VERMONT
Agency of Natural Resources
1 National Life Dr., Davis 2, Montpelier, VT 05620-3901, 802-828-1294

Endangered & Threatened Species Takings Permit

Statutory Authority: 10 VSA § 5408

1. Permittee

Steve Costello
Green Mountain Power
163 Acorn Lane, Colchester, VT 05446

2. Permit Period

Effective Date: 7/15/2013
Expiration Date: 12/31/2014
Authorization #: EH-2013-10
Amendment # 0

3. Principal Officer: Mary G. Powell

4. Subpermitee(s): Green Mountain Power staff and contractors.

5. Authorized Species: Eastern small-footed bat (*Myotis leibii*), Little brown bat (*Myotis lucifugus*), Northern long-eared bat (*Myotis septentrionalis*), Tri-colored bat (*Perimyotis subflavus*).

6. Authorized Activity: Operation of a 21 turbine (63 MW) wind energy facility in Lowell, VT.

7. Location Where Authorized Activity May Be Conducted: Lowell, VT.

8. Findings

A. The Permittee applied for an Endangered and Threatened Species Takings Permit under 10 V.S.A. § 5408 to operate a 63 MW wind energy project in Lowell, Vermont. The Project consists of 21 wind turbines of 3.0 MW each. The turbines have 85 meter tall masts and have a rotor diameter of 112 meters with a rotor-swept area of 9,852 meters squared. The Project lies on a forested ridge within the Green Mountains.

B. The Permittee is the Vice President of Generation and Energy Innovation at Green Mountain Power.

C. The Vermont Public Service Board (PSB) issued a Certificate of Public Good (CPG) for the Project in Board Docket 7628 on May 31, 2011. The Project must operate in accordance with the issued CPG. The CPG specifically incorporates the Bird and Bat Memorandum of Understanding (MOU) dated October 22, 2010 between Green Mountain Power and the Vermont Agency of Natural Resources. As such, the CPG conditions include operational curtailments, feathering the turbine blades, during certain times of the year in order to minimize bat fatalities as described in the Avoidance and Minimization subsection below.

D. The petition for a CPG for the Project was filed in May 2010, prior to the completion of the statewide evaluation by the VFWD of the status of Vermont's cave bat populations as a result of White-nose Syndrome (WNS). The evaluation determined that the disease devastated populations of cave bat species, resulting in the listing of the little brown bat and northern long-eared bat in 2011 and the tri-colored bat in 2012.

E. The species listed in Section 5 hibernate in caves or mines during the winters, but emerge from hibernation between March and May and enter hibernation in October-November. The populations of each of the listed species is regional in nature, meaning that summer and winter populations migrate to and from adjoining states/provinces such as New York, New Hampshire, Massachusetts, and Quebec. During the non-hibernating period, these bats are active in flight in order to meet their biological needs. Bats in flight in proximity to wind turbines are vulnerable to mortality by collision with the blades and barotrauma caused by rapid changes in pressure when swept up into the rotors. (See http://www.esf.edu/aec/adks/mammals/littlebrownbat.htm).

F. Pre-construction surveys were conducted by Stantec Consulting to measure bat activity at the Project site from April through October in 2009. Over the course this period, 856 detector-nights of bat acoustic data were surveyed and 10,130 call sequences (11.8 calls per detector night) were recorded at numerous locations throughout the Project area. Approximately 18% could be positively attributed to Myotids (i.e., bats of the genus *Myotis)*. Sixty-eight percent of the calls were identified as High Frequency Unknown Guild, a group that includes Myotids, red bats, and tri-colored bats.

G. During 2011 and 2012, the Vermont Fish and Wildlife Department (VFWD) collected and documented maternity colony information on little brown and big brown bats, the two species of bats that typically roost during the summer in buildings and structures. To date, the VFWD has documented approximately 2,200 adult females and juvenile little brown bats in 16 summer maternity colonies in Vermont, nearly all of which have

been located in western Vermont. No maternity colonies have been located in northeastern Vermont. While there are undocumented little brown bat maternity colonies remaining, current information suggests the distribution of Vermont's little brown bat population is heavily weighted to the western region of the state.

H. In the summer of 2012, the VFWD counted 2,222 little brown bats in Vermont. In light of known population dynamics, this places the minimum known population of little brown bats in Vermont at approximately 3,200. The actual number is likely significantly larger due to the number bats that were not actually observed and counted by VFWD staff.

Takings

I. The Permittee has applied for an annual take of a maximum of 4 little brown bats, 1 northern long-eared bat, 1 tri-colored bat, and 1 eastern small-footed bat.

