Appalachian Corridor H

Parsons-to-Davis SFEIS

Appendix C

Formal Section 7 Consultation
WVNFS USFWS
Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

November 6, 2006

Mr. Henry E. Compton
Division Environmental Coordinator
Federal Highway Administration
Geary Plaza, Suite 200
700 Washington Street, East
Charleston, West Virginia 25301

Re: Appalachian Corridor H, Davis to Bismark; Formal Consultation Initiation

Dear Mr. Compton:

On October 25, 2006, the U.S. Fish and Wildlife Service (Service) received your letter requesting that we confirm the May 5, 2006 draft Biological Opinion (BO) on the Appalachian Corridor H, Parsons to Davis project as the final BO. This letter serves to confirm that request. As a result, no further Endangered Species Act (ESA) Section 7 consultation on that project is required unless the reinitiation criteria are met, project plans change, or if additional information on listed and proposed species becomes available. The Service will continue to work with you to implement the terms and conditions of the BO as agreed to.

This letter also acknowledges the Service's October 6, 2006 receipt of your October 2, 2006 letter requesting initiation of formal section 7 consultation under the ESAct on construction of Appalachian Corridor H, Davis to Bismark section. The consultation concerns the possible effects of the proposed project on the West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*). As discussed with you by phone on October 25, 2006, due to our currently heavy workload and staffing shortages, the Service has not yet fully reviewed the information provided in your revised initiation package to determine whether it contains all the information necessary to initiate formal consultation on this project. In addition, because of the strong similarities between the two project sections, and the associated formal consultations, the Service also wished to resolve any outstanding issues on the previous Parsons to Davis consultation prior to proceeding with an additional consultation. We anticipate that we will have completed a review of your Davis to Bismark initiation package by November 30, 2006. Should it be determined that additional information is required, we will notify you at that time.

The Service will continue to coordinate with your office throughout the formal consultation process, and appreciates the cooperative efforts that have been expended to address these issues. If you have further questions regarding this letter, please contact Ms. Barbara Douglas of my staff at (304) 636-6586, or at the letterhead address.

Sincerely,

Laura Hill

For Thomas R. Chapman
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

May 5, 2006

Mr. Henry E. Compton
Division Environmental Coordinator
Federal Highway Administration
Geary Plaza, Suite 200
700 Washington Street, East
Charleston, West Virginia 25301

Re: Appalachian Corridor H, Parsons to Davis; Formal Consultation Initiation

Dear Mr. Compton:

This document transmits the U.S. Fish and Wildlife Service's (Service's) draft biological opinion (BO) on the proposed construction of Appalachian Corridor H, Parsons to Davis in Tucker County, West Virginia, and its effects on the federally endangered West Virginia northern flying squirrel, *Glaucomys sabrinus fuscus*. This BO has been developed in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 et seq.). Information provided in the September 2004 Biological Assessment; the October 2005 initiation package; and discussions between the Service, the Federal Highway Administration (FHWA) and the West Virginia Division of Highways (WVDOH) have been used in the preparation of this document.

CONSULTATION HISTORY

Table 1: Summary of Section 7 Consultation History for the Proposed Action.

Date	Event/Action
7/14/2000	Service letter to WVDOH providing a list of federally listed species that could occur within the study area
7/17/2001	WVDOH letter to the Service requesting attendance at meeting to discuss modifying alternatives to avoid impacts to *G. s. fuscus*
8/9/2001	Meeting with West Virginia Division of Natural Resources (WVDNR), Service, U.S. Forest Service (USFS), U.S. Environmental Protection Agency, FHWA, WVDOH, and Baker Engineering to discuss modifying alternatives to avoid impacts to *G. s. fuscus*

8/20/2001	WVDOH letter to the Service regarding the results of studies that document the occurrence of *G. s. fuscus* within the study area
8/24/2001	Service letter to the WVDOH stating that alternatives within the Blackwater Avoidance Area would impact *G. s. fuscus* and recommending that the WVDOH should look for alternatives that would avoid or minimize impacts to *G. s. fuscus* habitat.
9/6/2001	Service amends Appendix A (Guidelines for habitat identification and management) of the *G. s. fuscus* Recovery Plan
10/9/2001	FHWA publishes a Federal Register Notice of Intent to prepare a Supplemental Draft Environmental Impact Statement (EIS) and expand the study area
10/22/2001	WVDOH submits Indiana bat mist net survey report to the Service
11/9/2001	Service letter to the WVDOH confirming that the proposed project is not likely to adversely affect the Indiana bat
12/6/2001	Service letter to FHWA responding to Notice of Intent to prepare a Supplemental Draft EIS and concurring with the proposal to expand the study area.
7/29/2002	WVDOH letter to the Service providing results of Cheat Mountain salamander surveys conducted within the study area
8/12/2002	Service letter to the WVDOH confirming that the proposed project is not likely to adversely affect the Cheat Mountain salamander
8/21/2002	WVDOH letter to the Service submitting a Biological Assessment (BA) that evaluates impacts of alternatives and concludes the some alternatives are not likely to adversely affect *G. s. fuscus*
10/2/2002	Service biologist Tolin meets with Baker Engineering to conduct field review of habitat within study area and determines that suitable habitat is present within the area of the "avoidance" alternatives.
10/11/2002	Service letter to the WVDOH reviewing 8/2002 Biological Assessment and recommending that all alternatives are likely to adversely affect *G. s. fuscus* and that a more thorough evaluation of suitable habitat should be conducted
12/11/2002	WVDOH submits Supplemental Draft EIS
1/27/2003	Service's West Virginia Field Office memo to Department of the Interior providing comments on Supplemental Draft EIS and recommending that the WVDOH select the least damaging alternative
11/20/2003	Meeting with WVDNR, WVDOH, FHWA, Dr. Michael, and Baker Engineering to discuss current information on *G. s. fuscus* in regard to the proposed project
1/5/2004	WVDOH submits original Preferred Alternative Report to the Service

1/15/2004	Meeting with Service, WVDOH, and FHWA to discuss formal consultation procedures and review next steps
2/4/2004	Service letter to the WVDOH commenting on Preferred Alternative Report and recommending that a revised BA be completed before selecting a preferred alternative
2/25/2004	Baker Engineering submits *G. s. fuscus* maps to the Service
4/29/2004	Meeting with Service, WVDOH, FHWA, Dr. Michael, and Baker Engineering to discuss results of the habitat mapping effort
5/5/2004	Baker Engineering submits revised *G. s. fuscus* maps to Service
5/5/2004	Field review with Service biologist Ceperly, WVDOH, Dr. Michael, and Baker Engineering to evaluate *G. s. fuscus* habitat mapping
7/15/2004	Meeting with Service, WVDOH, FHWA, and Baker Engineering to discuss information to be included in the revised Biological Assessment
8/6/2004	WVDOH submits revised Biological Assessment to the Service
8/23/2004	Meeting with Service, WVDOH, FHWA, and Baker Engineering to discuss contents of revised Biological Assessment and next steps
9/8/2004	WVDOH submits revised Biological Assessment, including changes discussed at the 8/23/2004 meeting
10/14/2004	Service letter to the WVDOH concurring with revised Biological Assessment and concluding that all alternatives would adversely impact *G. s. fuscus*
11/12/2004	WVDOH sends Amended Preferred Alternative Report to the Service
3/18/2005	Service letter to the WVDOH commenting on Amended Preferred Alternative Report and not objecting to selected alternative
7/15/2005	Meeting with Service, WVDOH, FHWA, and Baker Engineering to discuss required contents of initiation package and proposed conservation measures
8/19/2005	WVDOH submits initiation package and request to initiate formal consultation to the Service
9/19/2005	Service letter to FHWA acknowledging receipt of initiation package and requesting additional information
10/25/2005	WVDOH submits revised initiation package and request to initiate formal consultation
11/18/2005	Letter from Service to FHWA confirming the initiation of formal consultation

3/22/2006	Letter from Service to FHWA requesting an extension for completion formal consultation.
3/30/2006	Letter from FHWA to the Service concurring with requested extension

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The FHWA, in conjunction with the WVDOH, is proposing to construct an approximately 9-mile long highway between Parsons and Davis in Tucker County, West Virginia. The general location of the proposed project is shown in Figure 1. The project begins east of Parsons, 0.2 miles south of the northernmost point at which Tucker County 219/4 intersects U.S. Route 219, and 3 miles north of the U.S. Route 219/WV Route 72 intersection. The project ends north of Davis, at WV Route 93, 1.1 miles east of WV Route 32. The proposed facility would be a four-lane divided highway, with partial control of access, built on a new location. This project represents one section of a proposed 100-mile long highway known as Appalachian Corridor H.

The proposed highway would have two 12-foot lanes in each direction. These sets of lanes would generally be separated by a maximum 48-foot wide graded median. Paved shoulders, 10-feet wide, would be constructed on the outside travel lanes, and 4-foot wide paved shoulders would be constructed adjacent to the median. Additional cut and fill areas in most cases would extend 25 feet on each side of the road; however in some cases these disturbed areas would extend an additional 100 to 125 feet. Average width of the entire disturbed area of the roadway is approximately 140 feet. The mainline of the project would incorporate truck climbing lanes near Backbone Mountain, as well as brake check and escape ramp areas. The project would also include: (1) an approximately 1.8-mile long, two-lane by-pass for trucks connecting with U.S. Route 219, north of the Town of Thomas; (2) a two-lane connecting roadway from the mainline to U.S. Route 219 to facilitate access to the Tucker County High School; and (3) an interchange at the eastern end of the project to connect the mainline of Corridor H with U.S. Route 32 in the vicinity of the Town of Davis.

Conservation Measures

The FHWA and the WVDOH have incorporated the following endangered species protection and conservation measures into their project:

- WVDOH produced a map of *G. s. fuscus* suitable and highly suitable habitat within the action area.

- WVDOH redesigned the highway in the vicinity of Middle Run to avoid a population of *G. s. fuscus* identified during trapping surveys.

- WVDOH bifurcated an approximately 2,000-foot long section of the project in the vicinity of Middle Run to minimize potential impact of the project on *G. s. fuscus* dispersal corridors.

- WVDOH refined the project design to minimize impacts to *G. s. fuscus* suitable and highly suitable habitat. This redesign reduced impacts to highly suitable habitat by 42%. This measure also minimized impacts to Slip Hill Mill Run and its watershed.

- WVDOH agreed to provide a minimum of $728,000 to establish a Habitat Mitigation Fund. Monies from this fund will only be used to implement beneficial measures that will contribute to the management and recovery of the *G. s. fuscus* such as purchasing habitat, conducting spruce restoration efforts, or supporting scientific research necessary to support *G. s. fuscus* management. Projects supported by the fund would be selected by a group of resource managers under conditions to be established in an agreement between the agencies.

