

## COMPATIBILITY DETERMINATION

**USE:** Pedestrian Travel to Facilitate Priority Public Uses

**REFUGE NAME:** Canaan Valley National Wildlife Refuge

**DATE ESTABLISHED:** August 11, 1994

**ESTABLISHING AUTHORITY:** Fish and Wildlife Act of 1956, as amended, 16 U.S.C §§ 742a *et seq.* (70 Stat. 1119, Aug. 8, 1956)  
Emergency Wetlands Resources Act of 1986, *esp.* 16 U.S.C. § 3901 (100 Stat 3582, Nov. 10, 1986).

### **PURPOSE(S) FOR WHICH ESTABLISHED:**

- (1) For the development, advancement, management, conservation, and protection of fish and wildlife resources. 16 U.S.C. § 742(f)(a)(4).
- (2) For the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill the international obligations contained in various migratory bird treaties and conventions....16 U.S.C. § 3901(b).

### **MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:**

To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. National Wildlife Refuge System Improvement Act, 16 U.S.C § 668dd(a)(2).

### **DESCRIPTION OF USE:**

#### **(a) What is the use? Is the use a priority public use?**

The use is pedestrian travel to facilitate priority public uses on the Canaan Valley National Wildlife Refuge (Refuge). Priority public uses of the National Wildlife Refuge System as defined by statute regulation are hunting, fishing, wildlife observation and photography, environmental education, and interpretation. 16 U.S.C. § 668ee(2); 50 C.F.R. § 25.12. Pedestrian travel includes walking, cross country skiing, and snowshoeing.

#### **(b) Where would the use be conducted?**

Since the establishment of the Refuge in 1994, pedestrian travel has been allowed, and will continue on the 7.57 miles of designated roads and trails listed below:

Forest Road 80 (FR 80)-2.20 miles

Idleman's Run Road (.21 miles) and wildlife observation trail (.39 miles)-0.60 miles

Freeland Tract wildlife observation trail-0.24 miles  
Beall Tract wildlife observation trails-4.53 miles

Additionally a commercial operation, White Grass, Inc., on the Kelly-Elkins tract offers snowshoeing and cross-country skiing on the trails listed below, that traverse both Refuge and adjoining private land. These routes comprise 10 miles of groomed ski trails that provide the public an opportunity to view winter wildlife and forest communities.

Three Mile Trail-3.0 miles  
Powderline Trail-1.1 miles  
Timberline Trail-1.2 miles  
Falls Overlook-0.6 mile  
Barton's Loop-0.2 mile  
Heartland Trail-1 mile  
Upper Falls Trail-0.5 mile  
Fern Gully Trail-0.4 mile  
Blackbirds Wing-0.9 mile  
Hawthorne Trail-0.7 mile  
Cross Cut Trail-0.4 mile

The recent refuge addition of 11, 541 acres (Main Tract) includes 22.2 miles of roads and trails where pedestrian travel will be allowed:

Camp 70 Road and Delta 13 Trail -1.81 miles  
Brown Mountain Trail-2.38 miles  
A Frame Road- 4.84 miles  
Cabin Mountain Trail-1.37 miles  
Summit View Trail-0.79 miles  
Sand Run Trail-0.94 miles  
Middle Ridge Trail-3.71 miles

In response to public interest, additional trails have been designated for pedestrian travel. These include:

Brown Mountain Overlook Trail – 1.96  
Middle Ridge Trail (Extension) – 0.87  
Glade Run Crossing Trail (S) – 0.90  
Glade Run Crossing Trail (N) – 0.75  
Blackbird Knob Trail – 0.65  
Blackwater River Trail – 1.33  
Swinging Bridge Trail – 1.07  
Valley Overlook – 0.06

The above pedestrian routes, totaling 41 miles, including 10 miles of cross-country skiing and snowshoeing trails provide the public with an opportunity to experience Refuge wildlife and plant communities in a diversity of habitats. Appendix 6 details the dominant plant communities that can be experienced from designated pedestrian roads and trails. The roads and trails have been used for pedestrian travel for many years. They have existing compacted surfaces that meet refuge criteria for route compatibility as

presented in Appendix 2-Checklist For Route Compatibility. Maps of pedestrian routes are shown in Figures 1 and 2. A map of skiing and snowshoeing trails is shown in Figure 3. See Appendix 3 for a description of each route found compatible for pedestrian travel at the current use level.

Refuge roads and trails traverse high elevation wetland, spruce-fir, mixed conifer/hardwood and northern hardwood forest habitats. Wildlife species occurring near roads and trails include various migratory birds, turkey, white-tailed deer, ruffed grouse, various furbearers, reptiles, and amphibians (Appendix 7). The threatened Cheat Mountain salamander (*Plethodon nettingi*) has been found within the spruce-fir forest that is traversed by FR 80. Refuge inventories have not found this species in the vicinity of the road. The endangered West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) has been documented on refuge property near the end of FR 80.

During the hunting seasons between late September through February and between late April through the end of May (spring turkey season) all Refuge areas open to hunting are open to cross-country foot travel by licensed hunters. Unlike other priority public uses that can be conducted from designated routes, hunting requires that participants be able to pursue game animals off roads and trails.

Many unique and rare plant species occur, or are likely to occur, on the Refuge. At least 26 species of plants found in Canaan Valley have been documented five times or less in the state of West Virginia. Plants tracked by the West Virginia Division of Natural Resources as state Species of Concern and have documented occurrences in Canaan Valley are listed in Appendix 1. Inventories have shown that some rare plants do grow near or directly adjacent to existing roads and trails.

**(c) When would the use be conducted?**

Pedestrian travel occurs throughout the year, but may be concentrated at times when multiple priority public uses coincide. Daily use hours are between one-hour before sunrise to one-hour after sunset. A Special Use Permit is required to hunt raccoon at night. Most cross-country skiing and snowshoeing occur mid-November through mid-March. Hunting occurs between October and March and in April through May as described above. Fishing is allowed year-round subject to West Virginia State fishing regulations. Wildlife observation and photography occur year-round but observation of returning neotropical migrant birds peaks in May and June. Raptors are most common in summer and fall. Viewing of fall foliage is popular between mid-September and mid-October. Opportunities exist year-round for environmental education and interpretation.

**(d) How would the use be conducted?**

Pedestrian travel is allowed on the Refuge. Visitors traveling on foot park vehicles at Refuge parking areas, along designated Refuge roads and trails, and public roads. Visitors engaged in non-consumptive priority public uses use designated Refuge routes to access other priority public uses. They enter the Refuge at public entry points by foot or drive to Refuge parking areas and walk from there. Pedestrian travel on the Refuge is conducted in accordance with the stipulations necessary to ensure compatibility. To accommodate other users and promote a positive wildlife observation experience,

pedestrian group size is encouraged to be small. Groups larger than 15 persons must contact the refuge office for a special use permit. Large groups will be informed of any environmental education programs that are scheduled or arrangements can be made to provide programs for students, scout groups, etc. Routes will be monitored annually to determine if they remain compatible subject to the route compatibility criteria shown in Appendix 2.

Some trails will not be designated for public access and as such will be closed and marked with signs. Information kiosks identify the roads and trails open for pedestrian travel and explain allowed public uses. The three designated wildlife observation trails on the south end of Canaan Valley (Freeland Tract, Beall Tract, and Kelly/Elkins Tract) are described in Refuge brochures. Refuge visitors who desire nature trails to walk are referred to these trails and the newly designated trails on the Main Tract. Existing Refuge brochures will be updated to show all trails designated for pedestrian travel. Parking lots have been constructed at the trailheads of Freeland, Beall, and Main Tract trails.

Visitors on cross-country skis and snowshoes travel to the refuge by departing from Refuge roads or parking areas on designated roads and trails. They then ski or snowshoe to the above designated trails. White Grass, Inc., grooms and maintains the above Kelly-Elkins Tract trails throughout the winter. The business has been issued an annual Special Use Permit to operate since 1999 when the Kelly-Elkins tract was acquired by the Refuge.

During winter, visitors will have to park vehicles further from pedestrian routes and gain access by snowshoeing or cross-country skiing. An average of 120 inches of snow falls in Canaan Valley. No snow removal is conducted on Refuge roads and trails.

During the hunting season, licensed hunters may access the Refuge by foot travel through private property with the written permission of the landowner in their possession.

