STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7250

Amended Petition of Deerfield Wind, LLC for a certificate	)
of public good authorizing it to construct and operate 17 turbine,	)
34 to 35.7 MW wind generation facility, and associated transmission	)
and interconnection facilities, on approximately 80 acres in the	)
Green Mountain National Forest, located in Searsburg and	)
Readsboro, Vermont, with 7 turbines to be placed on the east side	)
of Route 8 on the same ridgeline as the existing GMP Searsburg	)
wind facility (Eastern Project Area), and 10 turbines along the	)
ridgeline to the west of Route 8 in the northwesterly orientation	)
(Western Project Area)	)

PREFILED REBUTTAL TESTIMONY OF JEFFREY PARSONS

ON BEHALF OF DEERFIELD WIND, LLC

July 3, 2008

Summary:

Jeff Parsons' rebuttal testimony responds to issues related to impacts on large mammals raised by William Kilpatrick (Save Vermont Ridgelines), Forrest Hammond (Agency of Natural Resources). Mr. Parsons also addresses the impact of the revised 15-turbine project on other wildlife.

Q. What is your name, occupation, and business address?

Response: My name is Jeffrey Parsons, I am a consulting ecologist and a principal in the firm Arrowwood Environmental, specializing in wetland and wildlife work, and my home office is in Lowell, Vermont.

Q. Have you previously prefiled testimony in this case?

Response: Yes I have.

Q. **What is the purpose of your rebuttal testimony?**

Response: The purpose of my rebuttal is to address issues raised by Mr. Forrest Hammond and Dr. William Kilpatrick relating to the impacts of the proposed Deerfield Wind Project and the Project's associated infrastructure on large mammals. I have also addressed the impact of the revised 15-turbine project on other wildlife.

Q. What materials have you reviewed in preparing your rebuttal testimony?

Response: I have reviewed the direct testimonies of Mr. Hammond and Dr. Kilpatrick, and several scientific studies relating to roads and bears, including Elowe and Dodge 1989 and Hogland and Mitchell 2007.

Q, Have you reviewed the revised 15 turbine Project layout and its potential impact on wildlife habitat?

Response: Yes, I have reviewed the new layout and I have conducted additional field work to evaluate the impacts of the new layout on wildlife habitat.

Q. Please describe the additional field work you undertook.

Response: I walked the entire length of the proposed 15-turbine layout as well as the proposed transmission line corridor. Subsequent to my last field review, a few additional minor changes were made to the Project layout in order to further reduce impacts to bear-scarred beech (BSB) habitat. Because of these last-minute changes there are a few small areas in the anticipated clearing limits for the Project that are slightly outside of my current survey limits. These areas are immediately adjacent to the areas I have surveyed thus far. Based on my general review of the resources in the surrounding area I do not expect any significant impacts in these limited areas. A confirmatory review of these locations will be conducted.

Q. Do you have any new exhibits?

Response: Yes. In response to comments from Mr. Hammond and Dr. Kilpatrick regarding the suggested lack of available bear habitat in the southern Vermont area, I have prepared a map that provides details on the extensive nature of potential bear habitat in and around the Project area. See ***Exhibit DFLD-JP-3.*** The map presents data from several difference sources of information on oak and beech habitat within 25km of the Project. It also shows information from the State on bear/vehicle collisions and bear crossings on major state highways in the Project area. The data sources and the relevance of the information presented on ***Exhibit DFLD-JP-3*** are discussed further below.

Q Do the revisions to the layout alter your original testimony that the Project will not have significant or undue adverse impacts on deer, moose, small mammals, or rare, threatened or endangered animal species (other than birds and bats)? Please explain.

Response. No. Although the revised layout may have marginally more impact on moose habitat, it is my opinion that such impacts are not significant and thus the revised layout will not result in undue adverse impacts to moose. Furthermore, given the reduction in the number of turbines and length of road, if anything I expect the impacts to other wildlife habitat should be less as compared with either the original 24 turbine scenario (January 2007) or the 17-turbine layout (July 2007).

Moose

Q. How, if at all, is the revised layout different from the previous proposal in terms of potential impacts to moose and moose habitat?

Response: My conclusions regarding the impacts to moose wintering habitat on the western turbine string remains the same. The moose habitat on the western side of Route 8 is of low quality and actual moose utilization of the mapped potential habitat is very limited.

The road and turbine layout on the east side of Route 8 has changed slightly. The new limits of clearing for Turbine #E1 leave a larger forested buffer uncut between the turbine and mapped moose habitat. The new uncut buffer is approximately 210-220 feet as opposed to the 75-85 buffer that was called for under the previous design. However, the new project design places the road within the

edge of the mapped moose habitat on the east side. If kept as currently designed, there would be some loss of moose wintering habitat. Deerfield Wind has informed me that they intend to make additional micro-siting efforts to adjust the location of the road in this area to avoid any potential impacts to moose to the extent feasible.