J. There is substantial evidence that the operation of turbines of the size utilized by the Project will result in the taking of the species listed in Section 5 of this permit. Fatalities of bats have been recorded at wind facilities worldwide (Erickson et al. 2002, Durr and Bach 2004, Kunz et al. 2007, Arnett et al. 2008). Bat fatalities at wind energy facilities are considered to be especially high at wind facilities on forested ridges in the eastern U.S. such as the Project (Arnett et al. 2008).

K. The level of take of each species will vary based on both abundance and possible species-specific characteristics that influence their vulnerability to collisions with wind turbines.

L. Small-footed bat fatalities from wind turbines have yet to be documented, and an evaluation of potential small-footed bat summer roosting habitat conducted by Stantec Consulting did not identify any potential small-footed bat summer habitat. As a result, the possibility of taking small-footed bats is considered extremely low for this site.

M. Little brown bats have been killed at 19 of 20 wind energy facilities for which data is available in the Northeast. Little brown bats comprised approximately 15% of bat fatalities in the Northeast and 17% of observed bat fatalities at wind facilities in New England. Much of this data is derived from projects before White-nose Syndrome devastated cave bat populations in the Northeast. In 2012, there were no observed bat mortalities of state listed species at Vermont Wind's Sheffield facility during the first year of its fatality monitoring under a regime of one-half the turbines curtailed at wind speeds less than 6 meters/second (m/s).

N. Information from little brown bat mortality data from three operating wind projects in New England (Mars Hill, ME; Stetson, ME; and Lempster, NH) between 2007 and 2010 indicates that approximately 0.43 little brown bats per turbine/per year were estimated to be taken by the three projects. This data was recorded from projects operating prior to the population-reducing effects of WNS. These projects did not operate under any curtailment procedures.

O. Recent research on the use of the operational adjustments to reduce bat fatalities indicate that operational adjustments such as those described in Section 11 of this permit result in an estimated 44% to 93% reduction in bat fatalities (Arnett et al. 2010). Assuming fatality rates of little brown bats are consistent with operating wind energy facilities in New England, the Project's estimated take of 0.43 little brown bats/turbine/year may be reduced by at least 50% if operations adjustments are implemented, yielding a calculated estimated potential take of 0.215 little brown bats per turbine, per year. By deriving an estimated take of little brown bats from fatality data collected prior to WNS and by applying only a 50% reduction in bat fatalities from operational adjustments, the estimated take of 0.215 little brown bats/turbine/year for this facility is extremely conservative, especially given the results of the initial year of study at the Vermont Wind Sheffield facility.

P. Other threats to the listed bat species, including the little brown bat, include loss of summer and winter roosts, pesticides, and persecution (Kunz and Fenton 2003). From January through August 2012, there were nine reported takings of little brown bats in Vermont residences as a result of exposure, or potential exposure, to rabies. WNS has become the most significant threat to bat species, particularly the little brown bat (Frick et al. 2010).

Q. The Permittee will conduct bird and bat fatality monitoring for the period April 15 to October 15 as prescribed in *Bird and Bat Post-Construction Monitoring Plan – Year 1.* Weekly searches will be conducted during the spring (April 15 to May 31), and searches at 3-day intervals will be conducted for the period June 1 to October 15. The bat fatality monitoring will provide information on the take of listed bat species and estimates of bird and bat fatality rates.

Economic Impact

R. The PSB found that, "the proposed project will promote the general good of the state and the Petitioners should be granted a CPG under Section 248 authorizing construction and operation of the project. The proposed project will be a source of energy that does not produce greenhouse gases. As a non-emitting renewable resource, it will contribute to meeting the need for renewable energy in the region and aid in achieving the standards of the Regional Greenhouse Gas Initiative ("RGGI"). The new source will help meet the state's goals of promoting the development of new renewable generation. These include the standards in the Sustainably Priced Energy Enterprise Development Program ("SPEED") requiring that, by 2012, at least 10% of the state's energy load (as of 2005) be served by new sources of renewable energy, as well as the state's separate, longer-term goal of providing 25% of the energy used in Vermont from renewable resources." PSB Docket 7628, Order of 5/31/2011.

S. In order to avoid all takings of listed species, the facility could not operate during the times when the listed bat species are active, from ½ hour before sunset to sunrise, April 1 through October 30.

T. The Permittee states that curtailment of such duration would result in a loss of 23% of the annual output, equating to a loss of approximately 44,000 MWHs of annual production and a value of $4,000,000 per year of operation.