In addition to the conservation measures listed above that were developed specifically to address *G. s. fuscus* within the Parsons-to-Davis project area, the following conservation measures were developed as part of the 1996 Final EIS for the full length of the Corridor H project, and will be incorporated into the Parsons-to-Davis section. These measures help ensure that the project will be designed to minimize environmental impacts, including those to threatened and endangered species.

- WVDOH will limit clearing and grubbing activities to an area extending no more that 10 feet beyond project construction limits.

- WVDOH will purchase and preserve uneconomical land remnants and unique habitat to mitigate for upland habitat loss. (Note: These lands may not necessarily provide *G. s. fuscus* habitat.)

- Where practicable, WVDOH will design and construct bridge length and abutment placement to provide for riparian buffer strips along stream banks to facilitate wildlife movement.

- WVDOH will provide resource agencies the opportunity to review and comment during all design engineering phases, including field and office reviews, through and including final design.

These proposed conservation measures are discussed in more detail in Appendix B of the October 2005 Initiation Package.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. For the purposes of this BO, the action area includes the area within a 0.5-mile radius around the construction boundaries of the proposed project. This distance encompasses the majority of documented travel distances for *G. s. fuscus*. It should therefore be sufficient to include impacts to any squirrels whose home ranges

will be affected by the project, and any *G. s. fuscus* with adjacent home ranges that could potentially be affected by displaced *G. s. fuscus* moving into their already established home ranges.

This buffer distance is also consistent with distance established in the 1990 recovery plan. The action area (Fig. 1), is located entirely within Tucker County, West Virginia and contains a total of 6916 acres. Please note that the extent of the action area is based exclusively on potential impacts to federally listed species, and is therefore different than the "Blackwater Study Area" that was used to evaluate alternatives under the National Environmental Policy Act and previously submitted BAs.

STATUS OF THE SPECIES

Listing History

In 1985, both subspecies of northern flying squirrel, *Glaucomys sabrinus* found in the Appalachian Mountains; Carolina northern flying squirrel, *Glaucomys sabrinus coloratus*, and *G. s. fuscus* were listed as endangered (50 Federal Register 27002 [1985]). No critical habitat has been designated for *G. s. fuscus* within its range. The Service is currently conducting a 5-year status review for *G. s. fuscus* to determine if it should remain listed as an endangered species; be downlisted to a threatened species; or delisted (70 Federal Register 128 [2005]).

Recovery Plan

The Service issued the Appalachian Northern Flying Squirrels (*G. s. fuscus* and *G. s. coloratus*) Recovery Plan in September 1990. An update was issued in September 2001, which amended the Guidelines for Habitat Identification and Management (Appendix A) for *G. s. fuscus*. The amendment determined that for projects subject to ESA section 7 consultations, all areas which resemble known occupied habitat should be considered suitable habitat and potentially occupied.

Threats

Recent data collected and analyzed during the 5-year status review appear to suggest that *G. s. fuscus* is no longer subject to significant rangewide threats and may be close to recovery. Originally *G. s. fuscus* was listed primarily due to range restriction caused by widespread habitat loss and fragmentation during the railroad logging era of high-elevation spruce forests and subsequent wide-spread fires at the turn of the 20th century. New information suggests that the species is persisting widely throughout its historic range, habitat loss is localized, and a substantial amount of habitat is now secure and improving in quality.

The current known range of *G. s. fuscus* approximates the extent of the historic range. Compared to four isolated capture locations in 1985, the subspecies now is known widely from over 1100 captures at 107 dispersed sites (see later sections in this BO on Population Distribution and Trends). In the 20+ years since listing, threats to habitat have primarily been localized, on the periphery of the subspecies' range, and are not expected to pose a substantive threat in the future. Largely due to their mobile nature and plasticity in tree selection, *G. s. fuscus* continues to survive and persist even after the devastation of the historic old growth

spruce forests. Studies have confirmed the ability of *G. s. fuscus* to adjust its activity patterns and use of space to persist in a forest matrix of relict spruce stands interspersed with northern hardwood forests.

The final rule listing the species suggested that vast stretches of unsuitable habitat separated the four known population centers in 1985. We now recognize that there is more connectivity within and between the current seven known population centers, supported by large acreages of optimal and likely habitat. Increasing connectivity is expected to continue as the current spruce forest and spruce/hardwood forests continue to mature or are actively managed and restored.

Numerous conservation actions in the recovery plan have been implemented since the time of listing. Of particular importance, the Monongahela National Forest (MNF) has taken a proactive approach to avoid adverse impacts to *G. s. fuscus* habitat, alleviating the threat of logging within a large portion of the range of the species. Currently, about 60% of the squirrel's existing habitat (and 85% of the best habitat) is protected and managed on the MNF. In addition the MNF has initiated an active spruce research and restoration program, and other land managers have shown growing interest in spruce restoration. As habitat availability increases into the foreseeable future, the carrying capacity of secured and protected habitat should allow for persistence of viable populations of *G. s. fuscus*.

The final rule suggested that use of *G. s. fuscus* in the pet trade was a threat, as well as predation by pets and competition with the southern flying squirrel, *G. volans*. However, in the 21 years since the supspecies was listed, the Service has not received any evidence of overuse of *G. s. fuscus* for commercial (pet trade), recreational, scientific, or educational purposes. Human encroachment resulting in predation also has not been documented since listing and is not thought to be a substantial threat in the future. The final rule concluded that *G. s. fuscus* was threatened by competition with the *G.volans* for habitat and by spread of a parasite from the *G. volans* to *G. s. fuscus*. However, where *G. s. fuscus* and *G. volans* overlap, *G. s. fuscus* has persisted for multiple generations and has not shown signs of sickness, debilitation or death of individuals from parasite infestations in the over 1100 squirrels captured in the last 21 years.

Prior to listing, there were no known existing regulations to protect *G. s. fuscus*. Today, the majority of their range is protected by land use designations and regulatory commitments in forest plans, which would likely remain in place irrespective of the listing status of *G. s. fuscus*.

Since the time of listing, several new forest pests have been recognized (Balsam woolly adelgid, hemlock woolly adelgid, and beech bark disease). Active monitoring/control programs are in place for such pests and the preliminary analysis in the 5-year review suggests that, overall, these factors pose a low to moderate degree of risk to a relatively small portion of the habitat of *G. s. fuscus*.

Since the time of listing, detrimental effects of acid rain and climate change also have been detected in spruce-fir forests to the north and south of the range of *G. s. fuscus*. However, detrimental effects have not been detected within the range of *G. s. fuscus* and are difficult to

predict. Land managers are monitoring these potential threats to the spruce ecosystem and have indicated intent to respond by adaptive management, if necessary.

Life History

The flying squirrel, *G. s. fuscus* is a small, nocturnal, gliding mammal 10-12 inches in total length and 3-5 ounces in weight. Because of their rarity, nocturnal and secretive habits, and the remoteness of their habitat, little was known of the ecology of *G. s. fuscus* prior to its listing (Weigl 1977 *in* Service 1990). Furthermore, *G. s. fuscus* is recognized as a genetically distinct Pleistocene relict confined to montane boreal forests in the Allegheny Highlands of the central Appalachian Mountains of West Virginia and Virginia (Service 1990), Urban 1988, Payne et al. 1989, Stihler et al. 1995, Weigl et al. 1999, Sparks 2005, Menzel et al. 2004, Menzel et al. 2006(a and b) and Arbogast et al. 2005). While it nests primarily in tree cavities, it will utilize drey nests (Hackett and Pagels 2003, Menzel et al. 2004 and Menzel et al. 2000). Food habits of *G. s. fuscus* indicate reliance primarily on hypogeal fungi (truffles) and lichens, rather than upon hard mast (Maser et al. 1986, Maser and Maser 1988, Maser et al. 1978, Carey et al. 1999, Loeb et al. 2000 and Mitchell 2001). Loeb and others also observed an associative link of truffles associated with the roots of red spruce trees rather than with hardwood tress species (Ford et al. 2004). Simply put, the presence of red spruce (Urban 1988, Payne et al. 1989, Weigl et al. 1999, Hackett and Pagels 2003) and the forest structure (Carey 1989, Carey 1991, Carey 1995, Carey et al. 1999, Rosenburg 1990, McDonald 1995, Mowry and Zasada 1982) are deterministic factors in identifying *G. s. fuscus* habitat. Although *G. volans* is considered a competitor for dens where syntopic, there is limited evidence of parasite-mediated competition (Pagels et al. 1990, Reynold et al. 1999, Sparks 2005). Predators of *G. s. fuscus* may include weasel, fox, mink, owl, hawks, bobcat, skunk, raccoon, snakes and fisher.

Several authors have noted the acrobatic nature of flying squirrels in flight, with long glides including banking and turning to avoid objects in the flight path (Dolan and Carter 1977, Nowak 1999 *in* Vernes 2001). In a study by Vernes (2001), the horizontal glide distance of *G. sabrinus* varied between 10 and 148 feet, with the majority of the glides ranging from 16 to 82 feet. In this study, the most common landing tree was red spruce, although hardwood species were more readily available. Despite their dominance in the stand, nonconiferous trees were used infrequently as landing points, probably because flying squirrels have difficulty maintaining traction on the smooth, flaky bark of hardwoods such as yellow birch. For longer glides, gliding mammals usually select vertical tree trunks (Caple et al. 1983 *in* Vernes 2001). In Tucker County, West Virginia, *G. s. fuscus* was captured on one side of a cleared, vegetated power line right-of-way approximately 142 feet wide and recaptured on the other side a couple of weeks later (Michael 2002). Mature red spruce trees were present along both edges of the forest adjacent to this cleared power right-of-way.

Data is limited to accurately predict the reproductive biology of *G. s. fuscus*, primarily because most capture records are by virtue of nest box monitoring which has occurred primarily in the spring (April-May) and fall (October-November). Despite these limitations, capture data (WVDNR unpublished, 1990-2005) suggests that the majority of breeding activity occurs in the late spring and early summer and only a single litter per year is reared (Service 1990). Therefore, the most likely time of year for reproductive activity, and the presence of immobile young, appears to be April – June.

Population Distribution and Trends

When listed, *G. s. fuscus* was known from four geographic areas: Laurel Fork (Highland, Co, VA); Cranberry Glades (Pocahontas Co, WV); Cheat Bridge/Cheat Mountain (Randolph Co, WV); and Stuart Knob (Randolph Co, WV). Additional surveys led to the designation of five geographic recovery areas (GRAs) in the Recovery Plan (1990). These areas were Stuart Knob, Cheat Bridge, Cranberry, Blackwater Falls, and Spruce Knob/Laurel Fork. Unlike Recovery Units, no formal or regulatory distinction is imparted to these areas. By 1997, as distribution became better understood, Stihler et al. (1995) recognized Dolly Sods Recreation Area as a new GRA. Squirrels were also recorded from Rich Mountain in western Randolph County (WVDNRa, see above) in 1997. These records added other geographic locations for known squirrel populations.

