Chapter 3 – Environmental Effects

Introduction

This chapter summarizes the existing condition of physical, biological, and social resources in the Cherry River area and explains how they may be affected by Cherry River alternatives. It describes the direct, indirect, and cumulative environmental consequences of implementing proposed alternatives (40 CFR 1508.7-1508.8). Direct effects are those environmental consequences that are caused by the action and occur at the same time and place. Indirect effects are the environmental consequences that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative effects are the consequences to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the other actions. The methodologies used to evaluate effects are briefly mentioned in each section. More details may be found in resource reports in the project file.

Past, Present, and Reasonably Foreseeable Future Actions

The actions listed in the following table are activities of the Forest Service and other entities that have occurred within or around the Cherry River project area in the past, are currently being implemented, or may be implemented in the reasonably foreseeable future. All or only some of these actions may contribute cumulatively to the effects of Cherry River activities depending on the resource affected.

Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within or around the Cherry River project area.

Action	Past	Present	Reasonably Foreseeable
Timber harvesting within the Cherry River at the turn of the 20th century, prior to federal ownership.	x		
Crop tree release on about 335 acres in the 1980s	x		
Vine cutting treatments since 1980 on about 1110 acres (These treatments were not designed to cut all vines, and some were repeat treatments on the same acreage.)			
Forest Service timber harvest 30 to 40 years ago on about 225 acres.	x		
Forest Service timber harvest between 1983 and 1986 within the project area on about 468 acres (some of this harvest was public firewood sales).	x		
Holcomb Run Timber Sale, completed in 1997 by the Forest Service (FS) within the project area with 254 acres harvested in Compartment 61.	x		
Curtin Run Timber Sale, completed in 1998 (FS) within the project area with 258 acres harvested within Compartment 48.	x		
Jakeman Run Timber Sale, completed in 1999 (FS), of which 28 acres were within the project area.	x		
Timber harvest on about 4000 acres within the watershed	x		

Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within or around the Cherry River project area.

Action	Past	Present	Reasonably Foreseeable
Timber harvest and associated road construction and maintenance on private lands within the Cherry River watershed (about 14,000 acres since 1992)	x	x	x
The Desert Branch timber sale (about 900 acres) within the watershed		x	x
Bridge replacement on WV 55 at crossings of Gauley River at the mouth of Cherry and of the Cherry River at Holcomb		x	x
Natural gas pipeline that would result in approximately 1.6 acres of clearing of NFS forested land and conversion to herbaceous vegetation.			x
Wildcat gas wells: Two wells drilled (one in 1977, other drill date unknown) on private land. Both were dry holes and are now plugged and abandoned.	x		
Coal exploration and mining on National Forest or private lands within the project area (could occur, but no projects specifically planned)	x		
Coal mining on private lands within the watershed	x	x	x
Residential, governmental, and commercial uses of private land in communities of Richwood, Fenwick and Holcomb and the roadside areas between them.	x	x	x
Maintenance and public use of the Tri-Rivers Rail Trail on privately owned land	x	x	x
Maintenance of gas pipeline to Richwood, power and telephone utilities across National Forest and private lands	x	x	x
Residential development on private lands.	x	x	x
Stream channelization by non-federal entities.	x		
Agriculture activities such as pasture lands and small gardens on private lands	x	x	x
Recreation on NFS lands (e.g. hunting, fishing, hiking, camping, wildlife viewing, driving for pleasure, berry picking, etc.	x	x	x
Road maintenance and use of State Roads and Highways and Forest System roads	x	x	x
Acid deposition	x	x	x
Introduction of non-native or weed species	x	x	x
Limestone fines additions to the North Fork Cherry, and tributaries	x	x	x
Insect and disease occurrence and damage, especially hemlock wooly adelgid, gypsy moth, beech bark scale			x
Weather events such as ice and wind damage	x	x	x

In the future, additional development and disturbances may occur (e.g. timber harvest on private or National Forest lands). However, specific plans or the extent of such activities are not known. On National Forest lands, such future activities would be preceded by environmental analysis.

Presence or Absence of Resources

The following resources are not present in the Cherry River project area: wild and scenic rivers; ecologically critical areas; coastal zone areas; research natural areas; State or national parks; conservation areas; other areas of ecological, scenic, or aesthetic importance; or wilderness. There are also no Native American concerns associated with proposed activities or minority and low-income populations that would be adversely affected.

Historic or cultural resources, two local parks, prime farmlands, wetlands, and floodplains exist in the project area. Historic or cultural resources and wetlands would not be adversely impacted by any of the alternatives because these areas would be avoided (see Heritage effects and Hydrology/ Watershed report). Prime farmlands and floodplains would be affected, but the effects would be limited as described in the Soil and Hydrology/Watershed effects. The effects to migratory birds and threatened, endangered, and sensitive species are documented later in this chapter. None of the alternatives are expected to result in short or long term adverse effects to these species' population viability.

Physical Resources

Soils/Geology

Resource Impacts Addressed

This section summarizes the existing condition of soil resources in the project area and how proposed activities may impact them. It specifically describes the effects activities may have on soil compaction, erosion, soil acidification, and vegetation/nutrient removal. It also indicates whether soils in the area are capable of supporting the regeneration and road use proposed.

Affected Environment

Soils within the Project Area

Below are described the soil series found within the activity areas of the project. Gilpin and Buchanan soils are the most common. Other soils are present, but would not be affected by the location of projects.

GILPIN: The Gilpin series consists of soils that are moderately deep and well drained. The soil forms in residuum parent material, meaning that the soil weathers directly from the acid sandstone, quartzite, siltstone, and/or shale below. These soils are found on ridgetops, benches, hillsides, and on outcropping sideslopes. Runoff is medium or rapid, available water holding capacity is moderate, and permeability is moderate. In places on the landscape, large stones 10 to 24 inches cover the surface. Boulders may also be present on the surface. Some mapping units on non-sloping (0-3 percent slopes) landforms are considered to be primefarmland and are protected. See discussion below under "Primefarmland Determinations."

FENWICK: The Fenwick series consists of soils that are moderately well drained and moderately deep. The soil forms in residuum parent material, meaning that the soil weathers directly from the acid sandstone, quartzite, siltstone, and/or shale below. The available water holding capacity is moderate to high; permeability is moderate in the upper part of the subsoil and moderately slow in the lower par of the subsoil and in the substratum. Runoff is medium. A seasonal high water table about 1 ½ to 2 ½ feet below the surface restricts the roots of water-sensitive plants. Some mapping units on gentle landforms are considered to be primefarmland and are protected. See discussion below under "Primefarmland Determinations."

BUCHANAN: The Buchanan series consists of soils that are very deep and moderately well drained. The soil forms in colluvium that is weathered from acid sandstone, quartzite, siltstone, and shale. These soils are found on mountain footslopes, sideslopes, and in valleys. Runoff is medium to high, available water capacity is medium to high, and permeability is moderate above the fragipan and slow in the fragipan. Depth to the fragipan ranges from 20 to 36 inches. Seeps may be present. A seasonal high water table of 1-½ feet to 3 feet below the surface restricts the roots of some plants. Depth to bedrock is greater than 60 inches. Equipment limitations (slope dependent), slippage, and erosion on skid trails and roads are the major management concerns.

LILY: The Lily series consists of soils that are moderately well drained and moderately deep. The available water holding capacity is low to moderate, the permeability is moderately rapids in the subsoil, and runoff is rapid. The soil forms in residuum parent material, meaning that the soil weathers directly from the acid sandstone, quartzite, siltstone, and/or shale below.

A complete description of each soil type and the map units they are found in can be located in the county soil survey report (USDA-NRCS, 1992).

Soil Sensitivity Soils are rated as sensitive as a result of wetness and steep slopes. Wet soils are soils with seasonally high water tables within 18 inches of the soil surface. The drainage class of these soils is moderately well drained or wetter. Wet soils have a higher sensitivity or risk of effects such as compaction and ponding of water. Wet soils when disturbed to the depth of the water table have the ability to bring subsurface flows to the surface. A good example of how this occurs on the landscape is the excavation of bladed skid roads in conventional harvest units.

Steep slopes are identified as being sensitive for land management activities. Activities proposed on these steep slopes are examined closely for slippage potential and the use of mechanized equipment. Map unit GoF04 is identified as being sensitive for both steep slopes and wet soils. This soil map unit lays on "bench slope bench slope" topography. According to the soil survey report (USDA-NRCS, 1992) 25 percent of this map unit contains wet soils in the colluvial material in concave positions and at the toeslope above the benches where fragipans are more likely to form due to slope stability. However, ground observations made during the 2004 field season show that more like 40 percent of this map unit contains wet soils. Soils sensitive for flooding are found within the larger floodplains within the project area; however, no management activities are proposed on these soil types.

Soils designated as "Prime farmland" are federally designated by the USDA- Natural Resource Conservation Service (NRCS) and are protect by law.

Soils designated as "Prime farmland" are federally designated by the USDA- Natural Resource Conservation Service (NRCS) and are protect by law. There are activities proposed on prime farmland soil map units; therefore, as required by law LESA determination was done for the project by NRCS. The analysis shows that action alternatives do not permanently impact soils considered prime or unique farmland and state-wide important farmland.

Acid Deposition/Air Quality

By the 1950s, acid deposition was thought to be widespread across the northeastern United States (Bailey et al., 2005). The largest contributors to acid deposition in the east are fossil fuel burning power generation plant emissions (EPA, 1998). Acid deposition is formed when sulfur dioxide and nitrogen oxides react with water and oxygen in the atmosphere to form acidic compounds (EPA, 1998). These compounds then fall to the earth in either dry or wet forms as sulfuric and nitric acids. Sixty percent of the precipitation acidity in United States is from sulfuric acid (Sparks, 2003). Nitric

acid makes up the majority of the other 40 percent of precipitation acidity. Acidic compounds are only some of the ions in atmospheric deposition. Others include calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), ammonium (NH_4), and chloride (Cl).

There are three sites in WV that participate in the National Atmospheric Deposition Program (NADP) that monitor wet deposition inputs. Cedar Creek State Park operated by United States Environmental Protection Agency (USEPA) is the closest one to the project area, and for that reason, data from this site was used in the analysis. USEPA identified the Mid-Appalachian region, including WV, to be a sensitive region in their 1998 National Air Quality and Emissions Trend Report, even though deposition of nitrogen and sulfur compounds in this region have been decreasing since the mid 1990s (EPA, 1998).

Decreases in the emissions of sulfate and nitrogen oxides were expected to slow acidification of soils and water; however, emissions of base cations, which neutralize the acids, also declined. Therefore, even with the decreases in deposition, the net result was that acidic inputs to soil and water increased. (NADP, 2005).

Geology within the Project Area

The surface geologies of the project area are mapped as Kanawha and New River Formations of the Pottsville Group. The Kanawha Formation contains less sandstone and more shale than the New River Formation. (Reger, 1921). The Kanawha Formation is mapped as occurring on the ridges of the project area; however, no members of this formation were recorded in measured sections (Reger, 1921) of the area or noted on field visits (Tracy, 2005). The New River Formation of the Pottsville covers the project area with the Upper Nuttall Sandstone along the ridges (Reger, 1921). The formations of the Pottsville Group have a greater percentage of shale in the western part of the Gauley Ranger District (Tracy, 2005). The New River Formation consists of only 30% sandstone in the location of the project area compared to 74% in other areas of the Cherry River watershed (Tracy, 2005). Surface water pH in the project area was much higher ($\geq$6.0) than the surface waters from areas with higher sandstone content (4.0 – 5.0) like those found east of the project area (Tracy, 2005). The geology provides the parent material of the soil. Soil chemistry reflects the geology.

Soil Acidification Nutrient availability for forest trees can be affected deleteriously in areas subject to chronic, high levels of acidic deposition, which in turn can make those same trees susceptible to diseases or insect damage. Federer et al. (1989) stated "continual depletion of the total amount of any nutrient must sooner or later decrease its availability and, consequently, forest productivity." Thus, soil chemistry can play a key role in overall forest health, both directly and indirectly.

Some soil chemical factors that are believed to affect forest health and sustainability relative to acidic deposition are base cations (calcium, magnesium, potassium, sodium), effective cation exchange capacity, nutrient availability, acidity, nitrogen and sulfate saturation, and toxic metals, including aluminum and manganese (Adams et al., 2000). Base cations are important to sustaining forest health because they are macronutrients; calcium is particularly important because it is a primary component of bole wood. Base cations also neutralize soil acidity, thereby making other nutrients more available to forest vegetation.

The main inputs of calcium to soils are by weathering, litter fall, and atmospheric deposition (Huntington, 2000). However, the rate at which calcium is replaced by weathering tends to be very slow compared to rates of deposition, uptake, and leaching (USGS, 1999). Schnably (2003) found that the potential replenishment of soil calcium in Appalachia is low due to the highly weathered status of

these soils. Soils most susceptible to calcium depletion are older soils that form from base-poor geology.

While soil weathering, soil biotic processes, and vegetative uptake are naturally acidifying processes (Gbondo-Tugbawa and Driscoll, 2003) and acid deposition explains only about 38% of acidic input to ecosystems (Markewitz et al., 1998), there is evidence that acidic deposition has accelerated acidification of some soils.
Several soil chemical factors, including Ca:Al molar ratio and base saturation, have been related strongly to soil nutrient condition, with fewer of these factors related to forest health. Cronan and Grigal, (1995) noted that base saturation of the effective cation exchange capacity (BSECEC) of ≤15% typically is associated with some level of forest decline. However, while relationships have been found, threshold values for each across various situations (i.e., climate, topographic, deposition, soil conditions, bedrock/parent material, physiography, etc.) have not been identified.

Acidification of soils increases cation leaching, decreases soil pH and base saturation, and negatively affects many biological processes (Adams and Kochenderfer, 1998). Adams and Kochenderfer (1998) found that the nitrogen content in trees increased from the artificial acidification of forest soils. In another study, Adams (1999) found that calcium losses were particularly large when a forest soil was artificially acidified compared to a non-forest soil. A nine-year acidification study at Bear Brook watershed in Maine found accelerated losses of base cations from the soil into the streams due to fertilizer additions of nitrogen and sulfur (Fernandez et al., 2003). Lawrence et al. (1999) also performed an experiment that showed that calcium concentrations in leachate increased as acid concentrations increased.

The loss of base cations due to acidic deposition is also supported by other studies (Bailey et al., 2005).

The Ca:Al molar ratio is an indicator of the risk for forest decline due to aluminum antagonism and toxicity (Cronan and Grigal, 1995). Natural soil acidification, intensive tree harvesting, and acid deposition all deplete base cations, and thus, potentially increase soil solution aluminum. Impaired uptake of already depleted calcium and magnesium supplies, growth reductions, and increased root mortality and turnover all are problems caused by high aluminum concentrations in soil (Cronan and Grigal, 1995). Soils with low Ca:Al molar ratios are more likely to have forest decline due to aluminum antagonism and toxicity.

Cronan and Grigal (1995) estimate that a Ca:Al molar ratio of 1.0 results in a 50% risk of adverse growth or nutrient impacts on forest; a Ca:Al molar ratio of 0.5 to 0.6 creates a 75% risk of adverse impacts on forest; while a Ca:Al molar ratio of 0.2 gives a 95% or greater risk of adverse impacts on forest. The composite relationship Cronan and Grigal found in their review of over 300 references "is largely based on seedling responses under controlled conditions; it includes a mixture of more and less sensitive species studied under varying treatment conditions;. . . and it assumes that one can extrapolate from results with seedlings to mature trees growing under field conditions." (p. 219, Cronan and Grigal, 1995.) "For perspective, it can be noted that half of the 14 North American and northern European watersheds including in the ALBIOS interregional study of Al bio-geochemistry. . . exhibited soil solution Ca/Al molar concentration ratios below 1.0 in the B horizon. . . Symptoms of Norway spruce decline were evident at three of those sites." (p. 218, ibid)

It is difficult to attribute tree decline and mortality to a single cause (Bailey et al., 2004). Sugar maple has declined significantly in the eastern U.S. in past years, and its response to changes in soil

chemistry has been researched extensively (Bailey et al., 2004). Sugar maple seems to be the species that is lost from stands first during soil acidification (Bailey et al., 2004).

Jenkins (2002) found that soils in the Otter Creek watershed on the Monongahela National Forest in West Virginia commonly have a Ca:Al molar ratio of less than 0.2, along with a base saturation of the effective cation exchange capacity (BSECEC) of less than 15%. He interpreted these findings to mean that the associated forests are at 100% risk for decline.

Soil pH in the Cherry River watershed increased with depth (Sponaugle, 2005). This pattern is explained by the incorporation of organic matter and deposition of acids to the surface. Organic matter inputs provide nutrients as well as organic acids to the soil (Brady and Weil, 2002; Johnson, 2002). The lower soil horizons apparently have retained nutrients as a result of the weathering process and accumulation from leaching from higher horizons. Typically, the pH of most soils in the Northeast decreases with depth due to the low base status parent material of the region (Drohan and Sharpe, 1997). The increase with depth in the project area suggests that the majority of acidic inputs to the soils came from acidic deposition and biochemical processes occurring near the soil surface.

The following table is site specific to the Cherry River project area, based on soil monitoring pits from a variety of topographic locations. The risk for the transition and upper B horizons is 75% or more. However, the lower B, BC horizons, and C horizons in the area are 50 percent to no risk. The A horizons did not suggest a high risk to forest productivity. Risk increased initially for the upper horizons through the upper B with depth. This trend was predicted by the decrease in organic matter with depth.

Table 3-2. The soil acidification parameters used for the acid risk assessment of the soils in Cherry River watershed for the project area by horizon.

Horizon	Ca:Al Ratio	BSECEC	% Risk
A	2.0	15.1	<50
Transition (AB or BA)	.6	7.9	75
Upper B	.3	7.0	>75
Lower B	.8	7.2	50
BC	3.8	9.9	0
C	6.9	28.6	0

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 harvesting, road construction and wildlife opening creation 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 Maps for the locations of the proposed activities.

The spatial boundary used to address cumulative impacts was the entire 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. These effects result from the removal of the upper portion of the soil profile. This part of the soil profile contains a large amount of the soil's organic matter and available plant nutrients and therefore, its productivity or quality. The replacement of this part of the soil takes a long time (200-400 years) and depends on local climate and ecological conditions.

The Proposed Action and Alternative C have the potential to affect soil resources as a result of commercial timber sale activities, road construction and reconstruction, and log landing construction and use. The effects of these activities may include soil disturbance, soil compaction, soil rutting, erosion, slumping and mass wasting, accelerated decomposition of organic mater, changes in nutrient cycling due to biomass removal and mixing of the soil surface horizons, and changes in soil temperature and moisture.

Methodology

Soil samples were collected and data was used from the existing Geographic Information System database, past forest information on history and use of the area, field visit information, and information found in the Nicholas County Soil Survey Report.

In 2004 a soil chemistry monitoring project was initiated in the Cherry River. This project took an extensive look at current soil chemical and physical properties of the soils in the watershed. The project design was initiated prior to the detailed planning of the timber sale proposed in this EA; however the data collected are used in this document to discuss the existing condition of the soils and the potential effects and mitigations from the proposed management activities. Details about this monitoring are summarized in the project file, and in "Properties and Acid Risk Assessment of Soils in Two Parts of the Cherry River Watershed, West Virginia." (Sponaugle, 2005.)

The description of anticipated impacts to the soil resource was based on the sensitivity of the soils and the amount of soil disturbance that would occur from proposed activities. 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 reduced. 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). Acres of soil impacted by soil disturbing activities (log landings, skid trails, skid roads, road construction, and wildlife openings) were estimated using the best available information and compared to the total acres of the activity areas (harvest units and road corridors).

Direct/Indirect Environmental Consequences

Alternative A – No Action

Soil resource conditions would remain the same as described in the affected environment section. Alternative A would not implement activities that would compact, rut, or erode soils, change nutrient cycling, or impact prime farmland. Areas of bare soil existing in the project area such as roads and trails would continue to have soil movement. Signs of erosion around culverts and on non-revegetated cut banks are evident on the existing road system. Surface water flows down the middle of some roads during heavy precipitation events. The erosion and surface flow over bare soils adds to the already existing sediment load in streams. Soils would continue to erode in these areas until some

physical point of stabilization is met. Natural weathering and erosion occurs at background levels throughout the project area.

Soils in the Cherry River watershed would continue to acidify at an accelerated rate due to acid deposition. Long-term vegetation responses in the watershed are unknown at this time. However, the risk assessment suggests that there may be aluminum toxicity effects to vegetation if vegetation is dependent upon nutrient status in the subsoil of the soil profiles. Weathering of parent materials in the lower portions of the soil profile and recycling of nutrients in the surface horizons indicates that there are currently adequate nutrients available to feeder roots and roots that do extend down lower in the soil profile.

Effects Common to both Action Alternatives

Compaction: General timber harvest areas are expected to recover quickly from compaction caused by harvesting activities. Research has shown that the upper few inches of soil recovers quickly from light to moderate compaction (Adams 1991; Burger 1985; Hatchell 1971; Kozlowski 1999). This would be due to organic matter additions from logging debris, soil biota activity, freezing and thawing, and plant root growth from existing and new vegetation. Recovery from compaction would be slower in the areas where severe compaction occurs. These areas are associated with log landings and primary skid trails/roads, where equipment has passed over the soil many times. Severe compaction must be mitigated by ripping or soil tillage of the upper 7 to 24 inches to break up the compacted soil surface and promote water infiltration and root growth. Regional SQS recommend that bulk density values be no greater than 1.54 to 1.63 g/cm^3 for loamy soils (range dependent upon specific soil textures). Untreated severely compacted areas have long term (8-40+ years) impacts to soil productivity. Potential areas within units may exist from past activities; however, no areas were identified during field review. Units do not have areas of recent soil disturbance readily noticeable via aerial photographs. There may be some remnant compaction from historic logging practices from the early 1900s; however, most of the soil disturbance has recovered. There are some signs of old skidding which may imply that compaction in these areas still persists because few large trees grow in these 75 plus year old corridors. New areas of compaction on log landing areas may result from blading of the surface and heavy equipment use while stock piling logs. These areas could be ripped after harvesting is completed to mitigate the compaction. District staff has observed that in these areas, a small amount of compaction is beneficial to competing grass stands in maintaining a grassy opening (Bard, 2003). Therefore, decompaction may not be desired and will be determined if necessary during mitigation of landings after the harvesting and use is complete.

Nutrient Cycling: The above ground nutrient content of the forest stand is relatively small compared to the total nutrient pool of the soil (Patric and Smith 1975, Adams 1999.) Probable effects of proposed harvesting activities on nutrient cycling include: increased mineralization of organic material, resulting in increased available nutrients, particularly nitrogen; increased nitrification of soil nitrogen to nitrate, a more mobile form; increased leaching of soil nutrients (nitrogen, calcium, and magnesium) as uptake by plants decreases temporarily due to removal of the overstory; and increases in rates of cycling of some nutrients in the upper soil horizons. Increased soil moisture, surface soil temperatures, and increased organic matter which has been observed after clear cutting produce ideal conditions for rapid decomposition of the organic matter available on the site. Soil organisms responsible for decomposition would benefit from this surge in organic materials. Mineralization of organic compounds and nitrification has been shown to increase after clearcutting. Effects of nutrient cycling in thinnings and shelterwood cuts are not likely to be detectable in the short-term because of the dispersed nature of the removals. The dispersed removal of trees within the project area has relatively little, if any, effect on microclimate and thus nutrient cycling processes. Also, because the rates of these processes vary considerably spatially within a stand, detecting an adverse effect would

be unlikely. Sprouts from the existing root systems on harvested areas along with new germinations would benefit from any increase in available nutrients.

Soil Fertility: Fertility would be expected to increase from pre-harvest levels as increases in soil moisture and soil temperature from timber harvest contribute to an increase in organic matter decomposition. This effect would produce an increase in nutrients available to plants and soil organisms on the sites. This surge in nutrients, along with additions of nitrogen from the atmosphere and precipitation, would be expected to promote rapid growth on the sites as well as benefiting many soil-borne organisms. On roads and landings, where soils have been disturbed, additions of limestone and fertilizers prior to revegetation would contribute to soil fertility by adding calcium. Possible losses of nutrients to ground water and volatization are expected to be offset by addition of nutrient rich leafy tops and woody debris left on-site after harvest. Although frequently hypothesized, nutrient deficiencies as a result of overstory removal have not been reported in the eastern hardwood forests (Adams 1999.) Therefore, no adverse impacts to soil fertility are expected from the proposed treatments (USDA. 2000. p. 3-60.) Further discussion of effects to vegetation and soil fertility can be found in the acid deposition and cumulative effects sections.

Canopy Removal: Canopy removal is proposed to some degree in the action alternatives. The soil surface would be subject to effects from the removal of the tree canopy.

It would be anticipated that an initial surge of nutrients would occur as the vegetation canopy would be opened. Soil moisture, soil surface temperatures, and an increase in organic matter produce ideal conditions for rapid decomposition. Sprouts from the existing root systems on harvested areas along with new germinations would benefit from the increase in these available nutrients. A surge in growth would occur. Possible losses of nutrients to ground water and volatilization are expected to be offset by the addition of nutrient rich leafy tops from harvested trees and woody debris left on-site after the harvest. In addition, a decrease in evapotranspiration would result in increased runoff. These are considered short-term impacts and would be quickly reduced with regeneration of understory species.

Soil Temperature: Timber harvesting activities temporarily disturb the forest floor by mixing the organic layers with the mineral soil. Removal of a portion of the forest stand by harvesting can result in increased sunlight reaching the forest floor, higher soil temperature, increased soil moisture, as well as increased decomposition and mineralization rates resulting from increased microbial activity. The increase in soil temperatures would occur primarily during the growing season, but once the forest canopy closes in (within ten years), temperatures would return to normal. Soil biota activity would increase in the upper horizons of the soil and decomposition rates would increase temporarily. Bacterial activity assumes a more important role in the latter stages of decomposition. The increase in decomposition rates along with increased sunlight to the forest floor leads to an increase of leguminous plants, which are capable of fixing large amounts of nitrogen. Symbiotic nitrogen fixation by actinorhizal plants makes a considerable input of nitrogen to many ecosystems (Youngberg and Wollum, 1970.)

Helicopter Yarding: Helicopter yarding would be proposed to varying degrees in both the PA and Alternative C. Helicopter yarding minimizes the amount of soil disturbance and sedimentation production that occurs because no skid roads are used to move the logs from the unit to the landings. There would be little direct impact to the soils in the form of compaction, rutting, and erosion because of helicopter yarding. Field observations and ocular estimates of MNF timber sales in 2001 (North Gauley Mountain, Marlinton Ranger District) and 2004 (Smoke Camp Timber Sale, Greenbrier Ranger District; Dry Run Timber Sale, Cheat Ranger District) show that very little ground disturbance (less than 1 percent) occurs within an activity area during timber harvesting when using helicopters.

Therefore, it would be feasible to harvest areas with a helicopter and not have adverse effects to the soil water resources which may otherwise be susceptible if conventional methods were utilized.

Helicopter yarding would be expected to take place during the winter period. The National Forest roads in the Cherry River project area were not designed for hauling logs during the winter period when soil is not frozen and is saturated. The road surfaces would be upgraded to withstand the impact of heavy logging trucks hauling timber. This would include the addition of rock to the road surface and some road reconstruction. The source of the gravel and rock would be such that it does not readily weather and produce a sediment source to the watershed. Upgrading the road surface would help to avoid rutting the road surface during hauling and decrease the potential for sedimentation. Soil samples are taken prior to design and sent to a certified lab for soil engineering properties analysis. The design would then account for the soil type identified; logging truck used; and expected loads and hauling rates. If these steps are not taken to ensure that roads are designed for the intended use in the winter months, adverse effects to the road surface could occur. Severe rutting would be likely to occur if strict adherence to monitoring daytime freeze thaw conditions does not happen. It would be best to design the roads to the standard of use to avoid adverse effects.

Additional cross drains would also be added to the roads that would be used to access harvest units proposed for helicopter yarding. Cross drains would be added so that the roads drain adequately during the wetter winter periods, avoiding rutting of the road surface and potential road failures. Placement of these drains would be determined during implementation and would depend on depth of soil, drainage location, and slope of the road.

Table 2-5 in Chapter 2 shows the acreage of wet soils, coves and steep slopes affected by project activities.

Within the project area Buchanan and Fenwick soils are considered to be *Wet soils*; defined as those soils that are moderately well drained or wetter (water table exists at some time during the year in the soil profile at a depth of 18 inches to 30 inches). Buchanan and Fenwick soils have slow permeability, low strength and seasonal wetness. Rutting would be a high probability on roads, landings and general harvest areas on these soils (USDA Natural Resources Conservation Service, 11/29/2004). There is also a concern with placing skid roads across these soil types. Hydrological effects are described in the watershed section of this document, and can result in soil moisture reductions. The concern begins when the skid road cuts into the seasonal high water table. Certain activities on wet soils may be high risk for adverse effects such as compaction, erosion, and breaking subsurface water flow continuity. These activities include overland skidding and constructing system roads, skid roads, and landings. Units that are close in proximity to a stream channel pose a greater risk of sedimentation from skid roads. Stream crossings by roads and skid trails are also shown in Table 2-5.

Table 3-3. Feet of skid road that would intersect wet soils by Alternative.

	Proposed Action	Alt 1
Total Feet	166064	54925
Total Miles	31	10

As defined by the Forest Plan, steep slopes are those slopes that are 40-50%. Operation on these slopes would be analyzed on a case by case basis to determine the best method of operation. Wheeled and/or tracked motorized equipment on slopes greater than 50% would be prohibited without recommendations from interdisciplinary team review and Forest Supervisor approval. (MNF Forest Plan, Appendix S, pg 4). No use of such equipment on slopes over 50% has been recommended under either action alternative.

The filterstrip required by the Forest Plan would be primarily the sediment and nutrient trapping mechanism in areas of ground disturbing activities such as skid trail development, landing construction, and road building. Within the filterstrip roads and skid trails are designed and restored to prevent sediment movement into streams. To determine the width of the filterstrip necessary to protect the resources and values of the riparian area, topography, vegetation type, soil, geology, hydrologic regime, climatic conditions, management objectives and other factors are all considered (USDA Forest Service, MNF Forest Plan, 1986 pp R-1). Where activities expose the mineral soil, filterstrips would be required on all perennial, intermittent, and ephemeral water courses that have formed a functioning channel. There would be no drainage area limitation for application of filterstrips. The following table displays the filterstrips required for the soils where activities would occur under either action alternative. The basic filterstrip width for soils affected by project activities would be 100 ft. to 200 feet.

Table 3-4 Filterstrip widths

Soil Map Unit Name	Filterstrip Width (feet)	Slope Class (Percent)
FENWICK SILT LOAM, 3 TO 8 PERCENT SLOPES	100	0-30
BUCHANAN LOAM, 8 TO 15 PERCENT SLOPES	100	0-30
BUCHANAN CHANNERY FINE SANDY LOAM, 8 TO 15 PERCENT SLOPES, VERY STONY	100	0-30
BUCHANAN CHANNERY FINE SANDY LOAM, 15 TO 35 PERCENT SLOPES, VERY STONY	200	31-70
GILPIN SILT LOAM, 3 TO 8 PERCENT SLOPES	100	0-30
GILPIN SILT LOAM, 8 TO 15 PERCENT SLOPES	100	0-30
GILPIN SILT LOAM, 15 TO 25 PERCENT SLOPES	100	0-30
GILPIN SILT LOAM, 25 TO 35 PERCENT SLOPES	150	31-70
GILPIN SILT LOAM, 3 TO 15 PERCENT SLOPES, STONY	100	0-30
GILPIN SILT LOAM, 15 TO 35 PERCENT SLOPES, STONY	150	31-70
GILPIN-BUCHANAN COMPLEX, 35 TO 70 PERCENT SLOPES, VERY STONY	200	31-70
LILY LOAM, 8 TO 15 PERCENT SLOPES	100	0-30

Alternative B – Proposed Action

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 as soil productivity or soil quality. This measurement would be applied to activity areas. For this analysis, harvest units, helicopter landing sites, and skid trail development would be included in estimates for loss of soil productivity and the measures would be compared between the alternatives.

The majority of soil disturbance in a timber sale occurs during the harvesting of the timber. In conventional harvesting methods, using rubber tire skidders, skid trails and/or skid roads are created in

order to extract the timber. Landings are also created in order to temporarily deck the timber until it can be loaded on to trucks and hauled off-site. The percent of land disturbed would be often dependent upon slope of the activity area. In general, the steeper the slope the higher the road density would be in order to safely operate on the hill slope. A 1970's study conducted near Parsons, WV showed that the lowest measured road density of 5.6 percent occurred in a selectively cut harvest area with slopes less than 30 percent (Kochenderfer, 1977). A study on the nearby Fernow Experimental Forest indicated that roads in Haddix watershed occupied 10.6% of the logged area (Kochenderfer and Edwards, 1997). Slopes in the Haddix watershed were greater than 30 percent. Chapter 2 indicates that the Proposed Action would have 179 acres of conventional skidding in stands with average slopes of 30% or greater, and the rest would be on slopes of less than 30%.

Kochenderfer et al. (1997) reported that the amount of exposed soil because of skid trails and truck roads decreases rapidly after logging. This would be because grasses and shrubs become re-established in the disturbed areas. The study measured skid and truck roads in 1987 and again five years later in 1992. The percent of the disturbed are in the skid roads decreased from 6.2 percent of the logged area in 1987 to 5.1 percent in 1992 measurements. The percent of disturbed area in truck roads decreased from 4.5 percent to 3.1 percent. It is thought that practically all of the skid roads, especially in heavily cut areas, would eventually convert back to forest. However, Kochenderfer et al. (1997) recommended that water-control structures (broad-based dips, waterbars, and any other mitigations directed by the Hydrology Report) are necessary on closed out roads whether they are skid roads, skid trails, or abandoned system roads, because bare soil (up to 4 percent of the area) can remain on these roads even after six growing seasons.

A preliminary logging plan developed for the Cherry River area displays approximate landing locations and skid trail/road placement for the Proposed Action. This conceptual design of the logging system layout was used to determine the amount of soil disturbance, using a range of potential skid road widths: 10 feet, 12 ft. and 15 ft. The width of disturbance on the road bed may vary due to the type of equipment used, operator style, or logistics of moving within the unit. The locations on the ground may change during implementation due to logistics of harvesting activities and avoidance of important resources warranting protection from soil disturbance such as springs, archeology points, and rock outcrops. If resource concerns are identified at that time, specialists would be called into the field to help with locating skid trail/roads and landing sites as needed. Actual timber sale monitoring shows that soil disturbance within units consistently runs around 10 percent (2005 MNF Soil Resource Monitoring Report). Actual monitoring of National Forest timber sales shows that there is a substantial increase in disturbance if the landing is constructed within the unit boundary and can increase the percentage from approximately 10 percent to 15 or more percent. Percent disturbance from the conceptual logging system layout is approximately 5 percent. If the amount of skid trail/road is under represented, adding additional skid trail up to more than doubling the amount of preplanned skid trail/road would not exceed the regional standard, except in those units with 8-10% disturbance.

There is approximately 47 miles of skid trail/skid road construction in the project area under the Proposed Action. Most conventionally logged units have between 4 and 7 percent of the area disturbed, using the widest estimate of skid trail width. Two units are at 8%. Six percent of the total activity area acres would be disturbed.

The potential maximum amount of disturbance for any activity area (harvest unit) is approximately 10% in Compartment 62 stand 46. This amount may increase slightly depending if the landing for the unit falls with in the activity area boundary. The sizes of landings are discussed below. However, even with the additional disturbance from a landing the percent disturbed within the activity area

would fall below the 15 percent threshold indicated by the R9 Soil Quality Standards. Landings are used in both conventional and helicopter harvest systems. Helicopter landings are estimated to average 2 acres and conventional landings, 1/2 acre for the purpose of estimating potential soils effects. (Helicopter landing are discussed in greater detail in Alternative C below.) It is estimated that approximately 50% of the landing sites would have reduced soil productivity because most of the topsoil and some mineral soil would be cleared away and side cast in order to create a relatively flat area for loading logs. The remainder of the landing remains relatively intact with some mixing occurring as logs are stacked and moved on and off the site. Landings are revegetated with grass for erosion control.

As part of this proposal, approximately 19 acres of log landings (averaging approximately 1/2 acres each) would be developed in the project area. Landings would be created within the boundaries of proposed harvest units as well as outside of harvest units. Some landings would be developed from existing openings that have been used as log landings in the past.

New Road Construction: New road construction requires approximately 40 feet in width of soil disturbance. The 6.9 miles of road construction would equal about 34 acres of soils being permanently converted to a use other than growing vegetation. This acreage would not be considered to be part of the soil productivity loss in that it would be a permanent commitment of forest resources and the new roads would be added to the Forest System Roads Inventory.

The direct effects of new road construction include a complete removal of the O and A horizons (organic material) and removal of the subsoil material to varying depths in creating a road base in the cut locations. In the fill locations there would be areas where soil material would be borrowed and placed over the native soil surface to bring the soil to grade for the road bed. Soil properties in the roadbed surface and borrow areas are altered to the degree where they do not resemble native soil properties after construction. Compaction, loss of surface water infiltration, and loss of overall long-term soil productivity are to be expected. It is recommended that silt fences be installed between the road construction and stream channel when construction would be within the designated filterstrip width to minimize sediment moving into the channel. This recommendation comes from recent, 2003, field observations made by research Hydrologist, Dr. Pamela Edwards, USFS Fernow Experimental Station. This mitigation would be used on all new road construction where the road crosses ephemeral, intermittent or permanent channels. This mitigation exceeds Forest Plan standards and guidelines and WV state forestry BMP's. All disturbed areas of soil would be seeded, fertilized, and limed immediately after disturbance. If the construction occurs when seeding is not recommended then heavy mulching of the area would be recommended.

Short-term and Long-term Effects: In conventional harvesting operations, the impacts of unbladed primary skid trails and unbladed log landings are considered to be short term impacts to soil productivity because there would be no removal of the surface horizons. These horizons may be mixed due to rubber tire movement on top of the soil surface, but the majority of the soil remains on site and relatively in place. Compaction would still occur. The severity of compaction would depend on the number of passes of heavy equipment over the skid trail.

Table 3-5. Estimated Maximum Acreage of Short and Long Term Effects to Soil Productivity in Activity Areas for the Proposed Action.		
ACTIVITY	**SHORT TERM**	**LONG TERM**
	acres	
Skid Roads/Trails *(using 15ft width)*	**86**	**55**
Log Landings (.25 acres)	**19**	**9.5**
Savannah	**10**	**5**
Total Affected Acres	**115**	**69.5**
Percent of total activity area disturbed (1800 acres)	**6**	**4**
Percent of project area disturbed (9,380 acres)	**1**	**<1**

Assumptions used for Table 11:

1. Skid roads have 10-15 feet of travel way plus cutslope and 3 feet of fill slope.
2. Primary skid trails are unbladed and have a 10-15 foot width.
3. Approximately 65 percent of skidded areas would potentially have bare soil after six growing seasons (long-term effect) (Kochenderfer, 1997)
4. Log landings are approximately 1/2 acre each and 50% of this area would be a long term impact due to blading the area where trucks are loaded, while the balance of the area would be unbladed and considered short term impacts.
5. Primary skid trails and unbladed portions of log landings are short term impacts due to ripping/tillage mitigation.

Less than 15 percent of soil productivity would be lost under this proposed action for the unit boundaries, activity area, and project area for both short and long-term effects.

Alternative C

Effects are similar in Alternative C to those described under Alternative B, but the amount of most effects related to soil disturbance is smaller, since Alternative C has less conventional logging, and less logging overall.

There is approximately 20 miles of skid trail/skid road construction in the project area under the Alternative C. Most conventionally logged units have between 1 and 7 percent of the area disturbed, using the widest estimate of skid trail width. No units exceed 7% as an estimate of disturbed soils, and several units are at this maximum level. Two percent of the total activity area acreas would be disturbed.

Short-term and Long-term Effects: Under this alternative, less ground based skidding would occur, and thus reduce the chance of soil erosion and stream sedimentation. Some units would be harvested via helicopter logging instead of conventional ground based skidding operations and would reduce the chance of soil disturbance on steep slopes and/or wet soils. About 20 miles of skid trail/road would be created using conventional ground-based skidding.

Under Alternative C, approximately 18 acres of landings would be developed. The conventional log landings would be the same size as those for the Proposed Action, averaging 1/2 acres each. The helicopter landings would average 2 acres each. Impacts of temporary roads on disturbance would be similar to the impacts of landings, in that both would be quickly revegetated following use, and they would generally occur on gently sloping land away from stream channels, with drainage structures as needed to keep water off the surface during and after use.

Table 3-5. Estimated Acreage of Short and Long Term Effects to Soil Productivity in Activity Areas for Alternative C.

ACTIVITY	SHORT TERM	LONG TERM
	acres	
Skid Trails/Roads	36	23
Log Landings	18	9
Savannah	10	5
Temporary Road	1	1/2
Total Affected Area	**65**	**37**
Percent of total activity area disturbed (1700 acres)	**4**	**2**
Percent of project area disturbed (9,380 acres)	**<1**	**<1**

Less than 15 percent of soil productivity would be lost under Alternative C for the unit boundaries, activity area, and project area for both short and long-term effects.

New Road Construction: Alternative C proposed 2 miles of new road construction. Using the same width of road as in the Proposed Action (40 ft.) approximately 9 acres of soils would be permanently converted to a use other than growing vegetation. Effects of this construction would be the same as described above for Alternative B, but would occur on fewer acres. The same mitigations would be recommended.

Cumulative Impacts

Alternative A – No Action

Alternative A would not implement activities that would directly or indirectly disturb soils. Thus, it would not contribute cumulatively to the past, present, or reasonably foreseeable future activities listed at the beginning of Chapter 3.

Alternative B Proposed Action

Historical documentation and physical evidence shows us that the soils in this watershed have been severely impacted from past land uses in the late 1800's to around the 1930's. Currently the soils are recovering from massive amounts of disturbance including fires. Any disturbances to the soil resource that remove the soil to bedrock start the soil forming process all over. There are no activities proposed

in this assessment that do this to the soil; however, there are activities such as conventional logging, landing development, and road construction that disturb the soil surface and to some degree the subsoil. Soil development would be set back to some time before present, and to see the recovery of that soil to its native state may take a hundred years. In the case of roads, it would take a change in management and road obliteration to see soil recovery occur. The cumulative effect would be that the soil resource and associated soil productivity would be still recovering from historic activities in the watershed, and with additional disturbance the soil resource would take that much longer to recover.

Acid Deposition and Cumulative Effects: Past and present effects of acid deposition were considered in the result of soil analysis discussed under the affected environment. Continued acid deposition is expected, although the magnitude may change from current levels. This effect occurs within the project area and watershed independent of Forest Service management. Soil acidification occurs naturally, but because of acid deposition it occurs at an accelerated rate.

The results of the soil chemistry monitoring project (Sponaugle, 2005) indicate these soils have a moderate to high risk of adverse nutrient and growth effects, and this risk might be greater with additional timber removals over time. With harvesting and organic matter removal, base cations are removed from the soil, causing additional acidification. This could raise the risk of tree growth reductions and increased root mortality and turnover leading to tree or seedling mortality. Therefore, there is speculation that the forest potentially would not regenerate as well as expected, with the desired species composition. There is no evidence of this in any of the stands within the project area, and regeneration harvesting has been conducted in the project area over the last thirty years. Those stands overall are well stocked with a diversity of tree species including abundant yellow poplar, oaks and other species (MNF CDS database, 2005; Bard, 2005).

There are no scheduled future projects that would harvest timber from the project area, other than the Proposed Action or Alternative C. Regeneration harvests will be monitored to establish the degree of regeneration success. Future timber removals from National Forest lands would occur after future environmental analyses, during which monitoring results regarding soil acidification could be considered.

Soil productivity losses are not calculated for activities being conducted on adjacent private lands. Private land activities include timber harvesting, skid road development, grazing, agriculture activities, and other minor residential disturbances that can reduce soil productivity (see cumulative effects table of known activities within the project area and surrounding watershed). These activities contribute to the overall cumulative effect of the decrease in soil productivity both within the project area and the watershed.

Timber harvest, and utilities right of ways effects from disturbance that would have cumulative effects to the soil resource would include compaction from heavily used areas such as primary skid roads, landings, and use of utilities right of ways. These activities have had mitigations applied to them that have addressed the effects in varying degrees. Forest Plan standards and guidelines within Appendix S of the Forest Plan and the Forest Plan Amendment for Minerals provide for resource protection. The majority of this area has been reclaimed to some degree either naturally or through active management.