Numbers of pedestrians on the Refuge have not been thoroughly documented. Recent observations by refuge staff and discussions with refuge visitors were used to assess the current level of pedestrian travel on Refuge lands. Pedestrian use is the most popular mode to access the refuge. The level of pedestrian use on refuge property has been monitored by refuge staff since the fall of 2002. Out of 44 monitoring days (mostly weekends) between September 2002 and July 2003, a total of 1,387 visitors accessed the refuge on foot. Seventy-two percent of this use occurred during the hunting season, between October and January. Additionally, the refuge has maintained records for visitors accessing the refuge's Kelly-Elkins tract on cross-country skis through the Whitegrass Ski touring center. Over the last three seasons (1999 – 2003) an average of 5180 visitors have used cross-country skis to access refuge property.

Traffic counters were recently installed at FR 80, Freeland Trail, A Frame and Delta 13 Roads, and near the Beall Tract parking lot. Additional traffic counters may be installed on vehicle roads as needed. A Park Ranger will continue to record pedestrian numbers seen during patrols, types of access, user interactions, and potential safety concerns. Safety and information signs will be installed and maintained as necessary. Designated roads and trails will be maintained in such a manner as is practical to minimize

environmental effects such as erosion and sedimentation and to provide safe conditions for public access. Routes of travel are monitored annually to determine if they remain compatible subject to the route compatibility determination shown in Appendix 2. Any need for additional pedestrian travel can be considered during the preparation of the Refuge Comprehensive Conservation Plan (CCP), currently scheduled to begin by 2004.

**(e) Why is this use being proposed?**

Foot travel is a fundamental method for the public to access the Refuge. At the time of Refuge acquisition, the former landowner of the Main Tract allowed public “foot travel, hunting, fishing, and other recreational use” (Monongahela Power Company 1994). The designated routes for pedestrian travel preserve a historic and relatively unobtrusive means to view representative plant and wildlife species that occur on the refuge.

The Refuge 1994 Station Management Plan prescribes that a trail system would be developed for visitor use on existing roads and trails, logging roads, and old railroad grades. The development of a “system of trails” is prescribed to support opportunities for “photography, wildlife viewing, and wildlife education”. A Compatibility Determination (CD) authorizing “hiking” was approved but did not specify where such use should occur to avoid potential impacts to refuge resources.

Since then, three wildlife observation trails, identified above, have been designated in the southern part of the Refuge and 12 trails have been designated at the northern part of the Refuge and are open for pedestrian travel. Snow shoeing and cross-country skiing are major access modes to observe landscape and biological features in winter. These uses were added to the hiking CD in 1999 by the Refuge Manager. The above existing trails in the Kelly/Elkins Tract are only open in winter for snowshoeing and cross-country skiing.

The existing CD for hiking requires updating to protect sensitive wetlands and erosive soils on the recently acquired Main Tract. Pre-acquisition CD's, prepared before the Main Tract purchase, found hunting, interpretation, wildlife observation, environmental education, and nature photography to be compatible priority public uses. Fishing on the Main Tract has continued since Refuge acquisition. Methods to access these priority public uses were not analyzed however, and their potential environmental impact on Refuge resources could be as significant as those of the priority public uses themselves.

Subsequently, existing roads and trails were identified that could be used to facilitate these uses by pedestrian travel without impacting Refuge resources. The resulting routes provide the public with an opportunity to view the diversity of habitats and wildlife that characterize the Refuge without significant environmental consequences at the current level of use. Non-consumptive priority public uses are allowed to continue by providing foot travel on designated roads and trails that meet Refuge criteria for route compatibility.

**AVAILABILITY OF RESOURCES:**

The resources necessary to provide and administer this use, at the current use level, are available within current and anticipated Refuge budgets. Staff time associated with administration of this use is related to assessing the need for road and trail maintenance

and repair, maintaining kiosks, gates, maintaining traffic counters and recording collected data, sign-posting roads and trails, informing the public about new Refuge uses, conducting visitor use surveys, analyzing visitor use patterns, monitoring the effects of public uses on Refuge resources and visitors, and providing information to the public about the use.

The Deputy Refuge Manager will administer the program. An Outdoor Recreation Planner is responsible for public outreach. A Wildlife Biologist assisted by a term Wildlife Biologist and a Biological Science Technician monitors the environmental effects of public access. A Park Ranger monitors visitor use and user interactions with assistance from an Outdoor Recreation Planner. The Park Ranger and Deputy Refuge Manager conduct law enforcement activities to provide for visitor safety and resource protection.

A Heavy Equipment Operator performs the maintenance and repair of Refuge roads and associated structures. The refuge has a heavy equipment fleet that includes a motor grader, dump truck, bulldozer, front-end loader, 4x4 farm tractor, bobcat, and backhoe. The construction of a maintenance facility is currently funded and planned for construction in 2004. The maintenance facility will be used to repair vehicles and equipment, construct Refuge kiosks, signs, and gates, and carry out other maintenance operations.

The above listed Main Tract roads and trails can be significantly improved to restore wetland hydrology. Needed operations include the installation and relocation of culverts and the installation of water bars to properly drain roads and trails. Several segments of the designated routes need gravel to bring the route up to grade. The Refuge staff will perform repairs. The Refuge currently has one equipment operator on staff. The staffing plan for the Refuge includes two additional maintenance positions. The two maintenance positions are in the Refuge Operating Needs System to be filled in the future. The Refuge currently plans to have the US Department of Transportation, Federal Highways, perform road maintenance on FR 80 in 2004. The Refuge may also contract additional repair work as needed to maintain public access routes.

Annual costs associated with the administration of pedestrian travel on the Refuge are estimated below:

Road maintenance and repair (filling significant potholes, maintaining water bars, cleaning culverts, brush clearing) sign installation and kiosk construction and repair  
WG-10 Equipment Operator for 28 work days = \$4,751.04

Planning and monitoring road conditions and supervising staff to monitor pedestrian travel and its effects on environment and other visitors  
GS-12 Deputy Refuge Manager for 7 work days = \$1,456.5

Law enforcement, monitoring pedestrian travel users and interactions with other users, visitor services, traffic counter maintenance/data collection, sign maintenance  
GS-9 Park Ranger for 40 work days = \$6,160

Monitoring environmental effects of pedestrian travel  
GS-11 Wildlife Biologist for 7 work days (training & inspection) = \$1,296.40  
GS-9 Wildlife Biologist for 14 work days (monitoring) = \$2,008.16  
GS-6 Biological Science Technician for 14 work days (monitoring) = \$1,477.28

Providing information to the public and analyzing traffic counter and user data  
GS-11 Outdoor Recreation Planner for 14 work days = \$2,754.08

Vehicle fuel / law enforcement patrols = \$300  
Heavy equipment fuel = \$250

Kiosk construction, signs, printing maps and information = \$2500

Grand Total Estimated Costs = \$22,953.46

FY 2003 Budget Allocations:

Employee Salaries and benefits = \$531,981  
Fixed costs (utilities, fuel, administrative) = \$26,090  
Base maintenance = \$50,000  
MMS Project = \$42,250  
MMS Road Project = \$30,000  
Discretionary Funds (maps, printing, etc.) = \$171,354  
Total Available Funds for FY 2003 = \$851,675

Based on existing Refuge expenditures for managing visitor use, funding is adequate to ensure compatibility at the current level of use and to administer and manage the subject use.

#### **ANTICIPATED IMPACTS OF THE USE:**

To evaluate the effects of proposed uses and develop anticipated impacts refuge biologists began by gathering baseline information. Color infra-red aerial photography and field surveys identified existing trails. Locations of problem areas (erosion, vegetation loss, etc.) were marked in the field with a GPS and photographs were taken to document problems. All trails marked in the field were integrated into a GIS base map.

Existing information on Canaan Valley wetlands, streams, dominant plant communities and soils were overlaid onto the base map. All soils associated with trails were evaluated for their compaction and erosion potential from information received from an NRCS soil scientist and the Tucker County soil survey. Information from West Virginia Division of Natural Resources (WVDNR) Species of Special Concern database was added to the map. Trails that fragmented habitat and crossed wetland soils were identified.

A comprehensive literature review was conducted of published scientific journal articles detailing impacts to plants, soils, and wildlife through public use activities. Additional

information was gathered from biologists, land managers and scientists who had experience with wildlife disturbance and trail management issues.

