

November 8, 2007

WVNFS Draft PDM Plan Comments
U.S. Fish and Wildlife Service
West Virginia Field Office
694 Beverly Pike
Elkins, WV 26241

laura_hill@fws.gov

Re: Comments on the Draft Post-Delisting Monitoring Plan for the West Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*)

Dear Laura,

Thank you for the opportunity to comment on the Draft Post-Delisting Monitoring Plan (PDMP) for the West Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*). The undersigned individuals and organizations are always interested in the listing and recovery of endangered and threatened species and in the (West) Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*, also referred to as the WVNFS) in particular. We submit these comments on behalf of the undersigned individuals and organizations found at the end of this letter.

We appreciate the effort the agency has engaged in to produce a draft post-delisting monitoring plan. However, we have a number of significant concerns with both the PDMP itself and the analysis and assumptions that have gone into reaching this point in the delisting process. There are serious flaws in the PDMP, delisting analysis and conclusions reached that must be corrected. We believe the questions and concerns in this letter must be addressed before the decisionmaker has the information required to make an informed decision as to both a change in federal status and the adequacy of the PDMP.

We reiterate our belief that at this point in time there is insufficient evidence for the proposed delisting of the flying squirrel. That lack of evidence coupled with the inadequacy of the PDMP lead us to conclude that a change in federal status is not warranted at this time.

Major Concerns

Overall, we have a number of concerns with the draft PDMP and the US Fish and Wildlife Service's (FWS) characterization of the progress of the (West) Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*) towards recovery. Specific explanations for each item follow, but in broad terms we are most concerned with:

- ❖ The lack of adequate information on flying squirrel habitat, and the FWS decision to focus monitoring efforts on red spruce habitat only
- ❖ The fact that there is no credible information on the flying squirrel population, which in turn does not allow assessment of population trends and the need for delisting or relisting
- ❖ Flaws in the modeling for flying squirrel presence, population totals and habitat needs now embedded in the decisions informing the PDMP
- ❖ A reliance on the good intentions and interest of other state and federal agencies despite shrinking budgets and the failure to perform past monitoring activities in FWS post-delisting proposals to monitor the squirrel.
- ❖ The assertion that recovery actions have resulted in reduction in the threats to the squirrel sufficient to delist, despite the failure to adequately analyze the ongoing and cumulative impacts from the devastating effects of:
 - Global Warming
 - Private Land Development and Highway Construction
 - Energy Development
- ❖ The difficulty in commenting on this proposal

Process Concerns

The Monitoring Plan Does Not and Will Not Measure Whether Delisting or Relisting is Needed

The WVNFS recovery plan was approved in 1990 and amended in 2001. It includes the following recovery criteria:

Downlisting:

1. populations are stable or expanding at greater than or equal to 80% of Geographic Recovery Areas (GRAs) for 10 years
2. Sufficient life history information is available to permit effective management
3. GRAs are managed for squirrels in perpetuity

Delisting:

4. the existence of the high elevation forests on which the squirrels depend is not threatened by disease, pollution, or other systematic threats such as global warming¹

None of these conditions have been met. The PDMP as written will do nothing to assess any of these criteria. In addition, the relisting of this species would require information that the population has declined substantially. However, the PDMP by design, will tell us nothing about population trends. This is a serious violation of the ESA.

It also appears that monitoring activities would take place in the ten years following delisting, with interim results reported at the 5-year mark. This is too short a timeframe in which to assess the viability of the species. Any post-delisting monitoring should follow the example of the American peregrine falcon where annual monitoring efforts (in this case, 5 years of work) are spread out over a much longer timeframe.

Funding and Agency Commitment

Role and Work of Partners

The FWS relies on work by other agencies to implement the PDMP for the WVNFS. In many cases this work contains the same duties agencies have been tasked with completing for years: work which in many cases has not been completed in the past for any number of reasons including lack of resources, lack of funding or agency priority given to other tasks. All of these factors are still in play and in fact are likely to increase in importance and effect.

Forest Service Role

The Forest Service (FS) in particular has failed to conduct comprehensive monitoring of the WVNFS. The Monongahela National Forest (NF) and the George Washington and Jefferson NFs have failed to report on any of their monitoring activities for a number of years. Appendix 1 of the PDMP lists a role of the Monongahela NF as “provide ancillary forest health monitoring reports relative to the red spruce / northern hardwood ecosystem, as they are completed pursuant to the Land and Resource Management Plan.” Appendix 1 at page 2, emphasis added. Perhaps the FWS is not aware that almost all but the most

¹ Global warming is not expressly mentioned in this recovery criteria, but elsewhere the plan states “Even without human intervention, small, relict populations might suffer disproportionately from...climatic and vegetational processes associated with post-Wisconsin changes in mountain environments. However, habitat destruction, fragmentation, or alteration associated with clearing of forests, introduced insect pests, mineral extraction, recreational other development, pollution (heavy metals, pesticides, acid rain), the potential for global warming outweigh any known natural threats to the species or its habitat.” (p. 12)

broadly required monitoring and evaluation requirements have been removed from the Land and Resource Management Plan (Forest Plan). Monitoring and evaluation direction is to be contained in a separate Monitoring Implementation Guide, which more than a year after the Forest Plan was completed has yet to be written. One could reasonably assume that in the absence of this guide and no doubt lacking funds, that no monitoring (let alone forest health monitoring relative to red spruce / northern hardwoods) has taken place on the Forest. Given the fact that the PDMP and the very survival of the species is tied to red spruce health this is a significant problem and an egregious failing of the PDMP that must be corrected.

We also note that even after the Monitoring Implementation Guide is eventually written it will not include any mandatory measures and can be changed at will. The Forest Service will claim that this is to allow for “adaptive management” but we note that the core of adaptive management is monitoring and without any demonstrated effort on the agency’s part we remain unconvinced that this role will be fulfilled and any significant monitoring will take place.

West Virginia Wildlife Conservation Action Plan Citation

There are problems with one of the roles assigned to the WV DNR as well. The PDMP refers to the West Virginia Conservation Action Plan 2006a on page 2. It refers to pages 861-867 for an explanation of flying squirrel monitoring by the West Virginia DNR. The page on monitoring referenced by the Fish and Wildlife Service no longer exists. This page is no longer part of the current WV Conservation Action Plan on the DNR website. The West Virginia northern flying squirrel monitoring activities have been removed. This page has been removed. A different pagination system has been put in place. It is very disturbing that the Fish and Wildlife Service is not up to date on what its partners on squirrel monitoring are doing. It is a disservice to the public to refer them to out of date documents. Even more disturbing is the fact that the WV DNR was anticipating doing population and trend monitoring by means of surveys and inventorying of West Virginia northern flying squirrels, “subject to availability of funding and personnel”. This plan for scientific monitoring of actual squirrels seems to have been dropped for the unscientific proxy habitat monitoring plan set up by the Fish and Wildlife Service. Why was this plan dropped? Did lack of funding influence this decision? When was the change made?

In each of the above cases agency plans no longer seem to be in line with FWS PDMP roles. If cooperating agency plans can change without notice in such a way that monitoring, assessment and even survival of the WVNFS is at risk how does the FWS intend to track such changes? Obviously, self-reporting by these agencies will not be sufficient as these examples show, since the FWS should have been aware of these changes.

Lack of Funding

The lack of funding for any of the PDMP activities and roles is a significant problem. The FWS seems to be relying on each agency to carry out activities in support of the PDMP that agencies have previously been required to do and have failed to accomplish, often due to lack of funding. And the problem will only get worse. The Forest Service is currently intent on cutting 25% of its budget; should this happen there will be even less money available to fund the staff and activities outlined in the PDMP.