The current known range encompasses a seven county area across two states and follows the spine of the high Allegheny Plateau in a southwest to northeast alignment in an area known as the Allegheny Highlands. Helmick Run (Grant Co, WV) marks the northeast edge and Briery Knob (Greenbrier Co, WV), the southwest boundary. The concept of "Geographic Recovery Areas" no longer sufficiently describes the population distribution across the landscape. As new locations for *G. s. fuscus* have been identified, the extent of the recovery areas has expanded and new ones have been added. The possibility of movement between some of these areas suggests that the areas are not as temporally or spatially isolated as initially believed. Instead, the known population appears concentrated in six population centers of relict habitat which have the potential to merge and overlap with time and habitat restoration efforts. These six centers are:

- Cranberry Glades/Upper Williams
- Gauley Mountain
- Kumbrabow/MWERF
- Cheat Mountain/Spruce Knob/Laurel Fork
- Stuart Knob
- Blackwater Canyon/Dolly Sods

These population areas were likely panmictic in the early Holocene and became more isolated with Pleistocene warming and post-settlement logging. Habitat modeling and historical forest-type maps suggest that prior to settlement and logging pressures, the Cranberry and Gauley Mountain areas formed a contiguous complex, and the Cheat Mountain, Stuart Knob, and Blackwater Canyon areas formed another. Although we have no evidence to suggest that landscape features prevented dispersal of flying squirrels between these complexes, the interspersed low elevations might have limited dispersal.

Presence/absence surveys for this thinly dispersed subspecies are problematic for determining population trends, status, and occupied habitat. Although biologists occasionally use live-trapping, nest box monitoring has been the primary tool for surveys. Biologists place transects of nest boxes in the survey area and check the boxes periodically for occupancy. Foraging at night, *G. s. fuscus* return to their nests before daylight, which facilitates nest box monitoring during daytime. Nest boxes are typically checked twice each year, during fall and spring. The small sample size of twice-yearly surveys, combined with the unlikely chance of a squirrel occupying a box on the day of the survey, provide scant data on the overall squirrel population.

The success of nest box monitoring relies on the squirrels occupying the boxes during the day of the survey. Menzel (2003) found that *G. s. fuscus,* in her radio telemetry study, did not make use of nest boxes as dens. All nests were either cavities or drey nests. She also noted that *G. s. fuscus* used multiple den sites, switching nests on average every three days in summer. The WVDNR's nest box monitoring program had a 2% average success rate of squirrel occupancy per box checked. These data confirm the difficulty of capturing squirrels with nest boxes and the error in relying on nest box data for determining occupied habitat. A captured individual affirms the presence of squirrels at a site. An empty box, however, does not signify absence or unoccupied habitat.

Conclusions on the status of the population drawn from these data are tentative at best. Because of the low number of squirrels captured at a site and the infrequency of recapture events, population trends are not known and a viability analysis unfeasible. Density indices based on catch-per-unit effort are likewise inaccurate because of the unsystematic survey protocol.

After18 years of biannual surveys, we can report that the number of *G. s. fuscus* recorded in the Allegheny Highlands has increased. Prior to listing, 10 known captures of this subspecies were recorded in West Virginia and one in Virginia. Eleven years of monitoring in Virginia (1985-1996) and 18 years of monitoring in West Virginia (1985-2003) recorded over 1100 individuals (mean 56/yr, range 19-107; WVDNRa).

Monitoring and surveys have increased our knowledge of the extent of *G. s. fuscus*'s range in the Allegheny Highlands. Compared to 1985 when four capture sites were known, 107 sites were known in 2006. WVDNR defines a "site" as a capture location that is greater than 0.5 mile from another capture location. This definition was based on homerange estimates available when the surveys began (e.g. Urban 1988). During 1985-2002, squirrels were captured, on average, at 18 sites per year (range 6-30). The number of sites monitored each year varied between 16 and 53 (avg 34; WVDNRa).

Despite limitations in nest box monitoring, long-term data collected from over 30 sites is the best indication of continued persistence of *G. s. fuscus* at all long-term nest box monitoring sites. One or multiple years may pass between squirrel captures, yet squirrels continue to be found at each of these long-term monitoring sites. All sites had at least one year without captures followed by a year with squirrel captures. Juveniles have been captured at approximately 65% of these sites suggesting recruitment. Because *G. s. fuscus* has a relatively short life span, averaging approximately 4 years, persistence at a single nest box site over 5 years indicates successful reproduction across multiple generations.

Habitat Availability and Home range

Odom and others (2001) derived a model from topographic conditions and proximity to conifer cover which reiterated the importance of spruce for squirrel habitat. A more recent model delineates areas of the Allegheny Highlands in which squirrels are likely to occur based on more specific habitat characteristics and preferences (Menzel 2003, Menzel et al. *2006*). The habitat

model allows us to estimate the amount of high quality habitat in the Allegheny Highlands, prioritize areas for restoration and recovery, assess anthropogenic and geologic fragmentation of the spruce forest, and analyze stewardship of the suitable habitat.

Derived from habitat use and availability studies in West Virginia, modeling efforts reflect the habitat preferences of the squirrel. Menzel's model (2003) incorporated high resolution aerial photography for vegetation characteristics. Areas with greater than 50% likelihood of use by squirrels are classified as "likely" habitat; areas with a greater than 75% likelihood of use by squirrels are classified as "optimal" habitat. This model was applied only to USGS 7.5 min quads within the Monongahela and George Washington/Jefferson National Forests from which squirrels had been recorded. A second model was created to approximate likely and optimal habitat on topographic quadrangles without captures, particularly areas outside the proclamation boundary for the Monongahela National Forest (MNF) (WVFO files, Menzel et al. 2006). According to the combined models, there are 47,000 acres of optimal habitat currently available to the northern flying squirrel in West Virginia and Virginia, and 626,000 acres of likely habitat.

Many of the areas modeled as likely habitat are not currently suitable *G. s. fuscus* habitat. Likely areas are forest patches that may not be suitable at the present time, are typically lower in elevation, less mesic, or have little or no conifer component. If forested, they may be pure northern hardwood stands, or through forestry practices and other past anthropogenic events (fires) have been converted to stands containing oak or other mast producing species less favorable to *G. sabrinus*. Regeneration of suitable squirrel habitat in the degraded, former spruce forests is most likely to occur through strategic forest management in areas that are currently forested and near areas of optimal habitat.

Telemetry studies in the southern Appalachians have provided some data on *G. s. fuscus* and *G. s. colaratus*; activities and spatial use of habitat. Animals radio tracked during the summer have a marked biphasic activity pattern with peaks between sundown and midnight and 1-3 hours before sunrise (Service 1990, Menzel, 2000). During these times squirrels are extremely active in trees and on the ground and enter a number of different nests or refuges (Ferron, 1981, Weigl et al. 1999, Menzel 2000). The long periods of time spent on the ground is thought to be associated with foraging on hypogeous fungi.

Using radio-telemetry and GIS analyses, Menzel et al. (2006) examined homerange size and habitat use on the Monongahela National Forest, Kumbrabow State Forest and the Mead Westvaco Experimental Research Forest in West Virginia during summers of 2000-2003. Male squirrels had a mean homerange size of 134 acres and females had a mean homerange size of 38 acres based on the adaptive kernal method. Homeranges of *G. s. fuscus* observed were somewhat larger than many of those previously reported for any subspecies of *G. sabrinus*. Within the central and southern Appalachians, Weigl and others (2002) found mean homerange of the Carolina northern flying squirrel to be 18.5 acres in the Unicoi Mountains of North Carolina and Tennessee whereas the three *G. s. fuscus* tracked by Urban (1988) had a mean homerange 12.8 acres during the summer and fall months near the Stuart Knob, West Virginia study area on the Monongahela National Forest. The deviation between the homeranges reported by Menzel et al. (2006) and that of others might be attributed in part to the use of the minimum

convex polygon estimator that is dependent on number of sampling locations and bearings collected. Study duration also may have influenced the homerange size reported, as individuals were tracked over an average of 12 weeks each, somewhat longer than in other studies (Urban, 1988, Weigl et al. 1999). Lastly, Menzel et al. (2006) used simultaneous triangulation to determine location, rather than physically following squirrels and inducing behavioral reactions that bias movements. Simultaneous triangulation also prevents any temporal lag between bearings collected by observers.

The large homeranges of *G. s. fuscus* observed in the Menzel et al. (2006) study may be a result of the patchy distribution and degraded condition of suitable forest habitat in the region. Due to both natural processes and past logging and burning, most high elevation spruce and mixed spruce-northern hardwood stands in the region are highly disjunct. Since many of the extant spruce and mixed spruce-northern hardwood patches are generally insufficient in size or quality to sustain a population of *G. s. fuscus*, individuals may utilize several patches or stands to meet their ecological requirements for food and den resources. Additionally, the legacy of timber harvest and fires in the red spruce forests in the central Appalachians destroyed much of the humus layer (Clarkson 1993) and undoubtedly much of the coarse woody debris associated with the original old-growth forest, leaving a degraded forest floor condition in second-growth forests. As a result of the loss of ecological function of these red spruce forests, current conditions are still lacking compared to mature, old-growth type forests. It is therefore hypothesized that homeranges observed by Menzel and others may have been inflated for these reasons.

Euclidean distance analysis indicated the squirrels used spruce, and mix spruce-northern hardwood forests habitats more than what was available across the landscape and were not deterred by open areas (Menzel et al. 2006). In summary, the presence of red spruce is thought to be extremely important to the presence of *G. s. fuscus* (Urban 1988, Payne et al. 1989, Weigl et al. 1999, Hackett and Pagels 2003). The findings of Menzel and others indicate that *G. s. fuscus* in West Virginia primarily use spruce, mixed spruce-northern hardwood, while passing freely through limited areas of open habitats surrounded by forest. This generalist approach to habitat selection has made it possible for *G. s. fuscus* to persist in and around relict spruce and mixed spruce-northern hardwood patches despite the past natural habitat changes and the more catastrophic anthropogenic forest disturbances in the last century.

Conservation Needs of the West Virginia Northern Flying Squirrel

For projects that will adversely affect *G. s. fuscus* through the removal of suitable habitat, timber clearing should be designed to occur at a time of year when it is least likely for immobile young to be present, to avoid direct take.

The protection, restoration, or enhancement of the native red spruce ecosystem and the promotion of older forest structural attributes in current spruce and mixed spruce-northern hardwood forests should be the primary objective for managing *G. s. fuscus* (Menzel et al. 2005). A forest management strategy in northern hardwood stands that combines retention of large overstory tree species valued as dens, with selective thinning to release suppressed spruce in the understory, could result in conditions more favorable for *G. s. fuscus* (Carey 2001, Schuler et al. 2002).

