CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the Upper Williams Watershed Improvement project area affected environment, including the human elements, and discusses the environmental consequences by resource that may result from implementation of the proposed activities. The environmental consequences are described as the direct, indirect, or cumulative effects of carrying out the proposed action. Direct effects are caused by an action and occur at the same time and place. Indirect effects are caused by an action, but occur later in time or farther removed in distance. Cumulative effects result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions (40 CFR 1508.7-1508.8).

For each resource, a geographic area is described, where potential effects are considered. This area is termed the Affected Area.

National Forest resource management is subject to numerous laws, regulations, policies, and guidelines designed to protect, preserve, and properly manage forest resources. In this chapter, the "Regulatory Framework" associated with specific resources explains how the Proposed Action is designed to meet these requirements. The regulatory framework includes Federal laws, such as the Endangered Species Act and the National Forest Management Act; Forest Service regulation and policy expressed in the Forest Service Manual; and Forest-level guidance described in the Monongahela LRMP.

National Forest lands provide habitat for many forms of plant, wildlife and aquatic species. Analysis of the existing conditions and environmental consequences of the impacts for all existing or potential forms of these species within a planning area is impossible to address. Therefore, in accordance with 36 CFR219.19(a)(1), individual Forest Plans have identified specific species that would be analyzed as representative samples to show the condition of and effects on ecosystems. These are identified as Management Indicator Species (MIS). In addition to the MIS discussed in the appropriate sections, the Endangered Species Act requires an analysis of the existing condition and environmental consequences to species either listed or proposed for listing under this act. Forest Service policy includes the requirement to look at species listed as "sensitive" by the Regional Forester. While species that fell into these categories during the development of the Forest Plan are included as MIS, species added to these lists after approval of the Forest Plan(s) are also analyzed. This document will use these species as the representative samples to analyze the impact to all species within the planning area.

This chapter is organized into the following sections:

I. Cumulative Effects Consideration Actions

II. Biological/Physical Environment

- Aquatics
- Soil
- Botany/Ecology
- Wildlife

III. Social Environment

- Heritage
- Recreation
- Safety
- Environmental Justice

CUMULATIVE EFFECTS CONSIDERATION ACTIONS

The following discussion provides a summary of the known past, present, and reasonably foreseeable future activities in the Upper Williams River project area. Analysis of cumulative effects found in this chapter considers these activities.

Timber harvesting occurred in the Upper Williams River watershed prior to National Forest ownership. From the 1880s through the early 1900s, timber harvesting occurred across the state. Construction of railroads doubled in the 1880s and then doubled again in the 1890s, allowing access to and transportation of the timber resource (Lewis, 1998). As a result, much of what is now the Monongahela National Forest had been clearcut by the late 1920s, including the Upper Williams River area.

In the early to mid-1960s, clearcutting became the primary silvicultural tool on the Monongahela National Forest land, including the Upper Williams area. Clearcutting was used instead of the traditional individual tree harvests used during the 1950s.

Harvesting increased in this watershed on private lands in the early 1990s as prices for stumpage rose substantially. While future harvesting may occur on private lands, where the harvesting would take place, what types of harvesting would occur, and to what extent is unknown. Therefore, analysis of the effects of these activities would be speculative at best and are not included in this analysis unless proposals have been registered with the State of West Virginia.

Additional activities on private lands include grazing, housing construction, hunting, and fishing. While grazing, hunting, and fishing activities are assumed to remain static, future housing construction predictions as well as construction of camp structures would be speculative.

The Table 3.1 displays all past, present and reasonably foreseeable future actions considered in this analysis for the discussion of the cumulative effects.

Table 3.1. Cumulative Effects Activity

Activity	Year Completed	Quantity	Reasonably Foreseeable
Timber harvests (FS lands)	**1981 -1994**	**4,420 Acres**	
Powerline and gasoline Maintenance	**Ongoing**		**X**
Handley Public Hunting and Fishing Area timber sale	**2002**	**24**	
Trail Construction and Maintenance	**Ongoing**		**(Maintenance)**
Campground maintenance	**Ongoing**		**X**
Fish stocking	**Ongoing**		**X**
Stream limestone stream supplements	**Ongoing**		**X**
Road Maintenance 2	**Ongoing**		**X**
Residential land development	**Ongoing**		**X**
Snowmobile parking lot	**2002**		
Williams River Road (FR 86) Paving	**2003 - Ongoing**	**18 Miles**	**X**
Special use ROW vegetation control	**Ongoing**		**X**
Grazing	**Ongoing**	**134 Acres**	**X**
Firewood cutting	**Ongoing**		**X**
Fence Construction in Friel Run	**2003**		
Williams and Cranberry River RUA Improvement			**X**
Maintenance of existing permanent wildlife openings	**Ongoing**	**67 Openings**	**X**
Upper Williams River Wildlife Improvement Project		**700 Acres**	**X**
Upper Williams River Timber Sale (UWRTS) Project	**Ongoing**	**1,443**	**X**

Table 3.1. Cumulative Effects Activity			
Activity	**Year Completed**	**Quantity**	**Reasonably Foreseeable**
UWRTS – Road Improvements	**Ongoing**	**17 Miles**	**X**
UWRTS – Road Reconstruction	**Ongoing**	**11 Miles**	**X**
UWRTS – Road Storage	**Ongoing**	**3 Miles**	**X**
UWRTS – Road Decommissioning	**Ongoing**	**4 Miles**	**X**

[1] Harvest occurred in nine different areas by five different landowners. Primary method was diameter limit.
[2] Maintenance levels are dependent upon use allocations and available funding.
[3] Residential land development has been considered in the development of existing conditions within the planning area. As stated above, future development may occur but the effects would be speculative and are not considered in the effects analysis.

Most of the timber sales on National Forest System lands were even-age management. These areas are restocked within five years and crown closure usually occurs within ten years. Most of the ongoing effects from the timber sales that occurred prior to 1995 are related to roads constructed for the sales and skid trails. These impacts are primarily related to hydrological functions. These timber sales were also considered in the age class diversity within the planning area.

The 1,443 acres of timber harvesting (primarily commercial thinning) under the Upper Williams Timber Sale EA FONSI/DN of 2006 is currently being implemented. Helicopter and conventional logging are the two types of logging methods used for removing the timber. Along with the timber harvesting are several miles of road improvement projects, road reconstruction, decommissioning, and road storage.

The majority of the Williams River Road paving project was completed in 2003-2006. The project was placed on hold until this year, where the remaining two and half miles is planned to be completed this fiscal year.

The Upper Williams Wildlife project includes approximately 700 acres of habitat enhancement for snowshoe hare, Indiana bat, and songbirds. The habitat would be created or improved using tree girdling.

The timber sales on private lands were predominantly commercial thinnings using conventional logging methods. Key impacts are related to soils and vegetation. Power line and natural gas line maintenance is primarily maintaining vegetation at a level that would provide access. Key impacts are related to vegetation diversity. The trail and campground operations maintenance and firewood cutting are ongoing but are not expected to have additional impacts to the resources related to this proposal.

Biological/Physical Environment

Aquatic Resources

The following is a description of the aquatic resources in the Upper Williams River watershed improvement project area, and the potential effects of implementing the alternatives being considered in the environmental assessment.

Affected Environment

The Upper Williams River watershed improvement project area encompasses approximately 24,800 acres in the headwaters of the Williams River. The area includes approximately 11 miles of the Williams River main stem, from its headwaters to the confluence of Sugar Creek. The Williams River flows primarily in a north to northwesterly direction within the assessment area before it gradually turns and flows west to its confluence with the Gauley River, approximately 24 miles downstream. Major drainages within the assessment area include, from the headwaters progressing downstream, Beaverdam Run, Downy Run, Mountain Lick Run, Black Mountain Run, Day Run, Big Laurel Creek, Little Laurel Creek and Sugar Creek. There are also numerous unnamed perennial and non-perennial channels in the area.

A more detailed description of the affected environment for the Upper Williams River Watershed Improvement EA can be found in the Upper Williams River Watershed Assessment completed in 2000 (USFS 2000). A few key points identified in the watershed assessment are:

- A majority of the streams sampled in the watershed had levels of fine sediment that impair trout productivity. Roads, skid roads, and woods roads are one of the primary sources of fine sediment and opportunities were identified to decommission and store roads to reduce erosion and sedimentation in the watershed.

- Highly erosive soils cover approximately 78% of the watershed.

- Streams have limited amounts of large woody debris (LWD) which is important for healthy aquatic ecosystems. Channel stability and fish habitat quality are reduced in the analysis area due to limited amounts of large woody debris.

- Riparian conditions along portions of the Williams River main stem and tributaries contribute to unstable banks and poor stream shading. Actions are proposed to revegetate riparian areas and stabilize eroding banks.

- Culverts on streams create passage barriers for fish and other aquatic organisms. Culverts that are too narrow, too steep, or perched too high above a stream channel restrict upstream and downstream movement of aquatic organisms.

The highly erosive soils coupled with past and present land management activities have resulted in streams with levels of fine sediment that may impair aquatic productivity. This is generally considered to be levels of fine sediment (<4mm in size) that exceed 20-25% in potential spawning sites. Sediment samples collected in 1999-2000 throughout the Upper Williams River planning area showed six of the eight streams sampled had fine sediment levels that were greater than 20% **(Table 3.2)**.

Table 3.2. Data collected in 1999-2000 to assess the percentage of fine sediment (<4mm) in potential spawning gravels.

% Fine Sediment	Beaverdam Run	Downy Run	Mountain Lick Run	Black Mtn Run	Day Run	Big Laurel	Little Laurel	Sugar Creek	Williams River
	36%	28%	21%	25%	19%	NA	14%	25-42%	31%

More recent sediment sampling has shown similar results for Black Mountain Run (23% in 2006) and higher levels in Little Laurel (26% in 2006). In order to address this issue of elevated levels of fine sediment in the Upper Williams River planning area, a number of existing roads have been identified for decommissioning or storage to reduce sediment inputs. Actively eroding banks are also proposed to be stabilized and revegetated.

Large woody debris (LWD) is important for a number of functions in perennial, intermittent and ephemeral channels. In perennial streams, LWD increases habitat complexity by scouring pools, trapping spawning gravels, provides hiding cover, and dissipating stream energy. In intermittent and ephemeral channels LWD helps to trap and store sediment in the watershed, provides structure for channel stability, and helps retain moisture (Duncan et al 1987, Hicks et al 1991, Flebbe and Dolloff 1995).

Past logging activities have left most streams in the Upper Williams River planning area with limited levels of LWD. The extensive clear cutting around the early 1900’s removed trees adjacent to stream channels that were the source of LWD. Until the riparian timber stands mature, recruitment of LWD has been greatly reduced for the past 60+ years. This has resulted in the existing low levels of LWD in stream channels, and stream environments that are simplified and generally lack adequate pool habitat and hiding cover. Today, the riparian timber stands are maturing and natural recruitment of LWD is expected to increase as trees die and fall into the stream channels. Opportunities also exist to actively add wood to stream channels to facilitate recovery and improve the health of the aquatic environment.

Streams in the assessment area are inhabited by a number of native fish, primarily nongame species. A review of past sampling records, from 1957-1991, showed 20 different species have been collected in the planning area (Appendix A – Fish Species List).

No federally threatened or endangered fish or aquatic species occur in the assessment area. Candy darters, which are on the Regional Forester's Sensitive Species list, were collected within the assessment area in 1976, but a subsequent sample at the same site in 1991 failed to collect any (Chipps et al. 1993). The presence or absence of candy darter in the Upper Williams River main stem is currently unknown. For the purposes of this analysis they were considered as present in the main stem and the potential effects of project activities on their habitat were evaluated. Candy darters prefer riffle habitats with rock substrates (Stauffer et al. 1995) and may be affected by sedimentation (Chipps et al. 1993). Projects that reduce erosion within the watershed would improve candy darter habitat by reducing sedimentation.

Native brook trout are present in the planning area and identified in the Monongahela National Forest Land and Resource Management Plan as a management indicator species (MIS). The objective for management indicator species is to maintain or improve their habitat. Mountain Lick Run, Black Mountain Run, Day Run, Little Laurel Creek, Sugar Creek and the Williams River main stem contain brook trout habitat. Brook trout prefer streams with cold, clean water, a 1:1 pool to riffle ratio and abundant cover (USFWS 1982). Currently, areas of reduced riparian vegetation; elevated levels of fine sediment and a lack of LWD resulting in reduced pool habitat and hiding cover affect these conditions.

Overall, fish habitat and trout productivity in the Upper Williams River Watershed Improvement Project Area are considered to be reduced due to impacts associated with logging around the turn of the last century and contemporary land uses. Streams generally have elevated levels of fine sediment and reduced channel structure that effects water quality and habitat conditions. Proposed activities are intended to address these concerns and facilitate recovery of the watershed.

Scope of the Analysis

Direct effects are caused by activities that have a direct impact on aquatic resources and occur at the time the project is implemented. Activities in the proposed action that have direct effects on aquatic resources include removing or installing culverts, the addition of LWD to stream channels, and the installation of instream structures to improve bank stability.

Indirect effects are effects that occur at a later time or location from where or when the project is implemented. Indirect effects can be caused by activities that change runoff patterns, erosion rates, or riparian characteristics.

The spatial boundary used to address **cumulative** impacts is the Upper Williams River watershed boundary. The effects of implementing, or not implementing, the proposed action are considered in context with past, present and reasonably foreseeable future actions of other activities within the watershed.

The potential effects of project implementation can also be described by their timing or duration. **Short term effects** for aquatic resources are considered to be those effects that occur at the time of project implementation. An example of a short term effect would be an increase in stream turbidity associated with working in channels. **Long term effects** are the expected benefits of project activities that restore soil productivity, reduce erosion and sedimentation, improve channel and bank stability and improve the hydrologic conditions within the watershed.

Analysis of Effects

Alternative 1 – No Action:
A decision to implement Alternative 1 would result in no direct or indirect effects because no new actions would be pursued on National Forest System lands. Because there would be no direct or indirect effects, there would be no cumulative effects with this alternative. Sediment levels within the project area have been identified as a concern. Selection of this alternative would not treat known sources of sediment production. Additional sources of sedimentation may be created with the implementation of present and reasonably foreseeable timber sales within the project area. Low levels of LWD would remain in stream channels, but would increase through time as the existing forest matures and trees adjacent to channels fall. Passage barriers at road crossings on the main stem Williams River (FR 999) and Black Mountain Run (FR 216) would not be improved and habitat connectivity for aquatic organisms would remain impaired.

Alternative 2 – Proposed Action:
Road Decommissioning and Storage: Alternative 2 would correct a number of road related problems and sediment sources within the Upper Williams River watershed through decommissioning and storing roads. The activities to decommission and store roads are relatively similar, so they are considered together in this effects analysis. Approximately 22.4 miles of road would be treated improving soil and watershed conditions on approximately 77 acres (see Soils Section). This includes treating roads within drainage areas of important native brook trout streams such as Black Mountain Run and Mountain Lick Run. Short term direct effects would occur during project implementation where culverts are removed from stream crossings. This would include increased turbidity and possibly additional sedimentation when bank conditions are disturbed. Forest Plan standards and guidelines, and project design features, would be implemented to minimize the potential short term effects. Many of these culverts occur on small, non-fish bearing streams, so direct impacts to fish populations are not expected. The potential for erosion would diminish through time (1-3 years) as disturbed soils revegetate and ground cover increases. The long term benefits of road decommissioning and storage include reducing known sediment sources and restoring the drainage patterns and hydrologic functions in the treated areas.

Aquatic Passage Improvement: Implementation of passage improvements along FR 999 and FR 216 would have direct effects on the main stem Williams River and Black Mountain Run, respectively. Direct effects would occur when the existing structures are removed or modified and replaced by new structures. Experience has shown that a short term increase in turbidity would occur when the project is implemented due to disturbance to the stream substrate. This turbidity typically does not last long once the disturbance is stopped and travels a relatively short distance downstream. Short term increases in sedimentation could also occur from bank disturbances, but Forest Plan standards and guidelines and project design features are intended to minimize these effects. The potential for erosion would diminish through time (1-3 years) as disturbed soils revegetate and ground cover increases.

The short and long term effects of the passage projects would be improved connectivity of populations of aquatic organisms within the Williams River and Black Mountain Run. This would be especially true for trout that move from the Williams River main stem and seek refuge or spawning habitat within Black Mountain Run.

Channel Structure Improvement: The addition of LWD to Black Mountain Run and Mountain Lick Run is expected to have minimal short term direct effects. Trees would be directionally felled into the channels from adjoining timber stands. Trees to be felled would not include those immediately adjacent to the stream banks and would be distributed along both sides of the channel to avoid modifying riparian conditions such as stream shading. The projects are intended to mimic the recruitment of LWD, which is expected to increase naturally sometime in the future. In the long term the addition of LWD, both introduced and natural recruitment, would result in more channel structure which is expected to increase pool habitat, hiding cover and channel complexity. It can be anticipated that streams would adjust to increased LWD with localized bed and bank scouring and depositional features. This dynamic is part of the restoration process as the channels return to more of a stepped profile and more sinuosity which increases habitat complexity and helps to dissipate stream energy.

Bank Stabilization: The construction of instream structures to improve bank stability is anticipated to have short term direct effects to the Williams River in the work area, and along the banks where boulders would be delivered for placement in the channel. An increase in turbidity is expected as boulders are placed in the channel, but conditions would clear shortly after the work is completed and sediment would travel a relatively short distance downstream. The long term effects would be beneficial with stream energy redirected away from eroding banks and riparian vegetation re-established on exposed soils. Soils disturbed by implementation of the project would also be restored and re-seeded. The structures would also provide cover for fish and other aquatic species in the main stem and create habitat conditions favorable to candy darter.

Riparian Planting: Riparian planting would be done by hand and is not expected to have any measurable short term effects. Long term benefits include improving bank stability, stream shading and riparian conditions in the planted areas.

Black Mountain Mine: An abandoned mine is located along WR 33 and erosion and runoff associated with the mine site and access road would be corrected, if necessary, when the road is decommissioned. Initially, the mine site appears to be healing with no problems identified. The site would be re-visited and minor soil and drainage work may be done to the site before the access roads are decommissioned. Any work is expected to be relatively minor and not have any measurable direct or indirect effects to aquatic resources. The long term benefits would be to improve soil productivity and disperse runoff to avoid erosion.

Cumulative Effects: Although implementation of the Proposed Action would have an overall beneficial effect to watershed conditions, we do not expect it to have a measurable impact, either positive or negative, to the cumulative effects associated with past, present and reasonably foreseeable future actions both on and off Forest. The treatments are relatively minor at the watershed scale and aquatic resources would continue to be at risk within the analysis area. Nonetheless, the watershed improvement activities represent an improvement to localized and site specific conditions which contribute to the recovery trends for aquatic resources and expedite the attainment of future desired conditions.

The implementation of the Proposed Action would benefit native brook trout populations by reducing sedimentation, improving instream habitat conditions and improving population connectivity. This is especially true in the Black Mountain Run drainage where existing problems are being corrected and no reasonably foreseeable actions are proposed.

Design Features

Road Decommissioning: Mulching, liming, fertilizing, seeding exposed soils, and installing temporary silt fences in areas where the road crosses streams would minimize the movement of sediment off site.

Seeding would be done with an annual grass and a non-invasive seed mixture if needed. Often in these soil types native grasses do not establish quick enough to prevent gully erosion or sheet erosion; therefore it may be justified to use a more aggressive seed mixture that does contain non-native species as long as those species are not considered to be invasive. Consultation with the Forest Ecologist would occur prior to the purchasing of the seed mixture.

Road Storage: Culverts would be removed or in rare cases large drain dips would be placed in front of the culverts. The large drain dips would intercept water running towards the culverts, reducing the risk of a plugged culvert causing a road failure. Armoring of the areas above and below culverts is recommended in order to prevent head cutting of these severely erodible soil types. Armoring can be accomplished through woody debris, rock of varying sizes, synthetic materials, or other acceptable materials.

The surface of the road would be grassed for long-term storage. This organic material can be removed in the future down to the existing gravel surface in the future for use when needed.

Soil Disturbance near or adjacent to a stream channel: Soils would be stabilized as soon as possible with mulch and seed. Silt fences would be installed next to channels and cleaned periodically. Once vegetation is established the silt fences would be removed.

Large Woody Debris Additions: Trees located along the immediate edge of the stream bank would not be selected for directional felling. Trees would be well distributed to avoid modifying riparian conditions. Trees would be felled in the winter (Nov. 16-Mar. 31), while Indiana bats are in their hibernation period.

Consistency with the Forest Plan

All alternatives would be implemented consistent with Forest Plan goals, objectives, standards, and guidelines.

Consistency with Laws, Regulations, and Handbooks

All alternatives would be implemented consistent with Forest Service laws, regulations, and handbooks regarding management of the soil resource.

Soil Resources

The following is a description of the soil resources that would be affected by the alternatives, including the proposed action, that are being considered under the Upper Williams River Environmental Assessment.

Affected Environment

The Mauch Chunk Group is the primary geologic group found in the Upper Williams River project area, consisting mainly of the red and green shales of the Hinton and Bluefield formations. The shales in the Mauch Chunk Group are moderately high in clay minerals and are highly susceptible to weathering. The soils have a moderate shrink-swell potential meaning that they expand and contract through wetting and drying processes. The soil profile over the shale bedrock is thin and gully erosion is characteristic. The shales are prone to mass wasting; and roads crossing the Hinton or Bluestone formations of the Mauch Chunk Group are beset with falling rock and landslides in many places. Roads developed across or along these areas tend to be expensive to maintain because of the overpowering tendency for the parent material to slump and slide (Unpublished Article, 1960).

The Cateache-Shouns soils group is found overlaying the Mauch Chunk Group. This soils group is located on an estimated 78% of the project area and contains some of the most productive and highly erosive soils found within the Monongahela National Forest.

The Mandy-Snowdog-Gauley soils group is found on an estimated 17% of the Upper Williams River project area. This soils group is found overlaying several different geologic formations including 1) the Bluestone and Princeton Formations of the Mauch Chunk Group, 2) the New River Formation of the Pottsville Group, which is predominantly sandstone, with some shale, siltstone, and coal found at Red Spruce Knob and Big Spruce Knob, and 3) the Kanawha Formation of the Pottsville Group, consisting of sandstone, siltstone, shale, and coal found on Black Mountain and the higher elevations along the Highland Scenic Highway. These soils are frigid soils found at the higher elevations of the project area.

The Berks-Weikert soils group is found on an estimated 5% of the project area. This soils group is found overlaying several massive sandstone members of the Bluefield Formation of the Mauch Chunk Group.

A map of the soils groups and a map of the geologic groups can be found in the soils report, in the project file.

The soils in the Upper Williams River watershed developed over time because of erosion processes. These erosion processes varied based on geologic/soils relationships, landscape positions, aspect, vegetation, and climate. Present-day erosion processes consist primarily of stream bank erosion and sheet, rill, and gully erosion found across the drainage. Minor mass wasting in the form of landslides is evident along roads on the cut and fill-slopes. Soil humps are formed from the root wads or blown down trees, and soil creep is evident in areas.