Data and Personal Communications Not Available

At least ten of the references in the post delisting monitoring plan are listed as personal communications or unpublished data. The public has no chance to review the personal communications because they are not readily available. Peer reviewers are unable to see them as well. The information in these communications has not been published for review by the scientific community. This limits their credibility. All supporting documents should be available for public review. The same critique applies to unpublished data. This data can't be reviewed by the public or peer reviewers or the scientific community at large. Using such material undermines the scientific validity of this document.

Peer Review

The squirrel peer review process violates both the Department of Interior Endangered Species Act regulations enacted on July 1, 1994 (59 FR 34270) and the Office of Management and Budget draft peer review guidelines issued on August 29, 2003. Both require that peer reviewers be independent of the proposed decision they are reviewing. Stihler, Ford, and Adams are clearly not independent since they were involved in the development of the proposed rule. It is not in the least surprising that they supported the delisting and raised not significant concerns about the data and methods while the reviewers which were truly independent of the process (Pagel and Weigl) objected to the conclusion and found considerable problems with the data and methods. As the third independent peer reviewer (Browne) did not oppose or support the delisting decision, the Service is left in the awkward situation in which none of the independent peer reviewers supported the delisting while all of the peer reviewers involved in the delisting decision supported the decision. In order to comply with DOI regulations and OMB policy, the Service can not treat the letters by Stihler, Ford and Adams as peer reviews. They must be treated as comment letters by members of the public.

It appears too few people took on too many of the critical tasks, leaving a core group to review its own work. The peer review process must be changed and a pool of professionals tapped who can be objective about this proposal. They should be brought in to review the proposed rule, the Five-Year Review and the Post Delisting Monitoring Plan. The peer reviewers should include experts in the field of mammology, population studies and wildlife monitoring.

Recovery Team

The recovery team that created the Appalachian northern flying Squirrel Recovery Plan and updated the plan in 2002 was not involved in the creation of the proposed delisting rule, Five-year Review, or the Post Delisting Monitoring Plan. The recovery team members who were asked to comment on the delisting as peer reviewers were very critical of the work of the Fish and Wildlife Service and their delisting proposal. The Service needs to explain why recovery team members such as Dr. Peter Weigl and Dr. John Pagels were not consulted in this process. They both have years of experience in researching the squirrel and could have improved the analysis of the West Virginia northern flying squirrel's status and future research needs.

GAO Study

The federal General Accountability Office is planning a review of the West Virginia northern flying squirrel delisting plan. They are concerned about the process used to reach the conclusion that the squirrel is no longer endangered. It would be prudent to wait until the GAO study is complete to move forward with the proposed delisting and monitoring plan. Any decision made before this review is completed would be arbitrary and capricious.

Content Concerns

The U.S. Fish and Wildlife Service has proposed the delisting of *Glaucomys sabrinus fuscus*. We have previously submitted comments objecting to this proposal to delist. We also feel strongly that the content of a PDMP should have been a part of the consideration of the delisting decision rather than a separate process. The two decisions, delisting and developing a PDMP, are interrelated decisions that should inform each other. Given that the Service is proceeding with the development of a PDMP we feel that there are a number of issues and problems with the monitoring plan that should be addressed.

The Service Has Confused Persistence with Presence

The draft PDMP continues the pattern seen in both the Proposed Delisting Rule and the five-year review of repeatedly invoking the term “persist” to indirectly suggest the demographic trend is stable. The monitoring plan also confuses persistence over time with simple presence. The notion that presence or simple persistence is an indication of population health or stability is flawed. The definition of persistence used in the PDMP is “continuing captures of WVNFS over multiple generations at previously documented sites throughout the historic range.” This definition fails to address the analysis of the capture data, fails to explain how “persistence” relates to demographic health, fails to address recovery plan criteria of “stability,” and fails to address the five listing factors. The invocation of “persistence” as used in the PDMP is little more than a rhetorical hand-waving gesture.

Persistence as presented in the monitoring plan is presence/absence data; it does not index population size or demographic trend unless the site actually winks out. Short of this extreme, it does not indicate whether a population is declining, improving or remaining stable. Just as a pass/fail grading scheme does not distinguish between a student doing “A” work and one doing “D” work, persistence does not distinguish between healthy and declining populations. Take for example the Red Run site (five-year review, Appendix B, p. 10). Squirrels “persisted” at the site from 1989 to 2004, but the number of captured squirrels declined from an average of 8.7 in 1989-1991 to 2.7 in 2002-2004. It is unclear if surveys were conducted in 2005. If so, the 2003-2005 average would be just 2.0. Thus the fact that squirrels persisted at Red Run is absolutely no indication of the trend or health of squirrels at that site.

A recent analysis of all listed species in eight northeast states determined that all had persisted and 93% had increased in size or remained stable since listing (Suckling 2006). Under the proposal’s “persistence” criteria, all of them should be removed from the endangered species list. Some such as the piping plover, roseate tern, and green sea turtle have done considerably better than persist, they have dramatically increased in size, yet none have been proposed for delisting because, unlike the WVNFS, the Service is requiring that the species meet scientific recovery criteria established in recovery plans. The Service’s procedure in this case is to ignore the recovery plan and proceed to delist in the absence of any explicit recovery criteria based on the nearly meaningless and poorly defined concept of “persistence.” This clearly violates the Endangered Species Act requirement that the Service scientifically demonstrate the species is recovered.

The PDMP does not address the fact that the West Virginia and Virginia Divisions of Forestry as well as the US Forest Service all engage in extensive timber harvesting. In fact, the Forest Service has a multiple-use mandate with timber harvest a focal point of agency activities. Cutting down trees requires the building of roads and skid trails. “The ongoing harvest of old growth forest, its replacement with plantations or regenerating

stands and the increasing fragmentation of much of the remaining habitat has alarmed some biologists concerned about this and other rare animal species (see Smith, this issue).” Weigl, 2007, line 181. The result of delisting will be that the Forest Service, Divisions of Forestry and private landowners can return to timber harvest and development without having to consult with the FWS. Relying on management by the Forest Service, state agencies and any Memorandum of Understanding will be an overly simplistic solution to the conservation, recovery, and monitoring of this species.

As stated in our comments on delisting the FWS has not been able to obtain any useful demographic data to support their assertions about the status of the WVNFS population. This problem is compounded by a lack of consideration and knowledge of the life cycle of the WVNFS. Leading WVNFS expert Dr. Peter Weigl refers to a study by Smith and Nelson in his recent article submitted to the Journal of Mammalogy. In this article Weigl points out that Smith and Nelson have analyzed the demography of the *G. sabrinus* and “raised questions about the distribution and stability of populations” (Weigl 2007). Weigl goes on to describe the species as more long lived than previously thought, with a very low reproductive rate for a mammal of its size. If WVNFS has a longer life span and a lower reproductive rate then the assertions of persistence and reproductive success based on capture data must be reevaluated.

Presence data or simple persistence data must be combined with population and distribution data to form a coherent assessment of viability and population trends. Simple persistence or presence data can be extremely misleading when evaluating the viability of a population if considered uncritically. This danger in the interpretation of presence data without underlying data on population trends and distribution is illustrated in studies of Northern Flying Squirrel in Southeast Alaska. In analyzing habitat Smith and Person (2007) state: “Indeed, flying squirrels occupying peatland-MC might in some years represent population sinks (Pulliam, 1988; Pulliam and Danielson, 1991) that are sustained by immigration; and the rapid increase of flying squirrels in peatland-MC habitat observed by Smith and Nichols (2003) probably resulted from frequent immigration from neighboring source habitat.” (Smith and Person, 2007)

Presence Monitoring Concentrated in Spruce Habitat Likely Misses the Mark

As pointed out in comments to the proposed delisting, it is not clear from the research that northern hardwood forest is not providing good habitat. Weigl (2007) points out a number of habitat characteristics that seem to be associated with and important to *G. sabrinus fuscus* habitat. Fungal and lichen food sources for the squirrel are important factors. Other habitat factors that seem to be associated with habit are moist down woody debris and a cool and moist microclimate. These factors are characteristic of northern hardwood forests. In fact despite the focus in the delisting proposal and the modeling on which the delisting depends, the species has consistently been found in northern

hardwood forest. It is clear from several of the lines of research that the species is associated with older or old growth forest. Thus the focus on restoration of spruce at the expense of mature northern hardwood could easily harm *G. sabrinus fuscus* recovery.

