DESERT BRANCH PROJECT AREA
ENVIRONMENTAL ASSESSMENT

Compartments 69 and 70
Desert Branch Opportunity Area
Management Prescription 6.1

Monongahela National Forest
Gauley Ranger District
State of West Virginia
Counties of Nicholas and Greenbrier

Prepared July, 2004

SUMMARY

This is an Environmental Assessment (EA) for proposed timber sale and associated management activities in the vicinity of Richwood, West Virginia. The activities in the Proposed Action include the following: Even aged regeneration harvests including 34 acres in 2 clearcuts, 14 acres in a two aged cut, and 45 acres in 3 shelterwood cuts; 973 acres in thinning by conventional and helicopter methods, 16 acres of wildlife openings, 23 acres of wildlife savannahs, 2 acres of aspen plantings, 2 acres of chestnut release, 1.3 miles of road construction, and opening a vista on the Fork Mountain Trail.

The Proposed Action and alternatives to it are evaluated with consideration of public issues and the purpose and need. All proposed activities are guided by the direction stated in the Monongahela National Forest Land and Resource Management Plan.

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CHAPTER I – PROPOSED ACTION

Introduction/Area Description

The 3013-acre Desert Branch Opportunity Area (OA) is located in Nicholas and Greenbrier Counties just east of Richwood, West Virginia. The boundaries of the OA include WV Route 39/55 and North Fork of Cherry on the north, the Richwood corporate boundary on the west, and the National Forest boundary on the south. To the east, the boundary is formed by another 6.1 management area on the Gauley Ranger District, the Rabbit Run OA. Of the total acres, 5 acres are on private land, which is located close to the mouth of Joe's Branch, between the highway and the river. Within this document, any references to the OA will refer to National Forest acreage, unless otherwise specified.

The small community of Handle Factory Hollow is located adjacent to the southern boundary of the OA. This area has few residents; fewer than 30 private landowners own property there. The rest of the private land south of the OA is owned and managed for timber by a timberland management company.

The entire OA, as well as most of the adjoining private land, appears to have been under the same land use regimen since the area's massive timber harvest after the turn of the twentieth century. This area was owned by the Cherry River Boom and Lumber Co. and then owned by Georgia-Pacific (now Plum Creek) or managed by the Monongahela National Forest. Only the portion immediately surrounding Handle Factory Hollow is likely to have been subject to woodland grazing or other farm related land uses.

The OA is entirely within the Allegheny Plateau Landtype Association (LTA). This LTA has highly dissected topography, with primarily broad ridges. The drainage patterns are high density dendritic. The geomorphology is Pennsylvanian era sandstone/siltstone/shales. The soil families in this area of the LTA are Gilpin-Dekalb-Buchanan. Surface erosion and landslides are geomorphic processes at work in the area. In general, landslide deposits are estimated to underlie 21-50% of the Allegheny Plateau landscape. Elevation in this area extends from 2240 feet to slightly above 3680 feet above sea level. `

The vegetation associated with the Ecological Landtypes of the area are the sugar maple-basswood, sugar maple-red oak, sugar maple-beech as well as red oak, sugar maple and beech associations. These mixed mesophytic sites are some of the most productive sites on the Forest. Associated with the riverside and streamside locations are the yellow birch/rhododendron, often on very rocky soils, and the eastern hemlock/rhododendron vegetation types.

Conifer within the OA is patchy and scattered, and consists mostly of hemlock with a few red pines and one known red spruce tree. The conifer component of compartment 69 is about 0.7% and 1.4% for compartment 70.

This OA is mostly within the drainage area of the North Fork of Cherry. Named subdrainages include Camp 29 Run, Desert Branch, and Handle Factory. Desert Branch is the largest of these subdrainages, and there is a small wetland close to its head. Water from some private land drains into this wetland, but most of its watershed is national forest land. There are many small, steep, unnamed drainages which are intermittent streams less than ½ mile in length feeding directly into the North Fork of Cherry.

The North Fork of Cherry is the main municipal water supply for the city of Richwood, a community with population of about 3000. Only the area south of the Desert Branch watershed is below the intake point for the water system.

