality Control

Annual reporting under the WMMP will provide a mechanism for AWE and the agencies to review existing practices and ensure quality control.

9.1.5 Permit Compliance

Any Project staff that may be handling birds or bird carcasses will have appropriate federal and/or state wildlife handling permits. AWE will assure that wildlife rehabilitation centers and consulting staff also have appropriate permits if they will be responsible for transporting dead or injured birds protected by the MBTA and/or the BGEPA.

AWE operating personnel or designated contractors will be responsible for making sure that the Project maintains copies of all applicable permits and permit conditions. AWE operating personnel or designated contractors will also be responsible for maintaining all copies of annual permit reports to the USFWS and to any state agencies where required.

Copies of any necessary permits will be contained in the WMMP document, and will be kept current during annual updates.

9.2 Immediate Alert Procedure

An Immediate Alert Procedure (IAP), as defined and summarized in this ABPP, will be fully developed in consultation with USFWS and NHDFG, and will be incorporated as part of the WMMP. The IAP provides a mechanism for the reporting, assessment and resolution of biologically significant incidents.

For the purpose of this ABPP, biologically significant incidents are defined as those that involve the individual injury or death of a listed species or an eagle, or the large scale injury or death of any avian or bat species or groups. In the event that an avian or bat species that is federally or state listed as "threatened" or "endangered" is discovered,

injured or dead, the IAP will be triggered. If a single bald or golden eagle is discovered, the IAP will be triggered. Likewise, in the event that a large-scale mortality event is discovered, the IAP will be triggered.

Listed species will be defined in the WMMP, and changes to that list will be incorporated in annual updates to the WMMP. Likewise, the definition of what constitutes a large-scale event will be developed in consultation with agencies and incorporated in the WMMP; this definition is also subject to re-assessment over time and may be adjusted, as appropriate over the life of the WMMP.

In general, as described within the USFWS Land-Based Wind Energy Guidelines (USFWS 2012), baseline risk assessments, definitions of biologically significant or large-scale events, and mitigation thresholds relevant to the Antrim Wind Energy Project will be regionally relative, and generally qualitative. These assessments and thresholds will be developed in consultation with USFWS and NHFGD and will be based on: site specific data collected during pre- and post-construction surveys at the Project; regional information regarding avian populations; and known comparative mortality rates at other wind projects in the region.

The IAP, when triggered, will require notification of a biologically significant event to NHFGD and USFWS within 48 hours of discovery. AWE will immediately implement a "root cause analysis" to determine the likely cause of the event. This analysis will be presented during a consultation with NHFGD and USFWS which will occur within a fourteen-day period following the reported incident.

This meeting will constitute Phase 1 of a phased consultation strategy (described in detail, below). At this meeting, the participants will determine an appropriate course of action to address the specific event at hand. Decisions may range from no-action to a course of further evaluation and potential mitigation. During consultation as a result of the IAP, AWE and consulting agencies will consider the most current, relevant knowledge, information and technology to determine an appropriate response.

9.3 Phased Consultation Process

Generally, the phased consultation process will be initiated by an alert from AWE as prescribed by the IAP. Under unforeseen circumstances, however, the phased consultation process may be initiated based on the results of annual reporting under the provisions of the WMMP. The phased consultation process is also the mechanism by which evaluation phase studies and recommendations will be assessed. This process must seek solutions which balance Project financial viability and ability to operate with positive outcomes for avian and bat species.

9.3.1 Phase 1 Consultation: Action/No Action Determination

During Phase 1 consultation, AWE, USFWS and NHFGD will meet to determine whether the reported event (or other matter of concern) is isolated, and if further action is feasible or required. If it is agreed that no further action is required, the consultation shall be closed. If further action is required, Phase 2 consultation shall proceed. The consultation shall proceed to Phase 2 or be closed within 60 days of the initial IAP event.

9.3.2 Phase 2 Consultation: Resolution/Research Initiative Determination

Phase 2 consultation will occur, as needed, at the initial consultation meeting. If appropriate action measures are readily defined and agreed upon by all parties at this meeting, then the agreed-upon strategy will be implemented and consultation will be closed.

If it is determined that further research is needed to address the matter at hand, then Phase 3 Consultation shall proceed within 45 days of initiating Phase 2.

9.3.3 Phase 3 Consultation: Desktop Research and Recommendations

Phase 3 consultation will consist of a desktop analysis of action alternatives. This analysis will determine potential action alternatives based on the most current scientific knowledge and available technology relevant to the subject at hand. This assessment

will also take into account the fiscal viability of the Project and the financial and/or operational impact of any measures considered.