Avoidance and Minimization

U. Results from recent studies in Pennsylvania (Arnett et al. 2010), Canada (Baerwald 2008, Baerwald et al. 2009), and in Germany (O. Behr, University of University of Erlangen, unpublished data) indicate that changing the turbine "cut-in speed" (i.e., wind speed at which wind generated electricity enters the power grid) from the normal to higher cut-in speeds (between 5 and 6.5 m/s) resulted in substantial reduction in bat fatalities compared to normally operating turbines, specifically a 44–93% reduction in bat fatalities in various studies to date.

V. The Permittee will implement operational adjustments during the period from June 1 through September 30 as a means of reducing fatalities of listed bat species.

W. The bird and bat MOU describes four groups of operational adjustments (i.e., cut-in speeds of 3.0, 4.0, 5.0, and 6.0 meters/second wind speed) to be adjusted based on the performance characteristics of the turbines.

X. The Permittee proposes to curtail operation for the period June 1 to September 30 when wind speeds are equal to or below 5 m/s (11.2 mph) for one-half of the turbines and equal to or below 6 m/s (13.4 mph) for the remaining one-half of the turbines. Curtailment will occur during nights (½ hour before sunset to sunrise). This time period is when bats are active.

Y. The Permittee and VFWD will review the results of the first year of fatality monitoring to determine the most effective means of limiting bat mortality to the bat fatality thresholds as described in the MOU.

Mitigation

Z. The VFWD has conducted an evaluation of mitigation alternatives to offset the expected take of listed bats and determined that, with the exception of WNS, the greatest threat to remaining populations of listed bats is the disturbance of maternity colonies. With the average little brown bat colony size of over 125 bats, the impacts of the loss of a single colony greatly exceeds the estimated take of little brown bats at this wind facility.

AA. The Permittee has agreed to provide annual contributions of $18,438 to the Maternity Colony Technical Assistance Program established by the VT Agency of Natural Resources for the duration of this permit. The sum is a function of the estimated annual cost of the technical assistance program pro-rated by the proportion of Vermont's number of new generation operating turbines.

Advice of the Endangered Species Committee

BB. On May 2, 2013, the Secretary received the advice of the Endangered Species Committee. That advice has been considered and incorporated, in large part, into this permit.

9. Statutory Determination

A. 10 V.S.A. § 5408(a) provides: "[A]fter obtaining the advice of the Endangered Species Committee, the Secretary may permit, under such terms and conditions as the Secretary may prescribe by rule any act otherwise prohibited by this chapter if done for any of the following purposes: scientific purposes; to enhance

the propagation or survival of a species; economic hardship; zoological exhibition, educational purposes; or special purposes consistent with the purposes of the federal Endangered Species Act."

B. The Permittee requests an Endangered & Threatened Species Takings Permit for the following purpose: Economic Hardship.

C. The state of Vermont recognizes the value which plants, fish and wildlife in their natural environment have for public enjoyment, ecological balance, and scientific study. *See* 1981, No. 188 (Adj. Sess.), § 1(a).

D. The state of Vermont recognizes the need for protection and preservation of these plants, fish and wildlife in their natural environment. *Id*.

E. The General Assembly of Vermont intends that the species of wildlife and wild plants normally occurring within this state which may be found to be threatened or endangered within the state should be accorded protection as necessary to maintain and enhance their numbers. *Id.* at § 1(b).

F. The General Assembly of Vermont intends that the state should assist in the protection of species of wildlife and wild plants which are determined to be threatened or endangered elsewhere pursuant to the federal Endangered Species Act. *Id.*

G. The General Assembly intends to allow for the orderly development of the state without undue economic hardship being caused by the provisions of this act providing for the power of issuing variances. *Id* at § 1(c).

H. 10 V.S.A. § 5408(a) authorizes the Secretary to permit the taking of a listed species to lessen economic hardship.

I. In this case, to determine whether there is sufficient "economic hardship," the Secretary examined the nature and size of hardship, whether the economic activity associated with the Project has a public benefit and the impact of the taking on the state's population of the species listed in Section 5.

J. The Secretary weighed the takings against the economic hardship imposed by restricting the operation of the wind generation facility to times that would ensure that no listed species would be taken. In this instance, for the Project to ensure that there would be no takings of endangered bats the turbines would have to be immobilized from April to October from ½ hour before sunset to sunrise. The Permittee proffers, under the pains of perjury, that an operation regime of that design would result in a, 23% loss in the annual output, equating to a loss of approximately 44,000 MWHs of annual production and a value of $4,000,000 per year of operation. The Permittee has demonstrated that there is an economic hardship to the project that would make it uneconomical to operate over the long-term (see Section 8, Economic Impact subsection). The Agency agrees that this meets the "economic hardship" standard. *See* 10 V.S.A. § 5408(a).