The draft monitoring plan perpetuates two serious and troubling errors contained in the delisting proposal. First of all, it assumes that spruce forest can be restored at the expense of northern hardwood forest despite extremely little evidence that this is feasible. It also ignores the likely difficulty or impossibility climate change will introduce into this effort. Secondly, the proposal ignores the lack of clear evidence that *G. sabrinus fuscus* are actually dependent on spruce rather than a complex set of other factors that likely associate with spruce occurrence. By focusing monitoring exclusively on presence at a limited number of sites primarily in spruce forest the effort ignores the monitoring of populations and factors in other areas that may play an increasingly important role in viability. This unwarranted focus of monitoring on only a subset of the habitat is likely to harm viability of the species by allowing and encouraging the conversion of old growth or mature northern hardwood into young forest stands that may or may not have a significant spruce component. Smith and Person state: “For this reason, conservation planning that explicitly considers the quality and spatial configuration of suitable habitat across highly modified landscapes (Fuller et al., 2006; Odom et al., 2001) will have a greater likelihood of sustaining viable metapopulations of flying squirrels (Hanski et al., 2000; Selonen and Hanski, 2003, 2004).” (Smith and Person, 2007)

Population Data Missing

Monitoring Fails to Determine Population Size or Population Trends

One of the most obvious facts about the WVNFS is the lack of information regarding the population of the species and the draft monitoring plan fails to address this. It seems incomprehensible to consider delisting a species without understanding its population. The monitoring plan compounds this error by confusing simple presence with persistence. The 5-Year Review failed to address the issues of population viability in regards to the WVNFS. To adequately analyze population viability, you must explicitly consider population dynamics. Population dynamics refers to persistence of a population over time, which is key to making predictions about population viability. The USFWS has continued to confuse persistence over time with simple presence and has not addressed in the draft monitoring plan the need to establish persistence over time by failing to consider the following factors in examining population dynamics:

- 1) Population growth rate: Impacts that influence long-term population growth rate are perhaps the most important factors affecting persistence. Persistence is pointed to as the key factor for considering the decision to delist the WVNFS. This approach is flawed because it is not tied to knowledge of the population but

merely presence. Presence and absence surveys conducted for the species have been broadly interpreted. We have serious concerns about the exclusive reliance on the WVNFS capture data.

- 2) Population size: Larger populations will take longer to decline to dangerously small numbers. The FWS has failed to disclose the population numbers for this species. In Grumbine (1992, p. 34) a population size of 50 is said to be the minimum number to assure short-term viability, but "a manager could not count on maintaining many species at this reduced level for very long." However this refers to an "effective population" which means 50 reproducing individuals. This is "at the bottom of the genetic basement" (ibid., p. 35) and when factors other than just genetics are taken into consideration, "the models constructed so far have ratcheted viable-population estimates up from the original genetics-derived 50-500 toward the low thousands or higher" (ibid., p. 37). Identification of a viable population must be completed before any decision on delisting is made.

- 3) Linkages to other populations: Truly effective corridors, or linkages, should be shown to exist that connect the habitat for populations of WVNFS. It is clear that the WVNFS habitat is fragmented and the impacts of roads, logging and residential and resort development are far from abated especially when one considers the large geographic range of this species. It was shocking to read in the Five Year Review that the USFWS "recognizes that long standing isolation can produce important local adaptations that could be compromised through artificially induced connectivity". First, this statement assumes that currently isolated populations are discreet and viable. Assuming that isolated portions of the population are indeed adapting locally requires that a population is genetically healthy. This statement is another example of a flawed assumption based on limited knowledge of the population. Second, what is artificially induced connectivity? We have never heard the term used when discussing the obvious need to recover and restore forest ecosystems for a species that has a large geographic range. Is the USFWS saying that habitat fragmentation is necessary to protect the WVNFS? This is absurd and contradictory to the ecology of the species and the basic tenants of conservation biology.

There Is No Evidence of Population Growth

The proposed rule states that delisting is justified because of "an increase in the number of individual squirrels" (proposal at 75924). At the time of listing, ten squirrels were known at four sites; between 1985 and 2005 there were 1,141 captures at 107 sites (proposal at 75926). An unknown portion of the captures were recaptures, thus the 1,141 captures do not represent 1,141 squirrels. The population size was not known or estimated at any point between 1985 and 2005. These data do not in any manner support

the Service's assertion that the population has increased since 1985, nor has the Service provided any additional data to support the strange assertion. The only valid conclusions one can draw about WVNFS populations trends are 1) the population size is not known now or at any time between 1985 and 2005, 2) the 1985 to 2005 population trend is not known, 3) the current population trend is not known, 4) some capture sites have been used relatively continuously since 1985, some have been used sporadically, some have been abandoned, and many are lacking in sufficient data to determine whether use has been consistent, sporadic or abandoned between 1985 and 2005, and 5) the Service has completely dropped the ball on WVNFS monitoring, having consistently failed over a 20-year period to fund or establish demographically useful surveying methodology. The Service's failure is especially evident when compared to its successful efforts elsewhere to work with partners to obtain good demographic data on the listed Mt. Graham red squirrel, Delmarva Peninsula fox squirrel, and northern Idaho ground squirrel. It also compares unfavorably with researchers who have collected useful demographic data on unlisted flying squirrels.

The lack of data is better acknowledged in the five-year review, which does not assert an increase in squirrel numbers. This rhetorically motivated assertion is without scientific basis and should not be included in the text or rationale of the final delisting decision. The population could just as easily have declined or remained stable as have increased since 1985. There are no data demonstrating that any of these three conclusions is more or less valid than the others.

As the WVNFS is currently listed as an endangered species, the burden is on the Service to demonstrate that its population is sufficiently large and stable (or improving) to be considered non-imperiled. As neither the size nor the population trend is known, the Service cannot and has not demonstrated population health. Thus the WVNFS has not been demonstrated to be recovered. It must remain on the endangered list unless and until the Service conducts scientifically credible studies indicating what the population size and trajectory are.

Perversely, the Service appears to be using its failure to conduct meaningful demographic studies over the past 20 years to justify delisting the species. Its argument that lack of trend/size data would make the species fail the five listing criteria test treats the species as if it is unlisted and the burden of proof is on the listing advocate to demonstrate endangerment. The Service's lack of meaningful research would indeed weaken the listing advocate's position, but the burden of proof is not on those seeking to retain listing; it is on those seeking to delist.

The nest box data in Appendix B of the five-year review is fatally incomplete because they only indicate the year in which animals were found; they do not indicate years in which the size was monitored and no animals were located. Thus it is impossible to tell how often squirrels were not found, significantly undermining confidence in the Service's

assurance of site persistence. The final decision should include a complete dataset showing results for all monitoring years, not just successful years.