A contract hydrologist and soil scientist were hired to conduct field investigations of routes proposed for public use. Recommendations were given on limiting factors of these trails and restoration required to make existing trails suitable for continued public use.

A checklist that defines qualifying criteria for existing Refuge roads and trails to be considered as potential travel routes is presented in Appendix 2. Compatible routes were required to meet all checklist items. The Refuge assessed 67 miles of trail and roads and found 41.5 miles of trail met the Refuge trail checklist guidelines. Main reasons for finding trails incompatible include: 1) trails existing entirely on or crossing over sensitive wetlands; 2) trails on unstable and highly erosive soils; and 3) trails causing hydrologic impacts (i.e., changes in water flow, draining wetlands, etc.) that require substantial restoration to protect plant communities. Potential and anticipated impacts of pedestrian travel as reported in the literature and through field investigations are described below:

### **Impacts to Plants:**

Vegetation surveys have been conducted in Canaan Valley to document dominant plant communities as well as rare plant species and plant communities (Fortney 1975, 1997; Bartgis and Berdine 1991). Research to refine vegetation surveys (including rare and exotic species) is currently being conducted by West Virginia University. Information from previous research and trail inspections during 2002 by refuge staff were used to analyze potential impacts to plants.

Pedestrian travel can have indirect impacts to plants by compacting soils and diminishing soil porosity, aeration and nutrient availability that affect plant growth and survival (Kuss 1986). Hammitt and Cole (1998) note that compaction limits the ability of plants to re-vegetate affected areas. Repeated foot travel can directly impact plants by crushing the plants themselves. Rare plants with limited site occurrence are particularly susceptible to such impacts. Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986). Moist and wet soil conditions are common in Canaan Valley particularly during spring and early summer.

It is anticipated that allowing this use on designated routes will cause some vegetation loss. Foot travel may increase root exposure and trampling effects, however it is anticipated that under the current of use the incidence of these problems will be minor. Designated routes for pedestrian travel consist of former logging roads with hardened surfaces or are existing trails that have been used for many years. Designated routes do not have any known occurrences of rare plant species on their surface that would be impacted by this use. Some rare plants have been documented in habitat adjacent to trails. Continuing pedestrian travel on these routes is not likely to cause any significant impacts to plants or plant communities.

**Impacts to Soils:** Soils can be compacted and eroded as a result of continued use of pedestrian routes. All soils associated with wetland habitats were rated as either high or very high in their potential for compaction (Bell 2002). Out of all the trail and road miles analyzed, an average of 57.9% were listed as severely limited for hiking trails based on the Tucker County Soil Survey (USDA 1967). According to Bell (2002), 5.41 miles of upland trails (excluding A-Frame and Middle Ridge roads) were rated as either high or very high for their soil compaction potential.

The Mauch Chunk derived soil in Canaan Valley is particularly vulnerable to mechanical erosion when the vegetation has been removed (Rizzo 2002). If compacted, Mauch Chunk soils can facilitate rapid water runoff that accelerates erosion down slope (Rizzo 2002). Field investigations of trails in Canaan Valley have documented extensive damage displaying classic examples of the erosive nature of Mauch Chunk derived soils after years of unregulated use. In addition, many trails are now trapping and channeling water creating more erosive conditions. Although foot travel did not create highly erosive conditions in this soil type, lug soles of hiking boots could perpetuate the problem.

It is anticipated that some soil erosion will occur as a result of continuing pedestrian access on designated routes. These routes were selected by evaluating criteria established by the checklist (Appendix 2) to find those that would be least susceptible to soil erosion. These routes were found to be the best suited for hiking trails based on soil types and existing conditions. Under the current level of use impacts to soils (erosion, compaction) are not likely to be significant.

**Hydrologic Impacts:** Roads and trails can affect the hydrology of an area, primarily through alteration of drainage patterns. Bartgis and Berdine (1991) note that roads and trails can divert water from their original drainage patterns in Canaan Valley. This can result in some drainages becoming dry while others accelerate erosion by being forced to carrying more water. Zeedyk (2002) documented many instances in Canaan Valley where existing trails were channeling water away from historic wetlands and in some cases causing erosion and sedimentation of bog and other wetland communities. These problems have profoundly if not irreversibly altered the extent, depths, characteristics and function of the wetlands on the Main Tract (Zeedyk 2002).

Some of the designated pedestrian routes utilize historic railroad beds. The impact of some railroad beds on the hydrology of the Main Tract is currently under investigation. One section designated for pedestrian travel appears to have reduced the riparian flood zone by acting as a levee. This has also apparently caused the loss of a meander of Glade Run and straightened the stream channel.

It is anticipated that the designated existing roads and trails will continue to influence hydrology regardless of pedestrian travel. Maintenance will be required to create adequate and proper drainage to avoid a hydrologic impact. Based on the current level of use, pedestrian travel is not likely to significantly increase erosion, incision, or stream alteration. Therefore, no significant hydrologic impacts are anticipated from this use subject to the stipulations to ensure compatibility.

**Wildlife Impacts:** Disturbances vary with the wildlife species involved and the type, level, frequency, duration and the time of year such activities occur. Whittaker and Knight (1998) note that wildlife response can include attraction, habituation and avoidance. These responses can have negative impacts to wildlife such as mammals becoming habituated to humans making them easier targets for hunters. Human induced avoidance by wildlife can prevent animals from using otherwise suitable habitat.

Trails can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where common species (i.e, American robins) were found near

trails and rare species (i.e., grasshopper sparrows) were found farther from trails. Songbird nest failure was also greater near trails (Miller et. al 1998).

Disturbance can cause shifts in habitat use, abandonment of habitat and increase energy demands on affected wildlife (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Knight and Cole (1991) suggest recreational activities occurring simultaneously may have a combined negative impact on wildlife. Hammitt and Cole (1998) conclude that the frequent presence of humans in Awildland areas@ can dramatically change the normal behavior of wildlife mostly through Aunintentional harassment. @

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting or causing mammals to flee during winter months, thereby consuming large amounts of stored fat reserves. Hammitt and Cole (1998) note that females with young (such as white-tailed deer) are more likely to flee from a disturbance than those without young. Some uses, such as bird observation, are directly focused on viewing certain wildlife species and can cause more significant impacts during breeding season and winter months.

Impacts to wildlife may be indirectly caused through erosion and subsequent sedimentation of streams and vernal pools as a result of foot travel over bare soils and around drainages. Increased sediment loads can reduce aquatic vegetation and dissolved oxygen concentrations (Sadoway 1981). Sedimentation can directly kill aquatic invertebrates which impacts the success of amphibian larvae and adults (Sadoway 1981). Observations by refuge staff in 2002 document numerous occurrences of amphibian egg masses that failed after becoming coated in sediment from eroding trails and roads nearby. Bartgis and Berdine (1991) report that sedimentation was damaging habitat in Canaan Valley and could cause impacts to the rare plants, water quality and possibly affect habitat of the southern water shrew (*Sorex palustris punctulatus*), a state Species of Concern.

It is anticipated that there will be temporal disturbances to wildlife species using habitat on or directly adjacent to the designated pedestrian routes. These disturbances are likely to be short term and infrequent based on the current level of use. Sedimentation impacts will likely be minor as a result of foot travel. Long-term impacts may include some wildlife species avoiding designated trails as a result of this use over time. For example, ruffed grouse and turkey may avoid taking broods to trails to forge if use of these trails increase. These impacts are not likely to significantly affect wildlife populations along these routes based on current use.

**Threatened and Endangered Species Impacts:** Trails at higher elevations of the Refuge may affect threatened Cheat Mountain salamanders (*Plethodon nettingi*) including FR 80 and cross-country ski trails on the Kelly-Elkins Tract. This species is sensitive to any habitat changes that remove a forest canopy or reduce soil moisture and relative humidity. According to Pauley (1991), trails that receive heavy use resulting in bare trail treads could limit movements of Cheat Mountain salamanders and interfere with reproduction. Recommendations made for the recovery of the species state that known populations should be avoided, buffer zones of at least 300 feet should be established where vegetation disturbance should be prevented and trails should be rerouted to go around rather than through occupied habitat.

West Virginia northern flying squirrels (*Glaucomys sabrinus fuscus*) have been documented on refuge property near the end of FR 80. There is little information available that discusses the

effects of roads and trails on populations of this endangered species. The recovery plan (USFWS 2001) does note that habitat modification may create a competitive advantage for the southern flying squirrel (*Glaucomys volans*), although the extent to which a logging road or trail would create conditions conducive for this are unknown. Some research has found northern flying squirrels occupying den sites near logging roads, skid trails and on hiking trails (Ford 2002).