Active management is a valuable tool for restoring the red spruce forests and recovering *G. s. fuscus*, particularly because recent and ongoing studies have identified viable spruce restoration techniques for the central Appalachians (Schuler et al. 2002, Menzel 2003, Ford et al. 2004). Efforts to expand the coverage of red spruce forest and accelerate the time until a red spruce forest displays mature to old-growth structure in West Virginia, as suggested by Schuler et al. (2002) is prudent. Furthermore, there are forestry management techniques which have been used elsewhere to facilitate the structural development of flying squirrel habitat (Carey et al. 1999) that could be used to increase the red spruce component for *G. s. fuscus*. These types of improvements would increase the carrying capacity of habitat.

ENVIRONMENTAL BASELINE

General Description of the Action Area

The 6916-acre action area exists within the mountainous habitat of Tucker County, West Virginia. It is also located within the Black Fork/Cheat River watersheds and encompasses portions of the North Fork Blackwater River, as well as numerous smaller tributaries such as Slip Hill, Mill Run, Big Run, Tub Run, Long Run, Middle Run, and Snyder Run. Elevations range from approximately 2700 to 3600 feet above mean sea level. Forested habitats are a mix of mature hardwoods and spruce/conifer stands. Spruce/conifer areas are dominated by red spruce (*Picea rubens*), with eastern hemlock (*Tsuga canadensis*) and occasional red pine (*Pinus resinosa*). Typical hardwood overstory species include American beech *(Fagus grandifolia*), black cherry (*Prunus serotina*), yellow birch (*Betula alleghaniensis*), and maples (*Acer spp*). In both habitat types, rhododendron (*Rhododendron maximum*) and saplings of the overstory trees typically dominate the understory. Most of the forested areas have been logged two to three times in the past 100 years. Some scattered areas have been logged within the past 10 years.

Survey Efforts

As summarized in Table 2, Dr. Edwin Michael of West Virginia University has conducted a number of surveys to document the potential presence of *G. s. fuscus* within the action area. Figure 2 shows the location of those *G. s. fuscus* survey sites.

Table 2. Summary of Site-Specific Surveys Conducted near the Project Area

Date	Area	Location	Dominant Veg.	Trap Nts.	*G. s. fuscus*	*G. volans*
Aug-Sept 2000	1	East bank of Long Run	Hardwood w/ hemlock & pine	100		
Aug-Sept 2000	2	Knob to the west of Long Run elev. 3340 MSL	beech/maple	150		8
Aug-Sept 2000	3	Knob north of Middle Run elev. 3297 MSL	hemlock w/ spruce & yellow birch	250		
Aug-Sept 2000	4	Knob SE of Benbush, W of Snyder Run elev. 3226 MSL	beech/maple	150		3
Aug-Sept 2000	5	Near Rose Hill cemetery	red pine	100		
Apr/May 2001	6	W/SW of Middle Run – recently logged	hemlock w/ northern hardwoods	200	2	2

Apr/May 2001	7	West of the Right Fork of Big Run- recently logged	hemlock w/ northern hardwoods	120		
Apr/May 2001	8	E/SE of Coketon	red pine plantation	100		
Apr/May 2001	9	Between Davis and Thomas	mixed conifer plantation	100		
Apr/May 2001	10	Along the Right Fork of Big Run	mature hemlock/red spruce	250	21	
June/July 2001	10A	Big Run - north of US Route 219	mature hemlock/red spruce	138	0	27
June/July 2001	10B	Big Run - south of US Route 219	hemlock w/ northern hardwoods	438	13*	31
August 2001	10C	Big Run – east/west transects	mature hemlock/red spruce	716	53**	3
Sept 1999-May 2001	11	North Fork Blackwater River RR grade	hemlock/birch	N/A	4	

** includes 5 recaptures*
*** includes 29 recaptures*

Between August and September 2000, a survey effort was conducted at five locations of potential habitat within the "Blackwater Avoidance Area". This area was being studied to evaluate the effects of alternative routes for the proposed project. A total of 75 traps were set, resulting in the capture of no *G. s. fuscus*, 11 *G. volans*, and various other non-target species. Of the areas surveyed, the highest quality habitat was located on a knob north of Middle Run with a north-facing aspect and elevations between 3,250 and 3,300 feet. This area consisted of a large hemlock stand. Recent logging had occurred in hardwood stands surrounding this stand but not in the hemlock stand itself. Some trees within the area were estimated to be between 100-150 years old, and had diameter-at-breast heights of greater than 30 inches (Michael, 2000).

Five additional areas of potential habitat were surveyed between April and May 2001. A total of 77 live traps were set, resulting in the capture of 23 *G sabrinus*,, 2 *G. volans*, and other non-target species. Twenty-one *G. s. fuscus* were captured at the Right Fork of Big Run and 2 were captured at Middle Run. At Big Run, all *G. s. fuscus* captured were adults, with 3 males and 18 females. Two of the captured females were lactating, indicating reproduction was occurring within that area. At Middle Run, one male and one female were captured. The Big Run capture site had a southeast facing aspect and was at elevations of 3370 – 3380 feet. Although logging had not occurred within the hemlock stand itself, logging had occurred in the surrounding hardwoods. The hemlock stand contained a few red spruce trees with a diameter-at- breast height of greater than 30 inches and an estimated age of greater than 100 years old. This area had the highest quality habitat of the areas surveyed during this effort (Michael, 2001a).

Between June and July 2001 a survey effort was conducted near the previously delineated Big Run capture site in an attempt to determine the geographic boundaries of the population. Forty-four traps were set along transects to the south of U.S. Route 219, and 14 traps were set along transects to the north of U.S. Route 219. South of U.S. Route 219, the habitat was dominated by eastern hemlock with a 5-10% component of red spruce. No logging had been conducted in this

area within the last 50 years. Trapping in this area resulted in 13 captures of *G. s. fuscus*, 31 captures of *G. volans*, and other non-target species. Of the 13 captures of *G. s. fuscus*, there were 4 males, 4 females, and 5 recaptures. All captured *G. s. fuscus* were non-reproductively active adults, and were all captured in the 16 traps located farthest from U.S. Route 219. The 31 captures of *G. volans* were all in the18 traps closest to U.S. Route 219. No *G. s. fuscus* were captured in the traps located to the north of U.S. Route 219; however 27 captures of southern flying squirrels were in this area. This area was dominated by hemlock with 30-60% northern hardwoods in the canopy. Within the last 10 years, some areas of the Big Run watershed had been selectively logged for cherry and other hardwood species, and other areas had been clearcut; however, all *G. s. fuscus* were captured in areas where no recent logging had occurred (Michael, 2001b).

Additional surveys along Big Run/Right Fork of Big Run were conducted in August 2001 to delineate the eastern and western limits of the population. Seventy-two (72) traps were placed along eight transects established perpendicular to the Right Fork of Big Run. An additional 4 transects, each with 13 traps, were established east of Big Run. The efforts along the Right Fork of Big Run resulted in the capture of 53 *G. s. fuscus* including 24 individual adults (10 males and 14 females). Six individuals were captured on both sides of the Right Fork of Big Run, indicating that the squirrels commonly moved across the stream (Michael, 2001c).

Some additional surveys that were not related to the proposed project have been conducted in the Blackwater Canyon area. Surveys conducted in September 1999 and May 2001 resulted in the capture of four *G. s. fuscus*, including three males (two juvenile) and one adult female, at a site approximately 1.5 miles north of Blackwater Falls State Park along the old railroad grade following the North Fork Blackwater River. The overstory habitat consisted of 80% hemlock and 20% birch, with rhododendron dominating the understory. Elevations ranged from 2,750 and 3,180 feet (WVDNR, 2005).

Habitat Mapping

Maps of suitable squirrel habitat within the project area were developed in accordance with the 2001 West Virginia Northern Flying Squirrel Recovery Plan Amendment. Initial maps were developed based on field reviews by Dr. Michael and were refined using aerial photography. Additional mapping was developed based on the Menzel (2003) habitat model, maps and field data developed by the U.S. Forest Service, additional analysis of digital ortho quadrangles, and other available data. The maps were ground-truthed in selected locations and refined based on a multi-agency field review in May 2004. Additional information on the process used to develop the habitat maps can be found in the August 2004 BA, and is incorporated here by reference. The resulting maps delineated areas of "highly suitable" and "suitable" *G. s. fuscus* habitat. In accordance with the Recovery Plan Amendment, all areas delineated within these two categories are considered potentially occupied by *G. s. fuscus*. Highly suitable habitat generally includes areas that contain all required characteristics known to support *G. s. fuscus* including high elevations (greater than 3400 feet) and high percentages of conifers in the overstory. This designation coincides with Menzel's "optimal" category. Suitable habitat still provides the conditions necessary to support *G. s. fuscus* populations and may include areas that have high percentages of conifers in the overstory but occur at lower elevations, or high elevation areas that have greater percentages of mixed hardwoods and occur in close proximity to highly suitable

habitats. As discussed in the "Life History – Suitable Habitat" section, many areas identified as likely *G. s. fuscus* habitat by Menzel's model, may not currently provide the conditions necessary to support the squirrel. Because it was not possible to conduct field reviews at every location affected by this project, areas that were mapped as "likely" habitat were considered suitable unless field reviews or other data were available to show otherwise. As a result, it is likely that the map will over-estimate actual project impacts to *G. s. fuscus*.

Of the 6916 acres in the action area, there are 715 acres identified as highly suitable (10%) and 3513 acres identified as suitable habitat (51%). The highly suitable habitat occurs towards the western edge of the action area and runs southwest to northeast along the ridge of Backbone Mountain. Suitable habitat occurs throughout the project area, but becomes patchier towards the eastern end of the project (Figure 2). Suitable habitat generally does not occur near the towns of Thomas and Davis, or in the previously mined areas between the two towns.

Land Ownership
Most of the action area consists of privately owned timber lands with Western Pocohantas Land Corporation being the primary land holder. A small portion of the action area is within boundaries of the Monongahela National Forest.

Conservation Needs of West Virginia Northern Flying Squirrel in the Action Area
Conservation needs of *G. s. fuscus* within the action area are similar to conservation needs of *G. s. fuscus* range-wide. Specifically, designing timber removal activities so as to avoid encounters with adult females and their immobile young would decrease negative impacts by allowing adult female *G. s. fuscus* to successfully rear immobile young. Strategic project design to minimize forest clearing and establishment of conservation areas to protect, restore, or enhance the native red spruce ecosystem through the promotion of older forest structural attributes (e.g. downed woody debris, abundant tree cavities, etc.) should be included in conservation planning for the project.

EFFECTS OF THE ACTION
Construction of Corridor H, Parsons to Davis as proposed will result in the clearing of habitat for the *G. s. fuscus*. Clearing and removal of this habitat and the eventual operation of the project could adversely affect the squirrel by causing direct mortality, or through the direct and indirect effects of harm through habitat loss. Noise and other disturbances associated with construction and operation of the project also have the potential to adversely affect *G. s. fuscus*. The scope and potential effects of each factor is discussed in detail below.

