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13 December 2011

Joshua Brown, Project Manager
TRC Solutions
10 Maxwell Drive
Clifton Park, NY 12065

Subject: Antrim Wind RTE

Dear Josh,

This is a summary of my investigations regarding rare, threatened or endangered plant species at the proposed Antrim Wind project in Antrim, New Hampshire on 6, 7 and 8 September. With the assistance of your staff, I performed an extensive search of the project area, to include all of the previously identified natural communities.

Although my search was for any uncommon species occurrence, emphasis was placed on the species listed in the memo from Melissa Coppola of the New Hampshire Natural Heritage Bureau to you dated 3 August 2011. This included sickle-pod (*Boechera canadensis*), smooth rock-cress (*B. laevigata*), Carolina cranesbill (*Geranium carolinianum*) and climbing fumitory (*Adlumia fungosa*) in the Rich red oak rocky woods community, small whorled pogonia (*Isotria medeoloides*) in the Hemlock-beech-oak-pine forest, Douglas' knotweed (*Polygonum douglasii*) and Smooth sandwort (*Minuartia glabra*) in the Red oak-pine rocky ridge community, and green adder's mouth (*Malaxis unifolia*) in the Red spruce swamp community. In my experience, several of these plants can be found in associations other than those listed, so my searches were not limited to specific communities.

Additionally, I looked for rare species included on lists for Antrim and adjacent towns that might occur in project area habitats, for example three-birds orchid (*Triphora trianthophora*) and barren strawberry (*Geum fragarioides*), both known historically from Hillsborough.

SURVEY METHODOLOGY The searches were conducted with a "wander" methodology, which is a visual inspection of habitats with closer inspection of any potential microhabitats that might support individuals or populations of rare species. This type of so-called "Lévy-walk" search has been found to "optimize the intermittent search strategy in the critical situation of rare targets" (Lomholt et al. 2008), and is a standard method used in rare plant searches, especially when

extensive areas are involved. We have found that closer inspection of favorable habitat is more likely to yield results than, for example, parallel or grid transects which could easily bypass small habitat patches. This said, beech woods on the lower slopes at the northern end of the project area were searched using parallel transects to maximize coverage, with close inspections of favorable habitats as they appeared. As described below, that section of the project area contains habitat suitable for *Isotria medeoloides*, but none were found. As can be seen using GPS tracking, all previously identified natural communities (as well as many wetlands) were surveyed in this investigation (see Attachment 1). Vegetation in each community generally conformed to the species listed in the community descriptions issued by the New Hampshire Division of Forests and Lands. Although late in the season, most vegetation, including many spring-flowering species, was still identifiable.

The most common forest trees were northern hardwoods, particularly beech, sugar and red maple, yellow birch and paper birch. Common conifers included hemlock, white pine, balsam fir and red spruce. In appropriate communities, the spruce and hemlock form pure stands. Woody understory species included saplings of overstory species, as well as witch hazel, hazel nut, viburnums, stripped maple and mountain maple, and in more open areas, meadowsweet, brambles and low sweet blueberry are common.

FEDERALLY LISTED SPECIES Three New Hampshire plant species are included on the federal list of threatened or endangered species: Jesup's milk-vetch (*Astragalus robbinsii* var *jesupi*), northeastern bulrush (*Scirpus ancistrochaetus*), and small whorled pogonia (*Isotria medeoloides*). The milk-vetch is restricted to the banks of the Connecticut River in Plainfield and Claremont, but the other two could be found in Antrim. The bulrush has been reported from Acworth and Langdon, about 20 miles to the northwest of the project site, and small whorled pogonia has been reported from Weare (± 15 miles to the east) and Warner (± 17 miles to the north). Northeastern bulrush is typically found in drained beaver ponds and similar wetlands in the northern part of its range, and potential habitats in the project area were investigated. Although bulrushes were present, they were all common species such as green bulrush (*Scirpus atrovirens*) and wool-grass (*S. cyperinus*).

The small-whorled pogonia is a species of second growth deciduous woodlands with open understory and deep leaf litter, sometimes near intermittent streams with "braided" channels. Habitats where the small-whorled pogonia is found are variable enough that no critical habitat rules have been published for the species. Where found, this species is evident from early June until the first heavy frost, and capsule-bearing plants can be identified well into the fall, so I am confident that, if present, it would have been observed. As noted above, the most favorable habitat appeared to be in beech-dominated forests at the northern end of the study area, and a thorough search was conducted using parallel transects to maximize coverage.