It is anticipated that under current conditions and use level, pedestrian travel of these routes will not cause any significant direct or indirect impacts to threatened or endangered species. Routes designated for this use are pre-existing roads and trails some of which have been in existence for many years. No new habitat clearing will be required to accommodate pedestrian activities, however some vegetation clearing will be required within the trail corridor. Impacts of trails in the higher elevations of the Kelly-Elkins Tract will be reviewed for their impacts on threatened and endangered species. Concurrence with the U.S. Fish and Wildlife Service Ecological Services Office in Elkins, WV is necessary to ensure this designated use would not impact threatened or endangered species.

**User Conflicts:** Conflicts between trail users are commonly reported in the literature (Knight and Gutzwiller 1995, Ramthun 1995, Watson et al 1994, Chavez et al 1993). Conflicts range from concerns over personal safety to certain user groups feeling that they should be given priority over other groups based on a past history or other reasons. Based on interviews with individuals and user groups, conflicts between groups are not significant in Canaan Valley. This is likely due to the relatively low number of users in the area, as compared with heavy use and conflict sites reported in the literature. Providing safe routes for wildlife dependant activities is an important consideration for wildlife observation trails on the refuge. Safety considerations include ability of trail to support shared use without creating dangerous conditions, ability to maintain a trail to allow safe use and timing of various uses such as wildlife observation and hunting activities. Routes designated for pedestrian travel are considered safe under current conditions and level of use.

Any effects of pedestrian travel on the roads and trails designated are not considered, separately or cumulatively, to constitute significant short-term or long-term impacts. The current use is viewed as an effective and justifiable method of travel that allows the public to discover, experience, and enjoy priority public uses on the 15,000-acre Refuge. Continued monitoring of the effects of pedestrian travel and associated human activities is necessary to better understand the influence of the use on refuge habitats, plant and wildlife communities, and visitors. Monitoring identifies any actions needed to respond to new information (adaptive management) and correct problems that may arise in the future.

**Cultural Resources:** This use, as described, will not impact cultural resources.

**PUBLIC REVIEW AND COMMENT:** A draft was sent out for public review and comment on November 6, 2002 for 30 days. Due to public response, the deadline for public review and comment on this draft compatibility determination was extended an additional 30 days to January 6, 2003. The refuge also hosted two open houses to address public concerns on November 22, 2002 and December 12, 2002. A determination was made following the comment period.

**DETERMINATION:** THIS USE IS COMPATIBLE  \_\_\_\_\_  
THIS USE IS NOT COMPATIBLE  \_\_\_\_\_ (Check one)

**STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:**

-Pedestrian travel to facilitate non-consumptive priority public uses is only compatible on designated roads and trails described in Appendix 3 and shown on Figures 1 and 2. The only pedestrian access allowed on the trails shown in Figure 3 is cross-country skiing and snow shoeing. Evaluation criteria to assess route compatibility are shown in Appendix 2.

-Camping and overnight parking are prohibited.

-Signs necessary for visitor information, safety, and traffic control will be installed.

-The Refuge conducts an outreach program to promote public awareness and compliance with Refuge public use regulations.

-Pedestrian group size is encouraged to be no more than 10 persons to promote public safety, accommodate other users, and reduce wildlife disturbance. Group size greater than 10 require a Special Use Permit. Pedestrians traveling on roads shared with vehicles are not required to obtain a Special Use Permit.

-Pedestrian travel is restricted to Refuge open hours: 1 hour before sunrise until 1 hour after sunset.

-Hunters entering the Refuge on foot from private property must possess written permission from the landowner, a valid West Virginia hunting license, and a current Refuge hunting permit.

-The surface of Delta 13 Road will be maintained to eliminate water pools and provide adequate drainage.

-The current inventory of roads and trails on the refuge will be completed before the start of the Refuge CCP. This information will guide future decisions in the planning, locating and managing of Refuge road and trail systems.

-All routes designated for public access are annually inspected for maintenance needs. Prompt action is taken to correct any conditions that risk public safety. Roads and trails are maintained at a level that reasonably accounts for safe travel.

-Routes designated for public access are monitored annually to determine if they continue to meet the compatibility criteria presented in Appendix 2. Fishing access to beaver ponds and the Blackwater River system are also monitored. The purpose is to assess the long-term effects of pedestrian travel on refuge resources, visitor use, and route maintenance needs. Monitoring for biological and physical resources is listed in Appendix 4 but the methodology may change to reflect new information. Biological inventories will continue to provide baseline information to measure change. Should monitoring and evaluation of the use indicate that the compatibility criteria are or will be exceeded, appropriate action will be taken to ensure continued compatibility, including modifying or discontinuing the use.

-Routine law enforcement patrols are conducted throughout the year. The patrols promote education and compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interaction. Patrols include recording visitor numbers, vehicle numbers, visitor activities, and activity locations to document current and future level of Refuge use. Patrols also include the routine assessment of safety conditions and visitor interactions on Refuge routes. Conditions that are or will risk public safety will be identified and appropriate action will be promptly taken to correct such conditions.

-The Refuge conducts annual assessments of visitor perceptions of Refuge uses and the management of access routes. A visitor survey will be developed and executed upon approval. Providing for safe public use through proper administration and regulation, public education, and law enforcement will be essential.

**JUSTIFICATION:**

Pedestrian use has been determined to be compatible provided the above stipulations are implemented. Pedestrian use, as identified in this Compatibility Determination, is not expected to materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the Refuge was established. This use facilitates the Priority Public Uses and is a reasonable mode of access on designated trails. Monitoring will be conducted to ensure this use remains compatible. If significant impacts are found, corrective actions will be taken to protect Refuge resources.

**Signature:** Refuge Manager:

\_\_\_\_\_  
(Signature and Date)

**Concurrence:** Regional Chief:

\_\_\_\_\_  
(Signature and Date)

**Mandatory 10-year re-evaluation date:** August 1, 2013

**ATTACHMENTS:**

- Appendix 1:** List of state species of special concern
- Appendix 2:** Checklist for route compatibility
- Appendix 3:** Routes found to be compatible
- Appendix 4:** Route monitoring plan
- Appendix 5:** Responses to public comments
- Appendix 6:** Dominant habitat types viewed from roads and trails
- Appendix 7:** Wildlife species that may be encountered along roads and trails

- Figure 1:** Map showing routes designated for public access-North End
- Figure 2:** Map showing routes designated for public access-South End
- Figure 3:** Map showing cross-country skiing and snow shoeing trails-South End



## Citations

- Bartgis, R. and A. Berdine. 1991. A preliminary assessment of biological resources in the Canaan Valley of West Virginia. The Nature Conservancy, Boston, MA.
- Bell, S. 2002. National Resource Conservation Service. Letter to U.S. Fish and Wildlife Service. 4pp.
- Chavez, D.J, P.L. Winter, J.M. Baas. 1993. Recreational mountain biking: a management perspective. *Journal of Park and Recreation Administration*. 11(3): 29-36.
- Ford, M. 2002. Personal Communication with Mark Ford, U.S. Forest Service, Parsons, WV. May 3, 2002.
- Fortney, Ronald J. 1975. The vegetation of Canaan Valley, West Virginia: A taxonomic and ecological study. West Virginia University. Dissertation. 208 pp.
- Fortney, Ronald J. 1997. A chronology of post logging plant succession in Canaan Valley through the development of a series of vegetation maps from 1945 to present. Salem-Teikyo University, West Virginia. 38 pp.
- Gutzwiller, K.J., S.K. Riffell, and S.H. Anderson. 1995. Repeated human intrusion and the potential for nest predation by gray jays. *Journal of Wildlife Management*. 66(2): 372-380.
- Hammit, W. E. and D.N. Cole. 1998. *Wildland Recreation*. John Wiley & Sons, New York, 361pp.
- Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. *Transactions of the 56<sup>th</sup> North American Wildlife and Natural Resources Conference* pp.238-247.
- Knight, R.L. and K. J. Gutzwiller. 1995. *Wildlife and Recreationists: Coexistence through management and research*. Island Press, Washington, D.C. 371 pp.
- Kuss, F. R. 1986. A review of major factors influencing plant responses to recreation impacts. *Environmental Management*, 10:638-650.
- Miller, S.G., R.L. Knight, and C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. *Wildlife Society Bulletin* 29(1): 124-132.
- Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. *Ecological Applications* 8:162-169.
- Monongahela Power Company. 1994. News Release. Form 29-237. Rev. 2. 2pp.
- Pauley, T. 1991. Cheat Mountain Salamander (*Plethodon nettingi*) recovery plan. U.S. Fish and

Wildlife Service, Newton Corner, MA.