This effort will result in the production of a formal report to be submitted to the agencies by a date determined during Phase 2 consultation. The Phase 3 report will include descriptions of the action alternatives considered, and will present final action recommendations.

The results of Phase 3 consultation will dictate the course of research or mitigative actions, if any. If Phase 3 consultation results in a no-action decision, then consultation shall be closed. If Phase 3 consultation identifies and agrees upon mitigative measures to be taken, then those measures shall be implemented and consultation shall be closed.

If Phase 3 consultation agrees upon a strategy, but determines that a final plan of execution must be developed based on desktop research, then such a plan will be produced and assessed at the Phase 3 level.

If Phase 3 consultation determines that field research is necessary, then Phase 4 consultation shall proceed.

9.3.4 Phase 4 Consultation: Field Assessments

A final plan for research, as applicable, will be developed, approved and executed during Phase 4. The results of any field studies conducted during Phase 4 shall be submitted and treated as in Phase 3 consultation.

As in Phase 3, if consultation results in a no-action decision, then consultation shall be closed. If mitigative measures are identified and agreed upon by all parties, then those measures shall be implemented and consultation shall be closed.

If consultation agrees upon a strategy, but determines that a final plan of execution must be developed based on desktop research, then such a plan will be produced and assessed at the Phase 3 level. If it is determined that more field research is necessary, then Phase 4 consultation shall continue.

9.3.5 Closure of Consultation

Consultation shall continue until resolution is reached among all parties. Upon resolution, AWE will prepare a formal letter and submit it to the agencies. This letter will summarize the history of consultation regarding the specific matter at hand, explain the resolution, and declare that formal consultation has been closed. The agencies shall respond in a formal letter which indicates their acceptance of resolution and closure. The failure of agencies to provide such a letter within 60 days of AWE's letter of closure shall be construed as an acceptance of resolution and closure.

9.3.6 Dispute Resolution

If an occasion should arise where consulting parties do not agree on resolution and closure, a mediating entity (e.g. a third party technical committee, appropriate legal counsel, or other mediating party) will be selected and/or established as appropriate to assist in resolution.

10 PERMIT COMPLIANCE

Permit compliance will occur in several stages of project development and operation. In general, any project staff that may be handling birds or bird carcasses will have appropriate federal and/or state wildlife handling permits. AWE will assure that wildlife rehabilitation centers and consulting staff also have the appropriate permits or permission to handle or transport dead or injured birds protected by the MBTA and/or the BGEPA.

Handling, possession, and/or scientific collection permits will likely be needed for the post-construction mortality study. All necessary permits will be obtained and maintained by the contractor performing the study.

AWE operating personnel or designated contractors will be responsible for ensuring that the Project maintains copies (electronic and hard copy) of applicable permits and permit conditions. AWE operating personnel or designated contractors will also be responsible for maintaining all copies of annual permit reports to the USFWS and to any state agencies where required.

11 LITERATURE CITED

- APLIC and USFWS. 2005. Avian Protection Plan Guidelines (APP). April 2005. Accessed online December 2011 at:
<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/APP/AVIAN%20PROTECTION%20PLAN%20FINAL%204%2019%2005.pdf>
- Arnett, E. B., W. K. Brown, W. P. Erickson, J. K. Fiedler, B. L. Hamilton, T. H. Henry, A. Jain, G. D. Johnson, J. Kerns, R. R. Koford, C. P. Nicholson, T. J. O'Connell, M. D. Piorkowski, and R. D. Takersley Jr. 2008. Patterns of bat fatalities at wind energy facilities in North America. *Journal of Wildlife Management* 72:61-78.
- Arnett, E. B., M. M. P. Huso, J. P. Hayes, and M. Schirmacher. 2010. Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin, Texas, USA.
- Avery, M. L. 1979. Review of Avian Mortality Due to Collisions with Manmade Structures. Wildlife Damage Management Internet Center for Bird Control Seminars Proceedings. University of Nebraska – Lincoln.
- Baerwald, E.F., J. Edworthy, M. Holder, and R.M.R. Barclay. 2009. A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities. *Journal of Wildlife Management*. 73:1077-1081.
- Costa, J. 2011. Post-construction wildlife monitoring and results at terrestrial windfarms. Presentation to the Maine Chapter of the Wildlife Society: Wind Energy and Wildlife Forum, Thursday, May 5, 2011. Accessed online December 2011 at:
http://joomla.wildlife.org/Maine/index.php?option=com_content&task=view&id=187&Itemid=301
- DeGraff, M. and M. Yamasaki. 2001. *New England Wildlife: Habitat, Natural History, and Distribution*. University Press of New England, Hanover, NH.
- de Lucas, M., Janss, G.F.E., Whitfield, D.P. & Ferrer, M. 2008. Collision fatality of raptors in wind farms does not depend on raptor abundance. *Journal of Applied Ecology*, 45, 1695–1703. Accessed online December 2011 at:
http://www.fws.gov/filedownloads/ftp_nctccsp/SDM%20Practicum/Readings/de%20lucas%20et%20al%202008%20collision%20fatality%20does%20not%20depend%20on%20raptor%20abundance.pdf
- Ferrer, M., M. de Lucas, G.F.E. Janss, E. Casado, A.R. Munoz, M.J. Bechard and C.P. Calabuig. 2011. Weak relationship between risk assessment studies and recorded mortality in wind farms. *Journal of Applied Ecology*. doi: 10.1111/j.1365-2664.2011.02054.x. Article first published online: 1 SEP 2011.