K. In examining whether the Project has a public benefit, the Secretary determined that this question has been decided by the Public Service Board and affirmed in the Certificate of Public Good for the Project.

L. In examining the impact of the proposed takings, the Secretary considered the Agency bat biologist's opinion that a take of this magnitude will not be biologically significant over time if sufficient mitigation is undertaken. If the Project takes the maximum number of little brown bats authorized under this permit, it will likely represent no more than approximately 0.1% of the population of little brown bats in Vermont (see Section 8, Takings subsection).

M. In reviewing whether the Mitigation is sufficient to offset the takings, the Secretary considers whether such mitigation will be "in the best interest of the species." 10 V.S.A. § 5408 (f)(1)(B). Here, the Permittee is contributing a fair proportion of the funds needed to implement a Maternity Colony Technical Assistance Program conducted by the Vermont Fish and Wildlife Department. These funds will be applied strictly to this program for the duration of this permit, thereby assuring that every effort will be made to assist homeowners and landowners in addressing conflicts with bats.

N. Pursuant to 10 V.S.A. § 5408(a), the ANR Secretary hereby determines, based upon the findings detailed above and after receiving advice from the Endangered Species Committee, that the proposed activity is consistent the purposes of the 10 V.S.A. ch. 123. An Endangered and Threatened Species Takings Permit is authorized, as conditioned below.

10. General Conditions & Authorizations

A. General conditions set out in 10 V.S.A. ch. 123 are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is expressly conditioned upon compliance with all applicable federal and state laws, regulations and permits.

C. This permit does not confer upon the Permittee the authority to conduct research without the acquiring necessary landowner permission including, but not limited to, state lands.

D. By acceptance of this permit, the Permittee and its heirs, successors and assigns agree to provide the Agency of Natural Resources with unrestricted access, at reasonable times to the animal or plant specimens and/or animal or plant parts collected under this permit, collection and monitoring records, and access to the premises as necessary to ensure compliance with this permit.

E. The Agency maintains continuing jurisdiction over this activity, and may, at any time, order the Permittee to undertake remedial measures if necessary to ensure the protection and conservation of listed species.

F. This permit is not valid for state and federally listed endangered and threatened species not identified in section 5. A federal endangered species permit may also be required for federally listed species.

G. The permit is valid for use by the named Permittee and subpermittees(s) only and may be revoked by the Secretary at any time for cause, or for violations of any terms or conditions of this permit or state wildlife law.

H. The Permittee and subpermittee(s) shall carry a copy this permit whenever performing authorized activities.

I. Pursuant 10 V.S.A. § 5410 and the terms of this permit, the locations of listed species shall be kept confidential and the sharing of such information is a violation of this permit and the law.

11. Specific Conditions & Authorizations

Minimization

A. The Permittee shall fully feather the blades of the wind turbines for up to 120 nights (June 1 to September 30) when wind speeds are equal to or below 5 m/s (11.2 mph) for 10 of the turbines and equal to or below 6 m/s (13.4 mph) for 11 of the turbines. Curtailment shall occur during nights (½ hour before sunset to sunrise) when bats are active.

Monitoring Take

B. The Permittee shall implement an experimental design to estimate the difference in fatality rates of the two wind speed regimes of operational curtailment consistent with the research design as detailed in "*Bird and Bat Post-Construction Monitoring Plan – Year 1*," dated March 2013.

C. The Permittee shall hire a qualified consultant to conduct fatality monitoring through weekly search intervals for the period April 15 to May 31 and 3-day search intervals for the period June 1 to October 15 for all of the turbines. Personnel trained in proper search techniques shall conduct the carcass searches. Searchers shall walk at a rate of approximately 10–20 m/min. along each transect searching both sides out to 3 meters on each side for casualties.

D. Any state threatened or endangered bat species that are found dead shall not be used for carcass removal or searcher efficiency trials until each carcass is digitally photographed. Those that cannot be positively identified in the field shall be retained and frozen for later identification to eliminate the possibility of misidentifying a threatened or endangered species. If necessary to confirm the species, the Permittee shall submit the specimen to a lab approved by the VFWD for genetic analysis to identify the species. Collection and possession of federal endangered, threatened, or protected species shall be coordinated with the USFWS and VFWD.