The other items listed in Table 3-1 have had minor amounts of soil disturbance associated with them. Qualitatively, soil productivity has not been diminished by these activities. No quantitative soil productivity measurements have been made in association with these activities. Many of them are on-

going such as wildlife opening mowing, road maintenance and recreational activity. So overtime small amounts of sediment are generated but not measurable at the project level scale.

Alternative C

The cumulative effects of Alternative C would be much the same as Alternative B, except fewer acres of soil would be disturbed. The chance for contributing cumulatively to past, present and foreseeable future actions would be slightly less than Alternative B.

Unavoidable Adverse Impacts

The No Action Alternative would not implement actions that would cause unavoidable adverse impacts, but existing erosion on the road system in the project area would continue. The Proposed Action and Alternative C would implement activities that would disturb soils, which may cause unavoidable adverse compaction, erosion, nutrient removal, and adversely affect soil productivity, to the extent described above for both alternatives. Less than 10 percent of the project area would be affected in both action alternatives. A much smaller 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 the potential for adverse impacts.

Irreversible or Irretrievable Commitment of Resources

Construction of landing and skid roads proposed under the Proposed Action would result in an irreversible commitment of soil resources on approximately 69.5 acres and 37 acres for Alternative C. There would be an irretrievable commitment of 34 acres of soil committed for new road construction under the Proposed Action and 9 acres in Alternative C. Nutrients removed in timber products would be a small irreversible commitment of resources that could contribute in some degree to future soil acidification.

Consistency with the Forest Plan

All alternatives would be implemented consistent with Forest Plan goals, objectives, standards, and guidelines as explained in the above discussions (Forest Plan pp 40, 79-80, 82, 128, Appendix R, and Appendix S.)

Hydrology/Watershed

Resource Impacts Addressed

Peak flow, storm flow, flooding, water quality (especially sediment), and riparian area function will be addressed. Potential impacts on wetlands and floodplains are discussed, although projects are not located adjacent to wetlands, or the floodplain of the Cherry River.

Affected Environment: The project area (9,374 acres) occupies lands north of the Cherry River and entirely within the Cherry River watershed. The project area boundary includes nearly all of the Cherry River (to its confluence with the Gauley River), and short portions of the North and South Forks of the Cherry River at and near Richwood. The watersheds of several named tributaries comprise the majority of the project area and National Forest lands within the project area, including Curtin Run, Coal Siding Run, Holcomb Run, Morris Creek and Buckheart Run. Other un-named streams flow directly to the Cherry River and the North Fork of the Cherry River. Some of these un-named streams have perennial flow, and numerous smaller intermittent and ephemeral streams occur throughout the project area.

The entire project area lies within the 5th level hydrologic unit designated as Cherry River watershed (about 106,080 acres). Within this 5th level watershed, portions of four 6th level sub-watersheds form

the project area, of which Lower Cherry composite has the largest project area acreage. The portions of the South Fork and the Cherry River Composite are primarily private lands.

Table 3-6. Sub-watershed and Project Area acreage by 6th level sub-watersheds.

Sub-watershed Name	Total Sub-watershed size (acres)	Proj. area size (acres)	% of Total
No. Fk. Cherry River	23,868	800	3.4
So. Fk. Cherry River	30,700	40	0.1
Cherry River Composite (S.F.Cherry to Laurel Cr.)	14,602	1,342	9.2
Laurel Creek	27,195	0	0
Lower Cherry Composite (Laurel Cr. to mouth)	9,715	7,192	74.0
Totals	106,080	9,374	8.8

All of these watersheds (except for the mouth of the South Fork and floodplain alluvial deposits along the Cherry River) lie within an area underlain by Pennsylvanian System bedrock of the New River and Kanawha Formations. Bedrock is predominantly composed of sandstone, shale, siltstone and coal. Soils generally range from moderate to severe sensitivity from the standpoint of erosion and slippage potential. In particular, steep slopes, wet soils, coves and riparian areas should 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. There are no proposed project activities on floodplains.

Most project activities will be discussed in the context of subwatersheds where actions are proposed, mostly within the Lower Cherry Composite watershed. The named tributary of Morris Creek, Buckheart Run, is discussed both separately and combined with Morris Creek.

Table 3-6. Watershed acreages within the project area, including private lands.

Watershed	Watershed Acres
Curtin Run	547
Coal Siding Run	853
Holcomb Run	1412
Buckheart Run	828
Morris Creek (w/o Buckheart)	1944
Morris Creek incl. Buckheart	2772
Un-named to Cherry River	2950

The project area is characterized by watersheds with slopes that range from gentle to steep, but much of the acreage is of moderate steepness. Ridge tops and upper slopes have predominantly gentle terrain, as well as some riparian areas along streams. Mid-slopes range from gentle to steep. A small proportion of the project area has slopes that exceed 40%. Soils are relatively thin to moderately deep, typically ranging between 4 to 7 feet on sideslopes, toeslopes and in valleys, but are shallower (less than 40 inches) on ridges. Soils throughout much of the project area have a weakly formed fragipan and perched water tables, so only the upper portions of the soil profile have any appreciable water storing capacity. This makes them hydrologically more responsive in terms of reduced water storage and faster runoff, and with reduced streamflow supply during low flow periods.

The area receives high annual precipitation, with about 53 inches per year as the annual average for Richwood (source: National Weather Service.) Precipitation at the higher elevations within the project area is likely to be slightly higher than in Richwood. Evapotranspiration losses back to the atmosphere are believed to exceed 50% of the total precipitation (source: USDA Forest Service, Northeastern Research Station, Parsons, West Virginia.) The high annual precipitation, combined with some steeper slopes and hydrologically thin soils makes runoff within the watershed fairly rapid, and streamflow can be flashy.

Streams within the project area are generally low in large woody debris, which contributes to simplistic in-stream habitat conditions and some channel instability in portions of these streams. They are below their resource potential in this regard, due primarily to early 1900s (and to a lesser extent more recent) timber harvesting within riparian areas. Perennial streams in the area have elevated levels of fine sediment in their substrate. Some of this is attributable to soils that commonly occur in riparian areas throughout the project area and have a high component of sand, while some of it is likely attributable to past road construction, timber harvesting and other land management practices. Despite this (and acidic stream conditions), some of the perennial streams within the project area support native brook trout populations and associated coldwater biota. Due to the various environmental stressors, these populations remain vulnerable to future disturbances that would further degrade the quality of their habitat.

Riparian areas along most of the smaller streams are in good condition and well forested, but are still too young to be fully functioning riparian systems. State road 94/5 occupies a portion of the riparian area of Morris Creek and one of its headwater tributaries, contributing to accelerated runoff, sedimentation, and loss of riparian vegetation. Other State, National Forest and private roads occupy portions of riparian areas along or crossing streams within the project area, with some similar effects. The Cherry River Watershed Assessment (September 2002) identified sedimentation from roads, skid roads and other sources as a substantial concern within the watershed, and that fine sediment levels in stream substrate are high. Visual estimates put fine sediment levels at over 25% (by weight) of the substrate in potential brook trout spawning sites, which is above the level at which adverse effects on brook trout reproductive success would be expected. In 2002, five substrate samples were collected in lower Morris Creek, and the average fine sediment content was 27.5%.

Stream water quality in terms of sediment is moderate to good, except that suspended sediment and turbidity may be elevated in some of these streams during storm runoff events. Otherwise, streams generally run clear, and meet State water quality standards for turbidity. Water chemistry in these streams is generally considered to meet state standards, but biological productivity is low to poor. The Pennsylvanian age bedrock is typically low in calcium carbonate minerals, making it low in acid neutralizing capacity (ANC), and making project area streams moderately to strongly acidic. Acid

deposition is also affecting streams, and appears to be having a long-term effect of lowering stream ANC, thus decreasing aquatic productivity.

Water chemistry was collected by the USFS in the project area in April 2005. Streams generally had low to moderate pH in the spring, but all were less than pH 7, and ANC was very low to low. Curtin and Buckheart Runs had the lowest pH (about pH 5.5) and the lowest ANC (less than zero). Coal Siding Run and Morris Creek had slightly higher pH (about pH 6.1) and ANC of 25 and 13 microequivalents per liter (ueq/L), respectively. Holcomb Run had pH of about 5.6, and ANC slightly less than zero. (In a hydrologically and geo-chemically similar area just east of the project area, Desert Branch has been tested several times since 2001; pH has ranged between 5.3 to 5.8, and ANC between slightly less than zero to 6 ueq/L.) While water chemistry within the project area indicates marginal to poor conditions in terms of aquatic productivity potential, some of these streams are supporting small populations of native brook trout and their associated aquatic community. In particular, native brook trout were found in Morris Creek, Holcomb Run and Coal Siding Run during 2005.

Aquatic macroinvertebrate data collected by the USFS in three of the project area streams (Morris Creek, Buckheart Run and Holcomb Run, between 1994 and 1998) indicate largely clean stream conditions in terms of human caused pollution. However, low macroinvertebrate diversity indices and low EPT richness values (indicating reduced health of the aquatic ecosystem) are probably due to a combination of other factors that can affect streams, including high fine sediment in stream substrates, low productivity waters, and acid deposition effects on water chemistry. (EPT richness refers to the total number of macroinvertebrate taxa within the orders Ephemeroptera, Plecoptera and Trichoptera, which is one indicator of how clean/healthy a stream is.)

None of the streams within the project area is listed in the State's 303(d) list of streams not meeting water quality standards, even though water chemistry in the smaller streams is marginal and aquatic productivity is low. However, not all streams have been tested. The most recent 303(d) list was prepared in 2004. The North Fork Cherry River is the municipal water supply for the city of Richwood, and the water supply intake is in the North Fork, within the project area boundary on the outskirts of Richwood. Not all of the 800 acres within the project area in the North Fork watershed are above the water supply intake.

Small wetlands occur within the project area boundary, but they are all on privately owned lands. Most are actually small constructed ponds on those private lands. Another is a small pond on the west side of Cherry River near Fenwick. And another is an impoundment in the North Fork just north of Richwood. Floodplains are limited primarily to very narrow corridors along streams, but there are some areas where beaver have created small, temporary impoundments. The floodplain along the Cherry River is considerably wider in spots, but nearly all of that is in private ownership.

Scope of the Analysis: The spatial boundary used to evaluate direct and indirect consequences is the area occupied by the watersheds of the perennial, intermittent and ephemeral tributaries within the Cherry River project area, and which have project activities planned within their watershed boundaries. Only those watersheds where project activities might have an impact were analyzed. The spatial boundary used to evaluate cumulative impacts also is the Cherry River project area, with the addition of the remainder of the Cherry River watershed including industrial and private land ownership, totaling about 106,080 acres. Any substantial or measurable influence from the project area activities is not expected to extend further downstream than the limits of the project area at the mouth of the Cherry River (at its confluence with the Gauley River). This is because of the modest acreage of proposed activities relative to the size of the Cherry River watershed, the mitigation of effects that have been designed into the project, and the relative size of the Gauley River watershed in

relation to the size of the project area and proposed activity acres. The Gauley River watershed just below the mouth of Cherry River is approximately 338,560 acres (529 square miles), while the Cherry River watershed alone is about 166 square miles.

The temporal boundary used to evaluate direct and indirect consequences is about 10 years, because research has shown that sediment and stormflow effects from timber harvesting generally returns to pre-harvesting levels in about 5-10 years or so. However, riparian resource effects generally can be expected to last many decades, before riparian vegetation returns to a fully functioning condition. The temporal boundary used to evaluate cumulative impacts is also about 10 years for harvesting trees, because the evapotranspiration capacity of the site is generally restored within that time frame. But actions that result in extensive road and skid road development, particularly in areas of wet soils and coves, on steeper slopes, and near streams or with numerous stream channel crossings, may continue contributing to sediment and stormflow-related effects for a longer period of time.

Methodology: The evaluation of effects is based on watershed management and forest hydrology studies in the eastern United States spanning many decades of investigation. Studies of the effects of harvesting timber, which frequently involves road and skid trail construction, have documented sedimentation and streamflow effects of those practices. Effects that have been reported included analysis and discussion of erosion and sedimentation on streams, and of stormflow and peakflow characteristics of small streams that drain the small study watersheds.

The results of streamflow studies describe a range of effects on stormflow and peakflow, from either increasing the effect, having little or no change, to possibly decreasing the effect under some situations. The results used cover a wide range of studies done in the Appalachian Mountains, from North Carolina to New Hampshire, and include some studies conducted on the Fernow Experimental Forest, at Parsons, West Virginia. These results were used as the basis for determining the kind and magnitude of stormflow effects that could be expected from project activities. In this report, "effects on stormflow characteristics" (or changes in stormflow) means changes in stormflow volumes or changes in the peak rates of storm runoff (peakflows).

Other studies have reported on the structure, function and composition of riparian ecosystems and their resources, riparian values and benefits, and on effects of riparian management. Professional knowledge and judgment were used to assess the effects of each alternative. Direct and indirect effects on aquatic resources were evaluated for the influence each alternative would have on the potential to increase stream sediment by activities that disturb soils, or to reduce sediment sources by improving existing road problems. Riparian resource effects were evaluated primarily for the influence each alternative would have on non-perennial stream stability, large woody debris recruitment, and related hydrologic function of those channels. Factors considered included the size and location of proposed harvest units, yarding methods, location and amount of road construction, reconstruction and ground-based skidding, the presence of functioning stream channels and riparian areas within and near harvest areas, and the presence of sensitive landforms such as steep slopes, wet soils and coves. Each subwatershed was considered separately for the effects analysis.

All conventional yarding will disturb soil by re-using or creating new log landings, and by re-opening and using existing old skid roads or constructing new ones. Throughout this report, log landings for conventional harvesting will be assumed to be 0.5 acres, and helicopter log landings will be assumed to be 1.0 acre each. Skid roads are considered to disturb about 10% of the conventionally harvested acres. Actual percentages disturbed may be less, according to the logging plans prepared and soils input, but 10% would represent the worst case. Units harvested by helicopter are considered to have negligible ground disturbance, because the trees are felled and then lifted from the site and flown to the landing. No skid roads are needed in helicopter harvest units.

Stream crossings by new and reconstructed roads and skid roads have been reported in the effects discussion of this report. Some of those stream crossings were identified during field investigations for this analysis. But some of them have not been field identified, and these were determined largely from maps, identifying likely stream crossing locations from "crenulations" in the topographic lines on the maps. The determination of their status as perennial, intermittent or ephemeral was based on such information as the land shape, depth of the crenulation indicators, proximity to ridgetop or valley bottom, apparent drainage area, and other indicators. Hydrologist's field visits included review of closed skid trails within the project area from previous timber harvests.

The type and magnitude of expected effects within the project area and within each subwatershed were made by comparing watershed conditions, types and locations of proposed harvesting and roading practices, proportion of areas harvested, and other activities with above described studies and research results.

In this analysis, potential stormflow response to activities is partially based on a "clearcut equivalent" approach, which converts proposed activities into clearcut equivalent acres. It includes all activities that have a substantial impact on basal area, including all types of cutting (clearcut, shelterwood, thinning and selection harvest), wildlife openings, log landings, and road construction and reconstruction. It assumes that the basal area removed in a thinning or selection harvest (about 33% of the basal area in the stand) has the same hydrologic response as an equivalent basal area removed in a clearcut. This may somewhat overstate the water yield generated from stands that are thinned or harvested by individual tree selection, because some of the water that is made available by cutting trees is often utilized by the residual stand, reducing the potential water yield from the site.

In addition to this "clearcut equivalent" analysis, assessment of the potential for stormflow effects will also consider other site specific information, such as activity location within the watershed, location on wet/sensitive soils and in coves, location and amount of skid road development, and number of expected stream crossings. Professional judgment will factor into the determination of potential stormflow effects.

Direct/Indirect Environmental Consequences of the Alternatives

Alternative A – No Action

The No Action alternative proposes to do no timber harvest, road construction or reconstruction, or any of the other ground disturbing activities in other alternatives. Normal road maintenance work on existing Forest Service system roads (such as FR84, 908, 913 and 950) will continue, however, in order to protect those facilities and the adjacent soil and aquatic resources. Because there are no new ground disturbing activities and no timber harvest, the No Action alternative would have none of the sediment, riparian and stormflow effects described in the action alternatives. Aquatic and riparian resources and stream sediment and hydrologic conditions would remain more or less in their current condition over this planning period. Conditions would be driven by current management and natural watershed processes and events (such as fire, wind, floods or disease) and activities occurring on private lands. As riparian forests mature and large woody debris increases in streams by natural processes (tree decay, blowdown, etc.), many riparian and aquatic functions and resource conditions would likely improve. Stream habitat diversity, pools, sediment storage, channel stability and water storage may all increase over the long-term.

State road WV94/5 has substantial sediment effects in Morris Creek. Portions of this road are near Morris Creek or a portion of its headwaters. Drainage structures are too few in number, and many are undersized and frequently plug in stormflow conditions. The combination of eroding ditchlines and road cutslopes, washed and eroding road surface, and active erosion in the runoff channels below the

road substantially increase sediment delivery to portions of the watershed stream network. In the No Action alternative, this high level of sediment impact in Morris Creek would continue.

The No Action alternative would have a long-term adverse effect in two streams in particular, by retaining existing stream crossing structures that are inadequate in terms of their hydraulic design and restricted aquatic organism passage. FR908 crosses the headwaters of Coal Siding Run with dual undersized culverts, and WV94/5 crosses Morris Creek with an undersized multiple tube concrete structure. Replacement of these structures is needed to address water quality (sediment), stream habitat, and aquatic organism passage problems that currently exist. These problems would go uncorrected if the No Action alternative is selected.

Effects Common to All Action Alternatives:

Activities that have the same design and location through all action alternatives are considered to have common effects. Portions of proposed road construction, reconstruction and maintenance activities, in terms of amounts, design and location, are identical in both the Proposed Action and Alternative C. Road activities that are identical in the Proposed Action and Alternative C are summarized in Table 2. All reported road lengths in this report are approximate.

Table 3-7. Road activities common to Proposed Action and Alternative C.

Road	Type	Approx. Length	Watershed	Terminus
		(miles)		
FR908C	New Construct	0.7	Coal Siding Run	C48/S77
FR928	New Construct	1.0	Morris Creek & Buckheart Run	C62/S65
FR908B	Reconstruct	0.2	Coal Siding Run	C48/S301
FR928	Reconstruct	1.0	Morris Creek	C62/S44
FR913	Reconstruct	0.1	Morris Creek	C62/S8
FR908	Maintenance	2.3	Coal Siding Run and Curtin Run	C48/S18
FR84	Maintenance	0.4	Morris Creek	C61/S9
FR950	Maintenance	0.5	Morris Creek	C62/S20

The greatest source of sediment from timber management activities is generally due to the transportation system and logging roads (Duncan et. al., 1987; Waters, 1995). Skid roads are included as part of that transportation system, and have potential to deliver large amounts of sediment if not located, designed, constructed and managed properly. Log landings are another potential source of sediment. Closing unneeded roads and improving the drainage on existing roads can help reduce sediment inputs (Swift Jr., 1984; Trieu, 1999). Roads, skid roads and landings can also affect the hydrologic response of a watershed by compacting soil and reducing the infiltration rate of water, or by intercepting groundwater along road cuts (Coats, 1999). Sediment production from roads and skid roads generally is greatest at and near stream crossings, but may depend on other factors such as slope steepness or location in wet soils or near stream channels. Roads can affect stormflows by intercepting and rerouting precipitation, surface runoff and groundwater, concentrating flows and extending the channel system within a watershed. They also directly impact riparian areas by

removing the vegetation and modifying habitat. Stream hydraulics are frequently modified at road crossings, especially when the bankfull channel capacity is partially restricted. Road construction and reconstruction have the greatest potential for erosion and sediment delivery to streams of all actions included in the action alternatives.

Road maintenance of new roads is also planned in both the Proposed Action and Alternative C. Road maintenance of existing roads occurs in all three alternatives, but could occur more frequently during periods of higher traffic, under the action alternatives. Maintenance includes such measures as adding stone surfacing where needed, improving drainage, cleaning and maintaining drainage structures, and grading. These activities can have short-term adverse effects by disturbing soil, with short-term increases in erosion and potentially sedimentation. But the off-site effects of maintenance are expected to be limited and of short duration, because maintenance measures are designed to correct the long-term erosion and runoff problems that would occur without them. Regular road maintenance on system roads will identify problems early, help keep the driving surface stable and free of ruts, and keep drainage structures functioning properly. Road maintenance during and following the timber harvesting activities is expected to have minor short-term adverse effects in erosion and sediment delivery to streams, but long-term benefits in reducing erosion and sediment coming from existing roads. There is an overall net benefit from maintaining these roads.

Roads that are opened to public use for all or part of a year are subject to damage from that use, such as rutting and damage to drainage structures. That damage results in greater soil erosion from the road, sometimes more concentrated runoff from the road, and potentially increased sedimentation in nearby streams. Changing road management to open roads to the public is not a factor in either action alternative, because none of the proposed road construction or reconstruction would be managed as open to public use (except for pedestrians). All new road construction and reconstruction would be managed as closed to public vehicular use, and open only to administrative vehicle use. Presently existing Forest Service roads within the project area will be managed in a manner consistent with their existing management designation. Thus there is no change from the existing condition for existing Forest Service roads, and no new roads will be opened to public use.

Road segments common to both action alternatives were evaluated for potential sediment effects in their respective watersheds. FR908B, in Coal Siding Run; FR908C in Coal Siding Run, most of FR928 in Buckheart Run, FR913 in Morris Creek are mostly high in their watersheds, on ridgetops, far from perennial streams, and with few ephemeral stream crossings. Expected sediment effects from these road segments would be very low.

FR928 reconstruction and construction poses a somewhat higher risk of sediment effects in Morris Creek. This is because of its location lower in the watershed, nearer the Morris Creek stream channel in portions of the reconstruction (although outside the stream filterstrip), and because nearly all of the portion in Morris Creek occupies wet or otherwise sensitive soils. There are an estimated 8 intermittent and ephemeral stream crossings within the 1.8 miles in the proposed action. Because of the sensitive soil location and number of expected stream channel crossings, and the wet nature of this north facing slope, the risk of sedimentation to Morris Creek is somewhat higher from FR928 proposed road work. Standard road effects mitigation measures would help control erosion and sediment delivery, but short-term sedimentation could be greater, especially during the construction phase and before mitigation measures become effective.

Effects on stormflow volume and peakflow in the project area streams resulting from these road activities are not expected to be substantial by themselves. This is because much of these proposed road activities occur high in the watershed in moderately gentle terrain, and away from stream channels. Standard road development mitigation measures are effective at dispersing runoff from

roads, and discharging storm runoff in smaller, dispersed quantities and not directly into streams, when properly applied. Some of those mitigation measures include dips and culverts for cross-drainage, stone surfacing to maintain good road drainage, and revegetation to encourage water infiltration into the soil. But roads still do intercept and concentrate runoff, and can increase the rate at which storm runoff is delivered to the channel system. FR928 in particular has a somewhat higher potential to influence the rate of storm runoff to Morris Creek because of its lower elevation, and location in wet/sensitive soils and on some moderately steeper sideslopes. That potential effect is not considered to be substantial for FR928 by itself. (Other proposed activities that may also contribute to stormflow effects will be covered in the indirect effects discussion, by alternative.)

Riparian resource effects resulting from these proposed road activities would be small within the context of the overall length and acreage of riparian areas within the project area. Many tens of miles of riparian habitat occur along the perennial, intermittent and ephemeral streams within the project area. Proposed new road construction and reconstruction would directly impact riparian resources by removing most or all woody vegetation (overstory and understory) and non-woody vegetation along streams wherever roads cross channels. Much of that woody vegetation would not re-establish, as the cleared area for the road would be maintained. For all practical purposes, the road and cleared area in the right-of-way would permanently modify the riparian area within its limits, substantially reducing the functions and benefits that riparian areas provide. But the effect of new road construction and reconstruction on riparian resources as a whole is considered very small for the proposed road activities discussed here. There would be no perennial stream crossings for these roads, and the intermittent streams are mostly small ones. Very little riparian area would be directly occupied at stream crossings, and the effects of this are considered not substantial.

The State of West Virginia has established standard resource protection measures for controlling erosion and reducing sedimentation of streams from forestry practices. These Best Management Practices, or BMPs as they are commonly referred to, are contained in a publication titled Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations in West Virginia, 2002. BMPs apply to logging activities on both federal and private lands.

At a minimum, BMPs would be used in all National Forest timber harvesting unless a more restrictive measure is required by the Forest Plan, or by a mitigation measure in this EA. Examples of more restrictive measures in this EA include helicopter logging in some of the more sensitive harvest areas, Forest Plan filterstrips, and riparian area protection measures which are more restrictive than the state BMPs.

Forest Plan standards for filterstrip protection are applicable within all proposed harvest areas where functioning stream channels occur, and in conjunction with all earth disturbing activities (roads, skid roads, landings, etc.). A filterstrip is designed to trap sediment and nutrients in the existing forest floor before they can reach a stream channel, and are required along all water courses which have formed a functioning channel (see Forest Plan, Appendix R). Implementing filterstrip mitigation helps reduce the amount of sediment delivered to perennial, intermittent and ephemeral stream channels. Seeding of disturbed areas following logging activities reduces soil erosion and sediment transport by stabilizing and holding soil in place. Water-barring roads and skid roads, and gravelling roads and landings directs water onto vegetated slopes away from streams, and reduces soil erosion losses on road, skid road and landing surfaces, respectively. Helicopter logging disturbs and compacts substantially less soil compared to ground-based logging systems, and poses a low risk of erosion and sediment deposition in streams, because no skid roads are needed.

Riparian area protection provides stream shading and microclimate protection, habitat for riparian and aquatic species of plants and animals, structural support for streambanks, trees for future sources of

large woody debris (LWD), intact root systems to hold soil in place, channel stability and improved streamflow conditions, and other benefits. LWD plays an important role in channel stability by providing physical structure and channel roughness, and creating a step-profile within the channel that reduces flow energy and erosive forces. LWD traps sediment in the non-perennial headwater channels and stores it, releasing it more slowly to downstream portions of the channel system, thus helping to control and regulate the movement of sediment within the stream. It also helps stabilize the channel bottom and prevent accelerated channel bed and bank erosion. Stored sediment in the headwaters holds some of the streamflow for longer-term slow release which benefits downstream flow conditions during low flow periods. The more diverse habitats created by LWD and improved within-channel moisture conditions benefits certain fauna, such as fish, macroinvertebrates and some amphibians.

Riparian protection measures being used in this EA have been developed as site specific mitigation for riparian resource effects. Refer to Appendix 1. These measures provide a higher level of riparian resource protection than those found in the 1986 Forest Plan.

The 1986 Forest Plan requires a lesser level of riparian area protection, according to the following (condensed) guidance. Shade strips (riparian buffers) are required at or below the point (on a stream) draining 100 acres or more of watershed area (for the Cherry River area of the Forest). The width of that shade strip is normally 100 feet on each side of a stream. Trees may be removed from the shade strip, so long as stream shade is not materially reduced. For intermittent and ephemeral streams, generally no shade strip would be required, because streams in either of these categories nearly always have watershed areas less than 100 acres. Even small perennial streams with watershed areas less than 100 acres (and do not support trout) would not be required to have a shade strip. For other non-trout waters, and for trout streams greater than 25 feet wide, the shade strip 100 feet wide on each side of the stream would be required, but with tree removal (cutting) permitted down to a minimum of 50% of full canopy closure. For all perennial trout streams less than 25 feet wide (regardless of watershed size), tree cutting within the 100 foot shade strip would be permitted as long as 75 to 100% of full canopy closure were maintained. There is additional "leave tree" guidance within this management direction. It is clear in this 1986 Forest Plan direction that harvesting mature trees along all streams is permitted; and that riparian vegetation protection along most small, non-perennial streams, and even some small perennial (non-trout) streams, is not required.

The riparian buffers are being applied in both action alternatives as site specific mitigation of adverse effects on riparian resources, to further mitigate effects that could occur as a result of applying the Forest Plan guidelines alone. Perennial streams would be protected with a 100 foot riparian buffer width on each side of the channel, with no harvesting of trees within the buffer width except as necessary to meet riparian or aquatic resource management needs, or other limited objectives. Intermittent streams with a watershed area of 50 acres or more would have the same buffer management and width. Intermittent streams with less than a 50 acre watershed area would have the same buffer management within 50 feet either side of the channel. And all ephemeral streams would have no harvesting within 25 feet either side of the channel. Buffer widths may be adjusted based on interdisciplinary review and site specific field investigation. Riparian buffers shall, at a minimum, encompass the riparian area defined on the basis of soils, vegetation and hydrology and the ecological functions and values associated with the riparian area. Refer to Appendix 1 for a more detailed description of those riparian protection measures.

These riparian mitigation measures provide a higher level of riparian resource protection than the Forest Plan guidelines. They do this by retaining more of the overstory and understory trees in the designated riparian area, with no programmed harvest within the specified buffers, and by requiring riparian buffers on all channels regardless of size. This better protects the riparian ecosystem components, wildlife habitat, and the potential future sources of LWD to perennial, intermittent and

ephemeral stream channels within the proposed areas of harvesting. The no programmed harvesting widths better protect the majority of potential LWD source trees. Greater amounts of LWD incorporated into small headwater channels over the long-term would reduce effective channel gradient and reduce flow energy. Habitat diversity and sediment storage conditions would improve, and have a greater capacity for low flow improvement. Most of the adverse effects that could still occur with use of the Forest Plan riparian guidelines would be mitigated by applying these measures.

Watershed stormflow and peakflow studies referenced in the background document in the Project File were done on entire small watersheds, and generally involved more drastic treatments than those proposed here. Those studies reported effects for the entire small watershed, but did not examine effects for further downstream. As described in those studies, notable increases in stormflow parameters were found with the heaviest cuts (clearcuts), which sometimes included herbicide treatments to suppress revegetation in the harvest area. Effects were variable, but generally there were small to moderate but statistically significant increases in stormflows during the growing season. Dormant season effects were generally not significant. Observed stormflow increases usually did not persist for many years after the harvesting, typically 6 years or so, declining as the site revegetated and evapotranspiration was restored. Eastern studies are inconclusive about the stormflow effects of thinning; generally no appreciable effect is seen, but one West Virginia study showed increased stormflows in the growing season.

As discussed in the background document in the Project File, the greatest increases in stormflow or peakflow have been recorded in harvest situations where there has been a complete tree removal, on an entire small watershed of 35 to 100 acres, where skid roads have been constructed and used, sometimes involving herbicide use, and then those effects have been largely limited to the growing season. While some of those increases have been statistically significant, they have generally been a small to modest increment of the total storm-period flow, and quickly diminish in subsequent years following the harvesting.

Thinning harvest for this analysis generally removes about a third of the basal area, and this is generally not enough to produce a substantial stormflow response. As discussed above and in the Project File, thinning harvest of an entire small watershed generally results in no appreciable stormflow effects, although modest stormflow and peakflow increases in the growing season are possible; dormant season effects are unlikely. The research findings for small watershed responses to cutting also included skid roads, so the combined effects of thinning and skid roads still did not result in substantial stormflow or peakflow increases, when responsible logging practices were used.

The amount of streamflow increase is largely dependent upon the type of harvest (e.g. clearcutting, partial cutting or thinning) and the size of the area harvested (Reinhart et. al., 1963, Douglass and Swank, 1972, Arthur et. al., 1998, Swank et. al., 2001). Approximately 20-30% of the watershed basal area needs to be removed before an increase in flows due to harvesting can be detected (Hornbeck et. al., 1997, Hornbeck and Kochenderfer 2000). On the Fernow Experimental Forest in West Virginia, the water yield from a selection cut that removed 20% of the timber volume was approximately 25% of that generated by an equivalent volume removed by clearcutting (Lull and Reinhart, 1967). While increases in stormflows and peakflows have been measured on small, headwater channels where the entire catchment was harvested, the effect on downstream channels quickly diminished due to the limited treatment area relative to the increasing drainage size. In order to influence large-scale floods, large-scale harvesting would have to occur throughout a watershed (Hornbeck and Kochenderfer, 2000). Researchers have concluded that contemporary timber harvesting in forests of the eastern United States is not on a scale that will affect large-scale flooding downstream (Douglass and Swank 1972, Hornbeck, 1973, Hornbeck et. al., 1997).

The effect of increased streamflow in small, headwater channels has little influence on downstream flood flows, but may result in localized bank cutting and erosion (Arthur et. al., 1998). Roads, skid trails and landings can also influence the hydrologic response of a watershed by compacting soil and reducing the infiltration rate of water, or by intercepting groundwater along road cuts (Coats, 1999). Roads speed the routing of water through the watershed and act as extensions to the stream drainage network.

If it is assumed that all vegetative treatments would occur in the same year, the resulting hydrologic response would represent a "worse case" scenario. (In actuality the treatments would likely occur over a period of 5 to 7 years, although in a single watershed all treatments could occur in as little as one year.) The first year after treatment is the period when a watershed would show the greatest hydrologic response, and would be most vulnerable to the cumulative effects of increased stormflows. It will be assumed in this analysis that a detectable change in stormflow may occur when 20% or more of the existing basal area is removed from a watershed by all the vegetative treatments combined.

Existing conditions in each of the watersheds represents a modified hydrologic condition resulting from past and present land management (including private lands) activities, such as roads, skid roads, pastures and other cleared lands. It is assumed that these conditions have been present for some years and channels have somewhat adjusted to the modified flows during this time. This analysis will look at the potential effect of the proposed projects on these existing baseline conditions.

The normal operating season for timber harvest activities in both action alternatives would be May 1 to November 20. Conventional harvest activities outside the normal operating season (often called the winter shutdown period) generally have higher risk of erosion and sedimentation effects. During the winter, exposed soils may frequently be frozen to some depth, and hold up well to skidding and trucking. Soils under a snowpack, whether in undisturbed soil or on a road, generally are not frozen. But in West Virginia, frozen soil conditions are intermittent, and conditions can change very rapidly. Changing weather, such as rain and/or warming temperatures, may result in rapidly changing soil conditions. Skidding, and in some cases trucking, under such changing or unfrozen soil conditions can quickly lead to rutting, erosion, drainage structures with reduced or no effectiveness, damaged ditchlines, loss of surface stone on roads, and other problems. Subsequent rain events can result in substantial soil erosion, and potentially stream sedimentation. Mitigation needed to control adverse effects may include additional stone placement, drainage structures or other improvements to roads and skid roads, a greater level of sale administration and monitoring, timely sale shutdown during adverse conditions, and other measures.

Under both Action alternatives, there would be no adverse effects to any of the small wetlands that occur on private lands within the project area (none occur on National Forest lands).

The manual cutting of grape and camphor vines that would occur in some portions of the harvest areas would have little to no effect for any of the resource issues being addressed in this report. There would be no earth disturbance involved in the manual vine cutting activity, and no measurable effect on stormflows. A minor impact on riparian vegetative composition and wildlife food source would occur if vines were cut in riparian areas. But little vine cutting in riparian areas is expected to occur, and at the watershed scale would be insignificant.

Alternative B – Proposed Action

The table below details the mileage or acreage of activities discussed qualitatively below. Some activities are common to both action alternatives, and are discussed above. Additional detail is included in the project record. Table 3-8 below summarizes activity measures for each subwatershed.

Potential adverse effects to any floodplains would be small, and mitigated by design of crossing structures. The only activities proposed that would occupy any floodplain are the FR913B road

crossing on Morris Creek, and FR928 crossing on Buckheart Run. These are relatively narrow floodplain widths, and floodplain function would be protected with well-designed stream crossing structures.

Expected soil disturbance within the Curtin Run watershed that may have an effect on stream sedimentation is considered moderate. Direct skid road disturbance to soil has been estimated to be about 18.6 acres (10% of the conventional harvested acres), and landings add another 2.5 acres of soil disturbance. The 0.6 mile of FR908A construction is on the south side of Curtin Run, mid-slope and well away from perennial streams. It does occupy sensitive soil but no coves or stream crossings were identified along the road length. But conventional harvesting would occupy some sensitive areas within the watershed, including approximately 66 acres of harvesting in wet soils and 36 acres of harvesting in coves. There are no slopes >40% with conventional harvesting in Curtin Run watershed. Acres reported for conventional harvesting in wet soils, coves and on slopes over 40% are not mutually exclusive acres. Some acres counted for wet soils are also counted as cove acres, and a small amount of steep slope acres also overlap with wet soils or cove acres in the various drainages analyzed.

Skid roads are expected to cross 1 perennial, 6 intermittent and 8 ephemeral streams within the watershed. Curtin Run watershed is approximately 547 acres, and 34% of it would be harvested in the Proposed Action, all of it conventionally. This is a moderately high proportion of the watershed with conventional harvesting.

Skid roads would be located to reduce soil and filterstrip disturbance as much as possible, utilize existing old skid routes, and avoid the steeper areas within the units. Provided that the conventional harvest units are operated during the normal operating season (May 1 to November 20), the risk of increased sedimentation in the short and long term is reduced. But because of proposed harvesting in wet soils and in coves, and probable skid road locations with 15 small stream crossings, there is a moderate risk of sediment delivery to the Curtin Run stream system. Harvesting outside the normal operating season would raise the risk.

Sediment delivery to streams is expected to be small to moderate. Despite the planned mitigation measures, conventional harvesting in sensitive areas, near Curtin Run and along headwaters, and with stream crossings raises the risk. There could be some effect to water quality, and State turbidity standards could be exceeded in the short-term. Overall the State designation of water meeting standards would be maintained, but short-term sedimentation would likely occur. As discussed above, logging during the normal winter shutdown would likely increase the risk of greater sediment delivery. Once sediment is delivered to a stream channel, it can reside within the channel for very long duration, frequently decades or even longer. The effect of sediment on aquatic habitat will be discussed in the Aquatic Resources section of this analysis.

All functioning stream channels within and near harvest units would be protected by implementing the riparian buffer protection measures described in Attachment 1 and the Forest Plan filterstrip guidelines. Implementing these riparian guidelines protects the riparian areas and resources along all functioning stream channels, as described above. There would be no substantial or long-term adverse effects to riparian resources.

No wildlife openings are proposed within the Curtin Run watershed.

The effects of the proposed activities on stormflows are being analyzed using a combination of the clearcut equivalent methodology and professional judgement, as described earlier. The amount of basal area removal was calculated for the various harvest types, landings, wildlife openings and road construction/reconstruction, and converted to the clearcut equivalent acreage. Road construction and

reconstruction were lumped together in the calculation, and considered to have no difference in their potential to affect stormflows.

In the Curtin Run watershed, the combination of all harvest units with other actions would remove the equivalent of 83 acres of vegetation within the watershed. This represents approximately 15% of the watershed area. This reduction in basal area is not enough to affect stormflows. Other factors that could contribute to increased stormflows are the conventional harvesting on 66 acres of wet soils, 36 acres of harvesting in coves, and an estimated 15 stream crossings. Skid roads have the potential to contribute to stormflow response, mostly when they collect runoff from wet sensitive areas such as these and deliver it to channels. While these factors are important, they are not judged to raise the risk to the point of having substantial effects on stormflow characteristics in the Curtin Run watershed.

Some small stormflow increases in non-perennial tributaries of Curtin Run are possible, but would be minor and not substantial. The small size and scattered locations of the two clearcut harvest units would help reduce effects, and neither of them occupies an entire watershed as large as those reported in the referenced research findings. No substantial stormflow or peakflow effects are expected to result from the thinning harvest. The above-mentioned riparian tree retention and filterstrip protection would apply along all stream channels, further lessening effects and maintaining a portion of the site transpiration capacity. The risk of increasing streamflows can also be reduced by staggering the timing of the harvests to allow for some regrowth of vegetation between cutting periods.

Stormflow effects downstream of the proposed Curtin Run activities are expected to be very minor and possibly not measurable, because flow effects are attenuated downstream from the area of treatments. This is because of the increasing size of the watershed relative to the area of treatments. Stormflow effects beyond Curtin Run (in the Cherry River) are not likely to be measurable. The potential to affect downstream flooding is negligible.

Previously described mitigation measures help reduce the potential for adverse sediment and stormflow effects. Prompt and effective skid road closure, waterbarring, and revegetation by seeding and mulching will help stabilize soil, disperse surface runoff, and reduce the potential for sediment and stormflow effects.

Overall, the potential for substantial adverse effects in Curtin Run watershed would be low. Potential adverse effects to riparian resources would be mitigated. The potential to substantially increase stormflow characteristics would be very low. Adverse effects from sedimentation likely would be small to moderate, but would be greater if winter logging were conducted or if planned mitigations were not effective.

Much of the above discussion of the types of treatment activities, assumptions, application of mitigation and assessment of its effectiveness, applicability of research findings, and the rationale for the discussion of effects pertaining to the Curtin Run watershed also applies to the remaining watersheds and proposed activities within the project area. Therefore, the above discussion will not be repeated for each individual watershed in the project area, but will apply within all watersheds that have proposed activities. Any exceptions will be noted and explained for the watersheds in which they occur.

Expected soil disturbance within the Coal Siding Run watershed that may have an effect on stream sedimentation is considered moderate or higher. A substantial proportion of this harvesting is nearer to streams or includes functioning stream channels within the proposed harvest units. Harvesting in the headwaters has some functioning stream channels. Portions of the blocks of harvesting in stands 52 and 62/64 are near Coal Siding Run and contain headwater channels. Harvesting in about half the stands would have skid roads that cross one or more channels (20 stream crossings total). Portions of the thinning in stand 16 are in a cove with especially high risk of sedimentation.

Because of proposed harvesting in wet soils and in coves, some of it nearer the main stream channel and along headwaters, and probable skid road locations with 20 small stream crossings, there is a moderate or higher risk of sediment delivery to the Coal Siding Run stream system. There could be some effect to water quality, and State turbidity standards likely would be exceeded in the short-term. Overall the State designation of water meeting standards would be maintained, but short-term sedimentation would likely occur. As discussed above, logging during the normal winter shutdown would likely increase the risk of greater sediment delivery.

The wildlife opening would be revegetated, located outside of any stream filterstrips and riparian areas, and in gentle terrain. There would be no substantial adverse effects in terms of stream sedimentation or stormflow, or to riparian resources.

Taken by itself, the 15% clearcut equivalent area removed by the project is not enough of a reduction in basal area to affect stormflows. Other factors not included in this method that could contribute to increased stormflows are the conventional harvesting on 105 acres of wet soils, 49 acres of harvesting in coves, and an estimated 20 stream crossings. Skid roads have the potential to contribute to stormflow response, mostly when they collect runoff from wet sensitive areas such as these and deliver it to channels. While these factors are important, they are not judged to raise the risk to the point of having substantial effects on stormflow characteristics in the Coal Siding Run watershed.

Some small stormflow related effects in non-perennial tributaries of Coal Siding Run are possible, but would be relatively minor and not substantial. The small size and scattered locations of the several clearcut harvest units, and locations which are mostly higher in the watershed and nearer ridgetops, would help minimize effects. None of them occupies an entire small watershed as large as those reported in the referenced research findings. No substantial stormflow or peakflow effects are expected to result from the thinning harvest. Riparian tree retention and filterstrip protection would apply along all stream channels, further lessening effects. The risk could also be reduced by staggering the timing of the harvests to allow for some regrowth of vegetation between cutting periods.

Stormflow effects downstream of the proposed Coal Siding Run activities are expected to be very minor and possibly not measurable, because flow effects are attenuated downstream from the area of treatments. Stormflow effects downstream from Coal Siding Run (in the Cherry River) are not likely to be measurable. The potential to affect downstream flooding is negligible.

Overall, the potential for substantial adverse effects in Coal Siding Run watershed would be low for stormflow and riparian effects. Potential adverse effects to riparian resources would be mitigated. The potential to substantially increase stormflow characteristics would be very low. Adverse effects from sedimentation likely would be moderate or higher, and could be greater if winter logging was conducted or if planned mitigations were not effective.

The potential for any substantial sedimentation effects in Holcomb Run in either the short-term or long-term is extremely low. There would be no substantial effects to riparian areas or resources.

Expected soil disturbance within the Holcomb Run watershed that may have an effect on stream sedimentation is considered very low, because of the small acreage impacted. The potential to adversely affect stormflow characteristics in Holcomb Run would be negligible, and would not be measurable. No clearcut equivalent calculation was done for Holcomb Run, because the potential effect would be so low. The project acreage in the North Fork of Cherry is too small to have measurable adverse effect on water quality in the North Fork. So there will be no adverse effects to the Richwood water supply. (All other project locations are downstream from the point of intake.)