Q. According to Mr. Hammond's testimony, some level of displacement or disturbance to moose will occur during winter construction and the impacts during operation of the Project to wintering moose is unknown (Hammond pft at 7). How do you respond to these concerns?

Response: High quality moose wintering habitat is limited in extent within the proposed Deerfield expansion area. The highest quality moose wintering habitat is located near Turbine #1E. As currently designed, some impact to moose wintering habitat will occur. As noted above, however, Deerfield Wind intends to make additional micro-siting efforts to adjust the location of the road in this area.

Q. Is the habitat in the Project area necessary wildlife habitat for moose?

Response: First, the State has not identified any habitat for moose which rises to the level of "necessary wildlife habitat." With respect to moose habitat, there are certain habitats which are important, but there are no identified habitats which are decisive to the survival of the population of moose in the way that deer wintering yards have been recognized to be necessary for that species.

In this situation, the Project is located at the edge of some moose winter concentration areas. The road on the east side near Turbine #E1 impacts about 55-

60 feet of coniferous cover on the edge of the mapped habitat that has a consistent coniferous canopy that provides optimal cover for some moose during periods of deep snow. It is possible that the moose utilizing the habitat located to the east of the proposed Turbine #1E will be indirectly impacted in a relatively narrow band closest to the road.

If construction were to occur in winter, the result could be displacement of moose from the construction site. However, it is my opinion that in the post-construction phase i.e., during operation of the wind facility, moose will not be significantly displaced. The noise emitted from the facility will not be sharp or sudden in nature, the human imprint will be relatively minor, and moose will adapt to the turbines. The direct impacts from the road will be on the edge of the winter habitat and the center of the mapped moose habitat will remain undisturbed. As a result, in my opinion moose will continue to use this habitat in winter.

Q. Mr. Hammond states that the Project may need a post-construction study and forest management plan to address impacts on the moose population (Hammond pft at 7). How do you respond to this suggestion?

Response: I expect that moose will adapt to the sound of the turbines and to the very low project-related traffic volumes. Some additional browse may be created along the forest and turbine clearing interface, and just as moose come in to browse at winter logging operations, they may also come in to feed on browse created at the new edge habitat. I believe that they will adapt to the Project and displacement should be minimal. As discussed below, Deerfield Wind is willing to engage in some

post-operation management activities to address the Agency's specific concerns over snow banks, but in my opinion a broader forest management plan seems unnecessary from the perspective of moose management.

Q. Mr. Hammond suggests that Deerfield Wind create openings in snowbanks along access roads to allow free movement for wintering moose (Hammond pft at 7-8). Do you agree with his recommendation?

Response: I see no harm in proposing this measure. It may or may not be beneficial for moose in the area. I have no direct experience implementing such measures, and cannot conclude that it would have a specific benefit for moose near the site. It is my opinion that the Project will not pose any harm to moose in the area, irrespective of whether this measure is implemented, but Deerfield Wind has informed me that they are willing to incorporate this measure into their operational protocols.

Bear

Q. How, if at all, is the revised layout different from the previous proposal in terms of potential indirect impacts to bear and bear habitat?

Response: As described in more detail in Jeffrey Wallin's testimony, revisions to the Project were made to minimize and reduce impacts to bear-scarred beech habitat (BSB) in the Project area. The direct impact of the Project has been reduced from the original estimate of 643 BSB trees in the 24-turbine layout down to approximately 366 BSB trees in the current 15-turbine project. This represents approximately a 43% reduction in the direct impact of the Project. Based on Mr.

Wallin's random point sample estimates of the total amount of BSB in the surrounding area, this represents less than 1.4% of the BSB in the eight square miles around the Project.

The Project's potential indirect impact has also been reduced. The overall length of the turbine string on the western ridge has been reduced by approximately 32%. In addition, Deerfield Wind has committed to using a narrow track crane for turbine installation. As a result, the initial clearing limits for all of the ridge roads near bear habitat have been reduced from the originally expected 38 feet down to 22 feet.

Deerfield Wind has also committed to important limitations on site access that will reduce potential indirect impacts on bears, including gated roads to restrict access to the project roads. Deerfield Wind personnel will not be on-site during the nighttime hours and during the crepuscular periods that have been shown to be important periods for bear movement (one hour before and after sunrise and sunset), except in emergency situations and wildlife study periods.

Q Do the revisions to the Project layout alter your original conclusions with respect to the Project's potential indirect impacts to bear?

Response: No, as described above, the revisions to the layout have resulted in significant further reductions to direct impacts on BSB habitat, and have further reduced the potential for, and extent of, indirect impacts on bears.

Q. Mr. Hammond and Dr. Kilpatrick both express concerns about the Project's potential indirect impacts on bears. How do you respond to these concerns?

Response: The displacement of black bears is a function of the nature of the project itself as well as the bears' motivations and past experiences. As we've previously acknowledged it is impossible to know exactly how bears will respond to any particular activity. While it is possible that some bears will be displaced from the Project area, the available evidence indicates that bears can and will acclimate to the presence of the Project, although perhaps to varying degrees. Based upon the general design of the project and the activities associated with operation of the facility, we can make some reasonable assessments about how bear may respond and thereby address the possible impacts upon black bears.