Fire has been nearly excluded from the Upper Williams River Watershed in the past 60 years. Numerous, large fires occurred after the extensive logging in the 1920's and 30's. An extremely intense fire in logging slash occurred on Black Mountain in the 1930's. The high intensity of the fire damaged soils; and the subsequent rains caused erosion, resulting in vast areas of exposed rock with little soil remaining. Vegetation is still in the pole, sapling, and shrub stages nearly 70 years after the fire.

Sensitive Soils of the Upper Williams Watershed: The following soils in the project area have been identified for their potential to be "sensitive" based on factors such as flood potential, soil wetness, the occurrence of hydric soils, slippage potential, and slope. This is based on the interpretative ratings given to each series by the Natural Resource Conservation Service in the 1998 Pocahontas County Soil Survey Report for various management activities.

The following is a description of each soil series located in the project area that has been identified as being sensitive and would potentially be affected by the proposal. Soil types not affected by any of the proposed activities are not discussed. A map of the soils located in the watershed is attached to the soils report, in the project file.

Cateache: The Cateache series consists of moderately deep well drained soils with moderate permeability. These soils directly overlay the parent material from which they develop and are described as being "residual." This soil series weathered mainly from red interbedded siltstone and shale. Cateache soils are on steep and very steep side slopes of mountains and ridges and on gently sloping to moderately steep benches and ridgetops. Slope ranges from 3 to 80 percent. Permeability is moderate, the available water capacity is moderate, and runoff is medium to very rapid. In areas that have not been limed, Cateache soils are strongly acid to moderately acid. These soils are highly erosive and prone to mass movement and slippage. These soils have moderate shrink-swell potential and low shear strength. The depth to bedrock is 20 to 40 inches and may restrict root growth. The bedrock is soft and weathers relatively easily.

Shouns: The Shouns series consists of very deep, well drained, moderately permeable soils on footslopes and in coves. These are colluvial soils forming from weathered sandstone, siltstone, and shale. Colluvial soils are soils that have moved down slope from a position where they developed. The Shouns soil series primarily is located on the lower part of hillsides, benches, and foot slopes. Runoff is medium to very rapid, permeability is moderate, and available water capacity is moderate or high. In areas that have not been limed, reaction is strongly acid to moderately acid. These soils are highly erosive and prone to mass movement and slippage. These soils have moderate shrink-swell potential and low shear strength.

Trussel: The Trussel series consists of very deep, poorly drained soils formed in medium textured colluvium derived from acid shale, siltstone, and sandstone. They are on foot slopes and drainage ways near the tops of mountains. The potential for surface runoff is negligible to very high. Permeability is moderate above the fragipan and slow to moderately slow in the fragipan. A fragipan is a dense layer in the soil profile that restricts root penetration and water movement. In undisturbed areas, the depth to the top of a perched seasonal high water table ranges from the soil surface to one half foot for some time in most years.

Tioga: The Tioga series consists of very deep, well drained alluvial soils located on flood plains and high bottoms. Alluvial soils have been transported and deposited by occurrences such as floods in gently sloping to level landscape positions. Permeability is moderate or moderately rapid in the soil profile and moderate to rapid in the underlying material. The available water capacity is moderate to high. Runoff is slow to medium. This soil is subject to occasional flooding. In areas that have not been limed, the reaction is strongly acid to neutral. The erosion hazard is slight.

Chavies: The Chavies series consists of very deep, well drained soils with moderately rapid permeability. They formed in mixed alluvium washed mainly from soils of acid sandstone, siltstone, and shale origin. These soils are located on long, narrow, to broad areas on stream terraces. Runoff is medium and permeability is moderately rapid. Flooding frequency is none to rare. Depth to water table is more than 6 feet. The available water capacity is moderate or high. In areas that have not been limed, the reaction is very strongly acid to neutral. The erosion hazard is slight.

Holly: The Holly series consists of very deep, very poorly drained, and poorly drained soils formed in loamy alluvium on flood plains. Permeability is moderate or moderately slow in the solum and moderate or moderately rapid in the underlying material. Available water capacity is high, and runoff is slow. Slope ranges from 0 to 2 percent. The potential for surface runoff is negligible to low. The depth to an intermittent apparent seasonal high water table is +1.0 to 0.0 from October to June in normal years. These soils are subject to rare to frequent flooding. The high water table restricts the root zone of many types of plants. In areas that have not been limed, the reaction is moderately acid to slightly acid.

Lobdell: The Lobdell series consists of very deep, nearly level, moderately well drained soils that formed in recent loamy alluvium on floodplains. Permeability is moderate in the soil profile and moderate or moderately rapid in the underlying material. The available water capacity is high and the surface runoff is slow. This soil is subject to occasional flooding. In areas that have not been limed, reaction is strongly acid to neutral. The root zone of some types of plants is restricted by the seasonal high water table at a depth of 18 to 24 inches. The depth to bedrock is more than 60 inches. The hazard of erosion is slight.

Leatherbark: The Leatherbark series consists of moderately deep, somewhat poorly drained soils formed in residuum weathered from interbedded siltstone, sandstone and shale on broad ridgetops and upland depressions on mountains. The potential for surface runoff is negligible to very high. Permeability is moderately slow. In undisturbed areas, the depth to the top of a perched seasonal high water table ranges from one half foot to one foot for some time in most years. Available water capacity is moderate. In areas that have not been limed, reaction is extremely acid to strongly acid. The hazard of erosion is slight to severe. Wetness is a major management concern. Activities would be deferred during wet periods until the soil is reasonable firm. Adding gravel to the surface of roads or access areas minimizes the effects of wetness. Depth to bedrock is 20 to 40 inches. Water table and depth to bedrock may restrict root growth.

Simoda Series: The Simoda series consists of deep and very deep, moderately well drained soils formed in residuum weathered from interbedded sandstone, siltstone, and shale. They are on broad ridgetops and upland depressions on mountains. Permeability is moderate above the fragipan and slow in the fragipan. Depth to the fragipan ranges from 15 to 30 inches. Seeps are common on these soils. Potential productivity of this soil for red spruce trees is high if an available seed source exists, or there is already red spruce in the understory. Stones and boulders on this soil interfere with logging equipment use. The wetness restricts vehicular equipment during spring and winter.

Significant Issues Addressed

No significant soil issues were raised during the public scoping period. However, soil resources are affected in the proposed action and the risk of increased sedimentation because of soil erosion, mass wasting events, and minor slope failures related to implementing the proposed activities are addressed in this report.

Scope of the Analysis

The spatial boundary used to evaluate **direct** consequences would be the activity areas where actions are proposed within the project area. Activity areas are where road decommissioning, road storage, riparian plantings, large woody debris placement, stream bank stabilization, and watershed restoration or improvement activities are proposed. This spatial boundary was chosen because it can be used to determine threshold effects to soil quality from proposed actions associated with this project**. Indirect** consequences are bound within the project area because effects are not expected to move outside of the subwatersheds within the project area. Please refer to the project area map (Appendix A) for the locations of the proposed activities.

The spatial boundary used to address **cumulative** impacts was the entire Upper Williams project area. This allows us to assess past and future effects within this boundary and determine threshold impacts to soil quality when added to the proposed actions.

Short term effects to soils are related to a recovery period of one to three years. These effects are apparent until the affected area develops a vegetative cover and responds to site treatments to minimize soil movement and compaction. Long-term effects to soils result from soil displacement and would last for more than 100 years or in the case of restorative or improvement activities for perpetuity. These effects result from the restoration of soil profile and the implementation of activities that improve soil quality. The replacement of soil surface takes a long time (200-400 years) without any management actions to improve the soil and depends on local climate and ecological conditions.

Methodology

The Proposed Action has the potential to affect soil resources as a result of disturbing the soil in order to improve watershed conditions. These activities may include soil disturbance related to abating soil compaction, soil rutting, erosion, slumping and mass wasting, and changes in nutrient cycling due to improving soil conditions for vegetative growth. The effects of these activities on soil resources in the activity area can be described in terms of short and long term effects on the **productivity or quality** of the soils. **Short term effects** are those effects lasting three years or less, and are associated with the recovery period in which disturbed soils become reestablished with vegetative cover. Short term effects imply that the existing soil profile has very little to no impact from proposed activities. Surface disturbances, such as mixing of the surface horizons and compaction and removal of vegetation are the primary short term impacts. In contrast, **long term effects** are associated with activities which displace the upper portions of the soil profile (topsoil). Many years are needed for the soil to recover its original productivity when the surface layers are removed. Soil formation typically occurs at a rate of one inch per 200-400 years, and depends on many local environmental factors.

Important factors considered in evaluating effects to soil resources from this project are: the extent of the activity area and the extent of the activity area where long term soil productivity has been improved. Effects to the soils from this project are considered not significant when 85 percent of the activity area retains its potential long term **soil productivity** (Forest Service Handbook, 2509.18.2.2, Soil Quality Standards). In fact this project proposed activities that would increase the soil productivity in the watershed. Acres of soil improved by activities (road decommissioning, road storage, and stream bank stabilization) were estimated using the best available information and compared to the total acres of the activity areas.
Road Decommissioning: Soils formed over the Mauch Chunk formation (Cateache and Shouns) have a moderate shrink-swell potential and low shear strength potential. These soil properties do not provide for stable road surfaces when saturated. Heavy use of these soils in wetter periods can result in rutting and surface ponding which could potentially result in a risk of road failure and degradation of the sub-grade should soil saturation

occur. These effects are occurring within the watershed. Removing the potential for vehicles to travel on these roads and restoring a more natural drainage pattern greatly reduces the risk of slope failure and mass movement.

Road decommissioning would be a positive impact to the soil resource in the long term and cumulatively, throughout the Upper Williams River Watershed. Roads increase sediment delivered to streams because 1) soil compaction associated with roads do not allow infiltration of surface water into the road surface, causing overland flow which can result in moving sediment, 2) roads disrupt the natural drainage patterns by intercepting subsurface flow, causing overland flow down the road surfaces and ditch systems, and allowing water to be channeled into the drainages at a much higher rate as compared to subsurface rates, and 3) roads and ditches are a direct source of sediment. Decommissioning the road involves deep ripping of the road bed, re-establishment of the approximate hillslope contour, seeding and mulching of the soil surface, and improvement of hydraulic conductivity and water infiltration within the soil profile. By ripping the soils beneath the layers of compaction, and then liming, fertilizing, and seeding these areas, road decommissioning activities would help return these areas to a soil productivity level near what existed prior to road construction when a stable forested cover is finally established.

Fertility is expected to increase from existing levels in the area of decommissioned road beds. The effects of soil compaction on roadbed surfaces and in areas where equipment pass over the soil are mitigated via road decommissioning and road storage. Soil compaction makes it difficult for seedling to develop deep root system. This can result in reduced plant growth. Compaction decreases the ability of the soil to absorb water, reduces soil macro-pore space, and may result in increased runoff and erosion. Cumulatively, after the transportation plan is implemented, the soil resource would have less acres of soil compacted for Alternative 2 – Proposed Action, except in Alternative 1 – No Action, and over all the decrease in compaction by the activities would be a positive cumulative effect to the watershed.

Short-term impacts to the soil resource with road decommissioning would result from soil disturbance associated with culvert removal and deep ripping of the road surface. Culverts would be removed so that stream channels are allowed to return to their natural contour. The soil would be outsloped away from the channel. These activities provide a moderate risk of sediment generation upon initial disturbance. There would be a pulse of sediment produced after construction (with the first rain) and prior to seeding being established. Mulching, liming, fertilizing, seeding exposed soils, and installing temporary silt fences in areas where the road crosses streams would minimize the movement of sediment off site. Straw, coconut fiber, or any other weed free mulch would be utilized. Seeding would be done with an annual grass and a non-invasive seed mixture if needed. Often in these soil types native grasses do not establish quick enough to prevent gully erosion or sheet erosion; therefore it may be justified to use a more aggressive seed mixture that does contain non-native species as long as those species are not considered to be invasive. Consultation with the Forest Ecologist would occur prior to the purchasing of the seed mixture.

Road Storage: Road storage would have a positive impact to the soil resources over time across the Upper Williams River drainage. Direct effects to the soil resources occurred in the original construction of the roads. Indirect effects occurred to the receiving stream channels where sediment left the road surface and entered the ditch line. The amount of erosion caused by vehicle traffic would be reduced to zero once put into storage. However, if current problem areas on roads where erosion is occurring with existing failing culvert, failing dips, and other problems are not addressed prior to storage, these areas for sources of sediment would continue to exist and continue to erode.

Culverts would be removed or in rare cases large drain dips would be placed in front of the culverts. The large drain dips would intercept water running towards the culverts, reducing the risk of a plugged culvert causing a road failure. Armoring of the areas above and below culverts is recommended in order to prevent head cutting of these severely erodible soil types.

Some roads may be ripped, fertilized, and seeded in isolated areas that are particularly compacted, or where there is a concern that the area may not naturally re-vegetate. By restoring the soil in this manner several soil productivity concerns are addressed: 1.) bulk density would be decreased by adding macro pore space to allow for water infiltration into the soil profile; 2.) freeze-thaw action occurring within the soil profile would further restore soil structure and hydraulic conductivity and infiltration; and 3.) root distribution would increase throughout and down into the soil profile resulting in and further help to restore soil structure and other physical and hydrological properties of the soil. In other areas, natural re-vegetation would be allowed to occur. The surface of the road would be grassed for long-term storage. This organic material can be removed in the future down to the existing gravel surface in the future for use when needed. Over time, the roadbed surface would go through natural freeze thaw cycles, which would reduce compaction. The soils would remain compacted but vegetation would begin to grow loosing soil structure, creating void space, and increasing surface water infiltration.

Short-term impacts to the soil resource with road storage would result from soil disturbance associated with culvert removal, creation of large drain dips, and/or deep ripping of the road surface. These activities provide a moderate risk of sediment generation for a short term direct effect. Mulching, liming, fertilizing, and seeding exposed soils, and installing temporary silt fences would minimize the movement of sediment off site.

The Soil Management Handbook (FSH 2509.18) suggests a threshold of 15% reduction in “measurable or observable soil properties or conditions, or any measurable or observable reduction in soil wetland or hydrologic function”, referred to here a soil productivity or soil quality. This measurement is applied to activity areas. System roads, trails, and administrative facilities such as campgrounds, are not included in measurements for loss of soil productivity. For this analysis, we can calculate how much of the watershed would have increased soil productivity due to the implementation of the PA because system roads are being returned to areas dedicated to growing vegetation and restoring soil physical and chemical processes. For each mile of road that is decommissioned, we project 3.7 acres of soil productivity would be improved.

21 miles of road decommissioning – (5,280 ft = 1mile)
Average width of a system road – 30 feet wide
1 Acre = 43, 560 sq ft
Total project = **approximately 77 acres** would be improved for this project
This is equivalent to **much less than 1 percent** of the project area would be improved.

Riparian Plantings: Planting would involve limited, minor amounts of soil disturbance from planting individual trees and shrubs along banks to stabilize the streambank. This activity is so minor that effects would not be measurable.

Black Mountain Mine: An abandoned mine is located along WR 33 and erosion and runoff associated with the mine site and access road would be corrected, if necessary, when the road is decommissioned. This would involve reclaiming spoil piles by stabilizing the soil and refuse to stable slopes, mulching, and seeding the material. Surface water would be ditched and/or allowed to either enter a stream channel or dispersed into the soil so that gully and rill erosion are prevented. Effects are expected to be isolated to the area where the spoil piles are being moved around and revegetated. These areas would return to productive sites over time as vegetation is established and soil forming processes take over. This would potentially lead to a reduction in sediment to receiving streams in the area.

Channel Structure Improvement: This action involves the placement of large stems in the stream channel. Minor amounts of soil disturbance would occur as the stems hit the ground. This activity is so minor that effects of the soil disturbance would not be measurable.

Bank Stabilization: Soil disturbance would occur in areas where constructed structures are placed in the bank to stabilize the bank or where structures used to dissipate stream energy are tied into the bank. The effects are site specific and short term. Soil displacement would be minimized over time as vegetation takes hold and stream energy is directed more towards the stream channel and not into the banks. This would act to decrease these areas as a source of sediment to the stream. Naturally streams meander and remove and deposit sediment within the floodplain. These actions are meant to decrease erosion in areas where erosion is accelerated due to past management actions such as installation of roads, removal of woody vegetation, or other management problems described in the hydrology such as historic flooding.

Aquatic Passage Improvement: Soil would be disturbed in the removal and replacement of these culverts. Mitigations such as silt fencing, heaving mulching, seeding, and armoring all would potentially be used to prevent as much sediment as possible from entering waterways during construction. Overall, the effects are minor and not measurable within the subwatersheds where the improvements because so little soil disturbance would occur (less than 0.1 acre).

Analysis of Effects

Alternative 1 – No Action:

Under Alternative 1, current management plans would continue to guide management of the Upper Williams River Watershed. No new watershed or aquatic habitat improvement projects would be implemented to address existing adverse resource conditions. This alternative provides a baseline against which to describe the environmental effects of the proposed action.

Alternative 1 would allow ecological processes to control watershed and aquatic ecosystem processes along with effects associated with past, present and future land management activities. Ongoing management activities such as vegetation management, road maintenance and recreation would continue through current management direction, or other management decisions in the future.

Over time, the natural development of soils in the stable areas would continue with implementation of Alternative 1. The soils would continue to accumulate and build organic matter. This would help increase soil productivity over time since the organic layer holds much of the soil nutrients, controls soil temperature, holds in soil moisture, and acts to protect mineral soils from erosive forces. Since no additional acres of soil would be disturbed, natural processes resulting in soil slippage or movement of soils would occur. In addition, soil erosion would continue at accelerated rates from previous or historic activities especially within the road prism. Some of these on-going effects are a result of past management activities such as road building, timbering, diversion of water by culverts, and maintenance of roads and ditch lines. Within the watershed areas of historic soil disturbance, continue to be reclaimed over time through processes of soil development both chemical and physical. Freeze-thaw activity helps to reduce soil compaction on existing skid trails and landing areas. Vegetation has been reintroduced into those areas as well helping to rebuild soil organic matter and soil physical properties.

Cumulative Effects: Historical documentation and physical evidence shows us that the soils in this watershed have been severely impacted. Currently the soils are recovering from massive amounts of disturbance from timber harvesting, land clearing for agricultural use, landscape scale fires, and general settlement of the area. Any disturbances to the soil resource that remove the soil to bedrock start the soil forming process all over, Time = 0. There are no activities proposed in this assessment that do this to the soil. The cumulative effect is that the soil resource and associated soil productivity is still recovering from historic activities in the watershed and with additional disturbance; the soil resource would take that much longer to recover. However, with the implementation of this project soil productivity would increase in those areas. Cumulatively though it is difficult to show a positive change in the watershed due to the unknown soil disturbances on private and state lands. As well, the Upper Williams Vegetation Management decision is currently being implemented on federal land, which would result in the disturbance of 100 acres of soil in the watershed.

EFFECTS FOR THE PROPOSED ACTION – Alternative 2

Road Decommissioning

Soils formed over the Mauch Chunk formation (Cateache and Shouns) have a moderate shrink-swell potential and low shear strength potential. These soil properties do not provide for stable road surfaces when saturated. Heavy use of these soils in wetter periods can result in rutting and surface ponding which could potentially result in a risk of road failure and degradation of the sub-grade should soil saturation occur. These effects are occurring within the watershed. Removing the potential for vehicles to travel on these roads and restoring a more natural drainage pattern greatly reduces the risk of slope failure and mass movement.

Road Projects – Table 2.1 shows the list of proposed roads for decommissioning and storage.

Table 2.1. Roads Identified for Decommissioning and Storage.

Road	Action	Length (mi.)		Road	Action	Length (mi.)
FR 170	Decommission	1.5		M 169	Decommission	0.7
FR 170A	Decommission	0.4		M 170	Storage	0.5
FR 171	Decommission	0.9		M 171	Decommission	0.8
FR 216A	Decommission	2.4		M 171A	Decommission	1.2
FR 216B	Decommission	1.5		M 174	Decommission	0.3
M 132	Storage	0.7		M 176	Decommission	1.2
M 137	Decommission	0.4		WR 10	Decommission	0.5
M 139	Decommission	0.7		WR 11	Decommission	0.3
M 140	Decommission	0.7		WR 12	Decommission	0.2
M 142	Decommission	0.9		WR 15	Decommission	0.2
M 144	Decommission	0.6		WR 22	Decommission	0.5
M 145	Decommission	0.3		WR 27	Decommission	0.2
M 147	Decommission	0.4		WR 33	Decommission	0.3
M 151	Decommission	0.4		WR 6	Decommission	0.1
M 154	Decommission	1.0		WR 7	Decommission	0.7
M 157	Decommission	0.1		WR 8	Decommission	0.4
M 158	Decommission	1.1		WR 9	Decommission	0.3

Road decommissioning would be a positive impact to the soil resource in the long term and cumulatively, throughout the Upper Williams River Watershed. Roads increase sediment delivered to streams because 1) soil compaction associated with roads do not allow infiltration of surface water into the road surface, causing overland flow which can result in moving sediment, 2) roads disrupt the natural drainage patterns by intercepting subsurface flow, causing overland flow down the road surfaces and ditch systems, and allowing water to be channeled into the drainages at a much higher rate as compared to subsurface rates, and 3) roads and ditches are a direct source of sediment. Decommissioning the road involves deep ripping of the road bed, re-establishment of the approximate hillslope contour, seeding and mulching of the soil surface, and improvement of hydraulic conductivity and water infiltration within the soil profile. By ripping the soils beneath the layers of compaction, and then liming, fertilizing, and seeding these areas, road decommissioning activities would help return these areas to a soil productivity level near what existed prior to road construction when a stable forested cover is finally established.

Fertility is expected to increase from existing levels in the area of decommissioned road beds. The effects of soil compaction on roadbed surfaces and in areas where equipment pass over the soil are mitigated via road decommissioning and road storage. Soil compaction makes it difficult for seedling to develop deep root system. This can result in reduced plant growth. Compaction decreases the ability of the soil to absorb water, reduces soil macro-pore space, and may result in increased runoff and erosion. Cumulatively, after the transportation plan is implemented, the soil resource will have less acres of soil compacted for all alternatives except the NO ACTION alternative, and over all the decrease in compaction by the activities will be a positive cumulative effect to the watershed.

Short-term impacts to the soil resource with road decommissioning would result from soil disturbance associated with culvert removal and deep ripping of the road surface. Culverts would be removed so that stream channels are allowed to return to their natural contour. The soil would be outsloped away from the channel. These activities provide a moderate risk of sediment generation upon initial disturbance. There would be a pulse of sediment produced after construction (with the first rain) and prior to seeding being established. Mulching, liming, fertilizing, seeding exposed soils, and installing temporary silt fences in areas where the road crosses streams would minimize the movement of sediment off site. Straw, coconut fiber, or any other weed free mulch would be utilized. Seeding would be done with an annual grass and a non-invasive seed mixture if needed. Often in these soil types native grasses do not establish quick enough to prevent gully erosion or sheet erosion; therefore it may be justified to use a more aggressive seed mixture that does contain non-native species as long as those species are not considered to be invasive. Consultation with the Forest Ecologist would occur prior to the purchasing of the seed mixture.