A large block of the 2950 acres in unnamed watersheds that drain directly to the Cherry River is almost entirely private land (between Richwood and Fenwick) which is about 1342 acres. Direct drains to the Cherry River that have proposed harvesting amount to about 1608 acres.

Expected soil disturbance within these un-named watersheds that may have an effect on stream sedimentation is considered low. Direct skid road disturbance to soil has been estimated to be about 15.9 acres (10% of the conventional harvested acres), and no acreage in landings. New road construction largely would be on upper slopes in moderately gentle terrain and away from most streams, but would have 1 intermittent and 1 ephemeral stream crossing in one small watershed. The potential for substantial sediment effects from the road in this one small watershed is fairly low, but some sediment at the intermittent stream crossing (in wet soils) is expected. Conventional harvesting would occupy limited sensitive acreage, including approximately 35 acres in wet soils and 35 acres of harvesting in coves. There is less than 1 acre of slopes >40% with conventional harvesting. Skid roads are expected to cross 1 intermittent and 8 ephemeral streams, scattered throughout the watersheds. The watershed acreage of these areas is about 1608 acres total as determined above, and about 23% of it would be harvested in the Proposed Action, but less than 10% conventionally. This is a low proportion of the watershed with conventional harvesting.

Nearly all of the conventional harvesting would be on upper slopes near or on the ridgetops, in gentle terrain and away from streams. A large proportion of the cove harvesting (12.5 acres) occurs in one stand (stand 76), and the logging plan shows that nearly all skid roads in stand 76 would not intersect a channel. The expected sedimentation effects from conventional harvesting in these un-named watersheds is very low, both in the short and long-term. The potential for any substantial adverse effect to water quality from sedimentation is very low in these areas. Some short-term turbidity effects could be seen below the FR908C road construction at the intermittent stream crossing in stand 71. The potential for measurable sediment effects in the Cherry River would be extremely low.

Wildlife openings would be away from stream channels. All functioning stream channels within and near harvest units would be protected by implementing the riparian buffer protection measures described in Attachment 1 and the Forest Plan filterstrip guidelines. There would be

The 8% clearcut equivalent calculation for these un-named watersheds is not enough reduction in basal area to affect stormflow, and other factors are not enough to substantially add to stormflows. Stormflow effects in the Cherry River would not be measurable.

Expected soil disturbance within the Buckheart Run watershed that may have an effect on stream sedimentation is considerable, as shown by the table. Most landings are higher in the watershed, near ridges and away from streams, but the landing in stand 80 is on the lower slope in wet soils and nearer Buckheart Run (although outside the filterstrip). Some of the road construction is in sensitive terrain in terms of wet soils, coves and stream crossings. Conventional harvesting would occupy substantial sensitive area acreage within the watershed, most on wet soils and in coves. 47% of the watershed would be harvested conventionally, which is considered to be a high proportion of the watershed with conventional harvesting.

The 0.5 miles of FR913B construction on the north side of Buckheart Run would not be expected to have substantial sediment effects because it would be mostly in a mid-slope position on fairly gentle sideslopes, well outside the Buckheart Run filterstrip, and with only 1 ephemeral stream crossing. But the remainder of FR928 new construction (1.3 miles) starting in stand 65 and ending in stand 30 has four ephemeral and one perennial stream crossings, and crosses substantial wet soils acreage and some coves. Much of its length is in terrain with gentle to moderate sideslopes, some of it near the ridgetops, but there would be extensive construction on sideslopes in wet soils on both approaches to the Buckheart Run stream crossing, which is a major crossing. This crossing should be by a bridge or

some other open stream bottom structure design. The potential for sedimentation in Buckheart Run from this 1.3 miles of road is greater, particularly in the short-term during and following construction until mitigation measures have time to become effective.

Conventional harvesting in stands 29, 32, 39 and 66 of Compartment 62 are near the main stream or contain functioning stream channels within the harvest units. Harvesting in the headwaters has numerous functioning stream channels, which are scattered throughout the proposed harvest acreage. Forest Plan filterstrip mitigation measures will be followed to reduce the risk of substantial sedimentation. The 132 acres of harvest in stand 66 is expected to have 14 potential stream crossings by skid roads.

Skid roads would be located to minimize soil and filterstrip disturbance as much as possible, utilize existing old skid routes, and avoid the steeper areas and stream crossings within the units as much as possible. Conventional harvest units operated during the normal operating season (May 1 to November 20) would have less risk of substantial sedimentation in the short and long term than when harvesting occurs outside the normal operating season. But because of substantial acreage of proposed harvesting in wet soils and in coves, and probable skid road locations with 35 small stream crossings, there is a much higher risk of substantial sediment delivery to the Buckheart Run stream system than for the other sub-watersheds discussed.

Sediment delivery to streams is expected to be substantial. Despite the planned mitigation measures, conventional harvesting in sensitive areas, near Buckheart Run and along headwaters, and with 35 stream crossings raises the risk. There likely would be some effect to water quality in terms of sediment, and State turbidity standards likely would be exceeded in the short-term. Overall the long-term State designation of water meeting standards would be maintained, but short-term sedimentation would be expected. As discussed above, logging during the normal winter shutdown would likely increase the risk of greater sediment delivery. Once sediment is delivered to a stream channel, it can reside within the channel for very long duration, frequently decades or even longer

All functioning stream channels within and near harvest units would be protected by implementing the riparian buffer protection measures described in Attachment 1 and the Forest Plan filterstrip guidelines. There would be no substantial or long-term adverse effects to riparian resources.

The clearcut equivalent analysis represents approximately 20% of the watershed area that would have vegetation removed. This basal area reduction is at the low end of the range at which increases in stormflows could potentially occur, which would generally not be considered to be a substantial effect. Also, this method (of converting thinning into equivalent clearcut acres) may tend to somewhat overestimate the amount of increased flow from thinning because some of that potential flow increase would likely be utilized by the remaining overstory. But other factors that could potentially contribute to increased stormflows are the conventional harvesting on 182 acres of wet soils, 89 acres of harvesting in coves, and an estimated 35 skid road stream crossings. Skid roads have the potential to contribute to stormflow response, mostly when they collect runoff from wet sensitive areas such as these and deliver it to channels. These factors are considered important, and they raise the likelihood of having somewhat greater effects on stormflow characteristics in the Buckheart Run watershed; the magnitude of that added contribution to stormflow is not known, but probably would not be great.

Overall the potential to increase stormflows in Buckheart Run would be expected to be small to modest, and the magnitude of such increases would not be substantial. Such stormflow increases would not be expected to contribute in any substantial way to downstream flooding in Morris Creek. But modest increases in stormflow characteristics or peak rates of runoff, or to altered pathways of storm runoff, coming from primarily roads and skid roads would likely increase erosion within harvest

areas, and delivery to the downstream channel system as sediment. This would likely increase sediment effects in Buckheart Run and Morris Creek.

Stormflow-related sediment effects downstream of the proposed Buckheart Run activities would be cumulative with the proposed harvesting effects in the remainder of Morris Creek. These effects will be considered in the Morris Creek discussion.

Previously described mitigation measures help reduce the potential for adverse sediment and stormflow effects.

Overall, adverse effects from sedimentation likely would be substantial in Buckheart Run. Some of this sedimentation effect is attributable to the amount and location of ground disturbing activity, and the existing flow pathways from roads and harvest areas to Buckheart Run. Increases in stormflow would be likely to add to the potential to erode soil and deliver sediment, either from the disturbed areas or from new pathways created by overland flow. Otherwise, modest increases in stormflow or changes in stormflow characteristics (peakflows) would not have substantial adverse effects downstream. Increased streambank erosion in Buckheart Run resulting from any potential changes in stormflows would not be expected. The risk of increased erosion and sediment delivery resulting from conventional harvesting would be greater if it occurs outside the normal operating season. Potential adverse effects to riparian resources would be mitigated.

The 34% of the total Morris Creek watershed harvested, and the 31% harvested conventionally is considered to be a high proportion of the watershed.

Road construction and reconstruction activities have potential to deliver moderate or greater amounts of sediment to the Morris Creek stream system, especially in the short-term during and following construction until mitigation measures have time to become effective. Portions of roads (928, 911, 912 and 913) would be on mid-to-upper slopes, in gentle terrain and away from streams. But much of the proposed road work is in sensitive areas of wet soils, coves and with many expected stream crossings. FR928 and 913B have especially high potential for sediment effects in Morris Creek, because of their lower slope positions in wet soils and with stream crossings. FR913B in particular has a major stream crossing on Morris Creek and crosses wet soils on both approaches to the stream, and the potential for sediment effects is high, especially in the short-term. The Morris Creek stream crossing should be by a bridge, and a temporary bridge would be preferable. Standard road construction and maintenance mitigations would help reduce sediment effects, but those effects could still be substantial.

Some of the conventional harvesting in Morris Creek is mid-slope or higher, some near or along ridges in gentle terrain and away from stream channels, and some of these areas have less sensitive soils. But many areas of proposed harvesting (especially in stands 9, 22, 52 and 66) are nearer to the main stream and contain wet soils and functioning stream channels within the harvest units. Harvesting in the headwaters has numerous functioning stream channels, which are scattered throughout the proposed harvest acreage. Forest Plan filterstrip mitigation measures will be followed to reduce the risk of substantial sedimentation. But harvesting in most stands would have skid roads that cross one or more channels (38 potential stream crossings total). The 85 acres of conventional harvest in stand 52 is expected to have 8 potential skid road stream crossings.

There is substantial acreage of proposed harvesting in wet soils and in coves, and probable skid road locations with 38 small stream crossings

In spite of mitigations, sediment delivery to streams in this portion of the Morris Creek sub-watershed is expected to be substantial. Addition of the expected substantial sedimentation effects from the Buckheart Run watershed to Morris Creek (below their confluence) means even more sediment

coming into the Morris Creek stream system. That cumulative sediment impact in Morris Creek would likely be substantial.

There likely would be effects to water quality in terms of sediment, and State turbidity standards likely would be exceeded in the short-term, mostly during periods of storm runoff or saturated soil conditions. Overall the long-term State designation of water meeting standards would be maintained, but substantial short-term sedimentation would be expected.

There would be no substantial or long-term adverse effects to riparian vegetation resources, because of the areas near streams that would have no harvest.

For stormflow analysis, the clearcut equivalent vegetation removal would be 14% of the Morris Creek area, not including the Buckheart Run portion. When the Buckheart Run portion is added, less than 16% of the watershed area would be removed in clearcut equivalent terms.

Taken by itself, this is not considered to be enough of a reduction in basal area to affect stormflows, especially considering that the method is designed to overestimate flows from partially cut areas. But other factors that could potentially contribute to increased stormflows are the conventional harvesting acreage especially in coves, slopes over 40% and the numerous skid road stream crossings. Skid roads have the potential to contribute to stormflow response, mostly when they collect runoff from wet sensitive areas such as these and deliver it to channels. These factors are considered important, and they raise the likelihood of having greater effects on stormflow characteristics in the Morris Creek watershed; the magnitude of that added contribution to stormflow is not known, but could be measurable.

Some modest stormflow increases in non-perennial tributaries of Morris Creek are possible, where most or all of a small non-perennial watershed would be conventionally harvested. Increases in stormflow could be moderate and measurable in those situations, but would be somewhat attenuated at the larger watershed scale. The small size and scattered locations of clearcut harvest units would help reduce effects, and none occupies an entire watershed as large as those reported in the referenced research findings. No substantial stormflow or peakflow effects are expected to result from thinning trees, but conventional harvesting in the described sensitive areas would likely contribute to stormflow. The above-mentioned riparian tree retention and filterstrip protection would apply along all stream channels, further lessening effects and maintaining a portion of the site transpiration capacity. The likelihood of increasing streamflows can also be reduced by staggering the timing of the harvests to allow for some regrowth of vegetation between cutting periods.

Overall there is potential to increase stormflows in Morris Creek. Such stormflow increases would not be expected to contribute in any substantial way to downstream flooding in Morris Creek, and not measurably in the Cherry River. But modest increases in stormflow characteristics or peak rates of runoff, or to altered pathways of storm runoff, coming from primarily roads and skid roads would likely increase erosion within harvest areas, and delivery to the downstream channel system as sediment. This would increase (add to) sediment effects in Morris Creek.

Prompt and effective application of mitigation measures previously described likely would not reduce sediment effects to the point of being non-substantial in Morris Creek.

Overall, adverse effects from sedimentation likely would be substantial. Some of this sedimentation effect is attributable to the amount and location of ground disturbing activity, and the existing flow pathways from roads and harvest areas to Morris Creek. Increases in stormflow are likely to add to the potential to erode soil and deliver sediment, either from the disturbed areas or from new pathways created by overland flow. But modest increases in stormflow or changes in stormflow characteristics (peakflows) would not have substantial adverse effects downstream. Changes in streambank erosion

in Morris Creek resulting from any potential changes in stormflows would not be expected. The risk of increased erosion and sediment delivery resulting from conventional harvesting would be even greater if it occurs outside the normal operating season. Potential adverse effects to riparian resources would be mitigated.

Modest increases in stormflows could contribute a small additional increment of stormflow to the overflow problems at the low water crossing on Morris Creek at state road 94/5. Yearly high flows there were described (in No Action Alternative) as overflowing the crossing structure and causing erosion and additional stream sedimentation. Modest stormflow increases caused by the Proposed Action would not be expected to substantially add to this problem, partially because of watershed scale factors, and because the relative effect on stormflow would be less for these larger size storms.

Table 3-8 - Proposed Action Activity Measures by Watershed

Proposed Action	Curtin Run	Coal Siding Run	Hol-comb Run	Buck-heart Run	Morris Creek (W/O Buckheart Run)	Morris Creek (incl Buckheart Run)	Cherry River (Other)	Entire Project Area (9374 acres)
Skid Roads (miles)	6.1	8.9	2.3	9.1	14.7	23.8	5.7	46.6
Landings (acres)	2.5	4	1.5	2.5	8.5	11	0	19
Conv. Harvest on Wet Soils (acres)*	66	105	9	182	207	389	35	604
Conv. Harvest in Coves (acres)*	36	49	7	89	112	201	35	328
Conv. Harvest on Slopes >40% (ac)*	0	0	0.4	1.9	22	23.9	0.7	25
Road Construction (miles)	0.6	0.7	0.1	2.1	2.1	4.2	0.7	6.3
Road Reconstruction (miles)	0	0.2	0	0	2.4	2.4	0	2.6
Road Maintenance (miles)	1.7	0.6	0	0	0.9	0.9	0	3.2
Channel Crossings by Roads (#)*	0	1e	0	1p,5e	3p,12i,7e	4p,12i,12e	1i,1e	31
Channel Crossings by Skid Roads(#)*	1p,6i,8e	7i,13e	5e	8i,27e	12i,26e	20i,53e	1i,8e	122
Portion of Watershed Harvested (%)	34.0	29.7	3.5	47.0	28.1	33.8	22.9	19.1
Portion Wtrshd. Harvested Conv. (%)	34.0	29.7	3.2	47.0	24.5	31.3	9.8	16.1
Clearcut Equivalent % Harvested	15.2	14.8	-	19.9	13.5	15.4	8.4	-

Wet soils, coves and slopes over 40% may occur in the same location, thus the acreage can not be added for a total.

Channel Crossings by Roads and skid trails are shown as occurring on Perennial (p), Intermittent (i), or Ephemeral (e) channels.

For the entire project area, potential stormflow and riparian resource effects would be low to very low and not substantial. Potential effects to riparian resources would be largely mitigated by application of the riparian buffer and filterstrip protection measures described, and would not be substantial. Potential effects from stormflow increases due to harvesting and road development are low and not substantial as far as downstream consequences are concerned. The potential to substantially affect stormflows in the various watersheds analyzed is low to very low, and would have almost no effect on small stream flooding. The potential to affect streambank erosion processes from expected small

increases in stormflow is very low and not substantial. The potential to adversely affect flooding in the Cherry River would be miniscule, and would not be measurable.

For the sedimentation issue, the potential for adverse sediment delivery to streams and water quality impacts (suspended sediment and turbidity) for most of the project area watersheds would range between small and substantial. Exceptions would be the Holcomb Run and North Fork watersheds, and the 1608 acre watershed area for un-named streams that drain directly to Cherry River. For these exceptions, expected sedimentation effects would be low and not substantial.

Expected sediment effects for the remaining watersheds are summarized as follows. These effects are for the relatively short-term period of time which includes the duration of the activity until completion, and all mitigation measures are fully implemented, and also for the first year or so after full mitigation. This is the period of time in which mitigation measures should achieve most of their effectiveness. Beyond this period of time, sedimentation resulting from roads, skid roads, landings and harvesting should be declining to a low degree of impact provided that mitigation measures are functioning properly and as designed. Some residual longer term but lesser sediment effects would likely persist, possibly to between 5 and 10 years according to research findings.

- Curtin Run ……Small to moderate sedimentation effects
- Coal Siding Run ...……Moderate or higher sedimentation effects
- Buckheart Run ……..Substantial sedimentation effects
- Morris Creek …….Substantial sedimentation effects
- Cherry River main stem….Low sedimentation effects below Morris Creek

The magnitude of expected sediment effects in these streams is based to a large degree on the watershed sensitivity characteristics described for these watersheds, and the occurrence of project activities in highly sensitive areas. Activity measures are summarized in Table 10 above.

Compliance with the Clean Water Act would not be achieved in those instances where the State turbidity limits were exceeded.

As discussed previously, sediment delivery to the main receiving stream within each watershed can be exacerbated by small to moderate increases in stormflows that are brought on by harvesting and road development. Considering the expected low magnitude of stormflow increases, the duration of increased stormflows would be expected to be fairly short, probably 5 years or less before returning to pre-harvest conditions. Also, conventional yarding and sometimes hauling conducted outside the normal operating season of May 1 to November 15 would generally raise the risk of greater sediment effects.

Sedimentation effects in the Cherry River main stem would result from cumulative impacts of the various separate named and un-named watersheds. Those sediment effects generally would be considered low, because of the size of the Cherry River water body, and some attenuation of sediment effects with distance downstream from the sediment source areas. Noticeable sediment in the Cherry River downstream from Morris Creek watershed under some conditions of stormflow would be possible, and could exceed the State water quality limit for turbidity. Under most conditions of stormflow, however, when flow and sediment in the Cherry River are already high, additional sediment coming from Morris Creek and the other watersheds in the project area probably would not be noticeable.

Alternative C

Alternative C differs very substantially from the Proposed Action in terms of the potential for adverse sediment effects to water resources. The main differences would be in the substantially reduced

amount of conventional harvesting (both in total acreage and in sensitive area locations), and in the greatly reduced miles of road construction and reconstruction. Helicopter harvested acreage would be substantially greater in Alternative C, replacing much of the conventional harvested acreage, but it does not require skid roads. Whereas the Proposed Action would have approximately 9 miles of new and reconstructed road, Alternative C would have approximately 2 miles of new construction, 1.3 miles of reconstructed road, and ¼ mile of temporary road (about 3.5 miles total). The temporary road segment would differ from other road construction primarily in its closure after the sale, when it would not be expected to be used by vehicles. Otherwise, construction and use would be similar during the period of use.

Roads in Alternative C were discussed previously in "common effects" section, and most effects were discussed there. There is additional length of construction in Buckheart Run, and in an intermittent channel which would be crossed by the road in Alternative C, at a gently sloping location near the upper end of the portion that would be classified as intermittent. Forest Plan filterstrip requirements would reduce sediment at this location during and after construction. All road maintenance in Alternative C would be identical to that in the Proposed Action. Road maintenance effects were described as relatively small short-term sediment effects, but long-term and overall reductions in sediment compared to the consequences of not doing the road maintenance.

The regeneration harvest acreage (clearcut and shelterwood) would be divided fairly evenly between conventional and helicopter yarding methods. But overall, helicopter yarding (1092 acres) would exceed the 606 acres of conventional yarding. (In the Proposed Action, conventional ground skidding would be the yarding method used on 84% of the harvested acres.) For the entire project area, Alternative C conventional harvesting on wet soils (135 acres), in coves (91 acres), and on slopes over 40% (less than 7 acres), are all substantially less acreage than what would occur in the Proposed Action. In each individual watershed, conventional harvest acreage on wet soils or in coves would be less or substantially less, and the same or less on steeper slopes, so potential effects to water would be much less. Activity measures for Alternative C by watershed are summarized in Table 11.

Table 3-9 – Alternative C Activity Measures by Watershed

Alternative C	Curtin Run	Coal Siding Run	Holcomb Run	Buck-heart Run	Morris Creek (W/O Buck-heart Run)	Morris Creek (incl Buck-heart Run)	Cherry River (Other)	Entire Project Area (9374 acres)
Skid Roads (miles)	2.8	5.8	0.5	1.0	6.3	7.3	3.6	19.9
Landings and temp road (acres)	3	5	0.5	2.1	8	10.1	0	19
Conv. Harvest on Wet Soils (acres)	17	54	0	4	46	50	14	135
Conv. Harvest in Coves (acres)	14	19	2	4	38	42	14	91
Conv. Harvest on Slopes >40% (ac)	0	0	0	0	6	6	0.7	6.7
Road Construction (miles)	0	0.7	0	0.3	0.8	1.1	0	2
Road Reconstruction (miles)	0	0.2	0	0	1.1	1.1	0	1.3
Road Maintenance (miles)	1.7	0.6	0	0	0.9	0.9	0	3.2
Channel Crossings by Roads (#)	0	1e	0	2e	4i,4e	4i,6e	0	11

Channel Crossings by Skid Roads (#)	2i,3e	3i,4e	2e	2e	7e	9e	6e	29
Portion of Watershed Harvested (%)	31.6	26.5	3.5	42.4	25.8	30.7	24.8	18.1
Portion Wtrshd. Harvested Conv. (%)	13.7	20.8	1.1	6.3	8.9	8.1	7.1	6.5
Clearcut Equivalent % Harvested	-	-	-	18.1	-	13.5	-	-

Wet soils, coves and slopes over 40% may occur in the same location, thus the acreage can not be added for a total.

Channel Crossings by Roads and skid trails are shown as occurring on Perennial (p), Intermittent (i), or Ephemeral (e) channels.

Clearcut equivalent analysis was done for Buckheart and Morris Creek because they had the higher potential for stormflow effects in the Proposed Action.

The 10 acre wildlife savannah would be a heavy partial harvest, but about 1/3 of the stand density would remain on-site. This proposed savannah is within one of the small un-named watersheds that drains directly to the Cherry River. But it is small in size and located on upper slopes along or near the ridge, and away from streams. No substantial effects o watershed values would be expected.

Potential affects to riparian resources in Alternative C would be very similar to the Proposed Action, except for one important difference. There would be far fewer skid road small stream crossings (total of 29) in Alternative C compared to the 122 in the Proposed Action, and thus fewer direct impacts to riparian areas. Those effects are not substantial.

Potential for effects to stormflows would be less in Alternative C, primarily because conventional harvesting on wet soils and in coves, and the number of skid road stream crossings would all be substantially less. Even though the total acreage harvested would be only slightly less, these other factors would reduce the potential for increased stormflows. In the Proposed Action, potential increases in stormflow were expected to be relatively small and not substantial, so would be even less in Alternative C. There would be no substantial effect in terms of increased stream bank erosion.

Replacement of stream crossing structures on FR908 in Coal Siding Run, and on WV94/5 at the Morris Creek crossing, would increase sediment delivery in the very short-term in these two streams. Soil erosion and stream sedimentation would result from the construction activities at and near the crossings, but the duration of that sediment increase would be limited largely to the period of construction and implementation of mitigation measures. State required best management practices for construction in and around streams would be followed to reduce sedimentation. The expected short-term impacts would be greatly off-set by substantially reduced erosion and sedimentation at and near the crossings for the long-term. Overall long-term reductions in sediment would occur, by restoring adequate stormflow capacity at the crossings, reducing overtopping and road erosion problems, and correcting within channel hydraulic problems that tend to increase streambank erosion near the road. The greatest benefit of doing this type of project would occur in Morris Creek, but would require coordination and partnership with the State.

The potential for substantial sediment effects from harvesting and roads is greatly reduced in Alternative C, for the above reasons. In every watershed in which harvesting is proposed to occur, conventional harvested acreage would be less and helicopter harvested acreage would be greater in Alternative C. Expected sedimentation from activities in Alternative C would be much less in all watersheds. In Curtin Run, Holcomb Run and Un-named direct drains to the Cherry River, expected sediment effects to streams and water quality would be much less and not substantial in either the short or long-term. A more detailed discussion follows for the watersheds that had the highest potential for sediment effects in the Proposed Action.

With Alternative C, there would be no adverse effects to any wetlands (the same as with the Proposed Action). And there would be no adverse effects to any floodplains. The stream crossings by FR913B (Morris Creek) and FR928 (Buckheart Run) would not occur in Alternative C.

Coal Siding Run Most of the acreage proposed for harvesting in the Proposed Action located in the most sensitive portions of the watershed has either been dropped (especially C-48 stand 16), moved farther from the main stream channel (stand 62), or converted to helicopter yarding (stands 18 and 61/65/67). Conventional harvest occurring in wet soils (54 acres) would be about half that of the Proposed Action, and conventional harvest in coves (19 acres) would be about 39% of that in the Proposed Action. Expected skid road stream crossings would be far less in Alternative C (3 intermittent and 4 ephemeral) compared to 20 in the Proposed Action. New and reconstructed roads are the same.

The 5 acres disturbed by landings would be slightly higher than the 4 acres in the Proposed Action, but would not have a substantial sediment effect.

Also, potential effects on stormflow would be less because of less skidding in sensitive areas, and would not be substantial.

For all these reasons, the potential for substantial sediment effects to water would be much less in Alternative C. Sediment effects would be low and not substantial, both for short-term and long-term effects. Expected sediment effects on water quality would be low and short-term. In limited instances of storm runoff the state turbidity limits could be exceeded for short periods of time in Coal Siding Run near where skid roads cross functioning stream channels. While this effect is not considered substantial, it would not be in compliance with the Clean Water Act without further mitigation, as discussed later in this section.

Buckheart Run Nearly all of the conventional harvesting (389 acres) in the Buckheart Run watershed included in the Proposed Action would be helicopter yarded in Alternative C. Conventional yarding would occur on about 6% of the watershed in 2 stands (stands 65 and 66), nearly all of which is high in the watershed near or on the ridgetop and away from nearly all small streams. There are only 2 expected skid road crossings on ephemeral streams near the top of the watershed. Conventional harvest in wet soils (4 acres) and in coves (4 acres) would be a small fraction of those in the Proposed Action, and located high in the watershed near the ridge. Landings are reduced to 2 with less disturbed area (1.5 acres) high in the watershed, and temporary road would disturb 0.6 acres.

Road mileage would be substantially reduced (1.5 fewer miles of new construction), and have only 2 ephemeral stream crossings in Alternative C. The major stream crossing on Buckheart Run requiring a bridge or other major structure in the Proposed Action would not occur.

Because skid roads would not be used or developed for helicopter yarding, the potential for sediment effects is very low. And the potential for adverse effects to riparian resources is less than in the Proposed Action. Those effects are very low and not substantial.

For stormflow analysis, the clearcut equivalent analysis shows about 18% of the watershed area. This basal area reduction is below the low end of the range at which increases in stormflows could potentially occur, and would not be considered to be a substantial effect, especially considering that this method may overestimate flows from partial cuts. Other factors thought to potentially contribute to increased stormflows in the Proposed Action were conventional harvesting in sensitive areas. In Alternative C, conventional harvesting on wet soils, coves and skid road stream crossings are all so low that the potential to add to stormflow because of these factors would be negligible. The expected effect of any small increase in stormflow on erosion and sedimentation from within harvest units would be very small and not substantial. Expected sediment effects on water quality would be very

low in both the short and long terms. It is not likely that state turbidity limits would be exceeded in Buckheart Run. Water quality effects would be very low and not substantial.

Riparian area effects would be minor and not substantial because of the few skid trail and road stream crossings along with no harvest in riparian areas.

Morris Creek In Alternative C, activities in the Morris Creek sub-watershed are much different than in the Proposed Action. Much of the conventional harvesting on 9% of the subwatershed is on upper slopes high in the watershed or near ridgetops and away from most small streams. Total skid road length and expected skid road crossings on ephemeral streams in the higher portions of the watershed are much less than for the Proposed action. Total skid road length would be reduced from about 14.7 miles in the Proposed Action. Conventional skidding would occur in fewer sensitive areas. Landings (11) would disturb about 8 acres, or about the same as in the Proposed Action.

Road mileage would be substantially reduced from the proposed action, but would have 7 small stream crossings, and one crossing of an intermittent channel.

The potential for adverse effects to riparian resources is less than in the Proposed Action. Those effects are very low and not substantial.

Including Buckheart Run, the combination of all harvest units with other actions would remove less than 14% of the watershed area, according to the clearcut equivalent analysis. This basal area reduction is well below the low end of the range at which increases in stormflows could potentially occur, and would not be considered to be a substantial effect. There are few other factors, such as skid trails, stream crossings and conventional harvest in sensitive areas thought to potentially contribute to increased stormflows, as shown in the table. The expected effect of Alternative C on increased stormflows would be very small and sedimentation from within harvest units would be very small and not substantial, in the short term and the long term. Riparian area effects would be minor and not substantial.

Expected sediment effects on water quality would be low. It is possible that in some localized segments of Morris Creek or smaller headwater channels the state turbidity limits could be exceeded, mostly near small watersheds draining conventional harvest areas. Those water quality effects would be low, short-term and not substantial.

Sedimentation is occurring in Morris Creek under the existing condition (described in the No Action alternative) from state road drainage problems on WV94/5. Further overall reductions in sediment delivery to Morris Creek could be achieved by correcting those drainage problems. Those actions could include adding more culverts for ditchline relief, increasing the size of some existing road culverts (to reduce plugging), ditchline armoring with small rip-rap, placing gravel on portions of the road nearest the headwater channels, and stabilizing small gullies below the road at culvert discharge points.

The potential for substantial sediment delivery to Morris Creek would be much less in Alternative C. Sedimentation would be expected to be low and not substantial, both for short-term and long-term effects. Expected sediment effects on water quality would be low and short-term. It is possible that in some localized segments of Morris Creek or smaller headwater channels the state turbidity limits could be exceeded, mostly near small watersheds draining conventional harvest areas. While this water quality effect would be considered to be low, short-term and not substantial, it would result in short-term non-compliance with the Clean Water Act, unless further mitigations are applied as discussed below.

The 9374 Acre Project Area

None of the expected effects for any of the project area watersheds would be substantial. All expected effects for each watershed and for the Cherry River would be low, mostly short-term and not substantial. This is because the potential for adverse effects has been mitigated, largely by modifications to project design. The most important of those modifications is the change to helicopter yarding methods in the most sensitive portions of each watershed. Reduced haul road mileage and fewer major stream crossings is another important factor. Riparian resources would be better protected with Alternative C than in the Proposed Action. Potential effects on stormflows would be smaller, because of much less ground disturbance in the wet soils and coves, and far fewer skid road stream crossings. The watersheds that likely would have substantial sediment effects in the Proposed Action (Buckheart Run and Morris Creek), would have low and not substantial sediment effects in Alternative C. Potential sediment effects in all watersheds are much lower in Alternative C. Potential effects to riparian resources and stormflows are low, short-term and not substantial.

For Alternative C, the only remaining effects of concern are the situations where State turbidity limits may be exceeded for short-term periods within the Coal Siding Run and Morris Creek watersheds. While these effects are considered low and short-term, they would constitute non-compliance with the Clean Water Act, as administered by the State of West Virginia. In order to address these remaining concerns and effects with Alternative C, additional mitigation measures are included in this alternative, itemized below, that would further reduce the potential for sedimentation of these two streams. When implemented as planned, these additional mitigation measures will further reduce the potential for exceeding the State turbidity limits to a point that is very low and not likely to occur. By implementing these additional mitigations, compliance with the Clean Water Act would be achieved. These additional mitigations are itemized below, and have been added to Chapter 2 as required mitigation for Alternative C.

- Drop from Alt. 1 harvesting the following areas:
    - West edge of Comp. 48 stand 52; no skid roads into the cove.
    - West side of Comp. 62 stand 8, below FR913.
    - All of Comp. 62 stand 4.
- For the following harvest areas in the Coal Siding Run watershed, only one conventional harvest unit would be open at one time (of three sale units that would be set up in the sale contract). If a skid road is needed outside a payment unit for logistics or environmental reasons, it can be permitted to access the open harvest unit.
    - Comp. 48 stand 52, conventional thinning (one unit).
    - Comp. 48 stand 52, conventional clearcut (one unit).
    - Comp. 48 stands 62 and 64, conventional thinning (one unit).
- For the following harvest areas in the Morris Creek watershed, only one conventional harvest unit would be open at one time (of a minimum of two sale units that would be set up in the sale contract). If a skid road is needed outside a payment unit for logistics or environmental reasons, it can be permitted to access the open harvest unit.
    - Comp. 62 stands 11, 18 and 20, conventional thinning (minimum of one unit).
    - Comp. 62 stand 8, conventional thinning (one unit).
- For Alternative C harvest areas in Comp. 48 stands 52, 62, 64, and Comp. 62 stands 8, 11, 18 and 20, the following additional mitigations would apply.
    - Harvest operations in these conventional areas will be restricted to the Normal Operating Season ONLY (May 1 to November 20). No harvesting activities, including skidding, in the normal winter shutdown period (November 21 to April 30) would occur.

- Skid roads serving an area that has completed harvesting in that area (served their intended use) will be closed out within 7 days of skid road acceptance by the Forest Service. Skid road closure (waterbars, lime, seed and mulch) will be completed as harvesting is completed. They will not be held until completion of the entire harvest unit. If this measure can not be accomplished within the normal seeding seasons, then waterbars, lime and mulch will be promptly done within the specified time frame, and seeding done as soon as the needed seeding conditions occur.
- Wet weather shutdown and temporary waterbars are standard measures required and used in Sale Administration. In these specified stands especially close attention will be paid to accomplishing:
  - Wet weather shutdown
  - Temporary waterbars in place for weekends and all other periods of inactivity
- Skid road design would include "vertical rolling" at channel approaches.
- Install silt fence (or hay bales) at toe of fills along skid road stream crossings (but not across channels).

Cumulative Effects

Land disturbances that have the greatest potential for cumulative adverse effects to streams and riparian areas include timber harvesting and skid roads, road construction, reconstruction and maintenance, state road and highway maintenance, flood damage repair activities, natural gas pipelines, coal mining on private lands, old inactive mines and mine access roads on federal and private lands, agricultural activities on private lands, and the city of Richwood and smaller communities within the watershed of Cherry the size of the project area and proposed activity acres.

Alternative A – No Action

Alternative A would not implement new earth disturbing activities that would either reduce or contribute additional water quality, storm flow or riparian effects. Thus, it would not add to the cumulative effects of the past, present, and reasonably foreseeable future actions.

Proposed Action – Cumulative Effects

Past, Present and Reasonably Foreseeable Actions on National Forest Lands

Timber harvesting has been a major land use within the Cherry River watershed on both federal and private lands in the past, continues to be at present, and will be for the foreseeable future. The majority of the watershed was logged in the early 1900s, and extensive watershed damage no doubt resulted from that historic logging. Old roads and railroad grades still exist. Streams are largely lacking in LWD, in part due to historic logging activities before these lands came into federal ownership. Channels are less stable, and aquatic habitat is less diverse than it would be if natural processes of LWD recruitment and retention in the streams had been maintained. Amounts of fine sediment in most or all of these streams are known or believed to be higher than desired for native brook trout.

Timber harvesting activities on National Forest and private lands have had some adverse effects on water and riparian resources. Generally, timber harvesting on federal lands has less sedimentation and riparian resource effects than logging on private lands because roads, especially newer roads, are better located, constructed and maintained, harvesting is restricted in the more sensitive areas (such as avoiding the main streams and riparian areas, and avoiding ground disturbance on steep and more

sensitive slopes and soils), and more effective site specific mitigation measures are now used. Helicopter yarding is replacing ground skidding in some of the more sensitive sites, such as steep slopes.

The proposed timber harvesting and road development in the Proposed Action would all take place over a 5 to 7 year time period. Additional timber harvest in future years within this planning area could occur each entry period, about every 10 to 15 years as the Forest Plan is implemented. As the road system and a stable skid road network are developed to serve portions of the area, future entries would re-use them, reducing future new disturbance. Helicopter logging may be used more widely in the more sensitive portions of watersheds.

The State's BMP's for control of erosion and sediment from logging and roads applies to timber harvesting on federal and private lands. These State BMP's were updated and re-issued in 2002.

Also, in September 1992, West Virginia adopted a logging sediment control bill to exert greater control over the logging industry and reduce water pollution. As its provisions and the BMP's are put into practice, soil and water protection will continue to improve in private land timber management.

Alternative B

Expected effects of past, present and reasonably foreseeable future actions that might affect water quality, sedimentation, riparian areas and stormflow or flooding, on both National Forest and private lands, have been analyzed.

There would be no cumulatively substantial adverse effects to riparian resources. This is because riparian resource conditions resulting from actions on private lands have almost no effect on riparian resource conditions on the National Forest lands in these watersheds. Riparian resources on National Forest lands within areas of harvesting and road building would be protected by applying the riparian buffer mitigation measures in Attachment 1, and Forest Plan filterstrip standards.

Cumulative effects on stormflow characteristics (increases in stormflow and peakflow) would be small and not substantial. Stormflow effects from Proposed Action activities in the various watersheds analyzed are expected to be low to very low. Effects from actions on private lands and state/county roads are not considered to be substantial because of their locations, limited extent of activities, separation in location and time for timber harvests, and because they affect fairly small portions of the named watershed acreages. But state road WV94/5 does concentrate storm runoff and speed it to Morris Creek and its headwaters, having a small overall effect on stormflows in Morris Creek. (The more substantial impact of this is increased sedimentation from the state road.) Overall, small stormflow effects largely for the short-term resulting from the Proposed Action activities would not result in cumulatively substantial increases in either stormflow volume or peakflows in the small named watersheds. There would be almost no effect on small stream flooding because the cumulative additions from other actions would be too small to affect it, and because flooding is controlled more by the amount of precipitation. The potential to affect flooding in the Cherry River would be miniscule.

There is a high likelihood of cumulatively substantial sedimentation in some of the small streams. Exceptions would be the Holcomb Run and North Fork watersheds, and the small un-named watersheds draining directly to Cherry River. Cumulative sedimentation effects in Curtin Run are not expected to be substantial. This is because there is so little private ownership, the direct effects of the project are small, and because past National Forest timber harvest occurred 8 or more years ago, and those disturbed soils are largely revegetated, stable, and not producing much additional sediment in Curtin Run.

For the remaining small watersheds in the project area, cumulative sedimentation effects would be expected to be moderate to substantial. Proposed Action sedimentation effects in Coal Siding Run were described as moderate or higher, and substantial for Buckheart Run and Morris Creek. In Coal Siding Run watershed, the limited private ownership and modest level of private activity that would disturb soils and their location along the top of the watershed likely would not result in substantial additional sedimentation. Recent National Forest harvesting and road building likely is not delivering much sediment to Coal Siding Run now, although the truck road crossed it twice, and skid roads were developed in some low and wet areas. These likely are still delivering some additional sediment to the stream. And some sediment delivered to the stream during and following the harvesting likely is still stored within the substrate, increasing its fine sediment composition.

In both Buckheart Run and Morris Creek, cumulative sedimentation effects are expected to be substantial. The Proposed Action alone is expected to have substantial short-term sedimentation effects in both streams, and lesser long-term effects possibly out to between 5 and 10 years. And because of the location of those activities and extent of ground disturbance, longer-term residual sedimentation effects likely would persist. The cumulative effects of past National Forest activities and those from private lands and state roads may not be great. (WV94/5 is a more substantial additional source of sediment to Morris Creek.) But in Morris Creek in particular they add sediment in moderate amounts, and small to moderate amounts in Buckheart Run. This sediment is entering and being routed through streams that are already high in fine sediment, as well as being impacted by other factors such as reduced physical quality of aquatic habitat, and acid rain effects on water quality. Cumulative effects of these actions and processes together with sedimentation effects from the Proposed Action would be substantial. As discussed earlier, increased stormflows, although considered to be moderate, would increase the amount of sediment delivered to these streams.

The State turbidity limits would be expected to be exceeded in Buckheart Run and Morris Creek for the short-term period (as defined earlier), and would occur primarily during active logging in wet soils and near streams, and during periods of storm runoff. Turbidity limits could be substantially exceeded in these two streams during active logging with the Proposed Action. In Coal Siding Run turbidity limits likely would be exceeded in the short-term, and may be exceeded in Curtin Run on a more localized basis.

Despite the expected sedimentation effects in all these streams, some of it substantial, and the expected effects on turbidity (and suspended sediment), long-term State designation of water meeting standards likely would be maintained. Intermittent and relatively short-term increased sedimentation, even if substantial, would not be expected to result in any of these streams being listed as impaired water quality in the long-term. In the 2004 State assessment of streams, none of the small streams in the project area were listed as impaired water quality, and this would not be expected to change as a result of the Proposed Action.

Cherry River Cumulative effects for riparian resources along the Cherry River main stem would not be affected by the Proposed Action. There is no proposed activity within or near the riparian area of the river.

The Cherry River receives chronic and substantial supplies of sediment from widespread and varied human-caused sources, as well as natural sources of watershed and streambank erosion. Floods contribute large quantities of sediment from upland sources such as roads, mined lands and other disturbed areas. Some of this is a natural watershed process, but it is likely that the cumulative effect of all land uses and activities within the Cherry watershed have contributed to rates of stormflow runoff and possibly some peakflows, particularly for the more routine storm events in the growing season. The magnitude of cumulative stormflow effects is not possible to say, but could be more

substantial for non-flood producing storms. Some of these effects are related to the condition of riparian areas, and LWD in streams. Since most of these streams are somewhat modified systems, and many are deficient in LWD and other stream roughness features, with simplified structure, stormflow energy would be expected to be greater and channel damage is likely to be greater. Greater amounts of channel sediment and bedload can be moved in larger storms and floods as a result.

The potential to increase stormflows and affect flooding in the Cherry River from any cumulative effect of the Proposed Action would be miniscule, and would not be measurable. The Cherry River likely is being affected by increased rates of storm runoff and possibly peakflows from the cumulative effects of all the previously discussed activities within the watershed. Most of those potential stormflow effects in the Cherry River are believed to be associated with activities on large areas of private lands, and with the county/state road system. Although very small (potential) increases in stormflow in the small project area streams would add a small additional increment to the river, it would be too small to be measurable at that watershed scale, and would have essentially no effect on flood elevations.

Cumulative sedimentation effects in the Cherry River from the Proposed Action would generally be small and not substantial. The existing sediment load and turbidity in the river, mostly during periods of storm runoff, is considered to be high. Most of the sedimentation in the river is believed to be coming from private lands south and east of Richwood and Fenwick, and from the state road and highway system. Proposed Action activities would deliver additional sediment to the river, but in amounts that would be small compared to the existing sediment load. Under most conditions of stormflow, that sediment effect would most likely not be discernible in the Cherry River, even though substantial effects in Morris Creek may be occurring. But measurable turbidity in the river coming from project area activities could be detected at times, especially in the short-term, depending on how rain events track through the watershed or affect small localized areas.

Despite high existing sedimentation, the Cherry River is considered by the State to be meeting all required water quality standards and all of its designated uses. It is not considered by the State to be an impaired stream. Additional sediment from activities in the Proposed Action would not change that designation.

Alternative C

Cumulative effects with Alternative C all would be less than with the Proposed Action, to the extent that direct effects are smaller. Alternative C differs from the Proposed Action in that expected effects to riparian resources would be slightly less, potential effects on stormflow would be somewhat less, and sedimentation effects would be substantially less. Present and future effects would be the same with both alternatives.

Slight reductions in the rate of stormflow delivery to Morris Creek could be achieved by implementing recommended road drainage improvements on WV94/5, and some or all of these improvements could be done by the state at any time, although they are not currently scheduled.

There would be almost no effect on small stream flooding because the cumulative additions from other actions would be too small to affect it, and because flooding is controlled more by the amount of precipitation. There would be essentially no potential to affect flooding in Cherry River.

With the Proposed Action, cumulative sedimentation effects in those small streams ranged from very low (Holcomb Run, North Fork, and direct drains to Cherry River) to substantial (Buckheart Run and Morris Creek). The dominant factor in cumulatively substantial sedimentation effects was considered to be sediment delivered by activities included in the Proposed Action, and less from other actions in the watersheds.