Only 65 acres of national forest land ownership are within the drainage area of the South Fork of the Cherry River within this OA.

A forest health related factor which is currently contributing to tree mortality in the area is dense stocking. Basal area is a forestry measurement of stand density. One hundred fifty sq. ft./acre of basal area is the average maximum stand density for stands with 40% yellow poplar. Twenty stands out of 34 in the OA have basal area above this level. This means that trees have no room for crown and root expansion until the weaker trees die. Mortality from competition between trees is starting to become more noticeable in these stands. In general, thinning is recommended in all sawtimber stands with basal area over 90 sq.ft./acre, in order to provide for growth on the biggest and best trees and to minimize tree mortality and timber volume loss. All of the stands within the area have basal areas over 90 sq. ft./ acre.

Dense stocking can contribute to mast production and other wildlife benefits being below the area's potential, since species with mast production and other wildlife benefits are generally not the ones that survive overcrowding best. Black cherry is a species that can not recover from overcrowding if crown size is reduced below a certain threshold. Aspen is a naturally occurring element of diversity which is becoming scarce in the area because it has a short lifespan, and is very intolerant of dense, shaded conditions.

In addition to stand density, other factors that are also causing some tree mortality are wind and storm damage and grapevines. Patches of windthrow on the ridgetops appear to date from 1998, which saw many damaging storms, both in winter and summer.

Although the area is bounded by WV Rte. 39/55, a two lane paved road, this major access route to other WV locations does not provide appreciable vehicular access within the area. The North Fork of the Cherry is adjacent to this road. Access to the OA from the highway is restricted by the river and by steep slopes adjoining the highway. The road provides access to the river for recreational use, especially fishing.

WV 39/55, called the Highland Scenic Highway, is part of a 43 mile long National Forest Scenic Byway, which extends from its beginning at Richwood to a connection with US 219, seven miles north of Marlinton, WV. Six miles of this scenic byway form the northern boundary of this OA.

WV Rte. 39/17 connects Richwood to Handle Factory Hollow. This is a partly paved and partly graveled road which follows the stream course, and which crosses the creek twice. Access to this road is within the Richwood city limits, crossing the North Fork of Cherry on a narrow, wood-decked bridge.

Forest Road #946 is entirely within the OA, and provides access from WV Rte. 39/17 to the middle and western portions of the OA, at the higher elevations. It is 3.7 miles long, gated, and is considered a local road. It was constructed and reconstructed at the time of the Camp 29 Timber Sale, in the mid-1980's. No other system roads occur within this OA. Forest Road 730, the Rabbit Run Road, provides access to its eastern edge.

Purpose and Need for Action

The Monongahela National Forest Plan has established the desired future condition for areas such as the Desert Branch OA which are within Management Prescription 6.1. To the extent that the existing condition does not match the desired future condition, a need for action exists.

The primary purpose of management within Management Prescription 6.1 is to provide remote habitat for wildlife species intolerant of disturbance. The desired future condition from the Forest Plan for this area states that the area will be a mosaic of tree stands and openings with a near optimum quantity and dispersion of the habitat elements that feature the wild turkey and black bear along with associated wildlife species. These habitat elements are further explained in the standards and guidelines for management.

Those habitat elements not consistent with the forest plan desired future condition present a need for action. Some needs for action exist because they are connected, or required in order to address a need.

1. Age Class Diversity - One of the habitat elements not consistent with the Forest Plan is age class diversity. The following table shows that the Desert Branch area does not currently meet Forest Plan standards and guides for age class diversity, in that most of the area is within the 61 to 90 year age classes. Little area is within the younger, or early seral habitat classifications, or the older, i.e. mature habitat classes. Thus there is a need to create some early seral habitat by regeneration techniques. The Forest Plan (p. 174) says that the area regenerated per entry will generally be ½% per year, up to a maximum of 8% of the Forest land in National Forest ownership within a compartment. One half percent per year over a 15 year entry period would amount to 146 acres in Compartment 69 and 76 acres in Compartment 70.