Ramthun, R. 1995. Factors in user group conflict between hikers and mountain bikers. *Leisure Sciences* 17:159-169.

Rizzo, A. 2002. Personal Communications with Al Rizzo, Soil Scientist, U.S. Fish and Wildlife Service. April 17-19, 2002.

Sadoway, K. L. 1986. Effects of intensive forest management on amphibians and reptiles of Vancouver Island: problem analysis. Research, B. C. Ministries of Environment and Forests. IWIFR-23. Victoria, B. C.

Trails and Wildlife Task Force. 1998. Planning trails with wildlife in mind: A handbook for trail planners. Colorado State Parks, Denver Co. 51pp.

U.S. Dept. of Agriculture. 1967. Soil Survey, Tucker County. U.S. Government Printing Office, Washington, D.C.

U.S. Fish and Wildlife Service. 1992. Off-road vehicle use and impact in Canaan Valley, Tucker County, West Virginia. West Virginia Field Office Special Project Report 92-2. 17pp.

U.S. Fish and Wildlife Service. 2001. Appalachian northern flying squirrel recovery plan. West Virginia Field Office, Elkins, WV.

U.S. Fish and Wildlife Service. 1994. Canaan Valley National Wildlife Refuge Station Management Plan. Hadley, MA. 34pp.

Watson, A.E., M.J. Niccolucci and D.R. Williams. 1994. The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research* 26(4): 372-385.

West Virginia Division of Natural Resources. 1964. Annual Report-Largemouth Bass Stocking of Canaan Valley Beaver Ponds. West Virginia Conservation, Charleston. 28(10): 19-21.

Whittaker, D. and Knight, R. 1998. Understanding wildlife responses to humans. *Wildlife Society Bulletin* 26(3): 312-317.

Zeedyk, B. 2002. Personal Communications with Bill Zeedyk, Contract wildlife biologist/hydrologist. March 4-8, 2002.

**Appendix 1****List of State Species Of Special Concern**

State Species of Concern Known or Expected to Occur in Canaan Valley, WV  
 West Virginia Division of Natural Resources Natural Heritage Program

Plants		Ranks	
Scientific Name	Common Name	State	Global
<i>Abies balsamea</i>	Balsam fir	S3	G5
<i>Amelanchier bartramiana</i>	Oblong-fruited serviceberry	S1	G5
<i>Betula papyrifera</i>	Paper birch	S2	G5
<i>Carex aestivalis</i>	Summer Sedge	S2	G4
<i>Carex atherodes</i>	Awned sedge	S1	G5
<i>Carex atlantica</i> ssp. <i>capillacea</i>	Howe sedge	SH	G5
<i>Carex bromoides</i>	Brome-like sedge	S2	G5
<i>Carex buxbaumii</i>	Brown bog sedge	S2	G5
<i>Carex canescens</i>	Hoary sedge	S3	G5
<i>Carex comosa</i>	Bearded sedge	S2	G5
<i>Carex lacustris</i>	Lake sedge	S2	G5
<i>Carex leptoneuria</i>	Finely-nerved sedge	S1	G4
<i>Carex pauciflora</i>	Few-flowered sedge	S1	G5
<i>Carex pellita</i>	Wooly sedge	S1	G5
<i>Carex project</i>	Necklace sedge	S1	G5
<i>Coptis trifolia</i> ssp. <i>groenlandica</i>	Goldthread	S2	G5
<i>Cuscuta rostrata</i>	Beaked dodder	S2	G4
<i>Cypripedium reginae</i>	Showy lady-s-slipper	S1	G4
<i>Dalibarda repens</i>	Star violet	S3	G5
<i>Drosera rotundifolia</i>	Roundleaf sundew	S3	G5
<i>Equisetum sylvaticum</i>	Woodland horsetail	S1	G5
<i>Euphorbia purpurea</i>	Glade spurge	S2	G3
<i>Geum aleppicum</i>	Yellow avens	S1	G5
<i>Geum rivale</i>	Purple avens	S1	G5

<i>Glyceria grandis</i>	American manna-grass	S2	G5
<i>Glyceria laxa</i>	Northern manna-grass	S1	G5
<i>Juncus articulatus</i>	Jointed rush	S2	G5
<i>Juncus filiformis</i>	Thread rush	S2	G5
<i>Listera smallii</i>	Kidney-leaf twayblade	S2	G4
<i>Lonicera canadensis</i>	American fly-honeysuckle	S2	G5
<i>Oenothera pilosella</i>	Evening-primrose	S2	G5
<i>Pogonia ophioglossoides</i>	Rose pogonia	S2	G5
<i>Polemonium vanbruntiae</i>	Jacob-s ladder	S2	G3
<i>Ranunculus pusillus</i>	Low spearwort	S1	G5
<i>Rhamnus alnifolia</i>	Alder-leaved buckthorn	S1	G5
<i>Salix discolor</i>	Glaucous willow	S2	G5
<i>Saxifraga pensylvanica</i>	Swamp saxifrage	S2	G5
<i>Scirpus atrocinctus</i>	Black-girdle bulrush	S3	G5
<i>Scirpus microcarpus</i>	Small-fruit bulrush	S3	G5
<i>Scutellaria galericulata</i>	Hooded skullcap	S1	G5
<i>Stachys tenuifolia</i> var. <i>tenuifolia</i>	Smooth hedge-nettle	S2	G5
<i>Stellaria borealis</i> ssp. <i>borealis</i>	Northern stitchwort	S1	G5
<i>Synosma suaveolens</i>	Sweet-scented Indian-plantain	S2	G3G4
<i>Thelypteris simulata</i>	Bog fern	S1	G4G5
<i>Torreyochloa pallida</i> var. <i>fernaldii</i>	Manna-grass	S2	G5?
<i>Torreyochloa pallida</i> var. <i>pallida</i>	Pale manna-grass	S2	G5?
<i>Vaccinium macrocarpon</i>	Large cranberry	S2	G4
<i>Vaccinium oxycoccos</i>	Small cranberry	S2	G5
<i>Veronica scutellata</i>	Marsh speedwell	S1	G5
<i>Viola appalachiensis</i>	Appalachian blue violet	S2	G3
<i>Vittaria appalachiana</i>	Appalachian gametophyte	S1	G4
<i>Zigadenus leimanthoides</i>	Oceanorus	S2	G42

Animals		Rank	
Scientific Name	Common Name	State	Global

Accipiter gentilis	Northern goshawk	S1B,S1N	G5
Aegolius acadicus	Northern saw-whet owl	S2B,S3N	G5
Carphophis amoenus	Worm snake	S3	G5
Chlosyne harrisii	Harris=checkerspot	S2	G4
Circus cyaneus	Northern harrier	S1B,S3N	G5
Clinostomus elongatus	Redside dace	S1S2	G4
Colias interior	Pink-edged sulphur	S1	
Empidonax alnorum	Alder flycatcher	S3B,S3N	G5
Euphyes bimacula	Two-spotted skipper	S1	G4
Glaucomys sabrinus fuscus	West Virginia northern flying squirrel	S2	G5
Neotoma magister	Allegheny woodrat	S3	G3G4
Microtus chrotorrhinus carolinensis	Rock vole	S2	G4
Plethodon nettingi	Cheat Mountain salamander	S2	G2
Sorex palustris punctulatus	Water shrew	S1	G5
Sylvilagus obscurus	Appalachian cottontail	S3	G4
Zapus hudsonius	Meadow jumping mouse	S3	G5

West Virginia Division of Natural Resources 2001

Ranking Descriptions

- S1 Five or fewer documented occurrences, or very few remaining individuals within the state. Extremely rare and critically imperiled.
- S2 Six to 20 documented occurrences, or few remaining individuals within the state. Very rare and imperiled.
- S3 Twenty-one to 100 documented occurrences.
- S4 Common and apparently secure with more than 100 occurrences.
- S5 Very common and demonstrably secure.
- SH Historical. Species which have not been relocated within the last 20 years. May be rediscovered.
- G1 Five or fewer documented occurrences, or very few remaining individuals globally. Extremely rare and critically imperiled.
- G2 Six to 20 documented occurrences, or few remaining individuals globally. Very rare and imperiled.
- G3 Twenty-one to 100 documented occurrences. Either very rare and local throughout its range or found locally in a restricted range; vulnerable to extinction.
- G4 Common and apparently secure globally, though it may be rare in parts of its range, especially at its periphery.
- G5 Very common and demonstrably secure, though it may be rare in parts of its range, especially at the periphery.
- G? Unranked, or, if following a number, rank uncertain (ex. G2?)
- G\_Q Species of questionable taxonomy (ex. G4Q).