The access road will be gated and access will be tightly controlled. The gravel-surfaced ridge-top access roads will be 22 feet in width during construction (rather than 38 feet, as noted above) and will be allowed to re-vegetate to a narrower width of 16 feet after construction.

The Project in the operational stage is expected to generate 1 to 4 cars per day on the access road. As discussed in more detail below, this level of vehicular traffic, in the vast majority of situations reported in the literature, has not acted as a barrier to bear movement.

The clearings necessary for the turbine construction will be about 270 feet x 380 feet, some of which will be allowed to re-vegetate with low-growing plants. The turbine blades themselves, in the operational phase, will be the only moving machinery (other than maintenance vehicles) located on the ridgeline. The spacing

of the clearings for the turbines is such that in long stretches along the ridgeline, the 16 foot roadway will be the only clearing on the ridge. Most of the wooded stretches between turbines will be almost 800 feet long, up to over 1400 feet long. Within these long wooded stretches there will be very few impacts to wildlife, primarily limited to the narrow 16-foot road, occasional maintenance vehicles, and noise from the turbines themselves.

The expected noise generated from the turbines themselves can be determined from the Deerfield Wind Turbines Sound Modeling Results prepared by Ken Kaliski. In general, the sound levels from the turbines will be 55 -60 dB(A) at the towers and within approximately 660 feet adjacent to the towers. This is considered at or below the sound level of normal speech (Bowles, 1995 *In* Knight and Gutzwiller). Beyond approximately 660 feet the sound levels drop to 50-55 dB(A) out to a distance of about 1155 feet. This is roughly the sound level of an idling passenger car and below the range of normal conversation. Overall, the sound that is generated by the turbines is not a sharp, crisp sound. Turbine noise does not start and stop rapidly like a person talking, is not an explosive sound, but instead is a repeating whir of the blades.

Responses of wildlife to noise are influenced by a number of factors including: the season, whether or not the animal is in the breeding stage of its life cycle, the animal's motivation for being in the habitat, the animal's past history of persecution by humans, and its prior associations and history with a particular noise. Noise from this project will be largely stationary (except for the few cars and

maintenance personnel present) and black bears are likely to come to this area to feed on beechnuts in fall and spring regardless of the noise.

Bears' strongest attraction to the ridgeline is the presence of food prior to winter dormancy and in the spring. Several studies indicate that deterring animals from important food sources in very hard to accomplish. Bowles (1995) states that "Motivation to find food can make animals tolerant of noise." In fact, Reynolds et al (2007) reported that adult females bears increased their use of areas near paved roads as hard mast productivity increased and males increased their use near gravel roads as hard mast productivity increased (pg. 1058). During the summer in Arkansas, bears showed an affinity to edge habitats such as roads where soft mast was abundant (Smith 1985). Garner (1986) also found fire roads in the Shenandoah N. P. were utilized by female bears during the summer and early fall for the soft mast along these roads. "Every review of the literature on pest control has concluded that one cannot drive animals away from attractive sites with noise over the long run." (pg 127). Bowles (1995) also states that motivations such as hunger that keep animals from paying attention to noise lessen its aversiveness. Bowles goes on to say that studies illustrate that "[i]f mammals are exposed to the same noisy stimulus without harassment, responses decline rapidly" (pg. 133).

It is unlikely that black bears in the region have associated any strongly negative responses to the existing Searsburg turbines, which are adjacent to the proposed Deerfield project. It is always possible that a bear will avoid or has avoided approaching the existing turbine area due to the presence of a maintenance vehicle, a group of people, or perhaps an aversion to crossing the turbine string and clearing

during the daylight hours. This type of minor exposure may cause some temporary avoidance of similar sounds and places but is unlikely to result in a wide displacement of bears in the long-term, especially in years of high mast production. The presence of sought-after food combined with only a mild negative association typical of wind turbine disturbances (from the noise or a person, or relatively slow moving vehicle) suggests bears will continue to seek the food resources near the turbine string.

The movement of the turbine blades themselves may give reason to pause for some bears but with no strong negative reinforcement, many if not most bears will likely habituate to their movements. There will be space between the turbines where the movement of the blades will be hardly noticeable and times when one or more of the turbines are not spinning at all. Because of the nature of the tree canopy there are locations along the string where the turbine blade movements may not be visible at all to bears (those locations with turbines 800 feet apart). Black bears have poor eyesight and tend to walk with their heads and eyes pointed downwards. It is possible that some bears, perhaps the most sensitive of the bears that visit the region near the turbines, could become more nocturnal in their habits when approaching this site, or approach the area when the turbines are not spinning or are spinning very little.

Although not all bears will acclimate to the Project to the same degree, it is likely that some bears will come in close to feed on beech and other foods much as they have at the existing turbines at the Searsburg facility, as Jeff Wallin has recently

documented (see ***Exhibit DFLD-JW-10a***). For some bears, this acclimation period may take longer than for others.