Table 1 - Desert Branch Age Class Distribution by 15-year age groups in 2002

Based on GIS Acreages

Age Class	Compartment 69 Acres	Compartment 70 Acres	Total OA Acres	Percent of OA
Openings	35		35	1%
0-15	13	18	31	1%
16-30				
31-45				
46-60				
61-75	496		496	17%
76-90	1406	333	1739	59%
91-105		667	667	22%
106+	0	0	0	0%
Totals	1950	1018	2968*	100%

*Acreage of WV 39/55 and that of the N. Fork of Cherry itself are not included.

2. Mature habitat - There is also a need to leave some areas untouched while we wait for mature habitat characteristics to develop. The Forest Plan states that 5% of the National Forest lands should ultimately be in old growth (mature habitat) stands. They should be small, irregular in shape and dispersed throughout the OA. Areas evaluated for this habitat characteristic should be from the oldest age classes in the OA, have large trees, down woody material, gaps, structural diversity, and represent the diversity of forest types.

3. Opening habitat - Another habitat element which is deficient within the Desert Branch OA, is the amount of opening habitat. Openings make up 1.2% of the stand acreage, with an additional 0.5% in small openings along roads and as inclusions in other stands, for a total of 1.7% compared to the Forest Plan (p. 166) guideline of 5%. Thus, there is a need to create some opening habitat.

4. Hard mast production/maintenance of a continuous mast supply - "Management emphasis will focus on manipulation of the naturally occurring tree species composition to optimize hard mast production . . . and ensure a continuous mast supply." (Forest Plan, p. 165) The naturally occurring tree species in the area include many mast species, especially black cherry, beech, and several oaks, especially red oak, and many other trees and shrubs with important wildlife value, such as aspen and hemlock. However, yellow poplar is the most prevalent tree species, occurring most consistently and in greater density than every other species in most of the stands. The Ecological Land Types for the area and the presence of sugar maple in the understory throughout indicate that the potential future vegetation of the area is more likely to include greater amounts of sugar maple. Yellow poplar and sugar maple are not considered to be valuable wildlife mast producers. Thus there is a need to work with naturally occurring tree species with mast production potential to optimize hard mast production and ensure a continuous mast supply.

5. Use of normal forest management activities to achieve vegetative diversity and provide a mix of forest products (Forest Plan, p. 165) - The existing stand density as discussed above results in lower mast production in this area, because crowded trees with small crowns produce less seed. In addition, the trees that are most successful at surviving over-crowding may not be the most desirable mast species.

"Normal forest management activities will be used to achieve vegetative diversity that will enhance the habitat of the wildlife species being featured" (Forest Plan, p.165). A secondary purpose of Management Prescription 6.1 areas is to provide a mix of forest products (p. 164). Thus, there is a need to use normal forest management techniques to provide forest products while ensuring age class diversity and optimizing hard mast production. Forest wide standards and guidelines provide for the production of large, high quality sawtimber on appropriate sites and coordinated with other Forest uses (p.73). The sites within this area are appropriate for production of quality sawtimber since all but one stand are considered to be high sites, with greater than 85 cu. ft. per acre per year of volume production.

6. Use of the best timber harvest operation method for slopes over 40% - According to the Forest Plan, sites with slopes of 40% or greater will be analyzed on a case by case basis to determine the best method of operation for timber harvest depending on soils, slope, geology and other factors (p.75). Some of the slopes along the North Fork of Cherry are above 40%. Thus there is a need to consider the best timber harvest operation method for these steep areas, especially since the area contributes to the water supply for the city of Richwood.

7. Ensuring that management conforms to standards that enhance and maintain a visually sensitive landscape - Another secondary purpose of management in this area is to provide a semiprimitive and nonmotorized recreational environment. Driving for pleasure, fishing, hunting, and hiking are the primary recreation activities within this area, with the Highland Scenic Highway providing recreation opportunities and access to recreation lands within and adjacent to the project area. Thus there is a need to integrate management of other resources in the area seen from this highway to assure that the visually sensitive landscape is not negatively impacted.