The proposal states that the 107 capture sites are “dispersed across seven general areas of relict habitat in the Allegheny Highlands region” (proposal at 75926). It cites pages 9 and 26 of the five-year review. Page 26 is the bibliography. Page 9 states that the species “is distributed extensively across the Allegheny Highlands,” but provides no definition of “extensive.” Thus the reference to the five-year review provides no additional information that is not in the delisting proposal. Without citation or supporting data, the proposal states that the WVNFS occurs in “numerous additional sites dispersed throughout its historical range, suggesting that its current range roughly approximates the extent of its historical range.” Occurring in “numerous sites” does not suggest the species current range is similar to the historic range, and the Service has provided no citation or explanation for why it believes this to be true. Since diminishment of range is one of the five listing factors, can not simply assert the range is “extensive” while failing to describe what portion of the historical range is occupied. The final decision should provide maps showing the presumed historic range and sites that have been recently occupied (e.g. in the past ten years). It should also calculate what proportion of the historic range is known to be currently occupied by the species. The maps in the five-year status review may help to construct clear historic vs. current range maps, but do not in themselves constitute such a map.

No Critical Habitat Defined

There is a lack of a clear habitat definition for *G. sabrinus fuscus*. The literature reflects striking gaps in knowledge of the biology and ecology of the species. The Five-Year Review contributes to the confusion about habitat by grossly oversimplifying the results of a scientific review for habitat quality ranking contained in Appendix A. Rather than disclosing that Appendix reveals that optimal habitat is associated with a complex array of conditions including old growth spruce and hardwood, coarse woody debris, snags, and moist conditions, the Five-Year Review instead focuses on spruce as a source of one of the fungal food species, ignoring other fungal species and other food sources not associated with spruce. Appendix A of the Five-Year Review is consistent with scientific studies and capture data that habitat is difficult to describe definitively. Optimal habitat is associated with a number of factors, including large old growth spruce, but these factors are complex, likely inter-related, and poorly understood at the present.

The monitoring plan perpetuates this approach by relying on simple presence monitoring in a distinct subset of the habitat (spruce) and by failing to adequately identify habitat characteristics that could contribute to squirrel viability and could contribute to understanding population dynamics.

Connectivity of Populations and Habitat Not Addressed

The monitoring plan fails to address linkages between populations: truly effective corridors, or linkages, should be shown to exist that connect the habitat for populations of WVNFS. It is clear that the WVNFS habitat is fragmented and the impacts of roads, logging and residential and resort development are far from abated especially when one considers the large geographic range of this species. It was shocking to read in the Five Year Review that the USFWS “recognizes that long standing isolation can produce important local adaptations that could be compromised through artificially induced connectivity”. First, this statement assumes that currently isolated populations are discreet and viable. Assuming that isolated portions of the population are indeed adapting locally requires that a population is genetically healthy. This statement is another example of a flawed assumption based on limited knowledge of the population. Second, what is artificially induced connectivity? We have never heard the term used when discussing the obvious need to recover and restore forest ecosystems for a species that has a large geographic range. Is the USFWS saying that habitat fragmentation is necessary to protect the WVNFS? This is absurd and contradictory to the ecology of the species and the basic tenants of conservation biology.

This failure to address the issue of connectivity of populations is made more serious by climate change. Climate change is likely to change habitat. Habitat that has historically been conducive to *G. sabrinus fuscus* is likely to become less suitable or unsuitable as climate change progresses. This loss of habitat is not addressed in the monitoring plan nor is the need to maintain corridors to provide connectivity between populations. The monitoring plan does not even address the need to determine which populations are being affected by these climate changes or what management actions are doing to habitat in conjunction with climate change.

WVNFS Habitat is Not Limited to Red Spruce

The proposal to delist WVNFS depends heavily on modeling of the habitat in spruce forest as well as the assumed conservation of spruce forest in Forest Service management plans, other management commitments, and unproven plans for spruce restoration. The PDMP in turn depends heavily on habitat monitoring of this forest type consisting of self reporting of the management agencies, with triggers for action if this habitat falls below certain levels. The PDMP is built upon unsupported assumptions about WVNFS ties to spruce habitat that is not backed by the existing research on the subspecies.

The post delisting monitoring plan contains serious and troubling errors about habitat. First of all, it assumes that spruce forest can be restored at the expense of northern hardwood forest despite extremely little evidence that this is feasible. It also ignores the likely difficulty or impossibility climate change will introduce into this effort. Secondly,

the proposal ignores the lack of clear evidence that *G. sabrinus fuscus* are actually dependent on spruce rather than a complex set of other factors that likely associate with spruce occurrence. By focusing on the phantom of spruce occurrence the effort ignores other more significant factors and would likely harm viability of the species by encouraging the conversion of old growth or mature northern hardwood into young forest stands that may or may not have a significant spruce component.

The northern hardwood forest appears to play an important factor in *G. sabrinus fuscus* habitat. Northern hardwood is likely to continue to expand at the expense of spruce habitat as climate change continues. The long term presence of northern hardwoods in this region in the future due to climate change is also an open question. Weigl (2007) documents that Northern Flying Squirrel in some regions uses northern hardwood forest without spruce and fir. With the likely limitation of spruce forest under a climate change scenario, the Fish and Wildlife Service has the obligation to attempt to identify factors that can assure survival and control management to optimize these conditions. From the scientific literature it seems likely that northern hardwood forest and conditions within northern hardwood forest can play important roles in *G. sabrinus fuscus* recovery. Basing delisting on spruce restoration, which has questionable and uncertain prognosis and whose role in habitat is uncertain, is not a course of action that will contribute to the viability or recovery of the species.

One of the most consistent factors associated with *G. sabrinus fuscus* is old growth trees and old growth conditions. This should be a primary focus of recovery efforts. However, this is in direct opposition to efforts to “restore” spruce forest as this is likely to involve harvesting mature tree to be replaced with new regeneration. Even if spruce regeneration is successful, which is highly unlikely under a climate change scenario, these immature trees are unlikely to provide good habitat in any foreseeable future.

Monitoring Habitat is Not a Substitute for Population Monitoring

Federal agencies have been trying to relieve themselves of the responsibility to monitor wildlife populations for quite some time now. These efforts have largely been unsuccessful. The ways in which the FWS is trying to use habitat monitoring as a substitute for population monitoring in this case is particularly troubling.

When the FWS has been successful in using habitat as a proxy for species, the courts have been very specific in its application. In *Gifford Pinchot Task Force v. United States Fish and Wildlife Services*, 378 F.3d. 1059 (9th Cir. 2004), the Ninth Circuit Court held that the test for whether the habitat proxy is permissible is whether it “reasonably ensures” that the proxy results mirror reality. See *Idaho Sporting Cong., Inc. v. Rittenhouse*, 305 F.3d 957, 972-73 (9th Cir. 2002) (holding that deference to proxy on

proxy approaches is not warranted when the proxy method does not "reasonably ensure" accurate results).

The Ninth Circuit upheld habitat as a proxy for population count with the following analysis:

“The habitat analysis here is not just a simplistic "x number acres = y number of owls" type of equation. Rather, the habitat proxy takes into account type of land, extent of degradation of the habitat, relationship between different habitats, the owls' distribution, and the owls' range. The jeopardy analysis also takes into account non-habitat factors, including competition from other species, forest insects, and disease. This detailed model for owl population is sufficient to ensure that the FWS's habitat proxy reasonably correlates to the actual population of owls. Finally, the habitat proxy does not exist in a vacuum: The FWS has a program of demographic studies that supplements and verifies the habitat results.”

Gifford Pinchot Task Force v. United States Fish and Wildlife Services, 378 F.3d. at 1066.

Clearly, the habitat proxy proposed here is even more simplistic than “x number acres = y number of squirrels”. The FWS is making no effort to correlate acres with numbers of squirrels. Instead it is making the grand assumption that any acres of probable habitat = a recovering population of an endangered species. The proxy in this case takes into account just one type of land (red spruce), without clear understanding that this is even the defining feature of WVNFS habitat. It fails to examine the extent of degradation of the habitat; fails to examine the relationship between different habitats; and fails to examine the squirrel’s distribution or the squirrel’s range. The FWS fails to take into account non-habitat factors, including competition from other species, forest insects, and disease. In addition, the FWS fails to account for threats to either the squirrels themselves or their habitat.

