

COMPATIBILITY DETERMINATION

USE: Horseback 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 horseback travel to facilitate non-consumptive priority public uses on the Canaan Valley National Wildlife Refuge (Refuge). Priority non-consumptive public uses of the National Wildlife Refuge System defined by statute and regulation as: wildlife observation and photography, environmental education, and interpretation, 16 U.S.C. § 668ee (2); 50 C.F.R. § 25.12. Although hunting and fishing are priority public uses, they are consumptive and are not included as part of this compatibility determination.

(b) Where would the use be conducted?

Since the establishment of the Refuge in 1994, horseback travel has been allowed on roads open for vehicle access and a graveled service road on the Beall Tract, totaling 2.59 miles. These roads, in the southern part of the Refuge, are listed below and are open for horseback travel:

Forest Road 80 (FR 80)-1.91 miles
Idleman's Run Road-0.23 miles
Beall Tract Road-0.45 miles

The recent refuge addition of 11, 541 acres (Main Tract) includes the following gravel and old logging roads and trails that were used for horseback travel before Refuge acquisition, and which will remain open for that use:

Camp 70 Road and Delta 13 Trail – 1.81 miles
Brown Mountain Road – 2.38 miles
A Frame Road – 4.79 miles
Cabin Mountain Road – 1.37 miles
Summit View Road – 0.79 miles
Middle Ridge Trail – 3.71 miles
Middle Ridge Trail (Extension) – 0.87 miles
Blackbird Knob Trail – 0.65 miles
Glade Run Crossing Trail (S) – 0.90 miles
Glade Run Crossing Trail (N) – 0.75 miles
Blackwater River Trail – 1.33 miles
Swinging Bridge Trail – 1.07 miles

These roads and trails, totaling 23 miles, provide the public with an opportunity to experience Refuge wildlife and plant communities in a diversity of habitats by horseback travel. Appendix 6 details the dominant plant communities that can be experienced from designated horse roads and trails. The roads and trails have existing hard-packed surfaces and meet refuge criteria for route compatibility as shown in Appendix 2: Checklist For Route Compatibility. Roads and trails open for horseback travel are shown in Figures 1 and 2. Each road is described in Appendix 3: Routes Found To Be Compatible.

Refuge roads and trails designated for horseback travel traverse high elevation wetland, spruce-fir, mixed conifer/hardwood and northern hardwood forest habitats. Wildlife species occurring in the vicinity of 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.

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?

Designated roads and trails are open to horseback travel year-round. An average of 120 inches of snow falls annually in Canaan Valley. Snow removal is not conducted on Refuge roads and trails; therefore, trailhead access may be inaccessible during periods of heavy snowfall. Horseback travel occurs primarily spring through fall. During summer, riding typically occurs in early morning and late afternoon to avoid daytime heat although use can continue all day. To promote public safety, horseback travel hours are limited between 1 hour before sunrise and 1 hour after sunset and horseback travel is not allowed during the deer (bucks only) rifle-hunting season (The Monday before Thanksgiving and continuing for two weeks). Horseback travel during other refuge hunting seasons is allowed, but is not permitted to facilitate hunting.

(d) How would the use be conducted?

Horseback travel to facilitate non-consumptive priority public uses involves observing natural landscape features from horseback. According to interviews with local users, riders stop frequently to observe animal and plant communities. Horseback travel for such purposes is done at a walking gait. Riding commonly occurs in groups with an average group size of 2-4 riders. Riders may gather in larger groups for seasonal events like the viewing of fall colors.

Horseback travel on the Refuge is conducted in accordance with the stipulations necessary to ensure compatibility. Travel is limited to designated roads and trails with hard-packed surfaces and where road width can accommodate the safe passage of other users. Designated roads and trails also have sufficient viewing distance for horseback riders to detect the approach of other users and maneuver to accommodate them. Horses must be accompanied by riders at all times and not tied to trees or confined. To promote safety with other users, prevent conflicts and promote a quality wildlife observation environment, group size is limited to 10 riders. Larger groups need to contact the refuge office for a Special Use Permit prior to using the trail system. This will help protect refuge resources and ensure that larger groups do not conflict with other Refuge visitors. Riders either enter the Refuge at public entry points or transport horses by vehicle and park at designated sites.

