

**DIRECT TESTIMONY OF DR. JOHN PAGELS  
HIGHLAND CITIZENS  
VIRGINIA STATE CORPORATION COMMISSION  
CASE NO. PUE-2005-00101**

Q. Please state your name.

A. John F. Pagels

Q. What is your present occupation?

A. I am a Professor of Biology at Virginia Commonwealth University where I am also Director of the Graduate Program in Biology

Q. What is your education?

A. I obtained a Bachelor of Science degree at Central Michigan University and a Masters and Ph.D. at Tulane University

Q. What is your experience with studying the Northern Flying Squirrel?

A. I have been studying Virginia mammals including the Northern Flying Squirrel ("NFS") for more than 35 years. Exclusive of numerous technical reports to agencies and many popular articles in Virginia Wildlife Magazine, I have authored or coauthored more than 70 scientific publications. Some of those publications deal directly with the NFS and are necessarily cited herein. My study area has included nearly all portions of the Commonwealth and nearby, and has stressed small, non-game species, with special attention to selected shrew and rodent species. In recent years, my research and that of my students has concentrated in the mountainous region of the Commonwealth, notably in Mt. Rogers and Whitetop Mountain areas in the southwest (and see Hackett and Pagels 2003), and Bath and Highland counties to the west. Much of the work has been directed towards relict, boreal species (such as the NFS), many of which are isolated on mountain tops or ridges because only these areas provide the necessary Canadian-type habitat necessary for these species. I had the good fortune to be the first person to collect the southern water shrew and the rock vole in Virginia; both are now considered Virginia endangered species, and I am one of the relatively few people to have ever collected in Virginia the primary subject of this testimony, the federally endangered NFS. Finally, since its inception, I have been an adjunct member of the northern flying squirrel recovery team (USFWS 1990). I have attached a copy of my curriculum vitae as Attachment A.

Q. Are you familiar with Highland New Wind Development's proposed wind turbine project in Highland County, Virginia?

A. Yes, I am. Because of its unique physical characteristics Highland County contains a rich and diverse animal population. Over the last 25 years I have made countless trips to Highland County and have even conducted trapping and nest box studies on the proposed project site.

Q. Have you ever captured the NFS on or near the proposed project site in Highland County?

A. Based on my field notes I can provide the following details about captures of the northern flying squirrel on the McBride property: Just east and north of large bend in Hwy 250, and just east and north of intersection of route 601 and 250. Nest boxes (5) placed on 18 April 1986 and checked approximately four times a year until 20 May 1996. In those years a total of 13 individual northern flying squirrels were captured, 3 on 14 December 1987, 4 on 18 December 1990, three on 14 February 1992, and three on 31 January 1996. At the same site, I captured a total of 10 southern flying squirrels during those years, two on 10 October 1986, four on 19 December 1986, and four on 11 May 1989. I sometimes was accompanied by family or students to assist me in my box checks. As evidenced on my field data sheet, on 18 December 1990 I was accompanied by graduate students Kristen Uthus (now Ph.D.) and Sandra Erdle (now M.S., formerly with Virginia Natural Heritage Program, and now with Virginia Institute of Marine science), a day when four northern flying squirrels were captured. Some of the aforementioned 13 squirrels were recaptured on other dates, including one on 22 March 1991—that included in my field notes, “box on dead spruce on edge of pasture!” Obviously the squirrels were not bothered by the fact that a field was next to their habitat. And importantly, there is no doubt that the squirrel occurred and very likely still occurs in the environs of the project site. Considering that the NFS is known to have numerous alternate nesting sites (sometimes more than 30), it is remarkable that so many NFS were captured on the McBride property in only five nest boxes.

Q. Have any other endangered mammals been captured on the project property?

A. The northern flying squirrel was not the only very rare mammal collected on the McBride property. Pagels et al. (1994) acknowledge the McBrides for use of their property for a study of the masked shrew (*Sorex cinereus*), an associate of the northern water shrew (*Sorex palustris*), a Virginia state endangered species. The latter has also been captured on the McBride property. However, in a report on the distribution and habitat of the water shrew in Virginia (known only from 5 sites including the McBride property), Pagels et al. (1994) noted certain habitat data from the (McBride) site could not be included in the study because a portion of the riparian zone had been timbered between the time the shrew was captured and the time the habitat analysis was conducted.

Q. Have you had a chance to review the study by Edwin Micahael entitled *The Northern Flying Squirrel Survey at site of Proposed New Highland Wind Development Site, Highland County, Virginia* submitted by Highland New Wind Development?