The Service is also lacking in having a program of demographic studies to supplement and verify habitat results (or in this case assumptions). As we point out elsewhere in this document the FWS is lacking in some of the most basic knowledge about the WVNFS. The FWS has done nothing in this case to ensure that their habitat proxy reasonably correlates to the actual population of WVNFS. As such, the Service fails the test laid out by the Ninth Circuit Court. Any decision which relies on this faulty take on habitat proxies is arbitrary and capricious.

Other Habitat Concerns

When the FWS claims that the WV northern flying squirrel prefers red spruce habitat they are misinterpreting Jennifer Menzel's research. Menzel says on pages 53 and 54 of her 2003 thesis, "Habitat use of the (West) Virginia northern flying squirrel was similar at each spatial scale examined (landscape, stand and local)... There was no significant difference in the ranks of the top 3 used habitat types: spruce, Allegheny Hardwoods and spruce-northern hardwood types." (This is at the landscape level). She goes on to say there was no difference at the stand level between 6 forest types. At the local level she says, "there was little habitat type preference within the WVNFS home range." The FWS has concluded from this research that red spruce is the preferred habitat of the West Virginia flying squirrel. There is no scientific support for this conclusion, particularly when relying on Menzel's research.

Much of the conservation effort for the species has focused on understanding its habitat and the use of this habitat. To ensure recovery, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range. In the case of the WVNFS the protection of habitat is serving as a proxy for the status of its population. The FWS proposes that by protecting and monitoring the habitat for a species the species is protected. The protection of habitat is critical to the protection of a species but the outright protection of habitat does not ensure recovery. This is certainly the case when it is unclear what constitutes the WVNFS habitat.

Another important consideration is that much of the habitat believed to be important to the WVNFS is not fully protected. In fact, should this species be delisted there would be a complete lack of protections ascribed to the WVNFS or its habitat. It is egregious to assume that the US Forest Service would work to protect a species without the force of law in the face of declining staff and budgets.

Habitat Definitions

There is a lack of a clear habitat definition for *G. sabrinus fuscus*. The literature reflects striking gaps in knowledge of the biology and ecology of the species. The Five-Year Review contributed to the confusion about habitat by grossly oversimplifying the results of a scientific review for habitat quality ranking contained in Appendix A. Rather than disclosing that Appendix reveals that optimal habitat is associated with a complex array of conditions including old growth spruce and hardwood, coarse woody debris, snags, and moist conditions, the Five-Year Review instead focused on spruce as a source of one of the fungal food species, ignoring other fungal species and other food sources not associated with spruce. Appendix A of the Five-Year Review is consistent with scientific studies and capture data that habitat is difficult to describe definitively.

Optimal habitat is associated with a number of factors, including large old growth spruce, but these factors are complex, likely inter-related, and poorly understood at the present.

Red Spruce

Role of Spruce in Boreal Habitat

High elevation spruce in the Southern Appalachians is a relict of widespread spruce occurrence during the Pleistocene. However, spruce is just one component of this habitat. The PDMP relies on spruce habitat to the exclusion of other components of boreal habitat. It is simplistic to imagine that spruce and elevation by themselves determine preferred habitat for *G. sabrinus fuscus*. Indeed, a look at the literature reveals evidence for other boreal components playing key roles in the northern flying squirrel ecology. Weigl points out the key role fungi play as food for *G. sabrinus fuscus* and the role of the squirrel in perpetuating components of the boreal habitat. Old growth and forest with complex forest structure with a variety of tree species seem to be a component of ideal northern flying squirrel habitat. Spruce is but one component of the high elevation boreal ecology on which *G. sabrinus fuscus* depends. The association of *G. sabrinus fuscus* with spruce occurrence may be the association of both species with other boreal factors rather than a direct dependence of the squirrel on spruce. In fact Weigl (2007) points out that *G. sabrinus fuscus* is seldom found in pure conifer or pure spruce stands. It is more characteristic of the ecotone between hardwoods and conifers. This complexity in the habitat for *G. sabrinus fuscus* has been ignored by the proposal to delist the species as well as by the habitat modeling for the species (Menzel et al 2006).

Despite the direct association in the delisting proposal and PDMP of spruce occurrence with preferred habitat for *G. sabrinus fuscus*, it is not clear that this direct association exists. Weigl (2007) directly calls this assumption into question. It is significant as Weigl points out that there is a notable lack of *G. sabrinus* within pure spruce forest. Other factors such as food sources, climatic factors, and elevation may explain the seeming association of *G. sabrinus fuscus* with spruce. The capture data also reveals significant occurrence outside spruce forest. These factors cast tremendous doubt that the species is directly linked to spruce habitat rather than other factors that may have covariance with spruce occurrence. Serious errors and false confidence can result from attributing preferred habitat to phantom factors while discounting and failing to account for factors that may play a more critical role.

Red Spruce Management

Boreal forest is a complex forest containing elements of spruce, fir, and northern hardwood species. The extent of spruce forest has declined significantly during the historical period. The decline of spruce is cause for concern and spruce restoration should be a goal for lands, especially those in public ownership. Spruce, along with other

boreal species is clearly a Pleistocene relict whose range has been reduced due to past climate change. Boreal habitat and boreal species face a very serious challenge from current climate change.

It is not clear that spruce restoration efforts will be successful in face of these challenges. If northern hardwood forest is cut, it is not clear that spruce will replace the cut species. There is only one master's level study on the Monongahela NF suggesting that such recovery may be feasible. There are many factors, including the observed ongoing decline of spruce forest that suggests that such recovery is not feasible. Climate change, lack of seed source, and species competition could easily frustrate spruce restoration.

Meanwhile, it is not clear from the research that northern hardwood forest is not providing good habitat. Weigl (2007) points out a number of habitat characteristics that seem to be associated with and important to *G. sabrinus fuscus* habitat. Fungal and lichen food sources for the squirrel are important factors. Other habitat factors that seem to be associated with habit are moist down woody debris and a cool and moist microclimate. These factors are characteristic of northern hardwood forests. In fact despite the focus in the delisting proposal and the modeling on which the delisting depends, the species has consistently been found in northern hardwood forest. It is clear from several of the lines of research that the species is associated with older or old growth forest. Thus the focus on restoration of spruce at the expense of mature northern hardwood could easily harm *G. sabrinus fuscus* recovery.

The delisting proposal contains two serious and troubling errors. First of all, it assumes that spruce forest can be restored at the expense of northern hardwood forest despite extremely little evidence that this is feasible. It also ignores the likely difficulty or impossibility climate change will introduce into this effort. Secondly, the proposal ignores the lack of clear evidence that *G. sabrinus fuscus* are actually dependent on spruce rather than a complex set of other factors that likely associate with spruce occurrence. By focusing on the phantom of spruce occurrence the effort ignores other more significant factors and would likely harm viability of the species by encouraging the conversion of old growth or mature northern hardwood into young forest stands that may or may not have a significant spruce component.

The Squirrel and Other Habitat Types

Squirrel Adaptation

Because habitat is a complex and poorly understood complex of conditions, the modeling that has been conducted fails to account for the squirrel's adaptation. Climate change is likely to continue to limit the range and occurrence of red spruce in the Central Appalachians. By inappropriately linking *G. sabrinus fuscus* habitat to red spruce, and

proposing delisting based on the unproven and unlikely expansion of red spruce, the Fish and Wildlife Service is in effect proposing a scenario for the species' demise. The logical and responsible course should be to refine the species' actual habitat requirements to document habitat factors that could assure adaptation and survival in the face of climate change.