Q. Mr. Hammond testifies that the Project may displace bears for a distance of ¼ mile from the Project area (Hammond pft at 13-14). Do you agree?

Response: No I do not, based upon the relevant factors and the degree to which the Project has been designed to minimize the displacement effect on black bears.

On page 81 of Mr. Hammond's report "The Effects of Resort and Residential Development on Black Bears in Vermont", he states that the avoidance of roads and houses by bears to varying degrees depended upon their proximity to preferred food sources, and on the particular human activity associated with the individual development. As noted above, human activity at this Project will be greatly controlled. This will most likely serve to limit any interactions between people and bears, especially negative interactions, and between bears and the personnel at the facility. Furthermore, at Deerfield the presence of a preferred food, beechnuts, provides the motivation for black bears to continue to use this spring and fall feeding habitat. This is precisely what Mr. Wallin has documented by investigating the use of American beech trees by black bear in the vicinity of the existing Searsburg wind facility. Mr. Wallin has located over 185 bear scarred beech trees within one quarter mile of the existing turbine string at Searsburg. Mr. Wallin has also found several scarred trees within one eight of a mile of the turbine string in an area where, for the most part, beech trees were not concentrated. Mr. Wallin has also documented black bears within 300 feet of the existing turbines using remote

cameras and barbed wire fence. The use of beech trees and presence of fresh BSB marks attest to the fact that some bears (the number of is not known) have continued to use the area well within ¼ mile of the Searsburg turbines after the wind turbines were constructed and operational. I expect the same will be true for the Deerfield Project.

Q. Mr. Hammond testifies that roads may lead to increased habitat fragmentation because they may create a "partial barrier effect" which limits black bear population movements (Hammond pft at 19). Do you share this concern?

Response: No, I don't. In my opinion the low traffic levels on the proposed roads will not impose a barrier to bear travel, and will not fragment the large block of habitat available in the area around this project.

The vast majority of research conducted on roads and black bear behavior conclude that gated, dirt roads with low traffic volume are not likely to act as much of a barrier, if any, to the movement of black bears. Many experts have found that relatively low traffic volumes are not barriers to most bear movements. On pg. 20 of his prefiled testimony, Mr. Hammond cites Clark et. al. (1993); Garner (1986); and Reynolds-Hogland and Mitchell (2007) to support his conclusion that roads with relatively low traffic volumes are avoided by black bears. In Clark et al. (1993) the road classes and traffic volumes were not reported in the study. While the authors found that habitats within 200 meters of roads were utilized less than expected by black bears, their telemetry data was only accurate to within 159 m of the actual location 50% of the time (pg. 522).

Even more relevant to this Project is the finding by Reynolds-Hogland and Mitchell (2007) that black bears in their study neither preferred nor avoided areas near gated roads at all distances that were investigated (pg. 1055). In fact they found that during the fall season as hard mast availability increased, use of these habitats by bears also increased (pg. 1055). Furthermore the authors suggest that during the summer and fall months, bear avoidance of habitats near gravel roads may be related to the use of these areas by recreational users. Apparently bicycle riders, horse-back riders, hikers, campers and others utilized the study area roads to access recreational activities. Hunters in pursuit of other legal game animals also may have affected bears use of these areas, especially in fall.

Studies conducted in Florida did not find a barrier effect of a paved road with traffic counts as high as 6000-12000 vehicles per day (McCown and Eason 2001), as bears readily crossed such a highway. In contrast, Mr. Hammond suggests in Vermont that roads with average daily traffic counts of about 1400 vehicles per day may represent a barrier to bear movement. Hammond (2002). Yet Mr. Hammond also reports that bears crossed these heavily traveled roads during times of food scarcity (pg. 69). Coady (2001), Hellgren (1988), and Seibert (1989) all report the use of bears on low traffic roads and Coady (2001), Miller (1975), and Brody and Pelton (1989) suggest that bear willingness to approach and cross roads goes up as traffic levels decrease. In West Virginia, Miller (1975) found no avoidance of habitats adjacent to gated roads. In Virginia, Garner (1986) found that female black bears utilized fire roads (presumably roads with controlled access or gates) during the summer and early fall months. In Louisiana, low traffic roads were

neither avoided nor preferred by black bears (Hightower 2001). In North Carolina, Brandenburg (1996) found that bears cross roads more readily as traffic levels decrease.

Not all investigations of bear response to roads has shown that bears become habituated to gravel roads, but most suggest that controlling access with a gate and lock does mitigate some, if not all, of the avoidance behavior of bears near roads. Often the main negative modifying factor on low traffic roads is the presence of bear hunters particularly those with bear dogs. Beringer et. al. (1990) suggest that dirt roads in areas where hunting is allowed, are more of a problem due to the access they provide to hunters than because of the fact that a road is present. They go on to recommend gating and locking access across new roads. In Montana, New York, North Carolina, and California road closures and gating has been suggested as a way to mitigate the negative effects of roads on bear and their utilization of habitats near roads (Kasworm and Manley (1990), Brocke et al. 1988, Beringer et al. 1990, and Kelleyhouse (1980).