The extent of horseback use on the Refuge is not thoroughly documented. Interviews with local horseback riders as well as recent observations from refuge staff were used to

develop anticipated use levels. A Refuge Officer routinely monitors rider numbers seen during patrols, types of access, user interactions, and potential safety concerns. The level of horseback 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 five horseback riders have been documented on refuge roads and trails. Anticipated levels of use are higher on Forest Road 80 which is more popular with horseback riders due to the connection with U.S. Forest Service Property. Overall levels of this use are likely slightly higher than observed levels.

This use is conducted in accordance with the stipulations necessary to ensure compatibility. Safety and information signs are to be installed at Refuge entry points and at appropriate sites where designated roads and trails intersect other roads and trails. Brochures or maps depicting the roads and trails open for this use will be available at Refuge headquarters and kiosks.

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 travel. Existing potholes that promote off-road detours will be filled with gravel. Roads and trails will be monitored annually to determine if they remain compatible subject to the route compatibility determination described in Appendix 2. Horseback travel is done in accordance with stipulations necessary to ensure compatibility. Any need for additional horseback travel can be considered during the preparation of the Comprehensive Conservation Plan (CCP), currently scheduled to begin by 2004. In the interim, the Refuge is conducting an inventory of all existing roads and trails.

(e) Why is this use being proposed?

Horseback travel on the Refuge provides an increased opportunity for the public to participate in priority public uses. It is a traditional method of travel to view the Refuge's diverse biological assets that is less physically demanding than pedestrian travel. Designated roads and trails at the southern end of the Refuge provide good opportunities to view forest communities and grasslands. Main Tract roads and trails provide exceptional opportunities to view wetland, forest, and grassland communities because they offer unrestricted views and are relatively level for horseback travel.

Although no CD was ever written for horseback travel, this use has been allowed on the above roads and trails since Refuge establishment. The Refuge Station Management Plan (1994) identifies the use as a low priority use but states that horseback riding may be appropriate on well-drained, upland sites on existing, designated roads and trails, where use of horses would not conflict with people on foot. No negative interactions have been reported between horseback riders and bicycle riders on the Refuge (USFWS 2002).

The former Main Tract landowner did not exclude horseback travel by the public (Monongahela Power Company 1994). According to local horseback riders, horseback travel to view wildlife and natural landscapes has occurred in the subject area for at least two decades. At the anticipated level of use, and with the prescriptions necessary to

ensure compatibility, the sharing of designated roads and trails with other users is unlikely to be a safety risk. At the current use level and restricted to designated roads and trails with hardened and modified surfaces, horseback travel would cause minimal surface disturbance.

Opportunities for horseback travel exist on nearby public lands including the U.S. Forest Service, Monongahela National Forest and Wilderness Areas, and Canaan Valley Resort and Blackwater Falls State Parks. These public lands however, provide no opportunities to observe the wildlife and plant communities associated with the Refuge's wetland and adjacent uplands. The Main Tract roads and trails provide exceptional opportunities to view wetland communities because they offer unrestricted views and are relatively level for easy horseback travel.

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

The Deputy Refuge Manager administers 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 is monitoring the environmental effects of public access. A Park Ranger monitors visitor use surveys and visitor 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 trails 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 of water. 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 horseback riding 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 21 work days = \$3,563.28

Planning and monitoring road conditions and supervising staff to monitor horse use and its effects on environment and other visitors

GS-12 Deputy Refuge Manager for 5 work days = \$1,040.40

Law enforcement, monitoring horse users and interactions with other users, visitor services, traffic counter maintenance/data collection, sign maintenance

GS-9 Park Ranger for 28 work days = \$4,312

Monitoring environmental effects of horse use

GS-11 Wildlife Biologist for 5 work days (training & inspection) = \$926.00

GS-9 Wildlife Biologist for 10 work days (monitoring) = \$1,434.40

GS-6 Biological Science Technician for 10 work days (monitoring) = \$1,055.

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 = \$210

Heavy equipment fuel = \$150

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

Grand Total Estimated Annual Costs = \$17,945.16

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 and to administer and manage the recreational use listed.

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 data base 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 horseback 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 and 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.

Horse travel can impact plants on roads and trails by directly crushing them. Indirectly, horses can impact plants by compacting soils diminishing soil porosity, aeration and

nutrient availability (Kuss 1986). Hammitt and Cole (1998) note, compaction limits the ability of plants to re-vegetate affected areas. 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 and can occur on upland roads and trails that have been incised and are channeling water.