A. Yes.

Q. What is your critique of the study?

In my professional opinion, the sampling effort that was done was insufficient to yield scientifically reliable results. In particular, I don't believe the sampling effort was great enough. For a project of the magnitude of the proposed wind power project that could have long-term impacts on the area, sampling effort, 10 nights (two 5-day 100 trapnight sessions) and a total of 1000 trapnights was low. Early on (2<sup>nd</sup> P, p 2) Dr. Michael noted that in West Virginia, the northern flying squirrel is relatively abundant. The potential wind turbine site is in Virginia. There is nothing to suggest that it is relatively abundant in Virginia—indeed, the endangered species is apparently is very rare, much more so than in West Virginia. Potential Virginia sites for the northern flying squirrel are very few and far between in Virginia—making the McBride site and nearby localized habitat very critical.

Even in areas where there are known populations of the northern flying squirrel, trapping success is often very low, including at Stuarts Knob, West Virginia, where Stihler et al. (1987) reported one capture in 127 trap-nights. Suggestive of both the sampling effort and sampling sessions that may be required, Weigl (1968) captured one animal per 80 trapnights in an area with a known population, but noted his records included several week-long sessions without any captures. It is well known among researchers of the northern flying squirrel that it is sometimes not detectable for certain periods after it has been captured at a certain site, and then may be captured again much later. It is not known whether the squirrel abandons certain areas for awhile—e.g. months or years, or if individuals were present but did not enter traps during monitoring efforts (see "Difficulties of Present and Future Research" 11<sup>th</sup> P, p 2, USFWS 1990).

Q. Did you have any other opinions concerning Dr Michael's survey?

Yes. I also believe that the survey did not appropriately sample the various areas of potential habitat in and around the site. Although Michael indicated that he sampled "throughout the project area: 23 in grazed woodlots adjacent to ridge top pastures and 77 in forests adjacent to the pastures" (4<sup>th</sup> P, p 2), it is impossible to know from either the table or the map the kind of habitat in which he actually trapped as per forest type/trees present/dominant. There are various islands of suitable habitat adjacent to the pastures, just as there are other areas of habitat generally construed as unsuitable (although the squirrels could/would move through such areas at times). If the sampling effort included only 1000 TN, and if many of the sites were, for example, hardwood only sites, the effort in likely habitat (see suitable habitat below, and sampling effort above), where the NFS might occur, would be 1000 TN minus the hardwood only sites.

Q. Do you agree with Michael's description of suitable habitat for the NFS?

A. No. In his introductory comments (2<sup>nd</sup> P, P 2), Michael referred to the U.S. Fish and Wildlife Service 1990 recovery plan and reported that "Potential habitat with high

suitability rating is defined as a conifer stand characterized by the following: (1) dominant canopy trees of red spruce (*Picea rubens*), Norway spruce (*Picea abies*), eastern hemlock (*Tsuga Canadensis*), or balsam fir (*Abies balsamea*), (2) numerous mature conifer trees (>10" dbh) that reach into the canopy, (3) numerous yellow birch (*Betula alleghaniensis*), (4) a stand size greater than 1 acre, and (5) the conifer stand not separated from other conifer stands of potential habitat by more than 0.5 miles." The above is apparently an attempt at summarizing some of the guidelines for habitat identification and management in private and public lands that were provided in Appendix A of the 1990 USFWS Recovery Plan.

However, as a result of 10 plus years of work on the northern flying squirrel by various researchers (including myself) in universities and state and federal agencies, guidelines for habitat identification of the "West Virginia northern flying squirrel" (*G. s. fuscus*) were modified from the 1990 Plan. The more recent guidelines are presented in the Amendment to Appendix A, Guidelines for Habitat Identification and Management for *Glaucomys sabrinus fuscus* (USFWS 2001). Although related largely to public lands, the spirit of the guidelines also apply elsewhere. One of the goals of the new guidelines is to protect suitable habitat, even if the squirrel is not presently known to occur at a given site. This relates to the burden of proof not being placed on the successful location of the squirrel with traps or nest boxes, and the aforementioned difficulty in trapping this endangered species (and see above "Difficulties of Present and Future Research" 11<sup>th</sup> P, p 2, USFWS 1990).