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SPECIES OF STATE CONCERN According to the New Hampshire Natural Heritage Bureau (NHNHB) Sickie-pod (*Boechea canadensis*) and smooth rock-cress (*B. laevigata*) are species of rich rocky woods and thickets. Such habitats are limited at the Antrim site, but where they were encountered, searches for these species were conducted. No rock cress species were found. Carolina cranesbill (*Geranium carolinianum*) is reportedly found in the Rich red oak rocky woods community, but according to some sources it is also a species of cultivated soil, dry waste places, fields and roadsides. In any event, this species was not observed in the study area.

Climbing fumitory (*Adlumia fungosa*), a regarded as a species of the Rich red oak rocky woods community, is a very apparent species where it occurs. I have found it in other rocky woods communities and along roadsides, so did not restrict my searches to specific communities. Nevertheless, this species was not seen at Antrim.

NHNHB regards Douglas' knotweed (*Polygonum douglasii*) as a species of the Red oak-pine rocky ridge community; but can also be found in dry sandy or gravelly soil. Few areas that might support this species occur on the study area, and no Douglas' knotweeds were found. Neither did I find smooth sandwort (*Minuartia glabra*), another species of the Red oak-pine rocky ridge community.

Finally, NHNHB regards green adder's mouth (*Malaxis unifolia*) as a species of the Red spruce swamp community. From my experience, the species is found in a far broader range of habitats, including mossy woods roads, mixed upland forests, etc. I therefore for this species in many habitats, but found none.

CONCLUSIONS Although a number of natural communities that might support rare or uncommon species are found at the Antrim Wind study area, the species observed were generally common, and no species of concern were found. The investigation covered all identified natural communities, as well as intervening habitats such as powerline corridors, roadsides, clearings and cut-over areas. Special emphasis was placed on species reported from identified natural communities by the New Hampshire Natural Heritage Bureau and New Hampshire species protected under the federal Endangered Species Act.

Sincerely,

A handwritten signature in cursive script, appearing to read "Errol Briggs".

Errol Briggs

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LITERATURE







Lomholt, M.A., K. Tal, R. Metzler, and K. Joseph. 2008 Lévy strategies in intermittent search processes are advantageous. *Proc. Natl. Acad. Sci.* 105(32): 11055-11059.