Accessed online December 2011 at:

http://www.cb.tee.unibe.ch/content/e7117/e7118/e8764/e9889/e9893/Ferrer_JA_ppEco2011.pdf

Gehring, J., P. Kelinger, and A. M. Manville. 2009. Communication towers, lights, and birds: successful methods of reducing the frequency of avian collisions. *Ecological Applications* 19:505–514.

Hawk Migration Association of North America (HMANA). 2011. [Organization Website] Accessed online. March 2011 at: www.hmana.org

HawkWatch International. 2011. [Organization Website] Accessed online. March 2011 at: <http://www.hawkwatch.org/>

Hoffman, S.W., & J.P. Smith. 2003. Population trends of migratory raptors in western North America, 1977-2001. *Condor*, 105:397-419. Accessed online, March 2011 at: http://www.hawkwatch.org/images/stories/Conservation_Science/Publications_and_Reports/Publications/Hoffman-and-Smith-Condor-105.pdf

James, F. C. and H. H. Shugart, Jr. 1970. A Quantitative Method of Habitat Description. *Audubon Field Notes* 24: 727-736.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. *Frontiers in Ecology and the Environment* 5:315-324.

New Hampshire Audubon. 2010. Status of Breeding Bald Eagles in New Hampshire in 2010. Unpublished report prepared by Christian J. Martin, New Hampshire Audubon Senior Biologist, for New Hampshire Fish and Game Department, Nongame and Endangered Wildlife Program. November 1, 2010. Accessed online November 2011 at: <http://www.nhaidubon.org/wp-content/uploads/2011/02/2010-NH-Breeding-BAEA-Final-Report-no-app.pdf>

New Hampshire Audubon. 2011. New Hampshire's Oldest Known Eagle Dies. New Hampshire Audubon Website article Posted on November 16, 2011. Accessed online November 28, 2011 at: <http://www.nhaidubon.org/new-hampshire%E2%80%99s-oldest-known-eagle-dies>

New Hampshire Fish and Game Department (NHFGD). 2005. New Hampshire Wildlife Action Plan. Concord, NH. http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm

New Hampshire Fish and Game Department (NHFGD). 2010. New Hampshire Wildlife Action Plan, 2010 Wildlife Habitat Land Cover: Summary of Changes between