Northern Hardwood Habitat Use

In particular northern hardwood forest appears to play an important factor in *G. sabrinus fuscus* habitat. Northern hardwood is likely to continue to expand at the expense of spruce habitat as climate change continues. In fact, even the presence of northern hardwoods in this region in the future due to climate change is an open question. Weigl (2007) documents that Northern Flying Squirrel in some regions uses northern hardwood forest without spruce and fir. With the likely limitation of spruce forest under a climate change scenario, the FWS has the obligation to attempt to identify factors that can assure survival and control management to optimize these conditions. From the scientific literature it seems likely that northern hardwood forest and conditions within northern hardwood forest can play important roles in *G. sabrinus fuscus* recovery. Basing delisting on spruce restoration, which has questionable and uncertain prognosis and whose role in habitat is uncertain, is not a course of action that will contribute to the viability or recovery of the species.

Habitat Age-Class and the Squirrel

One of the most consistent factors associated with *G. sabrinus fuscus* is old growth trees and old growth conditions. This should be a primary focus of recovery efforts. However, this is in direct opposition to efforts to "restore" spruce forest as this is likely to involve harvesting mature tree to be replaced with new regeneration. Even if spruce regeneration is successful, which is highly unlikely under a climate change scenario, these immature trees are unlikely to provide good habitat in any foreseeable future.

Food Sources

The use of food sources by *Glaucomys sabrinus fuscus* is critical to an understanding of their habitat use. One study of the *G. sabrinus fuscus* fecal pellet contents, done by Donna Mitchell of the WV DNR in 1998 gives us some insight into what the squirrel eats. Entitled "Spring and Fall Diet of the West Virginia Northern Flying Squirrel" it was published by the American Midland Naturalist in 2001. The pellets studied were collected from 115 captured squirrels from 1989 to 1991 in the spring and fall. No information was collected for winter and summer food sources. The spring samples show equal consumption of buds from red spruce and beech trees and fungus associated equally with both conifer and broadleaf trees. In the fall, fungi were more widely eaten as were beech nuts. Lichen and mosses were also found in the samples. This small study

supports the contention that the squirrel forages in both northern hardwood and conifer habitat and is not limited to red spruce forest types.

The second study cited in the Five-Year Review was by Loeb et al 2000, “Habitat Associations of Hypogeous Fungi in the Southern Appalachians: Implications for the Endangered Northern Flying Squirrel (*Glaucomys sabrinus coloratus*)”. This study uses data from 1995 to 1996. The study is less useful than the Mitchell study because it just looks at fungi found near flying squirrel capture sites. There is no proof that this is a food source used by the Appalachian squirrel. The study does not cover the West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*).

In the Loeb study the most common fungus, found 78.8% of the time, is *Elaphomyces*. It is “is one of the most common and widely distributed species of hypogeous fungi in the northern hemisphere and is found in a variety of habitats including pine, chestnut, beech and oak forests (Smith et al., 1981, Zhang and Minter, 1989) from Loeb, page 293. This fungus, despite the authors’ claims, does not lead to the scientific conclusion that flying squirrel are found in red spruce habitat. The study was done in spruce and spruce/hardwood forests skewing the results toward red spruce. No comparative study was done in pure hardwood stands even though the *Glaucomys sabrinus coloratus* has been found in such stands. The study of structural and vegetation characteristics in the area of the fungus was conducted on just three one meter by one meter plots. This limited data cannot be used to define the canopy cover, soils, logs, snags, and vegetation characteristics (distance to closest tree species) of *Glaucomys sabrinus coloratus* habitat let alone that of *fuscus*. This study was too limited to be useful in the Five-Year Review.

Additional research is needed to further define habitat preferences, for example by looking at factors such as the presence of food sources by predominant surrounding age class. Until such research is completed, pinning species viability on limited understanding of food source preferences and extrapolation to the larger issue of overall habitat preference is unwarranted.

Capture Sites vs. Habitat Needs

The use of capture sites to define habitat needs for *G. sabrinus fuscus* is useful but is not definitive. There is no evidence that the capture sites have been placed or sampled with a strategy to accurately establish particular optimum or preferred habitat conditions.

Elevation

Certainly elevation plays a role establishing suitable habitat for the species. There is general consensus that habitat for the species is found in boreal areas, and boreal habitat is found in the higher elevations of the Central Appalachians. It is not surprising that

capture studies have found an association between elevation and captures. However, this tells us nothing about the finer relationships or what components of higher elevation boreal habitat the species is dependent on.

Timber Types

The fact that there is an association in capture studies with spruce occurrence is not necessarily surprising nor particularly revealing. Spruce is an important component of boreal habitat. Are there aspects of spruce biology that *G. sabrinus fuscus* is dependent on? Or as Weigl (2007) suggests are there underlying conditions that both spruce and the squirrel are responding to. There is a true danger in depending on spruce as a surrogate for these underlying conditions. The association of spruce to other conditions could mask the more fundamental dependence of the squirrel on these conditions. If these conditions are masked, management could ignore these conditions or actually degrade them. It seems likely from the literature and Appendix A of the five year review that old growth or mature northern hardwood is superior habitat to newly regenerated or early succession spruce forest. Yet this is ignored by the delisting proposal, the PDMP and the models being used for *G. sabrinus fuscus* habitat.

Food Sources

The literature and Appendix A of the five-year review indicates a strong association with certain fungi and other food sources. Yet there is no indication that captures have taken food into account, that the delisting or monitoring proposal has considered this association in any detail, or that the PDMP has addressed how its reliance on Forest Service management plans would impact these food sources.

Canopy Closure

The literature and Appendix A of the five year review document that forest structure may be one of the most important conditions impacting *G. sabrinus fuscus* habitat. Yet capture studies have scarcely addressed this factor. The association of the species' habitat with large old trees and complex structure including snags and coarse woody debris would logically call for addressing this habitat component. Yet the PDMP fails to address this habitat concern, and the strategy it is relying on to assure recovery would likely degrade this condition on significant areas on national forest land.

Habitat Manipulation

As detailed in previous sections, the habitat manipulations the FWS Service is relying on to assure viability of *G. sabrinus fuscus* on national forest lands are untested and unproven, are contrary to much of the biology that is known about the species, and are likely to harm its viability rather than enhance it. A logical approach to relying on habitat

manipulation to enhance habitat would include before and after examination of populations (or at least capture rates) that could be tied to the manipulations. There are no studies in this case. In fact careful examination of the capture data history reveals that nest boxes have been in areas that have been harvested, but no subsequent sampling has been conducted to assess how these management activities have affected capture rates.

Other Effects on Habitat Use and Quality

Most studies, e.g. (Weigl, 2007) and Appendix A of the five-year review, suggest the association of optimum or preferred habitat with moist conditions, high rainfall, and northern aspects. This association could result from the presence of food sources proliferating under moist conditions or other microclimatic effects. Moist conditions can be associated with micro-climate regimes in northern aspects, areas receiving higher precipitation and fog in certain positions in relation to prevailing weather patterns, and certain drainage patterns. In converse to this, aspect, drainage pattern, and areas within rain shadows can have reduced moisture. The model relied on to predict habitat (Menzel et. Al., 2006) lumps all of these areas together based on elevation and spruce occurrence. It is unlikely that these factors have no effect. Rather, it is more likely that the data and modeling are too insensitive to reveal these habitat patterns. In practice this inability to distinguish these habitat factors potentially overestimates the optimum habitat. It is premature to assess that there is adequate habitat for viability for *G. Sabrina fuscus* on national forest lands with the current state of knowledge about habitat needs, the likely changes to habitat with climate change, and the continued loss of high elevation habitat.