Horse use may cause local impacts to plants and soils when confined. West Virginia Conservation Officer Harold Spencer observed that tying horses to trees damaged plants and soils. Confined horses in Canaan Valley ate the bark of nearby trees. This occurred at upland camps where horses were left for extended periods (Spencer 2002). According to Cole (1983), bark damage from tethering horses to trees can result in insect invasions and girdling that can ultimately kill the tree. Soil compaction and erosion at these sites was also cited as a problem, especially where it exposed tree roots (Cole 1983). Horses may also browse native plants if tethered for extended periods.

It is anticipated this use will cause some vegetation loss on designated routes. No rare plant species or plant communities are known to exist on the trail surfaces. Most routes designated for horse use are old logging roads; therefore, plant communities are typically common grass and sedge species and often include exotic species planted by logging companies for erosion control. Erosion from horse hooves may increase root exposure, however it is anticipated that under the current level of use the incidence of this problem will be minor. Roads and trails that have been found compatible for horse use are pre-existing routes that have been modified by vehicles or are still being used for vehicle access to the refuge. FR 80, A Frame Road and Idleman's Run road are void of vegetation and consist of hard packed graded surfaces.

Soil Impacts: Horses can cause soil compaction, particularly when soils are wet which can directly affect plant growth and survival (Kuss 1986). Horseback riding has caused braided roads and trails in excessively muddy trail sections (Summer 1986). Weaver and Dale (1978) found horse use caused a greater loss of vegetation cover, wider and deeper roads and trails, and greater soil compaction when compared to hiker use on meadow and forest trail conditions. Horses may cause trail erosion by loosening the soil and increasing soil particle detachment under both wet and dry trail conditions (Deluca et al 1998).

The Mauch Chunk derived soil in Canaan Valley is particularly vulnerable to mechanical erosion (such as from horse hooves) 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 roads and 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 roads and trails are now trapping and channeling water creating more erosive conditions.

Kuss (1986) found that increasing moisture content of soils reduces the ability of the soil to support traffic. Summer (1986) recommended that horse roads and trails be established on dry, well-drained sites. Routine maintenance to remove water and repair

existing erosion is required to sustain horseback travel on most routes on the Main Tract (Rizzo 2002, Zeedyk 2002). This is similar to the recommendations provided by the refuge Station Management Plan that states horse roads and trails will be considered on “well-drained, upland sites...” (USFWS 1994).

It is anticipated that some soil erosion at the refuge will occur as a result of horse hooves on soil surfaces. Soil compaction is likely to occur, however this is anticipated to be insignificant relative to the current soil conditions. Routes designated for this use were selected based on soil conditions that were listed as low risk for compaction and erosion as well as an in-field evaluation of existing conditions (Bell 2002, Rizzo 2002). Routes that have been found compatible for horse use include pre-existing roads open for vehicle use on the refuge and routes modified through grading and proper drainage located predominately on upland soils. Roads and trails designated for horseback use avoid exposed Mauch Chunk soils to prevent accelerating erosion. The current level of horse travel on designated routes is not expected to cause significant impacts to soils through compaction or erosion.

Invasive Species: Exposed soil and an abundance of sunlight along roads and trails provide ideal conditions for the establishment of invasive plant species. Invasive plant species may be transported into the refuge through the presence of exotic plant seeds in feed hay. This concern has initiated strict requirements for “weed free” hay in some natural areas. At Yellowstone National Park, Green Mountain, and Fingerlakes National Forests in New York only processed feed (pelletized or cubed hay) or certified “weed seed free” hay is allowed in the back-country (Oliff 2001, Zimmer 2001). Currently, there are no programs to provide or certify “weed free” hay in West Virginia or in the surrounding vicinity (Rayburn 2001).

The known incidence of invasive plant species is relatively low on the Refuge, however a preliminary survey was conducted during the 2002 field season. According to the West Virginia Agricultural Extension office, two plants that could be easily transported in hay, via seed, are tall fescue (*Festuca arundinacea*) and reed canary grass (*Phalaris arundinacea*) (Rayburn 2001). Reed canary grass has been seen with greater frequency in Canaan Valley’s wet meadows and fields. Multiflora rose (*Rosa multiflora*) is often found along roads and power lines. Another invasive, Japanese knotweed (*Polygonum cuspidatum*), has been observed by Refuge staff on Route 32. Yellow iris (*Iris pseudacorus*) is a management concern in wetlands at the Canaan Valley State Park and has been found on the refuge, but not associated with the subject roads and trails.