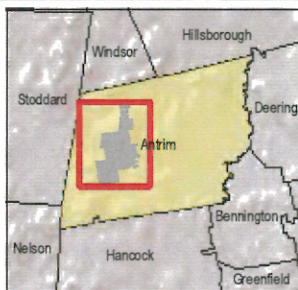
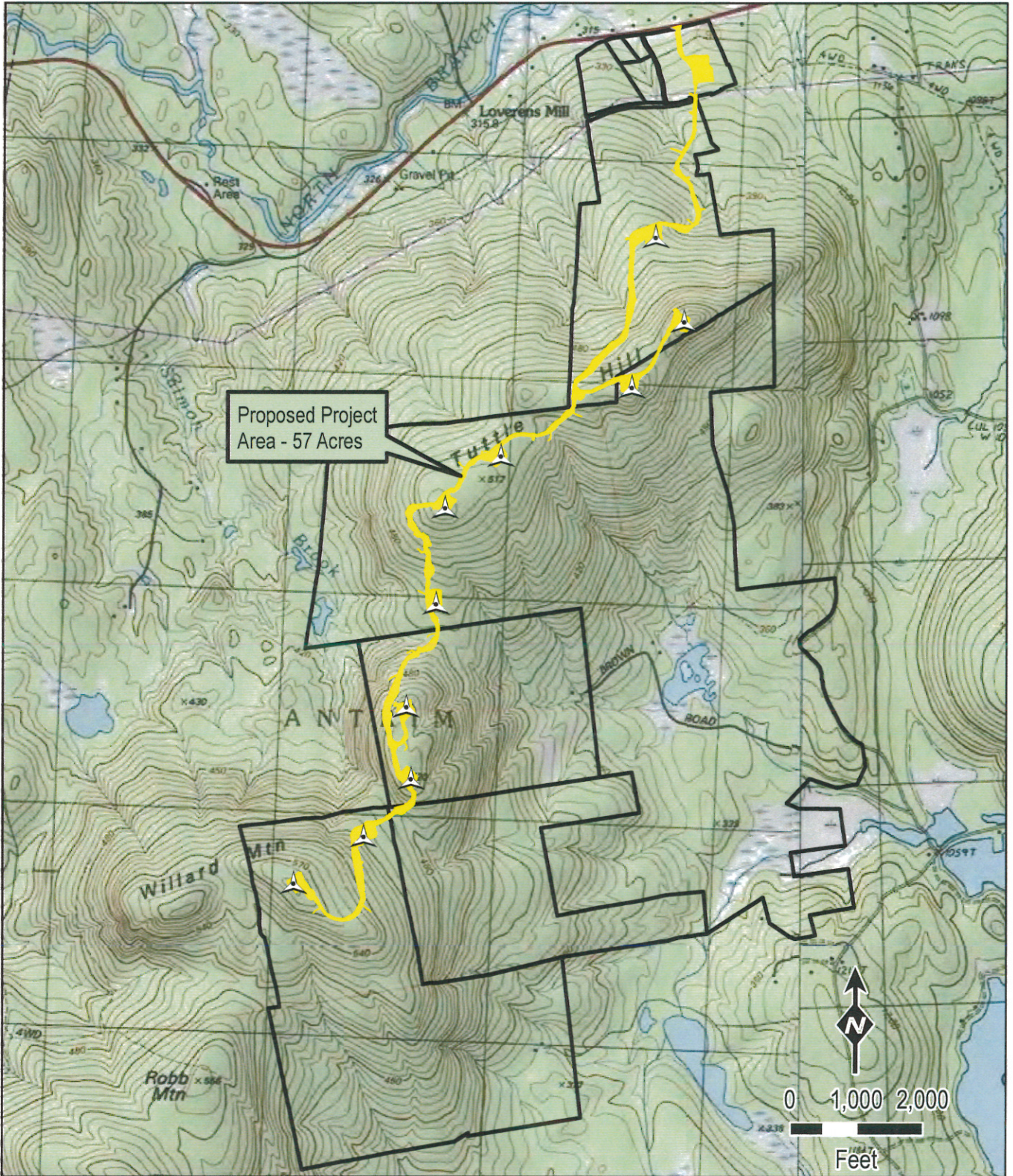
- 2005 and 2010 data. Concord, NH.
http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm
- New Hampshire Fish and Game Department (NHFGD). 2011a. Bats of New Hampshire. New Hampshire Fish and Game Department website. Accessed online, November 2011 at:
<http://www.wildlife.state.nh.us/Wildlife/Nongame/bats.html>
- New Hampshire Fish and Game Department (NHFGD). 2011b. White-nose Syndrome: A new threat to New Hampshire's bats. New Hampshire Fish and Game Department website. Accessed online, November 2011 at:
<http://www.nhfg.net/Wildlife/Nongame/bats/wns.html>
- New Hampshire Natural Heritage Bureau. 2011. Rare Animal List for New Hampshire Including species listed as threatened or endangered under the NH Endangered Species Conservation Act of 1979; July 2011. Accessed online, November 2011 at:
<http://www.nhdf.org/library/pdf/Natural%20Heritage/TrackingList-AnimalGeneral.pdf>
- Reynolds, Scott. 2007. Batting 4,000. New Hampshire Wildlife Journal. September/October 2007. Accessed online, November 2011 at:
http://www.wildlife.state.nh.us/Wildlife/Nongame/Nongame_PDFs/Batting_4000_SReynolds_NHWJ.pdf
- Sharp, L., C. Herrmann, R. Friedel, K. Kosciuch and R. MacIntosh. Comparison of pre-and post-construction bald eagle use at the Pillar Mountain wind project, Kodiak, Alaska, Spring 2007 and 2010. Presentation for the National Wind Coordinating Collaborative, Wind Wildlife Research Meeting VIII, October 19-20, 2010, Lakewood, Colorado. Accessed online December 2011 at:
http://www.nationalwind.org/assets/research_meetings/Research_Meeting_VIII_Sharp.pdf
- Shire, G. G., K. Brown, and G. Winegrad. 2000. Communication towers: a deadly hazard to birds. Special Report, American Bird Conservancy, Washington, D.C.
- Stantec Consulting Inc. 2007a. Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
- Stantec Consulting Inc. 2007b. Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
- Stantec Consulting Services Inc. 2008a. Spring 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.