There is some evidence that bears seek out road side habitats for the diversity of food plants available there. Seibert (1989), Hammond (2002), Carr and Pelton (1984), Hellgren (1988), Brody and Pelton (1987), all suggest that the development of plants with soft mast (such as raspberries and blackberries) may draw feeding bears to roads (road sides) in the summer. These same low traffic volume roads are often used as travel routes by black bears.

Q. Mr. Hammond testifies that his Stratton Mountain study established that bears prefer feeding on beechnuts within stands that are located more than 1 kilometer from roads. (Hammond pft at 20). Is that study relevant to conditions at the proposed Project?

Response: I do not believe the findings of Mr. Hammond's limited study on the use of beech stands near heavily traveled roads and areas of intensive human activity is applicable to the current situation. There is no information provided in Mr. Hammond's study, or the underlying work by Mr. Wolfson, about whether or not any of the beech stands they evaluated were near gated or controlled access roads with low traffic volumes, such as the proposed Project. In addition, the projected potential impacts of the Project are dramatically different than the impacts at large ski resorts in Vermont. The Deerfield Wind Project will have very limited traffic volumes on the access roads and a low level of human activity near the turbines. Wolfson's work did not address gated low traffic volume roads; in fact, his roads all had traffic volumes of > 100 cars/day during fall months.

Wolfson's work also did not pick beech stands randomly. On page 129 of the Proceedings: 11th Eastern Black Bear Workshop, Wolfson states that "... one of the first things we did was to go to high elevation areas." He is referring to how he located the 21 beech stands that were analyzed in his study. He suspected that these stands were there because the rough terrain and difficult access meant that they were left by loggers. The study sites in Wolfson's investigation were previously identified by the state and other parties. This could represent a bias in Wolfson's work.

The Deerfield Wind Project is entirely unlike the development activities considered by Mr. Hammond and Mr. Wolfson. Unlike housing developments, the proposed projects will not include high levels of human activity and other associated intrusions, such as pets and loud, inconsistent and unpredictable noises. Therefore, the application of the findings from those studies is of limited value to predict the impacts of this project. Once it is operational,[1] the Deerfield Wind Project will not be an area of concentrated human activity. Deerfield Wind has agreed to gate the access road, and will limit activity on the project site during the night hours and the early morning/late evening crepuscular periods. Access to the turbine strings by maintenance personnel will be limited. Long stretches of the unpaved access road will be without turbine clearings and will for the most part remain wild. If certain black bears for one reason or another become sensitized to wind turbines, their sound, or their blade movements, they may come in and feed at night when they feel more secure, stay in between turbines and feed, feed on beechnuts near the turbine string only when the turbines are not spinning, or feed only a comfortable distance away from the actual turbines. Different individual bears will react to the turbines in different ways.

Q. Mr. Hammond cites a study of bear movement in the Pisgah National Forest for the proposition that bears may avoid areas with 800 meters of gravel roads because of bear hunters' use of the gravel roads (Hammond pft at 21 citing

[1] The construction of projects, whether housing or ski area development, was not the focus of the cited studies.

Reynolds-Hogland and Mitchell (2007)). Is that study relevant to conditions at the proposed Project?

Response: As discussed above, gated roads and associated habitats were not avoided in the various studies at Pisgah. The proposed access road at the Deerfield Wind Project would be gated and access would be carefully controlled. In fact, Beringer, Seibert and Pelton (1990), also working in Pisgah National Forest, found no effect on the movement of bears by roads that had up to 100 vehicle trips per day. They concluded that any avoidance of habitat due to hunting on these open gravel roads can be mitigated by locking the gates and controlling access to these roads. This is exactly what is planned for the Deerfield Wind Project.

Seibert (1989), Hammond (2002), Carr and Pelton (1984), Hellgren (1988), Brody and Pelton (1987), all suggest that the growth of plants with soft mast along roads (such as raspberries and blackberries) may draw bears to roads in the summer. The Deerfield Wind Project will not result in wide roads with a lot of sun, but in some local areas such as at the edge of turbine clearing, some shade-intolerant shrubs and forbs could develop.

Q. Mr. Hammond testifies that the work Mr. Wallin has done on the existing Searsburg site is not directly applicable to the current Project because the prior work looked only at black bear movements, not use of concentrated bear-scarred beech habitat (Hammond pft at 22). Do you agree?

Response: I disagree with Mr. Hammond's conclusion. Mr. Wallin's initial snag work and camera work is relevant to some of the concerns Mr. Hammond and Mr.