Loss of Habitat
Direct Removal
Construction of the project will result in the direct removal of 25 acres of highly suitable habitat and 232 acres of suitable habitat. These areas will likely be cleared of all vegetation, will be paved, filled or excavated and represent a permanent loss of *G. s. fuscus* habitat within the action area. These impacts will affect 3.5% (25/715 acres) of the highly suitable habitat and 6.7% (232/3513 acres) of the suitable habitat within the action area.

Fragmentation of remaining habitat
In addition to habitat loss associated with tree clearing within the project footprint, construction of the project may also serve to fragment remaining parcels of suitable habitat. The remaining *G. s. fuscus* habitat may be so small and isolated from other patches of suitable/highly suitable habitat that they no longer provide the habitat characteristics necessary to support *G. s. fuscus*. The size of documented homeranges for *G. s. fuscus* varies greatly and ranges from 12 to 165 acres (Urban 1988; Menzel 2003). The size of an individual's homerange is dependant on the quality of the available habitat within the area and the sex of the individual. Females apparently have a smaller homerange than males. This difference may be explained by the males tendency to cover large distances in a short amount of time, particularly during breeding season. Another difference between males and females, especially those with young, is that a female exhibits den fidelity, rearing her young in a natal den instead of using multiple den trees.

The FHWA conducted an evaluation of the effects of habitat fragmentation by using the results of the habitat mapping effort to identify areas of suitable or highly suitable habitat that would remain after project construction, but would be smaller than minimum established homerange sizes (as listed above) or were isolated from other areas of suitable or highly suitable habitat. The detailed results of the habitat fragmentation analysis are presented in Section 4.4 and Exhibit 1 of the Formal Consultation Initiation Package for this project and are incorporated here by reference. That analysis determined that project construction would create nine habitat fragment areas, totaling 107 acres that would be no longer suitable to support *G. s. fuscus*. Currently, all of these areas are connected to larger blocks of contiguous suitable *G. s. fuscus* habitat.

The Effects of Loss of Habitat
The primary impact to *G. s. fuscus,* as a result of the proposed activities, is the loss of potentially occupied suitable and highly suitable forested habitat through the direct removal of 257 acres, and the fragmentation of an additional 107 acres, which will be rendered unsuitable. Consequently, *G. s. fuscus* that have homeranges within these affected areas will be displaced and forced to migrate, shift, or enlarge their homeranges to other available habitat in search of available food and shelter. Permanent displacement from affected areas may result in an increased level of competition for breeding, feeding, and sheltering resources in forests adjacent to the project footprint. These impacts may affect breeding, feeding, or sheltering success in the short term, and therefore survival of individual *G. s. fuscus*. Because the surrounding suitable and highly suitable habitat is likely to be occupied by other *G. s. fuscus* or *G. volans*, inter-specific and intra-specific competition for food and nest sites will increase. While radio telemetry studies indicate the homeranges of *G. s. fuscus* overlap in many instances (Michael 2000, Weigl et al. 1999, Urban 1988), and *G. s. fuscus* frequently share nests (Weigl et al. 1999), one of the critical limiting factors to recovery of *G. s. fuscus* populations is limited availability of secure nesting sites. Actions which would reduce the number of available secure nesting sites, would in turn adversely affect breeding behavior. Future breeding success will be reduced as a result of increased competition for secure nest sites. In addition, *G. s. fuscus* will be subject to increased energy expenditures from the loss of foraging habitat and increased competition for food. Malnutrition or starvation, particularly of breeding females and young *G. s. fuscus* may result. This loss may adversely affect future breeding success. Clearing of habitat associated with the construction and continued operation of this project would also reduce the amount of

cover and make the remaining habitat unsuitable. If affected *G. s. fuscus* cannot find adequate cover, predation could increase, particularly along the highway right-of-ways, which are known to attract raptors and some other predators. Weather-related mortality may also result if *G. s. fuscus* cannot find secure nest sites. The cumulative result of these adverse affects is anticipated to negatively affect the population of *G. s. fuscus* in and around the proposed project area. These impacts could potentially be reduced if, prior to timber removal, artificial den sites (*G. s. fuscus* nest boxes) were placed in the surrounding forest to enhance the availability of den sites in adjacent habitat. Impacts to foraging efficiency could be ameliorated by enhancing the quality of the adjacent habitat through measures such as placing downed trees and woody debris generated during project clearing in the remaining adjacent habitat.

Habitat loss resulting from construction of the project may also impede the ability of *G. s. fuscus* to move between the remaining patches of habitat in the action area. The *G. s. fuscus* recovery plan lists the limited and discontinuous nature of the remaining habitat as a threat to the species. Small, relict populations may suffer disproportionately from genetic constraints (e.g. increased homozygosity) as a result of decreased ability to disperse and mate with other individuals within the larger population (Service 1990). As noted in the "Life History – Population Trends" section, while some limited analysis of genetic samples has been conducted to compare results between different subspecies of *G. sabrinus* (Arbogast et al 2005; Sparks 2005), these studies did not evaluate a large enough quantity of samples from throughout the range of the subspecies to provide an analysis of baseline conditions relevant to the proposed project. It should be noted however, that suitable *G. s. fuscus* habitat, particularly within the northern portion of the subspecies' range (i.e. Grant and Tucker Counties) is more fragmented and discontinuous when compared to available habitat within the southern portion of the subspecies' range. Therefore, this potential effect to the population, if it exists, could be a more important consideration in the northern portion of the range where the action area occurs.

Range-wide habitat modeling has estimated that approximately 621,000 acres of potentially suitable *G. s. fuscus* habitat exists south of the proposed Corridor H alignment, whereas only 4400 acres of potentially suitable *G. s. fuscus* habitat exists to the north of the alignment (Service unpublished). Construction of the proposed project could decrease habitat connectivity within the northern habitats, as well as create a permanent barrier to dispersal of *G. s. fuscus* between northern and southern areas. Based on the absence of existing genetic data, it is not possible to quantify or evaluate the significance of this potential effect. As noted previously, some studies have found that other larger highways present "absolute barriers" to the movement of *G. sabrinus* (Weigl et. al. 2004). However, other studies have shown that *G. s. fuscus* are capable of moving across paved roads and other similar openings. Measures could be implemented that would minimize the potential impacts of the proposed project in this regard. Segments of the proposed project that have the widest right-of-way and associated cut and fill widths will present the most significant barrier to dispersal. For example, as described in the Initiation Package, the FHWA and the WVDOH evaluated design alternatives, such as constructing a bridge, that would minimize impacts to the Big Run area (largest documented population of *G. s. fuscus* in the action area). These alternatives were deemed to be infeasible based on excessive construction cost and increased ancillary impacts (e.g. increased excavation requirements). As a result, the proposed project will bifurcate the area known to support this large population of *G. s. fuscus*. The design of the project at this location currently consists of placing fill in the valley and

culverting Big Run, and most likely will totally impede the ability of *G. s. fuscus* to migrate to and from the remaining sections of these habitats.

Narrower segments of the road that are bordered by suitable habitat on each side provide the greatest opportunity to provide potential dispersal corridors. Therefore, restricting road widths to the minimum necessary, retaining forested habitat along highway right-of-ways, minimizing the amount of habitat disturbed, and revegetating disturbed areas within the right-of-way with native species so that they return to suitable *G. s. fuscus* habitat, would increase the potential that resident *G. s. fuscus* could successfully disperse to surrounding areas. In addition, shifting the road alignment to minimize the amount of suitable *G. s. fuscus* habitat that is bisected would help ensure that existing travel corridors are maintained to the extent possible. Many of these measures have been incorporated into the proposed project, as described in the Effects of the Conservation Measures section below. The remaining unavoidable impacts will affect a small portion of the overall range of *G. s. fuscus*.

Direct Mortality – Tree Clearing

Direct mortality to *G. s. fuscus* could occur as a result of the proposed project when cavity trees containing squirrel nests are felled to begin construction. There is limited data regarding how *G. s. fuscus* would respond if an occupied den tree was disturbed. However, it is assumed that an adult, mobile *G. s. fuscus* would flee so as to avoid lethal take if a den tree was disturbed. This assumption is supported by Dr. Andrew Carey, a research biologist for the northern flying squirrel in the Western United States. According to his experiences (Carey pers. comm., 2002), adult flying squirrels generally flee at any disturbance of an occupied den tree. Disturbances would include pounding an occupied tree with a stick, or cutting it with a chainsaw. Northern flying squirrels are even known to flee as a result of someone trying to quietly climb the tree. Methods of data collection for *G. s. fuscus* are live trapping and nest box monitoring. Both survey methods involve the release of captured individuals during the day. The normal behavior observed during these releases is for *G. s. fuscus* to flee without harm, normally climbing up a nearby tree, gliding to another tree and eventually traveling out of sight. The assumption that adults would be able to flee is further supported by the behavior of *G. s. fuscus* in that mobile adults are aware of and able to utilize several den trees. For example, Menzel and others (2004) found that 13 *G. s. fuscus* used 59 different nest trees. These squirrels used an average of 3.6 nest trees/month, switching trees frequently. During 2001, a *G. s. fuscus* was captured at the proposed location of a fire station at Snowshoe Resort. Tree clearing operations for the fire station occurred during the non-breeding season for *G. s. fuscus* (late September). The same individual was recaptured in 2002 in remaining adjacent habitat after the clearing had occurred for the proposed fire station. Therefore, if an occupied den tree were disturbed, it is assumed that a mobile adult *G. s. fuscus* would successfully flee from a tree before incurring serious injury or death.

However, northern flying squirrel litters have been recovered from falling trees which suggests that very young squirrels may not flee (Carey, pers. comm., 2002). Therefore, any immobile young present may be killed. Generally northern flying squirrels produce one litter per year and mate in late March through May, with young usually born in late May through June (Wells-Gosling and Heaney, 1984). Northern flying squirrel young may begin to leave the nest at about 35 days of age, but are not weaned until between 55 and 60 days old (Hamilton and Whitaker,

1979). The majority of young *G. s. fuscus* and/or pregnant or lactating females encountered during nest box monitoring and/or live trapping support the notion that breeding occurs in the spring and early summer (WVDNR, unpublished). Recent monitoring has documented immobile young as late as the end of July. While it is not known what the criteria for determining young were in the early monitoring of this sub-species, older data from the WVDNR show the presence of young later in the year. Trees greater than 6 inch d.b.h. and trees less than 6 inch d.b.h. with a cavity could serve as potential nest sites. Therefore, tree clearing that is conducted between April 2nd and September 14th could result in direct take of young. However any tree clearing conducted between September 15th and April 1st would coincide with the time of year that that young of the year would be mobile and be able to flee the trees. Restricting tree clearing in suitable and highly suitable habitat to this time of year would minimize the potential for direct take of immobile young.