- Stantec Consulting Services Inc. 2008b. Fall 2008 Radar Survey Report for the Groton Wind Project. Prepared for Groton Wind, LLC.
- Stantec Consulting Services Inc. 2008c. A Spring 2008 Survey of Bird Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
- Stantec Consulting Services. 2009. Fall 2009 Nocturnal Migration Survey Report. Prepared for TRC Engineers LLC.
- USFWS. 2011a. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List the Eastern Small-Footed Bat and the Northern Long-Eared Bat as Threatened or Endangered. *In* Federal Register /Vol. 76, No. 125 /Wednesday, June 29, 2011 / Proposed Rules [Docket No. FWS-R5-ES-2011-0024; MO 92210-0-0008]. Accessed online May 2012 at:
<http://www.fws.gov/midwest/es/soc/mammals/pdf/FR90DayFndng2Bats29June2011.pdf>
- USFWS. 2011b. U.S. Fish and Wildlife Service Draft Land-Based Wind Energy Guidelines: Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats. Accessed online, December 2011 at:
http://www.fws.gov/windenergy/docs/Wind_Energy_Guidelines_2_15_2011FINAL.pdf
- USFWS. 2011c. U.S. Fish and Wildlife Service Migratory Bird Program: Birds Protected by the Migratory Bird Treaty Act. Accessed online, December 2011 at:
<http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtintro.html>
- USFWS. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. Accessed Online April 2012 at:
http://www.fws.gov/windenergy/docs/WEG_final.pdf
- USGS 2009. Breeding Bird Census. Accessed online November 2011 at:
<http://www.pwrc.usgs.gov/birds/bbc.html>
- Veilleux, J.P. and S. Reynolds. 2005. Species Profile: Indiana Bat (*Myotis sodalist*) *In* New Hampshire Wildlife Action Plan. New Hampshire Fish and Game Department, Concord, New Hampshire, October 1, 2005. Accessed Online, November 2011 at:
http://wildnh.com/Wildlife/Wildlife_Plan/WAP_species_PDFs/Mammals/IndianaBat.pdf
- VINS. 2005. Mountain Bird Watch Protocol. Unpublished technical report of the Vermont Institute of Natural Sciences.
- Whittam, B. and M. Ball. 2002. Developing a Protocol for Monitoring the Bicknell's Thrush (*Catharus bicknelli*) and Other High Elevation Bird Species in Atlantic Canada. Unpublished report by Bird Studies Canada. Accessed online, November 2011 at:
<http://www.bsc-eoc.org/download/bithreport.pdf>

- Whittam, B. and M. Ball. 2003. High Elevation Landbird Program: 2002 Report. Bird Studies Canada, February 2003.
- Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar and Acoustic Survey of Bird and Bat Migration at the Proposed Liberty Gap Wind Project in Franklin, West Virginia. Prepared for US Wind Force, LLC.
- Woodlot Alternatives, Inc. 2006a. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Lempster Mountain Wind Power Project, Lempster, New Hampshire
- Woodlot Alternatives, Inc. 2006b. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
- Woodlot Alternatives, Inc. 2007a. A Spring 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project, Lempster, New Hampshire
- Woodlot Alternatives, Inc. 2007b. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.