Kilpatrick have raised regarding indirect impacts and fragmentation of habitat. Mr. Wallin has also provided additional data which shows extensive use of concentrated BSB habitat since the building of the Searsburg project. See ***Exhibit DFLD-JW-10a***. He has also further documented bears traveling across the Searsburg turbine string. See ***Exhibit DFLD-JW-10b.*** Together, this information paints a clear picture that some bears are continuing to utilize the habitat immediately adjacent to the existing Searsburg facility.

Q. According to Mr. Hammond, restricting human access to the Project site is an important factor in limiting the indirect impacts on black bears (Hammond pft at 23). Do you agree?

Response: Yes, I agree with this factor. I believe that by carefully restricting and limiting access to the turbine string the indirect negative impacts from the Project can be minimized. Limiting and controlling human and vehicular access is a critical component within the process of controlling potential indirect impacts associated with the Deerfield Wind Project.

Q. Mr. Hammond and Dr. Kilpatrick refer to the Elowe and Dodge (1989) study from western Massachusetts titled "Factors Affecting Black Bear Reproductive Success and Cub Survival" Did you read that study ?

Response: Yes I did.

Q. Do you have any comments on the Elowe and Dodge study in relation to the proposed Deerfield Wind Project?

Response: Yes I do. I think that there are two results of that work that are likely relevant to Deerfield. It appears that the study area for the Elowe and Dodge work is an area south of the Deerfield area in Massachusetts, so it is relatively close to the Deerfield project area. First, the major mast crops in that study included oak, beech, choke cherry, and black cherry. All four of these species are found in the region around the proposed Project, although in the immediate project area it appears that the cherry species are limited in extent. In the Massachusetts study, mast and other foods were utilized when available and it was the combination of these various hard and soft mast food sources that were found to be important to the black bear. As discussed above, beech was most heavily utilized when other mast crops were gone or not available at all. Again, all of these foods, as well as mountain ash, apple trees and berry-producing shrubs are available in the broader Deerfield project area in varying proportions. Elowe and Dodge (1989) report that February weights of bears that ate herbaceous fall foods were lower than weights of the same bears that had access to mast crops (pg. 964). These figures include high carbohydrate mast crops such as black and choke cherry as well as fat-rich oak and beech mast. Thus not only fatty mast species but also soft mast producing species were important foods in Massachusetts. This suggests that bears in that study area have learned not to depend upon just one mast species but have adopted a strategy that makes sense in light of the fact that mast production by different species is spotty year to year.

Q. How is this relevant to the Deerfield Wind Project?

Response: The results of Elowe and Dodge (1989) illustrate that black bear in this region take advantage of several available high carbohydrate content and high fat content food resources, likely because mast crops are cyclical and can be very undependable from year to year. Black bear, as evidenced at the Massachusetts study area (located near the Deerfield Wind Project) may not be so dependent upon a single food source as has been suggested by Mr. Hammond and Dr. Kilpatrick. As one might expect, black bears are opportunistic mast feeders that take advantage of heavy soft and hard mast production when and where they become available.

Q. Are there other relevant issues suggested by the Elowe and Dodge (1989) study ?

Response: Yes there are. Hammond in his prefiled direct testimony (pg 8, ln 19) characterizes Elowe and Dodge (1989) as stating that "the availability of hard mast in the fall affects the minimum reproductive age of bears, productivity rates as well as cub survival." I could not locate that conclusion or statement in the Elowe and Dodge report. In fact, the authors state that "… in our study, the 2 years of highest cub mortality (9 of 14 and 8 of 12) followed years of very abundant mast and high cub availability. Lowest cub mortality (1 of 6) followed a year when mast crops failed and only females feeding in corn produced crops" (pg 967). Also, Mr. Hammond (pg 8, ln 21) claims that "Only acorns and beech nuts provide the fat and high carbohydrate diet that the bears need for putting on the fat reserves that improve survival and reproduction." Elowe and Dodge (1989) found otherwise,

stating that the carbohydrate level found in beech nuts is the lowest of all the major foods eaten by bear in their study and cubs were produced in years that corn, red oak, and cherry were available as well as beech (page 965).

Q. Mr. Hammond testifies that beech nuts are a more important food source in southern Vermont than in other areas of Vermont because fewer alternative foods available to them (Hammond pft at 11). Do you agree?

Response: The available evidence suggests that other food sources may be as important as beech. Elowe and Dodge(1989), working not far south of the Deerfield project area in western Massachusetts, found that oak mast crops were important and black cherry and choke cherry crops were selected above all other food sources in their study area. They also found that bears in their study area began extensively feeding on beech nuts only after the cherries were gone or the trees failed to produce (pg. 963). It is very possible that the western Massachusetts black bears move between Vermont (perhaps north to the Route 9 area) and northern western Massachusetts. In the Deerfield area, there are no major roads or habitat discontinuities between Massachusetts and Vermont. If true, this means that some southern Vermont bears could have access to oak south in Massachusetts. Vermont's hard mast survey states the highest oak mast concentrations (over 80-90% of white and red oak) in Vermont are concentrated in the southern counties (including Windham county where the Project is located). Bears near the Deerfield project area likely have to travel to lower elevations to find oak and other masting species, but they readily do this, as long-range forays out of an individual bear's home range are

reported throughout much of the black bear's range. Mr. Hammond reported such behavior in Vermont (Hammond 2002).