In some cases, roads that have not been used in several years have healed and do not pose a risk to streams or watershed conditions. Little or no work has been proposed on these roads and decommissioning will constitute a decision to administratively remove them from the transportation system. Approximately 21.2 miles of roads are proposed for decommissioning. This includes mostly woods roads (WR or M) and some Forest Service system roads (FR). Woods roads are typically roads that are not considered part of the Forest transportation system and are not scheduled to be maintained. They are labeled with a WR for woods road, or with the first letter of the Ranger District where they are located (e.g. M for Marlinton). See Table 2.1 for a list of roads proposed to be decommissioned.

Road Storage

Road storage would have a positive impact to the soil resources over time across the Upper Williams River drainage. Direct effects to the soil resources occurred in the original construction of the roads. Indirect effects occurred to the receiving stream channels where sediment left the road surface and entered the ditch line. The amount of erosion caused by vehicle traffic would be reduced to zero once put into storage. However, if current problem areas on roads where erosion is occurring with existing failing culvert, failing dips, and other problems are not addressed prior to storage, these areas for sources of sediment will continue to exist and continue to erode.

Culverts would be removed or in rare cases large drain dips would be placed in front of the culverts. The large drain dips would intercept water running towards the culverts, reducing the risk of a plugged culvert causing a road failure. Armoring of the areas above and below culverts is recommended in order to prevent head cutting of these severely erodible soil types.

Some roads may be ripped, fertilized, and seeded in isolated areas that are particularly compacted, or where there is a concern that the area may not naturally re-vegetate. By restoring the soil in this manner several soil productivity concerns are addressed: 1.) bulk density would be decreased by adding macro pore space to allow for water infiltration into the soil profile; 2.) freeze-thaw action occurring within the soil profile would further restore soil structure and hydraulic conductivity and infiltration; and 3.) root distribution would increase throughout and down into the soil profile resulting in and further help to restore soil structure and other physical and hydrological properties of the soil. In other areas, natural re-vegetation would be allowed to occur. The surface of the road would be grassed for long-term storage. This organic material can be removed in the future down to the existing gravel surface in the future for use when needed. Over time, the roadbed surface would go through natural freeze thaw cycles, which would reduce compaction. The soils would remain compacted but vegetation would begin to grow loosing soil structure, creating void space, and increasing surface water infiltration.

Short-term impacts to the soil resource with road storage would result from soil disturbance associated with culvert removal, creation of large drain dips, and/or deep ripping of the road surface. These activities provide a moderate risk of sediment generation for a short term direct effect. Mulching, liming, fertilizing, and seeding exposed soils, and installing temporary silt fences would minimize the movement of sediment off site.

SOIL PRODUCTIVITY CALCULATIONS:
The Soil Management Handbook (FSH 2509.18) suggests a threshold of 15% reduction in “measurable or observable soil properties or conditions, or any measurable or observable reduction in soil wetland or hydrologic function”, referred to here a soil productivity or soil quality. This measurement is applied to activity areas. System roads, trails, and administrative facilities such as campgrounds, are not included in measurements for loss of soil productivity. For this analysis, we can calculate how much

of the watershed would have increased soil productivity due to the implementation of the PA because system roads are being returned to areas dedicated to growing vegetation and restoring soil physical and chemical processes. For each mile of road that is decommissioned, we project 3.7 acres of soil productivity will be improved.

21 miles of road decommissioning – (5,280 ft = 1mile)
Average width of a system road – 30 feet wide
1 Acre = 43, 560 sq ft
Total project = **approximately 77 acres** would be improved for this project
This is equivalent to **much less than 1 percent** of the project area would be improved.

Riparian Plantings

The lower reaches of Little Laurel Creek, and two sites along the Williams River main stem, would be planted with riparian vegetation to improve bank stability and stream shading. Sources of the planting material would include cuttings and transplants, primarily willow, from local vegetation. Approximately five acres would be planted.

Planting would involve limited, minor amounts of soil disturbance from planting individual trees and shrubs along banks to stabilize the streambank. This activity is so minor that effects would not be measurable.

BLACK MOUNTAIN MINE

An abandoned mine is located along WR 33 and erosion and runoff associated with the mine site and access road will be corrected, if necessary, when the road is decommissioned. This would involve reclaiming spoil piles by stabilizing the soil and refuse to stable slopes, mulching, and seeding the material. Surface water would be ditched and/or allowed to either enter a stream channel or dispersed into the soil so that gully and rill erosion are prevented. Effects are expected to be isolated to the area where the spoil piles are being moved around and revegetated. These areas would return to productive sites over time as vegetation is established and soil forming processes take over. This would potentially lead to a reduction in sediment to receiving streams in the area.

LARGE WOODY DEBRIS PLACEMENT

LWD is important for a number of watershed and aquatic ecosystem functions. In perennial streams, LWD increases habitat complexity by scouring pools, traps spawning gravels, provides hiding cover, and helps to dissipate stream energy. In the Proposed Action sent out for scoping, large woody debris would be added to approximately one mile long reaches of Black Mountain Run, Mountain Lick Run, and the main stem of the Williams River between Black Mountain and Mountain Lick Runs. Upon further field reconnaissance, the treatment along the Williams River main stem is dropped in this analysis.

Onsite trees would be directionally felled towards the channels from adjacent timber stands. Trees selected for felling would be distributed along both sides of the channels to avoid modifying riparian conditions such as stream shading, and will represent a mix of species. The intent is to mimic the recruitment of LWD when trees naturally fall into stream channels. The trees will generally be left in place, or in some cases winched into more desirable channel orientation.

This action involves the placement of large stems in the stream channel. Minor amounts of soil disturbance would occur as the stems hit the ground. This activity is so minor that effects of the soil disturbance would not be measurable.

BANK STABALIZATION

Three areas of bank instability are proposed to be treated along the Williams River downstream of Day Run near Handley. The treatments would use riparian planting and/or channel structures to improve bank stability. The structures are designed to redirect the stream energy away from unstable banks and towards the center of the channel and would be used where banks are actively eroding. They are constructed of boulders and placed in a series along the channel in the area of bank instability. Boulders would be delivered to the project area from a local source and placed in the channel with heavy equipment. The banks would also be re-vegetated to improve stability. See project map for approximate areas to be treated. The bank stabilization areas range in size from approximately 300-750 feet in length.

Soil disturbance would occur in areas where constructed structures are placed in the bank to stabilize the bank or where structures used to dissipate stream energy are tied into the bank. The effects are site specific and short term. Soil displacement would be minimized over time as vegetation takes hold and stream energy is directed more towards the stream channel and not into the banks. This would act to decrease these areas as a source of sediment to the stream. Naturally streams meander and remove and deposit sediment within the floodplain. These actions are meant to decrease erosion in areas where erosion is accelerated due to past management actions such as installation of roads, removal of woody vegetation, or other management problems described in the hydrology such as historic flooding.

AQUATIC PASSAGE IMPROVEMENT

Two areas where roads restrict movement of aquatic species would be corrected. One location is on Forest Road 999 along the main stem of the Williams River, and the other is on Forest Road 216 along Black Mountain Run. Existing structures would be replaced by structures that better fit the natural channel width, grade and stream substrate to facilitate passage.

Soil would be disturbed in the removal and replacement of these culverts. Mitigations such as silt fencing, heaving mulching, seeding, and armoring all would potentially be used to prevent as much sediment as possible from entering waterways during construction. Overall, the effects are minor and not measurable within the subwatersheds where the improvements because so little soil disturbance would occur (less than 0.1 acre).

Unavoidable Adverse Impacts
The No Action Alternative would not implement actions that would cause unavoidable adverse impacts, but existing erosion on the road system, at the mine site, and within the identified stream reaches in the project area would continue. The Proposed Action would implement activities that would disturb soils in the immediate short term but in the long-term and cumulatively would improve watershed condition including soil productivity. Direct, indirect, and cumulative effects are expected to be limited. Less than 1 percent of the project area would be affected. A much lesser percent of the total watershed would be affected by the activities described in this EA. Implementing Forest Plan direction and design features and mitigation identified in Chapter 2 would reduce any immediate potential for adverse impacts.

Irreversible or Irretrievable Commitment of Resources
There would be no irretrievable commitment of the soil resource committed for this proposal.

Consistency with the Forest Plan
All alternatives would be implemented consistent with Forest Plan goals, objectives, standards, and guidelines.

Consistency with Laws, Regulations, and Handbooks
All alternatives would be implemented consistent with Forest Service laws, regulations, and handbooks regarding management of the soil resource.

Botany/Ecology

Introduction
This report is divided into two sections: threatened, endangered, and sensitive plants; and non-native invasive plants. Due to the location, nature, and scope of the proposed activities, terrestrial ecosystem features such as old growth, ecological reserves, and rare communities either have little chance of being affected by this project or would benefit over the long term. Therefore, terrestrial ecosystem issues are not addressed in detail.

Threatened, Endangered, and Sensitive Plants

Scope of the Analysis
This analysis addresses effects to plant species that are federally listed as threatened or endangered, and also those plant species that are listed as Regional Forester's Sensitive

Species (RFSS) on the Monongahela National Forest. Threatened, endangered, and sensitive species are collectively referred to as TES species.

Spatial Boundary

The spatial boundary for direct and indirect effects on TES species consists of the Upper Williams project area/watershed boundary (see project area map in EA Appendix A). This boundary contains all proposed project activities and is the boundary within which all direct and indirect effects would occur. The spatial boundary for cumulative effects on TES species is the Proclamation and Purchase Unit boundary for the Monongahela National Forest. This is the boundary to which the National Forest Management Act viability requirement applies.

Temporal Boundary

The temporal boundary for direct and indirect effects on TES species is 30 years from the beginning of project implementation. This would allow ample time for sites disturbed by the project to stabilize and re-vegetate with native plants. It also would cover the long-term effects of redevelopment of a forest canopy over disturbed sites. This temporal boundary is also used for the cumulative effects analysis because the contribution to cumulative effects ends when the direct and indirect effects no longer exist.

Affected Environment – Threatened and Endangered Plants

Four federally-listed threatened and endangered plant species are known to occur on the Monongahela National Forest: running buffalo clover (*Trifolium stoloniferum*), shale barren rockcress (*Arabis serotina*), Virginia spirea (*Spiraea virginiana*), and small whorled pogonia (*Isotria medeoloides*). Fifty-four plant species are listed as Regional Forester's Sensitive Species on the Monongahela National Forest.

The likelihood of occurrence within the project area for each TES species is assessed in the Likelihood of Occurrence document, which is filed in the project record. Likelihood of occurrence is based on field surveys of the proposed activity areas, historic records, and the presence of potential habitat in the project area. Field surveys of the Upper Williams Watershed were conducted during 1998, 2000, and 2002. Survey effort was distributed throughout the watershed, with efforts concentrated on ecological communities that are most likely to harbor TES plants. Although not every potential activity area was surveyed, survey coverage was liberally scattered across National Forest land throughout the watershed, with systematic coverage of those habitats determined by the Forest Ecologist as most likely to support TES species. Survey results are on file at the Monongahela National Forest Supervisor's Office.

Based on field surveys of proposed activity areas and existing records, none of the four threatened and endangered species are known to occur in the Upper Williams project area. Potential habitat may occur for three of the species.

Virginia Spirea

Virginia spirea is a clonal shrub found on damp, rocky banks of large, high-gradient streams (USFWS 1992a). Moderate disturbance, typically in the form of flood scouring, is important for maintenance of habitat. Potential habitat could exist along the Williams River and Big Laurel Creek.

Running Buffalo Clover
Potential habitat for running buffalo clover typically exists in lightly disturbed forests and woodlands on soils derived from circumneutral geologic features (NatureServe 2006, USFWS 2007). Many of the populations on the Forest occur on old, lightly used roads and retired skid trails. Potential habitat could exist in association with several geologic formations in the Mauch Chunk group that underlie most of the project area. However, thorough surveys covering much of the project area did not find this species.

Small Whorled Pogonia
Habitat preferences for small whorled pogonia are poorly known, but could include a variety of forested habitats. The available literature indicates occurrence in mixed deciduous and pine-hardwood habitats of a variety of ages, often near partial canopy openings (USFWS 1992b). Likelihood of occurrence for small whorled pogonia is considered low because the species is not known to exist nearby, and site-specific surveys have not located this species. However, potential occurrence cannot be completely ruled out in the deciduous forest that covers most of the project area.

Shale barren Rockcress
Shale barren rockcress is not likely to occur in the project area due to lack of shale barren habitat. Shale barrens are limited to the drier areas on the eastern side of the Forest.

Regional Forester's Sensitive Plants

Based on field surveys and existing records, nine of the 54 RFSS plants are known to occur in the project area. These include rock skullcap (*Scutellaria saxatilis*), glade spurge (*Euphorbia purpurea*), Appalachian blue violet (*Viola appalachiensis*), butternut (*Juglans cinerea*), blunt-lobed grapefern (*Botrychium oneidense*), long-stalked holly (*Ilex collina*), Appalachian bristle fern (*Trichomanes boschianum*), swamp lousewort (*Pedicularis lanceolata*), and Canada yew (*Taxus canadensis*). Yew is known only from an old historic record (1893); the other species were all discovered during the 1998-2002 surveys. In addition to these nine species, a number of other RFSS species could occur based on the presence of potential habitat. For these additional species, the likelihood of occurrence is considered low because the extensive survey effort did not locate them. All together, 33 RFSS plants are either known to occur or may occur based on the presence of potential habitat.

To facilitate analysis, RFSS plants have been grouped according to their primary habitat (Tables 3.3 thru 3.5). The three habitat groupings are wetland/riparian habitat, mesic/cove forest, and rocky habitat.

Table 3.3. Wetland and riparian habitat RFSS plants that could occur in the Upper Williams project area.

Scientific Name	Common Name	Habitat Comments	Known	Potential
Agrostis mertensii	Arctic bentgrass	Open riparian habitats		X
Baptisia australis var. *australis*	Blue wild indigo	Primarily early successional wetlands		X
Botrychium oneidense	Blunt-lobed grapefern	Wooded wetlands	X	
Euphorbia purpurea	Darlington's spurge	Open or closed canopy	X	
Hasteola suaveolens	Sweet-scented Indian plantain	Riverbanks and disturbed wetlands		X
Hypericum mitchellianum	Blue Ridge St. John's wort	Riverbanks and disturbed wetlands		X
Ilex collina	Long-stalked holly	Open or closed canopy	X	
Marshallia grandiflora	Large-flowered Barbara's buttons	Banks of large streams; full sun		X
Menyanthes trifoliata	Bog buckbean	Bogs and marshes		X
Pedicularis lanceolata	Swamp lousewort	May prefer circumneutral soil	X	
Poa paludigena	Bog bluegrass	Sun to partial shade		X
Polemonium vanbruntiae	Jacob's ladder	Swamps, bogs, riparian zones		X
Potamogeton tennesseensis	Tennessee pondweed	Slow-flowing shallows of rivers		X
Syntrichia ammonsiana	Ammon's tortula	Wet rocks adjacent to waterfalls		X
Taxus canadensis	Canada yew	Can occur in spruce/northern hardwoods, but known occurrence in riparian area	X	
Trichomanes boschianum	Appalachian bristle fern	Dripping rocks	X	

Table 3.3. Wetland and riparian habitat RFSS plants that could occur in the Upper Williams project area.

Scientific Name	Common Name	Habitat Comments	Known	Potential
Vitis rupestris	Sand grape	Stream channels and banks		X
Woodwardia areolata	Netted chain fern	Swamps and wet woods		X

Table 3.4. Mesic forest and cove habitat RFSS plants that could occur in the Upper Williams project area.

Scientific Name	Common Name	Habitat Comments	Known	Potential
Botrychium lanceolatum var. *angustisegmentum*	Lance-leaf grapefern	Moist, shady woods and swamp margins		X
Corallorhiza bentleyi	Bentley's coral root	Habitat preferences poorly understood		X
Cypripedium parviflorum var. *parviflorum*	Small yellow lady's slipper	Moist to wet sites		X
Cypripedium reginae	Showy lady's slipper	Swamps and woods		X
Hexalectris spicata	Crested coral root	Rich woods		X
Juglans cinerea	Butternut	Most likely in rich soil, but could occur elsewhere	X	
Triphora trianthophora	Nodding pogonia	Deep leaf litter or humus		X
Viola appalachiensis	Appalachian blue violet	Often in riparian areas, but can occur in other mesic situations	X	

Table 3.5. Rocky habitat RFSS plants that could occur in the Upper Williams project area.

Scientific Name	Common Name	Habitat Comments	Known	Potential
Arabis patens	Spreading rockcress	Moist, rocky woods		X
Cornus rugosa	Roundleaf dogwood	Rocky areas within forests		X
Gymnocarpium appalachianum	Appalachian oak fern	Rocky woods		X
Heuchera alba	White alumroot	Most likely in dry microsites		X
Juncus trifidus	Highland rush	Rock crevices		X
Pycnanthemum beadlei	Beadle's mountainmint	Open canopy over rocks		X
Scutellaria saxatilis	Rock skullcap	Rocky areas within forests	X	

Desired Conditions

The Forest Plan addresses TES species at several places in the Forest-wide direction. The Forest Integrated Desired Conditions (USDA Forest Service 2006, p. II-6) call for maintaining habitats that support populations of TES species. Desired conditions for vegetation (p. II-17) emphasize protection and enhancement of rare plants and their habitats. Desired conditions for threatened and endangered species (p. II-22) call for managing habitats to maintain or enhance populations consistent with recovery plans, and for keeping adverse effects at levels that do not threaten population persistence.

Environmental Consequences – Threatened and Endangered Plants

Direct and Indirect Effects

Virginia Spirea – Two of the proposed activities would occur in potential Virginia spirea habitat along the Williams River and the lower part of Little Laurel Creek. These are the bank stabilization and riparian planting activities. If undiscovered Virginia spirea occurrences exist in the activity areas, bank stabilization, which involves placement of boulders using heavy equipment, could harm or kill Virginia spirea plants. Riparian plantings of willow cuttings could compete with Virginia spirea. Bank stabilization and riparian plantings could reduce the bank scouring upon which Virginia spirea depends. However, because stands adjoining the riparian areas proposed for these activities were surveyed, and no Virginia spirea was found, the effects are considered extremely unlikely to occur (i.e., discountable).

The other proposed activities would not occur in potential Virginia spirea habitat and would have no chance to affect this species. Road decommissioning, road storage, and mine rehabilitation do not occur in stream channels. Aquatic passage improvement involves replacement of existing structures in the stream channel, not natural stream bank habitat. Channel structure improvement involving placement of large woody debris would occur only on small tributaries that do not constitute potential habitat for Virginia spirea.

Alternative 1 (no action) would not involve any new disturbance and would have no chance to affect Virginia spirea.

Running Buffalo Clover – If any undiscovered occurrences of running buffalo clover exist in the project areas, several of the activities in the proposed action could affect this species. Road decommissioning would have the greatest chance of affecting this species because old road beds through wooded areas constitute most of the potential habitat. Road decommissioning could eliminate occurrences in areas where the roads are ripped, outsloped, or recontoured. Decommissioning would be less likely to have negative effects where it only involves removing the drainage structures and constructing water bars. Likewise, road storage involves only small amounts of ground disturbance and would have very little potential to impact any undiscovered occurrences of running buffalo clover. Decommissioning of "healed" roads would consist of simply an administrative decision to remove the roads from the system and would not directly affect running buffalo clover. For several years following decommissioning, the disturbed soil and partial shade on decommissioned road beds could provide habitat for new occurrences of running buffalo clover. Over the long term, decommissioned road beds likely would become unsuitable for running buffalo clover as soil disturbance subsides and woody vegetation creates dense shade.

If undiscovered occurrences of running buffalo clover exist in riparian areas, riparian planting could increase competition from woody species. Riparian planting also could improve running buffalo clover habitat by partially shading sunny riparian areas.

Mine site reclamation could have effects similar to road decommissioning, although it would involve a very small acreage and thus would have little chance of impacting an undiscovered occurrence of running buffalo clover.

Aquatic passage improvement, channel structure improvement, and bank stabilization all would occur in stream channels, which are not considered potential habitat for running buffalo clover. Therefore, these activities would be very unlikely to affect running buffalo clover.

Because extensive surveys failed to locate running buffalo clover in the project area, all of the potential effects outlined above are considered extremely unlikely to occur. Therefore, potential effects to running buffalo clover are considered discountable.

Alternative 1 (no action) would not implement any activities, therefore it would not affect running buffalo clover.

Small Whorled Pogonia – The potential for affecting small whorled pogonia is very low because of its low likelihood of occurrence and the low likelihood that the proposed activities would affect potential habitat. Small whorled pogonia is unlikely to occur on road beds and eroded mine sites, so road decommissioning, road storage, and mine site rehabilitation have little potential to affect this species. Likewise, small whorled pogonia does not occur in stream channels, so aquatic passage improvement, channel structure improvement, and bank stabilization would not affect it. If undiscovered occurrences exist in riparian zones, riparian plantings could compete with small whorled pogonia. Conversely, riparian plantings could improve potential habitat by shading currently sunny locations. Given the low likelihood of occurrence of small whorled pogonia in the project area, these effects are extremely unlikely to occur and are considered discountable.

Alternative 1 (no action) would not implement any activities, therefore it would not affect small whorled pogonia.

Shale Barren Rockcress – Because shale barren rockcress has no potential to occur in the project area, no alternative would affect this species.

Cumulative Effects
Because the potential for direct effects is either discountable or nonexistent for all four species under both alternatives, no alternative would contribute to cumulative effects on threatened and endangered plants.

Effect Determinations for Threatened and Endangered Plants
Virginia Spirea – Alternative 1 (no action) would have **no effect** on Virginia spirea. Alternative 2 (proposed action) **may affect, but is not likely to adversely affect** Virginia spirea.

Running Buffalo Clover – Alternative 1 (no action) would have **no effect** on running buffalo clover. Alternative 2 (proposed action) **may affect, but is not likely to adversely affect** running buffalo clover.

Small Whorled Pogonia – Alternative 1 (no action) would have **no effect** on small whorled pogonia. Alternative 2 (proposed action) **may affect, but is not likely to adversely affect** small whorled pogonia.

Shale Barren Rockcress – Both alternatives would have **no effect** on shale barren rockcress.

Regional Forester's Sensitive Plants

Direct and Indirect Effects

Wetland and Riparian Habitat Plants – The proposed activities would not affect known extant occurrences of wetland and riparian RFSS plants. One of the proposed bank stabilization structures on the Williams River is near the historic Canada yew occurrence. However, this occurrence is based on a specimen collected in 1893, and recent surveys associated with this project did not find Canada yew.

If undiscovered occurrences of wetland and riparian RFSS plants exist, they could be affected by the bank stabilization and riparian planting activities. Heavy equipment and boulders associated with bank stabilization could crush plants and alter habitat. Riparian plantings could compete with RFSS plants, especially those that prefer full sunlight or disturbed soil. Riparian plantings could improve habitat for those RFSS plants that prefer shade and stable soil.

Placement of large woody debris for channel structure improvement likely would not have major effects on undiscovered occurrences of wetland and riparian RFSS. This low-intensity activity, consisting of directional felling of scattered individual trees, would not change the riparian habitat appreciably. However, it is possible that plants could be crushed by falling trees.