Threats are Increasing, Not Decreasing

The notice for the PDMD claims that: “Recovery actions have resulted in reduction in the threats, which has led to: (1) A significant increase in the number of known WVNFS capture sites; (2) multiple generation reproduction; (3) the proven resiliency of the squirrels; and (4) the vast improvement and continued expansion of suitable habitat.” This claim is not credible in the light of the stark lack of substantive population and distribution trends, the profound open questions about the subspecies’ biology, and the immediacy of substantial threats including climate change, habitat fragmentation, and development threats.

In addition, the overall assertion that “recovery actions have resulted in reduction in the threats” is not borne out by evidence. Federal Register, Vol. 72, No. 194, page 57346. The FWS, in its threat assessment conforming to the five listing factors in December 2003 (Five-Year Review at 10) concluded that various threats were either insignificant in their effects on the squirrel or beyond the Service’s control. The FWS cannot have it both ways. The conclusion that “recovery actions have resulted in reduction in the threats” is negated by the statement that threats are beyond the Service’s control.

We take issue with FWS conclusions. The effects of global warming, private land development, highway construction and energy development are all ongoing (and increasing) threats that have not been affected by recovery actions and have certainly not been reduced as threats. They are examined in greater detail below.

The Effects of Global Warming Have Not Resulted in “Reduction in the Threats”

The examination of global warming in this document falls well below the “best available scientific information” standard. The FWS has ignored the large number of studies we cited in our comments on the delisting proposal, cherry picked studies which it believes to support its predetermined decision to delist the squirrel, misrepresented the studies it does cite, and failed to develop a rational connection between the cited studies and its conclusion.

The Service’s dismissive attitude toward global warming science is in stark contrast to how it treated warming models in its recent proposal to list the polar bear (72 FR 01064, 1/9/07). It also contrasts with how NOAA Fisheries dealt with global warming models in its decision to list two Florida coral as endangered (71 FR 26852, 5/9/06). The legal standard of the ESA simply do not allow the FWS to blithely dismiss the global warming impacts as not foreseeable. These impacts have been foreseen by numerous scientific studies as cited in our comments on the proposed listing rule. If the Service disagrees with these studies, it must go through them one by one and show that its position is better support by current science than the modelers.

The FWS cites Inkley et al. 2004 and Prasad et al. 2007 for the proposition that “regional models and predictions are more equivocal”. The fact that some regional models are equivocal is neither enlightening nor relevant. The Service is clearly trying to imply that Inkley et al. and Prasad et al. projected global warming scenarios without substantial impacts to the flying squirrel’s and its habitat. They did not:

- ❖ Inkley et al. did not examine or mention red spruce or the flying squirrel. They made no prediction about the future range of the squirrel’s habitat. There is nothing in this document relevant to the flying squirrel.
- ❖ The Service states that Prasad et al.’s “models do not predict red spruce range displacement or migration rate(s)” in West Virginia. The implication of this strangely vague sentence is that some or all of their models predict no displacement. This is false. Prasad et al. simply did not model displacement in West Virginia at all. The FWS has confused the lack of model with a negative conclusion from a model. Prasad et al. did present a table of “area-weighted importance values” for red spruce in West Virginia. Every scenario, from low to high emission rates, showed a massive decline in importance values. To

summarize: 1) there is nothing in Prasad et al. suggesting that red spruce won't migrate out of the squirrel's range and 2) red spruce in West Virginia declines in all models, and the West Virginia scenarios are massive. We fail to understand how the Service can draw any hopeful conclusion from Prasad et al.

The FWS states that "There is little consensus as to specific effects on WVNFS or its habitat." Lack of consensus usually means scientific disagreement. Yet the Service has failed to describe and cite any scientific debate about the impacts to the flying squirrel or its habitat. Instead it throws up *its own* speculation about differing possibilities; none of which have been published in scientific journals or exist outside the context of this listing/monitoring decision. The FWS has mistaken its own unwillingness to accept the scientific models with a debate within the scientific community.

The Service complains that global warming models involve "uncertainty." All models include uncertainty. It is inherent to the concept of modeling. If there were uncertainty, a model would not be needed. Thus the FWS needs to demonstrate not that there is uncertainty, but that the best available scientific information indicates that the uncertainty is such that it is more likely than not that the squirrel's habitat will not be sufficiently impacted by global warming to threaten the squirrel. It has not done so and is unable to do so.

The Effects of Private Land Development and Highway Construction Have Not Resulted in "Reduction in the Threats"

The FWS addresses the threats to the WVNFS from private land development and highway construction in the most cursory manner. Highway development and recreational development, as well as mining/gas exploration and wind farm development are assessed as follows:

"Activities such as these are expected to continue on private lands. While some low level of local impacts are likely to continue into the future, there is no indication that the activities would occur over a landscape level, or at such a magnitude as to pose a threat to the continued existence of *G.s. fuscus*."

Five-Year Review at 11.

No documentation or evidence accompanies these assertions for any of the above activities. There is no description of the criteria or thresholds for assessing magnitude. What level of activity or development would constitute "such magnitude as to pose a threat"? The FWS must define this condition, so that both FWS staff and the public can assess if or when this threat level is reached.

This minimal treatment of threats to the WVNFS flies in the face of the current level

of private land development. Primary residence and especially second home construction in the affected areas of West Virginia and Virginia has been booming. As reported by the Washington Post, "From 1990 to 2000, West Virginia had the second-biggest jump in the nation in the share of its housing considered "seasonal," according to a West Virginia University analysis of recent census data. The state trailed only Hawaii. The Mountain State also was the sixth-fastest-growing state for second homes in the last decade, behind Hawaii, Arkansas, Tennessee; Kentucky and Georgia, said Randy Childs, a West Virginia University economist." (Sandra Fleishman, Washington Post, April 19th, 2003)

Increased second home development in the habitat of the West Virginia Northern flying squirrel is removing the forest cover so vital to the squirrel's life cycle. It is fragmenting populations, reducing food supplies, and exposing the squirrel to increased predation. In addition, condo and resort developments have contributed to changing the face of VA and WV in the last few years. The pace of this growth is astounding. Most of West Virginia lacks any land use zoning laws further exacerbating the effects of this explosive growth.

The Five-Year Review touched on the topic of highway development, but failed to address the subject in any substantive manner. Appalachian Corridor H is a large 4-lane highway planned for the northern end of the current range of the West Virginia Northern flying squirrel. Once fully completed, Corridor H will open up this region to even more resort, condo and second home development as travel times from the Baltimore-Washington corridor will be shortened considerably.

Corridor H will have another adverse impact to the WVNFS as well. The preferred alternative described in the Supplemental Final Environmental Impact Statement for the Parsons to Davis Section released in February of 2007 cuts off two small populations of flying squirrels from the rest of the Blackwater Canyon population. These squirrels will be isolated from the larger breeding population to the south and from suitable habitat. They are already cut off from suitable habitat to the north by state route 219. The fact that these squirrels will not cross a two-lane highway let alone a four-lane one is well documented by Weigl et al. in 2002 in their study of the Cherohala Skyway. Their chances of survival on this small island of habitat is doubtful. This is but one example of the ongoing threats to these fragile populations.

The Effects of Energy Development Have Not Resulted in "Reduction in the Threats"

Mining and drilling for gas in the habitat range of the WVNFS is a real threat on both private and public lands. The growth of mining in the currently defined squirrel range has increased in the past couple of years. Many acres of land are cleared of forests prior to strip mining and portal development for deep mines. Road building to reach these facilities also results in significant areas being cleared of trees.

Gas exploration and the development of pipelines in the range of the WVNFS is increasing and will further fragment the habitat of the squirrel. This makes it more vulnerable to predators and separates the flying squirrel from food sources. In addition, it isolates the squirrel from suitable mates, further isolating populations which could lead to extinction.