Direct Mortality – Vehicular Strikes

Once the highway is completed and in use, there is a potential that *G. s. fuscus* could be taken through roadway mortality. There are limited data available to predict the probability of this type of take, or quantify the potential effects. While *G. s. fuscus* is known to occur adjacent to many paved roads, there are no documented occurrences of vehicular strikes of this sub-species, or other *G. sabrinus*. One study on the effects of highways on wildlife identified two *G. sabrinus* carcasses along four-lane highways in Illinois (Adams and Geis, 1981). However, Illinois is outside the documented range of *G. sabrinus*, and it is therefore likely that these specimens were actually *G. volans*, which were misidentified. Available data on *G. s. fuscus* movement patterns provides that best available information to evaluate the potential for roadway mortality.

Although *G. s. fuscus* may spend a significant amount of time on the ground foraging, the primary mode of travel is by gliding or moving through the branches of trees, they are capable of gliding up to to148 feet, with the majority of the glides ranging from 16 to 82 feet (Vernes 2001). In Tucker County, West Virginia, a *G. s. fuscus* was captured on one side of a cleared, vegetated power line right-of-way approximately 142 feet wide and recaptured on the other side a couple of weeks later (Michael 2002). Mature red spruce trees were present along both edges of the forest adjacent to this cleared power right-of-way. Squirrels tracked in North Carolina frequently crossed barriers and habitat boundaries, with documentation of a male crossing a paved road during five separate tracking sessions (Weigl et. al., 1999). In West Virginia, *G. s. fuscus* are also known to have crossed railroad right-of-way (C. Stihler, WVDNR, pers. comm.), logging roads, and gravel roads (M. Ford, USFS, pers. comm. 2005). Weigl et al. (1999) found that *G.s. coloratus* frequently crossed patches of non-forested habitat, and one crossed a paved road several times. This indicates that conceptually, *G. s. fuscus* might attempt to cross Corridor H.

However, telemetry studies conducted on *G. s. coloratus* near the Cherohala Skyway in North Carolina failed to document any evidence of squirrels attempting to cross this highway, even though in many cases the homeranges of the tracked squirrels were located in close proximity to the highway right-of-way. In some cases the home range boundaries were delineated by the highway right-of-way indicating the "significant effect" the highway had on movement patterns.

The study concluded that the road presented an "absolute barrier" to squirrel movement. The Cherohala Skyway is a two-lane paved road through mountainous region of North Carolina. Mean distances between forest edges across both sides of the right-of-way for that study ranged from 125 to 175 feet. For the Parsons to Davis project, a four-lane paved highway, typical width of the constructed roadway would be about 140 feet. Additional cut and fill areas in most cases would extend 25 feet on each side of the road; however in some cases these disturbed areas would extend an additional 100 to 125 feet. This indicates that for most locations along the proposed project, the constructed roadway would serve as a significant barrier to *G. s. fuscus* movement, thus reducing the chance that squirrels would attempt to cross the road and limiting their susceptibility to road mortality. However, *G. s. fuscus* are known to traverse distances greater than the width of the proposed project. Road crossing attempts are more likely in areas with narrow cut and fill boundaries and that have suitable habitat on both sides of the road. Squirrels are most likely to attempt to glide across the road rather than cross at ground level, thus reducing their susceptibility to vehicular mortality. We conclude that over the life of the project that there is a limited chance that some unquantifiable number of *G. s. fuscus* could be taken through direct roadway mortality, but that the overall this impact to the local population will be minor.

Effects of Noise and Associated Disturbances

Squirrels could be adversely affected through noise and other disturbances associated with construction activities, and by disturbances associated with the continued operation and use of the road. Construction activities would include tree clearing, grubbing, demolition and removal of existing structures, blasting, excavation, filling, grading, paving, and general operation of machinery and heavy equipment. While no studies have specifically evaluated *G. s. fuscus*'s response to noise, anecdotal evidence suggests that squirrels may be tolerant of noise and construction activity. In 2002, a male *G. s. fuscus* was captured at Snowshoe resort within 240 to 350 feet of locations where snowmaking machines had been operating for the three nights prior to the capture. Additionally, a lactating female *G. s. fuscus* was captured approximately 1.5 miles south of Snowshoe's Camp Wilderness in a small forested area that was surrounded by areas cleared of vegetation, active construction sites, condominiums, and roads heavily used by construction machinery and other vehicles, (Michael, 2002). In 2001, a pregnant female was captured and then recaptured during the same survey at Snowshoe Mountain near a heavily used and active ski lift (Michael 2001). These captures, in addition to the March captures of three scrotal male *G. s. fuscus* in the same area, suggest that breeding activity can occur in disturbed areas. These data also appear to indicate that while *G. s. fuscus* may be displaced from areas of direct construction they would still attempt use areas adjacent to construction activities. The extent that *G. s. fuscus* would continue to use these habitats and the degree that their behavior was disrupted would likely be correlated to the severity and extent of noise and disturbance occurring in the surrounding areas.

For Corridor H, the most potentially disruptive effects are associated with initial construction (major excavation, etc) and would be temporary. Construction of this entire segment of Corridor H is anticipated to last approximately 3-5 years. Activity in any specific area of the project will not occur for this entire duration, but may be intermittent. After that time, disturbances would be limited to continued maintenance such as mowing the right-of-way, occasional road repairs

and repaving, and the long-term and continuous use of the road (truck and car traffic, snow plowing, etc.) These types of disturbances would be much less intense than those experienced during construction, and it is likely that squirrels would adapt to these continued activities. Nest box monitoring has demonstrated that *G. s. fuscus* utilize nest boxes adjacent to major roads with truck traffic and also along railroads. In addition, telemetry studies along the Cherohala Skyway frequently documented *G. s. colratus* utilizing areas along the forest edge adjacent to the highway right-of-way, as well as foraging in large piles of timber at the forest/right of way junction which were pushed to the side during right of way clearing operations (Weigl et. al. 1999). In summary, it appears that any adverse effects to *G. s. fuscus* as a result of noise and other disturbances associated with the construction and continued operation of the highway will be limited in nature, with the most severe effects being associated with temporary behavioral alterations as a result of initial construction. Based on this analysis, while adverse effects may occur as a result of noise and associated disturbances, these effects will not "significantly impair essential behavioral patterns, including breeding, feeding, or sheltering", and therefore do not rise to the level of take as defined by the ESA.

Implementation of Conservation Measures

The FHWA and the WVDOH have incorporated numerous conservation measures into the design of the proposed project. A summary of those measures is provided in the "Description of the Proposed Action – Conservation Measures" section of this document. Additional detail is provided in the August 2004 BA and the Initiation Package and is incorporated here by reference.

Most significantly, the FHWA and the WVDOH have selected the least damaging practicable project construction alternative in regards to direct removal of *G. s. fuscus* habitat. They then refined the selected alternative to further reduce those direct impacts as shown in Table 3 below.

Table 3. Impacts to Acreage of *G. s. fuscus* Habitat as a Result of Project Modifications

	Highly Suit.	Suitable	Total
Original	43	226	269
Refined	25	232	257
Change	*-18*	*6*	*-12*

Further modifications to the proposed design and alignment were made to reduce fragmentation of remaining *G. s. fuscus* habitat (e.g. near Middle Run) and increase the potential that squirrels may be able to migrate across selected sections of the roadway. Additional compensatory measures, in the form of monies to be used to fund conservation actions for the benefit of *G. s. fuscus*, have been provided to partially offset unavoidable habitat loss. As a result of these measures, anticipated adverse effects of the project as a result of direct and indirect loss of habitat have been substantially avoided and minimized.

CUMULATIVE EFFECTS

Cumulative effects include the combined effects of any future state, local, or private actions that are reasonably certain to occur within the action area covered in this BO. Future federal actions

that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

As noted in the Baseline section, lands within the action area consist of a mixture of publicly owned National Forest Lands, and privately owned lands. Because all activities that occur within the National Forest are subject to consultation under section 7 of the ESA, no cumulative impacts within suitable *G. s. fuscus* habitats on public lands are expected. The majority of suitable *G. s. fuscus* habitat on privately owned lands is currently used as timber land. These private lands could be subject to future cumulative impacts. Private land holders could initiate timber harvesting activities at some time in the future that would adversely affect *G. s. fuscus* populations in the action area. In addition, construction of the proposed road is expected to increase accessibility to surrounding lands and could spur increased development in the lands adjacent to the project. Private development activities could include mineral mining, accelerated logging, or development of commercial, residential or recreational facilities. A cumulative effects assessment was conducted by the FHWA in section 5.4.2 of the BA, and is incorporated here by reference. That analysis suggests that there is an adequate amount of non-environmentally sensitive, low elevation, land (e.g. unsuitable *G. s. fuscus* habitat) within a 30 minute drive distance of the proposed highway, to support all development reasonably expected to occur as a result of the highway construction. This includes areas both within and outside the action area.

Unless a project is underway or a particular project proponent comes forth, it is not possible to determine the number of acres that may be cleared, or the precise locations where clearing may take place. At this time, the Service is not aware of any planned activities of this nature within the action area, nor do we have any specific information on activities that are "reasonably certain to occur." Therefore, cumulative effects, as defined in the ESA, are not reasonably certain to occur within the action area and will not be addressed further in this BO.

CONCLUSION

Take in the form of direct mortality and harm through habitat loss is reasonably expected to occur as a result of this project, resulting in a decrease in reproduction and numbers of *G. s. fuscus* within the action area. However, the project has been designed to avoid and minimize these adverse impacts to *G. s. fuscus*, and the action area should be able to sustain reproducing populations of *G. s. fuscus* after project construction. Project impacts will result in the loss of 364 acres of habitat for the *G. s. fuscus* and will be restricted to a localized portion of the species range. It is estimated that there are 47,000 acres of highly suitable habitat currently available to *G. s. fuscus* in West Virginia and Virginia, and roughly 626,000 acres of suitable habitat. The project will impact 0.05% of the available highly suitable and suitable habitat for the species. Therefore, the rangewide distribution of this sub-species will not be reduced.

After reviewing the current status of *G. s. fuscus*, the environmental baseline, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that constructing Corridor H, Parsons to Davis, as proposed, is not likely to jeopardize the continued existence of the *G. s. fuscus*. Jeopardize the continued existence means to engage in an action that would be expected directly or indirectly, to reduce appreciably the likelihood of both survival and recovery

of *G. s. fuscus* by reducing the reproduction, numbers, or distribution of that sub-species. No critical habitat has been designated for this sub-species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA, prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the FHWA and any applicant, agent, or contractor as appropriate, for the exemption of section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the FHWA should (1) fail to assume and implement the terms and conditions, or (2) fail to require an applicant, agent or contractor to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to any permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR § 402.14(i)(3)].