Aquatic passage improvement, road decommissioning, road storage, and mine site rehabilitation would affect little or no riparian and wetland habitat. Therefore, these activities have little chance of affecting wetland and riparian RFSS plants.

The potential effects discussed above are considered unlikely to occur because known extant RFSS sites would be avoided.

Alternative 1 (no action) would not implement any activities, therefore it would not affect wetland and riparian RFSS plants.

Appalachian Blue Violet – Appalachian blue violet is known to occur in the project area. It is a disturbance-adapted species, and is likely to occur in some of the disturbed areas in which proposed activities would occur. Road decommissioning, road storage, aquatic passage improvement, mine site rehabilitation, and bank stabilization would affect disturbed road banks and stream banks that could support Appalachian blue violet. Information on file indicates historic records for this species on or near woods roads M-154 and M-142, which are proposed for decommissioning in Alternative 2 (proposed action). However, recent surveys did not locate the species on these roads. Regardless, given the historic records, the known existence of this species in other locations in the project area, and the species' preference for disturbed soil, it is likely that undiscovered Appalachian blue violets occur on or near roads that are proposed for decommissioning or storage. This species also could occur at the mine rehabilitation site, aquatic passage improvement sites, and bank stabilization sites. Activities associated with road decommissioning, road storage, aquatic passage improvement, mine site rehabilitation, and bank stabilization would disturb or destroy any Appalachian blue violet occurrences on these sites. However, the disturbed soil created by these activities likely would be recolonized, and ultimately could increase the amount of suitable habitat over the short term. Over the long term, as disturbed soil stabilizes and shade from encroaching trees and shrubs increases, habitat suitability would decline. While it is difficult to predict whether the ultimate long-term effect would be positive or negative, these activities are unlikely to cause viability concerns for this species. It is known to occur in about 40 locations across the Forest.

Placement of large woody debris for channel structure improvement is likely to have little or no effect on Appalachian blue violet. While the species could occur on stream banks, large woody debris placement would involve little or no soil disturbance and only slight changes to the light regime due to felling of scattered individual trees.

Riparian plantings could have detrimental effects on Appalachian blue violets by reducing the amount of sunlight reaching the ground and by stabilizing the disturbed soil that is preferred by this species. However, viability concerns are not expected because Appalachian blue violet is known from about 40 locations across the Forest and riparian planting would affect only 5 acres.

Alternative 1 (no action) would not implement any activities, therefore it would not affect Appalachian blue violet.

Other Mesic Forest/Cove Plants – Mesic forest and cove RFSS plants other than Appalachian blue violet are unlikely to occur on roads, road stream crossings, and the degraded mine site, unless such sites have healed over and are on the way to becoming reforested. Such healed areas would not be subject to intensive ground disturbance during decommissioning, storage, aquatic passage, and mine site rehabilitation, so these activities are unlikely to affect mesic forest and cove species other than Appalachian blue violet.

Placement of large woody debris for channel structure improvement is likely to have little or no effect on mesic forest and cove RFSS plants. Large woody debris placement would involve little or no soil disturbance and only slight changes to the light regime due to felling of scattered individual trees.

If undiscovered occurrences of mesic forest and cove RFSS plants exist along stream banks, they could be affected by the bank stabilization activities. Heavy equipment and boulders associated with bank stabilization could crush plants and alter habitat.

Riparian plantings are unlikely to affect mesic forest/cove RFSS plants negatively. These species typically occur in shaded habitats with stable soil and leaf litter; therefore, riparian plantings could improve habitat for these species.

The potential effects discussed above are considered unlikely to occur because the activities would not affect the one known site for mesic forest/cove RFSS (butternut).

Alternative 1 (no action) would not implement any activities, therefore it would not affect mesic forest/cove RFSS plants.

Rocky Habitat Plants – Rocky habitat RFSS plants are unlikely to occur on roads, road stream crossings, and the degraded mine site, unless such sites have exposed rock and have begun to heal over from past disturbances. Such healed areas would not be subject to intensive ground disturbance during decommissioning, storage, aquatic passage, and mine site rehabilitation, so these activities are unlikely to affect rocky habitat species.

Placement of large woody debris for channel structure improvement is likely to have little or no effect on rocky habitat RFSS plants. Although these species could occur on stream banks to the extent that rocky habitat is present, large woody debris placement would involve little or no soil disturbance and only slight changes to the light regime due to felling of scattered individual trees.

If undiscovered occurrences of rocky habitat RFSS plants exist along stream banks, they could be affected by the bank stabilization activities. Heavy equipment and boulders associated with bank stabilization could crush plants and alter habitat.

Riparian planting is unlikely to affect rocky habitat RFSS because planting would be targeted toward areas of unstable soil, not rocky areas. Rocky habitat RFSS are unlikely to occur in the areas to be planted.

The potential effects discussed above are considered unlikely to occur because the activities would not affect the known sites for rocky habitat RFSS (rock skullcap).

Alternative 1 (no action) would not implement any activities, therefore it would not affect rocky habitat RFSS plants.

Cumulative Effects
The potential for direct and indirect effects is discountable or non-existent under both alternatives for all RFSS plants except Appalachian blue violet. Therefore, for all RFSS plants except Appalachian blue violet, neither alternative would contribute to cumulative effects on RFSS plants. Also, Alternative 1 (no action) would have no direct or indirect effects on Appalachian blue violet; therefore, it would not contribute to any cumulative effects on this species.

Alternative 2 (proposed action) is expected to have direct and indirect effects on Appalachian blue violet. These effects could add to the cumulative effects of other past, present, and reasonably foreseeable future activities within the Forest proclamation and purchase unit boundary. Table 3-1 in the EA lists such activities within the Upper Williams River watershed. Similar activities have occurred in the past, are occurring currently, or are expected to occur in the future on National Forest and private land throughout the Forest. Many of the past activities likely enhanced habitat for this disturbance-adapted species, although they may also have had detrimental impacts to individual plants. The major ongoing and future activities on National Forest land that have the potential to affect Appalachian blue violet are timber harvest projects, wildlife habitat improvement projects, and utility corridors. Harvest activities and related road construction are ongoing or would begin in the next year on the Upper Williams timber project (shown as three separate sales in EA Table 3-1), as well as the Desert Branch (Gauley District), Cherry River (Gauley), Lower Clover (Cheat-Potomac District), and Little Beech Mountain (Greenbrier District) timber projects. Timber projects are proposed in future years in the Lower Williams (Gauley District), Hogback (Cheat-Potomac District), and Ramshorn (Greenbrier District) project areas. Other ongoing and future activities on National Forest land that may affect potential habitat for Appalachian blue violet include the Upper Williams wildlife habitat improvement project, gas well and gas line activities, access and utility rights-of-way, grazing allotment improvements, wildlife habitat enhancement, bridge replacement, campsite and trail bridge construction, and prescribed burning.

Only four of these ongoing and future activities would affect known occurrences of Appalachian blue violet or are likely to affect undiscovered occurrences. The ongoing Upper Williams timber project includes three known locations in helicopter-yarded thinning units. The proposed Hogback timber project, if implemented as proposed, would include known occurrences in a conventionally-yarded thinning unit, a conventionally-yarded clearcut unit, and a helicopter-yarded clearcut unit. The proposed Upper Williams wildlife habitat improvement project would conduct low-intensity Indiana bat habitat improvement in a stand that contains Appalachian blue violet. The Nine gas pipeline project, which is being implemented on the Cheat District, may affect undiscovered occurrences. These activities may impact individuals, but because Appalachian blue violet is a disturbance-adapted species, the occurrences are not expected to be extirpated. Any of the other ongoing and proposed activities could affect potential habitat. If undiscovered occurrences exist, individuals may be impacted. Occurrences could be extirpated where habitat is rendered permanently unsuitable (e.g., campsites, bridge abutments, hardened roads), but most of the activities likely would not extirpate occurrences of this disturbance-adapted species. Where these activities create light to moderate disturbances (e.g., thinning harvest, Indiana bat habitat improvement, skid trails, wildlife habitat improvement), habitat suitability for Appalachian blue violet could be enhanced.

Many ongoing and future activities on private land also have the potential to have detrimental and positive effects on Appalachian blue violet. However, information on specific activities is not available, therefore any consideration of these effects would be speculative. Appalachian blue violet is known from around 40 locations within the Forest proclamation and purchase unit boundary. Only three of these known locations are on private land, so the potential for private actions to lead to a loss of viability is considered very low.

If the proposed action affects undiscovered occurrences of Appalachian blue violets, these effects would add to the effects of other activities outlined above. However, disturbances associated with the proposed action are likely to be light to moderate; therefore, they are unlikely to extirpate occurrences, and could be beneficial in some cases. Because the other actions also are considered unlikely to extirpate occurrences and/or may be beneficial, and because Appalachian blue violet is known to occur at around 40 locations scattered across the Forest, the cumulative effects of the proposed action and other actions are not expected to lead to loss of viability.

Effect Determinations for RFSS Plants
Based on the above effects analysis, the RFSS plants listed in Tables 3.3 through 3.5 have the potential to occur in the Upper Williams project area. Appalachian blue violet is likely to be affect by the proposed action, and if any of the other species occur at the proposed activity sites, they could be affected. However, as outlined above, the effects are not expected to impact viability of Appalachian blue violet. The potential for impacting the other RFSS plants is considered very low. If impacts were to occur, they would affect a very small proportion of the total habitat available with the Forest boundary. **Therefore, for all RFSS plants listed in Tables 1 through 3 above, Alternative 2 (proposed action) may impact individuals, but is not likely to lead to loss of viability or a trend toward federal listing.** All other RFSS plants are unlikely to occur in the Upper Williams project area (see Likelihood of Occurrence document in the project record). **Therefore, Alternative 2 (proposed action) would have no impacts on all RFSS plants not listed in Tables 1 through 3 above.**

Alternative 1 (no action) would not implement any new activities, therefore **Alternative 1 (no action) would have no impacts on any RFSS plants.**

Non-Native Invasive Plants

Scope of the Analysis
This section covers potential effects of the Upper Williams Watershed Improvement project on the establishment, spread, and control of non-native invasive plants.

Spatial Boundary
The spatial boundary for direct and indirect effects consists of the Upper Williams project area/watershed boundary (see project area map in Appendix A). This boundary contains all proposed project activities and is the boundary within which all direct and indirect effects would occur.

For cumulative effects, the spatial boundary of the analysis includes the terrestrial ecosystems within which the effects of the project would occur (Figure 1). These ecosystems include the high elevation spruce-northern hardwood forests associated with Gauley Mountain, Black Mountain, Cranberry Mountain, and Kennison Mountain. Also included are the mid-elevation mixed mesophytic forests associated with Day Mountain, Stony Mountain, and the Upper Williams River valley, and a portion of the Stony Creek valley. The transition to lower elevations in the valleys of the upper Elk, Gauley, lower

Williams, Cranberry, Cherry, and Greenbrier Rivers forms a natural boundary that contains these ecosystems. The cumulative effects boundary includes approximately 239,000 acres of land, of which approximately 151,000 acres is National Forest land. The non-National Forest land has a variety of owners, including the State of West Virginia, large forest products companies, and numerous small private landowners.

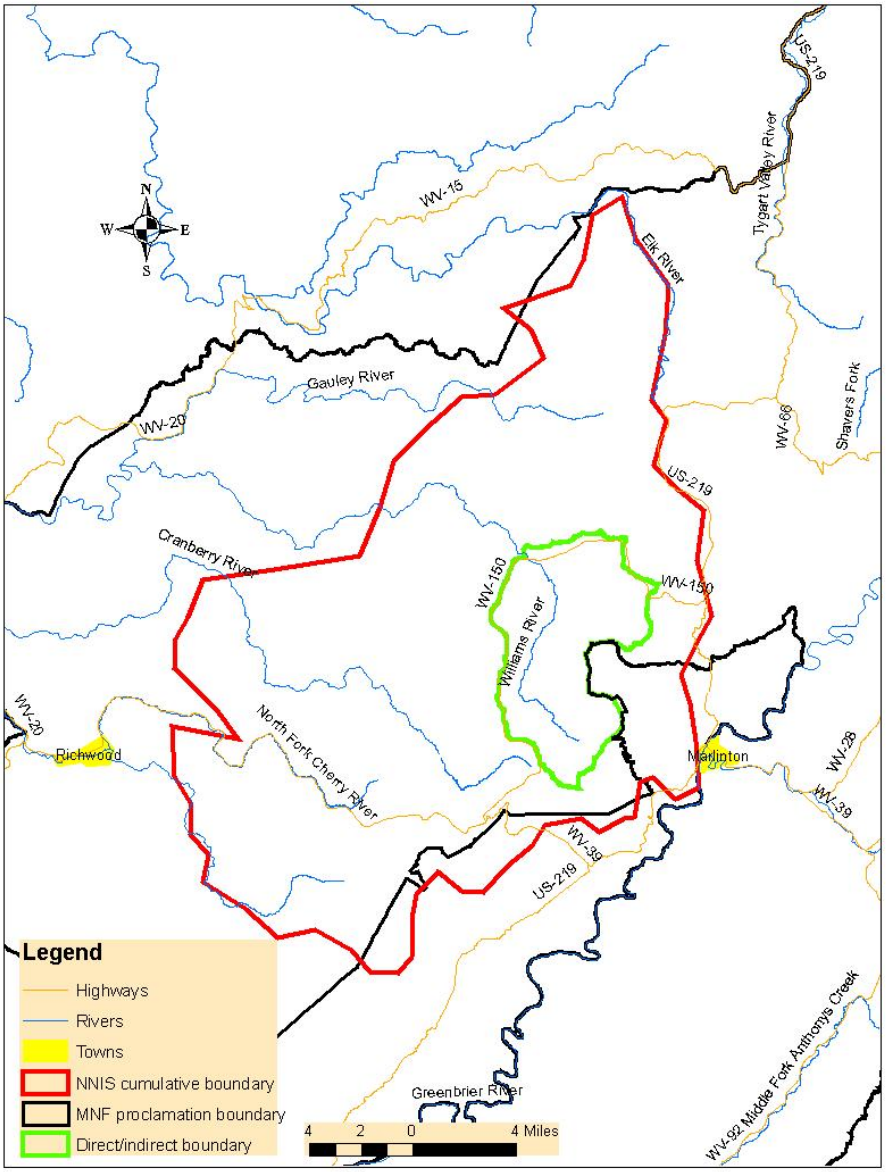
Temporal Boundary

The temporal boundary for analyzing direct, indirect, and cumulative non-native invasive plant effects is 30 years. This time period would allow more than enough time for completion of any control activities that are needed to mitigate potential spread of invasives due to project activities. It would also encompass the time period needed for redevelopment of a forest canopy over disturbed sites such as decommissioned roads. Redevelopment of the forest canopy would greatly reduce any shade-intolerant invasives that become established in these disturbed areas.

Affected Environment

Thirty-two non-native invasive plant species are known to occur in the Upper Williams project area (Table 3.6). Based on survey data, non-native invasive plants appear to be distributed throughout the project area. Known occurrences generally are in areas with road access. However, few portions of the project area without road access have been surveyed, so it is difficult to draw conclusions about the distribution of invasives relative to roads.

Figure 1. Cumulative Effects Analysis Boundary for Non-native Invasive Plants – Upper Williams Watershed Improvement Project, Monongahela National Forest.



Seven of these invasive plant species are particularly problematic because of their shade tolerance and/or their ability to spread very aggressively: garlic mustard (*Alliaria petiolata*), Japanese barberry (*Berberis thunbergii*), amur honeysuckle (*Lonicera maackii*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Polygonum cuspidatum*), and periwinkle (*Vinca minor*). These plants typically get established where disturbances create partial canopy openings, disturb the soil, and deposit propagules. Once established, their shade tolerance and aggressive reproduction allow them to take over forest understories.

The remaining 25 invasive plant species that occur in the project area typically reach ecologically damaging densities only in sunny, disturbed habitats. Although scattered individuals may occur in forests, they typically require major disturbance of soil and vegetation to attain invasive densities in forested ecosystems. In forested landscapes such as the project area, these species generally reach high densities only along roads and in openings such as wildlife clearings and log landings. These species pose little risk to the intact forest communities that dominate most of the watershed.

Numerous other invasive plants are known to occur within the cumulative effects boundary. Although a comprehensive inventory is not available, it is likely that most of the invasive plants known to occur on the Forest can be found within the cumulative effects boundary. Roadsides, riparian areas, and disturbed sites on private land are particular hot spots for the occurrence of invasive plants.

Table 3.6 Non-native invasive plants known to occur in the Upper Williams project area.

Scientific Name	Common Name
Alliaria petiolata	Garlic mustard
Anthoxanthum odoratum	Sweet vernal grass
Arctium minus	Lesser burrdock
Berberis thunbergii	Japanese barberry
Carduus nutans	Musk thistle
Centaurea biebersteinii	Spotted knapweed
Chrysanthemum leucanthemum	Ox-eye daisy
Coronilla varia	Crown vetch
Echium vulgare	Viper's bugloss
Eleagnus angustifolia	Russian olive
Eleagnus umbellata	Autumn olive
Festuca arundinacea	Kentucky 31 fescue
Festuca pratensis	Meadow fescue
Holcus lanatus	Velvet grass
Hypericum perforatum	Common St. John's wort
Lespedeza cuneata	Sericea lespedeza
Lonicera maackii	Amur honeysuckle
Lonicera morrowii	Morrow's honeysuckle

Table 3.6 Non-native invasive plants known to occur in the Upper Williams project area.	
Scientific Name	**Common Name**
Melilotus sp.	Sweet clover
Microstegium vimineum	Japanese stiltgrass
Phleum pratense	Timothy
Plantago major	Great plantain
Poa compressa	Canada bluegrass
Poa pratensis	Kentucky bluegrass
Polygonum cespitosum var. longisetum	Asiatic water pepper
Polygonum cuspidatum	Japanese knotweed
Rosa multiflora	Multiflora rose
Rumex acetosella	Sheep sorrel
Rumex crispus	Curly dock
Stellaria media	Common chickweed
Tussilago farfara	Colt's foot
Vinca minor	Periwinkle

Of the seven invasive species of greatest ecological concern, Japanese stiltgrass, garlic mustard, and Morrow's honeysuckle are known to occur on or near roads that would be decommissioned by the proposed action. Japanese stiltgrass occurs on or near roads M-169, M-171, WR-33, M-176, M-147, M-144, and WR-27. Japanese stiltgrass also occurs near the mine rehabilitation site. Garlic mustard occurs near the beginning of Forest Road 1796, which would be used as access to decommission road M-176. Morrow's honeysuckle occurs on or near roads M-154 and M-145. It is likely that undiscovered occurrences of these and other invasive plants occur on many of the roads that would be decommissioned or stored by the proposed action.

Desired Conditions

The Forest Integrated Desired Conditions (Forest Plan p. II-6) call for containing the expansion of existing non-native invasive species infestations and preventing the establishment of new invasive species. Desired conditions for vegetation (p. II-17 and II-18) envision use of an early detection/rapid response strategy to prioritize control needs based on threat severity and ability to achieve control. The desired conditions also call for using native species and desired non-invasive non-native species for revegetation efforts.

Environmental Consequences

Direct and Indirect Effects

Road decommissioning, road storage, and mine site rehabilitation activities that involve soil disturbance are likely to spread invasive plants that currently exist on the road beds. For species that are capable of invading forested ecosystems, these activities could hasten the invasion of undisturbed forest by creating new establishment sites and spreading propagules. Preventative measures and follow-up monitoring and control efforts would mitigate the potential for spreading species that are capable of invading forested ecosystems (see monitoring and control measures in Chapter 2). These monitoring and control efforts would reduce or eliminate the potential for the project to spread shade-tolerant invasives into currently uninvaded forests.

Road decommissioning, road storage, and mine site rehabilitation also are likely to spread many species of shade-intolerant invasive plants. However, these species would decline over the long term as the tree canopy re-develops over the disturbed areas. Therefore, monitoring and control efforts are not proposed for these species.

Over the long term, road decommissioning, road storage, and mine site rehabilitation would remove invasion corridors and establishment sites for invasive plants. This would reduce the threat posed by invasives to forested communities in the watershed and likely would reduce the overall infested acreage in the watershed.

The other activities in the proposed action (aquatic passage improvement, channel structure improvement, bank stabilization, and riparian planting) have a low probability of spreading invasive plants. Although invasives could become established wherever these activities disturb the soil, the potential for spread of ecologically damaging species is limited. This is because the amount of soil disturbance would be small and shade-tolerant invasives currently are not known to occur near these sites. Follow-up monitoring would occur wherever soil disturbance, seeding, and mulching occur, and any infestations of shade-tolerant invasives would be controlled. Over the long term, bank stabilization and riparian planting would reduce the potential of establishment of invasives by stabilizing disturbed soil.

Alternative 1 (no action) would not implement any activities, therefore it would not affect the establishment and spread of non-native invasive plants. Invasive plants would continue to establish and spread on their own.

Cumulative Effects

The major potential negative effect of the Upper Williams Watershed Improvement project relative to non-native invasive plants is the potential for introduction and spread of invasives in areas disturbed by project activities. This effect would add to the effects of past activities that may have caused the introduction and spread of invasives. Examples of such past activities include widespread timber harvest, soil erosion, and fires between the years 1880 and 1930, Forest service timber sales and road building in more recent years, historic strip mining on private land and what is now National Forest land, recent timber harvests and road building on private land, livestock grazing on National Forest land, grazing and crop farming on private land, and residential development on private land. Specific information on the introduction and spread of non-native invasive plants due to these past activities is not available. However, the current distribution of invasives in disturbed areas strongly indicates that these activities were collectively responsible for the introduction and spread of existing invasives.

Any effects of the Upper Williams Watershed Improvement project also would be additive to the effects of ongoing and future activities within the cumulative effects boundary. The major ongoing and future activities on National Forest land that have the potential to spread invasive plants are timber harvest projects. Harvest activities and related road construction are ongoing or would begin in the next year on the Upper Williams timber project (shown as three separate sales in EA Table 3-1). The Upper Williams Vegetation Management project involves approximately 190 acres of regeneration harvesting, 1,433 acres of thinning, 300 acres of beech bark disease treatments, and 35 miles of road reconstruction, improvement, storage, and decommissioning. These activities are likely to spread non-native invasive species in the cumulative effects analysis area, which could lead to a certain amount of ecosystem degradation. However, because the Upper Williams Watershed Improvement project includes monitoring and control efforts designed to limit or eliminate negative impacts associated with invasive plants, the proposed action is not likely to make a measurable contribution to any cumulative ecosystem degradation caused by the Upper Williams Vegetation Management project. In addition to the Upper Williams Vegetation Management project, a small portion of one harvest unit in the Cherry River Vegetation Management project lies within the cumulative effects boundary. This portion consists of a few acres of helicopter thinning. Due to the small size of this activity and the lack of ground-based equipment, it is unlikely to spread invasives.