Part of the non-motorized recreational environment includes trails, such as the part of the Fork Mountain trail, and part of the connector trail from North Bend, and the connector trail to the Richwood Rail-Trail which was recently approved for construction. The Fork Mountain and North Bend trails travel almost entirely through closed-canopy forest. District-wide, trails with a view are scarce, since any forest openings quickly grow back into brush which blocks the view.

8. Provide access needed for vegetation management activities (Forest Plan, p. 97 and 181) – In order to harvest timber and maintain wildlife openings by conventional means, access for equipment is needed. According to the Forest Plan, in 6.1 areas, road densities and impacts will be minimized in order to reduce the disturbance to the

areas. Forest wide transportation planning standards and guidelines state that the miles of road should be kept to a minimum considering the access needs and protection of resources. Roads should be kept on the best possible sites to protect resources and minimize the need for maintenance and future reconstruction. Standards will be the minimum necessary to meet the intended uses. Cost of road construction and management should be minimized. As a general rule, areas for conventional skidding should average less than ½ mile from the truck road used for timber hauling (Forest Plan, M-15). This distance would also be sufficient to provide farm tractor access for mowing of wildlife openings. Existing truck roads do not provide access to within ½ mile of forest roads to be used for timber hauling.

In summary, the purpose and need for action is to move toward the Desired Future Condition (DFC) for the Desert Branch area as determined by the Forest Plan, with respect to the following conditions:

1. Age class distribution,
2. Mature habitat,
3. Opening habitat,
4. Hard mast production and maintenance of a continuous mast supply,
5. Use of normal forest management activities to achieve vegetative diversity and provide a mix of forest products,
6. Use of the best timber harvest operation method for slopes over 40%,
7. Ensuring that management conforms to standards that enhance and maintain a visually sensitive landscape,
8. Providing access needed for vegetation management activities.

Proposed Action

1. In order to address the need for age class distribution and early seral habitat, the Gauley Ranger District of the Monongahela National Forest proposes to regenerate 93 acres in six separate units using even aged regeneration methods (See table for specific acreage and location of each). The specific harvest method used for each unit was chosen in order to meet the need to optimize hard mast production and ensure a continuous mast supply.

By regenerating 45 acres in three units using the shelterwood method where black cherry is present, we expect to regenerate stands with high percentages of black cherry. The shelterwood method for black cherry involves cutting about 50% of the basal area, waiting for 3-5 years until large numbers of black cherry seedlings are expected to develop, then harvesting the rest of the trees except for wildlife residuals. This method involves two separate entries within a 5-year period into these stands for timber harvest.

Fourteen acres of Compartment 69, stand 15 would be regenerated using the two aged harvest method. This is a stand with larger numbers of red oak seedlings present on the forest floor than others in the OA. However, these numbers of seedlings are not

sufficient to expect to regenerate an oak stand. Regenerating oak on such highly productive sites is very difficult, since many other species would regenerate at the same time, preventing the oak from dominating the stand. Thus, with the two aged method, some trees (about 20 square feet of residual basal area) would be left in the stand to retain an oak mast component within the stand without unduly hindering regeneration.

Regeneration of 34 acres in 2 clearcut units, in compartment 70 stands 7 and 5 is primarily to locate the young stands so as to disperse this element of age class distribution. Trees to be harvested are not primarily mast producing species, and the desired regeneration would include a large variety of species, including some mast species such as black cherry, but being primarily yellow poplar and sugar maple. All of the regeneration methods would include follow-up site preparation. Site preparation includes the felling of nonmerchantable trees after harvest. Reserve or leave trees would not be felled. No herbicide use is included.

Table 2a Regeneration Harvests in the Proposed Action.
Shelterwood harvest entails two separate time periods for logging Within approximately 5 years.