Alternative C is expected to result in less to substantially less direct sediment delivery to some of the project area streams, especially Coal Siding, Buckheart Run and Morris Creek. The mitigations, helicopter yarding, less road and skid road, and fewer stream crossings will substantially reduce sedimentation. Alternative C reduces sediment delivery in all these streams, including Buckheart Run and Morris Creek, to the point that those effects will not be substantial, either by themselves or cumulatively. Additional modest reductions in sedimentation of Morris Creek would be achieved by implementing recommended road drainage improvements on WV94/5.

There would be no cumulatively substantial sedimentation, either short or long-term, in any of the small streams within the project area. There would be no substantial adverse effects to water quality. Designated uses of all streams would be maintained.

Cumulative sedimentation effects, as a result of smaller direct effects of Alternative C, in the Cherry River would be less with this alternative, but the difference would be small in terms of overall sediment loads in the Cherry. Effects would be mostly short-term, and would not be substantial.

Table 3-10 – Comparison of Alternatives, Activity Measures for the 9374 acre Project Area.

Project Area		Proposed Action	Alternative C
Skid Roads (miles)	0	46.6	19.9
Landings (acres)	0	19	18
Conv. Harvest on Wet Soils (acres)	0	604	135
Conv. Harvest in Coves (acres)	0	328	91
Conv. Harvest on Slopes >40% (ac)	0	25	6.7
Road Construction (miles)	0	6.3	1.8
Road Reconstruction (miles)	0	2.6	1.3
Road Maintenance (miles)	3.2	3.2	3.2
Channel Crossings by Roads (#)	0	31	9
Channel Crossings by Skid Roads (#)	0	122	29
Portion of Watershed Harvested (%)	0	19.1	18.1
Portion Wtrshd. Harvested Conv. (%)	0	16.1	6.5

Unavoidable Adverse Impacts

The alternatives would have minor adverse impacts on stormflow, peak flow and riparian areas as previously described.

As discussed for specific stream channels, there is potential that individual measurements could exceed state turbidity standards for streams under the Proposed Action, as described above.

For Alternative C, the risk that these standards could be exceeded is substantially reduced, as described above. Use of additional mitigation measures as described above would further reduce the potential for exceeding the State turbidity limits to a point that is very low and not likely to occur. By implementing these additional mitigations, compliance with the Clean Water Act would be achieved. No alternative would directly, indirectly or cumulatively, cause the Cherry River, or other stream channels to be classified as impaired.

For the Proposed Action, substantial adverse sedimentation effects would be expected to occur in Morris Creek and Buckheart Run, with more moderate adverse sediment effects in Curtin Run and Coal Siding Run. Proposed Action activities would deliver additional sediment to the Cherry River, but in amounts that would be small compared to the existing sediment load. Under most conditions of stormflow, that sediment effect would most likely not be discernible in the Cherry River. But measurable turbidity in the river coming from project area activities could be detected at times, especially in the short-term, depending on how rain events track through the watershed or affect small localized areas.

Alternative C reduces sediment delivery in all project area streams affected, including Buckheart Run and Morris Creek, to the point that those effects will not be substantial, either by themselves or cumulatively.

Irreversible or Irretrievable Commitment of Resources

Forest Plan Consistency

All alternatives considered in the Cherry River EA would be consistent with the Monongahela National Forest Land and Resource Management Plan (MNFLMP). This includes direction found in the Forest-wide standards and guidelines for soil and water resources (MNFLMP pages 79-82), fish habitat management (pages 83-84), Amendment 3 of the Forest Plan for fishery resource management, Appendix R of the MNFLMP for riparian area and filterstrip management, and with standards and guidelines specific to Management Prescription 3 (pages 137-138). The riparian management guidelines being used in the Cherry River analysis are site specific measures to further mitigate adverse effects on riparian resources that could occur as a result of applying the MNFLMP riparian guidelines alone.

The following laws were considered in this analysis: Clean Water Act of 1977 as amended, Executive Orders 11988 (floodplain management) and 11990 (wetland protection), and Forest Service Manual chapter 2520 Watershed Protection and Management. State requirements included in the BMP's were also considered.

Biological Resources

Aquatic Resources

Resource Impacts Addressed

This section discloses the effects alternatives may have on aquatic habitat and aquatic biota: in-stream sediment, stream stability, habitat complexity, habitat connectivity and aquatic passage; composition and productivity of aquatic communities including aquatic MIS and sensitive species. It answers the public's questions regarding measures that would be used to protect riparian areas, streams and aquatic biota. Other information related to aquatic resources is included in the sections of this document dealing with sensitive species, watershed effects and soils.

Affected Environment

Streams within the project area are generally low in large woody debris (LWD), which contributes to simplistic in-stream habitat conditions and some channel instability in portions of these streams. They are below their resource potential in this regard, due primarily to early 1900's (and to a lesser extent more recent) timber harvesting within riparian areas. 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 helps to dissipate stream energy. In intermittent and ephemeral channels LWD helps to trap and store sediment in the upper watershed, provides structure for channel stability and habitat, and helps retain moisture (Duncan et al, 1987; Hicks et al, 1991; Flebbe and Dolloff, 1995).

Perennial streams in the area have elevated levels of fine sediment in their substrate. Some of this is attributable to soils that commonly occur in riparian areas throughout the project area and have a high component of sand, while some of it is likely attributable to past road construction, timber harvesting and other land management practices. For example, in August 2002 five samples of stream substrate were taken from potential brook trout spawning sites in lower Morris Creek. The fine sediment composition of those substrates averaged 27.5%, and three of the five were between 29 and 36%. Fine sediment composition further upstream in Morris Creek was visually estimated to be even higher.

Past activities identified at the beginning of Chapter 3 have contributed to the following conditions in area streams:

- Elevated levels of fine sediment. Soil disturbed by past and present activities has entered streams and impaired the quality of aquatic habitat, increased the fine sediment composition of stream substrates, and would be expected to reduce oxygen levels in spawning substrate needed by developing fish embryos;
- Barriers to aquatic migration. Some road culverts installed in the area act as barriers to aquatic and semi-aquatic species movement within project area streams, which isolates various stream reaches and disrupts life history patterns for various aquatic organisms;
- Reduced channel stability, and simplistic in-stream habitat conditions. Past earth disturbance, removal of rocks and trees from stream beds and banks, and riparian harvesting adversely affected stream channels, reduced in-stream LWD, and the future recruitment of LWD. More large woody debris is needed in area streams to help dissipate stream energy and provide structure for channel stability and aquatic habitat (e.g. pools and cover) (06/29/2004 Fisheries/Aquatic Biota Resources Report); and
- Low degree of vulnerability to elevated stream temperatures in smaller streams. Reduced stream shading contributes to higher stream temperatures during summer and early fall low streamflow conditions, and can affect aquatic species occurrence. Riparian areas along most of the small perennial (and non-perennial) streams in the area are well forested. But past and present roads, and past harvesting in riparian areas have reduced the quality of riparian vegetation, and stream shading is less effective than what it would be if no harvesting or roads had occurred. Today this is mostly the case where State roads or other development or land clearing occupy riparian areas and closely follow streams. Early 1900s (and to a much lesser extent more recent) timber harvesting severely impaired riparian vegetation, and those forested riparian areas have not entirely recovered to their full potential, although are providing shade. Riparian areas along the North Fork and Cherry River are impacted to a much greater degree than the small streams within the interior of the project area.

Acid deposition is believed to be affecting water chemistry in the small streams within the project area. Stream chemistry within the area is influenced in large part by soils and the Pennsylvanian age

bedrock which is typically low in calcium carbonate minerals, which gives rise to streams that are low in acid neutralizing capacity (ANC). Project area streams are moderately to strongly acidic. Acid deposition is believed to be adding to the problem, having a long-term effect of lowering stream ANC, thus decreasing aquatic productivity.

Water chemistry was collected by the USFS in the project area in April 2005. Streams generally had low to moderate pH in the spring, but all were less than pH 7, and ANC was very low to low. Curtin and Buckheart Runs had the lowest pH (about pH 5.5) and the lowest ANC (less than zero). Coal Siding Run and Morris Creek had slightly higher pH (about pH 6.1) and ANC of 25 and 13 micro equivalents per liter (ueq/L), respectively. Holcomb Run had pH of about 5.6, and ANC slightly less than zero. See the Watershed Report for more details. While water chemistry within the project area indicates marginal to poor conditions in terms of aquatic productivity potential, some of these streams are supporting small populations of native brook trout and their associated aquatic community. In particular, native brook trout were found in Morris Creek, Holcomb Run and Coal Siding Run during June 2005. In July 2005 Curtin Run was sampled but no fish of any species were found.

Much of the North Fork Cherry River is being influenced by limestone sand additions within the North Fork watershed through the State's stream liming program. (Limestone sand added to streams raises pH and ANC, and adds calcium to improve water quality.) Water quality and aquatic productivity are being improved in the North Fork, and to a lesser extent downstream in the Cherry River mainstem. Small streams within the Cherry River project area are not currently being treated with limestone sand additions, and their water chemistry is reflected in the data discussed above. Overall, riparian and aquatic habitat and trout productivity in the Cherry River project area are considered to be somewhat impaired. This area's impaired condition is due to impacts associated with logging in the early 1900's prior to Federal ownership, timber harvesting activities on Federal and non-federal lands since the 1950s, and other more recent private land uses.

Aquatic macroinvertebrate data collected by the USFS in three of the project area streams (Morris Creek, Buckheart Run and Holcomb Run, between 1994 and 1998) generally indicate largely clean stream conditions in terms of human caused pollution. However, low macroinvertebrate diversity indices and low EPT richness values (indicating reduced health of the aquatic ecosystem) are probably due to a combination of other factors that can affect streams, including high fine sediment in stream substrates, low productivity waters, and acid deposition effects on water chemistry. (EPT richness refers to the total number of macroinvertebrate taxa within the orders Ephemeroptera, Plecoptera and Trichoptera, which is one indicator of how clean/healthy a stream is.)

A number of native fish (primarily non-game species) and introduced fish species inhabit streams in the project area. Aquatic threatened and endangered species are not known to occur in the project area or the watershed (Cherry River Biological Assessment, 02/06 and Cherry River EA, and Appendix X - Likelihood of Occurrence Table). Three Regional Forester's Sensitive Species are known to occur in the project area: the New River shiner, Kanawha minnow, and Candy Darter. Suitable habitat for Appalachian Darter is present. Sport fish community typing information taken from Monongahela National Forest Fisheries database indicates native brook trout (*Salvelinus fontinalis*) can be found in North Fork Cherry River, Holcomb Run, Morris Creek and Buckheart Run, (and Desert Branch, Hunters Run, Bear Run, and Left Branch which are outside the project area). Electro Fish Surveys were conducted in June of 2005 in Morris Creek, Holcomb Run and Coal Siding Run, with brook trout showing up in all surveyed areas and all life stages. The North Fork of the Cherry also supports a stocked trout fishery (brown trout -*Salmo trutta* and rainbow trout - *Oncorhynchus mykiss*). Other fish species found in the Watershed include small and largemouth bass, rock bass, stoneroller, suckers, chubs, shiners, several dace species, creek chubsuckers, and Northern Hogsucker exist within the Cherry River Watershed (Stauffer et.al.1995).

Table 3-11. Fish species within the Cherry River Watershed, HUC code #05050005060. (Stauffer *et al.* 1995)

Common Name	*Scientific Name*	*Comments*
central stoneroller	*Campostoma anomalum*	
striped shiner	*Luxilis chrysocephalus*	
silver shiner	*Notropis photogenis*	
rosyface shiner	*Notropis rubellus*	
New River shiner	*Notropis scabriceps*	Regional Forester Sensitive Species
Kanawha shiner	*Phenacobius teretulus*	Regional Forester Sensitive Species
bluntnose minnow	*Pimephales notatus*	
Tonguetied minnow	*Exoglossum laurae*	
Rosy side dace	*Clinostomus funduloides*	
blacknose dace	*Rhinichthys atratulus*	
longnose dace	*Rhinichthys cataractae*	
creek chub	*Semotilus atromaculatus*	
river chub	*Nocomis micropogon*	
bigmouth chub	*Nocomis platyrhychus*	
white sucker	*Catastomus commersoni*	
Northern hogsucker	*Hypentelium nigricans*	
creek chubsucker	*Erimyzon oblongus*	
tiger trout		*brook trout x brown trout*
brook trout	*Salvelinus fontinalis*	Monongahela NF MIS species
rainbow trout	*Oncorhynchus mykiss*	introduced species
brown trout	*Salmo trutta*	introduced species
pumpkinseed sunfish	*Lepomis gibbosus*	
bluegill sunfish	*Lepomis macrochirus*	
rock bass	*Ambloplites rupestris*	
smallmouth bass	*Micropterus dolomieu*	

Common Name	***Scientific Name***	***Comments***
largemouth bass	*Micropterus salmoides*	
greenside darter	*Etheostoma blennioides*	
fantail darter	*Etheostoma flabellare*	
Johnny darter	*Etheostoma nigrum*	
Candy darter	*Etheostoma osburni*	Regional Forester Sensitive Species
Appalachian darter	*Percina gymnocephala*	Regional Forester Sensitive Species
blackside darter	*Percina maculata*	

Many of the species in the project area (e.g. bass, sunfish, suckers, and minnows) are associated with warm to cool water habitats and primarily occur within the Cherry River. Other species (***e.g.*** trout and dace) have a lower tolerance for warmer stream temperatures and are typically found in the smaller, coldwater streams within the project area. Brook trout prefer streams with cold, clean water, a 1:1 pool to riffle ratio and abundant cover (USFWS, 1982).

Annual and seasonal variations in stream temperature can allow for shifts in species occurrence. As such, coldwater fish species may be found in the lower reaches of the larger tributaries during the cooler, wetter periods, yet retreat to coldwater areas toward the headwaters with the onset of warmer, summer base flow conditions. On the other hand, warm water species may expand their range toward the headwaters during warmer, summer base flow conditions.

Wild trout (brook trout, rainbow trout, and brown trout) are identified in the Forest Plan as management indicator species (MIS). The objective for MIS is to maintain or improve their habitat. As previously mentioned, trout productivity is limited by elevated levels of fine sediment, reduced quality of the riparian forest and vegetation, and reduced amounts of large woody debris, which affect the quality of trout pool and spawning habitat and hiding cover. Despite these degraded habitat conditions, reproducing native brook trout are known to occur in some of the area's perennial streams including Morris Creek, Holcomb Run and Coal Siding Run. Brown trout and rainbow trout are also known to occur within the project area, but likely exist primarily within the North Fork Cherry River. It is not known if these introduced species have established wild populations.

Fish Habitat Quality and Trout Productivity. High levels of fine sediment and reduced levels of large woody debris have reduced fish habitat quality in the project area. There is a concern that proposed land management activities may impact aquatic and riparian habitats and adversely affect the productivity of the aquatic ecosystem for management indicator fish species (wild trout), Regional Forester's sensitive fish species, and their associated communities.

Scope of the Analysis

The area of analysis for direct and indirect and cumulative effects is the same as that identified in the Watershed section of this document. Any measurable effects on aquatic populations or habitats from the project area activities is not expected to extend further downstream than the limits of the project area, even though these streams are tributary to the Gauley River just to the west.

Methodology

The effects of land management activities on sedimentation of aquatic habitat and effects to aquatic biota, recruitment of LWD to channels, and stream shading will be discussed in this section. Surveys and monitoring results are described to support the analysis. Additional background material used in the analysis included forest and district stream surveys and macroinvertebrate surveys, monitoring results described in the *Monongahela National Forest Monitoring and Evaluation Report, FYs 2001, 2002, and 2003* (MNF, 2004), historic MNF fisheries information, and observations from field visits.

Sediment effects are described above, in the Watershed section of this document. The reproductive success of native brook trout is reduced as levels of fine sediment (<6.5mm) exceed 20% in spawning gravels (Bjornn and Reiser, 1991). On the Monongahela National Forest, fine sediment is defined as particles less than 4mm in size, which approximates the size of a brook trout egg (Duffield, personal communication 1999). An analysis of paired data for trout and sediment collected from streams on the Monongahela National Forest showed that trout productivity generally began to decrease around 20-25% fine sediment in spawning gravels (Edwards, personal communication 2002).

Effects determinations for aquatic habitat are based on the expected levels of sedimentation for each stream and on the existing conditions within those streams. Effects to aquatic biota are based on sensitivity to increased sediment in streams, existing sediment conditions in those streams, the amount of added sediment expected from the proposed activities, and other environmental stressors contributing to existing conditions of the aquatic community.

The alternatives were analyzed for their potential to impact LWD recruitment to streams. Natural recruitment is the method by which large woody debris (trees and tree limbs) will be delivered to channels, as timber stands along stream channels mature and trees die or succumb to windthrow and fall over. Natural recruitment of LWD can be affected by harvest activities along channels that reduce the recruitment potential, by reducing the size and number of trees within the riparian stand. It is assumed that recruitment comes from adjacent timber stands within 100 feet of the channel and harvesting within this area reduces the recruitment potential.

Riparian timber stands along functioning stream channels will be protected. Channels that are within or adjacent to timber harvest units will have riparian protection buffers where timber harvesting would generally not occur, as previously discussed.

Environmental Consequences Common to All Action Alternatives

The common sedimentation effects were described above as being low and not substantial by themselves for all of the individual watersheds in the project area except Morris Creek. In Morris Creek there would be a somewhat higher potential for greater sedimentation effects from the proposed FR928 road work because of the sensitive soil location, number of expected stream channel crossings, and the wet nature of the north-facing slope.

Action alternatives are expected to directly affect aquatic resources when roads are constructed across stream channels and when culverts are installed in streams during road construction and reconstruction, directly occupying the land and stream channel. Direct effects to riparian areas include construction and use of roads within riparian areas, and removing riparian vegetation within the transportation corridor. Harvesting trees from riparian areas alters the vegetative composition within the riparian area, modifies the riparian habitat and potentially its microclimate, and alters the natural recruitment of LWD to stream channels.

Indirect effects occur when rain washes disturbed soils off roads into stream channels, and when roads affect stream flows by altering watershed hydrologic processes. In some cases stream base flows may be reduced when roads intercept soil water, bring it to the surface and transport it more quickly out of

the watershed. Stormflow and sedimentation effects were discussed in the Watershed Report. These types of direct and indirect effects can adversely affect aquatic and riparian conditions, reducing the quality of aquatic habitat and changing the distribution and stability of in-stream flows, potentially creating harsher conditions for aquatic biota.

Proposed road activities that are common to both action alternatives (12 acres of soil disturbance) would be expected to have low and not substantial sedimentation effects in project area streams, except for Morris Creek as discussed above. The effects of these road developments by themselves on aquatic biota would be low and not substantial in most streams, but somewhat higher in Morris Creek. However, these sedimentation effects taken together with effects from the conventional harvesting, log landings, and additional road developments in the Proposed Action, would have greater effects on aquatic biota such as native brook trout. The overall effects of sedimentation on aquatic biota are discussed in following sections.

Riparian area effects from the common road activities would be low and not substantial. Riparian vegetation would be removed at stream crossing locations in the transportation system. For example, about 8 intermittent and ephemeral stream crossings would occur within 1.8 miles of FR928 road development, removing all trees within the road corridor and exposing those short lengths of channel to the sun. But riparian area affected would be very small and inconsequential in terms of the total riparian area within the watersheds. There would be no substantial reduction in LWD recruitment potential except within the short lengths of riparian clearing for transportation corridors. And the short lengths of non-perennial stream exposed to more direct sunlight would not be enough to substantially change water temperatures.

Minor negative effects to aquatic habitat connectivity and aquatic species passage could occur in intermittent streams. Road activities for the action alternatives are expected to affect the productivity of aquatic communities. Small to moderate adverse effects to aquatic habitats are expected as a result of road construction, reconstruction and maintenance activities.

Direct/Indirect Environmental Consequences

No Action Alternative

No new Federal actions would be implemented. Natural watershed and aquatic processes would continue. Current management such as maintenance of roads and wildlife openings would continue.

In the short term, existing aquatic conditions would likely persist (see Affected Environment). In the long term, road maintenance would help reduce the extent to which roads contribute to stream sediment production. Over time, as trees in riparian areas mature, more of them are expected to provide stream shade or to die, fall into streams and serve as large woody debris. Increased stream shading would further reduce stream vulnerability to elevated stream temperatures.

Increased large woody debris would help improve sediment storage; it would also help improve stream stability and increase aquatic habitat complexity (more pools and hiding cover). Migration barriers at some road culverts would continue to exist over time unless action is taken to correct them.

No Federally listed or proposed aquatic species are known to occur in the project area (Cherry River Biological Assessment and Biological Evaluation, 02/06). The no action alternative is not expected to impact population viability for Regional Forester's Sensitive Species or other aquatic species in the short term because habitat conditions are not expected to change.

State road WV94/5 has substantial sediment effects in Morris Creek. Portions of this road are near Morris Creek or a portion of its headwaters. Drainage structures are too few in number, and some are undersized and plug in larger stormflow or spring runoff conditions. The combination of eroding ditch lines and road cut slopes, washed and eroding road surface, and active erosion in the runoff channels

below the road substantially increase sediment delivery to portions of the Morris Creek stream network. In the No Action alternative, this level of sediment impact in Morris Creek would continue.

The No Action alternative would have a long-term adverse effect in two streams in particular by retaining existing stream crossing structures that are inadequate in terms of their hydraulic design and restricted aquatic organism passage. FR908 crosses the headwaters of Coal Siding Run with dual undersized culverts, and WV94/5 crosses Morris Creek with an undersized multiple tube concrete structure. Replacement of these structures is needed to address water quality (sediment), stream habitat, and aquatic organism passage problems that currently exist. These problems would go uncorrected if the No Action alternative is selected.

Proposed Action

The Watershed section of this analysis describes by individual sub-watershed the acres of harvesting and number of log landings that would occur in each sub-watershed. Direct soil and stream disturbance within each sub-watershed as described in the watershed section of this document could potentially affect aquatic habitat conditions and aquatic biota.

The Buckheart Run and Morris Creek sub-watersheds would have the greatest number of acres with soil disturbance, and a high proportion of the watersheds with conventional harvested acres (47% and 24.6%, respectively). Curtin Run and Coal Siding Run would have 34% and 30% of their watersheds conventionally harvested. The number of channel crossings during logging would most directly influence the amount of sediment reaching these streams. Morris Creek with a total of 60 crossings and Buckheart Run with 41 would see the greatest effects on fine sediment loading to these streams.

During road maintenance, soil is disturbed and short term surges of sediment likely enter road ditches and flow into streams. Wildlife opening maintenance likely has little, if any, impact on riparian and stream conditions, because most are located away from stream channels.

Despite implementation of the BMPs and other mitigation measures referred to above, the potential for adverse sediment delivery to streams and water quality impacts (suspended sediment and turbidity) for most of the project area watersheds would range between small and substantial. Exceptions would be the Holcomb Run and North Fork watersheds, and the 1608 acre watershed area for un-named streams that drain directly to Cherry River. For these exceptions, expected sedimentation effects would be low and not substantial.

Expected levels of added sedimentation for the remaining watersheds are summarized as follows. These effects are for the relatively short-term period of time which includes the duration of the activity until completion and all mitigation measures are fully implemented, and also for the first year or so after full mitigation. This is the period of time in which mitigation measures should achieve most of their effectiveness. Beyond this period of time, sedimentation resulting from roads, skid roads, landings and harvesting in the Proposed Action should be declining to a low degree of impact provided that mitigation measures are functioning properly and as designed. Some residual longer term but lesser sediment effects would likely persist, possibly to between 5 and 10 years according to research findings.

- Curtin Run ……Small to moderate sedimentation effects
- Coal Siding Run ...……Moderate or higher sedimentation effects
- Buckheart Run ……..Substantial sedimentation effects
- Morris Creek …….Substantial sedimentation effects
- Cherry River main stem….Low sedimentation effects below Morris Creek

The reproductive success of native brook trout is reduced as levels of fine sediment (<6.5mm) exceed 20% in spawning gravels (Bjornn and Reiser, 1991). On the Monongahela National Forest, fine sediment is defined as particles less than 4mm in size, which approximates the size of a brook trout egg (Duffield, personal communication 1999). An analysis of paired data for trout and sediment collected from streams on the Monongahela National Forest showed that trout productivity generally began to decrease around 20-25% fine sediment in spawning gravels (Edwards, personal communication 2002). Everest and Harr, 1982, reported that trout fry emergence can be reduced to 40% survival when spawning gravel fine sediment is equal to or greater than a threshold value of 30% (by weight). Based on research the 20% level for fine sediment less than 6.5 mm in spawning gravels is a widely accepted threshold above which trout experience substantially impaired reproductive success.

Existing fine sediment composition of stream substrates within the project area are high. Visual estimates put fine sediment levels at over 25% in potential brook trout spawning sites in most streams. Spawning gravel sampled in lower Morris Creek in 2002 averaged 27.5% fine sediment, and is even higher in upper Morris Creek based on visual estimates. From the standpoint of sediment, aquatic habitat in Morris Creek and the other streams within the project area are considered to be impaired in their present condition, and below their resource potential for aquatic biota. As discussed earlier, some of this condition is attributable to sandy soils along the stream channels, and some is likely attributable to past management activities.

In addition to fine sediment levels, other environmental stressors combine to create in-stream conditions that stress the aquatic community and reduce biological productivity. Those stressors include reduced habitat quality (insufficient pool habitat and cover), low amounts of in-stream LWD, naturally low productivity waters (because of geologic and soil characteristics), and further impairment of water chemistry and productivity by acid deposition.

Adverse effects to riparian resources from timber harvesting and roads would be mitigated by locating harvest units and roads away from the larger streams as much as possible, and implementing site specific riparian buffer protection guidelines to protect all functioning stream channels. Where roads and skid roads cross over streams, direct loss of riparian vegetation will occur for the long-term. Riparian habitat, stream shading and LWD recruitment potential in those corridors will be lost, much of it for the long-term. However, the amount of riparian area actually impacted at these crossings is quite small in terms of the amount of riparian habitat within the watershed, and these effects would be small and not significant on a project area basis. Effects to riparian areas within or adjacent to harvesting would be mitigated by applying the riparian buffer protection measures, and those effects would be very small and not substantial. Overall, Proposed Action effects to riparian resources would be small and not substantial. The potential to materially affect stream shading and LWD recruitment is very small and not substantial.

Earth disturbing activities from harvesting and roads in the Proposed Action would result in small to substantial increases in stream sedimentation, and sedimentation of aquatic habitats is likely despite use of the recommended mitigation measures. Increased sediment deposition in pools and spawning sites would place additional stress on aquatic biota. Wild trout (MIS) habitat would be impaired in the short and long term, particularly in Coal Siding Run, Buckheart Run and Morris Creek. Adverse effects on aquatic biota may be substantial given the stressed condition of the aquatic community and the low productivity of these streams. There would likely be periodic water quality effects (increases in turbidity) which can impact fish feeding during those times. Negative effects to aquatic habitat connectivity and aquatic passage could be expected in non-perennial channels. Road activities with the Proposed Action are expected to affect the productivity of the aquatic community.

Sedimentation effects in the Cherry River main stem would result from cumulative impacts associated with activities within the various named and un-named watersheds. Those sediment effects generally would be considered low because of the size of the Cherry River water body, and some attenuation of sediment effects with distance downstream from the sediment source areas. Sedimentation resulting from the Proposed Action would be expected to have limited adverse effects to aquatic communities inhabiting the Cherry River main stem.

Cumulative Effects

Streams within the project area are stressed aquatic ecosystems. They are low in large woody debris which contributes to simplistic in-stream habitat conditions and some channel instability. All of the smaller named streams in the project area have elevated levels of fine sediment in the substrate. Stream water chemistry is moderate to poor in terms of aquatic productivity (except for Cherry River). Streams are well below their resource potential for these reasons. Stream suspended sediment and turbidity are elevated during storm runoff events; otherwise streams generally run clear. Despite these conditions that degrade the habitat quality and lower productivity, some of the perennial streams within the project area support native brook trout populations and associated coldwater biota, especially Morris Creek, Coal Siding Run and Holcomb Run. Cool to warmer water communities inhabit the Cherry River. Riparian areas along most of the smaller streams in the area are in fair to good condition and well forested, but have not reached fully functioning riparian potential. The Cherry River has moderate to good water chemistry in terms of aquatic productivity, but is considered substantially affected by a large number of sediment sources.

Aquatic habitat conditions support an aquatic community, but at a level of productivity which is lower than could be achieved if the land and streams had fully recovered from past land uses, and were not continuing to be affected by a variety of sediment sources and acid deposition. Past and present land uses throughout these watersheds on both federal and private lands contribute to existing conditions of reduced health/productivity of streams and the aquatic community of fishes and other biota. Reasonably foreseeable future activities as discussed in the watershed section of this document also contribute to the cumulative effects analysis. Past, present and other future actions within the watersheds of the smaller named streams add mostly small to modest amounts of sediment to these streams. Riparian areas, stream shade and LWD recruitment potential on federal lands is little affected by actions on private lands. The Cherry River is substantially impacted by the wide variety of sedimentation sources, and the riparian area along the river is substantially impacted by removal of vegetation and development.

Substantial sediment delivery is likely to occur in some of the project area streams with the Proposed Action. During periods of storm runoff or when soils are saturated, suspended sediment and turbidity are expected to be higher in some of these streams during and following project activities for a year or more. The Proposed Action would cumulatively add to impaired aquatic habitat conditions, and populations of aquatic biota that are below their potential. These cumulative sedimentation effects could be substantial in some streams, especially Morris Creek, Buckheart Run and Coal Siding Run. In fish-bearing streams it is likely that there would be measurable effects on fine sediment in spawning gravels, and further reductions in pool quality at least for the short-term.

The Proposed Action, when combined with past and present actions and reasonably foreseeable actions on both federal and private lands, would likely result in cumulatively substantial sedimentation effects to aquatic habitat and aquatic biota in the specified streams. Cumulative effects on stream shading and LWD recruitment to streams would be very low and not substantial. Adverse effects to

aquatic habitat are likely and the viability of aquatic populations (including MIS) within these streams would be compromised.

Added sedimentation in the Cherry River resulting from Proposed Action activities would be low, and would not likely have cumulative substantial effects on aquatic habitat there. Populations of aquatic biota, including Regional Foresters Sensitive Species, inhabiting the Cherry River would not likely be substantially impacted by the Proposed Action. Beyond the project area boundary, downstream effects from these activities on National Forest lands would be expected to be extremely low and not measurable.

Alternative C

For the entire project area, Alternative C conventional harvesting on wet soils (135 acres), in coves (91 acres), and on slopes over 40% (less than 7 acres), are all substantially less acreage than what would occur in the Proposed Action. In each individual watershed, conventional harvest acreage on wet soils or in coves would be less or substantially less, and the same or less on steeper slopes, so potential effects to water would be much less.

The Oak/Mast tree release would not affect aquatic habitat, and Riparian area protection measures would protect riparian zones.

The watershed section of this document describes the much more limited nature of soil disturbance created by skid roads and landings in each of the sub-watersheds within the project area, than in the proposed action. A total of about 20 acres of soil disturbance would take place in skid roads within the conventional harvest units, and about 18 acres of soil disturbance in landings (conventional, helicopter and service landings). This is a total of about 38 acres of concentrated soil disturbance from the conventional logging. Road construction and reconstruction (3.1 miles) would disturb an additional 12 acres of land surface, for a total of about 50 acres disturbed compared to the 206 acres of disturbed land in the Proposed Action. There would be substantially less crossings of perennial, intermittent, and ephemeral streams from skid roads in Alternative C with a total of 29 crossings compared to 122 crossings in the Proposed Action. There would be much less sediment delivery to streams, particularly the named trout-bearing streams.

The 10 acre wildlife savannah would be a heavy partial harvest, but about 1/3 of the stand density would remain on-site. This proposed savannah is within one of the small un-named watersheds that drains directly to the Cherry River. But it is small in size and located on upper slopes along or near the ridge, and away from streams. No substantial effects on aquatic habitat would be expected.

Potential adverse effects to riparian resources would be mitigated by staying away from the larger streams, and implementing the site specific riparian buffer protection guidelines (the same as in the Proposed Action) to protect the smaller, non-perennial streams. Potential effects to riparian resources in Alternative C would be very similar to the Proposed Action, except for one important difference. There would be far fewer skid road small stream crossings (total of 29) in C compared to 122 in the Proposed Action, so there would be some acres of riparian buffer that would not be harvested or soil disturbed. Alternative C therefore would have somewhat less direct impact on riparian areas, and less effects. Those effects are not substantial.

The Watershed section of this analysis described potential sedimentation effects from Alternative C as being small, largely short-term and not substantial. Proposed harvesting in some of the most sensitive areas would be dropped, or changed to helicopter yarding. The level of conventional logging activities within the Wet Soils, Coves, and >40% Slopes in Alternative C would be 75% less than that in the

Proposed Action. Road construction/reconstruction would be 65% less in Alternative C, with landing development about the same in both action alternatives. The volume of timber cut, acres harvested and acres of concentrated soil disturbance would be less in Alternative C. Many road and skid road stream crossings in the Proposed Action would be eliminated with Alternative C. Major stream crossings on Buckheart Run and Morris Creek would not occur, as road construction stops short of these channels.

With Alternative C, the potential for substantial adverse effects has been mitigated, largely by modifications to project design. Expected stream effects within each watershed and for the Cherry River would be low, mostly short-term and not substantial. The watersheds most likely to have substantial sediment effects in the Proposed Action (Coal Siding Run, Buckheart Run and Morris Creek), would have low and not substantial sediment effects in Alternative C. Potential sediment effects in all watersheds are much lower with Alternative C, and adverse effects to habitat and populations of fish and other aquatic biota are expected to be much less. Potential effects to riparian resources, stream shading and LWD recruitment are small and not substantial.

CUMULATIVE EFFECTS OF ALTERNATIVE C

Aquatic habitat and riparian resource conditions are still somewhat impaired and below their resource potential, and contribute to aquatic populations that are below their expected potentials. Alternative C activities would substantially reduce sedimentation in all project area streams (especially in Coal Siding Run, Buckheart Run and Morris Creek) over expected sedimentation with the Proposed Action. The Alternative C level of sedimentation would be low enough that effects would not be substantial, either by themselves or cumulatively. Additional modest reductions in sedimentation in Morris Creek could be achieved if the recommended road drainage improvements on WV94/5 were implemented.

Riparian resources would be protected in Alternative C activities as described above. There would be no risk of adversely affecting LWD recruitment to streams in any substantial way as discussed above. As riparian forests mature, natural LWD recruitment to streams on National Forest System lands would continue to increase, and contribute to improving habitat and long-term channel stability over time.

Alternative C, when combined with past and present actions and reasonably foreseeable future actions on both federal and private lands, would not likely result in cumulatively substantial sedimentation effects to aquatic habitat and aquatic biota in any of the project area streams. Cumulative effects on stream shading and LWD recruitment to streams would be very low and not substantial. Adverse effects to wild trout (MIS) and Regional Foresters Sensitive Species (New River shiner, Kanawha minnow, Candy Darter, and Appalachian Darter) would be expected to be very low and not substantial. The viability of aquatic populations including MIS species and those sensitive species would be maintained at a level consistent with their current condition and trend. Beyond the project area boundary, downstream effects in the Gauley River from these activities on National Forest lands would be expected to be extremely small and not measurable.

Unavoidable Adverse Impacts

The Proposed Action would substantially increase sedimentation in some of the project area streams in the short term, with more road construction and reconstruction and greater use of skid roads, along with much larger amounts of conventionally harvested areas on wet soils and in coves. Once in the stream systems, that added sediment is likely to reside there for extended periods of time, degrading habitat quality (like spawning gravels) and further stressing aquatic populations like native brook trout.

The Proposed Action would also have slightly greater adverse effects on riparian areas of non-perennial streams, because of the substantially greater number and length of skid roads that would occupy slopes and cross stream channels.

Added sedimentation in the Cherry River resulting from Proposed Action activities would be low, and would not likely have cumulative substantial effects on aquatic habitat there. Populations of aquatic biota, including Regional Foresters Sensitive Species, inhabiting the Cherry River would not likely be substantially impacted by the Proposed Action. Beyond the project area boundary, downstream effects from these activities on National Forest lands would be expected to be extremely low and not measurable.

The Alternative C level of sedimentation would be low enough that effects would not be substantial, either by themselves or cumulatively.

Irreversible or Irretrievable Commitment of Resources
Consistency with the Forest Plan

All the alternatives would be consistent with the Forest Plan goal of protecting natural resources of the Forest from damage and degradation; with soil, water, and fish resource standards and guidelines; and Forest Plan Amendment 3, which updated fisheries management materials (Forest Plan, pp. 40, 79-84, and 133-134).

Vegetation

Resource Impact Addressed

This section summarizes the existing condition of vegetation in the Cherry River project area and explains how proposed alternatives may impact it. It addresses whether the alternatives help meet the desired future condition of the area, which is to develop age class diversity across the project area in order to ensure large, high quality hardwoods trees are growing to produce a sustainable amount of mast and forest products over time. Another component of the purpose and need for action is to reduce the amount of competition between trees for light and water resources in dense, over-crowded stands to decrease the risk of insect and disease infestation.

Affected Environment

Past land use activities (e.g. slash and burn agriculture, clearcutting, noncommercial thinnings, etc.) and natural disturbances (e.g. fires, wind, ice storms, and insect and disease) created the size, shape, age, and species of vegetation that exist in the Cherry River project area today (Timber Resource report, Heritage report, project file). Forest Plan standards and guidelines for Management Prescription 3.0 indicate that forest diversity will be enhanced by managing for a variety of forest types, sizes, and ages of trees. As the following tables demonstrate, the project area presently contains generally even-aged, closed-canopy forest between 70 and 100 years old. Over 80% of the National Forest lands are covered with forests that contain a high percentage of yellow poplar, since this species makes up a fairly large component of the Mixed Upland Hardwoods found in the area. Some of the Yellow Poplar, Red Oak, White Oak stands are actually nearly 100% yellow poplar. Stands diversity generally in the area includes many other species in smaller numbers. Red oak is the most common mast producing species, with other oaks, hickory and black cherry being less common. Site indices are generally high, with virtually all sites being capable of producing timber volumes over 85 cubic feet per acre per year.

The following table displays the size classes and age classes found within the project area.

Table 3-12: Size Classes and Age Classes on National Forest System Lands in the Cherry River Project Area

Size Class	Acres	**% of Total NF Acres**	**% of Total Acres**		**Age Class (Years)**	**Acres**	**% of Total NF Acres**	**% of Total Acres**
Open/Brush	23	0.3	0.2		Open/Brush	23	0.3	0.2
Early Successional	163	2.5	1.7		0-9	147	2.3	1.6
					10-19	16	0.2	0.2
Early-Mid Successional	289	4.5	3.1		20-29	64	1.0	0.7
					30-39	225	3.5	2.4
Mid Successional	1982	31.1	21.2		40-49	76	1.2	0.8
					50-59	0	0.0	0.0
					60-69	240	3.8	2.6
					70-79	1666	26.1	17.8
Mid-Late Successional	3924	61.6	41.9		80-89	1931	30.3	20.6
					90-99	1733	27.2	18.5
					100-109	256	4.0	2.7
					110-119	4	0.1	0.0
Late Successional	0	0.0	0.0		120+	0	0.0	0.0
NF land Acres	**6381**	100.0			**NF land Acres**	**6381**	100.0	
Private or state lands not classified	2993		31.9		Private or state lands not classified	2993		31.9
Total	9374				Total	9374		

As the table shows, National Forest lands in the Cherry River area contain less than one percent openings, on the basis of identified stands. See the fragmentation section of this document for an analysis of openings that is more inclusive. Most open acreage in the vicinity is on private land.

About 92 percent of the NFS lands in the project area are greater than 60 years old. Very little open/brush or early successional forest exists in the project area.

Table 3-13. Existing and Desired Size Classes

Size Class	Existing		Desired Minimum		Desired Maximum	
	Acres	%	Acres	%	Acres	%
Open/Brush	23	.4	319	5	319	5
Seedling/Sapling	163	2.5	638	10	1595	25
Poletimber	289	4.5	957	15	2425	38
Sawtimber	5906	92.6	2425	38	4785	75

Currently, the project area is dominated by saw timber (greater than 11.0" in diameter for hardwoods and 9.0" in for conifers). Forest Plan standards and guidelines for Management Prescription 3.0 provide for a range of size classes recommended for this area, to provide for a sustained yield of timber, mast, and scenic attributes. The current distribution is not consistent with Forest Plan MP 3.0 direction, which would have these lands contain more seedling/sapling and pole size stands, and less saw timber.

The Forest Plan does not specify specific age class objectives, but does so in actuality by assigning size class objectives (Forest Plan, page 129). The Forest Plan states, "It is the ultimate objective of the Forest to balance age classes of the primary Forest types on all...lands on which even-aged management is applied..." (Forest Plan, p. 74, 2410, VI, Timber Regulation, B, #4). It also indicates forest diversity will be enhanced by the dispersal of different ages and types of vegetation (Forest Plan, p. 129, 1900, VI, A).

Table 3-14: Forest Types in the Cherry River Project Area

Forest Type	Acres	% of Total N.F. Ac.	% of Total Ac.
Private or State lands - Not Typed	2993	0	31.9
Yellow Poplar-White Oak-Red Oak	2930	45.9	31.3
Mixed Upland Hardwoods	2100	32.9	22.4
Mixed Oaks	752	11.8	8.0
Northern Red Oak	212	3.3	2.3
Black Cherry,White Ash, Yellow Poplar	187	2.9	2.0
Sugar Maple-Beech-Yellow Birch	93	1.5	1.0
Birch	39	0.6	0.4
Sugar Maple-Basswood	18	0.3	0.2
Sugar Maple	21	0.3	0.2
Eastern White Pine	6	0.1	0.1
Opening	23	0.4	0.2
Total	9374	100 %	100 %

The Forest Plan does not specify specific forest type objectives, but, it indicates the Forest will be a mosaic of stands of predominantly hardwood trees and associated understories…the stands will vary in…species depending on the silvicultural system applied (Forest Plan, p. 127, Desired Future Condition). Given the abundance of shade-intolerant tree species currently in this area, even-aged management is expected to be the best method for maintaining hardwood trees in the project area (Nyland 2003, Miller et. al 2004, Lamson and Smith 1991).

In the 2.5% of the area in seedling sapling stands, yellow poplar is predominant, even in some stands where oak seedlings were present before harvest. Yellow poplar is a predominant species in the pole sized stands as well. Stands under aged 15 have diverse species, with yellow poplar being abundant.

Comparison of basal area data with stocking guides, and field reviews confirm that stands proposed for thinning harvests are over crowded; trees are competing for light, nutrients, and water. The Forest Plan states that thinnings will be a normal practice, particularly on better sites (Forest Plan, p. 135). There are also grapevines in some stands that can affect stand health or regeneration of new stands. Substantial disease or insect infestations (e.g. beech bark scale disease, gypsy moth, and hemlock woolly adelgid) have not been noted to date. However, all three insects and disease are of concern due to their presence or nearby presence and the potential impacts.

Deer abundance is a concern because deer browse can inhibit regeneration. Field reviews confirm deer are present, with low to medium impacts on understory vegetation.

Scope of the Analysis

The scope of analysis for direct, indirect, and cumulative effects was the project area because it is the area focused on to attain desired Forest Plan future conditions. The temporal boundary used for direct and indirect effects analysis was one to seven years, since that is the time frame in which timber sales are generally completed and revegetation begins to occur. The temporal boundary for cumulative effects would be 10 years, since this is the time when the project area could reasonably be expected to receive additional vegetative treatment (Forest Plan, p. 133).

Methodology

Tree and understory data were collected in 2005 for the analysis. Data on vegetation and past forest management activities was used from the MNF Geographic Information System (including survey results on defoliation, mortality, and ice damage) and CDS databases (most updated in 2002). Monitoring results were used from the WV Dept. of Agriculture Cooperative Forest Health Protection Surveys (1998-2005), previous timber sale administration reports, stocking survey results from within and near the project area, and field observations. Additional background was provided by Silvics of North America (USDA, 1990).