Level of Take

As noted in the Baseline section, surveys conducted in and around the action area between August 2000 and July 2001 documented the presence of at least 41 individual *G. s. fuscus* in the area. However, the results of these surveys should not be used to quantify the number of *G. s. fuscus* that may be affected by the proposed project. These surveys were conducted a number of years ago, and the proposed project may not be constructed for a number of additional years. As a result, the survey data are not likely to be reflective of populations within the action area at the time that the impacts will occur. In addition, as noted in the Life History section, presence/absence surveys for this thinly dispersed subspecies are problematic for determining population levels. Rather these results serve to confirm that suitable habitat within the action area is indeed occupied by populations of the *G. s. fuscus*. There is no practical means to directly measure the number of individual *G. s. fuscus* affected by the alteration of suitable habitat associated with the proposed action, and the Service anticipates incidental take of the *G. s. fuscus* will be difficult to detect because of the secretive nature of the sub-species. Therefore, for most forms of take, the anticipated level of take is expressed most accurately in terms of acres of habitat affected.

The Service anticipates that the proposed project could cause incidental take of *G. s. fuscus* either as a result of harm through loss of habitat, or direct mortality.

Loss of Habitat: A total of 364 acres of highly suitable/suitable *G. s. fuscus* habitat will be lost either directly or indirectly as a result of the proposed project. Direct clearing of habitat for project construction will remove 257 acres, while fragmentation of remaining habitat will make an additional 107 acres unsuitable. Consequently, *G. s. fuscus* present within these affected habitats will suffer harm as a result of a decreased ability to feed, breed, and obtain shelter. These effects may cause increased mortality of squirrels within the affected areas. In addition, squirrel populations present along the nine miles of highway may suffer from decreased ability to disperse between areas of suitable habitat, potentially resulting in decreased genetic health of populations.

Direct Mortality: Direct mortality of *G. s. fuscus* could occur through loss of immobile young or vehicular strikes.

- Loss of Immobile Young: All immobile young that are present within the 257 acres of *G. s. fuscus* habitat to be cleared could be killed if trees are cut between April 2 and September 14.
- Vehicular Strikes: After the project is in operation, an unquantifiable, but likely low number, of *G. s. fuscus* may be killed as a result of collisions with vehicles using this nine mile stretch of highway.

However, implementation of the terms and conditions associated with the reasonable and prudent measures will reduce the potential for incidental take. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize incidental take of *G. s. fuscus*. In order to be exempt from the prohibitions of section 9 of the ESA, the FHWA must comply with the following terms and conditions which implement the RPMs and outline reporting/monitoring requirements. These terms and conditions are non-discretionary. Each RPM is listed in italics, followed by numbered terms and conditions that implement each RPM.

RPM 1: Avoid Direct Take of Immobile Young

Restricting tree clearing activities within suitable and highly suitable habitat so that they only occur when no immobile young are present would avoid direct take of young that are unable to flee from trees being cleared.

1.1 All trees within suitable or highly suitable habitat that provide potential nest sites (i.e., all trees greater than 6 inch d.b.h., and trees less than 6 inch d.b.h. with a cavity) will be

removed only between September 15 and April 1, when both adult and young *G. s. fuscus* are expected to be capable of avoiding construction activities. Trees without cavities and with a d.b.h. less than 6 inches (non-nesting trees) may be cleared during the period from April 2 to September 14, as needed for project construction.

RPM 2: Reduce impacts of habitat loss by enhancing nesting and foraging habitat in remaining habitat.
As discussed in the "Effects of Loss of Habitat" section, the availability of nest sites may limit *G. s. fuscus* distribution and population size. Potential nest sites will likely be removed during clearing associated with the project construction. Impacts associated with loss of nesting habitat could potentially be reduced if, prior to timber removal, artificial den sites (nest boxes) were placed in the surrounding forest to enhance the availability of den sites in adjacent habitat. Impacts to foraging efficiency could be ameliorated by enhancing the quality of the adjacent habitat through measures such as placing downed trees and woody debris generated during project clearing in the remaining adjacent habitat.

2.1 Nest boxes must be installed in forest adjacent to construction areas to enhance nest site availability for *G. s. fuscus* that will be displaced during construction. Current USFWS guidelines require 15 boxes to be installed for the first 50 acres impacted, and 1 nest box for each additional 5 acres (Service 1990). Thus, for the 257 acres proposed to be cleared, a total of 57 nest boxes would be required. All nest boxes will be installed in forest adjacent to areas to be cleared at least six months prior to the start of tree clearing. Nest boxes will be constructed according to designs specified by the Service or the WVNDR. The location of all nest boxes will be documented using GPS or other similar technology, and will be coordinated with the Service prior to placement. Characteristics of the forest within 100 feet of each nest box will also be recorded, using forms provided by the Service.

2.2 Trees and woody debris generated during clearing of highly suitable and suitable habitat shall be gathered and placed in piles within or adjacent to remaining highly suitable and suitable habitat. Because *G. s. fuscus* may be expected to travel an average of 1500 linear feet from the center of their homerange (M. Ford, Pers. Comm. Year), one pile on each side of the highway should be placed for every 1500 feet of road frontage adjacent to suitable or highly suitable *G. s. fuscus* habitat. Pile design and placement shall be coordinated with the Service prior to clearing.

RPM 3: Reduce barriers to dispersal by retaining and restoring adjacent habitat.
As discussed in the "Effects of Loss of Habitat" section, construction of the proposed project may create barriers to *G. s. fuscus* dispersal. Narrower segments of the road that are bordered by suitable habitat on each side provide the greatest opportunity to provide potential dispersal corridors. Therefore, restricting road widths to the minimum necessary, retaining forested habitat along highway right-of-ways, minimizing the amount of habitat disturbed, and revegetating disturbed areas with native species so that they return to suitable *G. s. fuscus* habitat, would increase the potential that resident *G. s. fuscus* could successfully disperse to surrounding areas.

3.1 The FHWA and the WVDOH shall limit clearing within the project right-of-way to the minimal size needed to construct the project. Where possible, spruce trees and forested habitats should be retained as close as possible to the highway.

3.2 Prior to initiating any construction activities, the FHWA and the WVDOH shall develop a reclamation plan so that to the extent possible after project construction, disturbed areas will be revegetated with native, non-invasive species consistent with those found in *G. s. fuscus* habitat. The plan shall be submitted to the Service for review and concurrence.

3.3 The FHWA and the WVDOH shall develop a right-of-way maintenance plan that restricts activities in areas of *G. s. fuscus* habitat so that existing habitats will be maintained and reclamation plans will not be impeded. The plan shall be submitted to the Service for review and concurrence.

RPM 4: Implement all Proposed Conservation Measures.
In order to avoid and minimize adverse effects to *G. s. fuscus* as a result of the proposed project, the FHWA and the WVDOH have coordinated with the Service to develop and implement project specific conservation measures. The resulting beneficial effects are described in the "Implementation of Conservation Measures" section of this BO.

4.1 All conservation measures proposed in Appendix B of the October 2005 "Appalachian Corridor H Parsons-to-Davis Project; West Virginia Northern Flying Squirrel Formal Consultation Initiation Package" shall be incorporated as an integral part of the project and implemented as proposed.

4.2 Within 30 days of signing a Record of Decision for the project, the FHWA and the WVDOH shall have: 1) completed an agreement with the Service, and other resource trustees, as appropriate, outlining the management and use of monies associated with the Habitat Mitigation Fund (as described in Appendix B of the Initiation Package); and 2) placed the funds in a dedicated account set up to support only the designated uses. Under this agreement, the Service shall have the ability to direct use of funds for designated uses by other parties to the agreement.

RPM 5: Develop and Implement a Monitoring Program to Track Incidental Take Associated with the Project.
It is anticipated that some of the nesting and foraging habitat for *G. s. fuscus* will be removed and fragmented. Those *G. s. fuscus* displaced from these areas will be subject to reduced survival as a result of decreased ability to feed, reproduce, and obtain shelter. Monitoring studies have the potential to identify these effects. A plan for surveying, monitoring, and reporting incidental take of *G. s. fuscus* within the action area shall be developed and conducted in consultation with the Service. The purpose of the monitoring plan is to: 1) determine whether the actual level of take occurring is in compliance with the established level of incidental take; 2) assess the effectiveness of RPMs and conservation measures over time; and 3) evaluate the response of *G. s. fuscus* to the disturbance that will occur in the action area.

5.1 Direct loss of habitat: The incidental take statement authorizes direct clearing of 257 acres of *G. s. fuscus* habitat. In order to ensure that this level is not exceeded, the FHWA shall monitor the amount of clearing conducted during construction of the project. The FHWA shall use the already developed *G. s. fuscus* habitat map and aerial photography of the project area that is no more than one year old at the initiation of construction to establish a baseline habitat conditions map. All areas cleared for the project shall be delineated on the habitat map. Acreages of highly suitable and suitable habitat cleared shall be calculated annually. Results including acreage figures, a corresponding map of the current habitat status, and whether seasonal clearing restrictions (as described in RPM 1.1 above) were used for each cleared area, shall be reported to the Service annually as described in 5.3 below.

5.2 Tracking of squirrels: The FHWA and the WVDOH, under consultation with the Service, will develop a program to monitor the response of *G. s. fuscus* to construction and operation of the proposed project.

- This tracking program shall include annual monitoring of nest boxes, trapping, and radio telemetry of *G. s. fuscus* within the action area. Telemetry efforts shall target tracking of three *G. s. fuscus* annually.

- Baseline conditions shall be established by conducting monitoring within the year prior to initiation of construction. Monitoring shall be continued annually for the duration of construction, and two years post-construction.

- All *G. s. fuscus* monitoring efforts shall be conducted by a qualified surveyor with experience identifying and working with *G. s. fuscus*. At the time work is conducted, surveyors must hold any permits required by the Service and have a valid collecting permit from the WVDNR.

- The FHWA and the WVDOH shall coordinate all surveys with the Service prior to conducting the work. Proposed survey locations, frequency, level of effort, and methods for each field season shall be submitted to the Service for review and concurrence at least 45 days prior to the beginning of each monitoring season.

- The applicant shall notify the Service and the WVDNR within 5 working days of the capture of each *G. s. fuscus*. Field data relative to captures and observations of *G. s. fuscus* shall be reported regularly to the Service in an informal manner as notable events occur. An annual report of all findings regarding *G. s. fuscus*, including raw data, shall be furnished to the Service and the WVDNR annually as described in 5.3 below.

5.3 Reporting: An annual report of project related efforts in regard to the *G. s. fuscus* shall be furnished to the Service and the WVDNR no later than January 15 following each monitoring year. This report shall include: 1) a description of all activities implemented in accordance with the RPMs during the previous year (e.g. number and location of nest

boxes installed or debris piles created); and 2) a description of the methods, results, and associated data analysis of all monitoring as described in 5.1 and 5.2 above.

RPM 6: Implementation of these minimization measures shall be ensured by appropriately informing all project personnel and contractors.