Based on the anticipated level of use, no significant increases in invasive plant species are likely to occur as a result of this use. Some designated routes are old logging roads planted with exotic grasses by logging companies that should result in relatively low impacts. Because weed-seed free hay is unavailable for use in West Virginia, no requirements for its use can realistically be implemented.

Hydrologic Impacts: Roads and trails used for horseback travel 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 results 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 roads and 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).

It is anticipated that horse use could alter drainage features of roads and trails through erosion and compaction. These changes are likely to be insignificant based on the anticipated level of use and condition of designated routes. The designated routes for horse use are pre-existing logging and skid roads, with the exception of two newly created routes that avoid highly eroded existing trail sections. Designated routes for horseback travel do not appear to be significantly affecting the hydrology of the refuge habitats.

Wildlife Impacts: Horseback travel can cause disturbances to wildlife using the refuge. 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.

Roads and 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 “wildland areas” can dramatically change the normal behavior of wildlife mostly through “unintentional 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 impacts that are more significant during breeding season and winter months.

Wildlife disturbance from horse use has been cited for trail closures in West Virginia. A trail was closed at the Bluestone Wildlife Management Area due to anticipated impacts of disturbance to wild turkey populations (Silvester 2001). Similar disturbances to resident and migratory wildlife species may also become a problem in the Canaan Valley. No historic information on the status and distribution of Main Tract wildlife populations is currently available. Refuge wildlife surveys of the Main Tract were initiated in 2002. No species of special concern have been found directly associated with the roads and trails. The subject roads and trails have been consistently used for public access for at least 20 years.

Impacts to wildlife may be indirectly caused through erosion and subsequent sedimentation of streams and vernal pools. Increased sediment loads can reduce aquatic vegetation and dissolved oxygen concentrations (Sadoway 1986). Sedimentation can directly kill aquatic invertebrates, which impacts the success of amphibian larvae and adults (Sadoway 1986). Observations by refuge staff in 2002 document numerous occurrences of amphibian egg masses that failed after becoming coated in sediment from eroding roads and trails 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.

Anticipated impacts of horse use on wildlife include temporal disturbances to species using habitat on the trail or directly adjacent to the trail. These disturbances are likely to be short term and infrequent based on the current level of use. Use of some roads and trails may cause direct impacts such as mortality (crushing amphibians foraging on grassy trails) to nest abandonment of bird species nesting on trails. Long-term impacts may include certain wildlife species avoiding trail corridors as a result of this use over time. Routes found compatible for horse use are located primarily in continuous tracts of northern hardwood forest on the refuge. Smaller more sensitive wildlife habitat such as riparian, wetland and grassland areas were mostly avoided. Based on current observations of public use during 2001 and 2002, the existing level of horseback riding is not anticipated to significantly increase wildlife habitat fragmentation or cause significant impacts through disturbance.

Threatened and Endangered Species:

The refuge provides habitat for threatened and endangered species. The threatened Cheat Mountain salamander (*Plethodon nettingi*) is sensitive to any habitat changes that remove forest canopy or reduce soil moisture and relative humidity (Pauley 1991). Because of this species reliance on high soil moisture and relative humidity, they are not likely to be found on or crossing a road or trail that is exposed to the heating and drying effects of the sun and wind. Cheat Mountain salamander populations have been confirmed at higher elevations in the southern end of the refuge and within 150 feet of FR 80. Because this

use will occur on pre-existing roads and trails, no new habitat will be disturbed where the salamander is found.

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. However, some research has found northern flying squirrels occupying den sites near logging roads, skid trails and on hiking trails (Ford 2002). No evidence of potentially occupied habitat has been found in the vicinity of other access roads and trails designated for horse use.

It is anticipated that horse travel on these routes will not cause any direct or indirect impacts to threatened or endangered species. Routes for horseback travel are existing roads and trails. No new habitat disturbance will occur outside of these routes. Habitat for the West Virginia northern flying squirrel and the Cheat Mountain salamander exists along FR 80 in the higher elevations of the refuge. Because FR 80 is a historic road used for vehicle access to the refuge and the Dolly Sods Wilderness area, horse travel will not cause additional significant impacts to these 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-oriented activities is an important consideration for wildlife observation roads and trails on the refuge. Safety considerations include ability of multiple modes of access to use a trail without creating dangerous conditions and ability to maintain a trail to allow safe use and timing for nature appreciation. Horseback travel on the proposed routes are considered safe under current conditions and level of use.