Secondly, the amended guidelines note that preferred habitat is basically as stated in the Recovery Plan, with exceptions relating to elevation guidelines, the conifer component, and spatial distribution of the habitat components. The amendment notes that many of the captures of the squirrel occur in transitional zones between northern hardwood forests and montane boreal forests, that this zone occurs at elevations of ranging from approximately 2,600 to 4,600 feet, and is "typified by a mixed and highly variable overstory species composition of American beech, yellow birch, black cherry, sugar maple, red spruce and eastern hemlock." All of these trees variously occur in selected forested areas of the project area. In decreasing order of abundance, tree species present at the site where (and in the years when) the northern flying squirrel was collected on the McBride property were red spruce, red maple, American beech, yellow and black birch, eastern hemlock, black cherry, and service berry (Pagels et al. 1994). Similarly, trees present at a Tamarack site, also on the McBride property, and where no northern flying squirrel was captured were red spruce, red maple, American beech, black birch, black cherry, black locust, hawthorne (*Crataegus* sp), sugar maple, and northern red oak (Pagels et al. 1994). Although none was captured there in my work, the Tamarack site appeared suitable for the northern flying squirrel.

Michael, in introductory comments (3<sup>rd</sup> P, p 2) about the trees of the forests of the project area, included all of these trees, but he unfortunately did not view any of the forests of the project area as containing islands of suitable habitat. While on a site visit of the area in winter 2003 with members of the USDA, USFWS, and others, and accompanied by the McBrides, I observed several such areas that appeared suitable for the squirrel, both

nearby Red Oak Knob and along the Tamarack ridge line. Michael's discussion concludes by simply stating "adjacent forestland is dominated by maples and oaks, which provide suitable habitat for southern flying squirrels, but not for northern flying squirrels." However, the amended (USFWS 2001) guidelines note that the relative abundance of the conifer component can be small, and in some cases confined to the understory.

I have numerous pictures of the Red Oak Knob area that were taken from Highway 250 that show scattered stands of red spruce/mixed hardwood forest in the project environs on the McBride property. Some of those are included with this testimony as Attachment B. You will note that there are indeed islands of suitable visible habitat in the environs of Red Oak Knob. The same is true for the Tamarack Ridge area, however I have no pictures except a couple taken very near Highway 250 and none from the extensive ridgeline where turbine installation is planned.

Note that islands of suitable habitat were present on the project land at the time of my last visit in 2003, however I do not know if these sites or red spruce within them may have since been harvested. The McBrides were made well aware of the importance of red spruce as a component of NFS habitat at the time of my visit .

Q. Do you have any other comments on Dr. Michael's survey?

A. The survey fails to reference any of the relevant publications that are available on the NFS and its critical habitat. In fact, Dr. Michael elected to cite only one published paper (other than the USFWS Recovery Plan, 1990) in his report, and that one publication was used only in respect to the range of elevations at which most flying squirrels in West Virginia have been captured. Apparently Dr. Michael was not aware of selected publications that could have been used in the report, and that are salient to his discussion.

Q. The proposed project area is largely cleared pastureland bordered by forest. Does this mean that the NFS is not likely to be impacted?

A. It is understood that the areas where the turbines may be placed are largely pasture/hay fields and have been maintained as such for many years. The question, to me, and others, is--what impact might the construction and operation of the turbines have on northern flying squirrels that may occur in suitable forested habitat that bounds the cleared areas? The answer is that we do not know. There is not enough information available at this time to accurately predict what impact the turbines might have on the squirrel.

For the reasons stated herein, the study submitted by the developer in support of the turbines is insufficient in some places and erroneous in others. Indeed, based upon my years of research in and around the subject property we know that the report's conclusion, that the northern flying squirrel is not present, is wrong. Rather than trying to disprove something that we already know to be a fact, the focus of the study should have been on the potential impact of the construction and operation of the turbines on the

northern flying squirrel. Potential issues that need to be studied are the destruction of critical habitat, the increased isolation of suitable habitat, and the attraction of predators to the site due to increased food supply (dead birds/bats).

A. What is your recommendation with respect to the project site and the NFS?

The area should not be viewed as already too perturbed, and instead it should be jealously protected and reforestation should be encouraged. At the very least we need additional study before further wasting what is known to be a very valuable resource.

Unfortunately, the study submitted by the developer does not provide us with sufficient information to make an informed decision. My years of research have demonstrated the presence of the northern flying squirrel. We now need to study what impacts the construction and operation of the turbines would have on the northern flying squirrel. Obviously, industrial wind projects such as these can impact much more than just the northern flying squirrel, and as suggested earlier, we cannot have wholesale development of our ridgetops without an awareness of potential consequences. Certainly, wind energy is not green energy if it requires that we negatively impact special natural resources, including rare and endangered species and their habitats.

Q. Does this conclude your SCC written testimony?

A. Yes it does.