The first screening for stands to thin was done by looking at basal area data, from CDS data. Generally those stands with a basal area below 120 to 140 were dropped from consideration, although a few stands under 140 did enter back into consideration after a field check. Stands were checked on a map to see if they were primarily riparian areas and also to determine access. Stands that remained in consideration were field checked; notes on field visits document observations. Past history on the Gauley Ranger District and references were used to help evaluate effects of thinning. The Allegheny Hardwood Stocking guides developed by Roach were used to determine whether stands were over stocked.

Stands eligible for thinning with greater than 1/3 of the current composition in sugar and red maples were also screened for selection harvest.

The methodology of selecting stands for even aged regeneration is described below.

The CDS data was examined to eliminate some stands from consideration for regeneration. All stands aged less than 70 as of 2003 were eliminated from consideration since stands under 70 are not generally regenerated under the Forest Plan. Stands next to stands in the 0-15 year age classes were also dropped from consideration because of spacing needs.

Stands that the CDS data indicated were low diameter stands did not receive consideration. Stands that were designated as potential old growth from previous analyses were not considered. Areas within ¼ mile of the Cherry River were also not considered because of visual concerns from the river and highway along the river.

In addition, the CDS seedling data for striped maple, black cherry, red oak, sugar maple, and red maple were checked to see how selected regeneration areas matched up with stands showing seedlings for those species. In some cases the maple seedlings may represent competition to the more desirable red oak and black cherry.

For those stands selected, additional seedling and other understory vegetation data was taken. For some stands, additional basal area data was taken. This data was evaluated through the Oak Silvah program to determine recommended treatments and harvest methods. Printouts from the program are included in the project file.

Acreages in landings, roads and skid trails were considered as inclusions within surrounding stands, for the purpose of determining age class distributions, but their acreage was included in other effects sections dealing with fragmentation, soils, etc. Uncut acreage in riparian areas within units were treated the same way.

Direct/Indirect Environmental Consequences

Alternative A – No Action

The existing age classes in the project area and the extent of the oak, cherry, and yellow poplar found today are largely the results of turn of the century logging. Alternative A would not harvest trees to change the existing size or age classes or forest types of the project area. In the short term, the existing percentage of size classes, age classes, and forest types would be expected to persist. In the long term, natural processes (aging) and disturbances (e.g. wind, ice, disease, insects, fire, etc.) may influence size, age, and forest type diversity, the extent of which cannot be predicted.

Stands are expected to continue to age, thus more acres would move into older age classes. Natural processes and disturbances may create additional grassy openings and cause the decline in saw timber and increase the percentage of seedling/sapling and pole size timber; but the extent of such changes cannot be predicted. As stands mature, fewer shade intolerant species (oak species, poplar, and cherry) would be expected in the area. Given the ecological setting of this area, shade tolerant maple species are expected to increase in the understory over time. Since thinning/stand improvement harvesting would not be conducted, stand productivity would not be actively improved and trees that would inevitably succumb to vegetative competition would not be recovered as commercial timber volume, but would provide a larger snag component. Stands would continue to be over crowded until, over time, competition causes the natural decline and death of some trees. As trees age or as natural thinning occur in stands, there would likely be an increase in large dead and dying trees. As they get

older or are crowded, trees are expected to become more susceptible to disease and insect infestations; the extent and occurrence of such infestations are not known.

Environmental Consequences Common to All Action Alternatives

Regeneration harvest with associated site preparation, planting and/or release treatments assists in attaining a desired future condition (DFC) of creating young forest habitat for a variety of wildlife species such as deer, grouse and squirrel in MP 3.0 (Forest Plan, page 127). These harvests would provide a sustainable mast supply and forest products are provided over time. Balancing age and size classes so the Forest is a mosaic of diverse habitats is a way to measure meeting DFC. Both Alternative B and C regenerate virtually the same amount of acreage, about 3% of the area. Even if current seedling/sapling stands did not grow out of the seedling/sapling size class, this amount does not meet the minimum guideline for percent in the seedling/sapling class, as shown in the following table. The amount of young forest habitat provided is less than that envisioned in the Forest Plan, but additional young habitat could be provided in future decades to approach the Forest Plan level.

As the table below indicates, the sawtimber size class would still dominate forested stands on NFS lands within the project area, as some pole sized stands will grow into the sawtimber size over the next 10 years.

Table 3-15: Existing Size Classes in the Cherry River Project Area, Recommended Size Classes for MP 3.0, and Projected (to 2015) Size Classes by Alternative

Size Class	Existing		Desired Minimum		Desired Maximum		No Action		Proposed Action		Alternative 1	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Open/ Brush	23	.4	319	5	319	5	23	0.4	29	.5	33	.5
Seedling/Sapling	163	2.5	638	10		20	147	2.3	345	5.4	344	5.4
Poletimber	289	4.5		15		30	80	1.2	80	1.2	80	1.2
Sawtimber	5906	92.6		50	4785	75	6131	96.1	5927	92.9	5843	91.6
Unevenaged											81	1.3

Uneven aged acres could be counted as sawtimber stands, after the proposed harvest, since most trees in them would still be sawtimber. However, they would be expected to consist of two primary size classes, the overstory being mostly sawtimber, and the understory consisting of new and released seedlings and saplings.

The regeneration harvests in the project area would regenerate shade intolerant, moderately tolerant and tolerant tree species similar to the existing forest stands in both alternatives, with expected differences in the actual species mix in each stand. The expected regeneration would come from seedlings already present in the understory, stump sprouts, and new seedlings that begin to grow after the harvest. Vine treatments would be designed to eliminate the risk that young regenerating seedlings and saplings would be destroyed by sprouting mature vines (Forest Plan Appendix P). Vines originating from seeds would still be present to provide for future soft mast production. Forest products would be provided as shown in the Economic Effects.

Thinning harvests are proposed in stands with the potential to increase growth and improve quality in residual trees by freeing them from competition. Thinning would remove those trees growing close to better trees, and those with poor form, unhealthy crowns or less mast production potential. About 1/3 of the stand density in mostly sawtimber trees would be harvested. Although pulpwood sized trees

would be harvested in conventionally thinned stands, these trees make up a smaller percentage of the growing stock than sawtimber. In helicopter logged areas, pulpwood trees would not be harvested. Because of an increase in sunlight reaching the forest floor, an increase in forest floor vegetation is likely, although this is not the main purpose of this harvest. Forest floor vegetation, including tree seedlings, herbaceous plants, and species that can interfere with future regeneration may increase. Mast production from residual trees would be enhanced, since it has consistently been shown that well-spaced trees produce more seed than those which are growing close together. The effects of thinning are most pronounced in species intolerant of shade, which bear their fruit in the free-growing portion of the crown above the level of crown contact by adjacent trees. (Daniel, et.al., 1979, p. 149). Thinning will allow residual trees to increase in size and value following forest product removal. Although the total growth of timber volume per acre is expected to stay the same, the growth will be on fewer, and mostly larger stems.

Alternative B – Proposed Action

Effects of regenerating about 3% of the National Forest acreage on age class distribution are described above.

The following table shows the existing oak percentage in each stand for regeneration, by basal area. Most of the oak in these stands is red oak, with chestnut oak the next most common oak species. Site indices are high, according to the forest plan. These sites grow about 100-170 cubic feet per acre per year. The effect of clearcut harvests on species composition and forest type would differ from Alternative B regeneration harvest, in that less oak would be a component in the young regenerated age class, as the new young stands develop. Existing seedlings, and stump sprout regeneration from cut trees, would be expected to be overtopped by poplar and other species, and would be expected to decline in numbers and vigor by age 15-30. Future release of these trees could help to maintain more oak in the young stands. Comparing the following table with regeneration acreage in Chapter 2 indicates that oak regeneration is likely to occur, at least to the level currently present, on 115 acres.

Table 3-16: Percent Oak

Compt/ Stand	Total Oak % of BA	Total Yellow Poplar %	Forest Type	Number of Understory Oak Seedlings	% of plots with oak Seedlings	Oak Regeneration
48/21	67.6	0	MO	6663	45	Likely
62/65	58.7	0	RO	11447	77	Yes
62/65*	58.7	0	RO	4773	22	Unlikely
62/46	53.7	0	MO	2326	9	No
62/58	50.7	42	YP,WO,RO	11447	77	Yes
48/37	44.4	28	YP,WO,RO	7069	51	Yes
62/66	42.1	21	YP,WO,RO	6163	67	Yes
48/19	36.0	44	YP,WO,RO	2504	22	No
48/57	28.6	36	YP,WO,RO	4202	36	Likely
48/52	26.6	46	YP,WO,RO	3190	100	Likely
48/66	18.1	57	YP,WO,RO	2017	91	Likely
62/52	7.3	33	BC,WA,YP	44	11	No
62/22	0	53	YP,WO,RO	37	9	No

Oak and Yellow Poplar percents and other existing stand data are taken from CDS stand data. Percent of plots with oak seedlings is from a regeneration survey in summer of 2005, with 6' radius plots.

In all stands sampled, oak seedlings are both established and new, but few are competitive, and would easily by overtopped by rapidly growing yellow poplar and other mixed hardwoods. Compartment 62 stand 65 is shown twice, since data is different for the two regeneration units within this stand. The stand with the asterisk is the southern unit within stand 65. Advanced regeneration of other desirable species such as sugar maple, black cherry, and hickory would also contribute to successful regeneration of mixed hardwood stands following the clearcut regeneration harvest.

Oak seedlings present in the Mixed Oak (MO, in the above table) and Red Oak (RO in the table) stands are of concern, since low numbers and poor distribution of existing seedlings indicate that oak would not be a primary component of the regenerated stand. The table shows Compartment 62 stand 46 and the southern unit in Compartment 62 stand 65 with few oak seedlings. Although oaks are still expected to be a component of the stand, they would not occur in the same numbers as in the current overstory. Compartment 48 stand 21 is less than 50% stocked with oak seedlings, but the number and size of seedlings is fairly high. Oak is likely to be a major component in this stand, but it may not reach the levels currently present in the overstory.

Low oak percentages in stands with few oaks in the existing stand would not be a concern, since these stands would be expected to regenerate a stand similar to the current stand, and high in yellow poplar. This regeneration would add age class diversity, without detracting much from oak mast production, since few oaks are in these stands. Stands 22 and 52 in Compartment 62 have few oaks, and little or no potential to regenerate oaks. These stands have advance regeneration of sugar maple, hickory and white ash and good potential for yellow poplar to regenerate.

Moderate to high oak seedling percentages in the yellow poplar-red oak-white oak stands indicate some potential to maintain oak in the regenerated stands, in spite of the expected competition with yellow poplar. Compartment 48 stand 66, 57 and especially 52 have good potential to regenerate a stand with a preponderance of oaks mixed with yellow poplar and other species.

If deer pressure increases, and given the relatively small size of the existing seedlings, there is risk of less oak in some regenerated stands than the current ones. Deer browsing tends to have more harmful effects on seedling growth on the edges of clearcut harvests, where seedlings experience more shading and may be growing slower. The unshaded area in the center of such harvest units often grows out of the reach of deer more quickly. The average size of the regeneration harvest units in Alternative B is 15 acres. Compared to the Forest Plan maximum size of 25 acres, these units would have more shaded edge where growth and deer damage may be higher.

Regeneration plots also recorded other undesirable seedlings and species that would compete to restrict growth of desired tree seedlings, such as vines, ferns, witch hazel, red maple, sourwood and striped maple. Detailed survey results are included in the project file. In general, the undesirable woody vegetation and fern cover was heavier than desired, but given that the woody species were diverse, the deer impact is currently low to moderate, and a site preparation tree and shrub cutting treatment will be done, these species are not expected to dominate the new young stands. Compartment 62 stands 65, 58, 65 and 66 were found to have numbers of vines that might tend to dominate the new young stand and overgrow tree seedlings, even with the one time vine treatment included in the proposed action

In young stands previously regenerated, oak trees are likely to continue to be overtopped within the next 10 years primarily by yellow poplar, and the oak composition would not be maintained in these stands.

Alternative C

Alternative C effects on age class distribution would be as described above, however, on the 64 acres of shelterwood harvests, this direct effect would require two entries separated by an estimated 5 to 7 years to harvest all trees (Some residual culls and snags would be left).

In this alternative, stands with high overstory oak percentages but unlikely oak regeneration are dropped from regeneration harvesting. Comparing the table above with regeneration acreages in Chapter 2 indicates that 149 acres would be regenerated with oak, at least in numbers comparable to those currently present.

In stands with likely oak regeneration, but with low numbers or distribution of seedings, the shelterwood treatment is expected to allow the existing seedlings of oak to get taller and more numerous, thus regenerating a larger and stronger oak component, even if deer browsing increases. The average size of regeneration units is 22 acres, which provides for slightly more edge than would be provided at the Forest Plan maximum clearcut size, and less shaded edge than the Proposed Action. The larger size compared to Alternative B, would be expected to help oaks and other trees grow out of the reach of deer more quickly.

Eighty seven acres of young stands within the project area would have a healthier oak component as a result of the oak release in young stands. The oak component in young stands established by shelterwood harvest would have a stronger oak component. Overall, the seedling/sapling age class would have stronger and more numerous oak trees established than under Alternative B.

The effects from unevenaged management cutting would be similar to those from thinning in the first cut except that different trees would be marked for cutting. Whereas thinning would have the objective of developing larger trees for an eventual evenaged regeneration harvest, unevenaged management would have the objective of developing regeneration in the understory and would work towards a stand of shade tolerant species with many different sizes of trees. Selection harvests in Alternative C would begin the process of regenerating all aged stands of primarily sugar maple (USDA, 2004), which is consistent with the existing species composition within these stands. Until future entries however, the stands would be considered as two aged, not uneven aged stands. The two age classes within these stands would be the residual trees dominating the stands and represented by the current stand age which places these stands in the sawtimber size class, and a much younger seedling class of advanced regeneration and new seedlings.

Proposed thinnings and selection harvests would help meet the need of reducing vegetative competition to promote larger and healthier trees in existing stands; this would promote predominantly hardwood trees and emphasize large, high quality hardwood trees for lumber and veneer consistent with Forest Plan direction (Forest Plan, p. 127). There is some variation in acres of effects from the Proposed Action. Many more acres under this alternative would be released using helicopter methods. See the Economic Effects chapter for the effect on costs.

Cumulative Impacts

Alternative A – No Action

Many factors affect the mosaic of the Forest. Natural processes and disturbances (e.g. wind, ice, insect, disease, fire, etc.) and many of the past and present activities identified at the beginning of Chapter 3 that have been implemented on federal and non-federal lands contributed to the size, age, and forest types that exist in the area now (e.g. past timber harvesting and associated road building; mineral development; etc.).

Existing size classes, age classes, and forest types on NFS lands are identified in the affected environment section. The exact size, age, and forest type of vegetation on the non-federal lands in the project area is not known. Much of the private land within the area is developed for housing and

communities, and would not be considered to be forested. Cutting practices on private lands in the project area would be expected to be similar to those commonly found throughout West Virginia. Selective cutting reduces the number of faster growing species, principally red oak, black cherry and yellow poplar. Thus, the overall stand condition would consist of slower growing and less valuable species.

Alternative A would not implement activities that would change the size, age, or forest type diversity of the area. As previously mentioned, natural process would likely cause changes in size, age, and forest type diversity, but the extent and distribution of such change cannot be accurately predicted. In the short term, they are expected to remain similar to what they are now.

In the long term, natural processes and disturbances and future activities on federal and non-federal lands (except for maintenance activities such as for roads and openings or small mineral exploration activities) are expected to change the size, age class, and forest type diversity of the area.

Timber harvesting on non-federal lands may affect within stand size and age class diversity, but it is not expected to greatly affect size and age class diversity across the project area. This is because diameter-limit cutting is usually used on non-federal lands. This type of cutting removes most trees over a certain diameter and is not considered a regeneration treatment. Future timbering is expected to change existing forest type diversity on non-federal lands because diameter limit cuts favor more shade tolerant species such as maple and beech.

Given the randomness of natural events, it is unlikely that implementing Alternative A over time would ensure balanced size and age classes are created across the project area consistent with Forest Plan direction. Over time, forested stands would continue to age and eventually decline in vigor and health.

The no action alternative would favor natural succession, and therefore more shade tolerant tree species and would not provide sequential (even) early successional habitat development.

The cumulative effect of applying either the Proposed Action or Alternative C harvest methods is a watershed with a mix of stands of different ages and species interspersed with residential and developed lands in local communities.

The cumulative effects of past, present, and future activities and harvest methods would be a mix of stands of different ages and species across the project area, but meeting Forest Plan guidelines for age class distribution would not occur immediately. Several decades of management similar to Alternative B would be required to meet the guidelines shown in the table. Past and future wildlife opening creation help move the project area towards the five percent openings desired in MP 3.0 areas. The NFS timber harvests identified in Table 3-1 helped move the area towards desired MP 3.0 age class and vegetation type objectives. Applying even-aged regeneration harvest methods as proposed under Alternative B would further help move the area toward a balance of size and age classes and would maintain a diversity of forest types across the project area. Thinnings would allow continued management of high quality hardwoods while removing low quality, high risk, diseased and mature trees.

As previously mentioned, the exact size, age, and forest type of vegetation on non-federal lands in the project area is not known. Selective cutting would likely be implemented on private land as has been done in this area in the past and is common throughout West Virginia. Selective cutting on private land is likely to remove commercial sized trees, leaving the smaller slower growing trees and species.

Residential construction, road construction, and agricultural activities mentioned in Table 3-1 have removed acres from forest management. Road maintenance activities and recreational activities generally have little if any affect on the size, age, and type of forest vegetation.

Proposed harvest treatments are not expected to greatly influence the three current primary insects of concern: gypsy moth, beech scale, and the hemlock woolly adelgid. Overall, management regimes that provide access, stand variety, and treatment generally reduce the susceptibility and vulnerability of impacted stands and aid in prescribed treatment should it become necessary. Young stands and stands with more yellow poplar and less oak would be less susceptible to gypsy moth damage. Thinning might increase survival and mast production from oak trees if an outbreak occurs. Oaks with healthier crowns are more likely to survive defoliation than those that are stressed and crowded.

Alternative C

Applying even-aged regeneration harvest methods continues the move toward balancing age and size classes, allows for more stable mast production over time, and provides a variety of habitats. Thinnings in this and other projects allow continued management of high quality hardwoods while removing low quality, high risk, diseased and mature trees across the forest. Over time, under Alternative C, approximately 81 acres would move towards multiaged stands composed of mostly shade tolerant species, especially sugar maple. Cumulatively, this and other similar projects would result in a landscape with a mix of different ages and species across the National Forest. Cumulative effects of oak or other mast species release would result those species being a larger component of the forest in the future than they would if no release treatment were done.

Irreversible or Irretrievable Commitment of Resources

Alternative B and C would result in irretrievable commitment of vegetative resources in that trees would be cut and removed from the project area. However, none of the alternatives would result in an irreversible commitment of vegetative resources since vegetation would grow back after harvesting. The selection harvest in Alternative C would not be an irreversible or irretrievable commitment to continue managing entirely for sugar maple and shade tolerant tree species. Selection harvesting would normally require future entries for partial harvests at 10-15 year intervals. However, selection harvesting under Alternative C would result in fully stocked sawtimber stands that could be managed in the future in a variety of ways.

Consistency with the Forest Plan

Alternative A would not be consistent with the desired future condition described in the Forest Plan for MP 3.0 in that no action would be taken to move the area's existing size or age classes to desired percentages. Alternative B and C would be more consistent, in that they would move toward the DFC for age class distribution.

Old Growth/Mature Habitat

Resource Impact Addressed

This section discloses the impacts proposed Cherry River alternatives may have on existing, potential, and future mature forest in the Cherry River project area.

Affected Environment

The project area and surrounding areas are roaded and managed landscape located adjacent to the communities of Richwood, Holcomb and Fenwick. Approximately 68 percent of the project area is made up of NFS lands and about 32 percent is made up of non-federal lands. NFS land in the project

area is about 99 percent forested (see Vegetation effects). According to the coarse analysis of private and National Forest for fragmentation effects, the project area has over 500 acres in openings, or about 6% of the project area, with the rest considered as forest or woodland. The project area is surrounded mostly by private lands, including mainly small communities, but also some private lands managed by large landowners. National Forest lands to the north and east are mostly other roaded and managed MP 3.0 areas (see Management Prescriptions Map in the Roads Analysis Report), and one MP 6.1 area, called Desert Branch. The project area is not connected to large, undisturbed areas of NFS lands such as wilderness or semi-primitive non-motorized settings such as provided in Management Prescription 6.2 areas.

Currently, none of the project area could be considered mature habitat/old growth because none is 120+ years old, only 4 acres, or 0.1% is between 110 and 119 years old, and only 4%, or 256 acres is between 100 and 109 year old. About 30% of the project area is over 90 years old.

Previous designation as mature habitat has occurred in Compartment 48 and 61, with 120 acres so designated within the project area. About two percent (120 acres) of the project area is designated and managed as mature habitat (see 1993 Holcomb Run Decision Notice where over 5% is designated, and Cherry River Decision Notice of May 1994 where 60 acres of 1.3% was designated). Management Prescription 3.0 direction would have five percent of the NFS land within each Opportunity Area be mature habitat. The following table shows the acres, age, and forest type of stands officially designated as old growth.

Table 3-17. Existing designated potential old growth stands in the Cherry River project area.

Forest Type	Age Class in 2005			Total
	70-79 Mid Successional	80-89 Mid-Late Successional	100-109 Mid-Late Successional	
Yellow Poplar/Oak	15	10	0	25
Mixed oaks	60	0	20	80
Mixed hardwoods	0	0	15	15
Total	75	10	35	120

The above acres were designated to provide wildlife habitat and meet wildlife habitat goals in a roaded and managed landscape.

Scope of the Analysis

Direct and indirect effects to older aged forests and designated old growth in the project area were considered over the next five to seven years, the time it could take to implement alternatives. Cumulative impacts were determined based on past, present and reasonably foreseeable future actions in the project area in the next 1-10 years. Ten years is the likely period between entries in this project area for active management such as timber harvest. The Cherry River project area was used as the spatial boundary for direct, indirect, and cumulative effects because effects to mature habitat are expected to be limited, and the project area is similar to National Forest lands near it.

Methodology

Tree species composition and age data were used to assess how proposed Cherry River alternatives may impact designated old growth stands and older aged stands within the project area. Roads, skid roads, landings and wildlife openings were not considered for effects on old growth since their acreage would be very small, and they affect no designated old growth.

Environmental Consequences Common to All Action Alternatives

Under Alternatives A, B and C, proposed actions would not affect designated old growth stands, because none are located in them. There would be no effect on stands over age 120, because none are present in the watershed.

Direct/Indirect Environmental Consequences

Alternative A – No Action

As there would be no projects implemented under Alternative A, there would be no negative effect to mature habitat or designated old growth. Forested stands in the area would continue to age and mature. Vertical stand structure would increase in diversity within stands, and diversity between stands slowly would decrease as all stands would trend toward uneven-aged conditions. **Alternative B – Proposed Action**

Regeneration harvests proposed under Alternative B would remove 198 acres from age classes over 70. Roads, landings and wildlife openings would remove an additional small acreage. The following table displays the acres of older age class that would be affected by regeneration harvests.

Table 3-18. Age classes affected by proposed regeneration under Alternative B.

Age Class	Acres Prior to Harvest	Acres Proposed for Regeneration	Acres After Harvest
70-79	1666	46	1620
80-89	1931	97	1834
90-99	1733	55	1678
100-109	256	0	256
110-119	4	0	4
Total			**5392**

Only one of the stands over age 100, 62/9 (26 acres) would be affected by timber harvest treatments. It would be included in thinning in the Proposed Action.

Thinning this stand could alter the structure and increase the diameter growth of the trees not harvested. Forest Plan guidelines for "old growth" indicate that stands should not be thinned after designation as old growth. Thus the acreage within the project area in the two oldest age classes present would decrease from 4.1% to 3.7%.

Seventy two percent of national forest lands within the project area would continue to mature and grow, with no timber harvest under this alternative. Riparian areas adjacent to or within harvest units would be protected via riparian buffers and would contribute to potential mature habitat except at road crossings where trees would be removed. Acreage of these areas was roughly calculated, using 100 foot width for perennial streams and 50 foot width for intermittent streams (Some intermittent streams would actually have wider riparian buffers, depending on the acreage of the watershed, but this would indicate the minimum acreage provided.) Perennial stream buffer acreage would provide about 4% of the project area in potential mature habitat, and intermittent streams would provide almost 1%.

Table 3-19. Approximate Riparian acreage for Perennial and Intermittent Channels.

Stream Classification	Holcomb OA	Cherry River OA	Project Area
Perennial	173 ac.	211 ac.	384 ac.
Intermittent	48 ac.	35 ac.	83 ac.

Alternative C

Regeneration harvests proposed under Alternative C would remove 197 acres from age classes over 70. Roads and landings would remove an additional small acreage. The savannah would impact 10 acres from the 90-99 age class. The following table displays the acres of older age class that would be affected by regeneration harvests.

Table 3-20. Age classes affected by proposed regeneration under Alternative C.

Age Class	Acres Prior to Harvest	Acres Proposed for Regeneration	Acres After Harvest
70-79	1666	61	1605
80-89	1931	98	1833
90-99	1733	38	1695
100-109	256	0	256
110-119	4	0	4
Total			**5353**

None of the stands over age 100 would be affected by timber harvest treatments. The acreage within the project area in the two oldest age classes present would remain at 4.1%.

The contribution of riparian buffer areas near perennial and intermittent streams would be the same as for the proposed action, however the number and locations of road crossings are different and would create a break in the riparian buffer where trees would be removed.

Cumulative Impacts

Alternative A – No Action

Past and present activities on federal and non-federal lands have reduced acres of older age classes in the past, but most of the project area still consists of forest stands over 70 years old, as shown in the table below. Timber sales or other National Forest management could occur in the future that would be expected to reduce or other wise affect mature habitat, but none is currently scheduled. However, as there would be no harvest, road construction, or reconstruction projects implemented under Alternative A, there would be no cumulative negative effect to mature habitat or designated old growth.

Forested stands in the project area that are not affected by present or future activities would continue to age and mature. Vertical stand structure would increase in diversity within stands, and diversity between stands slowly would decrease as all stands would trend toward uneven-aged conditions. The two percent of the NFS lands in the project area that is currently designated and managed for old growth would continue to be protected.

Alternative B – Proposed Action

Alternative B timber management activities would change the age of stands of trees and forest structure. However, these effects are not inconsistent with the overall landscape context, compared to the desired future condition for the area, and the goals and objectives for the MP area. Past timber harvest records for the project area indicate 1233 acres (or 13% of the project area) of timber harvest occured, as listed in Table . Combined with Proposed Action timber harvest, this would amount to roughly 32% of the project area. (Some acreages harvested in the past are actually in the same areas as current harvests, so the actual acres would be slightly less.) None of the designated old growth would be affected by Alternative B, thus, there would be no cumulative effects to designated stands. As

described under Alternative A, forested stands in the project area not affected by present and future activities would continue to age and mature.

Alternative C

Alternative C timber management activities would change the age of stands of trees and forest structure. However, these effects are not inconsistent with the overall landscape context, compared to the desired future condition for the area, and the goals and objectives for the MP area.

Combined with the 13% harvested previously in the last couple decades, the 18% of the project area amounts to 31% affected by timber harvests. (Some acreages harvested in the past are actually in the same areas as current harvests, so the actual acres would be slightly less.)

None of the designated old growth would be affected by Alternative B, thus, there would be no cumulative effects to designated stands. As described under Alternative A, forested stands in the project area not affected by present and future activities would continue to age and mature

Unavoidable Adverse Impacts

Both action alternatives change older stands to younger or open areas by regeneration or conversion to wildlife openings. This is an unavoidable impact, but not irreversible, since regenerated stands will continue to mature, and most open areas could be allowed to revert to forest land.

Irreversible or Irretrievable Commitment of Resources

Regeneration harvests reduce the acreage in older stands, and thinning or selection harvests change the stand structure within older stands. Since no stands with remarkable old growth values have been identified, and no stands older than 120 years are present, this is not considered an effect on old growth.

Consistency with the Forest Plan

Actions proposed in Alternatives A, B, and C would be consistent with Forest Plan vegetation standards and guidelines for Management Prescription 3.0 areas (Forest Plan, pp. 127-129 and 55-56). All alternatives would preserve the two percent of the project area that is currently designated as potential old growth/ mature habitat, and an additional 3.7% and 4.1% is still present in the two oldest age classes. Mature habitat along stream channels provides additional acreage over and above the 5% guideline for Opportunity Areas in the Forest Plan.

Threatened, Endangered, and Sensitive Plant Species

Resource Impacts or Issue Addressed

The impact of the proposed actions on threatened, endangered, and sensitive (TES) plant species is not considered a significant issue in the EA. However, one of the goals listed in the Forest Plan is to protect sensitive and unique species until their populations are viable (MNF Forest Plan, page 37). Also, in forest-wide standards and guidelines, the Forest Plan directs us to afford sensitive wildlife species the highest possible protection commensurate with other appropriate uses and benefits and include mitigation measures in project design if sensitive species are found (MNF Forest Plan, page 87). The term sensitive wildlife species has been assumed to include both plant and animal species on the RFSS list.

The concern addressed in this report is the effects to known TES plant species within stands proposed for active management. Mitigation measures will be outlined to address any potential effects.

Scope of the Analysis

Direct and indirect effects will be addressed for the TES plant species in the Cherry River project area over the next 12 years as the projects are implemented. Cumulative impacts will be determined based on reasonable foreseeable future actions and known future actions over the next 15 - 20 years in the project area. Fifteen years is the likely period between entries in this project area for active management such as timber harvest. The project area is used as the spatial boundary because TES plants are not likely to move into or out of the area within these timeframes.

Methodology

Surveys for TES plant species were conducted in 2001, 2003, 2004 and 2005 by contract and National Forest personnel. Data and reports from these surveys are found in the Project File. All stands proposed for management were surveyed at least once. Some sections of planned road construction were not surveyed. Direct and indirect impacts will be addressed by reviewing locations of known TES plant species and locations of active management. The number of TES species sites potentially impacted by alternative will be the basis for comparing the alternatives for effects to the resource.

The surveys were made as random meander transects through stands proposed for active management with bias toward potential habitat.

Affected Environment

Previous surveys of the project area found no TES plant occurrences. Within the watershed there are known locations of long stalked holly (*Ilex collina*) a species on the RFSS list. These plants and their habitat will not be directly or indirectly affected by the proposed actions because they are upstream from the proposed activities.

A survey of the entire Gauley District for rare plants was made in 1992-1993. Notes from the EV Heritage Program Botanist about the Cherry River and adjacent Cranberry River areas note presence of long stalked holly and large-flowered Barbara's buttons (*Marshallia grandiflora*), both on the RFSS list. These species are almost always found in riparian areas of larger stream channels. The State Botanist also noted that the areas could contain habitat for the RFSS species white monk's hood (*Aconitum reclinatum*) and glade spurge (*Euphorbia purpurea*). These species are also mainly found in riparian areas, although in sites of smaller extent than the previous two species. Neither of these species were found in the surveys made of specific areas where activities will occur. However, if these plants were missed during surveys or are found near to areas where activities will occur, the use of the riparian area protection measures will also serve to protect these plants and their habitat.

Direct/Indirect Environmental Consequences by Alternative

No Action Alternative

As there are no harvest, road construction, or reconstruction projects proposed in Alternative A, the No Action alternative, there will be no negative effect to TES. Positive effects of this alternative are the continued maturing of the forest and only natural disturbance to habitat and populations of TES plant species.

Environmental Consequences Common to All Action Alternatives

No direct effects are common to all alternatives. However, some cumulative effects are possible. In areas not actively managed this entry cycle, the forest will continue to age and change in structure and possibly species composition. TES plant species in the project area will be both positively and negatively impacted by these changes. The impacts of beech bark disease and hemlock wooly adelgid

on the structure and composition of the forest are largely unknown, although in some areas tree mortality from these will create canopy gaps, with the potential for some large openings.

Proposed Action

No TES plant species were found in the stands proposed for management during surveys. Some small sections of proposed road construction were not surveyed. Given the findings across the project area from completed surveys (no TES plants found), there is little likelihood that TES plants would be impacted by the proposed road construction. However, the road locations should be walked before implementation of the project if at all possible to make sure no TES plants are present.

There will be no impacts to TES plant species in the Cherry River project area from the proposed action as no TES plants were found in the stands proposed for actions. If butternut trees are found in any of the harvest units, shelterwood or thins, they should not be removed unless a safety hazard. If this species is found, increasing sunlight to the forest floor will help in regeneration of butternut trees or thinning around them will likely increase their growth.

Alternative C

Alternative C contains many of the same harvest units; some have been dropped and none have been added. The creation of a savannah in compartment 48, stand 57 has been added.

Fewer miles of road construction are proposed in Alternative C as compared to the Proposed Action.

Compartment 48, stand 57 was surveyed for threatened, endangered, and sensitive plants on July 21, 2005. No TES or NNIS plants were found.

There will be no impacts to TES plant species in the Cherry River project area from Alternative C as no TES plants were found in the stands proposed for actions. If butternut trees are found in any of the harvest units, shelterwood or thins, they should not be removed unless a safety hazard. If this species is found, increasing sunlight to the forest floor will help in regeneration of butternut trees or thinning around them will likely increase their growth.

No NNIS plant species were noted to be in general forested areas. Those found tend to be species that flourish in open conditions or near the edge of open areas.

Cumulative Impacts

There are no direct or indirect negative impacts to threatened, endangered, or sensitive plant species from either the proposed action or Alternative C, therefore there are no cumulative impacts.

Unavoidable Adverse Impacts

There will be no unavoidable inverse impacts from the implementation of any of the alternatives.

Irreversible or Irretrievable Commitment of Resources

There will be no irreversible or irretrievable commitment of resources from the implementation of any of the alternatives.

Consistency with the Forest Plan

All actions proposed in the alternatives are consistent with Forest Plan goals and objectives. This analysis assumes that all appropriate Forest Plan standards and guidelines will be followed during implementation.

Consistency with Laws, Regulations, and Handbooks

All actions are consistent with laws, regulation, and handbook direction.

Non-Native Invasive Species (NNIS)

Resource Impact Addressed

This section identifies the non-native invasive species (NNIS) that exist in the project area now and explains how proposed alternatives may affect the introduction and spread of NNIS.

Affected Environment

Multiflora rose (*Rosa multiflora*), is the only NNIS documented in the area based on site surveys (see Tables 2 and 3 above). The sites where multiflora rose was found include stream and road sides, in small openings of the stands, and along an ORV trail. There are old pastures that are reverting to forest or were planted with red pine that likely contain NNIS commonly found in old pastures. Also, there is private land within the project area; both forested and open, that also likely contains common NNIS plants. There are likely common roadside weeds (coltsfoot, various grasses, etc.) along the roads in the project area.

Scope of the Analysis

The spatial boundary for direct, indirect, and cumulative effects was the project area because although only a portion of the project area was surveyed (only areas proposed for activities); the risk for spread of NNIS is to the entire project area. The temporal boundary was the recent past, and the next 1 to 10 years because this is the possible entry cycle of this area.

Methodology

Botany surveys were completed in 2003 and 2004. Data from the surveys were used to assess how proposed activities may affect NNIS populations and distribution. Preliminary unpublished information from an ongoing survey of NNIS near the project area was also used (Huebner, 2004-2005).

Direct/Indirect Environmental Consequences

No Action

Under the No Action alternative no activities that would affect existing populations of NNIS or introduce new populations are proposed. NNIS found during recent surveys tend to be species that flourish in open conditions or near the edge of open areas. If species that can invade forested areas, such as Japanese stiltgrass or garlic mustard, are in the area they have the potential to invade into the forest understory even if no action is implemented. Any NNIS present in the project area could spread into openings created form natural disturbances near these populations. They also are likely to continue to spread along road corridors regardless of disturbances.

Proposed Action

The known multiflora rose sites are generally on the edge of the forest, but multiflora rose does have the potential to spread from these areas. Stands 4, 5, 9, and part of 22 of compartment 62 are proposed for thinning by conventional yarding methods. In these stands the potential for there to be more area for multiflora rose to expand into is less than in stands 22 and 46 of compartment 62. These areas are proposed for even-aged regeneration harvest by clearcut with conventional yarding methods. In these areas existing multiflora rose could expand into the open areas of regenerating forest. Stocking surveys will be made in regeneration harvest areas and will serve as monitoring of this possibility. Since multiflora rose is common and spread by our actions and other animals, no restrictions on equipment use or cleaning is needed.

Road construction (new roads and reconstruction of existing older roads) in the proposed action totals about 9 miles. These areas have the highest potential for introducing new NNIS to the project area. Many NNIS follow road corridors into areas because they favor the disturbed habitat created by road construction. Others are found in seed mixes and mulching materials. One mitigation for this possible introduction is to use only native species in the seed mixes and use non-invasive, non-persistent species as temporary cover. Also, relatively weed free mulch such as straw or coco fiber mats could be used in place of hay.

Alternative C

The effects under Alternative C would be much the same as under the proposed action. No actions are proposed in stand 46, compartment 62, however multiflora rose could continue to spread. The even-aged regeneration harvest (clearcut) in stand 22, compartment 62 is proposed for yarding by helicopters. This will lessen the likelihood that multiflora rose could spread by mechanical methods, however open areas will be created and birds or other animals could spread multiflora rose from seeds. In stand 5, compartment 62, single tree selection by both helicopter and conventional yarding measures is proposed. This management will have the least potential for creating areas suitable for expansion of multiflora rose. In stand 22, compartment 62, the yarding method proposed changes form conventional in the proposed action to helicopter. This lessens the possibility that multiflora rose is spread by mechanical means. There is no change in proposed management of stand 8, compartment 62 between the two alternatives other than 1 fewer acre proposed for thinning. Overall, the chance of spread of NNIS by our actions is less under this alternative than with the actions under the proposed action.

In those stands proposed for helicopter yarding, the spread of multiflora rose would continue by means of seeds dispersed by birds/animals, and not likely increased by our actions. In those areas where conventional yarding is used, multiflora rose may be spread by the transportation of parts of plants and seeds that later sprout.

In Alternative C, only about 3 miles of new construction and reconstruction of roads is planned. The same possible effects from road construction and reconstruction area likely here as in the proposed action, however the magnitude is less. The same mitigations given in the proposed action could be use dif Alternative C is implemented.

Cumulative Impacts

No Action

The No Action alternative would not implement actions that would directly or indirectly affect existing populations of NNIS, thus, it would not contribute cumulatively to the effects of past, present, and reasonably foreseeable future activities on Federal and non-federal lands, although some NNIS are likely to spread and new ones move into the area regardless.

Since no threatened, endangered, and sensitive plants were found in areas of the project area proposed for activities, and little potential habitat exists, the project area is likely not a high priority for NNIS treatment. Along with prioritization of areas to treat, is the prioritization of species to treat. In the long run, an emphasis on using native seed in revegetating road cut and fill areas will have greater impact on retaining native diversity than treating roadside weeds on all roads regardless of ecological risk.

Proposed Action

Road related activities associated with the proposed action would be the most likely activity to introduce or spread NNIS. The effects are likely to overlap in space and time with past, present, and future actions and NNIS may spread without action.

There is likely a similar mix of NNIS on non-federal lands, both those that stay in or near road corridors and those with potential to spread under the shade of forest canopy, but we do not know the extent or density of the infestations. Any treatment of NNIS on National Forest land must weigh the possibility of continued spread from non-federal lands when prioritizing areas and species to treat. With the mix of non-federal land and forest and agricultural lands in the project area, this area may not be a high priority for treatment of NNIS when considered with other, more isolated and sensitive areas.

Alternative C

The effects of Alternative C would be the same as the proposed action.

Unavoidable Adverse Impacts
Proposed activities could introduce or cause the spread of NNIS, as mentioned above, but the effects are expected to be limited for reasons previously explained.

Irreversible or Irretrievable Commitment of Resources
None of the alternatives would affect the introduction or spread of NNIS to the point it would cause an irreversible (e.g. extinction of a native species) or irretrievable (e.g. loss of native species for a time) commitment of resources, for reasons previously explained.

Consistency with the Forest Plan
Proposed alternatives would be consistent with Forest Plan direction on page 84c that states project analyses will consider, as needed, ways of minimizing or eliminating threats to threatened, endangered, and proposed species due to NNIS. There are no other Forest Plan standards and guidelines specific to management of NNIS.

Wildlife and Management Indicator Species (MIS)

Resource Impacts Addressed

This section of the document discusses how Cherry River alternatives may change terrestrial wildlife habitat, influence availability of mast and other food resources, and affect terrestrial species tolerant or intolerant of human disturbance. It focuses on effects to species identified within the deer and gray squirrel associations (as listed on page L-2 of the Forest Plan). It also considers effects to five of the species recognized as Forest management indicator species (MIS) (Forest Plan, p. 83), which represent important game species, threatened and endangered species and species inhabiting specific ecosystems.

Some of the species that are part of the deer and gray squirrel associations and that are emphasized in this analysis include gray and red foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), bobcat (*Lynx rufus*), eastern cottontail (*Sylvilagus floridanus*), southern flying squirrel (*Glaucomys volans*), woodpeckers, owls, songbirds, wood thrush (*Hylocichla mustelina*), ruffed grouse (*Bonasa umbellus*), and certain amphibians. The MIS addressed in this section include white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis*), black bear (*Ursus americanus*), wild turkey (*Meleagris gallopavo*), and varying hare (*Lepus americanus*).

Note that the effects to the four terrestrial MIS that are listed as threatened or endangered species (Virginia big-eared bat, Indiana bat, northern flying squirrel, and Cheat Mountain salamander) are documented in this EA's "Terrestrial Threatened and Endangered Animals" section. Also, effects to aquatic MIS (brook trout, brown trout, and rainbow trout) are documented in this EA's "Aquatic Resources" section.

Affected Environment

Management Prescription Direction

All of the project area is managed under Management Prescription 3.0 direction, which emphasizes wildlife tolerant of disturbance, such as white-tailed deer, gray squirrel, ruffed grouse, and associated species.

The Forest Plan standards and guidelines for wildlife management in MP 3.0 emphasize the even-aged system of silviculture when shade intolerant species such as oaks are the species objective (p. 134). 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. 127). The gray squirrel and associated species are to be emphasized in oak/hickory stands, and deer are to be emphasized on other sites. Mast production, especially acorn production, is a primary component of gray squirrel habitat, and therefore is a very important wildlife habitat consideration in this prescription.

Other habitat components called for in the Forest Plan for this prescription include creation of permanent wildlife openings, retention of down woody debris, establishment of high value wildlife trees and shrubs such as soft and hard mast trees and scattered evergreens for cover, retention or creation of natural and artificial wildlife dens and cavities, creation of permanent water sources, protection of seeps, protection and improvement of cold water fisheries, and retention of streamside vegetation (Forest Plan, p. 136).

A challenge in managing for multiple wildlife species is to maintain sufficient habitat for species that need mature forest while providing for the needs of desired edge and early successional species. Management Prescription 3.0 direction seeks to maintain canopied stands of a sufficient size, interspersed with younger stands throughout the landscape, which would provide habitats for a variety of wildlife species requiring different seral stages and habitat types. The proposed Cherry River activities would serve as a means of attaining diverse tree stands, early successional stages/openings, and open understory conditions, which have been noted to provide benefits for wild turkey and black bear (Bailey and Rinell, 1968; Miller, 1975; Rieffenberger et al., 1981; Wunz, 1989; Wunz, 1990). Deer and other species associates could benefit from the additional food, cover, and nest sites provided by tree seedlings and saplings, forbs, grasses, blackberries, etc. in even-aged regeneration areas (Robinson and Bolen, 1984). These activities would affect mature forest to some extent, which would affect species like the wood thrush, a forest interior species in the gray squirrel and white-tailed deer associations that requires larger areas of mature forest. Robbins (1979) estimates that 250 acres is the minimum forest area required to sustain viable breeding populations of this thrush.

Different wildlife species use different vegetative stages/ages. As documented in the "Vegetation" section of this EA, less than one percent of the National Forest System lands in the project area provide openings and brush, habitat that is used by species like white-tail deer, cottontail rabbits, and wild turkey. National Forest lands within the project area have 2.5% of forest stands in the seedling/sapling size class which are early successional stands, and 4.5% in the pole size class in early to mid sucessional stands. Ninety two percent of forest stands within the project area are sawtimber, while about 84% of National Forest stands within the project area are between 70 and 100 years old. This forested habitat provides habitat for a variety of species such as gray and red foxes, bobcat, southern flying squirrel, woodpeckers, owls, songbirds, various amphibians, gray squirrel, black bear, and turkey. Nearly three quarters of the project area consists of yellow popular and mixed oaks. Northern red, white, chestnut, and scarlet oaks in the project area provide a considerable amount of mast for wildlife like squirrels, chipmunks, turkey, and black bear. Hickories and black walnut in the area provide additional hard mast sources for various species. Other species occurring in this project area, which contribute to a varied food supply, include American beech, black cherry, eastern

hemlock, wild grape, and greenbrier. Wild grape is very common and abundant within the project area.