Any effects of horseback travel on the designated roads and trails, are not, based on our current level of knowledge, and at anticipated level and pattern of use, considered separately or cumulatively, to constitute significant short-term or long-term impacts. The use is viewed as an effective and justifiable method of access that better enables the public to discover, experience, and enjoy priority public uses on 23 miles of horseback riding roads and trails on the Refuge. Continued monitoring of the effects of horseback 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:

-Horseback travel to facilitate non-consumptive priority public uses is only compatible on the roads and trails designated and described in Appendix 3 and shown in Figures 1 and 2. Evaluation criteria to assess route compatibility are shown in Appendix 2.

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

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

-Horseback travel is allowed during Refuge open hours: 1 hour before sunrise until 1 hour after sunset.

-Camping and overnight parking are prohibited.

- Horseback rider group size is encouraged to be no more than 10, to promote public safety, accommodate other users, and provide a positive wildlife viewing experience. Group sizes greater than 10, require a Special Use Permit issued by the Refuge manager. Horseback riders traveling only on roads shared with vehicles are not required to obtain a Special Use Permit.

-Horses will not be tied to trees or confined on the Refuge and must be accompanied by riders at all times.

-Horseback travel is not allowed during the deer bucks only gun hunting season (Beginning the Monday before Thanksgiving and continuing for two weeks) for public safety, but is not a permitted means of access for hunting or fishing.

-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 are maintained at a level that reasonably accounts for safe vehicular travel.

-Designate public access routes are monitored annually to determine if they continue to meet the compatibility criteria presented in Appendix 2. The purpose is to assess the long-term effects of the subject use 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 changes in conditions over time. 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 compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Patrols include recording visitor numbers, vehicle numbers, visitor activities, and activity locations to document current and future level of Refuge use. Patrols will also include the routine assessment of safety conditions and visitor interactions on Refuge Routes. Conditions that 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. Providing for safe public use through proper administration and regulation, public education, and law enforcement is essential.

JUSTIFICATION:

Horseback riding has been determined to be compatible provided the above stipulations are implemented. Horseback riding, 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. The use of horses to facilitate the Priority Public Uses is a reasonable mode of access on designated roads and 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
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- Figure 1:** Map showing routes designated for public access – North End.
 - Figure 2:** Map showing routes designated for public access – South End.

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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 appalachensis</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
<i>Accipiter gentilis</i>	Northern goshawk	S1B,S1N	G5

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

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Ranking Descriptions

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- 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 it's 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 it's range, especially at it's 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 "high" or "very high" for compaction and/or erosiveness. The route is not rated as "severely 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 horseback travel because it is highly modified and is not causing unacceptable erosion and sedimentation problems. Horseback travel on 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 horseback travel as it does not cause unacceptable erosion and sedimentation and is in stable condition. Continued horseback travel on 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.

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 horseback 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 have been documented on the trail surface itself. The road exists partly on the edge areas of the riparian corridor, the 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 horseback riding 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. Horseback 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 horseback 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. Horseback 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. Trail maintenance will be necessary in such areas to prevent erosion and sedimentation. Stream and spring crossings will be armored to prevent bank erosion.

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 that 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. Horseback travel of this trail will not cause significant increases in erosion or stream sedimentation. There are rare plant species documented in the wetlands adjacent to 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. Horseback 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. Horseback travel on this road will not cause significant erosion, compaction, nor 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 anticipated 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.

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 Characteristics:

A baseline inventory on 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 “problem 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 set for refuge trails is a non-degradation policy such that existing “problem areas” will not increase in size, number, or frequency. It is intended that access limitations improve currently degraded vegetation and soil conditions. Improvement is defined as reducing “problem areas” by : narrowing trail width, decreasing numbers of “bootleg” trails through revegetation, fewer mud holes, less soil erosion, and fewer areas of exposed roots. Information generated from this survey includes the following products:

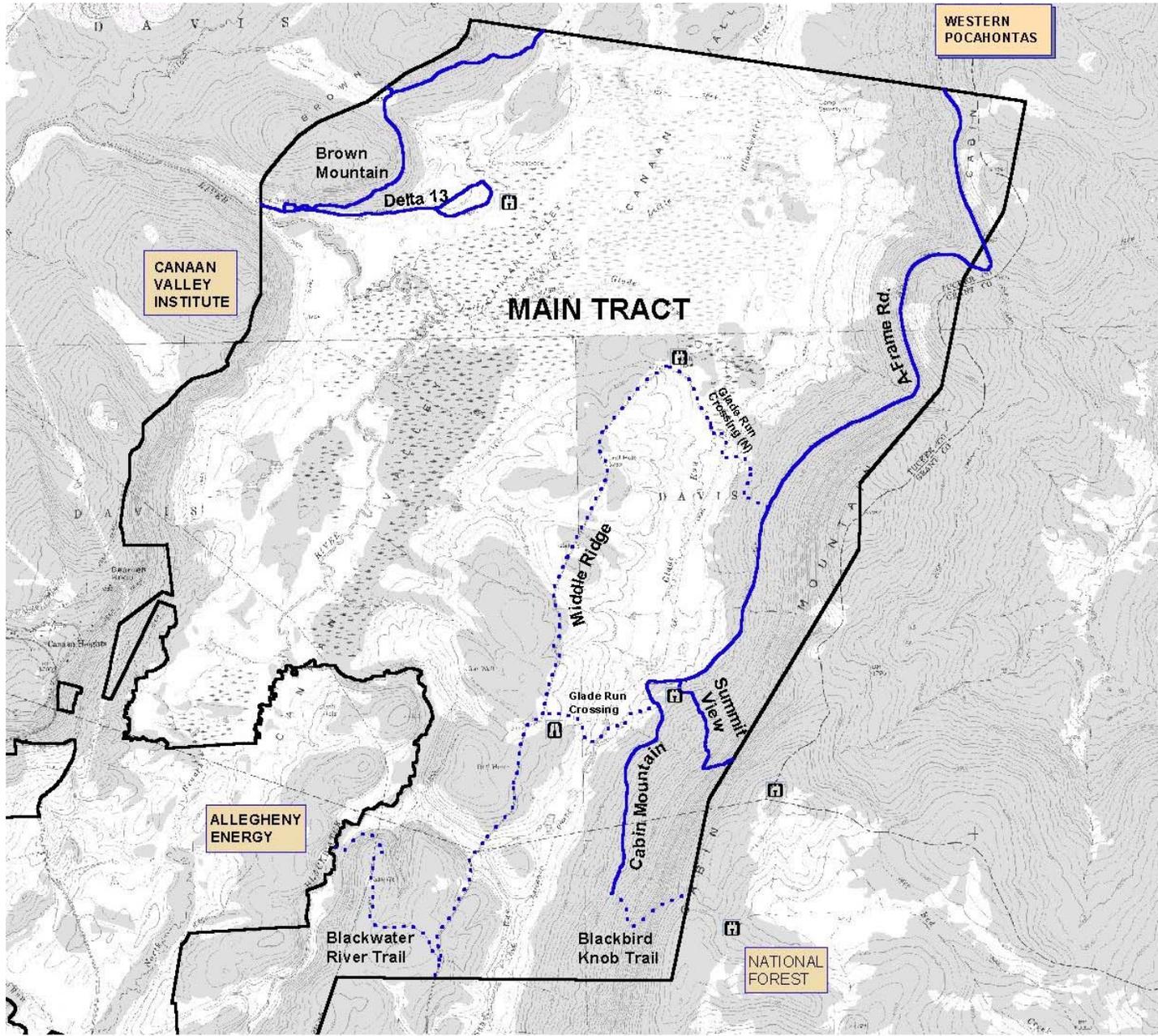
- A description of the frequency of “problem areas” on targeted trails
- A description of the average physical characteristics of trail features
- A description of the lineal extent of “problem areas”
- A repeatable monitoring protocol that will track the trend of physical condition of refuge trails.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

Biological Monitoring:

Wildlife associated with public access routes is monitored to detect any impacts from public use. Monitoring occurs seasonally to document how species use of associated habitats is affected throughout yearly life cycles. Point counts during early summer are used to inventory nesting bird species and to compare results with areas not influenced by public access. Transects are and 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 are conducted during early spring for breeding and late summer for movements. Monitoring during winter evaluates the importance of routes to mammals for winter movements and feeding areas. Vegetation surveys are conducted to detect the presence of rare, unique or exotic invasive plant species located on 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 are 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 horse – North end



**Figure 1.
Horseback
Travel
Routes
on Canaan
Valley NWR,
North End**

-  Horseback Travel Routes
-  Added Routes
-  Refuge Boundary
-  Adjacent Landowners
-  Scenic View

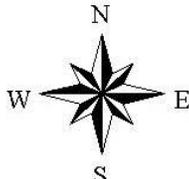




Figure 2: Map showing routes designated for public access by horse - South End