The mesic red oak northern-hardwood forest natural community occurs scattered throughout southern Vermont at elevations below 2500 feet (Thompson and Sorreson, 2000). The lowest elevations near the Project area are to the east near Harriman Reservoir, to the west in Woodford, and to the south in Readsboro, Stamford, and in northwestern Massachusetts. Elevations in these towns range as low as 1400 feet, so occurrences of this natural community containing red oak are likely. In fact, the majority of the forest in the region surrounding the Deerfield Project is under 2500 feet. Perhaps the most likely places to find oak in the region are on south and west-facing slopes and in warm-microclimates such as near Harriman Reservoir (the largest body of water bound only by Vermont lands) as well as in certain soil types. Black bears venture out of their home ranges to find available mast when local mast crops are not available and it is very likely that oak mast crops can be found in the vicinity of the Deerfield Wind Project without bears having to cross major highways. Also some of the bear that utilize this region may also use habitat south in Massachusetts where both oak and corn fields are present.

Q. Are oak trees and oak-dominated forest communities located in southern Vermont or western Massachusetts near the Project area?

Response: Yes, they are. A number of oak stands have been identified in southern Vermont and northern Massachusetts. My partner at Arrowwood Environmental, Michael Lew-Smith, has undertaken a preliminary process of remotely mapping

forest areas where oak are present. His methodology for identifying these stands is described in his rebuttal testimony. Mr. Lew-Smith identified oak trees within the forest canopy within 2 distance classes: 1) 27.5 kilometers from the Deerfield Wind Project; and 2) 14.5 kilometers from the project site. These stands are within the distances that Mr. Hammond reports observing female black bears traveling in search of food in years of beech mast crop shortages Hammond (2002). Mr. Lew-Smith has identified stands where oak are present as a forest canopy species and several additional stands where oak is dominant in the forest canopy within these distances. Mr. Lew-Smith preliminarily identified over 7800 acres of oak-dominated and oak within the forest canopy forest communities within the 27.5 kilometer radius of the Deerfield Wind Project. In the area bounded by Route 9 in the north, Bennington to the west, and to Route 2 (MA) and North Adams to the south, nine forest communities or stands where either oak was present or was dominant were located, totaling over 5600 acres. The oak or mixed oak forest stands are located near and north of North Adams, Massachusetts, and in Pownal and Woodford, Vermont. The oak and acorn resource from these forests are accessible to black bears in the Deerfield Wind Project area without bears having to cross major roads or having to enter or cross large developed or agricultural landscapes.

Q. What is the relevance of this amount of oak in the vicinity of the Project?

Response: There is a considerable probability, one that is accepted by both Mr. Hammond and Mr. Kilpatrick, that some of Vermont's black bears south of Route 9 venture south into Massachusetts. It is also likely that these same or other bears near

the proposed Deerfield Wind Project venture west into Woodford and Stamford Vermont. The oak resource found there, as well as other foods such as cherry, apples, and corn crops, are accessible to bears in the Deerfield Project area, and are likely sought-after foods in years of beech mast crop failure. Hammond (2002) found that most female bears in the Stratton study abandoned their home ranges and took "extended sallies" beyond their normal home ranges during years of summer (late) and fall mast food shortages (pg. 36). The oak in the 5600 acres of forest inventoried by Mr. Lew-Smith provides acorns that black bears can feed upon in years of beech mast failure within the region. There are six oak-dominated forest stands located near the Yankee Rowe Nuclear Power Station in western Massachusetts that comprise a large alternative fall mast crop about 16-20 kilometers south of the Deerfield Wind Project. An over 2000 acre forest stand dominated by oak (or likely dominated by oak) is located about 20 kilometers south of the Deerfield Wind Project just north of North Adams, MA, is also accessible to some bears in the vicinity of the Deerfield Wind Project. Mr. Hammond's work at Stratton estimated female travel distances outside of home ranges averaged 14.5 kilometers distant to find alternative food when beech crops failed. He is referring to the edge of female home ranges and some unknown number of female bears in the vicinity of the Deerfield Wind Project may already have home ranges extending well to the south of the actual wind project footprint and could readily access these southern oak stands. Male bears regularly travel distances at least as far as these southern and western oak stands that have been preliminarily identified in Vermont and Massachusetts.

Q. How does the average distance that female bears travel during the years of mast failure in this region of Vermont compare to bears in other areas of the Northeast?

Response: In Maine and Massachusetts female black bears have been reported to travel widely in search of seasonally abundant food sources. Radio-collared female bears have been observed traveling up to 48 km to areas of raspberry and beechnut abundance and males up to80 km (Mc Laughlin et al. 1986). These distances are greater than the average distance reported by Mr. Hammond in Vermont (14.5km). While physical barriers could play a role, the difference may also suggests that female bears in Vermont do not need to travel as far to find requisite concentrated food resources, including alternative food sources – be they apples, corn, oak, or some other food sources – during beech mast failures.