The following pages describe existing habitat conditions for MIS within the project area. Habitat and population trends on the Forest and in the project area are discussed where information is available. Monitoring data and surveys are primarily from the WV DNR *Big Game Bulletin (*2004, and 2005)*, Spring Gobbler Survey* (2004 and 2005) and *West Virginia Mast Survey and Hunting Outlook* (2002, 2003, 2004, and 2005), which complements field observations during the analysis. Wildlife monitoring data and changes in available habitat from Forest Monitoring Reports were also used.

White-tailed Deer

This species is an indicator of early-successional or regenerating deciduous habitat in combination with mature forests. Deer rely on a mosaic of forested and open/brush ecosystems to provide cover and foraging habitat. Tree harvesting typically converts forested cover into early successional stages of vegetation that function as important foraging areas. However, overabundant deer densities preclude tree regeneration and over time alter tree species composition (Tilghman 1989). White-tailed deer are considered a "keystone" herbivore, capable of affecting the distribution and abundance of many other wildlife species, plant species and plant communities (Waller and Alverson 1997). If deer populations increase too much, they can eventually reach a level where they would reduce or eliminate understory vegetation, thus decreasing nesting sites and cover for songbirds and small mammals (DeCalesta 1994, McShea and Rappole 1994).

Deer consume mast and browse on twigs, buds, and leaves of many plant species. Habitat in the project area is currently meeting white-tailed deer food, cover and water requirements. Thickets of rhododendron and mountain laurel are found predominantly along the lower slopes and drainages of the project area. These thickets provide cover during the hunting seasons and thermal cover throughout the winter months. Deer or their sign were evident during every site visit to the project area from 2003-2005.

According to Forest Plan population objectives for white-tailed deer, the Cherry River population objective is 50.5 deer/square mile in a mixed hardwood type (MNFMP 1985, Appendix L). Big Game bulletins, a yearly publication of the WV Division of Natural Resources, track deer harvest numbers by county and National Forest wildlife management areas. Population estimates are based on the premise that the number of bucks harvested represents 10% of the deer population in an area. The Holcomb and Cherry River Opportunity Areas (6400 acres) are located in the Western side of the Cranberry Wildlife Management Area (CWMA) (295,040 acres or 461 square miles). Deer populations, based on harvest numbers, are shown in the table below.

Table 3-20. Cranberry Wildlife Management Area (CMWA)

YEAR	2000	2001	2002	2003	2004
Buck Harvest CMWA	431	491	395	237	181
Est. Deer Pop. CMWA	4310	4910	3950	2370	1810
Est. Deer/sq. mi.	9.3	10.7	8.5	5.1	3.9

Although deer populations can fluctuate from year to year, the general trend for the past three seasons in this project area and adjoining areas has been a sharp decrease.

Deer populations in the CWMA seemed to have reached a peak in 2001, which has been followed by a population crash in 2002, 2003, and 2004. A similar crash has been seen across much of the Monongahela National Forest. The apparent reduction in the deer population was due to a combination of mast failures, and severe winters in 2002 and 2003 which included deep snows and bitter temperatures. Mast failures continued for the 2003-2004 hunting season along with additional severe winter conditions. It is possible the low deer harvest in 2003 and 2004 may have been exacerbated by lower hunter effort because of perceived lower deer population and unpleasant weather conditions during those hunting seasons. It is not known what portion of the drop in harvest was due to lower deer density versus lower hunter effort.

The current distribution of water in the project area is not limiting white-tailed deer use. Approximately 90% of the watershed is within ½ mile of permanent water sources. Intermittent streams throughout the watershed provide water during wet seasons.

Black bear (Ursus americanus) – This species is an indicator of mature/late-successional forests and does best in oak/hickory or mixed mesophytic forests with an understory of blueberry, blackberry, raspberry, rhododendrom and mountain laurel. They feed primarily on grasses and forbs in the spring. Insects, blackberry, blueberry, pokeberry, serviceberry compose up to 60% of their diet during summer months. As fall approaches, black cherry and acorns are the preferred food (Eagle & Pelton 1984). All these foods are present in the project area.

Regenerated areas less than 15 years old (3%) are found within the project area and offer increased soft mast supplies during summer. Temporary and closed system roads, wildlife openings, the beaver pond wetlands within Coal Siding Run, Curtin Run, Holcomb Run, Morris Creek, and log landings provide soft mast and forage habitat.

Thickets of grape and greenbrier also, provide key feeding areas for black bear. Grape arbors are found in several stands proposed for treatment. Mid-successional and mid/late successional stands would provide shrubs and trees (dogwood, serviceberry, black gum, fire cherry) that produce soft mast. Regeneration harvest will provide additional early to mid-successional habitats.

Mature hardwood stands provide important sources of year-round food, particularly fall and winter food such as acorns and nuts. Approximately 84% of the project area provides this habitat.

The availability of bear den habitat appears to be sufficient in the project area. Rock outcrops, cliffs and surface rocks are present that contains the complexity of crevices, cavities or overhangs that could accommodate a large animal such as a black bear. Elevated tree dens, uprooted root wads, and slash piles may also be used as den sites.

Access management has always been thought to influence black bear movement. Road density may therefore be a limiting factor in the ability of an area to provide quality black bear habitat. National Forest road density for the entire Cherry River watershed is relatively low, and would not be a factor in Black Bear movement, since most are closed. Open public roads within the project area may be a factor, but location outside the bear sanctuary probably has more impact than the road density.

None of the project area but a large portion of the CWMA is within the Cranberry Black Bear Sanctuary. Neither hunting for bear nor training dogs for bear hunting is allowed within the sanctuary boundaries. Because of the protection that the sanctuary provides the species this area has some of the highest bear populations in the state. According to Forest Plan population objectives for black bear, in all 3.0 management areas the objective is .7-bear/square mile.

Gray squirrel (Sciurus carolinensis)– This mature/late successional forest species is found in most woodland areas, especially oak, hickory and beech forests which provides food over a long season and an abundance of den and cavitity trees. Forest Plan population objectives for gray squirrel in 3.0 management areas is 640-squirrel per square mile in a mixed hardwood type ecosystem. This small

game species is the most popular game animal in West Virginia with annual harvests approaching 2 million. Although the WVDNR does not track yearly harvests on squirrel, annual population fluctuations are normal. These fluctuations occur in response to the abundance of hard mast the preceding year. Bumper crops result in population explosions and mast failures are equally as devastating. The Cherry River area has an abundance of mixed oak with yellow poplar and therefore on good mast years gray squirrel population may actually reach this objective. The mast years of 2002-2004 have been very poor mast years so squirrel populations are presently below the Forest Plan Objective.

Turkey (Meleagris gallopavo)– Typically associated with grassy openings, thickets of dense cover, scattered clumps of conifers and extensive tracts of mature/late-successional forests. They can be found throughout the project area.

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. The project area provides very few grass forb openings on National Forest lands. This habitat type is usually associated with agricultural lands which are found in and around the Western Cherry watershed area.

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, dogwood, yellow poplar, and black cherry. The project area provides hard mast in the form of acorns, hickory nuts, beechnuts, and black cherry. Flowering dogwood 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 some conifers that provide roost cover during severe winter weather.

Turkeys need a daily water source and water is available throughout 90 % of the project area in the form of seeps, springs, streams and created waterholes.

Population objectives for turkey in this 3.0 management area is 31.7-turkeys/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. The Holcomb and Cherry River Opportunity Areas (6400 acres) is 10 square miles and the Cranberry Wildlife Management Area (CWMA) is 461 square miles.

Table 3-21. Estimated turkey populations, based on harvest numbers, are shown in the table below.

Year	1999	2000	2001	2002	2003	2004
Spring gobbler Harvest	64	45	60	29	37	26
Est. population CWMA	640	450	600	290	370	260
Est. turkey/sqmi CWMA	1.4	1	1.3	0.6	0.8	0.6

According to the WVDNR, the suspected reasons for the tremendous decline in the number of birds harvested statewide in the spring of 2002 were not due to an actual reduction in the turkey population but were due to (1) the adverse weather conditions during the hunting season that affected hunter participation and success, (2) fewer naive 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 (WVDNR 2002). In contrast, the continued harvest rate decline in the spring of 2003 is believed to at least partially reflect a decline in the turkey population in some areas due to the severe winter weather that killed many birds. The spring 2003 harvest decline probably was exacerbated by the poor weather during the spring gobbler season, which may have reduced hunter participation (WVDNR 2003). Mast failure has occurred for 4 of the last five years in various areas of the Forest and has contributed to a general decline in turkey numbers and distribution throughout the Forest.

Scope of the Analysis

The area considered for direct, indirect, and cumulative effects to MIS wildlife is the Cherry River project area, which is surrounded by a number of natural and man-made fragmenting features. These features include the town of Richwood in the south, along with the communities of Fenwick and Holcomb. The North Fork Cherry, Cherry River and Gauley River along the South to Western side; WV 55 along the entire south side; WV 94/5, 7/3 and 7 on the North side; agricultural fields, and residential/farms on the East side and scattered centrally. Direct and indirect effects will be limited to the project area in the vicinity of management activities. The partial isolation of the project area by fragmenting features will tend to limit the spatial extent of the project's contribution to cumulative effects on wildlife. The temporal boundary used for assessing effects varies depending on the effects considered (as explained in the effects discussion that follows). For example, regeneration harvests reset succession and can affect certain habitat characteristics (e.g., mast production) for a century or more.

Methodology

The effects analysis was based on review of literature and scientific knowledge concerning the effects of timber harvest and road construction on habitat structure, mast production, and disturbance of wildlife. Wildlife biologists visited the project area to assess wildlife habitat conditions and evidence of species present in the harvest units. Deer impact on forest floor vegetation was included in the understory survey done in 2005. Population information for MIS was considered (WVDNR, Big Game Bulletins 2004 and 2005 and the 2004 and 2005 WV Mast Survey and Hunting Outlook).

Environmental Consequences Common to All Action Alternatives

Both action alternatives involve thinning harvests. Effects due to thinning would be the same in both action alternatives, however, effects may differ when conventionally logged versus helicopter logged. Some direct and indirect effects due to harvesting and yarding activities would be similar in thinning and regeneration harvest units.

Thinning harvests would remove lower quality trees and release healthy trees, including mast producing trees such as oaks and hickories. Wildlife species requiring closed canopy forests may be adversely affected by the thinnings in the short term, as the thinnings would create gaps in the forest canopy. However, these gaps may allow understory vegetation to flourish from the temporary increase of sunlight reaching the forest floor. A variety of wildlife species, including deer, bears, and shrub-nesting birds, would capitalize on the new growth of understory vegetation. This vegetation would provide increased structural diversity that could attract songbirds such as hooded and Kentucky warblers (Smith 1988) and nesting wild turkeys. Hawks, owls, and other predators that prefer a more open understory may have reduced hunting success in the dense understory vegetation. Some mast-producing trees would be removed, but residual mast producing species of trees and shrubs would experience less competition and probably would produce more mast. The thinnings would leave an

abundance of healthy trees whose canopies would soon expand to fill the gaps, so some of the beneficial and adverse effects of reducing canopy cover would be temporary (5-10 years). Thinning harvests could have a somewhat longer term effect by reducing competition for resources among overstory trees. This in turn could result in more vigorous trees and increased mast production, which would benefit a variety of wildlife species, including deer, bear, squirrels, and turkeys.

Direct effects of thinning harvest on birds, gray squirrels, and other tree-nesting species could result from loss of eggs, young, and/or adults during tree felling and skidding, primarily if these activities are conducted during the nesting season. Indirect effects could include loss of nests, nest cavity sites, and roosting sites. Bats roost under shredding bark of old trees and snags, so they could also experience loss of roosting sites and mortality during felling operations. Other cavity users, such as mice, squirrels, and raccoons, could be adversely affected by loss of cavities. Such effects could occur due to the thinning included in both action alternatives, as well as the regeneration harvests. The effects would be similar in both action alternatives. These effects would be minimized by standards and guidelines in the Forest Plan that call for the retention of snags and den trees in cutting units (Forest Plan, pages 86-86a).

Salamanders could experience local population declines in the regeneration harvest units proposed and possibly in thinned stands. Pauley (1997) noted that in sections of clearcuts where sunlight reaches the soil, the surface is hardened and prevents salamanders from reaching the surface to feed. Where slash and surface litter is left and soils retain moisture, salamanders are still able to reach the surface. The alternatives will include regeneration harvest and thinning harvests where the canopy has been opened. The effects would be similar in nature in the two action alternatives., but would occur to a greater extent in the proposed action because of the greater area of open canopy created by the regeneration harvests and road construction. Effects would be limited by leaving tree tops and other slash scattered through harvest units. Pauley (1997) has noted that in West Virginia, red-backed salamanders would return to pre-clearcut populations within 22 years. Populations of mountain dusky salamanders would return and would be abundant, but would not equal pre-clearcut populations as quickly as the red-backed salamanders.

The skid roads needed to remove timber from the conventional harvest units may provide travel lanes for some species, such as deer and bear. Skid roads may temporarily isolate some small species such as salamanders that are associated with leaf litter and other forest floor organic matter, since their movements may be restricted by areas of bare soil.

Both action alternatives include several miles of road improvements, construction and reconstruction. In general, the reconstruction of existing roads would have minor effects on wildlife. Road reconstruction would result in the removal of vines, tree limbs, brush, and other vegetation that have encroached onto the roadways in the last several years. The reestablishment of the road corridor may benefit certain bat species that forage in linear openings. Road reconstruction would also remove any herbaceous vegetation that has grown on the road surface. Species such as deer, turkeys, grouse, cottontails, and songbirds would lose the clover and other preferred plant species that presently occur on some of the roadways. However, these resources should still be available to a lesser extent on the roadsides and in other open areas. Log landings would provide temporary herbaceous cover after the period of use, since the landings would be revegetated after use.

The new road construction and the sections of road reconstruction that would occur outside of the existing road beds would result in the removal of linear strips of trees, other woody and herbaceous vegetation, topsoil, leaf litter and other organic material used by wildlife. Soil and ground disturbance from road construction could directly affect ground-nesting species by destroying ground nests and burrows, with possible loss of adults and young (salamanders, rabbits, mice, chipmunks, and ground-

nesting birds such as juncos and ovenbirds). Soil compaction on roads, skid roads, and log landings would be detrimental for burrowing animals on those specific sites, but adjacent to the roads and landings would be largely unaffected by soil compaction. By creating new edge habitat, road construction may benefit species like deer and eastern towhees (*Pipilo erythrophthalmus*).

Most of the species in the gray squirrel and deer species associations are considered to be tolerant of human disturbance to some degree. However, some species such as bears and turkeys are believed to be sensitive to disturbance, particularly during critical life stages like nesting, denning and brood rearing. Short-term direct and indirect disturbance to wildlife may occur during project implementation from (1) physical harm or mortality of individual animals from equipment use, tree felling, and skidding; (2) disturbance or destruction of nesting and roosting sites, cover vegetation, or food sources; (3) noise disturbance from equipment use and vehicle traffic; (4) visual disturbance from increased human activities in the area; and (5) soil disturbance and compaction during road construction and skidding. Some animals may become roadkill victims due to the increase in log truck and other vehicle traffic in the project area during project activities.

Long-term disturbance could occur after project completion if new roads or road improvements facilitate human access into the area. However, none of the alternatives would open any additional road mileage to public vehicular use, therefore sources of additional disturbance due to improved access would be limited to increased foot travel, bicycle travel, and unauthorized motor vehicle use (i.e., ATVs). Noise from equipment and human activity could cause some species, such as bears, bobcats, and turkeys, to change their normal activity patterns to avoid some locations.

Helicopter operations require less road construction/reconstruction and no skid trails. Therefore, long term effects to ground conditions are less than with ground-based systems. Less time is required to harvest a unit using helicopter logging as well. Helicopter logging is normally done in the leaf off period, October through May, which reduces effects to wildlife. This timing would avoid disturbance to nesting and brooding turkeys, but could cause disturbance of denning bears if any are present in the harvest units during harvest. Fewer animals will be displaced in an equal sized unit with helicopter logging versus ground based logging because ground conditions are not disturbed and many animals will habitualize to the noise and will not disperse from the area or will disperse only a short distance and return when operations are completed. Most reptiles and amphibians, for instance, will be burrowed underground for some of this time of year and will not be affected by the noise but would be active during the warmer months and could be extremely disturbed by skidders and other heavy equipment.

Alternative A – No Action

Early successional habitat in the project area likely would decline as early successional forest in previously harvested areas matures. If large-scale natural disturbances occur (such as fire, windthrow, severe ice or insect damage), they could offset this trend, but the timing and duration of natural disturbances cannot be predicted. Timber harvest on private land is not likely to provide much early successional habitat because such harvest typically is selection or diameter limit cutting. Early successional species would find habitat located in small patches scattered throughout the area. Some species that are limited to this habitat or require it as a component of their habitat would probably decline as the previously harvested units continue to mature. Woodpeckers and cavity nesters would be maintained at current levels or possibly increase as more snags and dying trees become available. Availability of den trees for bears may increase as trees grow larger and become more susceptible to diseases and injuries that create hollows. Species requiring larger expanses of mature forest would be maintained at current levels or possibly increase as existing early successional forest matures, unless natural catastrophic events affect large areas.

With no habitat management to enhance browse or mast availability, management activities would not impact deer populations in the short term. However, over the long term, lack of management actions on NFS lands in the project area may result in less browse being available to deer populations, which could affect their populations.

No trees or grapevines currently producing mast would be removed; however, no mast trees would be regenerated or released for future sustainable yields. Cherry, oak, and hickory would not regenerate over wide areas unless there were a natural disturbance in the area, such as fire, windthrow, or insect damage. Mast production of black cherry, oak, and hickory could decrease in perhaps 40-50 years when existing mast trees begin to decline in mast production and are not replaced by younger trees. Over the long term, squirrel, deer, turkey, bear, and other wildlife populations that depend on mast could be adversely affected by the reduction in mast production across the area. However, some mast production likely would continue, and any population declines would not noticeably affect Forest-wide species viability.

Mast producing shrubs would remain in the understory but would not produce as much mast as in a managed forest where light conditions in the understory would be increased by management actions such as thinning and two-age harvests. Natural breaks in the canopy due to overstory tree mortality would allow additional sunlight to reach mast producing shrubs, however.

Affects on wildlife from human activities in the project area would remain static. Wildlife would not experience increased disturbance or other effects from equipment use, road compaction, soil disturbance, human presence, or vehicle traffic since this alternative would not include those activities. Access and use of the area would remain at current levels with no expectation of any increased use of the area.

Alternative B - Proposed Action

The Proposed Action would create two types of early seral habitat (the amount of which is currently below Forest Plan objectives for MP 3.0) by regeneration harvest and construction of wildlife openings. The regeneration harvest will total 200 acres in 13 separate units using even aged regeneration methods and conventional logging. Wildlife openings on National Forest lands are few, and private fields make up most of the opening acreage discussed in the fragmentation section of this document. The wildlife openings will be constructed on 6 acres in 3 separate locations. The harvest method proposed is clearcutting with residuals. Residual trees are left for wildlife habitats including the creation or maintenance of 6 snags per acre. This would remove closed-canopy habitat needed by some wildlife species, resulting in local population declines in the harvested stands. However, most of the project area and surrounding lands would continue to be dominated by mature, closed-canopy forest, and Forest-wide species viability would be maintained. Habitat for species needing young stand characteristics would be created. The regeneration harvests would result in abundant ground and shrub vegetation available for browse, nesting, and cover. During the initial 10 to 15 years following harvesting, these sites would provide a varied food base of blackberry, forbs, woody vegetation, and grasses for a variety of animals, such as bears, turkeys, grouse, foxes, raccoons, chipmunks, deer, mice, and songbirds. The open canopy conditions would last approximately 20 years, which is about the time it takes for trees to reach 1/3 the height of the scattered mature trees that would remain throughout the two-age harvest units.

Clearcutting would retain some residual trees, according to Forest Plan guidelines for 3.0 areas. These trees would produce some mast, although their primary function would be to provide structural diversity, snags and culls for perch, den and roost trees. The residual trees remaining after the timber harvests likely would experience an increase in mast production on a per-tree basis, but the overall mast production of the affected stands would be reduced for several decades.

However, assuming regeneration of desired mast-producing species is successful, the regenerated stands would help sustain mast production in the future when some of the adjacent older stands may be declining in mast production.

No shaded regeneration units (such as two aged harvests) are proposed so that growth of young trees would be expected to outpace deer browsing. Small, unmerchantable trees would also be cut to avoid shading seedlings, and to provide sprouts as part of the new stand.

Some of these sprouts would become preferred deer browse and for the first five years provide a late winter survival food. Any vines growing in trees, including grapevines would be cut before the harvest to prevent sprouts from later damaging young trees. This will have an immediate short term effect on soft mast feeders but will be lessened with the establishment of other soft mast such as blackberry. Even on the acreage where vines would be cut prior to harvest, many young vines would be expected to be a part of the new young stand of trees, since seeds from the abundant vines present will grow following harvest.

The proposed action may change approximately 226 acres of the project area from closed canopy forest to openings (this includes new openings created by proposed road construction, reconstruction, and landings); this would temporarily increase the total area of openings from approximately 523 acres to approximately 757 acres. Approximately 200 acres of new openings will come from regeneration harvesting; the remaining acres to come from road construction/reconstruction and expansion/creation of openings for landings. The increased open area due to regeneration harvesting would last about 20 years until the canopy closes again, while the new openings due to roads and landings would persist as long as these areas are maintained as openings. Because existing timber harvest openings would close during this time, the actual area of openings at the end of 20 years could be more or less than current levels, depending on other activities in the project area.

The creation of three 2 acre wildlife openings, along with landings and skid roads would provide nesting, dusting, and foraging sites dispersed throughout the area for all species using grassy, open areas. The openings would also create habitat for those species using a grassy open understory with moderate canopy cover. Turkeys and grouse would use the open areas as brood range, and for fall feeding. Hawks, owls, and bats could benefit from increased open foraging/hunting area. These openings could attract more predators, such as the great-horned owl and crows, possibly changing the predator/prey ratio of those areas.

Salamanders could experience population declines in the regeneration units, and openings. Pauley (1997) noted that in sections of clearcuts where sunlight reaches the soil, the surface is hardened and prevents salamanders from reaching the surface to feed. Where slash/surface litter is left and soils retain moisture, salamanders are still able to reach the surface. Pauley has also noted that in WV, red-backed salamanders will return to pre-clearcut populations within 22 years. Populations of mountain dusky salamanders will return and will be abundant, but will not equal pre-clearcut populations as quickly as the red-backed salamanders. Effects would be minimized by leaving all topwood and other slash scattered through regen units.

Mitigation: Leave all topwood and slash scattered throughout clearcuts.

Direct effects on birds could result from loss of nestlings and/or adults during tree-felling and skidding. Indirect effects could include loss of nests, nest cavity sites, and roosting sites. Bats roost under shreddy bark of shagback hickory, and older or dead trees, and could also lose roosting sites. Other cavity users, such as mice and squirrels, could be adversely affected by loss of cavities. These effects are minimized by guidelines in the Forest Plan as amended which leave snags and den trees in thinning and other cutting units.

Mitigation: Leave all shagbark hickory, and den trees in all harvest units; retain all cull trees, and snags unless they pose a safety hazard.

Deer populations within this project area and adjoining areas had been increasing slowly over the past decades, however during the last three years deer populations have declined dramatically. In addition to mast, deer browse on the twigs, buds and leaves of many plant species. Currently the deer population and their browsing has a non significant impact on the under story vegetation, however, with a growing population browsing would increase and eventually reach a level where it could reduce or eliminate under story vegetation, thus decreasing nesting sites and cover for songbirds and small mammals (deCalesta, 1994; McShea and Rappole, 1994).

Regeneration harvests, and wildlife openings (204-208 acres) would create ground level vegetation available for browse, nesting and cover. In addition, slash when left in clear cuts *(See mitigation #1)* would make it harder for deer to move around within these stands, minimizing browsing and allowing regeneration of the forest trees.

The thinning would temporarily open the overstory canopy allowing sunlight to reach the forest floor. Understory vegetation would flourish, producing additional browse, forage, and cover for deer and small mammals. This vegetation would provide increased structural diversity which could attract songbirds, such as the hooded and Kentucky warblers (Smith, 1988). It could detract from the hunting ease of hawks and owls, which need a more open understory to hunt. The skid roads needed to remove timber from the harvest units could provide travel lanes for some species. Bare skid roads, however, could temporarily isolate some species such as salamanders, which are limited in travel where there is no leaf litter cover.

The Proposed Action would provide for 298 acres of regeneration harvest where some mast-producing species such as oak, black cherry, and hickory would regenerate. Yellow poplar would be expected to predominate in the young stands, as it does in the current overall composition of many of the areas regenerated, but some of the regeneration harvests would be changed from predominantly oak to a mix of species with less oak, as discussed in the vegetation section of this document.

This would remove these acres from current mast production; however, the stands created would provide mast in the future when some of the older stands may be declining in mast production. During the initial 10 to 15 years following clearcutting, these sites would provide blackberries, forbs and grasses for a varied food source for many animals. This increased food source would benefit black bear, squirrel, wild turkey, blue jay, tufted titmouse, fox, raccoon, chipmunk, deer, mice, hermit and wood thrush, towhee, and woodpecker, among others. Mast tree/shrubs, such as dogwood, hawthorn, etc. when released in the under story after thinning opens the canopy would provide additional seasonal food sources.

Habitat disturbance during project implementation would occur from (1) soil disturbance and compaction during road construction, wildlife opening creation, tree felling, and skidding; (2) noise, equipment use, and vehicle traffic; and (3) increased human activities in the area.

Soil and ground disturbance from road construction could directly affect ground-nesting species by destroying burrows, with possible loss of adults and young (salamanders; rabbits; mice; chipmunks; ground-nesting birds, such as juncos and ovenbirds). Soil compaction on roads/skid roads would be detrimental for burrowing animals on those specific sites, but other habitat is available next to roads and in other stands not being harvested. Tree-felling could directly affect species, such as birds, bats, and squirrels if they were located in the tree at the time of felling. Noise from equipment and human activity could cause some species, such as bears and bobcats, to change their normal range patterns to avoid certain sites. Some of these animals could be lost to mortality on roads from vehicle use during project activities.

Bulldozing to clear wildlife openings could disturb nests in slash piles, and ground burrows. Effects would be greatest in the spring when the majority of young are being born and raised, and late fall and winter when disruption could expose animals to harsh weather and remove their cache of winter food supplies.

Mitigation: Use bulldozer for clearing of wildlife openings from July 15 through October 15.

Long-term disturbance would not change much from the existing condition as only 6.5 miles of new road will be built onto the existing road system and this system will continue to be gated to public motorized travel.

Alternative C

Effects of Alternative C are similar in quality to those described above for the action alternatives, and for the Proposed Action, especially in their disturbance effects and the effects of thinning. The number of acres varies for these effects (see Chapter 2 for acreages). Because more of the area would be logged using helicopters, the short-term disturbance effects during project implementation would be much less than the Proposed Action, especially considering the seasonal nature of effects during mostly the winter season. The two cut shelterwood harvests would double the disturbance effects described above, for the area with this type of harvest, but this effect would not be substantial, especially considering that some of these units would be expected to be logged in the leaf-off season using helicopter logging.

Early successional habitat effects would be substantially the same as the proposed action, since about the same number of acres would be regenerated. Edge effects beneficial to some wildlife species such as deer would be slightly less, since there are fewer units with larger average size.

One difference in quality of effects, as opposed to quantity, is the likelihood of regenerating more mast producing tree species such as oaks is higher with Alternative C. The units expected to be more successful in regenerating mast species are retained in this alternative, and those where advanced regeneration showed fewer oak seedlings are dropped. This, along with a mitigation to plant and tube oak seedlings, would enhance the future potential for mast production in these stands. The two cut shelterwood harvests would tend to increase the potential for oak regeneration in those stands where existing oak regeneration is present, but not large.

Mast tree release in young stands would tend to increase the numbers of oak trees present in the area over the longer term. Existing oak seedlings still have potential to be retained in these stands, and crop tree release efforts have been shown to be effective in retaining desirable species in stands less than 15 years old.

Mast production from the numerous grape vines in Compartment 62, stand 65 would continue, since this area was dropped from the regeneration. Otherwise, the effect on grape mast production would be about the same as in the Proposed Action, in spite of the apparent difference in acres treated. This is because stands with no vine treatment in Alternative C actually have few vines. The double vine cutting treatment would reduce the number of resprouting arbors in Compartment 48 stand 52, and in Compartment 62 stands 52 and 58/65. Existing arbors and individual vines are plentiful in the area as a whole and vines would continue to provide mast and habitat in all but the 131 acres where preharvest vine treatments would be done.

A 10 acre Savannah would be created along with a waterhole and would replace the three 1-2 acre Wildlife openings created in the proposed action. The savannah has many well-spaced oak and mast trees with healthy crowns, and this area would be expected to provide mast, shrub and herbaceous vegetation in the same area, compared to the wildlife openings in the Proposed Action, which would provide this benefit only around the edges of each open area. The waterhole effects are the same as

for the Proposed Action. They would provide a source of water locally, especially for species which are not able to move far in search of water. Maintenance of landings would retain the open habitat longer than expected under the Proposed Action. Most landings would be located along closed roads where vehicle disturbance would be less likely.

Cumulative Impacts

No Action Alternative

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

Both Action Alternatives

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 planning area 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 utility corridors, and possible residential and agricultural developments. Reasonably foreseeable activities of this type are unlikely to change the area much from the existing environment.

Natural factors such as gypsy moth, hemlock wooly adelgid, and the natural aging of the existing forest could have more potential to change the environment for wildlife than the treatments in the action alternative. Some of these changes would be beneficial for a variety of wildlife since more snags and dead trees and more early successional habitat would occur if these insects and diseases develop. Reduction in conifer cover and changes in mast production would be considered less favorable for many wildlife species. Mast production reductions as a result of gypsy moth would tend to reduce oak mast in the area. In general, oak trees with larger and healthier crowns and root systems (the goal in areas thinned) would better survive defoliation by gypsy moths, but mast production can be severely reduced by these insects over a period of years after a heavy infestation. These potential changes are difficult to predict, even though they are known to occur in or near the project area currently. Beech bark scale, which would have similar effects, is currently present in the Cherry River watershed, but not known to occur within the project area.

In general, these activities tend to maintain or create permanent openings, early successional forest habitat, edge habitat and tend to reduce and fragment mature forest habitat. As described previously, even-aged partial harvest treatments result in short-term effects to wildlife habitat and use, and for this reason, partial harvest activities are not included in the cumulative effects analysis. Ice storms are a common natural disturbance in the area, but these disturbances tend to damage many trees, without changing the predominant characteristic of the landscape to an opening. Since there have been no other major naturally-occurring disturbances or changes within the project area within the last 10 years, potential 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 Cherry River Composite/North Fork Cherry River watershed area. The following rationale was used to identify the cumulative effects analysis area for wildlife. The planning area is characteristic of the surrounding

landscape, in that the area is predominantly forested and surrounding lands are similarly forested. No reasonably foreseeable actions would change the amount of forested land relative to developed communities in the vicinity of the project area.

The regeneration and road reconstruction proposed in the Action Alternatives would contribute to the cumulative effects of other actions that replace mature forest habitat with early successional forests, permanent openings, and edge. The regeneration harvests would also contribute to the long-term maintenance of mast production in future mature forest habitat, assuming regeneration of mast producing species is successful.

The thinning harvests included in all alternatives would not remove the forest canopy, and thus would not contribute to cumulative effects related to openings. However, thinning would stimulate understory growth and would make a very short-term contribution to some components of early successional and edge habitats. The Action Alternatives contribution to cumulative effects would last about 5-10 years, at which time canopy closure of the thinning (and selection, in Alternative C) harvest units would return to these areas of forest habitat. However, road reconstruction contributions would persist indefinitely as long as they are maintained.

Mast production increases over time could contribute to future regeneration potential of the thinned stands, if acorns and other nuts sprout and grow into understory trees. The contribution of regeneration harvest areas to sustainable mast production would begin when the regenerated trees reach optimal mast production several decades after the harvest, and would continue until the trees begin to senesce around a century after the harvest.

Species in the project area limited to mature forests, such as wood thrush and some salamander species, would 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. The Action Alternatives would not adversely affect maintenance of species viability at the Forest-wide scale.

Unavoidable Adverse Impacts

The adverse impacts identified above for the action alternatives are unavoidable because they are associated with activities that would occur if the alternatives are implemented. The impacts identified for salamanders due to drying and hardening of the soil surface may be partly mitigated by retention of slash, but they are not completely avoidable. The adverse impacts identified for the no action alternative are also unavoidable because they would occur naturally in the absence of management activity.

Irreversible or Irretrievable Commitment of Resources

The no action alternative does not involve new action, thus it would not commit any wildlife resources. The early successional habitat that would be lost gradually under the no action alternative is retrievable through future management actions. The action alternatives would each result in the conversion of some mature forest habitat to early successional habitat. These commitments of habitat resources would not be irreversible because the harvested areas eventually would return to mature, closed-canopy forests. The action alternatives would cause a temporary irretrievable commitment of forested and herbaceous habitat associated with the construction and reconstruction of roads and landings. These commitments are not irreversible because the roads and landings could be decommissioned and re-vegetated.

Consistency with the Forest Plan

All alternatives would be consistent with Forest-wide standards and guidelines for wildlife (Forest Plan, pp. 83-84) and with wildlife standards and guidelines in management prescriptions 3.0 (Forest Plan, pp. 136-138).

Habitat Fragmentation

Resource Impacts Addressed

This section addresses adverse effects of increasing fragmentation of forested habitat. This analysis addresses not only the effect of increased area of temporary and permanent openings, but also the fragmentation and degradation of remaining forest due to the edge effect. Edge is the forested area near openings, measured at several different widths, as discussed in this section. Edge effect varies depending on the shape and arrangement of openings, as well as the size of the openings (Franklin and Forman 1987). Particular discussion is given to fragmentation effects as they relate to neotropical migratory birds because many of them require interior forest conditions (Forman and Godron 1986). Fragmentation is evaluated in terms of amount of forest and openings, interior to edge ratio, and percent core area. Core area is the interior forest that is left after the edge effect of the openings is subtracted from the total forested area; it is expressed as a percentage of the project area (all land ownerships). Interior to edge ratio is the ratio of interior forest to forest that is included in the edge effect of adjacent openings. Edge effects were calculated using a 49-foot-wide edge and a 328-foot-wide edge. The 49-foot edge width is based on the typical penetration of sunlight in eastern forests (Ranney et at. 1981) and represents the impact of the edge on forest structure. The 328-foot edge width is based on habitat needs of neotropical migratory birds in the eastern U.S. (Temple 1984) and represents the impact of fragmentation on forest interior wildlife. Percent core area and interior to edge ratio analyses focus on the 328-foot edge width to assess habitat for neotropical migratory birds, which represents a "worst case" effects scenario.

Landscape ecology studies suggest that the interior to edge ratio is a meaningful parameter in assessing forest fragmentation and viability of interior species (Forman and Godron 1986, Laurence and Yenson 1991, Chen 1991). When the interior to edge ratio is 2:1 or greater, an area is presumed to provide adequate interior habitat. Ratios less than 1.5:1 are approaching a level of concern. As the interior to edge ratio reaches 1:1, the amount of interior equals the amount of edge. This is considered an important threshold because the remaining interior patches are generally small, isolated, and unlikely to support interior species over time. The relationship of percent core area to fragmentation effects on songbirds has been investigated on the MNF. Across landscapes with 42% to 81% forested core area on the MNF, fragmentation effects on songbirds were only apparent at very localized scales within 75-100 feet of edge, with no pervasive landscape-scale effects noted (DeMeo 1999). In a different study, Donovan et al. (1995) hypothesized that 40% core area represents a minimum threshold where there is no difference between source and sink habitats for neotropical migratory birds in the landscape.

Affected Environment

The Cherry River project area (National Forest and other ownerships combined) currently contains approximately 8851 acres of closed-canopy forest and approximately 523 acres of permanent and temporary openings. Permanent openings include agricultural fields, roads, residential areas, wildlife openings, etc. Temporary openings consist primarily of recent even-aged timber harvests.

For Compartments 48, 61, and 62, the perimeters of open fields/pasture/croplands on private properties, old and newer clearcuts, brushlands, and wildlife openings were measured. The Gauley Ranger District office compound was included in the river/road polygon with the Richwood, La Frank, Fenwick, Holcomb City/town areas included for the 39/55 road polygons. Where roads intersected existing openings, the perimeter was placed around the units only and did not count the road length

going through existing openings. The total existing edge length for roads was calculated at 58 miles, while the openings were 22 miles.

Based on an edge width of 49 feet, the forest acreage is divided into approximately 8514 acres of interior forest and approximately 337 acres of edges. Using a 328-foot edge width, the project area contains approximately 6589 acres of interior forest and approximately 2262 acres of edges. This translates to an interior to edge ratio of about 2.9:1; percent core area is about 70 percent. This area is presumed to provide adequate interior habitat with an interior to edge ratio greater than 2:1. The percent core area suggests that current levels of fragmentation are not problem for forest interior birds. Current levels of fragmentation reflect the intensity of management on both National Forest and private land in the project area. Management Prescription 3.0 emphasizes a variety of activities including vegetation management to produce forest products. It does not focus on maintaining remote undisturbed habitat as some other management prescriptions do.

Scope of the Analysis

The area considered for direct, indirect, and cumulative effects of fragmentation is the Cherry River project area, which is surrounded by a number of natural and man-made fragmenting features. These include the town of Richwood on the southeast with Highway 39/55 on the east side; the communities of La Frank, Fenwick, Holcomb, State Highway 39/55, and the Cherry River Composite west to the confluence with the Gauley River forming the southern and western boundaries; Forest Service Roads 907, 908, and 99 on the northside; agricultural fields and private lands are found in the interior along with the sub-watersheds of Curtain Run, Coal Siding Run, Holcomb Run, Morris Creek, and Buckheart Run. Other Roads (County Road 7 and 94, and FSR 76) and pipeline right of ways are also found in the interior. Direct and indirect effects would be limited to the project area in the vicinity of management activities.

The partial isolation of the project area by fragmenting features would tend to limit the spatial extent of the project's contribution to cumulative effects. The temporal boundary for most effects is approximately 20 years, which is about the time it takes for regenerated areas to return to forested conditions. However, impacts due to roads may last longer if the roads are maintained beyond that time period.

Methodology

To assess the areas existing condition and the effects of each alternative, a coarse analysis was performed. This analysis permits a quantitative display of fragmentation effects, in addition to qualitative discussion. The total existing edge of openings in Cherry River analysis area was determined using ArcView/ArcGis. The North Fork of Cherry River and Highway 39/55 runs east and south along the planning area, forming the southern and eastern boundaries. A polygon created by a 30' road width and its length was used to determine edge area amounts for Forest Service Roads 76, 94, 99, 907, 908, along with County Road 7, the Rail trail, and pipeline/right of ways. This total perimeter length for interior roads and exterior/boundary roads was 35.2 miles. The interior roads perimeter length was doubled to include the total edge area for road effects to be included in this analysis.

Fragmentation was assessed through a GIS analysis of the project area. Polygons representing existing openings were digitized from digital orthophoto quarter quads (DOQQs) covering the project area. All features that appeared to represent a substantial break in the tree canopy were digitized, including roads, agricultural land, wildlife openings, residential sites, recent even-aged timber harvests, and anything else that appeared to be a substantial opening. These features were digitized

without regard to land ownership. Thinning harvests were not included for either alternative. While thinning creates small gaps in the tree canopy and may alter habitat characteristics for some species, it does not create non-forested habitat and edge effects. Therefore, for this analysis, we did not consider thinning to be a fragmenting event.

For the existing condition and each action alternative, the area of openings was calculated from the digitized polygons. For the two edge width scenarios, the area of edge was calculated by buffering the openings polygons by 49 and 328 feet. Total forest area was calculated as the total area of the project area minus the area of openings. Interior forest area was calculated by subtracting the area of edge from the total forest area. The interior to edge ratio was calculated as interior forest area divided by edge area. Percent core area was calculated as interior forest area divided by the total area of the project area, with the result expressed as a percentage.

Direct/Indirect Environmental Consequences

Table 3-14 summarizes forest fragmentation impacts by alternative.

Alternative A – No Action

Alternative A would not involve any new activity, and therefore would not add to existing fragmentation. Fragmentation would decline over time as recent timber harvests mature and cease to produce edge effects, unless natural events or future timber harvests produce new edge to offset the decline.

Alternative B – Proposed Action

The Proposed Action may change approximately 255 acres of the project area from forest to openings (this includes new openings created by proposed road construction, reconstruction, and landings); this would temporarily increase the total area of openings from approximately 523 acres to approximately 778 acres. Approximately 198 acres of new openings come from regeneration harvesting; the remaining acres come from road construction/reconstruction and expansion/creation of openings for landings and wildlife openings.

The increased open area due to regeneration harvesting would last about 20 years until the canopy closes again, while the new openings due to roads and landings would persist as long as these areas are maintained as openings. Because existing timber harvest openings would close during this time, the actual area of openings at the end of 20 years could be more or less than current levels, depending on other activities in the project area.

Based on a 49-foot edge width, the Proposed Action would create approximately 184 acres of new edge, temporarily raising the amount of 49-foot-wide edge from approximately 337 acres to approximately 521 acres. The proposed action would create approximately 1258 acres of new 328-foot-wide edge, raising the total amount from approximately 2262 acres to approximately 3520 acres for up to 20 years; edge effects would decline gradually during this time as existing timber harvest openings close. Immediately after harvest, the interior to edge ratio would decrease from about 2.9:1 to about 1.5:1, which is still above the threshold where interior species are believed to have difficulty persisting over the long term. Percent core area would decline from about 70 percent to about 56, which is above the hypothesized 40 percent threshold where fragments are believed to begin acting as population sinks.

Most of the increases in edge habitat and associated fragmentation effects would last about 20 years until the tree canopy closes over the regeneration areas. Slight additional fragmentation would persist due to the roads and helicopter landings for as long as these areas are maintained as openings.

The interior to edge ratio and percent core area presented here represent the worst-case scenario that would exist immediately after implementation of the project. Because existing timber harvest

openings would close some time after project implementation, the actual degree of fragmentation at the end of 20 years could be more or less than current levels, depending on other activities in the project area. Any such effects are not expected to impact viability at the Forest-wide scale because large areas of the Forest are managed to maintain forest interior characteristics (e.g. wilderness, remote backcountry). About 23 percent (206,000 acres) of National Forest land is included in wilderness areas and remote backcountry, and an additional 12 percent (about 112,000 acres) is in zoological areas reserved for management of the West Virginia northern flying squirrel.

Alternative C

Alternative C would change approximately 236 acres of the project area from forest to openings, increasing the total area of openings from approximately 523 acres to approximately 759 acres. Alternative C includes 197 acres of regeneration harvest including two-age shelterwoods. This analysis also includes the increase in open area due to road construction/reconstruction and expansion/creation of openings for helicopter landings. These openings would persist as long as they are maintained as openings. Because existing timber harvest openings would continue to close, the area of openings would begin declining after project implementation, and the future amount of openings would depend on the extent of future activities.

Based on a 49-foot edge width, Alternative C would create approximately 103 acres of new edge, raising the amount of 49-foot-wide edge from approximately 337 acres to approximately 440 acres. Alternative C would create approximately 691 acres of new 328-foot-wide edge, raising the total amount from approximately 2262 acres to approximately 2953 acres. This would cause a smaller decrease in the interior to edge ratio from about 2.9:1 to about 2.4:1. Percent core area would also show a small decline, from about 70 percent to about 67 percent. The increases in edge habitat and associated fragmentation effects would persist as long as the roads and helicopter landings are maintained as openings. The interior to edge ratio and percent core area presented here represent the worst-case scenario that would exist immediately after implementation of the project. Because existing timber harvest openings would continue to close, the area of openings and edge would begin declining after project implementation and the future amount of openings and edge would depend on the extent of future activities.

Table 3-22. Forest fragmentation impacts by alternative. Numbers are approximations.