Other ongoing and future activities on National Forest land that may affect the establishment and spread of invasives include the proposed Upper Williams Wildlife Habitat Improvement project, the Marlinton Grazing Allotments project, two proposed trail bridges across the Cranberry River, outfitter guide permits, recreation by individuals, and utility and access rights-of-way. All of these activities, especially horseback riding associated with outfitter guide permits and individual recreation, have the potential to spread non-native invasive species. However, these activities by themselves are not likely to lead to large-scale landscape invasions. Rather, they are likely to lead to small, incremental, and possibly temporary increases in the amount of the landscape that is invaded. The Upper Williams Watershed Improvement project could make a small contribution to the cumulative effects of these incremental increases. However, because the Upper Williams Watershed Improvement project includes monitoring and control efforts designed to limit or eliminate negative impacts associated with invasive plants, the proposed action is not likely to make a measurable contribution to any cumulative ecosystem degradation caused by these activities.

Negative effects related to invasive plants are also likely to occur due to continuing activities on private land, such as timber management, agriculture, off-road vehicle use, road construction and maintenance, residential development, and a host of other activities. Specific, quantitative information for future activities on private land in the cumulative effects boundary is not available. However, based on the recent past and the current condition of much of the private land in the area, it is likely that these activities would continue the landscape-level ecosystem alteration due to invasive species. In comparison, the activities proposed for the Upper Williams Watershed Improvement project are very small-scale and relatively benign. It is very unlikely that the proposed action would make a measurable contribution to the cumulative ecosystem alteration that is occurring due to activities on private land in the cumulative effects boundary.

The major potential positive effect of the project is the long-term elimination of invasion corridors and establishment sites through road decommissioning, road storage, and mine site rehabilitation. Available information does not indicate that any other invasive species control work is proposed in the cumulative effects boundary, either on National Forest or private land. Therefore, this project's contribution to invasive species control is likely to be very small when measured at the scale of the cumulative effects boundary.

Alternative 1 (no action) would have no direct or indirect effects on the establishment and spread of invasive plants. Therefore, Alternative 1 would not contribute to any positive or negative cumulative effects on the spread and establishment of invasive species.

Wildlife

Introduction

This report discusses how the Upper Williams River watershed improvement projects may change terrestrial wildlife habitat, affect wildlife resources and Management Indicator Species (MIS).

Chapter 2 of the Environmental Assessment contains a detailed description of the proposed action (Alternative 2). The proposed action is the only action alternative; a no action alternative (Alternative 1) is also analyzed.

Scope of the Analysis

This analysis addresses effects to animal species that are federally listed as threatened or endangered, animal species that are listed as Management Indicator Species (MIS) on the Monongahela National Forest as well as Birds of Conservation Concern and Regional Forester Sensitive Species (RFFS) sensitive animals. Threatened, endangered, and sensitive species are collectively referred to as TES species.

Spatial Boundary

The spatial boundary for direct and indirect effects on TES species consists of the Upper Williams project area/watershed boundary. This boundary contains all proposed project activities and is the boundary within which all direct and indirect effects would occur. The spatial boundary for cumulative effects on TES species is the Proclamation and

Purchase Unit boundary for the Monongahela National Forest. This is the boundary to which the National Forest Management Act viability requirement applies.

Temporal Boundary

The temporal boundary for direct, indirect, and cumulative effects on TES species is 30 years from the beginning of project implementation. This would allow ample time for sites disturbed by the project to stabilize and the area to revegetate. This temporal boundary is also used for the cumulative effects analysis because the contribution to cumulative effects ends when the direct and indirect effects no longer exist.

Methodology

Original determinations for the Upper Williams River watershed were made based on review of the following: 1) species-specific literature as cited: 2) internal agency information (e.g., ArcGIS information: and 3) field review. ArcGIS information is a compilation of wildlife survey and sightings collected over many years. Field site visits were conducted by the District Biologist and/or by Biological Technicians in the spring of 2007.

Consistency with the Forest Plan

The project area is managed under Management Prescription (MP) 4.1 and 6.1. MP 4.1 emphasizes Spruce and spruce-hardwood restoration, with emphasis on wildlife habitat. The Forest Plan standards and guidelines for management of MP 4.1 emphasize the use of even-aged system of silviculture when shade intolerant species such as oak are the species objective and when outside of spruce and spruce-hardwood restoration areas (p.III-15). The Forest Plan also recommends creating and maintaining a mix of age classes, favoring mast-producing species in hardwood communities where spruce restoration is not practical and maintain a hardwood component in mixed stands as well to provide mast, nesting habitat, and species diversity (p. III-14).

Other habitat components called for in the Forest Plan for this prescription include maintaining up to 5% of the area in permanent openings and retention of natural areas of standing water as wildlife water sources (p. III-16).

The Forest Plan standards and guidelines for management of MP 6.1 emphasize the sustainable production of mast and other plant species that benefit wildlife (p. III-31). The Forest Plan recommends a mosaic of hardwood stands varying in size, structure, and species composition to provide habitat for a variety of wildlife species (p. III-35).

Other habitat components called for in the Forest Plan for this prescription include maintaining 3-8% of the area in permanent wildlife openings and retention or creation of permanent water sources (P. III-38).

Management Indicator and Other Species

Implementing regulations for the National Forest Management Act (NFMA) under which the 2006 Forest Plan was prepared require National Forests to select MIS to monitor the effects of Forest management activities on fish and wildlife populations and habitat (36 CFR 219.19). These regulations have since been superseded by new regulations that do not require MIS. However, because the Forest Plan was prepared under old regulations, it selected MIS to monitor effects of management on wildlife habitat and populations. The Forest Plan identifies three terrestrial animal species as management indicator species:

Cerulean warbler (*Dendroica caerulea*)
Wild turkey (*Maleagris gallopavo*)
West Virginia northern flying squirrel (Glaucomys sabrinus fuscus)

The Forest Plan also includes brook trout on the MIS list. This species is discussed in the Aquatic Resources section. One of the terrestrial MIS, West Virginia northern flying squirrel, is federally listed as endangered. This species is discussed in the Threatened and Endangered Terrestrial Animal section. The remainder of the terrestrial MIS analysis would focus on cerulean warbler and wild turkey. Table 3.7 summarizes the habitat objectives for the MIS considered in this section (Cerulean warbler and Wild turkey).

Table 3.7. Forest-wide Management Indicator Species Pertinent to The Analysis

Species	Reasons for Seclection	Habitat Objective
Cerulean warbler	High-interest non-game species. Associated with large trees, gaps, and complex canopy layering characteristic of old-growth forests. A forest interior species that is believed to be sensitive to fragmentation. The Forest and WV DNR are cooperating on an ongoing songbird point count monitoring program that is expected to provide Forest-wide data on this species.	Maintain at least 50,000 acres of midlate and late successional (>80 years old) mixed mesophytic and cove forest to meet habitat needs for cerulean warbler, a MIS.
Wild turkey	High-interest game species. In the Appalachians, strongly associated with oak mast. Requires herbaceous openings for brood range and is expected to reflect the effectiveness of the cooperative Forest-WV DNR wildlife opening management effort. Uses shrub/sapling stands for nest sites. Ongoing harvest data collected by WV DNR provides a Forest-wide population index.	Maintain at least 150,000 acres of 50-150 year old oak and pine-oak forest in MPs 3.0 and 6.1 to meet habitat needs for wild turkey, a MIS.

General Habitat Requirements of MIS

The two terrestrial MIS discussed herein have certain unique habitat requirements, and each can be viewed as representing a particular combination of habitat elements. Cerulean warblers typically occur in mature to old mixed mesophytic and oak forests with tall, large diameter trees and a mostly closed canopy, but with some canopy gaps and complex vertical structure. Cerulean warblers also are associated with large tracts with forest interior conditions (Hamel 2000 and references therein). Wild turkeys in the eastern U.S. are highly dependent on acorns, but they also require herbaceous openings for brood rearing and shrubby cover for nesting (Steffen et al. 2002, Ryan et al. 2004, Wunz and Pack 1992, Everett et al. 1985, Pack et al. 1980). Thus, turkeys represent forests with an oak component that have interspersed openings and regenerating stands.

Cerulean warbler (Dendroica cerulea) – A regional sensitive species, the Cerulean warbler is a neotropical migrant, which occurs throughout the eastern United States in summer. Typically associated with large trees, gaps, and complex canopy layering characteristics of old growth forests the warbler is known to breed within the National Forest and state-wide breeding bird surveys show stable or increasing numbers within the state. There have been no point count surveys or breeding bird surveys completed in the Upper Williams area.

Eastern wild turkey (*Meleagris gallopova*) - This species is typically associated with grassy openings, thickets of dense cover, scattered clumps of conifers and extensive tracts of mature/late-successional forests. Wild turkeys are limited to the mid and lower elevation oak, beech and cherry stands within Upper Williams watershed area (UWWA).

Eastern wild turkey and their young use grass/forb habitat to forage for insects in the late spring and summer months. While acorns are the primary food of wild turkey in fall, winter and into spring, their prominence in the diet declines to less than 5 % in summer (Dickson 1990). Insects, herbaceous material and grass seed dominate the summer diet.

Mature mixed hardwood forest types cover the majority of the project area. Eastern wild turkeys eat a variety of plant and animal matter as it is available but important fall and winter foods are the fruits, seed, or nuts from wild grape, oaks, beech, ash, dogwood and black cherry. The project area provides hard mast in the form of acorns and beechnuts. Wild grape, flowering dogwood and black cherry are locally common but are not abundant throughout the project area. Dense rhododendron thickets along drainages provide security cover during hunting seasons and shelter. The project area also contains conifers that provide roost cover during severe winter weather. Turkeys need a daily water source and water is available throughout the project area in the form of seeps, springs and streams.

Population objectives for turkey are 31.7-turkey/square mile in a mixed hardwood type. WVDNR Big Game bulletins track spring and fall turkey harvest numbers by county and National Forest wildlife management areas. Population estimates are based on the premise that the number of spring gobblers harvested represents 10% of the turkey population in an area. UWWA (24,832 acres or 38.8 square miles) is located in the southwest corner of the Tea Creek WMA (64,000 acres or 100 square miles). Estimated turkey populations, based on harvest numbers, are shown in Table 3.8.

Table 3.8. Estimated Turkey Populations in Upper William Watershed Area

Year	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06
Turkey Harvest in Tea Creek	30	30	29	25	37	10	12	5	3	18
Estimated turkey population in Tea Creek	300	300	290	250	370	100	120	50	30	180
Estimated turkey population in UWWA	116	116	112	97	143	39	46	19	11	70
Estimated turkey / sq. mi. in UWWA	3	3	3	2	4	1	1	1	1	2

According to the WVDNR, the suspected reasons for the tremendous decline in number of birds harvested statewide in spring 2002 were not due to an actual reduction in turkey population but were due to 1) the adverse weather conditions during the hunting season that affected hunter participation and success, 2) fewer naïve young gobblers in the population that are easier to kill, and 3) gobblers were more difficult to call in because of male-female social interactions that year. In contrast, the continued harvest rate decline in spring 2003 is believed to at least partially reflect a decline in the turkey population in some areas due to severe winter weather that killed many birds. The spring 2003 harvest decline probably was exacerbated by poor weather during spring gobbler season, which may have reduced hunter participation**.** In subsequent years (2004-2006) an increase in turkey numbers has been seen within the Upper Williams Watershed Area.

Scope of the Analysis

The area considered for direct, indirect, and cumulative effects to wildlife and MIS is the Upper Williams watershed project area. Direct and indirect effects would be limited to the project area in the vicinity of management activities.

Methodology

The effects analysis was based on review of literature and scientific knowledge concerning the effects of large woody debris recruitment and road decomissioning activities on habitat structure, mast production and disturbance of wildlife. A wildlife biologist visited the project area to assess wildlife habitat conditions and evidence of species present in the proposed project area

Direct and Indirect Effects to MIS; Alternative 1- No Action

In this alternative, the proposed activities would not be implemented. There would be no direct and indirect effects to eastern wild turkey and Cerulean Warbler with Alternative 1. The project area would continue to meet food, cover and water requirements for wild turkey. Area turkey populations would not experience increased disturbance or other effects from equipment use, soil disturbance, human presence, or vehicle traffic since this alternative would not include those activities. Existing Cerulean warbler habitat would not change as no timber activity would occur to alter age class distribution.

Alternative 2. – Proposed Action
This alternative proposes to reduce the impacts of roads in the Upper Williams project area by correcting road-related problems and reducing overall road density through activities that include road decommissioning, road storage, aquatic fish passage improvement structures, channel stream improvements, bank stabilization activities, riparian plantings, and abandoned mine revegetation activities.

Large Woody Debris Recruitment – In this alternative, large woody debris would be added to approximately one mile stretches of Black Mountain Run and Mountain Lick Run. Onsite trees at least 12' dbh would be directionally felled from adjacent timber stands located approximately 100 feet from the stream bed. The large woody debris would increase habitat complexity by scouring pools, trapping spawning gravels, providing hiding cover, and dissipating stream energy. Direct effects to wildlife from this type of treatment are generally short-term in nature and may involve some individual mortality during tree feeling operations if cutting occurs during the nesting season. However, tree feeling would not affect nesting cerulean warblers and turkeys since felling operations would occur during the winter months when cerulean's are not present and turkey's are not nesting. Felling activities may result in site avoidance by species sensitive to disturbance.

Female turkey nest on the ground from late March thru early May. Nests are usually close to a water source and well concealed by ground vegetation. Eggs are laid on average of two every three days with a typical clutch of 10-14. Incubation requires about 28 days. During nesting, both the eggs and the female turkey are susceptible to predation and disturbance. Any ground disturbing activity (tree felling, road decommissioning and storage) occurring during nesting may lead to crushing of eggs. Along with the actual direct affects of tree felling, increased human activity in an area can cause turkey to abandon the nest making eggs or young vulnerable to predation. Nesting and care of young are the most vulnerable time as far as affects from project work

Cerulean warblers arrive in West Virginia around the last week of April. Three to four eggs are laid in May/June, females nest for 11-13 days and young birds usually fledge after 14 days. Usually only one brood is raised per season. Due to tree felling operations occurring during the winter months no nests would be vulnerable to destruction.

Road Decommissioning – Approximately 21.2 miles of road have been identified for road decomissioning. Methods of road decommissioning would be determined on a case by case basis. Levels can range from no ground disturbance on roads that are stable to out-sloping roads and culvert removal. There are areas where wet and erosive conditions have occurred long enough to create small wetland ecosystems over various portions of the road. This habitat is used by a variety of amphibians, mammals, insects and birds and has developed and prospered because these roads have not been extensively used, providing an area relatively lacking noise and motorized disturbance. Decommissioning methods that require ground disturbing activities may negatively affect those species occupying the area during ground disturbance. This disturbance would be long-term as the purpose of the action is to eliminate water collection and runoff. This would result in a loss of habitat for those species dependant upon standing water sources. It is known that rutting and standing water on roads and skid trails provides breeding habitat for a variety of amphibians (Pauley & Kochenderfer 1993). There would also be short term disturbance (increased noise and human presence) while the work is occurring. Noise and human disturbance is extremely variable and hard to extrapolate as effects would vary according to species and extent of disturbance. Many responses of animals to disturbance are short-lived and this would be the case with this action.

Roads can be barriers for small reptiles and amphibians that would not cross areas lacking humus and leaf litter. This can split existing populations preventing future genetic exchange. As decommissioned roads become less and less distinguishable, reptiles, amphibians and mammals would reestablish populations. Road decommissioning would decrease linear opening acres used by a variety of wildlife. Turkey brood range would be reduced in areas where roads are no longer mowed and kept in a grassy state.

Road activities (decommissioning) removes a small amount of forested acres, but provides edge environment that allows for suitable soft mast vegetation growth, bugging areas and linear openings used by local turkey populations. Roads that are scheduled for permanent or seasonal opening could affect turkey populations due to increased disturbance and increased hunting pressure. Roads usually take up a small proportion of the landscape, so the amount of habitat loss at the project boundary scale is not likely to be substantial. Because turkeys are considered a species intolerant of human disturbance, the time of year harvest activities take place, may play a factor in the level of disturbance to turkey populations in the area proposed for activity. If activities occur during nesting season, affects may be more detrimental than other times. Overall, activities identified would be beneficial to wild turkey populations and fall within Forest Plan objectives for these areas. Due to the removal of a small amount of forested acres associated with decomissioning as well as the small size of those tree found along the roadside edge, no Cerulean warbler nests would be vulnerable to destruction. In fact, the clearing of vegetation could promote increased insect production to the benefit of Cerulean warblers in the area.

Road Storage - Approximately 1.2 miles of road would be placed in storage. The intent of storage is keeping the road on the system, but not using the road until the next harvest entry. Methods of road storage would be determined on a case by case basis. The most common form of storage would be construction of broad based water dips below existing culverts. These dips would prevent excessive water buildup and washout in the event that the culvert becomes blocked. Effects to wildlife are explained in the road decommissioning section above.

Aquatic Passage Improvement - There are two areas where roads restrict movement of aquatic species. One location is on Forest Road 999 along the main stem of the Williams River, and the other is on Forest Road 216 along Black Mountain Run. Existing structures would be replaced by structures that better fit the ntural channel width, grade and stream substrate to facilitate passage. No suitable habitat for terrestrial MIS would be modified by the proposed aquatic fish passage projects.

Cumulative Effects

Alternative 1- No Action
Alternative 1 would not involve any management activity in addition to ongoing activities and maintenance. Therefore, Alternative 1 would not contribute to the cumulative effects of past, present and reasonable foreseeable future actions.

Alternative 2- Proposed Action
Cumulative effects related to wildlife, are evaluated by looking at past, present and foreseeable future effects, which are most likely to result in a change in wildlife habitat conditions and wildlife distribution and use when considered cumulatively. When considering the effects to wildlife over time, and based on past and anticipated future disturbances within the project area, the primary factors of change affecting wildlife and wildlife habitat in the UWWA and surrounding landscape include activities such as timber harvests on Forest Service and private land, wildlife habitat improvements such as new permanent openings and waterholes, maintenance of existing Forest and State roads, maintenance and operation of existing gas wells and pipelines, construction of new gas wells, and possible residential and agricultural developments.

In general, these activities tend to maintain or create permanent openings, early successional forest habitat, and edge habitat and tend to reduce and fragment mature forest habitat. Since there have been no significant, naturally-occurring disturbances or changes within the project area within the last 10 years, potentially significant cumulative effects were identified by looking at the predominant, human-caused disturbances which have occurred within the project area over time. For the purpose of this analysis, the geographic scope or cumulative effects analysis boundary used to evaluate effects to the wildlife resource, includes all private and National Forest System lands within the Upper Williams watershed area (24,832 acres). The following rationale was used to identify the cumulative effects analysis area for wildlife. The UWWA is characteristic of the surrounding landscape, in that the area is predominantly forested and surrounding lands are similarly forested. Also the level of past and anticipated future activity in adjacent watersheds surrounding the project area is comparable to that of the Upper Williams area. The large woody debris recruitment included in the action alternative would not remove the forest canopy, and thus would not contribute to cumulative effects related to openings. However, large woody debris recruitment could stimulate understory growth and would make a very short-term contribution to some components of early successional and edge habitats. Most all of the alternative's contribution to cumulative effects would last about 20 years, at which time canopy closure of the units proposed for large woody debris recruitment would return these areas to forest habitat.

Species in the project area limited to mature forests, such as wood thrush and some salamander species, could experience population declines due to these cumulative effects. However, despite these effects, mature forests and the species that inhabit them are expected to continue to dominate the majority of the project area. Alternative 2 would not adversely affect maintenance of species viability at the Forest-wide scale.

Birds of Conservation Concern

Resource Impacts Addressed
This section of the EA has been prepared in response to the President's Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds" of January 10, 2001. Pursuant to this Executive Order, the U.S. Fish and Wildlife Service developed a list of birds of conservation concern for the Appalachian Mountain Bird Conservation Region (USFWS 2002). This section addresses the impacts of the proposed action and alternatives on birds of conservation concern.

Affected Environment
The Monongahela National Forest and the State of West Virginia occur within the Appalachian Mountain Bird Conservation Region. Twenty-seven species of birds are listed as birds of conservation concern for the Appalachian Mountain Bird Conservation Region. To simplify a discussion of the effects of the alternatives, these species have been grouped by the type of habitat they use. A description of each of these species and its habitat is provided below.

Species using forested habitat
Kentucky Warbler – dense under story of mature, humid deciduous forest, wooded ravines, oak-pine or northern hardwood forest.

Louisiana Waterthrush – along streams flowing though heavily wooded valleys, deciduous forest, some hemlock, northern hardwoods.

Swainson's Warbler – dense under story under an older forest, rhododendron or mountain laurel thickets in woods, mostly found in the south and west part of the state.

Worm-eating Warbler – mature deciduous woodland that lacks dense ground cover, mature beech-maple or oak-pine forest.

Cerulean Warbler – mature forest, mixed mesophytic and oak forest below 600 meters in elevation, common in the western portion of the state, sparse in the mountains.

Wood Thrush – mature or near mature deciduous forest, prefers dense shade on forest floor.

Acadian Flycatcher – mature mixed deciduous forest dissected by small streams and ravines; lower elevations; not in spruce, oak or pine forest; nests over water; more common in the west side of the state.

Yellow–bellied Sapsucker (breeding populations only) – upland black cherry forest, cut over mature hardwoods, spruce-hardwoods.

Whip-poor-will – mixed deciduous woods, upland oak-hickory forest, not in spruce, hardwood-pine or hardwood-hemlock, few in northern hardwoods, rare in dense forest. Potential habitat could occur.

Northern Saw-whet owl (breeding populations only) – spruce and mixed spruce-hardwoods, swampy areas in coniferous forest, high elevations.

Black-billed Cuckoo – northern hardwoods, cove hardwoods, oak-hickory forest.
Prothonotary Warbler – swamps (wooded wetlands) and large streams, not in the highlands.

Red-headed Woodpecker – open oak groves with little understory, groves of oaks and grazing lands, Ohio River valley and low elevations in the Allegheny Mountains.

Species using non-forested habitat (grassland or other permanent openings)
Upland Sandpiper – grass, old field habitat, grassy mountain tops and reclaimed surface mines, pastures, airports, golf courses.

Buff-breasted Sandpiper – short grass, not listed in the West Virginia breeding bird atlas, accidental/hypothetical to West Virginia. Nests in the arctic shores of Alaska and Canada. Winters in the pampas of Argentina. Migrates up the Mississippi Valley and to the west.

Short-eared Owl – extensive open grassland, meadows, prairies, plains, marshes, dunes, tundra, not listed in the West Virginia breeding bird atlas.

Sedge Wren – wet grass and sedge meadows, nests near surface of water, needs wetlands, grassy marshes.

Henslow's Sparrow – grassy, weed filled fields, fields of broom sedge and weeds, early years of plant succession.

Species using young forest/brushy habitat
Olive-sided Flycatcher – in openings in northern spruce forests, such as bogs, old beaver ponds, burned over slash from lumber operations with scattered snags and trees for perches.

Bachman's Sparrow – brushy overgrown fields, abandoned pastures growing up in shrubs, often in erosion gullies in steep hill sides, much un-used habitat remains.

Bewick's Wren – dry open country in valleys east of the mountains, in small clearings in spruce at high elevations, brushy thickets, favors old farm buildings, old farmsteads, very local or extirpated.