The development of industrial wind turbine projects which requires the removal of large swaths of sensitive high elevation ridgeline forest ecosystems also can fragment and wipe out suitable habitat for the WVNFS. There is a great deal of existing, approved or planned wind energy development in Virginia and West Virginia that could adversely affect WVNFS habitat and should have been examined more thoroughly in the Five-Year Review.

In addition, the Forest Service is currently formulating policy for wind energy development on national forest system lands that will surely result in adverse effects to the WVNFS and may in fact threaten the species' continued existence. Wind energy facilities in the east are placed at high elevation on ridge and mountain tops, the same habitat occupied by the squirrel. The vegetative clearing and road building that accompanies wind facility development would impact and further isolate WVNFS populations and fragment habitat. Should the squirrel lose its listing under the ESA, the threats to it would only increase as federal managers would have less reason to consider the needs of the WVNFS when making wind energy development decisions.

Threats Will Be Monitored Indirectly

We are very concerned about the lack of research to be done on current and future threats to the West Virginia northern flying squirrel. The exclusive focus on monitoring habitat means threats to the squirrel's existence will be monitored indirectly. Indirect monitoring of threats through red spruce habitat increase or decrease will not guarantee that the squirrel does not become extinct. This turns a blind eye to disease, loss of food sources, mates, and nesting sites, increases in predators and competitors. In addition, waiting ten years to review threats as the Post Delisting Monitoring Plan states on page 15, is unconscionable and irresponsible. The WVNFS could be irreparably harmed by that time. Given the timeframe on which the five-year review was conducted, we have little faith in timely completion of monitoring and review activities.

In conclusion, the threats described above were barely touched upon, let alone adequately considered in the Five-Year Review. This has resulted in a PDMP that fails to even acknowledge the threats caused by these activities. The very premise for delisting, that "recovery actions have resulted in reduction in the threats" is proven false by ongoing and proposed activities in likely squirrel habitat. The FWS must withdraw its proposal to delist until such time as threats to the WVNFS have been adequately

assessed.

Difficulty in Commenting on This Proposal

Citizens have run into difficulty commenting on the post delisting monitoring plan for the West Virginia northern flying squirrel. The e-mail contact listed for Fish and Wildlife in the Federal Register Notice of October 9, 2007 is Laura Hill. However when Laura Hill was contacted by the staff of Friends of Blackwater she denied being the contact person and said the e-mail address had been changed. This information was not made available to the public. Any number of people who used the Laura Hill contact e-mail may have lost their opportunity to comment. In addition the website portal for commenting was not available. An appendix to the PDMP available online specifically stated that the web portal was not available and that email contact should be directed to Ms Hill. Citizens' confidence that the Fish and Wildlife Service is interested in their comments is undermined by these sorts of errors.

Recommendations and Conclusions

The consideration of the proposal to delist *Glaucomys sabrinus fuscus* is premature at this time. Any decision to delist would be arbitrary and capricious. As we have discussed in the preceding pages, there is a significant lack of knowledge of basic elements of WVNFS existence including its population size and trends, life cycle and habitat needs. Furthermore, the very premise for delisting, a "reduction in threats" is patently false.

We are also concerned with the process approach the agency seems to have used in this case. Recovery plans, standards, adherence to assessment of (delisting) criteria and the actual recovery of the species itself seem to have been abandoned in the rush to delist. We hope this approach is not indicative of a new standard for threatened and endangered species protection at the Fish and Wildlife Service, but rather an anomaly in agency performance which can be corrected.

The post-delisting monitoring plan is fatally flawed. First of all, it relies on a number of assumptions that aren't supported by research performed on the WVNFS. It also relies too much on good will and action on the part of a number of agencies many of whom have failed to complete these same requirements in the past. In the face of declining staff and budgets we hold little hope and even less assurance that this work would be completed in the future.

Further action on the status of the WVNFS must be focused on filling significant gaps in knowledge and accurately assessing the ongoing and increasing threats to the squirrel. Obviously, more research is needed. For all the reasons discussed, we ask that the US Fish and Wildlife Service withdraw the proposal to delist the WVNFS and continue

implementing the existing recovery plan.

We appreciate the opportunity to comment on the PDMP for the *Glaucomys sabrinus fuscus*. Please include these comments and attachments as part of the administrative record for this matter. We'll also email an electronic version of this comment letter to aid in comment content analysis. If you have any questions about our comments, please feel free to contact me.

Please continue to send any materials regarding the delisting process. We, the undersigned, hereby each request to receive these documents in both CD-ROM and paper formats. The addresses and phone numbers of all signatories can be found below. Mary Krueger will act as point person for any questions on these comments.

Please contact Mary Krueger at:
The Wilderness Society
950 Pearl Hill Road
Fitchburg, MA 01420
(978) 342-2159
mary_krueger@twc.org

Sincerely,

Mary C. Krueger
Forest Policy Analyst
The Wilderness Society
950 Pearl Hill Road
Fitchburg, MA 01420
(978) 342-2159
mary_krueger@twc.org

Judith Holyoke Schoyer Rodd
Director - Friends of Blackwater
501 Elizabeth St., Room 3
Charleston, WV 25311
(304) 345-7663
info@saveblackwater.org

Hugh Irwin
Conservation Planner
Southern Appalachian Forest Coalition
46 Haywood Street
Suite 323
Asheville, NC 28801
(828) 252-9223
hugh@safc.org

Kieran Suckling
Center for Biological Diversity
PO Box 710
Tucson AZ 85702-0710
(520) 623-5252
ksuckling@biologicaldiversity.org

Ben Prater
Conservation Director
WildSouth
16 Eagle Street
Ste 200
Asheville, NC 28801
(828) 258-2667
ben@wildsouth.org

Gary Zuckett
Development Director
WV Citizens' Action Group
1500 Dixie Street
Charleston, WV, 25311
304-346-5891
garyz@wvcag.org

Leigh Haynie
Heartwood Staff Attorney
Heartwood
1009 Kidder Road
Carencro, LA 70520
(337) 886-9145
envirolah@earthlink.net

Janet Keating
OVEC
PO Box 6753
Huntington, WV 25773-6753
Mountainwild49@yahoo.com

Sherry Ann Evasic
President
Blue Heron Environmental Network,
Inc.
512 Paxton Cut Drive
Hedgesville, WV 25427
(304) 754-8717
bluheron7@earthlink.net

David Muhly
Senior Regional Representative
Sierra Club - Appalachian Region
10501 East Bluegrass Trail, Ste 2
Bland, VA 24315
(276) 688-2190
david.muhly@sierraclub.org

Mark Blumenstein
(signature available upon request)
Friends of the Lower Greenbrier River
Box 277
Alderson, WV 24910
info@lowergreenbrierriver.org

Caitlin Love Hills
National Forest Program, Director
American Lands Alliance
(202) 547-9105
(202) 547-9213 (fax)
caitlin@americanlands.org

Myra Bonage-Hale
LaPaix Herb Farm
3052 Crooked Run Road
Alum Bridge, WV 26321
lapaix@westvirginia.net

Paul Burke
Stewards of the Potomac Highlands
PO Box 455
Wardensville, WV 26851
numbersinstitutue@juno.com

Sherman Bamford
Public Lands Coordinator
Virginia Forest Watch
PO Box 3102
Roanoke, Va. 24015-1102
(540)343-6359
bamford2@verizon.net

Karla Raettig
(signature available upon request)
Legislative Representative
National Wildlife Federation
1400 16th Street, NW - Suite 501
Washington, DC 20036
(202) 797-6869
raettigk@nwf.org

Adam Webster
Interim Director
West Virginia Rivers Coalition
329 Davis Avenue #7
Elkins, WV 26241
Phone: (304) 637-7201
Fax: (304) 637-7204
awebster@wvivers.org
www.wvivers.org