The FHWA and the WVDOH have the responsibility to ensure that all RPMs and their associated terms and conditions are fully implemented over the life of the project, and that the permitted level of take is not exceeded. Unless workers on-site are familiar with the contents of the Biological Opinion and the presence of *G. s. fuscus*, they may inadvertently engage in actions that would adversely impact listed species in violation of the terms and conditions of the Biological Opinion.

6.1 In order to ensure compliance with these terms and conditions, the FHWA and the WVDOH shall instruct all personnel and contractors potentially operating within the action area and their supervisors, as appropriate, about the requirements and restrictions identified within, or developed as required by the terms and conditions of this Biological Opinion. The requirements and restrictions of the RPMs and associated terms and conditions shall be placed as special provisions in contract specifications and described in any work manuals as appropriate.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service is not providing any conservation recommendations at this time.

REINITIATION NOTICE

This concludes formal consultation for the Corridor H, Parsons to Davis. You may ask the Service to confirm this draft biological opinion as a final biological opinion on the prospective action. The request must be in writing. If the Service confirms this as the final biological opinion on the project, no further section 7 consultation will be necessary except if any reinitiation criteria are met. As required by 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such a take must cease, pending reinitiation.

The Service appreciates the opportunity to work with the FHWA and the WVDOH in fulfilling our mutual responsibilities under the Endangered Species Act. If you have any questions regarding this letter, please contact Ms. Barbara Douglas of my staff at (304) 636-6586 ext. 19, or at the letterhead address.

Sincerely,

Thomas R. Chapman
Field Supervisor

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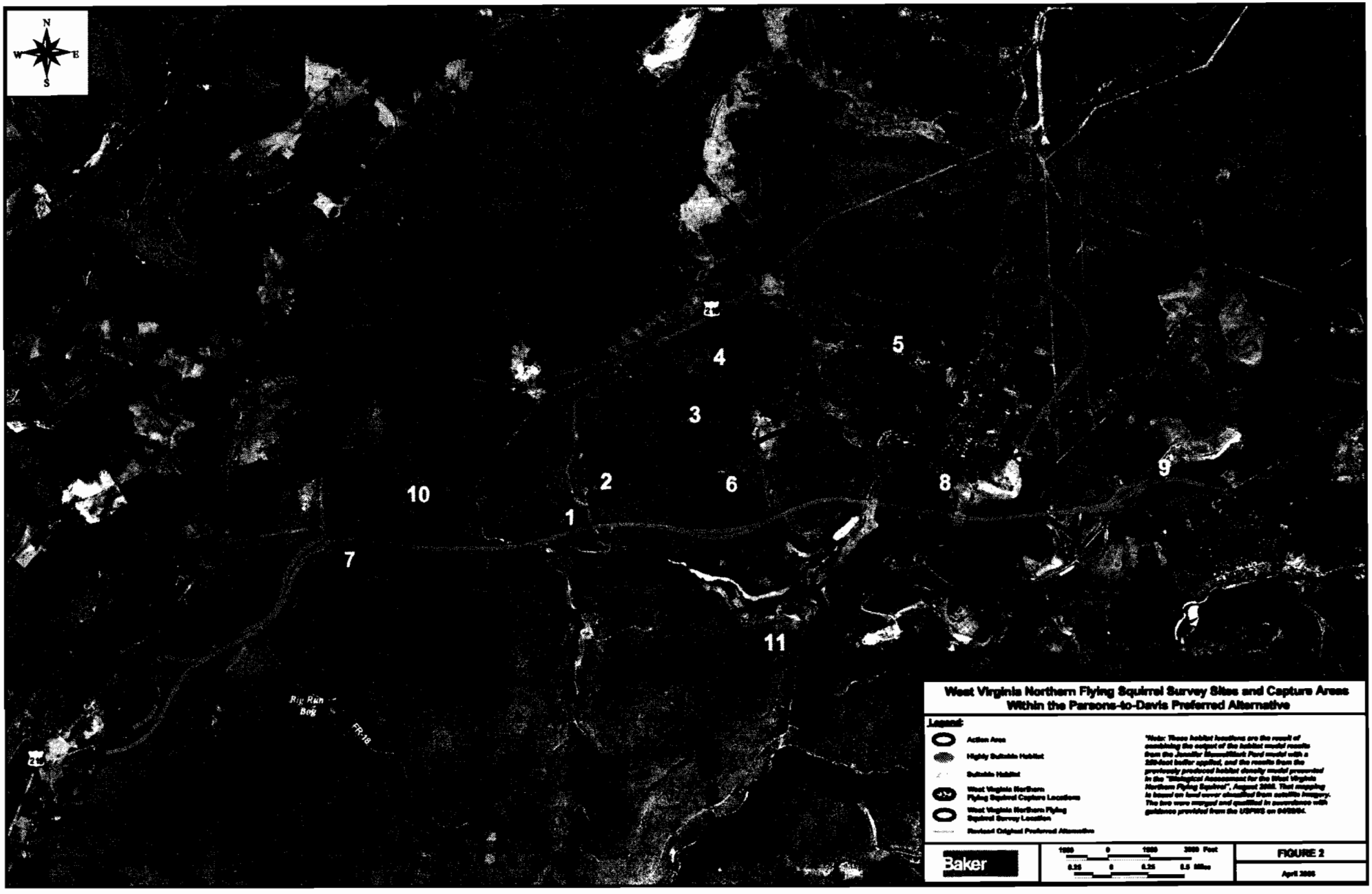
TABLE OF CONTENTS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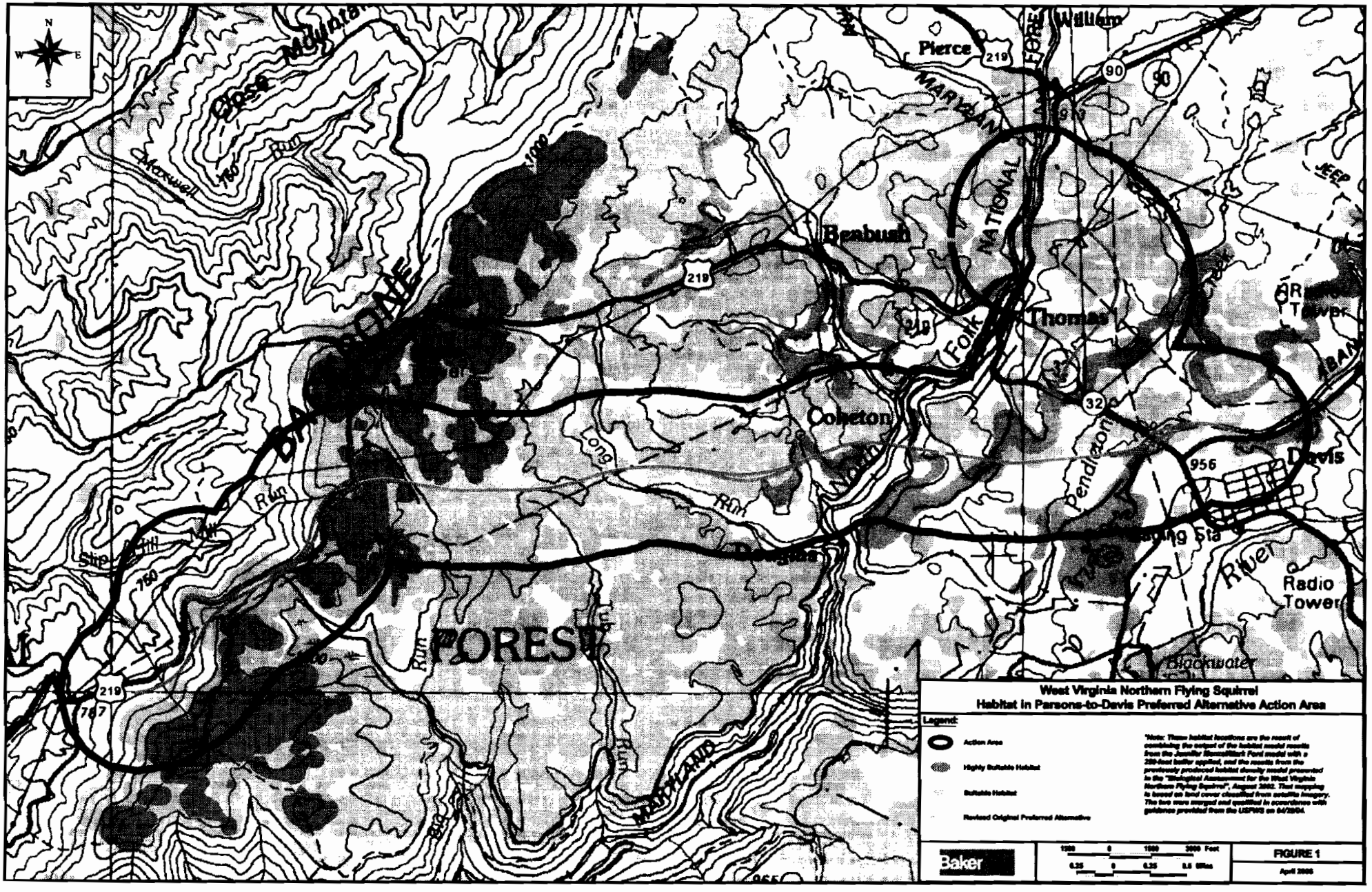
Big Run Bog
FR-18
West Virginia Northern Flying Squirrel Survey Sites and Capture Areas Within the Parsons-to-Davis Preferred Alternative
Legend:
Action Area
Highly Suitable Habitat
Suitable Habitat
West Virginia Northern Flying Squirrel Capture Locations
West Virginia Northern Flying Squirrel Survey Location
Revised Original Preferred Alternative
Baker
1000 0 1000 2000 Feet
0.25 0 0.25 0.5 Miles
FIGURE 2
April 2006


N
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MARYLAND
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Maxwell
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Bemboush
Thomas
Folk
Coketon
Long
Run
North
Fork
Pendleton
956
Davis
Stip
Hill
760
767
FOREST
Run
MARYLAND
Radio
Tower
River
Blackwater
West Virginia Northern Flying Squirrel
Habitat in Parsons-to-Davis Preferred Alternative Action Area
Legend:
Action Area
Highly Suitable Habitat
Suitable Habitat
Revised Original Preferred Alternative
"Note: These habitat locations are the result of combining the output of the habitat model results from the Jennifer Stansfield's Ford model with a 200-foot buffer applied, and the results from the previously produced habitat density model presented in the "Biological Assessment for the West Virginia Northern Flying Squirrel", August 2002. That mapping is based on land cover classified from satellite imagery. The two were merged and qualified in accordance with guidance provided from the USFWS on 04/28/04.
Baker
1500 0 1500 3000 Feet
0.25 0 0.25 0.5 Miles
FIGURE 1
April 2005