Prairie Warbler – young pine forests and brushy scrub, young second growth hardwoods, overgrown pastures, Christmas tree plantations.

Golden-winged Warbler – low, brushy second growth forest and open woodland, especially powerline rights-of-way, higher elevations, not in spruce.

Species using both forest and non-forest habitat
Peregrine Falcon – nests in cliffs, bridges over water, or high rise buildings in urban areas. Feeds over fields, forest, or urban areas by catching birds during flight.

Species not applicable to the Monongahela National Forest
Red Crossbill (southern Appalachian populations only) – not applicable to West Virginia or the Monongahela National Forest.

Black-capped Chickadee (southern Blue Ridge populations only) – not applicable to West Virginia or the Monongahela National Forest.

Chuck-will's-widow – No nest records from the state, mostly found in western hills portion of the state. The Monongahela National Forest is outside the known breeding range of this species.

Of the 24 species of birds of conservation concern in the Appalachian Bird Conservation Region that are applicable to the Monongahela National Forest, 13 (54%) use primarily mature forest habitats. Permanent herbaceous openings and young forest/brushy habitat are each used by 5 species (21%). One species (4%) has very specific nest site requirements, but forages over a broad variety of habitats.

Methodology
Birds of conservation concern were grouped according to primary habitat usage based on information from the *West Virginia Breeding Bird Atlas* (Buckelew and Hall 1994). The atlas, breeding bird point count data from the project area, and habitat preferences were used to determine which species occur or could occur in the project area. Information on habitat preferences was used to assess the likely effects of management activities on the species in each habitat group.

Environmental Consequences Common to All Action Alternatives

Species Using Forested Habitat
Some individuals could be subject to direct mortality during large woody debris recruitment, particularly if recruitment occurs during the nesting season (generally May through August for these species). Road related activities (storage and decommissioning) would remove a small amount of forested habitat in the action alternative. The tree felling included in the action alternative would have short-term effects until the canopy closes again in a few years. These effects would be detrimental to those forest species that prefer a closed canopy, but beneficial to those that use dense understory vegetation.

Species Using Non-forested Habitat
Species using non-forest habitats are unlikely to be affected by the action alternative. They are not known to occur in the project area now, and no additional non-forest habitats would be created by the project.

Species Using Young Forest/Brushy Habitat
Species that use young forest/brushy habitat likely would not suffer direct mortality from large woody debris recruitment in the action alternative because these species likely would not be present in mature forested areas when large woody debris recruitment would occur. Tree felling activities are unlikely to affect these species indirectly because tree felling would not create the type of open-canopy brushy habitat that these species prefer.

Direct/Indirect Environmental Consequences
Alternative 1 – No Action
Under Alternative 1, no tree felling, road storage or road decomissioning would occur, so Alternative 1 would have no direct effects on Birds of Conservation Concern. Indirectly, natural succession would continue, and the project area would trend toward older forest conditions. This trend generally would have no effects or beneficial effects on species that use forested habitats. Species using non-forest habitats would not be affected, because no new permanent openings would be created and existing openings would continue to be maintained. Habitat for species using young forest/brushy areas would decline as young forests in previously harvested areas mature. However, some young forest/brushy habitat would likely be provided by natural disturbances.

Alternative 2 – Proposed Action
Species Using Forested Habitat:
In the short term, the large woody debris recruitment in the proposed action alternative would temporarily remove or alter less than 1 acre of habitat for species that use forested habitat. Two of the species that use forested habitats, red-headed woodpecker and whip-poor-will, prefer open forests and could benefit form the broken canopy conditions provided by the large woody debris recruitment. These effects would persist for a period of about 5-10 years until the canopy closes.

Species Using Non-forested Habitat:
Effects are discussed previously under Environmental Consequences Common to All Action Alternatives

Species Using Young Forest/Brushy Habitat: Indirectly, these species would benefit from the brushy habitat created by large woody debris recruitment along the riparian corridors within the action area.

Cumulative Impacts
Alternative 1- No Action
Lack of management under Alternative 1 would not contribute to the cumulative effects of past, present and reasonably foreseeable future management actions.

Alternative 2 – Proposed Action
Species Using Forested Habitat: The past, present, and reasonably foreseeable future actions tend to remove or alter forested habitat. The direct and indirect effects of the large woody debris recruitment could make a small contribution to the cumulative effects

of temporary and permanent removal and alteration of forest habitat due to past, present, and reasonably foreseeable future actions. However, most of this alternative's contribution to these effects would be short-term, lasting only a few years until the canopy closes again (5-10 years). Minimal cumulative effects due to the road activities would occur for a short time after the roads are decommissioned or placed in storage. These effects would be seen until the small diameter vegetation along the roadside grew back. Despite the cumulative effects of these actions, the project area is expected to remain dominated by mature forests. Within the project area, populations of species that use forested habitat are likely to decline somewhat over time.

Species Using Non-forested Habitat: These species are unlikely to be affected directly or indirectly, so there would be no contribution to cumulative effects.

Species Using Young Forest/Brushy Habitat: Effects from the large woody debris recruitment and road activities would contribute to the cumulative effects of creation of temporary and permanent young forest/brushy habitat due to past, present, and reasonably foreseeable future actions. Most of the proposed project's contribution to these effects would cease when the large woody debris recruitment areas achieve canopy closure (5-10 years). Minimal cumulative effects due to the road activities would occur for a short time after the roads are decommissioned or placed in storage. These effects would be seen until the small diameter vegetation along the roadside grew back. Cumulative effects of all of these actions could result in larger populations of these species in the project area.

Unavoidable Adverse Impacts

The adverse impacts noted above for the action alternatives are integral to the nature of the alternatives and cannot be avoided if the alternatives are implemented.

Irreversible or Irretrievable Commitment of Resources

Large woody debris recruitment would result in the irretrievable conversion of approximately one acre of forested habitat to young forest/brushy habitat. None of these commitments of resources would be irreversible, however. Large woody debris recruitment areas would eventually grow back to forest.

Consistency with the Forest Plan

All alternatives would be consistent with Forest-wide standards and guidelines for birds of conservation concern (Forest Plan II-29-31).

Threatened and Endangered Terrestrial Fauna

Resource Impacts Addressed

A biological assessment (BA) was completed to determine the effects of the proposed action and alternatives on federally listed and proposed threatened and endangered species that have been identified as having at least part of their range on the Monongahela National Forest. This section summarizes the data on terrestrial animals from the BA/BE. The following federally listed threatened or endangered terrestrial

animals occur on the MNF: Indiana bat (*Myotis sodalis*), Virginia big-eared bat (*Corynorhinus townsendii virginianus*), West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*) and Cheat Mountain salamander (*Plethodon nettingi*). Aquatic animals are covered in the Aquatic Resources section; terrestrial plants are covered in the Threatened, Endangered, and Sensitive Plants section.
Field surveys, GIS layers pertaining to wildlife, layers specific to federally listed, or Regional Forester Sensitive Species (RFSS), as well as layers pertaining to unique habitat features such as soils and rock outcrops were reviewed. A Likelihood of Occurrence (LOO) table was created to aid in this analysis. Through this analysis, it was determined that the planning area is considered occupied habitat for five TES terrestrial animal species (West Virginia northern flying squirrel, Northern goshawk, eastern small-footed bat, Allegheny woodrat and Southern water shrew) and may provide suitable habitat for 11 additional TES terrestrial animal species. Specific information regarding TES species can be found in the project Biological Assessment.

Although it is very unlikely that the project area includes occupied habitat, Cheat Mountain salamander is addressed below because further explanation of their analysis seemed appropriate due the importance of documenting survey efforts or due to their transient nature.
The project area includes potential habitat for several other MNF R9 sensitive species in which presence cannot be discounted. Southern rock vole, Diana fritillary, and two tiger beetles (*Cincindela ancocisconensis*) and Barren's tiger beetle (*C. patruela*) are associated with habitats that either are known to exist in the project area or, due to the general habitat description and lack of survey data, potential presence cannot be discounted.

There is a high potential for occurrence for the Diana fritillary because its obligate plants (columbine and starry campion) are thought to be ever-present across the forest and assumed to occur in the project area. Although it is not known to occur within the project area, the tiger beetle (*Cincindela ancocisconensis*) is assumed to occur there due to the potential habitat along the Williams River. While the potential for occurrence of the southern rock vole and Barren's tiger beetle is difficult to assess due to the difficulty for surveying or lack of knowledge about preferred habitats, presence is also assumed.

Threatened and Endangered Animal Species

Indiana bat (*Myotis sodalis*)

The Indiana bat is distributed throughout the eastern U.S., from Oklahoma, Iowa, and Wisconsin, east to Vermont and south to northwestern Florida (Romme et al. 1995). During winter, Indiana bats restrict themselves primarily to karst (limestone geology) areas of the east-central U.S. During summer, Indiana bats forage nightly for terrestrial moths and aquatic insects in riparian as well as upland forests.

The area of influence for Indiana bats is recognized as four distinct areas;

1. Hibernacula (200-foot radius)
2. Maternity sites (2 mile radius)

3. Primary range (primary foraging, summer roosting and fall swarming – 5 mile radius around hibernacula)
4. Key areas (150 acres within 5 miles of each hibernacula).

Hibernacula

Indiana bats typically hibernate predominately in karst caves between October and April; the precise dates vary depending upon local weather conditions. During a recent decade, West Virginia saw a 45% increase in the number of hibernating Indiana bats (Wallace pers. comm. 1999), with a total statewide population of approximately 10,770 (Stihler and Wallace 2004).

In most years, approximately 26 West Virginia caves provide adequate Indiana bat winter hibernacula. Eleven hibernacula are within the Monongahela National Forest Proclamation Boundary, but only three (Big Springs Cave, Cave Hollow/Arbogast Cave, and Two-Lick Run Cave (all more than 50 miles from Upper Williams) have all or most of their entrances on MNF land.

Hellhole Cave, a privately owned cave in Pendleton County, is the only West Virginia cave currently designated as Critical Habitat for the Indiana bat (Priority II) (USFWS 1996); it lies within the Monongahela National Forest proclamation boundary, but on private land approximately one mile from national forest land. Hellhole Cave is located approximately 51 miles from the project area. There are no Indiana bat caves in the Upper Williams watershed area; however Tub Cave is located on private land within a five mile radius of the watershed. Tub Cave was last surveyed by WVDNR in January 2001. A total of 571 bats were counted, of which 20 were Indiana bats. This is an increase over the 1992 survey when only 3 Indiana bats were counted. The 200-foot radius area of influence around this hibernacula falls well outside the Upper Williams project area.

Maternity sites

Female Indiana bats depart hibernacula before males and arrive at summer maternity roosts in mid-May. Some males can remain near the hibernacula year-round (Stihler 1996). Females form small maternity colonies containing up to 100 adults and their young. A single offspring per female is born during June and is raised at the maternity site, usually under loose tree bark (Harvey et al. 1999). Maternity colonies typically use multiple roosts – at least one primary roost used by most bats during summer, and a number of secondary roosts used intermittently and by fewer bats. Thus, some Indiana bat maternity colonies may use more than a dozen roosts (USFWS 1996).

Romme et al. (1995) presented five variables that determine roosting habitat and described the values of these variables that make the most suitable Indiana bat habitat. The optimal forest canopy cover for roosting Indiana bats is 60-80%. The higher the mean diameter of overstory trees, the more suitable the area is for roosting. The abundance of snags indicates current roosting value, so the more snags the better. Percent understory cover indicates how accessible the roost trees are to the bats. A lower percentage means better access to roost sites. Tree structure, specifically the availability of exfoliating bark with roost space underneath, is a critical characteristic for roost trees. Potential roosting habitat, both maternity and non-maternity, is widely available as the Monongahela National Forest is 96 percent forested, with 63 percent of the forested land being more than 60 years old. Trees exhibiting roosting characteristics, such as shagbark and bitternut hickory, red and white oak, sugar maple, white and green ash, and sassafras, are plentiful throughout the Forest and many are found in the project area. Forest Service land within the project area is almost all forested, with nearly 90 percent being greater than 60 years old, indicating abundant potential roosting habitat.

West Virginia is within the Indiana bat's eastern maternity range, but not within the core range. Prior to summer 2003, maternity colonies in West Virginia had not been confirmed. Despite extensive summer surveys throughout West Virginia, especially in and around the Monongahela National Forest, Indiana bat maternity roosts had not been found. Presumably, reproductive female bats are more constrained by thermoregulatory and energy needs than are males and non-reproductive females (Cryan 2000). Night temperatures on most of the Forest are thought to be too cold to support maternity colonies (Stihler and Tolin, pers. comm. 1999).

Additionally, in survey efforts conducted in 2004 on the MNF, a confirmed maternity colony was located in the Lower Glady area. This capture site is approximately 55 miles from Upper Williams project area. A radio transmitter was placed on the female bat and roosting habits were documented through monitoring efforts until the transmitter fell off the bat. Evening emergence counts were conducted at two identified roost sites. Both roost sites were either on or very near Forest Service lands and within ½ mile from the original capture site. Generally, the area in which this maternity colony is located is a mixture of forested areas, forest edges, and early successional areas. The maternity roost tree is located in an area that has experienced recent (≈ 5 years) partial timber harvest and has been burned over creating a generous number of larger snags with sloughing bark. Protections as provided in the Forest Plan have been implemented with regard to this maternity roost site. These protections include establishing a 2-mile radius buffer ("area of influence") around the maternity site. Thus, the maternity site area of influence falls well outside of the Upper Williams project area boundary.

Primary Range

From May to October, Indiana bats forage nightly for terrestrial moths and aquatic insects, primarily in upland forests and riparian woodlands. Prey selection reflects the available foraging environment (Romme et al. 1995). While summer needs are not well understood (USFWS 1997), Indiana bats prefer to forage within upper forest canopy layers where overstory canopy cover ranges from 50-70% (Romme et al. 1995). Indiana bats are known to forage along forest edges, in early successional areas, and along strips of trees extending into more open habitat, but drinking water must be available near foraging areas (Romme et. al. 1995). Large open pastures or croplands, large areas with <10% canopy cover, and stands with large unbroken expanses of young (2-5-in dbh), even-aged forests are avoided or are rarely used for Indiana bat foraging (Romme et al. 1995). Field observations suggest that a large amount of the Forest is above optimal canopy closure for Indiana bat foraging habitat (USFS 2001), but the majority of forested conditions (63% greater than 60 years old) make most of the Forest, including the project area, potential habitat.

Indiana bats begin swarming in preparation for hibernation as early as August and continue through October or November, depending upon local weather conditions. Swarming entails congregating around and flying into and out of cave entrances from dusk to dawn, prior to hibernation (Kiser and Elliot 1996). The Monongahela National Forest provides approximately 203,235 acres of swarming habitat within 5 miles of known hibernacula. Swarming activity is believed to be concentrated within 5-mile radii around hibernacula, but Indiana bats may also swarm around cave entrances not necessarily used as hibernacula. The closest non-hibernacula caves to the project area are McKeevers Waterfall, Overholts Dome, Carpenters Pit, Turkey Roost, and Barnes Pit. All these caves are located outside the Upper Williams watershed boundary.

On the Monongahela National Forest foraging, roosting and swarming are believed to be concentrated within five miles of hibernacula, although individual bats can occur outside this area (USFS 2001). Therefore, the Forest Plan has designated areas within five miles of hibernacula as Primary Range. Within these areas, vegetation greater than five inches dbh may be managed only for the benefit of the Indiana bat, for other threatened, endangered or sensitive species habitat, to achieve research objectives or for public safety (Forest Plan, p. II - 24). Emphasis would focus on management of tree species to provide a continuous supply of suitable roost trees and preferred foraging habitat for Indiana bats. Approximately 4,927 acres in the southern half of Upper Williams watershed area lies within the 5-mile radius primary range associated with Tub Cave.

Key Area

The Forest Plan also calls for the designation of a Key Area within the 5-mile radius primary range around each hibernacula. A Key Area consists of a group of mature stands, totaling at least 150 acres, located as close as practical to the hibernacula. This area would include 20 acres of old growth forest or potential old growth and an additional 130 acres of mature forest (Forest Plan p. II – 26). As appropriate, the key area would include the area around the cave entrance, the area above the cave entrance, as well as foraging corridors and ridge tops/side slopes around the cave. There are approximately 155 out of 166 total Key area acres located in Upper Williams watershed area.

A total of seven mist net sites have been surveyed within the Upper Williams watershed. A total of 181 bats of several species were captured during efforts in 2002, 2004 and 2006. No confirmed Indiana bats were captured, although several unidentified specimens were captured (SEI 2003).

Virginia big-eared (*Corynorhinus townsendii virginianus*) – The Virginia big-eared bat is a geographically isolated and sporadically distributed cave obligate species that feeds predominantly on moths (Dalton et al. 1986, Sample and Whitmore 1993).

Virginia big-eared bats begin to return to hibernacula in September, but continue feeding during warm evenings. By December, they hibernate in dense clusters on cave ceilings.

Nine West Virginia caves are monitored as Virginia big-eared bat hibernacula. Three caves are found on the Monongahela National Forest and harbor approximately seven percent of all hibernating Virginia big-eared bats in West Virginia. Hibernacula caves, as well as 200-foot buffers around them, are considered part of the areas of influence for Virginia big-eared bats. The closest hibernacula to the Upper Williams project area is Stewart Run Cave**,** which is approximately 17 miles Northeast of the watershed.

Female maternity colonies generally utilize warm caves, though some may use cold caves. Nocturnal activities in maternity colonies vary as the maternity season progresses. During May and most of June, when females are pregnant, the colony remains outside the cave most of the night. After birth in late June and July, nightly emergent behavior of the mother depends on the needs of her young. Male Virginia big-eared bats also roost together in bachelor colonies during the non-hibernation season, although they inhabit different areas of the cave than the females (USFS 2001 and references therein). Virginia big-eared bats are also known to use mine adits and abandoned buildings as summer maternity colonies and bachelor roosts. Identified summer colonies, including both maternity and bachelor sites, are included within the area of influence for Virginia big-eared bats. Eleven caves in West Virginia are monitored by the West Virginia Department of Natural Resources for summer Virginia big-eared bat use. Three of these are on Monongahela National Forest land. The closest gated and fenced summer colony (a maternity cave) is Minor Rexrode Cave which is located approximately 45 miles from the Upper Williams project area. Two other caves (Keys and Izaak Walton caves) have harbored Virginia big-eared bats in the past, however according to WVDNR they are not used as consistently as other caves. Refer to the likelihood of occurrence table (Appendix B) for cave distances for Virginia big-eared bats. There are no mine adits on federal property within the Upper Williams project area that could be used as summer maternity or bachelor roosts.

Observational research shows Virginia big-eared bats forage only after dark. Virginia big-eared bats forage near their caves. In general, distances from roosts to centers of foraging areas do not differ between males and females (Adam et al. 1994), though foraging area size for females may increase during the summer. The maximum distance a male bat has been found from its roost was 5.04 miles (8.4 km). Maximum distance a female was found from the maternity colony was 2.19 miles (3.65 km) (Adam et al 1994).

Based on information that Virginia big-eared bats travel up to six miles from their caves to forage (Stihler 1995), areas six miles in radius from hibernacula and summer colonies are included within the area of influence for Virginia big-eared bats. Other than the 200-foot buffer around hibernacula and summer colonies, there is no specific management prescription designation for roosting and foraging areas within this 6-mile radius circle. Within the 6-mile radii surrounding the eleven monitored Virginia big-eared bat maternity/bachelor caves, 76 percent of the land is privately owned, and the majority is in agricultural use. Of the less than 25 percent that is National Forest land, more than 95% is forested habitat over 60 years old. There are no areas of influence for Virginia big-eared bat within Upper Williams watershed area.

There are no known Virginia big-eared bat hibernacula or maternity caves within the UWWA or within a 6.5 mile radius of the watershed area.

Cheat Mountain salamander (*Plethodon nettingi*) – This small woodland salamander is found in red spruce and mixed deciduous forests above 2,700' in microhabitats that have relatively high humidity, moist soils and cool temperatures. Thirteen potential Cheat Mountain salamander sites within the UWWA have been surveyed by Dr. Tom Pauley, Marshall University. No individuals were found during these efforts. In 2001, Dr. Pauley provided the Monongahela National Forest maps identifying high and low potential habitat, known population locations and areas surveyed. There are 3,399 acres of low potential Cheat Mountain salamander habitat identified in Upper Williams watershed area.

Northern flying squirrel (*Glaucomys sabrinus fuscus*)– On July 31, 1985, USFWS listed Northern Flying Squirrel (NFS) *Glaucomys sabrinus fuscus* as endangered (50 CFR Part 17). The USFWS released the Appalachian Northern Flying Squirrel (*Glaucomys sabrinus fuscus) (Glaucomys sabrinus coloratus)* Recovery Plan on September 24, 1990 (USFWS 1990). A Recovery Plan Update was signed on September 6, 2001 which includes an Amendment to Appendix A; Guidelines for Habitat Identification and Management for *Glaucomys sabrinus fuscus* (USFWS 2001).

The amended guidelines stipulate two basic types of Northern Flying Squirrel habitat, suitable and unsuitable. Suitable NFS habitat is defined as areas that have habitat characteristics required by the squirrel as indicated by known capture locations. All mapped suitable habitat, as defined and displayed in the most recently reviewed map, is assumed potentially occupied by WVNFS, and emphasis would be placed on protecting this habitat. No projects or activities that would adversely affect suitable habitat on the MNF would be allowed unless authorized under Section 7 or, in the case of scientific permits, Section 10(a)(1)(A) (USFWS 2001). Unsuitable habitat does not currently have habitat components preferred by the WVNFS and must, therefore, be assumed to be unoccupied by WVNFS. Consequently, management activities planned in unsuitable habitat would not affect the WVNFS and would not require consultation or permits pursuant to the ESA (USFWS 2001).

To effectively delineate suitable WVNFS habitat, a map of suitable habitat within the Upper Williams watershed has been produced, reviewed and refined collaboratively among the Fish & Wildlife Service, the Monongahela National Forest and the WVDNR (USFWS 2001). Approximately 8,306 acres of suitable WV NFS habitat has been identified within Upper Williams Watershed.

Scope of the Analysis

The spatial boundary used for the assessment of direct, indirect and cumulative effects includes the Upper Williams watershed area. The spatial boundary also includes areas of influence around Tub Cave. The time period considered for direct effects is the duration of the road decommissioning and large woody debris recruitment activities. The time period of analysis of indirect and cumulative effects is approximately 5-10 years post-recruitment, when tree canopies of stands likely would be closed.

Methodology

The likelihood of occurrence of each threatened and endangered species and its potential habitat was determined for the Upper Williams project area (Appendix B). Likelihood of occurrence was based on habitat requirements, district files, Natural Heritage Section of the West Virginia Division of Natural Resources (WVDNR) records, research literature, various field surveys, and personal communication with species specialists. Conclusions drawn from the likelihood of occurrence table dictated the level of analysis needed for each threatened and endangered species (see information in the Affected Environment section). The potential effects of each alternative on species and their habitats were evaluated. Also considered was information presented in the **Biological Assessment for the new 2006 Forest Plan (USDA 2006) and the associated Biological Opinion (USFWS 2006).**

Direct/Indirect Environmental Consequences

Alternative 1 – No Action

Bald Eagle: There are no activities proposed that would directly affect the bald eagle or have adverse impacts to its foraging habitat along Williams River. As a result, there are no adverse effects anticipated to this species under Alternative 1.