Q. Is American Beech common in the region surrounding the Project area?

Response: Yes it is. American beech is found throughout the region in great quantities.

Q. What information is available on the quantity of beech in the surrounding region?

Response: There are several general sources of information, many of which have been cited by Jeff Wallin in his testimony. There is also very specific information maintained by the U.S Forest Service for land in the Green Mountain National

Forest. The U.S. Forest Service keeps information on forest types, including the relative percentages of certain trees, including beech.

Q. Have you obtained specific information on the forest types for the Green Mountain National Forest in southern Vermont and if so, what does it indicate?

Response: Yes, we have obtained GIS data from the Forest Service displaying information about forest types surrounding the Project. The available information clearly demonstrates that the forests within the Green Mountain National Forest in this region contain a significant beech component. In fact, within a 14.5 km radius of the Deerfield Wind Project area the USFS reports that 56,829 acres of forest have at least 20% beech (by basal area). Throughout much of this forest, up to 50% of the basal area may consist of beech. The US Forest Service has also reported 71 forest stands of varying sizes in which bear-scarred beech were noted in the notes of foresters. The presence of beech trees on private lands undoubtedly occurs in southern Vermont and this region as well.

Q. Have you prepared any exhibits to indicate the extent of bear habitat in the surrounding region?

Response: Yes. We have combined data from the U.S. Forest Service on beech trees, together with data collected by Mr. Lew-Smith on oak stands, and data from the State on significant bear habitat features (including bear-scarred beech stands, wetlands, and bear crossing/collision data) to prepare a map on potential bear habitat in the region. The map is attached as ***Exhibit DFLD-JP-3***.

This map was prepared in response to Dr. Kilpatrick's and Mr. Hammond's suggestion that there are limited hard mast resources for bears in the southern Vermont region of Vermont. We believe the map actually indicates the exact opposite. First, there is a very large component of beech in the area surrounding the Project. We only have specific information on National Forest Service Land, but the data that is available shows that beech is a dominant species on National Forest Service land in the region. That fact is confirmed by Mr. Wallin's survey of the eight-square mile area around the Project (previously discussed in his prefiled direct testimony). In addition to the general availability of beech, the data also indicates a large number of stands which have been specifically identified as bear scarred beech stands. The State keeps track of known bear scarred beech stands in a GIS database, and we have projected the available information on identified stands in the area on ***Exhibit DFLD-JP-3***. This information shows a concentration of bear scarred beech, particularly on National Forest Service land, which is confirmed by the U.S. Forest Service's own documentation of 71 bear scarred beech stands of varying sizes in the area.

In addition to this information on beech, we have also projected the data on oak stands in the region complied by Mr. Lew-Smith. As noted above, his investigation indicates that there is over 5600 acres of oak stands in the area generally bounded by Route 9 on the north, Route 7 on the west, and Route 2 (in Massachusetts) to the south. The U.S. Forest Service also has some data on oak on U.S. Forest Service land, which has been included on the map.

The map also includes two circles, one which indicates the area within 14.5 km of the Project, and another which indicates the area within 27.5 km. We have also included information on bear vehicle collisions and bear road crossings maintained by the State for the southern Vermont region. This information demonstrates the general movement of some bears in this region between the major habitat features on the map.

As is evident from the map, there is no shortage of available bear habitat in this region of Vermont. That fact is confirmed by Mr. Hammond's recognition in the Stratton study that bear harvest numbers from this region "have been consistently high without large fluctuations in the age structure that might indicate problems with recruitment or harvest levels that are unsustainable" (Hammond 2002).

Q. Have you reviewed Dr. Kilpatrick's prefiled testimony in this case ?

Response: Yes I did.

Q. He asserts that your literature review did not identify certain studies he believes are relevant to the current Project's impact on bears. How do you respond to this assertion?

Response: I disagree with Dr. Kilpatrick's characterization of my literature review. Dr. Kilpatrick refers to the work of Adams and Geist (1981), and to Forman and Alexander (1998) and to the fact that I failed to indicate that I was aware of these works. In my literature review, I obtained and reviewed several dozen additional

studies that were not specifically referenced or mentioned in my report (including the two mentioned above). The studies that were not included I found to be outdated, not directly relevant to my inquiry, or redundant as they were reviews of studies for which I had the original.

Furthermore, Dr. Kilpatrick, of course, conducted his own literature review several years after mine was completed, and new work would be published or newly indexed or cross-indexed and made available through a more recent literature review. He has not however specifically identified any other new studies which I should have located or discussed.

Q. Does this conclude your testimony at this time?

Response. Yes, it does.

Additional Literature Cited

T. R. Smith. 1985. Ecology of black bears in a bottomland hardwood forest in Arkansas. Ph.D. Thesis, Univ. of Tennessee, Knoxville. 209 pp.