## **Appendix 2 Checklist For Route Compatibility**

### **Checklist For Existing Routes To Be Eligible For Interim Compatibility Consideration** (Routes must meet all criteria)

- 1) Route provides an opportunity to view a variety of habitats and wildlife.
- 2) Route is an existing road or trail that provided access or is in close proximity to access that supported priority public uses.
- 3) Route is safe for the access proposed at current use levels.
- 4) Any refuge entry route was open to public access based on historic use.
- 5) Route requires minimal annual maintenance (i.e, waterbars, stepping stones, etc.) to ensure safe access and to prevent further habitat degradation.
- 6) Route has a low potential for fragmenting habitat or disturbing wildlife populations.
- 7) Based on existing soils information, less than 50% of the route's length occupies soil types rated as Ahigh@ or Avery high@ for compaction and/or erosiveness. The route is not rated as Aseverely limited@ for hiking trails based on the Tucker County Soil Survey.
- 8) Any route crossing of sensitive soils occupies the shortest possible distance. Organic soil crossings are minimized or eliminated.
- 9) Continued use of the existing route is not likely to cause further wetland alteration or degradation. There is low risk that hydrology, soil stability, sensitive plant communities, riparian zones, and wildlife habitats would be adversely affected.
- 10) Route predominately occupies modified substrate (graveled, compacted, or filled) like logging roads and rail grades.
- 11) Route is not incised greater than 1 foot deep over 10% of its total length.

### **Appendix 3      Compatible Routes**

**Forest Road 80 (1.91 mi):** This road has been in existence for decades. It has been minimally maintained and is currently only passable to vehicles with clearance. The road surface is highly modified, packed and graveled in sections. Planned maintenance operations will improve drainage and stabilize the road surface. This road was found acceptable for pedestrian travel due to the fact that it is highly modified and is not causing unacceptable erosion and sedimentation problems. Pedestrian travel of this road will not cause trail widening, increasing erosion, trail incision, trampling of vegetation or unacceptable disturbance to wildlife species. This road does not cross wetland soils on the refuge. Although this road crosses habitat suitable for Cheat Mountain salamanders and West Virginia northern flying squirrel, it is likely that there will be no significant impacts to these species through the continued use of this route in its current condition.

**Idleman's Run Road (0.21 mi):** This is a highly modified road branching from FR 80 running north. It has been in existence for many years and has been compacted, graded and graveled in the past. Use of this road on the refuge will terminate at the Idleman's Run crossing (refuge boundary). This road is acceptable for pedestrian travel as it does not cause unacceptable erosion and sedimentation and is in stable condition. Continued pedestrian travel of this road will not cause increased trail widening, trail incision, soil erosion and stream sedimentation or trampling of vegetation. It does not cross organic wetland soils.

**Idleman's Run Trail (.39 mi):** This is a trail existing partly as a foot path and partly as a skid road. This trail follows Idleman's Run for a short distance then loops onto FR 80. It has been used for many years and is in stable condition. The lower portion of this trail was graveled in the past. Soils represented are not highly susceptible to compaction but do have a moderate erosion potential. Moderate pedestrian travels are not likely to cause significant soil erosion and stream sedimentation. Currently the trail is not incised and is one of the most narrow trails on the refuge. There is no information about rare plant species in this area. It is not likely to significantly fragment habitat nor create serious wildlife disturbance as the trail does not follow the stream corridor for its entire length. Pedestrian travel of this trail is not likely to cause significant wetland degradation or alterations in existing hydrology.

**Freeland Tract Trail (0.36 mi):** This trail consists of a narrow foot path to a bubbling sand spring and branches to include a trail to a small stand of balsam fir and a spirea thicket. The trail is not incised significantly and evidence of trail widening since construction is lacking. However, soils on this tract are rated as moderate to severe for soil erosion and compaction potential and moderately suited for hiking trails. Construction of a boardwalk to protect vegetation and allow access for disabled visitors is underway. There is no evidence that moderate use of this trail is fragmenting habitat or causing changes in hydrology to the surrounding area. Wildlife disturbance is insignificant but does occur occasionally when water birds are flushed off the beaver pond.

**Beall Tract Trails (3.96 mi):** These routes are located on old farm roads and logging roads. They have been modified by previous vehicle use and in some cases graveled for service roads. These trails are flat and some are fully vegetated. The south loop trail drops to the Blackwater River along an existing logging road that is stable and previously modified. This trail does not show signs of trail widening or excessive incision. Soils are predominately rated as low compaction potential with the exception of a narrow area on the north trail where it crosses a wet

meadow. The trail crosses the edges of grasslands and meadows so that the area is not severely fragmented by the trail crossing. Pedestrian travel of the Beall trails should not cause excessive erosion, vegetation trampling, changes to the existing hydrology or wetland degradation.

**Delta 13 Road and Trail (1.81 mi):** This road originates at the western Refuge boundary from Camp Seventy Road and continues until it contacts wetland soils. There is a small loop at this point that allows an overlook of the wetland complex. The majority of the road is located on upland soils which appear to be stable and packed. The trail segment adjoining Camp Seventy Road appears to have been graveled at one time. There are heavily rutted sections with many potholes that capture water. As a result users have begun widening the road to avoid the water holes and muddy areas. Management action will be taken to either drain the pools of water or bridge them to prevent continued braiding and trail widening around these points. Large rocks may be placed through the potholes for pedestrian travel. Continuing pedestrian travel along this route, with such management, will not likely cause significant erosion or vegetation trampling. There are documented rare and sensitive plant species in the wetlands surrounding the terminus of this road however; no rare plant species are known to exist on the road surface itself. The road exists partly on the edge areas of the Blackwater River riparian corridor, forest and wetland complex and does not appear to fragment habitat.

**A Frame Road (4.8 mi):** A Frame road joins state route 93 at the north end of the Canaan Valley. It crosses through private land until it meets the refuge boundary. The refuge segment is 4.9 miles long from the Main Tract boundary at the north to the intersection with the Glade Run wetland complex. This road is well developed and has been graded and graveled in the past. Soils are compacted through years of vehicle use and the continued use of this road for pedestrians will not significantly damage soils and plant communities. Although minimally maintained, it remains serviceable and provides access throughout the year. A Frame Road is relatively level and does not reflect the erosion patterns of steeper tracks and secondary roads and trails that branch from it. Pedestrian travel of this road will not cause any significant changes in soil erosion, compaction, downstream sedimentation or vegetation trampling.

A Frame Road terminates in a section of existing railroad grade that connects the southern end of A Frame Road. The trail provides access into a beaver pond complex along the Glade Run drainage. The rail grade is raised, filled and in stable condition. Allowing access on this grade will not cause significant erosion or sedimentation into the surrounding wetlands. The section of trail between the end of A Frame road and the rail grade is in worse shape and has been degraded by years of vehicle use. However, minimal maintenance operations on this short section can allow pedestrian access to the rail grade without increasing or significantly continuing soil erosion and wetland sedimentation.

**Cabin Mountain Trail (1.35 mi):** The section of road connecting to A Frame Road has been partially eroded and is channeling water. Along this section exposed soil has not had an opportunity to revegetate. However, this road continues on a stable logging road that has been vegetated and modified in the past through grading and filling. There are at least 24 small streams and springs that cross this trail but are not causing significant erosion problems. Pedestrian travel is not likely to cause significant soil erosion, compaction or vegetation trampling. Areas of concern include the beginning of the trail where bare soils are exposed and previous water channeling has created some rutting. Keeping pedestrian travel on the side of the road will be important to prevent soil erosion along this section. Stream and spring crossings will be armored to prevent bank erosion.