Indiana Bat: With Alternative 1, no areas or potential habitat would be harvested or otherwise disturbed within suitable Indiana bat habitat. Usual road maintenance would continue unchanged. Therefore, implementation of Alternative 1 would have no direct or indirect effects on Indiana bat hibernacula, maternity sites, key areas, summer foraging and roosting habitat, or fall swarming and migratory habitat. Because no tree felling or other activity would occur, Alternative 1 would have no potential for take.

Virginia Big-Eared Bat: With Alternative 1, no areas or potential habitat would be harvested or otherwise disturbed. Usual road maintenance would continue unchanged. Therefore, implementation of Alternative 1 would have no direct or indirect effects on Virginia big-eared bat hibernacula, maternity colonies, or foraging habitat. Because no tree felling or other activity would occur, Alternative 1 would have no potential for take.

Cheat Mountain salamander: There would be no direct effect to Cheat Mountain salamander with Alternative 1. Indirectly, as stands mature and canopies close, there would be more moisture retained on the forest floor, providing more salamander habitat. In stands containing beech, beech bark disease would create additional dead/down woody debris on the forest floor, but would also temporarily increase light and temperature to the forest floor. Because no tree felling or other activity would occur, Alternative 1 would have no potential for take.

Northern flying squirrel: There is approximately 8,306 acres of suitable northern flying squirrel habitat within Upper Williams watershed. There would be no direct effect to northern flying squirrel with Alternative 1. The project area would continue to meet food and cover requirements for the squirrel. Indirectly, beech bark disease would create more snags and culls, however NFS seem to use leaf (drey) nests as heavily as available cavity dens. Under story spruce in areas of beech disease would be released allowing that habitat to mature more quickly without competition. Because no tree felling or other activity would occur, Alternative 1 would have no potential for take.

Direct and Indirect Effects of Alternative 2– Proposed Action
Indiana Bat - Hibernacula and Maternity Sites - There would be no direct, indirect or cumulative affects to Indiana bat hibernacula or maternity sites with implementation of any activities identified in Alternative 2 because there are no hibernacula or maternity sites within the Upper Williams watershed.

Indiana Bat Primary Range - As proposed, Alternative 2 includes approximately one acre of large woody debris recruitment activities within the 5-mile radius primary range. Tree felling activities would have the potential for take, whether they occur inside or outside the primary range. Alternative 2 includes one acre of large woody debris recruitment, 22.4 miles of road work, along with riparian planting, streambank stabilization, and aquatic fish passage improvement. Some of these activities require some degree of tree removal. While information gaps still exist, Romme et al. 1995 found that Indiana bats prefer to forage within upper forest canopy layers where overstory canopy cover ranges from 50-70%. All large woody debris recruitment activities proposed in Alternative 2 would not reduce forest canopies below this threshold.

Except for removing potential roost trees, large woody debris recruitment may indirectly benefit Indiana bats by reducing canopy closure to a more optimal level for Indiana bat foraging. Opening up canopy cover improves foraging as well as improved roosting conditions. These effects are short-term, because canopy closure occurs in approximately 5-10 years after the removal occurs. Damage to residual trees during felling can also improve roosting quality and quantity as damage areas turn to cavities and crevices are more likely to develop due to resulting pathogen and insect attack at the injury point.

Road decommissioning would have the same effects as large woody debris recruitment, as far as habitat removal. Roads would provide travel corridors and may also provide water sources if standing water collects on road surfaces.

Virginia big-eared bat: Implementation of Alternative 2 would not directly affect Virginia big-eared bat hibernacula or maternity caves within the Upper Williams watershed. Virginia big-eared bats use caves year around, although standing timber may be used for night roosts during foraging. There are no known hibernacula within the watershed and no reason to presume that Virginia big-eared bats using Izaak Walton Cave would need to travel the 35 miles required to forage specifically within the Upper Williams watershed area, therefore, there would be no direct effect on this species from large woody debris recruitment activities.

Cheat Mountain salamander: Activities proposed at an abandoned mine located along WR 33 are planned in low potential CMS habitat within the Upper Williams watershed area. Proposed activities would include ripping, seeding, and mulching the area once the road is decommissioned. Road management activities directly affect the forest floor and therefore have potential to harm or kill salamanders or change their habitat. These activities also may fragment CMS populations. These activities could create long term drought-like stressful conditions, which could cause desiccation or escape to underground retreats where food is scarce (Petrtanka et al. 1994).

Northern flying squirrel: Channel structure improvement activities involving large woody debris recruitment would open up a small portion the canopy layer along a 2 mile stretch of the Upper Williams River. Assuming 30 trees per mile, these activities would affect approximately one acre along the Black Mountain and Mountain Lick run areas of the Upper Williams watershed. The vegetation to be removed would consist primarily of large diameter hardwood species including, red maple, birch and buckeye. There are numerous large diameter conifer species available however, after informal consultation with the United States Fish and Wildlife Service it was determined that these species would not be selected for removal. Additional measures to exclude trees that could harbor potential nest (e.g. obvious cavities) would also be avoided. Therefore, the effects to the northern flying squirrel habitat are expected to be negligible.

Because the habitat to be affected by the large woody debris recruitment has very little potential to harbor northern flying squirrels, it is extremely unlikely that these activities would directly harm or kill individuals. Furthermore, if any potential nest trees need to be removed, they would be removed only between September 15 and April 1, when both adult and young northern flying squirrels are expected to be capable of avoiding removal activities.

There would be no direct, indirect or cumulative effects from road decommissioning or storage activities due to the small diameter limit (less than three inches dbh) of vegetation that would be cut for those activities.

Cumulative Effects

Alternative 1 – No Action

Alternative 1 would involve no action in addition to currently ongoing activities, so it would not contribute to the cumulative effects of past, present and reasonably foreseeable future actions.

Alternative 2 – Current Forest activities do not appear to be negatively affecting the single known bald eagle nest located on the east side of the Forest well away from the Upper Williams watershed area. Past and present management has been conducive enough to the eagle to have led to the increase and stabilization of the Monongahela National Forest populations. Cumulative effects to bald eagle habitat would be minimal since little management or disturbance would occur along shorelines. The large, easily visible nests minimize the potential that nests would be accidentally disturbed by management activities.

Approximately 88% of CMS populations within the Monongahela National Forest boundary, timber harvesting and other activities outside the Monongahela National Forest would have limited cumulative effects on CMS populations. Because most ground disturbing activities are avoided in occupied and high potential CMS habitat there would be no cumulative effects on this species within the Forest boundaries due to implementation of any action alternatives chosen.

Suitable Indiana bat roosting and foraging habitat would continue to predominate throughout the project area. On private land within the foraging circle, forest management is likely to continue to be the dominant land use, with scattered agricultural and residential development. The effects of these activities would vary. Some timber harvesting, both on National Forest and private land, could have beneficial effects on Indiana bat if it reduces canopy cover to the optimal range for foraging or roosting. Other timber harvesting could have adverse impacts by reducing canopy cover below the optimal range or by reducing the availability of potential roost trees. Alternative 2 as proposed would make a minor contribution to the cumulative effects of large woody debris recruitment in the Tub Cave primary range. Cumulative effects of incidental take associated with Alternative 2 are within the scale and scope addressed in the Biological Opinion and Incidental Take permit (USFWS 2006).

Forest wide, the majority of Virginia big-eared bat foraging habitat is on private lands and is in mixed habitats consisting of forests, pastures, and other agricultural uses. This habitat provides a variety of foraging opportunities for this species. Most activities that add to or maintain this habitat diversity would have a somewhat beneficial effect on Virginia big-eared bats. The contribution of the proposed action to cumulative effects at the forest-wide scale is not measurable in Upper Williams.

Because direct and indirect effects of the action alternative on northern flying squirrel habitat are expected to be negligible, any contribution to the cumulative effects of other actions on habitat is not expected to be measurable. Reasonably foreseeable timber harvest activities including the Upper Williams timber sale may disturb denning northern flying squirrels. The large woody debris recruitment activities included in the action alternative may make a small contribution to the cumulative amount of disturbance in the Upper Williams watershed. However, because of the low numbers of squirrels expected to be disturbed by the action alternative, any contribution to cumulative disturbance is not likely to be measurable at the scale of the entire watershed.

Sensitive Species – Terrestrial Animals

A Biological Evaluation (BE) was completed to determine the effects of the alternatives on Regional Forester's Sensitive Species (RFSS) for the Monongahela National Forest. This effects section summarizes the data on terrestrial animals. Aquatic animals are covered in the Aquatic resources section; terrestrial plants are covered in the plant section.

Affected Environment
Several terrestrial RFSS animals are known to occur within the project area, but surveys have not been conducted for all species on the RFSS list. Sensitive species have been grouped into habitat types for effects analysis.

Riparian/Stream Species
Numerous smaller intermittent and ephemeral streams occur throughout the project area. In particular, steep slopes, coves, and riparian areas would be considered sensitive from the standpoint of erosion, aquatic and riparian resource effects, and the potential to influence the hydrologic function of the watersheds and stream channels themselves.

Refer to the Water/Hydrology and Aquatic Resources sections for more detailed discussions of current resource conditions. The aquatic/riparian zones in the project area provide potential habitat for the following sensitive terrestrial animals:

Species	Limiting Factor
Eastern small footed bat	Disturbance to individuals or habitat
Southern water shrew	Disturbance to individuals or habitat
Hellbender	Disturbance to water quality
A tiger beetle	Disturbance to individuals or habitat
Bald eagle	Disturbance to individuals or habitat

Eastern Small-footed Bat: Eastern small-footed bats occur from Maine, Quebec, and Ontario southwestward through the Appalachian region to Arkansas and eastern Oklahoma. Eastern small-footed bats may hibernate close to summer roosting and maternity habitat (Whitaker and Hamilton 1999). Very little is known about their summer ecology. During this time, these bats are sometimes found in unusual roost sites such as under rocks on exposed ridges, in cracks in rock faces and outcrops, in bridge expansion joints, abandoned mines, buildings, and behind loose bark (Erdle and Hobson 2001).

Eastern small-footed bats forage over land and bodies of water (Wilson and Ruff 1999). Their diet includes flies and mosquitoes, true bugs, beetles, bees, wasps, ants and other insects (Harvey et al. 1999). They forage in and along wooded areas at and below canopy height, over streams and ponds and along cliffs and ledges (Erdle and Hobson 2001).

Little is known about their reproductive ecology. Available data suggests that females form small maternity colonies, and proximity to water may be a factor in selecting nursery sites (Erdle and Hobson 2001). The greatest threats to this bat are human disturbance and vandalism at maternity and hibernating sites. Other possible causes of bat population declines include natural disasters, loss of roosting sites due to sealing mine entrances, cave commercialism, chemical contamination, and loss of foraging habitat.

There are rock ledges on National Forest lands in the Upper Williams project area that would provide roosting sites for eastern small-footed bats. There are bridges in the area, along with riparian and woodland habitat. Small-footed bats may use the area for foraging; however, none were found during mist-netting activities within the watershed. Four areas within the Upper Williams project area were mist-net surveyed in the summer of 2006. A total of 65 bats were captured during these efforts. Bats captured included *Eptesicus fuscus, Lasiurus borealis, Lasiurus cinereus, Myotis lucifugus, Myotis septentrionalis, and Pipistrellus subflavus*.

Southern Water Shrew: Water shrews are typical animals of northern forests, or of Canadian and Hudsonian life-zone montane forests to the south. Specifically, southern water shrews range from the Appalachian Mountains of southern Pennsylvania to just north of Georgia. They most commonly occur along the edge of slow or swift flowing streams with rocks, crevices, and over hanging banks, with boulders, rocks, and woody debris present in the stream and streambed. The species inhabits both perennial and ephemeral streams (Beneski and Stinson 1987, Pagels et al. 1998). The riparian areas are typically in or near northern hardwood forests, often with the dominant trees being yellow and black birch, sugar maple, red maple, black cherry, American beech, and eastern hemlock (Pagels et al 1998). Water shrews have also been captured in sphagnum swamps, beaver pond meadows and grass/sedge marshes (Whitaker and Hamilton 1999). Water shrews are seldom found far from water and feed extensively on immature stages of aquatic insects.

Southern water shrews are difficult to capture, which has made this a difficult species to monitor. It may be more abundant within its range than records indicate (Whitaker and Hamilton 1999). Riparian areas in the Upper Williams project area provide potential habitat for southern water shrew, though specific surveys for southern water shrew were not conducted.

Hellbender: The hellbender, (*Cryptobranchus allegeniensis*), is found from southern NY, through PA, southeastern OH, WV, and KY to northern GA and AL (Green and Pauley 1987, Petranka 1998).

Hellbenders inhabit cool, clear, fast-flowing permanent streams below 2500 ft. in elevation. These salamanders spend much of their time under large, flat rocks and logs in streambeds and emerge at night to forage along river and stream bottoms (Green and Pauley 1987, Wilson 1995, Petranka 1998). Crayfish make up a majority of the hellbenders diet, with fish, aquatic insects, other salamanders, and earthworms being of secondary importance (Green and Pauley 1987, Wilson 1995, Petranka 1998). Extraneous matter such as leaves, pebbles, and sticks may occur in stomach contents of hellbender, perhaps due to the fact these salamanders forage along stream and river bottoms (Green and Pauley 1987).

Hellbenders do not reach sexual maturity until they are 4-8 years old (Wilson 1995, Petranka 1998). Breeding season for hellbenders begins in August and continues into September. Egg lying occurs from late August to early November. The males excavate a nest under a flat rock or log in the stream, where the female lays more than 400 eggs (Green and Pauley 1987). The eggs are guarded by the male, and hatch in approximately 6 weeks (Wilson 1995).

Hellbenders are rare range-wide, but can be locally common in some streams. Hellbenders cannot reproduce successfully in streams experiencing siltation or general pollution. Excessive, long-term sedimentation covers the loose rock and gravel, thereby destroying nest sites, protective cover, and food sources for the hellbender. Thermal pollution also has a negative effect on this species. Streams become unsuitable for hellbenders if the water temperature rises above 20º C (68º F). There have been no specific hellbender surveys conducted within the watershed, however, the Upper Williams project area provides potential habitat for the hellbenders.

Tiger Beetle: This species inhabits dry sandy banks and islands along major rivers in West Virginia from the Allegheny Mountains eastward. It is usually found in dry, sandy openings among sparse vegetation above the river shoreline (Allen and Acciavatti 2002).This species has a two-year life cycle, over-wintering the first year as a mature larva and the second year as an adult. Newly emerged adults become active in late summer to early fall, feeding for a brief period, before hibernating in the soil over winter. They become active again during April through June to mate and lay eggs; they die by early summer. Riparian areas in Upper Williams provide potential habitat for tiger beetle. Specific insect surveys were not conducted within the watershed.

Bald Eagle: On July 12, 1995, the United States Fish and Wildlife Service (USFWS) reclassified the bald eagle from endangered to threatened throughout the lower 48 states of the U.S. In March 1998, the USFWS announced plans to analyze information to determine if the bald eagle should be de-listed. In July 1999 the USFWS proposed de-listing the bald eagle. The USFWS announced they have removed the bald eagle from their list of Threatened and Endangered speies. On July 9 2007, a Notice of Action was published in the Federal Register and making the effective date August 8, 2007.
Bald eagles are closely associated with large bodies of water with abundant fish populations during both the breeding and non-breeding season (DeGraaf et al. 1991, DeGraaf and Yamasaki 2001). During the breeding season, bald eagles appear to prefer large lakes, rivers, or estuaries in open areas adjacent to forests (DeGraaf and Yamasaki 2001). Nest trees are large, dominant trees, with an unobstructed flight path to the nest (McEwan and Hirth 1979, Anthony and Isaacs 1989). Andrew and Mosher (1982) found that nesting eagles in Maryland selected nest trees in forested areas with an open, mature structure located in close proximity to water. Eagles in West Virginia appear to select similar habitats; known bald eagle nests in West Virginia occur along major rivers.

Eagles forage along rivers, large streams and lakes, where they perch in trees near the waters' edge and wait for fish or waterfowl to come along. The bald eagle's diet consists of fish, waterfowl and other birds, carrion, small- to medium-sized mammals, and turtles (DeGraaf et al 1991), however the percentage comprised by each one of these food items may vary regionally. Todd et al (1982) found that fish comprised 57% of the diet for eagles nesting inland, whereas eagles nesting in coastal regions relied more heavily on fish (76%). It is possible that bald eagles may be seen during migration along the Upper

Williams River, however there are no known nests within or near the project area. There are no activities proposed that would directly affect bald eagle or have adverse impacts to available foraging habitat along Upper Williams. As a result, there are no adverse effects anticipated to this species under the action alternative.

Direct/Indirect/Cumulative Effects
Activities that disturb soils can increase stream sedimentation and lead to various forms of aquatic habitat degradation. Soil disturbing activity can have direct, indirect, and cumulative effects on aquatic and riparian resources and these effects can be variable in terms of the extent and duration of effects. Soil disturbing activities associated with the action alternative include road decommissioning and storage activities, aquatic passage improvement activities, bank stabilization activities riparian planting and channel structure improvement activities.

Timber harvesting can affect watershed processes that are important to maintaining the health of many aquatic and riparian dependent communities. Extensive timber harvesting and associated activities throughout a watershed can affect stream flow conditions, particularly storm flow and peak flow characteristics during the growing season. However, due to the management direction for soil and water within the Forest Plan and the limited amount of large woody debris recruitment associated with the project the action alternative may impact individuals but are not likely to cause a trend toward federal listing or a loss of viability for the sensitive species inhabiting riparian/stream areas.

Mature Forest Species
The age class distribution in the project area is somewhat typical of the entire Monongahela National Forest in that about half of the area is in stands between 70-100 years old. The mature forest in the project area provides potential habitat for the following sensitive terrestrial animals:

Species	**Limiting factor**
Diana fritillary	Insecticide application
Green salamander	Disturbance to habitat
Timber rattlesnake	Disturbance during hibernation and direct killing of individuals
Eastern small footed bat	Disturbance during hibernation

Diana Fritillary: The Diana fritillary is a southern Appalachian species that ranges from Virginia and West Virginia south to northern Georgia and Alabama. The Diana is found in West Virginia in the southern third of the state, south from lower Pocahontas County and west to Kanawha and Lincoln Counties. The species may also occur occasionally in other surrounding counties, as well as the southern counties, with no records to date. The Diana fritillary is a forest species inhabiting mountainous areas in West Virginia. It prefers moist and well-shaded forest covers with rich soils. The butterfly uses small openings and roadsides in search of nectar plants but would not stray far from the woods (Allen 1997).

Milkweeds and thistles are the preferred nectar plants. They would also use butterfly weed and swamp milkweed. Later in the season, wild bergamot, Joe-pye weed and ironweed are the common plants selected. As with other *Speyeria*, woodland violets serve as host plants for Diana in West Virginia (Allen 1997).

This species is known to occur within Pocahontas County and the plant species listed as nectar sources and host plants do occur within Upper Williams project area.

Green Salamander: The range of the green salamander extends from southwestern Pennsylvania, western Maryland, and southern Ohio to central Alabama and northeastern Mississippi. Preferred habitat for the Green salamander is crevices in well shaded and moist, but not wet, rock faces in mesophytic forests. Because of their microhabitat preferences, green salamanders probably do not compete with other salamanders that restrict their activity to the forest floor. Green salamanders can occasionally be found under logs and loose bark on trees in the absence of suitable rock formations (Green and Pauley 1987, Petranka 1998, Wilson, 1995). Green salamanders have also been found in upland pine forests (Virginia pine, white pine and eastern hemlock) with a mountain laurel understory (Wilson 1995). The unique habitat of the green salamander may be the limiting factor for this species. Suitable habitat is patchily distributed; therefore the salamander is generally uncommon throughout its range (Petranka 1998). Timbering in the immediate vicinity of rock outcrops dries crevices used for foraging and nesting and can lead to the extinction of local populations.

There are rock formations within Upper Williams project area. Green salamanders are also known to occur under rotting bark and logs. Both these habitat types can be found within the project area. Green salamander surveys were not conducted in the project area.

Timber Rattlesnake: The timber rattlesnake was once widespread, but due to hunting and disturbance of winter dens, remaining populations are restricted primarily to mountainous areas that have suitable denning areas for winter hibernation, and rocky ledges on south facing slopes for basking and nursery areas. Forested areas consisting of second-growth deciduous or coniferous forests with high rodent populations provide excellent habitat for this species (DeGraaf and Yamasaki 2001), and rocky areas with southern exposure allow maximum exposure to the sun during the spring and fall (Green and Pauley 1987, Mitchell 1994, Wilson 1995). Timber rattlesnakes return to the same den site each year during October (Mitchell 1994, Martin 1999).

After emergence in the spring (April-May), rattlesnakes remain close to the den until after shedding (Galligan and Dunson 1979). Brown (1993) recognized the importance of "transient habitat", a habitat that is distinct from the den and summer-range habitat. This habitat is usually within 650 ft. of the den site, and largely consists of more open, grassy woodlands with numerous rocky surfaces.

Gravid (pregnant) females preferred forested sites with approximately 25% canopy cover, equal amounts of leaf litter and vegetation covering the ground surface, large amounts of coarse woody debris, and overall warmer microclimate then males and non-gravid females (Reinert and Zappalorti 1988). Male timber rattlesnakes have large home ranges and may travel over two miles from the den in the summer (Martin 1982), although most timber rattlesnakes travel no further then a mile from the den during the summer (Galligan and Dunson 1979, Martin 1982). Outside of the winter den, males and non-gravid females prefer forested habitat with >50% canopy closure, thick ground and shrub vegetation (approximately 75%), and low coarse woody debris cover (Reinert and Zappalorti 1988).

The diet of the timber rattlesnake primarily consists of small mammals such as mice and voles, squirrels, chipmunks, rabbits, bats, songbirds, frogs, and other snakes (Keenlyne 1972, Mitchell 1994, Degraaf and Yamasaki 2001).

In the Appalachian Mountains, mating occurs in the late summer (August-September), and ovulation takes place in late May and early July the following year. The gestation period is 5½ to 6 months, and 6 to 17 young are born in late August- October (Galligan and Dunson 1979, Brown 1993, Martin 1999). Timber rattlesnakes in the Appalachian Mountains do not reproduce every year, rather reproductive intervals ranged from 2-4 years with the proportion of reproductive females varying from 31-80% annually (Martin 1992, Brown 1993, Martin 1999). Timber rattlesnake reproduction is highly dependent on the fat store of the females. Low reproduction may occur in years with low temperatures, high cloud cover, or low small mammal populations (Martin 1999).

The primary causes of timber rattlesnake population declines are snake hunting resulting in the destruction of den sites and removal of timber rattlesnakes from winter dens by humans (Galligan and Dunson 1979, Mitchell 1994). Martin (1992) states that summertime snake hunting is by far the biggest factor in the extirpation and reduction of timber rattlesnake populations. Additionally, the prolonged mate searching by male rattlesnakes results in increased movements and thus greater exposure to predators and vehicles during the late summer mating season, leading to higher mortality during these months (Aldridge and Brown 1995).