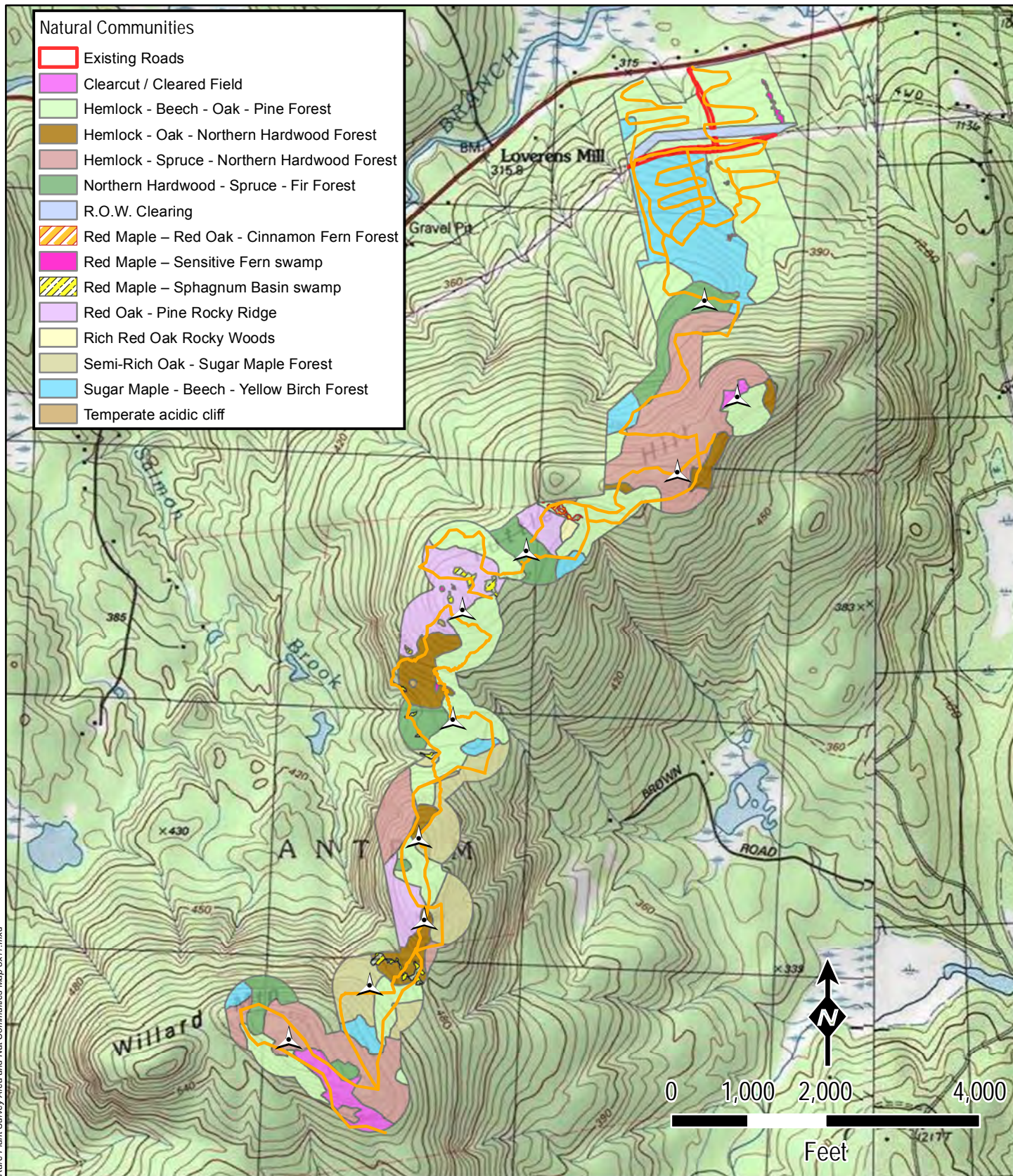
Magee, D.W., and H.E. Ahles. 1999. *Flora of the Northeast*. University of Massachusetts Press. Amherst.

New Hampshire Natural Heritage Bureau. 2008. *Rare Plant List for New Hampshire*. Division of Forests & Lands. Concord.

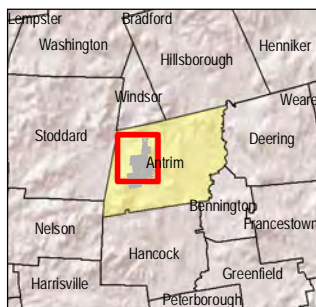
New Hampshire Natural Heritage Bureau. 2011. *Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns*. Division of Forests & Lands. Concord.

Natural Communities



-  Existing Roads
-  Clearcut / Cleared Field
-  Hemlock - Beech - Oak - Pine Forest
-  Hemlock - Oak - Northern Hardwood Forest
-  Hemlock - Spruce - Northern Hardwood Forest
-  Northern Hardwood - Spruce - Fir Forest
-  R.O.W. Clearing
-  Red Maple - Red Oak - Cinnamon Fern Forest
-  Red Maple - Sensitive Fern swamp
-  Red Maple - Sphagnum Basin swamp
-  Red Oak - Pine Rocky Ridge
-  Rich Red Oak Rocky Woods
-  Semi-Rich Oak - Sugar Maple Forest
-  Sugar Maple - Beech - Yellow Birch Forest
-  Temperate acidic cliff



S:\Projects\TRC\Augusta\Antrim Wind\par\Att 1 Rare Plant Survey Area and Nat Communities Map 8x11.mxd



Legend

-  Proposed WTG
-  Rare Plants Survey Area


Hillsboro and Stoddard 7.5-Minute USGS Topographic Quadrangles



ANTRIM WIND ENERGY PROJECT
ANTRIM, NH

Attachment 1

Rare Plant Survey Area and Natural Communities Map

Produced by: 

1/23/2012