**Sand Run Trail (.93 mi):** This Road connects Middle Ridge Road to the Cabin Mountain Road. This is an existing logging road that was used for many years. It exists predominately on upland soils with the exception of a wet meadow crossing between Middle Ridge and Cabin Mountain. The majority of the trail is in good condition and is not heavily eroded or incised. The east section that connects to the Cabin Mountain road is incised and channeling water. The relative distance of this condition is not known and was caused by many years of unregulated vehicle use. Water bars would help keep this trail dry and prevent further channeling of water. Soils are generally low to moderately susceptible to compaction with the exception of the meadow crossing which comprises approximately 10% of the total length of the trail. Moderate pedestrian travel of this trail will not likely contribute to significant erosion or downstream sedimentation. Crossing the meadow at a narrow location will prevent habitat fragmentation and unnecessary wildlife disturbance using associated beaver ponds and riparian corridor. A permanent monitoring station will be established at the wetland crossing to ensure plants and soils do not become significantly degraded with the continued use of this trail.

**Middle Ridge Trail (3.68 mi):** This is a historical road used recently for logging operations. It is heavily modified and has been graded and graveled. Recent logging cleanup operations included providing road drainage and seeding to prevent excessive erosion. This has no public access from the south as it borders private property. The road requires basic infrastructure such as culverts and better drainage to reduce its impact on the local hydrology. The northern end of this road is incised and is channeling water for over a half mile, the result of many years of vehicle use. The route connects to a historic railroad grade the ends at Glade Run. The railgrade is a filled and raised bed that is in good condition. It requires only minor maintenance to move water off the trail. Pedestrian travel of this trail will not cause significant increases in erosion or stream sedimentation. There are rare plant species documented in the wetlands surrounding the Glade Run end of the trail. No rare plant species have been documented on the trail surface itself.

**Summit View Trail (.79 mi):** This road provides access to the higher elevations of Cabin Mountain and was historically used to connect to Forest Service property. It begins near the end of A Frame road and consists of a narrow logging road ascending the ridge. Water bars are still functional and are preventing water from channeling long distances down the trail. Soils are mostly compacted and bare although some sections have considerable rock base that is helping to stabilize the trail. Soils are predominately listed as having a low compaction and comparatively low erosion potential. Pedestrian travel will not cause significant soil erosion or vegetation trampling. The road is not channeling water but will require minor maintenance to prevent deterioration.

**Brown Mountain Trail (2.35 mi):** This route starts on the Delta 13 Road and connects to a logging road that runs north along a contour of Brown Mountain. This road exists on upland soils and has only a few short stream crossings. Soils are predominately rated as having a low potential for compaction and moderate to low potential for erosion. The logging road that runs north is a well established and previously graded road that follows a contour on Brown Mountain. It has functioning waterbars and is not incised. Pedestrian travel of this road will not cause significant erosion, compaction, nor vegetation trampling.

**Brown Mountain Overlook Trail (1.96 mi):** This route starts on the Brown Mountain Trail at 2.2 miles from the junction at Delta 13 Road. The Brown Mountain Overlook Trail provides a scenic view of the interior wetlands. The trail is well established and is predominantly an upland trail with one short, seasonally wet crossing. Soils are rated as having a low potential for

compaction and low to moderate potential for erosion. Pedestrian travel of this road will not cause significant erosion, compaction, or vegetation trampling.

**Middle Ridge Trail (Extension of original trail) (0.87 mi):** This route joins the Middle Ridge Trail and the property boundary of the Timberline Homeowner's Association (THA). This is a historical road used recently for logging operations. It is heavily modified and has been graded and graveled. Recent logging cleanup operations included providing road drainage and seeding to prevent excessive erosion. The road requires basic infrastructure such as culverts and better drainage to reduce its impact on the local hydrology. Pedestrian, horseback, and bicycle travel of this trail will not cause significant increases in erosion or stream sedimentation. There are rare plant species documented in the wetlands near the Glade Run end of the trail. No rare plant species have been documented on the trail surface itself.

**Glade Run Crossing North (0.75):** This route joins A-Frame Road to the north end of Middle Ridge Trail. Soils on this trail have low erosion and low to moderate compaction potential. The greatest source of compaction and erosion is anticipated to occur where the trail crosses Glade Run. Rare plant species and rare bird species have been documented near this section of trail. No rare plant species have been documented on the trail surface itself. This trail will require maintenance and restoration efforts (i.e., streambank stabilization), particularly where the trail crosses Glade Run, to alleviate and prevent further deterioration. However, at current use levels pedestrian, horseback, and bicycle travel are not anticipated to cause significant increases in erosion or stream sedimentation.

**Glade Run Crossing South (0.90 mi):** This route is accessed from the A-Frame road parking lot and crosses Glade Run to join up with Middle Ridge Trail. Soils on this trail have low compaction and erosion potential, except where the trail crosses Glade Run and compaction and erosion potential is relatively high. The location where the trail crosses Glade Run was selected based on its ability to support pedestrian, bicycle, and horseback travel with minimal impact to the soils and watershed. This trail was made compatible by rerouting a section around exposed Mauch Chunk derived soils that can contribute to substantial erosion, compaction, and Refuge maintenance. Additionally, the area being avoided is heavily incised and carries water during precipitation events. This route requires maintenance to clear the new section of trail and maintain the total length of the trail. The crossing will be monitored and require maintenance and soil stabilization to prevent deterioration, particularly where the trail crosses Glade Run. Bicyclists are required to carry their bikes across Glade Run to prevent further trail deterioration.

**Blackwater River Trail (1.33 mi):** This route is located near the southern border of the Main Tract and is accessed from the Middle Ridge Trail. The Blackwater River Trail goes east and ends at the Blackwater River where Refuge property ends. This is a historic road used recently for logging operations. It is heavily modified and has been graded and graveled. Recent logging cleanup operations included providing road drainage and seeding to prevent excessive erosion. The road requires basic infrastructure such as culverts and better drainage to reduce its impact on the local hydrology. Pedestrian, horseback, and bicycle travel of this trail will not cause significant increases in erosion or stream sedimentation.

**Blackbird Knob Trail (0.65 mi):** This trail provides access to the higher elevations of Cabin Mountain and was historically used to connect to Forest Service property. It begins at the end of Cabin Mountain Trail and consists of a narrow logging road ascending the ridge. Water bars are still functional and are preventing water from channeling long distances down the trail. Soils are mostly compacted and bare although some sections have considerable rock base that is helping to

stabilize the trail. Soils are predominately listed as having a low compaction and comparatively low erosion potential. Pedestrian, bicycle, and horseback travel should not cause significant soil erosion or vegetation trampling. The trail is not channeling water but will require minor maintenance to prevent deterioration.

## **Appendix 4 Route Monitoring Plan**

### ***Physical Condition Monitoring:***

A baseline inventory of the physical condition of access routes open to public use was conducted during the 2002 field season. This information will be used to monitor how continued public use affects plants and soils associated with current designated routes. Changes in physical conditions of the routes will be used to identify any management interventions required to protect refuge resources. Interventions will occur where surveys document increases in the frequency and lineal extent of Aproblem areas@. Current trail conditions on much of the refuge were primarily influenced by the use of motorized vehicles prior to acquisition by the USFWS. The standard that will be set for refuge trails is a non-degradation policy such that **existing Aproblem areas@ will not increase in size, number or frequency**. It is intended that access limitations will improve currently degraded vegetation and soil conditions. Improvement will be defined as reducing Aproblem areas@ by : narrowing trail width, decreasing numbers of Abootleg@ trails through revegetation, fewer mud holes, less soil erosion, and fewer areas of exposed roots. Information generated from this survey will include the following products:

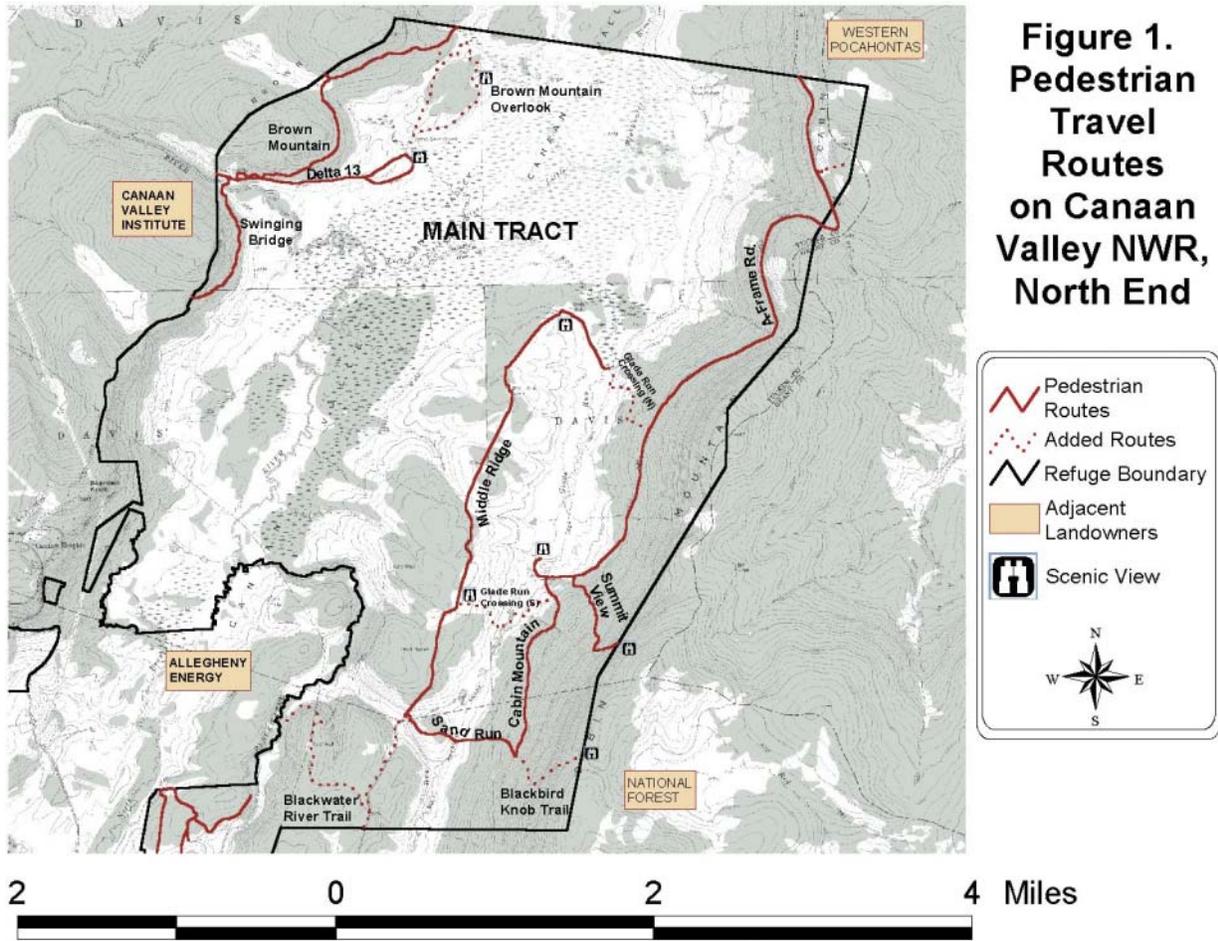
- A description of the frequency of Aproblem areas@ on targeted trails
- A description of the average physical characteristics of trail features
- A description of the lineal extent of Aproblem areas@
- A repeatable monitoring protocol that will track the trend of physical condition of refuge trails.
- Trail management recommendations to halt continued trail degradation and vegetation trampling and promote revegetation.

### ***Biological Monitoring:***

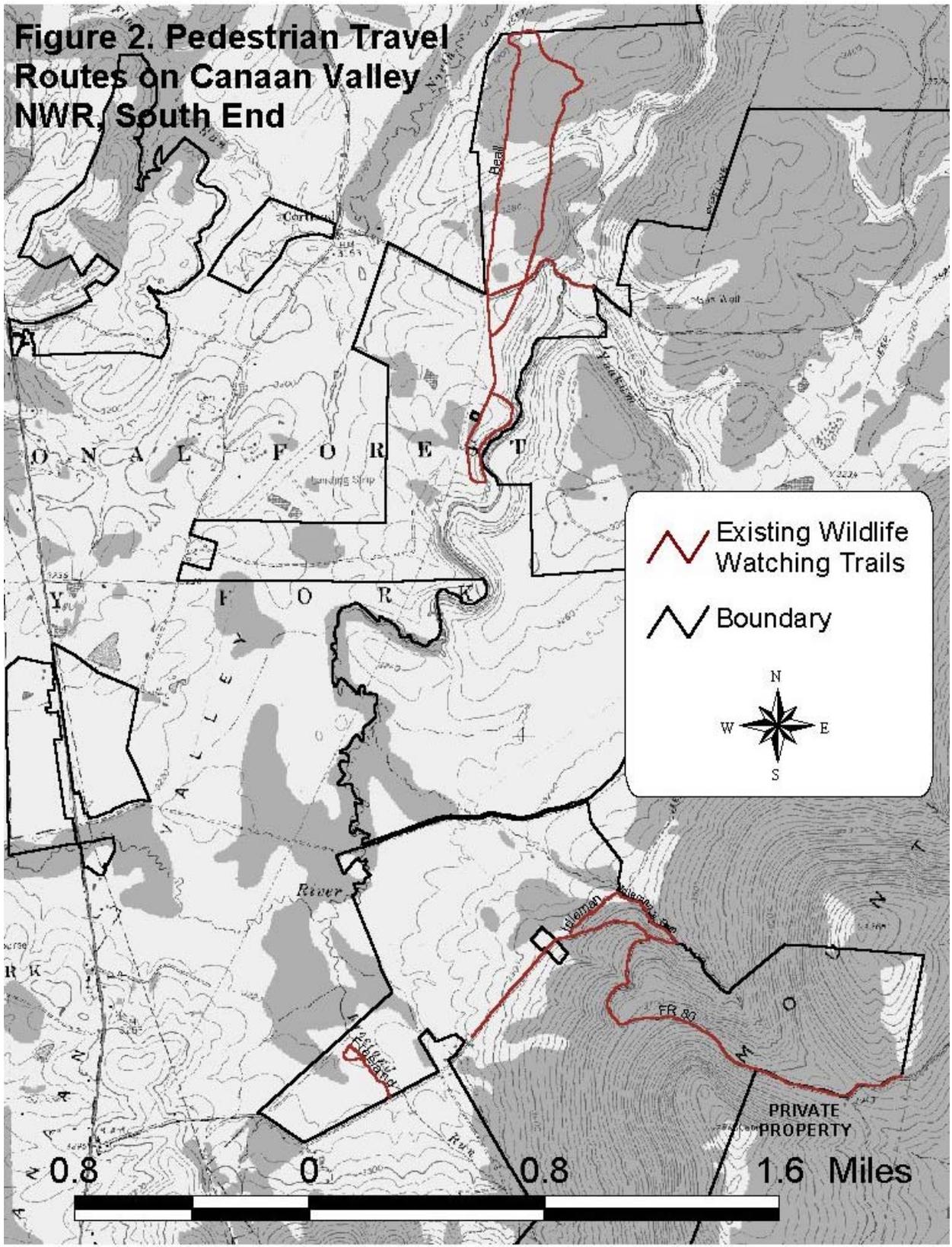
Wildlife associated with public access routes will be monitored to detect any impacts from public use. Monitoring will occur seasonally to document how species use of associated habitats is affected throughout yearly life cycles. Point counts during early summer will be used to inventory nesting bird species and to compare results with areas not influenced by public access. Transects will be established and monitored to determine how different species are influenced by the presence of a particular trail or road (i.e. for brood habitat, nesting, movement corridors etc.). Amphibian and avian surveys will be conducted during early spring for breeding and late summer for movements. Monitoring during winter will evaluate the importance of routes to mammals for winter movements and feeding areas. Vegetation surveys will be conducted to detect the presence of rare, unique or exotic invasive plant species located on designated public access routes.

Inventory results will be reviewed annually to ensure that designated routes continue to meet compatibility requirements. Management intervention to correct significant problems will occur if monitoring indicates that public use is impacting wildlife or plant species and/or populations. Remedies will be based on the significance of impacts and practical options for reducing or eliminating them. Intervention may include investigative research projects.

**Figure 1:** Map showing routes designated for public access by pedestrians in the Refuge's north end.



**Figure 2. Pedestrian Travel Routes on Canaan Valley NWR, South End**



**Figure 3. Cross Country Skiing and Snowshoeing on Canaan Valley NWR, South End**