E. Following completion of the research to evaluate the efficacy of operational adjustments to reduce bat fatalities, the Permittee shall work with the VFWD to determine effective strategies for limiting the take of listed bat species. This determination shall include an analysis as to whether sufficient statistical power is available to conclude that bat fatality rates at a cut-in speed of 5 meters/second wind speed during the period June 1 through September 30 approach the bat fatality thresholds established in the MOU. The evaluation shall include

a prescription for an operational adjustment regime in a document *Bird and Bat Post-Construction Monitoring Plan – Year 2.* The Secretary may require adjustments in operations to limit the take of listed bat species.

F. Upon the completion of the evaluation of operational adjustments at the Project site after year 1, all turbines shall be curtailed at winds speeds equal to or below 6 m/s for the period June 1 to September 30, for the remainder of the Permit Period, unless the prescription for operational adjustments as described in *Bird and Bat Post-Construction Monitoring Plan – Year 2* is otherwise authorized by the Secretary of the Agency of Natural Resources in writing.

Mitigation

G. The Permittee shall submit an annual contribution of $18,438 to the Maternity Colony Technical Assistance Program established by the VT Agency of Natural Resources each year of the permit term, beginning within 45 days of the granting of the permit, and by April 1 of each of the ensuing calendar years for the duration of this permit.

Authorizations

H. This permit allows the taking of up to 4 little brown bats, 1 northern long-eared bat, 1 tri-colored bat, and 1 eastern small-footed bat, for an annual total of 7 State listed bats.

I. Each take of a listed species shall be reported to the Secretary of the Agency of Natural Resources (with a copy to VFWD Permits Specialist) within 72 hours of occurrence. Should the take exceed the annual take limits as established in this permit, the Secretary of the Agency of Natural Resources may require the implementation of additional strategies to reduce take of listed species, up to, and including, the cessation of operation of the Project ½ hour before sunset to sunrise April 1 through October 30, all dates inclusive.

12. Reporting Requirements

A. Any mortality of a listed species related to the activities authorized under this permit shall be reported in writing to the Secretary of the Agency of Natural Resources (with a copy to VFWD Permits Specialist) within 72 hours of occurrence.

B. The applicant shall report the takings of any listed species on a monthly basis in writing, to Scott Darling or any other designee of the Secretary, with a copy to the VFWD Permit Specialist. The report may be submitted by email and shall list taking (and specifically mortality of any listed species.

C. An annual report, due by December 31 of each year of the permit term, unless an extension is specifically requested and granted, shall be submitted to the Secretary (with a copy to the VFWD Permits Specialist). At a minimum the reports shall:

i. Detail all bat fatalities for the year specifying date, turbine, species and gender.

ii. Estimate bat fatality rates for the year

iii. Provide documentation sufficient to assess the degree to which each turbine was operated consistent with the curtailment conditions of this permit. This documentation may be in the form of reports to the Public Service Board or ISO, provided they are in a format that can evaluate the operation of each turbine during the period June 1 to September 30.

D. The Permittee shall accommodate requests by Department staff for additional information from turbine operations and collection activities including but not limited to: any raw data, copies of original field sheets, and computerized data in usable format. Reports of results of any subsequent analyses and copies of subsequent publications resulting from the collections made under this permit shall be forwarded to the Vermont Fish & Wildlife Department within 30 days of publication.

Issued by: _____ Date: 7-12-13

Deb Markowitz, Secretary
Agency of Natural Resources

Appeals

Right to Appeal to Public Service Board

If this decision relates to a renewable energy plant for which a certificate of public good is required under 30 V.S.A. §248, any appeal of this decision must be filed with the Vermont Public Service Board pursuant to 10 V.S.A. §8506. This section does not apply to a facility that is subject to 10 V.S.A. §1004 (dams before the Federal Energy Regulatory Commission), 10 V.S.A. §1006 (certification of hydroelectric projects) or 10 V.S.A. Chapter 43 (dams). Any appeal under this section must be filed with the Clerk of the Public Service Board within 30 days of the date of this decision; the appellant must file with the Clerk an original and six copies of its appeal. The appellant shall provide notice of the filing of an appeal in accordance with 10 V.S.A. 8504(c)(2), and shall also serve a copy of the Notice of Appeal on the Vermont Department of Public Service. For further information, see the Rules and General Orders of the Public Service Board, available on line at www.psb.vermont.gov. The address for the Public Service Board is 112 State Street, Montpelier, Vermont, 05620-2701 (Tel. # 802-828-2358).