	Existing Condition/ (No Action)	(Proposed Action)	Alternative C
Total project area size (acres)	9374	9374	9374
Open area (acres)	523	778	759
Forested area (acres)	8851	8596	8615
Based on a 49-foot Edge Width			
Edge area (acres)	337	521	440
Interior area (acres)	8514	8330	8411
Change in interior (%)	NA	-2	-1

	Existing Condition/ (No Action)	(Proposed Action)	Alternative C
Based on a 328-foot Edge Width			
Edge area (acres)	2262	3520	2953
Interior area (acres)	6589	5331	6258
Change in interior (%)	NA	-19	-5
Interior:edge ratio	2.9:1	1.5:1	2.4:1
Percent core area	70	56	67

Cumulative Impacts

Alternative A – No Action

Under Alternative A, no new activities would be implemented, therefore it would not contribute to the cumulative effects of past, present, and reasonably foreseeable future actions.

Alternative B – Proposed Action

The past, present, and reasonably foreseeable actions listed in Table 3-1 that have been or are expected to be implemented within the project area tend to create or maintain temporary or permanent fragmentation of forested habitat (e.g. timber harvesting, savannah creation, gas, agricultural, and residental development). The fragmentation effects outlined above for Alternative B would contribute to the cumulative effects of these fragmenting activities. Most of the fragmentation contributed by Alternative B would last about 20 years until the canopy closes in the regeneration harvest units. The small amount due to the roads and landings would persist as long as these features are maintained as openings. The cumulative effects of fragmentation would further reduce percent core area and the interior to edge ratio. The amount of the additional fragmentation cannot be predicted due to uncertainty over actions on private land. This cumulative fragmentation could negatively affect populations of forest interior species in the project area. However, Forest-wide viability will not be affected because approximately 23 percent of the National Forest land is managed as wilderness and remote backcountry, which provides forest interior habitat.

Alternative C

The fragmentation effects outlined above for Alternative C would make a small contribution to the cumulative effects of fragmentation caused by the past, present, and reasonably foreseeable future actions in the project area that are listed in Table 3-1. This small contribution to cumulative fragmentation would persist as long as the roads and landings are maintained as openings. The cumulative effects of fragmentation are likely to further reduce percent core area and the interior to edge ratio. The amount of the additional fragmentation cannot be predicted due to uncertainty over actions on private land. Cumulative fragmentation from Alternative C is less likely to negatively affect interior species than Alternative B because the direct and indirect effects are less under Alternative C.

Unavoidable Adverse Impacts

The fragmenting effects identified above would occur if regeneration harvesting and construction of roads and landings is implemented. The adverse effects identified for each alternative are unavoidable if the alternatives are implemented.

Irreversible or Irretrievable Commitment of Resources

The action alternatives would cause irretrievable fragmentation of forested habitat due to regeneration harvesting and construction of roads and landings. However, these effects are not irreversible because the harvested areas would grow back and the roads and landings could be decommissioned and returned to forested habitat.

Consistency with the Forest Plan

The Forest Plan does not contain specific direction addressing fragmentation of forested habitat. The fragmentation that would occur under the action alternatives is consistent with the overall management emphasis in Management Prescription 3.0, which calls for a variety of intensive uses (Forest Plan, p. 127-128).

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Terrestrial Threatened and Endangered Animals

Resource Impacts Addressed

Table 3-23 displays the status of all Federally Proposed, Endangered, Threatened, and regionally Sensitive species found on the Monongahela National Forest. It also identifies if habitat can be found within the Cherry River watershed area. Eastern cougar and Gray wolf are not addressed further as they are considered extirpated in West Virginia. Plant species are covered in the Threatened, Endangered and Sensitive Plant section and are not discussed further in this section.

Table 3-23: Federally Proposed, Threatened, Endangered, & Regionally Sensitive Species Habitat related to Cherry River Watershed Area.

Species	Status	Occupied habitat	Suitable habitat: unknown occupancy	No suitable habitat
Bald Eagle (Haliaeetus leucocephalis)	Threatened		X	
Cheat Mountain Salamander (Plethodon nettingi)	Threatened			X
Indiana Bat (Myotis sodalis)	Endangered		X	
Running Buffalo Clover (Trifolium stoloniferum)	Endangered			X
Shale Barren Rock Cress (Arabis serotina)	Endangered			X
Small whorled pogonia (Isotria medeoloides)	Threatened		X	
Virginia Big-eared Bat (Plecotus townsendii)	Endangered		X	
West Virginia Northern Flying squirrel (Glaocomys sabrinus fuscus)	Endangered			X
Virginia Spirea (Spiraea virginiana)	Threatened		X	
BIRDS				
Migrant loggerhead shrike (Lanius ludovicianus migrans)	Sensitive		X	
Northern Goshawk (Accipiter gentilis)	Sensitive		X	
Peregrine Falcon (Falco peregrinus anatom)	Sensitive			X

Species	Status	Occupied habitat	Suitable habitat: unknown occupancy	No suitable habitat
MAMMALS				
Allegheny woodrat (Neotoma magister)	Sensitive	X		
Eastern small-footed bat (Myotis leibii)	Sensitive		X	
Southern rock vole (Microtus chrotorrhinus carolinensis)	Sensitive	X		
Southern water shrew (Sorex palustris punctulatus)	Sensitive		X	
AMPHIBIANS				
Green salamander (Aneides aeneus)	Sensitive	X		
Hellbender (Cryptobranchus alleganiensis)	Sensitive	X		
REPTILES				
Timber rattlesnake (Crotalus horridus)	Sensitive		X	
MOLLUSKS				
Elktoe (Alasmidonta marginata)	Sensitive			X
Green floater (Lasmigona subviridis)	Sensitive			X
Organ Cavesnail (Fontigens tartarea)	Sensitive			X
INSECTS				
A cave beetle (Pseudanophthalmus fuscus)	Sensitive			X
A cave beetle (Pseudanophthalmus hypertrichosis)	Sensitive			X
A tiger beetle (Cicindela ancocisconensis)	Sensitive		X	
Appalachian Grizzled skipper (Pyrgus wyandot)	Sensitive			X
Barren's tiger beetle (Cicindela patruela)	Sensitive		X	
A springtail (Pseudosinella gisini)	Sensitive			X
A springtail (Sinella agna)	Sensitive			X
Culver's planarium (Sphalloplana culveri)	Sensitive			X
Diana frittilary (Speyeria diana)	Sensitive		X	
Dry Fork valley cave beetle (Pseudanophthalmus montanus)	Sensitive			X
Gandy Creek cave springtail (Pseudosinella certa)	Sensitive			X
INVERTEBRATES				
A Cave obligate planarian (Phagocata angusta)	Sensitive			X
An isopod (Caecidotea sinuncus)	Sensitive			X
An isopod (Caecidotea simonini)	Sensitive			X
An underground crayfish (Cambarus nerterius)	Sensitive			X
Cheat Valley cave Isopod (Caecidotea cannulus)	Sensitive			X
Culver's cave isopod (Stygobromus culveri)	Sensitive			X
Dry Fork Valley cave pseudoscorpion (Apochthonius paucispinosus)	Sensitive			X
Germany Valley cave millipede (Pseudotremia lusciosa)	Sensitive			X

Species	Status	Occupied habitat	Suitable habitat: unknown occupancy	No suitable habitat
Grand Caverns Blind cave millipede (Trichopetalum weyeriensis)	Sensitive			X
Greenbrier cave isopod (Stygobromus emarginatus)	Sensitive			X
Greenbrier Valley cave millipede (Pseudotremia fulgida)	Sensitive			X
Hoffmaster's cave flatworm (Macrocotyla hoffmasteri)	Sensitive			X
Holsingers/Greenbrier valley cave isopod (Caecidotea holsingeri)	Sensitive			X
Luray Caverns blind cave millipede (Trichopetalum whitei)	Sensitive			X
Minute cave isopod (Stygobromus parvus)	Sensitive			X
Pocahontas cave isopod (Stygobromus nanus)	Sensitive			X
South Branch Valley cave millipede (Pseudotremia princeps)	Sensitive			X
Timber Ridge cave beetle (Pseudanophthalmus hadenoecus)	Sensitive			X
WV blind cave millipede (Trichopetalum krekeleri)	Sensitive			X
FISH				
Appalachian Darter (Percina gymnocephala)	Sensitive		X	
Candy Darter (Etheostoma osburni)	Sensitive	X		
Cheat minnow (Rhinichthys bowersi)	Sensitive			X
Kanawha minnow (Phenacobius teretulus)	Sensitive	X		
New River Shiner (Notropis scabriceps)	Sensitive	X		
Pearl Dace (Margariscus margarita)	Sensitive			X
Redside Dace (Clinostomus elongatus)	Sensitive			X
PLANTS				
Ammons tortula (Tortula ammonsiana)	Sensitive			X
Appalachian blue violet (Viola appalachiensis)	Sensitive		X	
Appalachian Oak Fern (Gymnocarpium appalachianum)	Sensitive			X
Arctic bentgrass (Agrostis mertensii)	Sensitive			X
Bog buckbean (Menyanthes trifoliate)	Sensitive			X
Box huckleberry (Gaylussacia brachycera)	Sensitive			X
Bristle fern (Trichomanes boschianum)	Sensitive		X	
Butternut (Juglans cinerea)	Sensitive		X	
Canada Mountain Ricegrass (Oryzopsis canadensis)	Sensitive			X
Canby's mountain lover (Paxistima canbyi)	Sensitive			X
Cooper's milkvetch (Astragalus neglectus)	Sensitive			X
Crested Coralroot (Hexalectris spicata)	Sensitive		X	

Species	Status	Occupied habitat	Suitable habitat: unknown occupancy	No suitable habitat
Darlington's spurge (Euphorbia purpurea)	Sensitive	X		
Fraser fir (Abies fraseri)	Sensitive			X
Harned's swamp Clintonia (Clintonia alleghaniensis)	Sensitive			X
Highland Rush (Juncus trifidus)	Sensitive			X
Jacob's ladder (Polemonium vanbruntiae)	Sensitive		X	
Kate's mountain clover (Trifolium virginicum)	Sensitive		X	
Lance leaf Grapefern (Botrychium lanceolatum)	Sensitive		X	
Large-flowered Barbara's buttons (Marshallia grandiflora)	Sensitive	X		
Lillydale onion (Allium oxyphilum)	Sensitive			X
Long-stalked holly (Ilex collina)	Sensitive	X		
Netted Chain fern (Woodwardia areolata)	Sensitive		X	
Nodding pogonia (Triphora trianthophora)	Sensitive		X	
Robust fire pink (Silene virginica v. robusta)	Sensitive			X
Rock Skullcap (Scutellaria saxatilis)	Sensitive		X	
Sand grape (Vitis rupestris)	Sensitive			X
Showy Lady's Slipper (Cypripedium reginae)	Sensitive			X
Silvery Nailwort/Virginia/Yellow (Paronychia virginica v. virginica)	Sensitive			X
Smokehole Bergamot (Monarda fistulosa v. brevis)	Sensitive			X
Spreading Rockcress (Arabis patens)	Sensitive			X
Swamp Lousewort (Pedicularis lanceolata)	Sensitive			X
Swordleaf phlox (Phlox buckleyi)	Sensitive			X
Tall larkspur (Delphinium exaltatum)	Sensitive			X
Tennessee pondweed (Potamogeton tennesseenisis)	Sensitive		X	
Thread rush (Juncus filiformis)	Sensitive			X
Turgid gay feather (Liatris turgida)	Sensitive		X	
White alumroot (Heuchera alba)	Sensitive			X
White monkshood (Aconitum reclinatum)	Sensitive	X		
White Mountain silverling (Paronychia argyrocoma)	Sensitive			X
Yellow Buckwheat /Shalebarren wild buckwheat (Eriogonum alleni)	Sensitive			X

As can be seen from Table 4, the planning area is considered occupied habitat for 10 species and provides suitable habitat for 32 species. The project area is considered unsuitable habitat for 61 species. Specific information regarding TES species can be found in the project Biological

Evaluation. Terrestrial animal species are discussed in this section.

Affected Environment

Bald Eagle *(Haliaeetus leucocephalus)*

On July 12, 1995, the 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.

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 sight path to the nest (McEwan and Hirth 1979, Anthony and Isaacs 1989). Andrew and Mosher (1982) found that nesting eagles in Maryland (MD) selected nest trees in forested areas with an open, mature structure located in close proximity to water. Eagles in WV appear to select similar habitats. Known bald eagle nests in WV 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 the bulk of the diet for eagles nesting inland. The closest known bald eagle nest to the Cherry River watershed is located approximately 28 miles away. It is possible that bald eagles may be seen during migration along the Cherry River, however there are no known nests within the project area.

Indiana bat (*Myotis sodalis*)

There is no known suitable hibernacula or maternity sites within or near the planning area. The Indiana bat is distributed throughout the eastern US, 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 Forest Plan threatened and endangered species amendment was signed in the end of 2004. The amendment created Management Prescription 6.3 areas around known hibernacula, OA 838 and identified standards and guidelines specific to Indiana bat habitat management.

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, Primary Range and Key areas

Indiana bats typically hibernate predominately in karst caves between October and April.

There are no Indiana bat caves in the Cherry River watershed and no karst topography. Thus here are no hibernacula. The nearest caves which have Indiana bats are Bob Gee Cave 17 miles away,

Snedgers Cave 18.5 miles away and Martha Caves at 18.8 miles away, all to the east and located on private lands. The edge of these five mile circles would be 12-13 miles from the Cherry River area. These caves were last surveyed by WVDNR in January 2000.

Since there are no hibernacula in or near the project area, there are no areas designated as Primary Range and Key areas.

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).

West Virginia is within the Indiana bat's eastern maternity range, but not within the core range. Prior to summer 2003, maternity colonies in WV had not been confirmed. Despite extensive summer surveys throughout West Virginia, especially in and around the MNF, 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).

In survey efforts conducted in 2004 on the MNF, a confirmed maternity colony was located about 75 miles from the Cherry River project area. Generally, the area in which this maternity colony is located is a mixture of forested areas, forest edges, and early successional areas. The two-mile circle of protected area around this site is well outside of the Cherry River project area boundary.

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 summer roosting habitat.

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. There are no non-hibernacula caves within the Cherry River project area. One closed coalmine with bat gates is present in the project area, and other mine openings are present in the watershed.

A total of 709 bats of 12 species have been captured during mistnet surveys in and near the Cherry River watershed in surveys between 1998 and 2004.

In August of 1999 a male juvenile Indiana bat was discovered while examining bridges on the North Fork Cherry River. This was the first known capture of a juvenile Indiana bat on the MNF during the summer period and, at that time, the best evidence of potential maternity activity in West Virginia. The capture occurred on the Gauley Ranger District approximately 2.5 miles north northeast of Richwood, WV. The Indiana Bat Recovery Plan states that one bat capture does not represent a maternity colony, however the potential for one does exist. Following this capture, the Forest implemented a temporary 3-year, 2-mile radius buffer to provide protection to any unidentified maternity colony should it exist. This circle would have included part of the project area. The timing and other climatic factors surrounding this capture might indicate the bat was in route to its fall hibernaculum from a more far removed maternity site. To help further evaluate the significance of this one capture, mist netting and other survey techniques were used in the project area over a 3 year period following this capture.

Area surveys completed in 2000, 2001, 2002 and 2004 did not identify additional Indiana bats. With the completion of mist netting in 2002, the terms and conditions set forth in the USFWS Biological Opinion have been met. Because additional evidence of possible maternity colonies (lactating females or juveniles prior to August 15) was not discovered, the temporary 3-year, 2-mile radius buffer has expired and proposed activities may proceed.

Virginia big-eared bat (*Corynorhinus townsendii virginianus*) – There are no areas of influence for Virginia big-eared bat within the Cherry River watershed area. No Virginia big-eared bats were found during the above referenced mist net surveys. There are some deep mine openings within the Cherry River watershed that could potentially provide summer maternity or bachelor roosts. These bats travel variable distances from caves to forage in summer.

Cheat Mountain salamander (*Plethodon nettingi*) ---Due to the small home range of these species, individual impacts to potential habitat were used to analyze the effects to this species. 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. Three potential Cheat Mountain salamander sites within the Cherry River Watershed area 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 1,568 acres of low potential Cheat Mountain salamander habitat identified in Cherry Rivershed watershed area, and the nearest to the proposed action area is 7 miles away. There is no potential CMS habitat within the planning area, and no high potential habitat within the watershed.

West Virginia Northern flying squirrel (*Glaucomys sabrinus fuscus*)– The analysis for this species focused primarily on impacts to suitable habitat within or adjacent to the planning area. Cumulative effects encompassed primarily the forest boundary due to the available reliable data. On July 31, 1985, USFWS listed Virginia Northern Flying Squirrel (VNFS) *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 WVNFS habitat, suitable and unsuitable. Suitable WVNFS 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 will be placed on protecting this habitat. No projects or activities that would adversely affect suitable habitat

on the MNF will 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 will not affect the WVNFS and will not require consultation or permits pursuant to the ESA (USFWS 2001).

To effectively delineate suitable WVNFS habitat, a map of suitable habitat within the Cherry River watershed has been produced, reviewed and refined collaboratively among the Fish & Wildlife Service, the MNF and the WVDNR (USFWS 2001). Approximately 15,000 acres of suitable WV NFS habitat has been identified within Cherry River Watershed. These areas are identified as Management Prescription 832. All WV NFS suitable habitat is 7-8 miles from the nearest proposed units.

Methodology

The likelihood of occurrence of each threatened and endangered species and its potential habitat was determined for the Cherry River 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 programmatic Biological Assessment for the Monongahela National Forest Plan (USFS 2001), the corresponding Biological Opinion from the U.S. Fish and Wildlife Service (USFWS 2002), and the recently approved Forest Plan Amendment for threatened and endangered species on the MNF.

Scope of the Analysis

The spatial boundary used for the assessment of direct, indirect and cumulative effects to TE and S species varies for individual species. Species that have wide home ranges will have larger areas analyzed versus species with narrower home ranges. The spatial boundary also includes areas of influence around Bob Gee, Snedgers, and Marthas cave systems for the Indiana bat.

The time period considered for direct effects is the duration of the road building, harvest, and yarding activities. The time period of analysis of indirect and cumulative effects is approximately 10 years post-harvest, when tree canopies of regenerated stands likely will be closed. Temporal considerations beyond these timelines would be speculative and irrelevant to this analysis

Direct/Indirect Environmental Consequences

Alternative A – No Action

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

Indiana Bat: With the No Action Alternative, no potential habitat would be harvested or otherwise disturbed within the 6.3 management area. Usual road maintenance and wildlife opening mowing activities would continue unchanged. Therefore, implementation of the No Action Alternative 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. Indirectly, beech bark disease could create additional snag and cull trees used for roosts. Because no tree felling or other activity would occur, the No Action Alternative would have no impact on the Indiana bat.

Virginia Big-Eared Bat: With the No Action Alternative, no potential habitat would be harvested or otherwise disturbed. Usual road maintenance and wildlife opening mowing activities would continue unchanged. Therefore, implementation of Alternative A 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, this Alternative would have no potential for take.

Cheat Mountain salamander: There would be no direct effect to Cheat Mountain salamander with the No Action Alternative. Indirectly, as stands mature and canopies close, there will 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, the No Action Alternative would have no potential for take.

West Virginia northern flying squirrel: There is approximately 15,000 acres of suitable West Virginia northern flying squirrel habitat within Cherry River watershed. There would be no direct effect to West Virginia northern flying squirrel with the No Action Alternative. 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 WVNFS 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, the No Action Alternative would have no potential for take.

Effects common to both Action Alternatives

Bald Eagle: There are no activities proposed that would directly affect bald eagles or have adverse impacts to available foraging habitat along Cherry River. As a result, there are no adverse effects anticipated to this species under the Proposed Action.

Indiana Bat - Hibernacula key areas and Maternity sites - There would be no direct, indirect or cumulative affects to Indiana bat hibernacula, key areas, or maternity sites with implementation of any activities identified in the Proposed Action because there are no hibernacula, maternity, or key sites within the Cherry River watershed.

Primary Range/Outside Primary Range Effects – Effects of both Action Alternatives would be similar in type, but different in amount. See below for Effects of Alternative C. The project area is not located within a 5-mile radius primary range (MP 6.3). Tree felling activities would have the potential for take, whether they occur inside or outside the primary range. Effects on Indiana bats outside of Hibernacula, Maternity, Key Areas and Primary Range would be similar to those described below for Primary Range, but could be expected to have potential for impacts on fewer bats. Regeneration harvesting would affect potential foraging, roosting and fall swarming/migratory habitat by reducing canopy closure below optimal levels (Indiana bats prefer to forage within upper forest canopy layers where overstory canopy cover ranges from 50-70% (Romme et al. 1995)). These effects would last about 10 years until the canopy closes again. Potential roost trees would be removed and future roost tree availability could be reduced by large tree removal. The effect of potential roost tree loss would last several decades until trees in the regenerated areas reach roost tree size. Effect to roost tree loss would be reduced by retaining cull trees, snags, and all shagbark hickories required by the Forest Plan.

Except for removing potential roost trees, commercial thinning 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 roosting conditions. These effects are short-term, because canopy closure occurs in approximately 5-10 years after thinning occurs. A more long-term effect of thinning is increased residual growth on the remaining trees, creating larger diameter and more suitable roost

trees. 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 management activities require some tree felling. The effects described for regeneration harvesting apply to road management.

There are direct effects from the remaining activities proposed outside the identified primary range. Any tree removal during the non-hibernation period (April 1 – November 14) may result in mortality (take) of an individual roosting Indiana bat if a tree containing that bat is removed intentionally or felled accidentally. If a bat using the said felled and removed roost tree is not killed by the felling action, the roosting bat would be forced to find an alternative roost trees, potentially expending energy and making the bat vulnerable to predation. This action would result in harm or harassment to the bat and constitutes take. All proposed activities fall within the scale and scope addressed in the Biological Opinion and within the level of take identified in the Incidental Take permit (USFWS 2002).

Virginia big-eared bat: Implementation of the Proposed Action will not directly affect Virginia big-eared bat hibernacula or maternity caves as there are none within the Cherry River 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 55 miles required to forage specifically within the Cherry River watershed area, therefore there would be no direct effect on this species from timber harvesting activities. The effects of silvicultural practices on moths, the primary food source of VBEB, are largely unknown. Moth species use different habitats as a result of their different sizes and vegetative requirements. Changes in moth populations caused by habitat changes, could indirectly affect bat populations. Because the Cherry River is so far from known hibernacula or maternity sites there would be no expected impacts.

Cheat Mountain salamander: There are no activities planned in low potential CMS habitat within the Cherry River watershed area. Timber harvest activities can create long term drought like stressful conditions to salamanders, which could cause desiccation or force escape to underground retreats where food is scarce (Petranka et al 1994). The home range of CMS is small (approximately 6-10 ft^2).

Timber harvest activities created in CMS areas may affect microclimate conditions, indirectly affecting CMS populations. 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. Direct effects described under harvest activities apply to road construction and reconstruction. Tree removal is required for timber landing areas, where wildlife openings will be created. This activity has similar potential direct effects as regeneration harvests.

West Virginia Northern flying squirrel: The Proposed Action will not include harvest activities within MP 832, suitable squirrel habitat. Since the nearest suitable habitat is 6-7 miles away, WV Northern flying squirrels would not be expected to impacted by the project.

Potential direct effects include felling of cavity trees containing young squirrels (if harvest occurs in the spring). Adults may escape injury, but nestling young most likely would not. Equipment noise could disrupt nesting squirrels, possible causing them to leave the nest, exposing them to daytime predators. Indirectly, regeneration harvesting could decrease habitat by: 1) removing potential nest cavity trees; 2) maintaining or changing forest types to those less suitable for WVNFS; 3) disrupting fungi/lichen growth; and 4) eliminating "travel" trees used in gliding. In unsuitable habitat, silvicultural guidelines would emphasize habitat enhancement in areas that have the ecological potential for WVNFS. Because these areas at present are not suitable, no direct effects are anticipated. Indirectly regeneration harvest within unsuitable habitat that improves conditions for WVNFS would

be beneficial. Regeneration harvests in the project area are not expected to improve habitat for WVNFS, since conifer percents are unlikely to increase in the areas harvested. Thinning harvests would have the same potential direct effects as regeneration harvests.

Indirectly, thinning could enhance residual overstory and understory tree growth and result in faster attainment of desirable habitat characteristics within unsuitable habitat. Thinning designed to release conifer components, would be beneficial.

Thinning designed to release hard-mast species could encourage an influx of southern flying squirrels which would compete with any WVNFS in the area. Thinning may also alter microclimates and decrease lichen and fungal food availability.

Road management activities have the same effects as regeneration harvests.

Alternative C

Indiana Bat: Effects due to harvest activities proposed in Alternative C would be similar to those explained in the Proposed Action, but to a lesser degree due to the reduced acres and different treatments. See Tables in Chapter 2 for project acreage.

Cumulative Impacts

Alternative A – No Action

The No Action Alternative 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.

Effects Common to the Action Alternatives

Because there is no potential habitat within the project area for Cheat Mt. Salamanders, there will be no cumulative effect on this species. Approximately 88% of Cheat Mt. salamander populations are within the MNF boundary. Timber harvesting and other activities outside the MNF will have limited cumulative effects on CMS populations. Because most ground disturbing activities are avoided in occupied and high potential CMS habitat there should 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 National Forest land, potential future actions include thinning and regeneration harvests to benefit the Indiana bat and to create age class diversity. Although no such harvests are scheduled within the Project Area, other timber harvests are scheduled within the watershed. Future activities may also include creation and maintenance of wildlife openings and water sources. 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. The magnitude of the impacts of these actions cannot be assessed because specific actions have not been proposed. The proposed action would make a minor contribution to the cumulative effects of regeneration harvesting. Cumulative effects of incidental take associated with the action alternatives are within the scale and scope addressed in the Biological Opinion and Incidental Take permit (USFWS 2002).

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. Cumulative impacts on Virginia big-eared bat should be viewed in the context of the 6 mile radius area of influence; the closest area of influence to Cherry River is located approximately 37 miles away (Stewart Run cave). Because of this distance, cumulative effects associated with the Action Alternatives would not be measurable at the Forest-wide scale.

The Action alternatives will not reduce available West Virginia northern flying squirrel suitable habitat.

Cumulative effects of incidental take of Indiana bats associated with either action alternative are within the scale and scope addressed in the Biological Opinion and Incidental Take permit (USFWS 2002).

Unavoidable Adverse Impacts

All alternatives result in expected impacts to wildlife as discussed above. While some of the activities are expected to result in improvements to wildlife habitat, adverse impacts to individual species and/or species habitat including the Indiana bat are expected to occur as discussed above. These impacts have been mitigated to reduce the impacts but have not been eliminated.

Irreversible or Irretrievable Commitment of Resources

While individual potential roost trees may be removed from the planning area, management of the area will still consider and, where appropriate, be designed to manage for those species dependent upon the habitat. There will be no reallocation of primary uses within the planning area. Therefore, there will be no irreversible or irretrievable commitment of resources.

Consistency with the Forest Plan

All alternatives would be consistent with Forest-wide standards and guidelines for threatened and endangered species (Forest Plan, pp. 84-88).

Sensitive Species – Terrestrial Animals

Resource Impacts Addressed

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.

Scope of the Analysis

This analysis addresses possible direct, indirect, and cumulative effects on terrestrial animal sensitive species that occur or could occur in the project area. The analysis also considers any impact the proposed project and alternatives could have on viability of sensitive species populations Forest-wide, as well as whether effects occurring within the project area could contribute to a trend toward federal listing of a sensitive species. The temporal and spatial boundaries considered for direct, indirect and cumulative effects vary by species, as described above for other wildlife species.

Methodology

All MNF RFSS were considered, and the species or suitable habitat determined to occur within the Cherry River project were evaluated as part of this effects analysis. Species information was collected

from the West Virginia Natural Heritage Program database, Gauley district records, Combined Data System information, Ecological Classification System database and predictive vegetation associations, soil maps, Geographical Information System library, research literature, field surveys, and personal communication with specialists to determine each species' occurrence or likelihood of occurrence in this project area. Occurrence and habitat data were organized into a likelihood of occurrence table (Appendix B). Species determined not to occur or unlikely to occur in the project area due to lack of habitat were not brought forward for further analysis. Sensitive species have been grouped into habitat types for effects analysis. The key to determining effects is evaluating how each alternative affects habitat and, in particular, how alternatives affect factors that limit a species' ability to thrive (limiting factor).

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

There is roughly 500 acres of riparian habitat within the various sub-watersheds created by numerous perennial, intermittent and ephemeral streams. Riparian ecosystems are productive areas with great physical and biological diversity. Refer to the Water/Hydrology and Aquatic Resources sections for more detailed resource condition discussions. The aquatic/riparian zones in the project area provide potential habitat for the following sensitive terrestrial species:

Species	Limiting Factor
Eastern small footed bat	Disturbance to individuals or habitat
Hellbender	Disturbance to water quality
Southern water shrew	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 and bridges on National Forest lands in the Cherry River project area that would provide roosting sites for eastern small-footed bats. Riparian and woodland habitat is used for foraging. Two individual bats of this species have been found in the Spruce Run and Upper Williams areas during mist net surveys taking place since 1998. No Myotis leibii, was captured during these surveys on the North Fork Cherry River watershed.

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, 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.

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. 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 hellbenders do occur within the western and southern portions of the project area.

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. 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. Riparian areas in the Cherry River project area provide potential habitat for southern water shrew, though specific surveys for southern water shrew were not conducted.

Direct/Indirect/Cumulative Effects

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. Activities that disturb soils can increase stream sedimentation and lead to various forms of aquatic habitat degradation. Soil

disturbing activities associated with the Action Alternatives include reconstruction, maintenance, and use of roads (system, temporary, and skid roads) and landings (log and helicopter landing sites) and to a limited extent, timber harvests. The riparian mitigations used for both action alternatives would limit the effects on sensitive species that use riparian areas, since soil disturbance and tree felling would be limited to areas where roads or skid trails cross streams.

Roads within riparian areas and floodplains can inhibit stream and floodplain function and physically occupy riparian habitat. Roads that cross stream channels can disconnect aquatic habitat, change stream channel dynamics in the vicinity of the crossing, and contribute toward channel instability. All these effects can alter the quality of habitat for many terrestrial and aquatic species that inhabit these areas. Activities and effects on floodplains are very limited, as described in the sections of this document dealing with watersheds and aquatic species.

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 activity throughout a watershed can affect stream flow conditions as described in the watershed section of this document.

Mature Forest Species

The Cherry River area was not designated to function as large-scale future old growth ecosystems; however, it was designated to meet wildlife habitat goals. In this area, designated "old growth" stands function as future mature habitat areas scattered throughout the more heavily managed landscape. The age class distribution in the project area is somewhat typical of the entire MNF 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
Northern goshawk	Disturbance during nesting

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 will not stray far from the woods (Allen 1997).

Milkweeds and thistles are the preferred nectar plants. They will 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 and Greenbrier Counties and the plant species listed as nectar sources and host plants do occur within Cherry River 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). This 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 Cherry River 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, however they have been found in the Holcomb Run sub-watershed.

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 and rocky areas with southern exposure allow maximum exposure to the sun during the spring and fall (Green and Pauley 1987). Timber rattlesnakes return to the same den site each year during October. After emergence in the spring (April-May), rattlesnakes remain close to the den until after shedding. 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 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, although most timber rattlesnakes travel no further then a mile from the den during the summer. 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.

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 (Brown 1993). 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). 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.

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. Martin (1992) states that summer time 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.

Specific timber rattlesnake surveys were not conducted. There are no known den sites located within the Cherry River project area, but rattlesnakes can be found almost anywhere within the Monongahela National Forest. Suitable timber rattlesnake habitat exists within the project area.

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

Northern Goshawk: Considered a habitat generalist at range-wide spatial scales, the goshawk is more specialized in its choice of nesting and foraging habitat at the local scale. Landscape features and vegetation structure and composition among goshawk home ranges vary with the location and forest type. In general, the goshawk uses mature forest conditions for nesting and foraging purposes. The age at which forest stands express "mature" characteristics and become suitable for goshawk use varies based upon forest type and site capability.

Historic goshawk nesting has been observed within the eastern portions of the Cherry River watershed but no active nesting has been observed in the last 5-7 years. Goshawk Call Surveys were completed within the proposed action areas in the spring of 2005 with no responses.

Direct/Indirect/Cumulative Effects

Direct effects due to timber harvest activity on many of the R9SS include directly crushing individuals, collisions with vehicles or purposefully killing an individual (timber rattlesnake in particular) or permanently removing their territories.

Indirect effects on Diana fritillary and green salamander, would be similar. Timber harvesting would remove canopy, potentially changing forest floor microclimate. Decreasing soil moisture may make those harvest units unsuitable to these species.

Timber harvesting from April thru October would have the greatest probability of directly affecting rattlesnakes. During timber harvesting, falling trees may crush rattlesnakes. There would also be increased probability of threat to snakes due to increase human activity in the area while harvesting. Timber harvesters do not generally tolerate rattlesnake in the area where they are working. Indirectly, timber harvesting may benefit rattlesnakes by increasing food resources. Small mammal populations are higher in open wooded areas with an abundance of forest floor vegetation. In addition, increases in coarse woody debris on the forest floor provides good habitat for both timber rattlesnake and their prey species.

Timber cutting may improve eastern small-footed bat foraging areas as the canopy opens and allows the bats to forage more easily. Additionally this would create more edge habitat suitable for summer foraging.

Direct effects due to road management activity on Diana fritillary and green salamander include crushing individuals with equipment, collisions with vehicles or purposefully killing an individual (timber rattlesnake in particular) or permanently removing their territories.

Indirectly, road management may benefit Diana fritillary as they tend to utilize roadsides in search of nectar bearing plants. Indirectly, roads create barriers to salamander movement and dispersal (DeMaynadier and Hunter 1995), and prevent genetic exchange between fragmented populations. Green salamanders do occur within the project area but not within any proposed units.

Road management activities may have both adverse and beneficial effects on rattlesnakes. Reconstruction activities may directly affect individuals if they are present during heavy equipment use. Effects may be due to equipment or equipment operators directly killing a snake if they see it. On the other hand, roads act as travel lanes for small mammals, providing snakes with additional hunting areas. Snakes may also use roads to sun themselves during the day.

Road construction/reconstruction requires some timber removal; however this activity would have no direct effect on eastern small-footed bats. These bats roost in rock crevices and caves during daylight hours when road construction and road use take place. Indirectly, roads within the project areas provide travel corridors and the increased edge provides foraging areas for bats. Bats would also take advantage of standing water found in road ruts.

Overall the effects of the Action Alternatives on mature habitats and populations of sensitive species potentially and actually occupying this habitat would be extremely negligible and short-term. Mature community viability would be maintained. Most of the project area would still consist of mature habitat. Activities may impact individuals but are not likely to cause a trend toward federal listing or a loss of viability.

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 Cherry River project area provide potential habitat for the following sensitive species:

Species	Limiting factor
Migrant loggerhead shrike	Disturbance to individuals or lack of suitable habitat
Barren's Tiger beetle	Disturbance to individuals or lack of suitable habitat

Migrant Loggerhead Shrike: The shrike typically nests in dense brush, hedgerows, or isolated trees in pastureland. Year-round, shrikes generally concentrate their activity in grassland habitats. Winter foraging habitat does not seem to differ strikingly from summer habitat with hayfields and idle pastures heavily used. This species requires open pastureland habitat with scattered trees for nesting and fence posts for perching.

This species has probably never been abundant in West Virginia, but its numbers have declined in recent years, perhaps from chemical contamination. Shrike population declines in most of the NE suggest a lack of suitable breeding habitat.

Habitat loss has been caused by farmland abandonment, development and widespread changes in farming practices.

There are not any confirmed shrike breeding records for Nicholas and Greenbrier Counties (Buckelew and Hall 1994). Active hayfields on National Forest land, along with private farms, pastures, and hayfields, provide potential habitat in the project area. Specific surveys for migrant loggerhead shrikes were not conducted for the project area.

Breeding bird point counts were conducted within and near the project area during 1996 through 1999. No loggerhead shrikes were found during these surveys.

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 Cherry River project area.

Direct/Indirect/Cumulative Effects:

Direct effects due to timber harvest activity and road management activities on Migrant loggerhead shrike and Barren's tiger beetle include direct crushing of individuals, collisions with vehicles, or permanent removal of territories while management activities are taking place.

Indirectly, timber harvesting would remove canopy, creating more suitable "disturbed" or open areas. This habitat is temporary, usually lasting about 10 years until the canopy is closed and forest litter or vegetation covers exposed soils. Regeneration harvests would create more and longer lasting disturbed habitat than thinning harvests.

Road construction disturbs ground and opens up the forest canopy creating a permanent edge affect along the road perimeter. This will indirectly benefit species associated with disturbed habitats.

No action alternative will result in loss of viability for any species associated with disturbed habitat types.

Rocky Habitat Species

There are several stands with rock outcrops and ledges. A field review of several of these stands found that these rock ledges follow contours through the project area, creating a severe slope break. The rock material has many holes and crevices that provide potential habitat for the following species:

Allegheny woodrat	Disturbance to habitat
Southern rock vole	Disturbance to habitat

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. Gypsy moths are known to be present near the project area. 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. Allegheny woodrats are found on the western side of the Cherry River Watershed. Allegheny woodrat signs (potential droppings and tracks) were observed in rock outcroppings above Coal Siding Run.

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 under story. 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). Southern rock voles have been found in the Cherry River watershed.

Direct/Indirect/Cumulative Effects:

Timber harvesting 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.

Direct effects due to timber harvest activity and road management activities on Allegheny woodrat and Southern rock vole include direct crushing of individuals, collisions with vehicles, or permanent removal of territories while management activities are taking place.

Indirectly some species associated with rock habitats are found in other areas in the forested landscape and are sensitive to changes in micro site conditions such as opening of the canopy, increasing allowable light and change in species composition with changes in ability to compete.

No action alternative will result in loss of viability for any species associated with Rocky habitat types.

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. The black-capped chickadee and red cross-bill are not applicable to West Virginia or the Monongahela National Forest.

Species using forested habitat

Kentucky Warbler (*Oporornis formosus*)– dense understory of mature, humid deciduous forest, wooded ravines, oak-pine or northern hardwood forest. This species has been documented near the project area.

Louisiana Waterthrush (*Seiurus motacilla*)– along streams flowing though heavily wooded valleys, deciduous forest, some hemlock, northern hardwoods. This species has been documented near the project area.

Swainson's Warbler (*Limnothlypis swainsonii*)– dense understory under an older forest, rhododendron or mountain laurel thickets in woods, mostly found in the south and west part of the state. Potential habitat could occur in the project area, but the species has not been documented there.

Worm-eating Warbler (*Helmitheros vermivorus*)– mature deciduous woodland that lacks dense ground cover, mature beech-maple or oak-pine forest. Potential habitat could occur in the project area, but the species has not been documented there.

Cerulean Warbler (*Dendroica cerulea*)– mature forest, mixed mesophytic and oak forest below 600 meters in elevation, common in the west part of the state, sparse in the mountains. This species has been documented near the project area.

Wood Thrush (*Hylocichla mustelina*)– mature or near mature deciduous forest, most forest types except pure spruce, prefers dense shade on forest floor. This species has been documented near the project area.

Acadian Flycatcher (*Empidonax virescens*)– 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. This species has been documented near the project area.

Yellow–bellied Sapsucker (*Sphyrapicus varius*) (breeding populations only) – upland black cherry forest, cutover mature hardwoods, spruce-hardwoods. Potential habitat could occur in the project area, but the species has not been documented there. Unlikely to occur in the project area due to distribution.

Whip-poor-will (*Caprimulgus vociferus*)– 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 in the project area, but the species has not been documented there.

Northern Saw-whet Owl (*Aegolius acadicus*) (breeding populations only) – spruce and mixed spruce-hardwoods, swampy areas in coniferous forest, high elevations. Unlikely to occur in the project area due to lack of habitat.

Black-billed Cuckoo (*Coccyzus erythropthalmus*)– northern hardwoods, cove hardwoods, oak-hickory forest. Potential habitat could occur in the project area, but the species has not been documented there.

Prothonotary Warbler (*Protonotaria citrea*)– swamps (wooded wetlands) and large streams, not in the highlands. Unlikely to occur in the project area due to lack of habitat and distribution.

Red-headed Woodpecker (*Melanerpes erythropthalmus*)– open oak groves with little understory, groves of oaks and grazing lands, Ohio River valley and low elevations in the Allegheny Mountains. Potential habitat could occur in the project area, but the species has not been documented there.

Species using non-forested habitat (grassland or other permenant openings)

Upland Sandpiper (*Bartramia longicauda*)– grass, old field habitat, grassy mountain tops and reclaimed surface mines, pastures, airports, golf courses. Unlikely to occur in the project area due to lack of habitat.

Buff-breasted Sandpiper (*Tryngites subruficollis*)– short grass, not listed in the WV Breeding Bird Atlas, accidental/hypothetical to WV. Nests in the arctic shores of Alaska and Canada. Winters in the pampas of Argentina. Migrates up the Mississippi Valley and to the west. Unlikely to occur in the project area due to lack of habitat.

Short-eared Owl (*Asio flammeus*)– extensive open grassland, meadows, prairies, plains, marshes, dunes, tundra, not listed in the WV Breeding Bird Atlas. Unlikely to occur in the project area due to lack of habitat.

Sedge Wren (*Cistothorus platensis*)– wet grass and sedge meadows, nests near surface of water, needs wetlands, grassy marshes. Unlikely to occur in the project area due to distribution.

Henslow's Sparrow (*Ammodramus henslowii*)– grassy, weed-filled fields, fields of broom sedge and weeds, early years of plant succession. Unlikely to occur in the project area due to lack of habitat and distribution.

Species using young forest/brushy habitat

Olive-sided Flycatcher (*Contopus borealis*)– 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. Unlikely to occur in the project area due to lack of habitat.

Bachman's Sparrow (*Aimophila aestivalis*)– brushy overgrown fields, abandoned pastures growing up in shrubs, often in erosion gullies in steep hill sides, much unused habitat remains. Unlikely to occur in the project area due to lack of habitat.

Bewick's Wren (*Thryomanes bewickii*)– dry, open country in valleys east of the mountains, in small clearings in spruce at high elevations, brushy thickets; favors old farm buildings and old farmsteads, experiences competition from house wrens; very local or extirpated. Unlikely to occur in the project area due to lack of habitat.

Prairie Warbler (*Dendroica discolor*)– young pine forests and brushy scrub, young second growth hardwoods, overgrown pastures, Christmas tree plantations. Potential habitat could occur in the project area, but the species has not been documented there.

Golden-winged Warbler (*Vermivora chrysoptera*)– low, brushy, second-growth forest and open woodland, especially powerline rights of way and old fields at higher elevations; not in spruce; hybridizes with the blue-winged warbler. Potential habitat could occur in the project area, but the species has not been documented there.

Species using both forest and non-forest habitat

Peregrine Falcon (*Falco peregrinus*)– nests on cliffs, bridges over water, or high rise buildings in urban areas. Feeds over fields, forest, or urban areas by catching birds during flight. Unlikely to occur in the project area due to lack of habitat.

Chuck-will's-widow (*Caprimulgus carolinensis*)– open woodland and clearings near agricultural areas, uses open country for foraging and pine or mixed woodlands for nesting, no nest records from the state, mostly found in the western hills portion of the state. Unlikely to occur in the project area due to lack of habitat and distribution.

Among the 27 birds included in the Appalachian BCR, 25 species are applicable to the Monongahela National Forest. Thirteen (52%) of these 25 species use forested habitats, 10 (40%) use non-forested or young forest/brushy habitat and the remaining two species use forested and non-forested habitats.

Only five of the 25 species are confirmed breeders within the Cherry River Watershed. These species are the Kentucky Warbler, Louisiana Waterthrush, Cerulean Warbler, Wood Thrush, and Acadian Flycatcher (Buckelew and Hall 1994). All of these species prefer forested habitat and therefore may be affected by forest fragmentation. However, the Wood Thrush and the Kentucky Warbler seem to be less sensitive to fragmentation than the Louisiana Waterthrush and the Cerulean Warbler (Buckelew and Hall 1994). A detailed analysis of forest fragmentation associated with this project can be found in the Fragmentation section of this EA.