Attachment A

Site Map




Legend

-  Proposed WTG
-  Proposed Project Area - 57 Acres
-  Project Parcels



**ANTRIM WIND
ENERGY PROJECT**
354 KEENE ROAD, ANTRIM, NH
Project Location Map

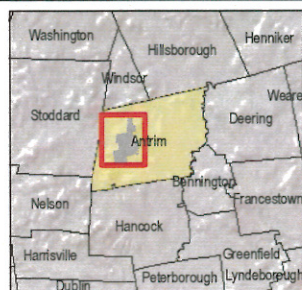
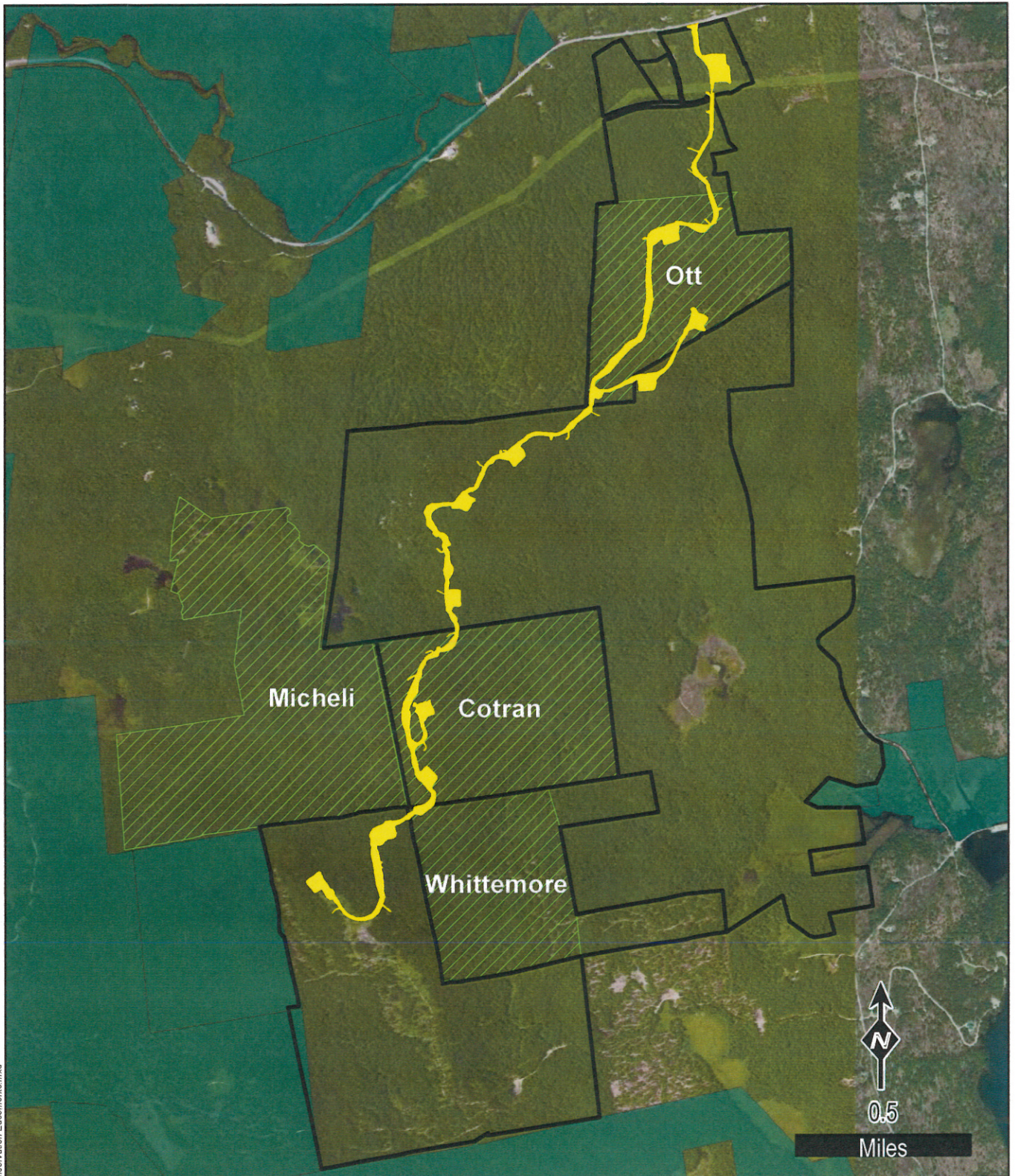
Produced by:  CTRC

1/3/2012

Attachment B

Conservation Easements

PROJECT: AUGUST 2011 Attachment B Pr Conservation Easements.mxd




Legend

-  Project Parcels
-  Proposed Project Area
-  Proposed Conservation Easements (750 acres)
-  Existing Conserved Lands

Conserved Lands layer courtesy of NH GRANIT and Town of Antrim



**ANTRIM WIND
ENERGY PROJECT**
ANTRIM, NH
Attachment B
Proposed Conservation
Easement Areas

Produced by: 

6/13/2012