Specific timber rattlesnake surveys were not conducted. There are no known den sites located within the Upper Williams project area, but rattlesnakes can be found almost anywhere within the Monongahela National Forest, so suitable timber rattlesnake habitat may exist within the project area.

Eastern Small-footed Bat: See discussion above under Riparian Species.

Direct/Indirect/Cumulative Effects

Large woody debris recruitment would have no direct or indirect effects on Timber Rattlesnakes or Diana Fritillary because the large woody debris recruitment would occur in areas that are not proper habitat for either species at this time. The direct effect of large woody debris recruitment on green salamanders would be the possibility of nest site destruction from individual tree felling. However due to the removal of these trees from

September 15 through March 31st any reproduction would have already taken place and any effects would be negligible.

The direct effects of 22.4 miles of road decommissioning and storage would be the temporary creation suitable roadside habitat for the Diana fritillary. During decommissioning and storage activities, some larval stages of Diana fritillary, as well as individual timber rattle snakes, could be run over and killed if this work is done in the late spring and early summer. Indirectly, this road work would benefit Diana fritillary.

No indirect or direct effects to green salamanders would occur during road decommissioning activities because this species is not found along or adjacent to road corridors.

Disturbed Habitat Species
Disturbed habitats within the project area include young timber stands, landings and roadsides that provide either exposed soils, grass/forbs or seedling/sapling seral stages that allow more light to reach the under-story than does a forested stand. Disturbed areas in the Upper Williams project area provide potential habitat for the following sensitive species:

Species	Limiting factor
Timber rattlesnake	Disturbance during hibernation and direct killing of individuals
Diana fritillary	Disturbance to individuals or lack of suitable habitat
Barren's Tiger beetle	Disturbance to individuals or lack of suitable habitat

Timber Rattlesnake: See discussion above under Mature Forest Species.

Diana Fritillary: See discussion above under Mature Forest Species.

Barren's Tiger Beetle: This species has a two-year life cycle, over-wintering the first year as a mature larva and the second year as an adult. Adults emerge in September and can be encountered for a short time in the fall before hibernation. The following spring they are usually more abundant when they emerge to feed and reproduce. Adults die during early summer, following reproduction.

Adults occur on dry sandy soils with sparse vegetation, such as mosses, lichens and low forbs where sandstone strata create natural forest openings. They can also be found in open areas of sparse vegetation in a variety of woodland habitats consisting of trails, along woodland roads, gas well sites, power and gas line rights-of-way, road banks, and at the edges of abandoned sandstone quarries. This species ranges across the northern portions of the central and eastern US southward into Georgia (Allen and Acciavatti 2002). Woodland habitat, roads, road banks and openings can be found within Upper Williams project area.

Direct/Indirect/Cumulative Effects
Direct effects due to large woody debris recruitment activities and road management activities on timber rattlesnakes, Diana fritillary and Baren's tiger beetle include direct crushing of individuals, collisions with vehicles, purposeful killing of individuals (timber rattlesnakes in particular) or permanent removal of territories while management activities are taking place.

Road decommissioning and road storage activities disturb the ground through ripping, scouring and contouring the road grade. Indirectly, these activities could create temporary open habitat for the Barren's tiger beetle, however these activities would be temporary in nature until the road edge reverts back to its original form.

The action alternative would not result in the loss or viability of any species associated with disturbed habitats types.

Rocky Habitat Species
Allegheny woodrat: Allegheny woodrats live almost exclusively in rocky areas such as caves, deep crevices, and large boulder fields. Most woodrat dwellings are located in or around hardwood forests that have an abundance of oaks and other mast-bearing trees. The woodrat is also known to occur in northern hardwood (beech, birch, maple) and oak-pine forests. Woodrats are seldom found in agricultural or residential areas. Woodrats are herbivores: they rely almost exclusively on plant materials for their food. Among their favorite foods are acorns and other nuts, berries, twigs, leaves and fungi. Occasionally they may feed on snails, insects or other invertebrates. In autumn woodrats habitually cache (store) large quantities of acorns, twigs, leaves, and other edible vegetation to ensure a constant food supply throughout the winter months

Scientists have identified several factors that may be contributing to the decline of the Allegheny woodrat. Some cite the gypsy moth, which has been spreading south into the oak forests where woodrats live, as the culprit. Defoliation by gypsy moth larvae can severely weaken oak trees, reducing the acorn crops on which woodrats rely for food in the winter. A second threat to the woodrat is a parasite, the raccoon roundworm (Baylisascaris procyonis), that is carried by raccoons. The raccoon roundworm, which does not severely harm raccoons, causes death in woodrats by attacking their central nervous systems. With their tendency to collect debris, including the scats of other animals, woodrats are especially susceptible to contracting this disease from raccoon feces. Habitat degradation and fragmentation may also be playing a role in the woodrat's decline throughout much of its range. Because of their tendency to inhabit remote places, woodrats generally have not been severely impacted by human activities.

Southern rock vole: Rock voles are specialized in their habitat selection and occupy cool, moist, rocky, northern hardwoods and mixed deciduous-coniferous forests dominated by yellow birch, sugar maple and beech. Voles live among mossy rocks and boulders in forests with moderately open canopies and rich herbaceous understory. Water, either in the form of surface or subsurface streams is a key habitat component.

Their primary food source is bunchberry (Cornus Canadensis), however their diet also includes wood sorrel, mosses, and ferns (Tucholska 2001).

DIRECT/INDIRECT/CUMULATIVE EFFECTS

Large woody debris recruitment could cause direct disturbance as the removal of trees on or near outcrops increases sunlight and winds, changing the microclimate of the rocky areas. This would cause an increase in ground vegetation and a general drying effect. However, due to the limited amount of effected habitat within the action area, the effects of this activity are considered negligible

The other remaining proposed activities, outlined in Chapter 2 of the EA document, would have no effect on either the Allegheny woodrat or the Southern rock vole due to their habitat requirements.

The action alternative would not result in loss of viability for any species associated with rocky habitat types.

Social Environment

HERITAGE RESOURCES

The physical setting and Heritage Resources were originally addressed in the Upper Williams River Watershed Assessment and Upper Williams Timber Sale Environmental Analysis.

AFFECTED ENVIRONMENT

Previous Survey Information: A total of seventeen Heritage Resource surveys, approximately 18,700 acres, have been conducted either wholly or partially within the current analysis area between 1982 and 2001. These surveys provided total coverage for the area of the watershed planned to be affected by all the alternative actions. Information on these surveys is shown in Table 3.9. This previous survey data indicates that all the heritage surveys were project-driven. Surveys have been conducted primarily for timber sales (n=11), followed in order of importance by trails, roads, and lands issues.

Table 3.9. Previous Cultural Resources Surveys in the Upper Williams Watershed Assessment Area.

Project Name	Total Acres Surveyed	Total Sites Identified	Sites Identified in Current Project Area
Little Laurel Timber Sale	290	0	0
Big Spruce Timber Sale	625	2	2

Table 3.9. Previous Cultural Resources Surveys in the Upper Williams Watershed Assessment Area.

Project Name	Total Acres Surveyed	Total Sites Identified	Sites Identified in Current Project Area
Mountain Lick Timber Sale	553	2	2
Big Spruce II Timber Sale	223	1	1
Swago Mountain Mine Prop Sale	10	0	0
Big Spruce Land Exchange	735	5	5
Log Landing on Forest Road 437	1	0	0
Black Mountain Timber Sale	778	0	0
Williams River West OA	5,745	5	5
Friel Run Timber Sale	82	2	2
Woodrow OA	2,633	3	3
Black Mountain Run Trail Construction	20	1	1
Highland Scenic Highway OA	3,448	5	0
Woodrow OA West	323	11	11
Williams River East OA	3,156	1	1
Tea Creek Trails	75	9	2
Red Spruce Trail	1	0	0
Totals	**18,698**	**47**	**35**

Previous Site Data: In addition to the thirty-five sites identified through project-related surveys, ten more were recorded by the Culture Resources Overview in 1978, or were encountered by chance in the field. A total of forty-five heritage resources have been recorded in the Upper Williams Watershed Assessment Area. Of these, seventeen represent the remains of prehistoric resource exploitation and/or habitation, while twenty-seven represent Euro-American historic period activities; one represents multicomponent prehistoric/early 20th century deposits. In the project file, is a table that presents information on each of these sites. Sites are presented numerically without reference to specific physical locations. Such locations would be made available to Forest personnel as part of planning for specific management actions.

Prehistoric and Historic Patterns: The project area holds a very high probability for containing numerous prehistoric resources owing to its location just west of the edge of the Greenbrier Limestone formation, in which high-quality chert is often found. Research conducted on some prehistoric sites in the project area indicates Early and Late Archaic utilization of the resources in the area. The dated prehistoric sites are all open-air occupations; this is not necessarily surprising given the apparent dearth of rockshelters in the vicinity.

The results of archaeological surveys indicate that historic period activity in the area was relatively balanced between commercial resource extraction activities and human settlement. Of the twenty-eight historic period sites or components, eleven are logging/railroad-related, while seven were permanent Euro-American homesites. Of the remaining ten, seven are unidentified structures, while the rest consist of a CCC camp, an improved spring, and an isolated find. The historic period occupation of the immediate area was, and continues to be, focused on the area along the Greenbrier River and its tributaries, including Marlinton and nearby communities.

The vast majority of the project area has felt the impact of human use. Forest species age and diversity, wildlife populations, stream profiles, soils, viewsheds, fragmentation/openings ratios, and the demographic profile of the area (Indian-to-colonial; low-to-moderate population density) all changed between the 18th and early 20th centuries. Some of these changes were dramatic.

There are numerous sites and features left on the landscape; they are the correlates to the standing architecture and functional outbuildings of the historic economy. We would therefore expect the remains of communities, houses, barns, outbuildings, mills, blacksmith shops, schools, logging camps, mining structures, etc. Also, the footprints of transportation systems, and vegetative "artifacts" in the form of complete and partial cultural landscapes (apple orchards, pine plantations, sugar bushes, openings, and more) would likely be located. Their distribution is heavily biased toward the main transportation arteries

National Register Eligibility – Status and Protection: Ten of the eighteen prehistoric sites or components located in the project area have been evaluated for their eligibility for inclusion in the National Register of Historic Places. Three of these sites were found to retain sufficient integrity and research potential to provide important information regarding the prehistoric occupation of the area. They are therefore eligible for placement on the National Register and would be protected during project implementation. Seven sites were determined to be not eligible and do not need to be protected during project implementation. The remaining eight have not been evaluated and, until such time as they are evaluated, would be managed as though they are eligible.

Of the twenty-eight historic period sites or components located in the project area, ten have been evaluated for eligibility for inclusion in the National Register of Historic Places. All ten were determined to be not eligible and are therefore does not require protection. The remaining nineteen, however, since they remain unevaluated and their status is unknown, may therefore be eligible. Until such time as they are evaluated, these sites would be treated as if they were eligible and would be protected during project implementation.

Environmental Consequences

No Action – Alternative 1

From the perspective of Heritage Resources protection, the No Action alternative would provide protection to cultural resources, as no additional erosion or soil disturbance would occur.

Alternative 2

An examination of the watershed improvement activities proposed in the Upper Williams project area reveals that minimal project impacts would occur. Project activities would occur adjacent to or proximate to site locations. Such activities include riparian planting, woods roads conversion and road storage. None of these activities, however, would have any adverse effects to cultural resources.

Cumulative Effects

The foreseeable affects of implementing the watershed improvement projects would not adversely effect heritage resources. Continued management of the Upper Williams River Watershed for timber and wildlife purposes would lead to heavier pedestrian and vehicular use of the landscape. Consequently, more individuals would become aware of site locations, thereby exposing them to potential vandalism and loss of scientific information.

FOREST PLAN AND STATUTORY CONSISTENCY

Forest Goal XVI provides for the protection of cultural resources on the Forest, as does direction in Appendix Q of the Forest Plan. Executive Order 11593, promulgated in 1971, instructs that all archaeological resources on Federal land are to be evaluated, while the 1988 amendment to the Archaeological Resources Protection Act (16 USC 470 mm) instructs federal land-managing agencies to develop and implement a plan for archaeological survey and evaluation. Provided that National Register eligible sites are avoided or mitigated, and unevaluated sites are avoided or evaluated and appropriate management taken, then action alternative is consistent with the Forest Plan and legal statute. The proposed action is consistent with following laws, regulations, and authorities:

Antiquities Act of 1906 (16 USC 431-433)
Historic Sites Act of 1935 (16 USC 461-467)

National Historic Preservation Act of 1966 (16 USC 470)
National Environmental Policy Act (42 USC 4321-4347)
Archaeological Resources Protection Act of 1979 (16 USC 470)
Archaeological and Historical Conservation Act of 1974 (16 USC 469)
Executive Order 11593
FSM 2361

Recreation

AFFECTED ENVIRONMENT

Developed Recreation Sites
Day Run Campground, numerous dispersed campsites, and a group campsite are located within the watershed. Tea Creek Campground is located about a mile downstream from the watershed boundary. Campers from Tea Creek are consistent users (hunting, fishing, hiking, biking) of the Upper Williams River area. An accessible fishing pier is located near the junction of the Highland Scenic Highway and F.R. 86.

Dispersed Recreation
Fishing, trail use, driving for pleasure, and hunting, are the primary recreation activities within this watershed.

The Williams River is stocked several times a year with hatchery trout. Fishing activity is highest during the spring months, then drops considerably during the summer, and increases during the fall months. This activity is well dispersed through the Williams River corridor, however the section known as the Deadwaters, located upstream from the Scenic Highway bridge, is especially popular.

Trails in the watershed are well used. Eight miles of non-motorized trails are located within the watershed. This includes the Tea Creek Mountain Trail, one of the more popular mountain bike routes, and the Williams River Trail, which is very popular with anglers.

The Highland Scenic Highway, a designated National Scenic Byway, is located within the watershed. Also, the Williams River Road - a State Backway, begins within the watershed. These routes are popular scenic drives, and provide access to recreation lands within and adjacent to the Upper Williams Watershed. Three overlook parking lots on the Scenic Highway provide broad vistas of the watershed. A boardwalk, observation deck and interpretive trail are located adjacent to the Big Spruce Overlook.

Hunting occurs throughout the watershed area. Roads and trails within the watershed help distribute this use. Two roads, FR 461 and FR 999, are open seasonally for deer hunting.

Wild and Scenic Rivers
A segment of the Williams River is eligible for Wild and Scenic River status, with a classification of Recreational; defined as containing the "remarkable values" of scenery and recreation. The entire section of the river within this watershed fits this classification. The Forest plan directs that the river corridor, generally described as one-quarter mile from each bank, shall be managed to maintain the characteristics that made the river eligible for classification.

Wilderness and Roadless Areas
There are no federally designated wildernesses within the Upper Williams Analysis Area. The Cranberry Wilderness borders the project area to the west. The Highland Scenic Highway separates the analysis area from the wilderness.

There is no Inventoried Roadless or Roadless Area Conservation Rule Areas located within the analysis area.

DIRECT AND INDIRECT EFFECTS OF ALTERNATIVES

Under Alternative 1, there would be no direct effects to the recreation resource or recreational activities within the project area. However in the long term, water quality and the related fishery resource could decline if road-related problems were left unmanaged, resulting in a reduction of fishing opportunities.

Alternative 2, the proposed action, includes a few activities that could potentially affect recreation use within the watershed area. These activities and effects include:

Road Decommissioning – The proposed decommissioning of FR 171 would necessitate temporary closure of campsite #30 on the Williams River. This campsite is located at the entrance to this road, so the site would be closed to public use for the duration of the road-decommissioning project, to provide for public safety. The landowner and permittee would require notification and coordination, to reduce the impact to their activities. Warning signs would be posted on open Forest Service roads adjacent to roads that would be decommissioned and stored.

The long-term effect of road decommissioning projects would be positive, as related to dispersed recreational use within the watershed area. Decommissioned roads would eventually become more natural appearing, thereby enhancing the experience for people seeking a more primitive dispersed recreation setting.

Aquatic Passage Improvement – Two proposals to replace existing road structures would have a short-term effect of recreational use. The planned culvert replacement project at Black Mountain Run on FR 216 is adjacent to campsite #29. This campsite would be closed to public use for the duration of this project, to provide for public safety. Public vehicular use of FR 216 would be restricted or prohibited during this project. Traffic would likely be temporarily rerouted to FR 437, FR 86, and the Scenic Highway. This may shift some recreational use, especially fishing and camping activity, to other areas of the Forest.

The planned project to replace the low-water bridge on FR 999 would require temporary closure of this road. FR 999 is normally open to public traffic during the deer gun season thru December 31 each year. Hunters who normally travel this road would be displaced for the duration of this project. FR 999 also serves as the primary access to private lands on Day Mountain, and a grazing allotment.

Channel Structure Improvement and Bank Stabilization – These activities are planned along Mountain Lick and Black Mountain Runs, and the Williams River. These projects would temporarily disturb and possibly displace anglers on these streams, although the likely duration of project work at any given site would be very short term. The channel structure improvement activity would occur during the fall and winter months, thereby avoiding the popular spring fishing season.

The long-term effect of these activities would improve the stream habitat, thereby improving the fishery and related recreational uses of these streams.

Wild and Scenic River (W&SR) Status – Planned activities within the river corridor include development of channel structures, fish passage improvement, riparian area plantings, and the recruitment of large woody debris. These projects would help improve water quality and stream habitat within the corridor, which would enhance the recreation value of this watershed. These activities are compatible with the guidance for the Recreational classification contained in the W&SR Act. The W&SR classification (Recreation) for the Williams River would not be adversely affected by any of the proposed projects.

Activities like road decommissioning, road storage, and channel structure improvements could pose a safety hazard. Also, the directional felling of trees into stream channels to improve channel structure may be a safety hazard.

Cumulative Effects

The most recent activities related to the recreation resource were the paving of the Williams River Road, including a short section completed in this project area in 2004, and improvement of dispersed campsites scattered along the river corridor upstream from the Scenic Highway. The paving project occurred during the summer months, and created a short-term inconvenience to people who were traveling this route.

No other recreation related projects are ongoing, and no projects are planned at this time within the project area.

There are no known or expected activities occurring on private lands within the project area that would have an effect on the recreational resource within the Upper Williams area.

The Handley Public Hunting and Fishing Area are located within this watershed. There are no known activities in the Handley area that would affect the recreational resource within this watershed. However, recreational users who may be temporarily displaced from National Forest lands, would find very similar resources and recreational activities available at the Handley area.

Safety

The proposed action includes mitigation to close campground 30 during the decommissioning of FR 171 to eliminate possible interaction of members of the public with heavy equipment. Therefore, the safety of the public is protected as much as possible.

Environmental Justice

Resource Impacts Addressed

This section summarizes the results of the analysis the Forest completed to assess the impacts of proposed activities on minority and low income populations per Executive Order 12898.

Affected Environment

There are no known community-identified environmental justice related issues. Recent data indicate that Pocahontas County, the county in which the Upper Williams Watershed Improvement project area is located, does not demonstrate ethnic populations or low income percentages greater than two times that of the State average (U.S. Census Bureau, Census 2000). The same holds true for Greenbrier County, Pocahontas County, and Randolph County, the other counties with land in the Marlinton Ranger District.

Scope of the Analysis

The counties in which the Marlinton Ranger District is located were considered in the scope of the analysis. Marlinton, in particular, was considered since it is the nearest town (and census area) to the project area. The temporal boundary considered was five years from the date of initiation of project implementation. Other post project activities, such as monitoring, may continue for approximately five years after the completion of the project, but effects would be negligible.

Methodology

The potential for Environmental Justice effects was evaluated by using demographic and income data from the 2000 U.S. Census. Demographic data for Webster, Randolph, Greenbrier, and Pocahontas Counties were compared to the data for West Virginia. Income data for Webster, Nicholas, Pocahontas, and Greenbrier Counties and the town of Marlinton was compared to that of West Virginia. The minority populations in all four counties are lower than the state average. None of the towns or counties evaluated has low income percentages greater than two times the state average.

Direct/Indirect Environmental Consequences of All Alternatives

None of the alternatives would pose disproportionately high or adverse impacts on minority or low income populations, because these populations in Pocahontas County and the other counties with lands in the Marlinton Ranger District are not greater than two times that of the State average. Affected communities have been provided opportunities to comment during the planning process (see Public Involvement section in Chapter 2).

Cumulative Impacts
No past, present, or future actions previously identified in this chapter are expected to contribute cumulative disproportionately high or adverse impact on minority or low income populations.

Unavoidable Adverse Impacts
None of the alternatives would result in unavoidable adverse impacts.

Irreversible or Irretrievable Commitment of Resources
None of the Upper Williams Watershed Improvement activities would result in irreversible or irretrievable commitment of resources as it relates to environmental justice.

Consistency with the Forest Plan
All the Upper Williams Watershed Improvement alternatives would be consistent with the Forest Plan (Forest Plan, pp. I-8, I-10).

Other Required Disclosures

Unavoidable Adverse Effects
There would be unavoidable impacts with both alternatives. These are discussed in depth above and are related to the Heritage, Recreation, and to a smaller extent soils, aquatics, and wildlife.

Short-Term Use vs. Long-Term Productivity
There would be a short-term change in the productivity of the FS managed lands during the implementation of the proposed activities. However, the long-term productivity of FS managed land would eventually return. This return to productivity would vary amongst each of the different resources.

Irreversible or Irretrievable Commitment of Resources
Irreversible and irretrievable commitments of resources are defined in Forest Service Handbook 1909.15, Environmental Policy and Procedures (9/21/92).

Irreversible commitments of resources mean the consumption or destruction of nonrenewable resources, such as minerals or cultural resources, or the degradation of resources such as soil productivity, which can be renewed only over long periods of time.

Irretrievable commitments of resources are opportunities foregone; they represent tradeoffs in the use and management of Forest resources. Irretrievable commitments of resources include expenditure of funds, loss of production, or restrictions on resource use. When one alternative produces less of a natural resource (such as timber volume) or offers fewer opportunities for use (such as motorized recreation) than another alternative, the difference represents an irretrievable commitment of resources.

There would be no irreversible or irretrievable commitment of resources. There is no transfer of management direction (i.e. changes in management areas).

Energy Requirements and Conservation Potential

This proposal is not expected to change any requirements for energy nor have any potential for conservation of energy.

Prime Farmland, Rangeland, and Forestland

There is no prime farmland in the project area. There is prime rangeland and forestland in this project area

Effects on the Human Environment

Effects on the human environment are documented throughout Chapter 3 of this EA. Further documentation can be found in the project record.

Threatened and Endangered Species

Potential effects to species listed under the Endangered Species Act can be found in Chapter 3 of this EA (Threatened and Endangered Species section) and in the specialist reports in the Project File. Prior to making a final decision, consultation with U.S. Fish and Wildlife would be concluded.

Wetlands and Floodplains

There are wetlands or floodplains that would be impacted on National Forest System lands.

Conflicts with Other Agency or Government Goals or Objectives

Contact, review, and public involvement with other federal and state agencies have indicated no major conflicts between this project and the goals and objectives of other governmental entities.