Some of the other BCC species in the Appalachian Mountain BCR may use the project area during migration to rest and feed. Because the proposed action alternatives would provide diversity of vegetation structure and composition within a larger matrix of forested habitat, sections of the project area would become more suitable for those species requiring non-forested or young forest/brushy habitat while maintaining a large portion of the forested habitat.

By providing a combination of forested lands of various forest types and age classes, by protecting wetlands, riparian areas and other unique habitat types, and by providing some non-forested areas of various sizes and structural composition more of the habitat needs for BCC species in the Appalachian Mountain BCR can be met.

Scope of the Analysis

The area considered for direct, indirect, and cumulative effects to birds of conservation concern is the Cherry River project area. Direct and indirect effects would be limited to the project area in the vicinity of management activities. The partial isolation of the project area by communities and other fragmenting features would tend to limit the spatial extent of the project's contribution to cumulative effects. The temporal boundary for regeneration cuts is approximately 20 years and 5-10 years for thinnings. This is about the time it takes for regenerated and thinned areas to return to forested conditions. The cumulative effects analysis used information also contained in the fragmentation section of this document, and considers effects for the Cherry River watershed.

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 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

Direct/Indirect Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, no timber harvest or road construction/reconstruction would occur, so this Alternative 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. Habitat for species using young forest/brushy areas would decline as young forests in previously harvested areas mature. However, some young forest/brushy habitat could be provided by natural disturbances.

Proposed Action

Species using forested habitat: Some individuals could be subject to direct mortality during harvest operations, particularly if harvesting occurs during the nesting season (generally May through August for these species). In the short term, the even age regeneration harvest would temporarily remove or alter 204 acres of habitat for species that use forested habitats. Construction of wildlife openings/savannahs, landings and new roads would add about 16 acres of permanent or semi-permanent openings. Some forest species would cease to use the harvested areas, while others would persist at lower densities due to the retained basal areas. The effects from the wildlife openings, new roads and landings would persist as long as these openings are maintained. Thinning would affect 1589 acres, by reducing the basal area and opening up the canopy. This change would have short-term detrimental effects on forest species that prefer a closed canopy, but would be beneficial to those that use dense understory vegetation. Thinning might provide a short-term benefit to red-headed woodpecker and whip-poor-will, which prefer broken-canopy forests. Despite the effects of all of these actions, the project area and watershed are expected to remain dominated by mature forests. While populations of species that use forested habitat are likely to decline somewhat, these effects are not expected to extirpate any species from the project area or watershed.

Species using non-forested habitat: It is unlikely that species using non-forest habitats would be affected by this alternative. None are known to occur in the project area now and the non-forest habitats created by the wildlife openings and landings would not be large enough to provide habitat for these species.

Species using young forest/brushy habitat: Species that use young forest/brushy habitat likely would not suffer direct mortality from the proposed action because they would not be present in mature forested areas when harvesting would occur. Indirectly, these species would benefit from the brushy habitat created by the even age regeneration harvests and the edge conditions created along the wildlife openings, new road and landings. Thinning harvests are unlikely to affect these species because they will not create the type of open-canopy brushy habitat that these species prefer. Effects of all of these actions could result in larger populations of these species in the project area and watershed.

Species using both forest and non-forest habitat: Suitable nesting habitat for the peregrine falcon and the chuck-will's-widow is not known to occur near the project area, so the proposed project would not affect these species.

Alternative C

Species using forested habitat: Some individuals could be subject to direct mortality during harvest operations, particularly if harvesting occurs during the nesting season (generally May through August for these species). In the short term, the even age regeneration harvest would temporarily remove or alter 197 acres of habitat for species that use forested habitats. Construction of wildlife openings/savannahs, landings and new roads would add about 13 acres of permanent or semi-permanent openings. Some forest species would cease to use the harvested areas, while others would persist at lower densities due to the retained basal areas. The effects from the wildlife openings, new roads and landings would persist as long as these openings are maintained. Under this alternative the basal area of 81 acres would be reduced through individual tree selection and 1410 acres would be reduced through thinning. This change would have short-term detrimental effects on forest species that prefer a closed canopy, but would be beneficial to those that use dense understory vegetation. These actions may also provide a short-term benefit to red-headed woodpecker and whip-poor-will, which prefer broken-canopy forests. Despite the effects of all of these actions, the project area and watershed are expected to remain dominated by mature forests. While populations of species that use forested habitat are likely to decline somewhat, these effects are not expected to extirpate any species from the project area or watershed.

Species using non-forested habitat: Some of the species using non-forest habitats may benefit by the proposed project. None are known to occur in the project area now, but the 10 acres of non-forest habitat created by the wildlife savannah could potentially be large enough to provide habitat for some of these species.

Species using young forest/brushy habitat: Species that use young forest/brushy habitat likely would not suffer direct mortality from the proposed action because they would not be present in mature forested areas when harvesting would occur. Indirectly, these species would benefit from the brushy habitat created by the even age regeneration harvests and the edge conditions created along the wildlife openings, new road and landings. Thinning harvests are unlikely to affect these species because they will not create the type of open-canopy brushy habitat that these species prefer. Effects of all of these actions could result in larger populations of these species in the project area and watershed.

Species using both forest and non-forest habitat: Suitable nesting habitat for the peregrine falcon and the chuck-will's-widow is not known to occur near the project area, so the proposed project would not affect these species.

Cumulative Impacts

Alternative A – No Action

No new management is proposed under Alternative A that would contribute to the cumulative effects. The past, present, and reasonably foreseeable future actions that have or will occur in the project area and the watershed are unlikely to further reduce the amount of forested lands. Trends in West Virginia forest lands over the past several decades have shown an increase in forested lands as fields and farms are abandoned. New construction of homes and camps often retains most or all of the woodlands surrounding the house site. No activities are currently scheduled that would increase the amount of land currently occupied by communities and residences. Utility corridors, roads, yards, and small agricultural parcels would continue to be the main source of openings on private and National Forest lands. Thus the area is expected to continue to provide habitat mainly for birds that primarily use forested habitat. Frequent ice storms have affected the area and have resulted in some brushy habitat. This effect is likely to continue into the future. Species using non-forested or brushy habitat would be unlikely to increase.

Alternative B – Proposed Action

Species Using Forested Habitat: The project area is expected to remain dominated by mature forests. This is shown for National Forest lands by the age class distribution table on page XX. Although the expected amount of sawtimber stands will slightly decrease, no substantial effect on these birds is expected.

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

Species Using Young Forest/Brushy Habitat: Cumulative effects of all of these actions could result in larger populations of these species in the project area, but not much larger, considering the age class distribution and the little expected contribution to this habitat within the project area. There may be more habitat for these species in other portions of the watershed where timber harvest and road construction are more extensive and frequent.

Alternative C

Species Using Forested Habitat: The direct and indirect effects of the thinning and new road included in Alternative C could make a small contribution to the cumulative effects of temporary and permanent removal and alteration of forest habitat due to the past, present, and reasonably foreseeable actions in the project area, which are listed in Table 3-1. However, most of this alternative's contribution to these effects would be short-term, lasting only a few years until the canopy closes again in partially harvested areas, or for about 20 years in regenerated areas. Minimal cumulative effects due to the new road would persist as long as it is maintained. Despite the cumulative effects of these actions, the project area is expected to remain dominated by mature forests. While populations of species that use forested habitat are likely to decline somewhat as early successional habitat is created, these effects are not expected to extirpate any species from the project area because the project area will remain about 92 percent forested with little increase in fragmentation.

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

Species Using Young Forest/Brushy Habitat: Edge habitat created by regeneration harvests and road construction could make a very small contribution to the cumulative effects of maintenance of utility corridors and roads and creation of temporary and permanent young forest/brushy habitat due to past, present, and reasonably foreseeable future actions in the project area. Cumulative effects of these actions could result in larger populations of these species in the project area, but the area still remains primarily forested.

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

Regeneration cuts and wildlife openings or savannahs would result in the irretrievable conversion of forested habitat to young forest/brushy habitat. Additional minor amounts of forest habitat would be irretrievably converted to a new road. None of these commitments of resources would be irreversible, however. Harvested areas would grow back to forest, and the road could be abandoned and returned to forest habitat.

Consistency with the Forest Plan

The Forest Plan does not contain specific direction for migratory birds.

Social Resources

Economics

Resource Impacts Addressed

This section of the EA discloses the potential economic impacts of the Cherry River alternatives. It addresses public comments regarding the monetary costs and benefits of proposed activities. Other sections of the EA describe effects on non-monetary values such as water quality, fish and wildlife habitat, recreation opportunities, vegetation, etc.

Affected Environment

The area has provided direct economic benefits in terms of forest products removed in previous timber sales. Firewood permits are currently sold that may include the project area. These permits provide very little revenue, and will not be considered as direct economic benefits. The project area offers many indirect economic benefits via the ecosystem services it provides: water storage and filtration; a diversity of habitats for aquatic and terrestrial fauna and flora, including threatened, endangered, and sensitive species; and recreational opportunities, like wildlife viewing, fishing, hunting, hiking, and biking. The Forest has not tracked such economic benefits in quantitative terms. Qualitative descriptions of the resources provided by the project area are described in other parts of the EA. Costs currently incurred in the area are associated with routine maintenance, like grading and brushing roads, cleaning ditches, mowing wildlife openings, etc.

Scope of the Analysis

The project area, and as appropriate, nearby communities, were considered in the analysis of effects. Most Gauley Ranger District sales are sold to sawmills located within a two hour drive of the sale. Residents and associated businesses in nearby communities are expected to benefit directly from timber products removed from the area and indirectly from employment opportunities generated. The temporal boundary used for analysis of effects was up to ten years from the time a timber sale is awarded. Most costs and benefits from timber harvest activities (sale of timber products, employment opportunities, etc.) are expected to be generated in the first five years after a sale is awarded. Post-timber sale related activities are usually completed within the first year after a sale closes; although, some post-sale activities such as stocking surveys and tree planting can occur five years after a sale is completed.

Methodology

Table 3-25 displays the direct costs and values for each alternative. The costs identified are only those direct costs expected to be incurred by the Federal government. Costs incurred by timber purchasers or other parties are not known.

The costs of road construction, reconstruction and maintenance were included as separate items and were based on estimates provided by engineers on the basis of recent values for similar work on the National Forest. The cost per mile is based on constructing four season gravel roads. The cost of reconstructing most roads was the same as that for new construction, since the existing grades are covered with small trees and vegetation, currently do not have culverts and would need similar amounts of gravel to new construction. Even though road maintenance is a routine management cost, it is included since using the road for hauling during the winter might result in a need for more gravel surface and more maintenance.

There are many site-specific and economic factors that determine the cost of performing road work. Site-specific factors include the following: length, width and grade of the road, sideslope and terrain, intended vehicle use, season of use, existing drainage and aggregate, subgrade soil properties, season that work would be performed, and complexity of work required. Economic factors include the following: fuel prices, availability of labor, material prices, quantity of work available to contractors, location, inflation, equipment required to perform the work and its availability.

The Log Cost program was used to calculate the cost of helicopter logging, as well as to evaluate the feasibility of the method. The helicopter logging adjustment is based on the weight of each timber species and the distance to landings which is specific to each alternative, and to each stand. Costs per Ccf vary from a low of $98 in Compartment 62 stand 52 to a high of $522 in Compartment 48 stand 67. The adjustment reflects the additional costs of helicopter logging over that of conventional logging. Conventional logging costs were not included, as these costs are already reflected in the average timber values used. In Alternative C, the cost of ¼ mile of temporary road is also considered to be a normal cost for logging operations, and would be included within the average bid price.

The costs for timber sale administration and preparation were derived from comparisons of past forest budgets for timber sale preparation and administration and timber volume outputs. Cost for required snag creation in timber sale units is based on an approximate acreage where the work would be needed. Project costs are based on similar projects that have been done recently.

Timber volumes per acre were calculated for each stand and combined based on acreage for each alternative. The basis for the calculation was tree data mostly from from 2001 or 2002 in the CDS database. Pulpwood was not included from helicopter logged units under Alternative C. Timber volumes were slightly underestimated to allow for riparian and other areas that would not be harvested within stands. Shelterwood harvests involve two separate entries for volume removal. Volumes, values, and helicopter adjustments for the second entry are calculated separately. No additions to volume are made for the expected growth or mortality.

The values shown below are based on the proportion of each species expected to be harvested in each stand. Yellow poplar and red oak sawtimber make up the biggest proportion of the trees expected to be cut, with over 15 other species represented. Values are from the base period selling prices in FSH 2409.18, Chapter 40, effective date of January 15, 2006. These prices were derived from actual bid prices for National Forest timber sales for the past three years, and are adjusted to represent the minimum acceptable bid rate. Prices used range from $22.53 for black locust up to $1,188.09 for Black Cherry, with Red Oak being $357.05 and Yellow Poplar being $76.45 per Ccf. Competition and other market forces often result in bids that are greater than the minimum acceptable bid rate for timber, but would not necessarily have that result. One recent sale was sold for 100% more than the minimum acceptable bid rate, with many sales being sold for at least 20% more (L.Blodgett, 2006).

Values and costs for the second shelterwood harvests included in Alternative C are shown separately, since these volumes would be sold about 5-7 years after the initial harvest in these stands.

Direct/Indirect Environmental Consequences

The following table summarizes the expected costs and revenues for Alternatives B and C. Maintenance and administrative costs included are those that would be required over and above the current level of maintenance and administration under the No Action alternative.

Table 3-25. Total values and costs by Alternative

	Value/Unit		Alternative B		Alternative C	
Timber Volume Estimated						
Volume CCF			19,332		15,323	
Revenue ($)						
Sawtimber and pulpwood			2,844,249		2,477,078	
Helicopter Adjustment			-281,329		-1,405,902	
Total Revenue			2,562,920		1,071,176	
Engineering Road Estimate			-1,547,595		-920,095	
Sale Revenues			**1,015,325**		**151,098**	
Costs of Projects in $ per acre						
Sale Preparation	17.59		340,050		269,532	
Sale Administration	13.63		263,495		208,852	
Site Preparation	117.39		23,243		23,126	
Regeneration Surveys	43.96		8,704		12,485	
Construct Wildlife Opening/savannah	1500		9,000		15,000	
Vine Treatment	109.64		21,709		22,257	
Oak Release	149.95		0		13,046	
Create Snags	55.84		63,378		62,876	
Oak/Chestnut Planting			10,000		10,000	
Total Cost			739,579		637,173	
Total Net Revenue			**275,746**		**-486,075**	
Revenues for Shelterwood Removal Harvest (5-7 years after the remaining harvest)						
Volume CCF					767	
Sawtimber Value					139,474	
Helicopter Adjustment					-64,677	
Sale Preparation cost	17.59				13491	
Sale Administration cost	13.63				10454	
Total Revenue					50,852	

Alternative A – No Action
No activities would be implemented under Alternative A. Thus, no costs, other than those currently expended for existing maintenance activities would be incurred. No direct economic benefits would be generated since timber products would not be sold from the area. Timber-related employment opportunities and incomes to associated local community businesses would not be generated. The area would continue to provide the indirect benefits described under the affected environment.

Alternative B – Proposed Action
Timber sale activities in the project area would generate direct and indirect costs and benefits, but only direct ones are shown in the table. Considering only helicopter logging costs and road construction costs, the total sale value is expected to be over one million dollars, at the minimum bid rate. As explained above, the value of actual bids could be more than this minimum bid rate. The direct costs of all the project activities would be less than the total sale value

The helicopter adjustment is calculated based on the 16% of the acreage being logged by helicopter. Road costs in this alternative are over half the value of the timber harvested, but Alternative B would still produce positive net revenue when all direct costs are accounted for.

Alternative C
Considering only helicopter logging costs and road construction costs, the total sale value is expected to be about $200,000, at the minimum bid rate. As explained above, the value of actual bids could be more than this minimum bid rate. The direct costs of all the project activities would be more than the total sale value at minimum bid rate, even if the value of the shelterwood removal harvest were included.

Alternative C has a very large helicopter adjustment, primarily because of the large acreage in helicopter logged units. Helicopter logging makes up 64% of the acreage harvested under Alternative C. The road mileage and thus cost is reduced from Alternative B, but not enough to make up for the increased helicopter adjustment.

Although the timber value is expected to be large enough to cover the cost of road building and logging by helicopter, it does not cover the other administrative costs of the project.

Cumulative Impacts

Alternative A – No Action
Alternative A would not generate new direct or indirect costs and benefits that would add to the effects of past, present, or future actions because new activities would not be implemented. Therefore, there would be no cumulative effects.

Effects Common to Both Action Alternatives
The thinned areas would still retain about 2/3 of their stocking, and thus a comparable percentage of their value. This volume remaining could provide economic timber sales either immediately or in the future. In the clearcut areas, commercial timber harvest would be expected to be possible within 60 years or so, if timber markets were similar to current ones. Both action alternatives would build roads that would add to maintenance costs in the future, and that would make it possible to harvest timber with less upfront cost in the vicinity. These effects of roads would be greater with Alternative B, with the greater road mileage.

Unavoidable Adverse Impacts

The No Action Alternative would not have unavoidable adverse impacts, but the purpose and need identified for the area would not be met. Alternatives B and C could result in unavoidable costs if no bids are received at the minimum bid rate. In Alternative C, the direct project costs are expected to be greater than the expected revenue at minimum bid rate.

Within the stands harvested using thinning and selection harvest methods under both action alternatives, the volume available for future sales would be reduced for the next ten years or so. After that time, the volume and values are expected to approach that currently present. Within the stands that are harvested by clearcut and shelterwood methods, the volume (and thus value) available for harvest would not be sufficient for a commercial harvest for 60 or more years.

Irreversible or Irretrievable Commitment of Resources

Alternative B is expected to return a surplus to the treasury, even considering all direct project costs, but Alternative C may not, if the sale is not sold for more than the minimum bid rate. Alternative C would not be expected to cover the cost of all projects, unless the bid rate exceeded the minimum by about 20%.

Volume reductions in the areas harvested are not irreversible, since they would be expected to grow back in the time frames shown above.

Consistency with the Forest Plan

The economic analysis presented here is consistent with the Forest Plan guideline to conduct an economic analysis, as appropriate, as part of the environmental analysis process (Forest Plan, p. 57). All alternatives would be consistent with Forest Plan goals and other direction identified on pp. 38, 40, 74, 76, 78, 127-128 of the Forest Plan.

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 Nicholas County, the county in which the Cherry River project area is located, does not demonstrate ethnic populations or income percentages greater than two times that of the State average (U.S. Census Bureau, Census 2000).

Scope of the Analysis

The communities in Nicholas County were considered in the scope of the analysis. The temporal boundary considered was five years from the date timber sales are awarded, since average MNF sales are implemented within five years from the date of award.

Methodology

The potential for Environmental Justice effects was evaluated in 2002, as part of the Desert Branch environmental analysis. U.S. Census data remains the same, so this analysis is still current. Information from the US Census Bureau was used to assess the make up of communities in Nicholas County and the possible effects of the alternatives.

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 Nicholas county 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 Cherry River activities would result in irreversible or irretrievable commitment of resources as it relates to environmental justice.

Consistency with the Forest Plan

All the Cherry River alternatives would be consistent with the Forest Plan (Forest Plan, p. 39).

Heritage Resources

Resource Impacts Addressed

This section describes potential impacts Cherry River alternatives may have on heritage sites.

Scope of the Analysis

Heritage site boundaries and the Cherry River project area boundary were the spatial boundaries used to evaluate the effects of the alternatives. These boundaries were used because direct, indirect, and cumulative effects are not expected to extend beyond the location of heritage sites within the project area. The temporal boundary used for the analysis was five years after the awarding of timber sales. This is because activities and potential effects could occur anytime during the contract period of the timber sale.

Methodology

A total of twelve heritage resource surveys have been conducted either wholly or partially within the current analysis area between 1981 and 2004. Archaeological site evaluations have been carried out in the project area on several prehistoric sites.

All areas located within timber stands for the current project area, or which are proposed for ground-disturbing actions within either of the action alternatives, were surveyed between 2001 and 2006. These surveys were conducted employing a methodology previously agreed upon with the WV State Historic Preservation Officer (WV SHPO). The Forest has completed consultation with the WV SHPO regarding this project under the terms of Section 106 of the National Historic Preservation Act of 1966.

Effects to heritage resource from the alternatives were identified using ArcView GIS mapping. Base maps showing the project area and potential actions for each alternative were overlain on site location and survey maps. Such locations have been made available to Forest personnel as part of planning for specific management actions.

Affected Environment

A total of 106 heritage resource sites have been recorded previously in the Cherry River project area as a result of the surveys tabulated above or through the results of chance encounter in the field by Forest Service staff. Of these, sixty-five represent the remains of prehistoric resource exploitation and/or habitation, while thirty-four represent Euro-American historic period activities; seven represent multicomponent prehistoric/historic period century deposits.

Direct/Indirect Environmental Consequences

Alternative A – No Action

The No Action Alternative would not affect heritage resources, as no new erosion or soil disturbance from logging, road construction, and other project-related activities would occur.

Environmental Consequences Common to All Action Alternatives

Logging activities, and the construction of log landings, roads, wildlife openings and savannahs have ground disturbance associated with them from skidding and, in the case of wildlife openings or savannahs, plowing. Helicopter logging lessens these effects from ground disturbance considerably, as there is no skidding disturbance associated with this type of treatment.

A comparison of the two alternative management treatments to the Cherry River project area reveals that no direct effects will occur as a result of actions planned in either alternative. Some indirect effects may occur as a result of increased erosion brought about by the construction of new roads, road reconstruction, skid road construction, and tree felling, hauling and skidding.

Negative indirect effects to known heritage resources would not be derived from increased erosion associated with road construction, skidding, and regeneration cutting, since mitigation involves avoidance and buffering of known sites, as described in Chapter 2. Monitoring on the MNF indicates that when mitigation is applied properly it is effective in protecting heritage resources (Calabrese 2005).

No direct effects will accrue to archaeological sites pursuant to the mitigation measures agreed upon in consultation with the WV SHPO, as all eligible or potentially eligible sites will be avoided.

Mitigation identified in Chapter 2 would be implemented to avoid adverse effects should new sites be discovered during project implementation. Monitoring on the MNF indicates that when mitigation is applied properly it is effective in protecting heritage resources (Calabrese 2005).

Cumulative Impacts

The foreseeable effects of carrying out all of the Alternatives are approximately equal. Management of the Opportunity Area for timber and wildlife purposes will lead to heavier pedestrian and vehicular use of the landscape. Consequently, more individuals will become aware of site locations, thereby exposing them to potential vandalism and loss of scientific information.

Unavoidable Adverse Impacts

None of the Cherry River alternatives are expected to result in unavoidable adverse impacts.

Irreversible or Irretrievable Commitment of Resources

None of the alternatives are expected to result in irreversible or irretrievable commitment of resources, since all known heritage sites would be avoided.

Consistency with the Forest Plan

Given that known National Register eligible sites would be avoided and/or mitigated, and known unevaluated sites would be avoided or evaluated and appropriate management taken, all Cherry River alternatives would be consistent with Forest Plan goals and direction (pp. 40, 70, and Appendix Q).

Recreation

Resource Impacts Addressed

This section discloses how recreation resources in the Cherry River project area would be affected by proposed activities. The public brought up few recreation related questions or concerns. Potential

impacts on the Tri-River Rail trail and on access for hunting, fishing, driving for recreation, berry picking, etc. will be addressed. Potential changes to access to private property for recreation is also disclosed.

Affected Environment

The area is used year round for recreation activities. Recreational opportunities include hunting, fishing, sightseeing, and gathering forest products (e.g. firewood, moss, and ginseng). Dispersed camping is allowed in the area, but is rarely seen, and no designated dispersed sites are present. Recreation use is generally low within the project area as compared to other places on the Monongahela National Forest, except for recreation traffic on WV 55. This is the main through route for access to Richwood and the Gauley Ranger District, and is also used extensively as a through route to Snowshoe. This two lane, paved highway is co-located with WV 39 east of Fenwick, where it is designated as a National Scenic Byway. Tourists rarely stop along the road, but it is also used to access the Cherry River for fishing, and the Tri-Rivers Rail Trail at Holcomb, Fenwick, or Richwood. Rhododendron Roadside Park provides parking and access to the Cherry River, and is near National Forest. Dain Park is another local park within or near the project area, which adjoins the Tri-Rivers Rail Trail and the Scenic Byway, but it is surrounded by private lands, with no view of National Forest lands.

No developed recreation sites exist within the project area on National Forest lands. No designated dispersed recreation sites exist in the project area. No National Forest trails exist in the area. The Tri-Rivers Rail Trail occupies privately owned land near the Cherry River, and is used for recreation, including fishing, hunting, hiking and biking.

About 25 miles of open paved roads (including some city streets) within the project area primarily provide access to private lands and communities. Some also are used by recreationists and to access National Forest lands. About 9 miles of public roads with gravel surface within the project area help provide access to National Forest lands. One public access road north of Holcomb crosses Morris Creek and Holcomb Run and traverses National Forest land. It is not a Forest Service system road, nor a numbered state route. There may be additional mileage of driveways, smaller city streets and private access roads that do not access National Forest lands, and will not be discussed in detail.

There are about 4 miles of Forest Service roads in the project area. These roads are all closed to public motorized use by gates, earthen road blocks or vegetative growth. They provide some pedestrian access, especially for hunting.

No wilderness or special areas are located within the project area. The Cherry River was considered ineligible and dropped from further consideration as a potential wild and scenic river based on the Wild and Scenic River Study Report, p. 3-13.

Scope of the Analysis

The scope of the analysis for direct, indirect, and cumulative effects was limited to the project area and the area immediately surrounding the project area. This is because the anticipated effects to recreation would be limited, as described below. The temporal boundary used for assessing effects was 0-14 years from the time a timber sale is awarded. This time frame was used because a sale can be implemented anytime within five years of the date of awarding, and the effects of activities such as the effects of fencing could occur up to seven years after the sale is complete.

Methodology

Effects were determined following field review of the affected environment, review of the Forest Plan, and based on general experience in the field of recreation.

Environmental Consequences Common to All Action Alternatives

Neither of the action alternatives is expected to noticeably change existing recreation opportunities in the project area. As explained below, proposed activities are not expected to noticeably affect recreation use levels. There would be no effects on special areas, wilderness or wild and scenic rivers, because no areas with these designations exist in or near the project. There would be no impacts to National Forest trails, and developed or dispersed recreation sites, because these developments do not exist in or near the project area. There would continue to be no developed or dispersed recreation sites in the project area.

The closest helicopter logged unit to the Tri-Rivers Rail Trail is over 200 feet from the trail, above private land and an open public road. Views and sounds of helicopter logging would be perceived in this vicinity, and in the other helicopter units along the slope above the river, under both action alternatives. It is unlikely that felling or flying of trees would impact the safety of trail users on the trail, because activities would be implemented to avoid impacts to the road and the private land above the trail.

No changes are expected in long-term public access, motorized or non-motorized, since state roads currently open to the public would continue to be maintained. All new roads would be gated. Existing roads for reconstruction would continue to provide access to pedestrians after reconstruction, although the appearance and surfacing would be changed from native material to gravel. Proposed timber and road activities are not expected to noticeably change foot travel access; although skid roads created in units harvested via conventional methods could be used for foot travel.

Proposed timber harvesting activities are likely to create additional habitat for wildlife that prefer temporary openings and edge (Wildlife effects). This could slightly improve hunting potential in the area. Activities are not expected to adversely affect aquatic resources (Aquatic effects), thus fishing success is not expected to be noticeably affected.

Public closures or delays would likely occur while roads are being constructed, reconstructed, or maintained, and while trees are being felled and removed. Signs would be posted closing off the timber sale area to public use during felling and flying operations during helicopter logging (see mitigation in Chapter 2). However, impacts are expected to be short term, and could be up to a couple months at one time. Such closures would affect dispersed pedestrian access. State roads would not be posted as closed, but traffic may be stopped during tree felling or flying for a few minutes during the times when operations occur adjacent to or near such roads, and would pose a danger. Roads or sale units may be inaccessible while road work is completed or while trees are felled and removed from units.

Helicopter logging has normally occurred during the late fall and winter season, with tree felling occurring a little earlier in the year. If this pattern continues, the closure of the area would affect hunting. Although many other areas are open on the National Forest for hunting, some hunters may prefer this area.

Timber harvesting activities and road work would generate noise in localized areas at different times during the life of the timber sale.

Direct/Indirect Environmental Consequences

Alternative A - No Action

Recreational opportunities would continue to include those listed in the affected environment. Recreation use is not expected to change noticeably. No developed recreation sites exist in the area, so there would be no effects to this resource. Maintenance and use of the Tri-Rivers Rail trail is expected to continue as is. Existing motorized use would continue, with no changes in public access.

Congressionally designated wilderness and wild and scenic rivers would not be affected as none exists in or near the project area.

Alternative B - Proposed Action

Short term, temporary closures to dispersed pedestrian access would affect users of the 283 acres of helicopter logged units. Additional acreage surrounding these units would be closed to provide additional safety and a clear boundary, and these closures might curtail hunting in the vicinity. These closures are likely to occur in some but not all of the winter and late fall season, and might occur in more than one year within the project area, although actual helicopter logging would be expected to occur for less than one month in any one of the helicopter logged units.

Traffic and temporary traffic stopages would also be expected as described above.

Alternative C

Short term, temporary closures to dispersed pedestrian access would affect users of more acreage connected with the 1092 acres of helicopter logged units under this alternative. Additional acreage surrounding these units would be closed to provide additional safety and a clear boundary, and these closures might curtail hunting in the vicinity. These closures might also last longer, since more time would be taken to complete the additional acreage in each vicinity. A mitigation to prohibit felling, helicopter and conventional skidding, and hauling during the first week of WV deer gun hunting season would be included in the timber sale contract. This would reduce the number of people affected by the closure to public use, since this is the hunting season that often draws more people.

Temporary traffic stoppages would be expected only where helicopter units are near open public roads, and these units are the same in both alternatives. Thus the degree of inconvenience related to vehicle traffic would be similar under both alternative B and C. Traffic associated with helicopter logging tends to occur over a shorter period of time, and thus it is concentrated. Because this alternative has more acreage in helicopter logging, the traffic would be heavier, but would not occur over as long a period of time as in alternative B.

Cumulative Impacts

Alternative A would not directly or indirectly affect recreation resources; thus, it would not contribute cumulatively to past, present, or future actions. Given how little Alternative B and C would impact recreation resources, they are not likely to contribute noticeably to the effects of past, present, and reasonably foreseeable future actions identified in Table 3-1.

Past timber sales created diverse habitat for wildlife which may have improved hunting potential and improved foot travel on closed roads and skid roads. Both action alternatives would contribute somewhat to these effects.

Traffic related effects could occur, if activities are initiated on private lands that involve more traffic, such as logging, construction of new homes, etc. None of these activities are currently known, but they are somewhat likely to occur.

Unavoidable Adverse Impacts

None of the alternatives would cause unavoidable adverse impacts to recreation resources.

Irreversible or Irretrievable Commitment of Resources

None of the alternatives would result in irreversible or irretrievable impacts to recreation.

Consistency with the Forest Plan

All alternatives would be consistent with the Forest Plan goal of managing the spectrum of recreation opportunities that exist on the Forest with an emphasis on recreation activities such as hiking or hunting, and facilities to support that use (Forest Plan, p. 37). All alternatives are consistent with the Recreation Opportunity Spectrum designation for the Cherry River area, which is roaded-natural. None of the alternatives conflict with Forest Plan direction for recreation management (Forest Plan, pp. 63-66 and p. 130).

Scenery

This section describes the existing condition of the scenic resources that may be affected by activities proposed in this analysis area.

Recreation opportunities within the Cherry River Area consist primarily of dispersed recreation activities including; hunting, fishing, and some dispersed camping. Recreation use within the area is generally low and occurs primarily during hunting and the spring and fall fishing seasons. Primary viewpoints within the analysis area include State Roads 39/55, 55 and 7, 7/3, 76, 94/5,15/6, Forest Roads 83, 99, 908, 913, 928, 84 and the towns of Fenwick and Holcomb. There are no National Forest trails within or immediately adjacent to any proposed harvesting units. The Tri-Rivers Rail Trail traverses the area along the river.

The Cherry River assessment area lies within the Northern Hardwood and Red Oak/Sugar Maple Land Type Associations of the Monongahela National Forest. Landforms in the northern hardwood zone are rolling to steeply sloped mountains with narrow, winding valleys. Northern hardwood forests are the rule across the zone; pastures are also common throughout. Temporary openings of less than 25 acres due to timber harvests are common, as are changes in vegetative texture brought about by partial harvests such as thinning. Mountainsides within the zone typically have an even-textured appearance, often punctuated by temporary openings. The line introduced by road construction on mountainsides is most evident during leaf-off periods. Streams in the zone have steep gradients, are swift flowing, clear, and normally have horizontally fractured, dark brown rock beds

The landforms of the red oak/sugar maple zone vary from gently rolling, highly dissected low hills to steep sided and massive mountains. Valleys are narrow to very narrow and winding. Visitors encounter enclosed landscapes with foreground detail views. Views of the near middle ground are common, but background vistas are rare. In the northern portion of the forest, the red oak/sugar maple zone is generally found on the mid to lower slopes. Mixed mesophytic vegetation is interspersed with northern hardwoods and oaks. This zone contains the most productive sites on the forest. Valleys are often in open farm or pasture. High altitude openings are rare. Temporary openings, of less than 25 acres, due to timber harvests are common, as are changes in texture where partial harvests have been implemented. The overall appearance is of an even textured forest with scattered openings, either permanent or temporary. Streams have steep gradients and are swift flowing over rock beds within this zone. Natural rock forms are relatively visually unimportant. The scattered ownership pattern of intermingled private and public lands reduces the opportunity for the visitor to sense an undisturbed expanse of forested land. Valued cultural features include pastures and woodlots in the valleys and lower slopes.

The views of residents of Fenwick and travelers on State Road 39/55 and 92, include the middle-ground 3 (low concern) and not seen areas. The landscape visibility within the assessment area is primarily Middle-ground 2 (moderate concern), Middle-ground 3 (low concern) and Foreground 3 (low concern. The Scenic Attractiveness is typical and the existing Scenic Integrity is moderate within the assessment area.

All proposed actions for the Cherry River project are located in Management Prescription (MP) 3.0. The desired future condition of this MP is described in the Forest Plan as a mosaic of hardwood tree stands and openings that provide diversity for a variety of wildlife species. The Visual quality objectives for the analysis area is primarily partial retention and modification.

The existing Recreational Opportunity Spectrum classes within the proposed project area range from rural to semi-primitive motorized with a few small pockets of roaded natural.

Scope of the Analysis

This section describes the area of analysis for direct and indirect effects and the area evaluated for cumulative affects.

The scope of the analysis will include the scenic resources within the Cherry River Project Area and potential visual quality effects from roads and trails adjacent to the area. Because the Forest provides a wide range of recreation opportunities and scenic landscapes, there are no scenery resources or recreation activities limited or specific to the Cherry River Project Area. Therefore, any analysis beyond that described above will not be necessary.

The spatial boundary used to evaluate direct and indirect consequences and cumulative impacts is the Cherry River assessment area include the roads listed above and the town of Fenwick West Virginia. This area was used because it will adequately address any effects related to vegetative management and road construction on the recreation and scenery resources.

Methodology

This section describes the process that will be used to describe how the alternatives will affect the resources and the units of measures used to measure change.

The following materials were used to evaluate the affects of alternatives on the recreation resources within the Cherry River analysis area: The Monongahela National Forest Land and Resource Management Plan Standards and Guidelines, National Forest Landscape Management Handbook, Recreation Opportunity Spectrum,The Wilderness Act of 1964, Monongahela National Forest Wild and Scenic River Study Report,The National Wild and Scenic Rivers Act of 1968.

The units of measure which are used to analyze change are as follows:

Scenery Resource	Unit of Measure
Landscape Visibility	# units/ acres not consistent with Visual Quality Objectives
Scenic Integrity	# units/ acres not consistent with Scenic Integrity Objectives
Scenic Attractiveness	# units/ acres which would change the scenic attractiveness of the area.

Direct/Indirect Environmental Consequences and Cumulative Impacts by Alternative

Alternative A – No Action

Based on the methodology described above. There are no effects to the scenic quality/ visual management objectives.

This alternative maintains the status quo. Although, there would be no effects to scenic/ visual resources there is also no opportunity to develop a mosaic of age classes which will diversify the age and structure, including scattered openings and a variety of landscapes, within the assessment area over time.

Alternative B – Proposed Action

The Primary viewpoints within the analysis area include the state and National Forest roads listed above, and the communities of Fenwick and Holcomb. There are no National Forest trails within or immediately adjacent to any proposed harvesting units. The Tri-Rivers Rail Trail traverses the area along the river. Views from this trail would be restricted by trees growing near the trail, but helicopter thinning in Compartment 48 stand 87 and 71 might be visible. Other harvest on the ridgetops might also be seen, with some difficulty, from points on the trail.

The 24 units (1,589 acres) proposed for commercial thinning and the 13 units (204 acres) of clearcut harvesting operations are within a Typical Scenic Attractiveness Zone with a Moderate Scenic Integrity (state of naturalness) and a low to moderate Scenic Integrity zone (low to moderate level of human concern). All proposed harvesting activities are within either Foreground 3, (low concern) Middleground 2 or 3 (moderate-low concern) or Seldom Seen areas (very low concern). All 6.5 miles of proposed road construction are located in low or seldom seen concern areas.

Generally, from the primary viewpoints identified above, the proposed timber harvesting activities will either not be noticeable or only noticeable for a short duration while traveling along a State road 39/55 or 92 and not be seen from the town of Fenwick. Any visual effects to the landscape from forest roads within the proposed project area should be relatively short term (1-3 years) and will enhance the diversity (texture) of the of the existing landscape. Road cut slopes would be revegetated where needed to eliminate the distraction of exposed soil and erosion. Also, thinning units will provide for larger tree characteristics over time.

The visual effects of these proposed harvesting activities will be more noticeable to residents, hunters and other visitors using the local forest roads, especially as pedestrians. Visual effects may be more noticeable from a few places on private lands within the area, but views would primarily be of thinned areas. The clearcut in Compartment 62 stand 46 would be visible from the adjacent private land.

Implementation of this alternative will continue to maintain the textured visual pattern of the area. This includes a variety of permanent and temporary openings (agricultural and timber harvest) and an even textured appearance brought on by partial timber harvests.

The scattered ownership pattern, within the project area, of intermingled private and public lands will continue. This pattern reduces the opportunity for visitors to experience an undisturbed expanse of forested land, especially from the most traveled roads.

The 6.75 miles of road construction proposed in this alternative will be limited to foreground 3 middle-ground 3 and seldom seen areas. The Scenic Attractiveness within proposed road construction/ reconstruction areas is Typical and they are located in areas of low to moderate existing Scenic Integrity.

Past and present actions o private and National Forest lands were considered in forming the affected environment of the area as described above. No anticipated future actions are known that would be inconsistent with the visual quality objectives for the analysis area which are primarily partial retention and modification. The Scenic Attractiveness would be typical and the existing Scenic Integrity would be moderate within the assessment area.

Alternative C

Effects on scenery would be very similar to those of Alternative B, except that road-related visual effects would be less. The section of FR 908C which would be expected to be visible in the background from WV 55/39 would not be constructed.

Although there are some differences in the regeneration harvest areas from Alternative C, fewer acres in partial harvest areas, and less new road construction, all are still within a Typical Scenic Attractiveness Zone with a Moderate Scenic Integrity (state of naturalness) and a low to moderate Scenic Integrity zone (low to moderate level of human concern). All proposed harvesting activities and roads are within either Foreground 3, (low concern) Middleground 2 or 3 (moderate-low concern) or Seldom Seen areas (very low concern).

Past and present actions on private and National Forest lands were considered in forming the affected environment of the area as described above. No anticipated future actions are known that would be inconsistent with the visual quality objectives for the analysis area which are primarily partial retention and modification. The Scenic Attractiveness would be typical and the existing Scenic Integrity would be moderate within the assessment area.

Unavoidable Adverse Impacts

There are no unavoidable adverse impacts identified that would impact the scenic resources within the project area since views from the most traveled roads are affected primarily by the pattern of intermingled private and public lands. Although views of harvest activities would be more noticeable to hunters and other visitors traveling the local forest roads, they would be similar to the existing condition of the area.

Irreversible or Irretrievable Commitment of Resources

There are no irreversible or irretrievable commitment to the recreation and scenery resources within or adjacent to the project area.

Consistency with the Forest Plan

This alternative is consistent with the 1986 Monongahela National Forest Land and Resource Management Plan for recreation and visual quality management for management prescription 3.0.

Consistency with Laws, Regulations, and Handbooks

There are no conflicts between this alternative and the Federal, regional, State, and local laws, land use plans, policies, and controls for the recreation and visual resources.

Special Uses

Resource Impacts Addressed

This section discloses how special uses authorized in the Cherry River project area would be affected by proposed activities.

Affected Environment

Several special uses are authorized within the project area (Special Use information in project file). Utility corridors are present for a gas pipeline, and electric and telephone lines. Forest Road 908 crosses the gas pipeline, and was constructed to do so safely.

Scope of the Analysis

The spatial boundary used to evaluate direct, indirect, and cumulative effects was the boundary of the project area, since it includes all the utility corridors that could be affected by activities for Alternative B or C.

Methodology

Field review of units near utility corridors was done to determine best methods of skidding which would avoid potential impacts to utilities that might impact services. Roads and skidding plans were developed which would avoid construction across utility corridors if possible.

Direct/Indirect Environmental Consequences

Alternative A – No Action

No action would be implemented, thus there would be no effect to special uses and Rights of Way in the area.

Alternative B and Alternative C

Timber harvest could effect the transmission of power, gas or telephone service to individuals or communities through damage to pipelines, powerlines or telephone lines. Trucking could result in damage to overhead lines. Excavating for roads or skid roads could damage buried utilities. Dropping logs from helicopters on either type of utility could result in effects to utility transmission. These situations could also result in fires or other hazards.

There would be no direct effects to utility corridors under either action alternative, because of the mitigations to prevent such damage. Skid trails were planned to avoid crossing the pipeline. If skid trails are needed which would cross the pipeline, this would be done under safety guidelines provided by the gas company, with their advice at the time of implementation.

Landing locations near the pipeline have landing space on either side of the pipeline, so that traffic would be over roads constructed to protect the pipeline, in a similar way to FR 908. This type of road construction would add to costs, but it mainly involves a larger than normal amount of certain types of fill over the pipeline. Conventional skidding would not be expected to cross the pipeline.

For helicopter logging, transporting logs over utilities would also be avoided. Landing locations are planned to avoid any need to transport logs over existing utility corridors.

Public use of road right of ways is discussed in the recreation section of this document.

Cumulative Impacts

Alternative A – No Action

Since Alternative A would not cause direct or indirect effects, it would not contribute cumulative effects.

Alternative B and Alternative C

Since these alternatives are not expected to have direct effects on utility corridors, they would not contribute to cumulative effects. Helicopters are sometimes used for utility corridor maintenance in the area.

There are expected to be no unavoidable adverse effects or irretrievable commitment of resources with regard to the utility corridors permitted in the area.

Consistency with the Forest Plan

All alternatives would be consistent with Forest Plan direction for special use management (Forest Plan, pp. 88 and 138a).

Consistency with Laws

The following Federal, State, or local laws or requirements imposed for the protection of the environment have been considered during the analysis of the Cherry River Proposed Action and alternatives.

American Indian Religious Freedom Act of 1978
Antiquities Act of 1906 (16 USC 431-433)
Archaeological and Historical Conservation Act of 1974 (16 USC 469)
Archaeological Resources Protection Act of 1979 (16 USC 470)
Cave Resource Protection Act of 1988

Clean Air Act of 1977 (as amended)

Clean Water Act of 1977 (as amended)
Endangered Species Act (ESA) of 1973 (as amended)

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
Historic Sites Act of 1935 (16 USC 461-467)
Multiple Use Sustained Yield Act of 1960
National Environmental Policy Act of 1969, (as amended) (42 USC 4321-4347)
National Forest Management Act (NFMA) of 1976 (as amended)
National Historic Preservation Act of 1966 (16 USC 470)
Organic Act 1897
Prime Farmland Protection Act

Wild and Scenic Rivers Act of 1968, amended 1986

Forest Service Manuals such as 2361, 2520, 2670, 2620, 2760
Executive Order 11593 (cultural resources)

Executive Order 11988 (floodplains)
Executive Order 11990 (wetlands)
Executive Order 12898 (environmental justice)
Executive Order 12962 (aquatic systems and recreational fisheries)

Executive Order 13112 (NNIS)