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002	Slope %
Regeneration Shelterwood	69/10 69/11	193 87	16 9	C	89 89	180 160	81 78	23 20
Regeneration Shelterwood	69/10	193	5	C	89	180	81	23
Regeneration Shelterwood	69/9 69/10	82 193	9 6	C	89 89	180 180	79 81	11 23
Regeneration Two Aged	69/15	146	14	C	56	140	76	19
Regeneration Clearcut	70/7	66	15	H	83	150	95	45
Regeneration Clearcut	70/5	270	19	C	89	120	92	39

C = conventional logging with skidders and skid roads.
H = helicopter logging with no skid roads.

Totals:
Shelterwood: 45 acres by conventional skidding
Two Aged: 14 acres by conventional skidding
Clearcutting: 19 acres by conventional skidding
15 acres by helicopter logging

2. In order to address the need for mature habitat, many areas would be left untouched while we wait for mature habitat characteristics to develop. The Forest Plan standards and guidelines direct identification of old growth habitat in the

database. However, because of philosophical differences between the intent of the Forest Plan and current ideas, a large pool of potential old growth would be tracked and evaluated in detail. This will fully comply with Forest Plan standards and guidelines for distribution of old growth habitat elements, while evaluating effects based on Forest Plan compliance and old growth habitat concerns expressed in current research.

3. In order to address the need for opening habitat, 16 acres of openings and 23 acres of savannahs would be constructed. Not all of these openings would be maintained in the long term as completely grassy and herbaceous habitat. Their locations were chosen partly to disperse this habitat element throughout the area. Some of the locations were chosen in order to take advantage of small timber sale landing locations, where trees would be a little slower to grow back into the opening and shade out the grass. In addition, creating some of the openings at helicopter and conventional landing locations would help minimize disturbance to the area. Compartment 70 stands 301 and 302 were originally created as openings, but are now sapling stands. They would be restored to their previous open condition. Small waterholes within many of the planned open areas are included to provide additional diversity of wildlife benefits for amphibians, bats and other wildlife. When creating savannahs usually less than 10 trees are left per acre so that they provide some canopy cover but allow for grass to grow below. Trees to be left would emphasize dominant trees that are more wind firm, and mast producers such as oaks, hickory, beech or black cherry. Openings and savannahs as shown below are part of the proposed action.

Wildlife openings (and waterholes) c = compartment, s = stand.

- 1 ac – c70/s7 with waterhole (1/2 ac permanent, ½ ac let grow back) an old landing site.
- 1 ac _ c70/s11 (1/2 ac permanent, ½ ac let grow back) an old landing site.
- 1 ac – c70/s302 created from Camp 29 sale but is now a sapling stand.
- 3 ac – c70/s301 created from Camp 29 sale but is now a sapling stand.
- 2 ac – c69/s15 along FR 946 at helicopter landing location.
- 2 ac – c69/s10 with waterhole.
- 2 ac – c69/s9 helicopter landing site.
- 2 ac – c70/s3 near s13.
- 2 ac – c69/s11-12 off of trail along old skid trail.

16 acres Total

Wildlife savannahs (and waterholes) c = compartment, s = stand

- 5 ac – c70/s3 where there is a lot of striped maple in the under story with little current habitat value and beech over story that will provide mast. Try to put next to s13 with a waterhole. This would provide more structural diversity within a smaller area.
- 5 ac – c69/s15/16 with a waterhole.

- 5 ac – c69/s7 with waterhole (leave rhododendron to provide some hiding cover within the opening).
- 5 ac – c69/s9 next to rock ledge, with a waterhole (save any sassafras so that it can be regenerated and not converted into grass).
- 3 ac – c69/s15 next to s23.

23acres

Table 2b – Proposed Action, Wildlife projects

Wildlife Opening or Savannah	Compartment	Stand	Acres	Waterhole (Yes or No)	Logging Method
Wildlife Opening	70	7	1	Yes	H
Wildlife Opening	70	11	1	No	H
Wildlife Opening	70	302	1	No	C
Wildlife Opening	70	301	3	No	C
Wildlife Opening	69	15	2	No	C
Wildlife Opening	69	10	2	Yes	C
Wildlife Opening	69	9	2		C
Wildlife Opening	70	3	2	No	H
Wildlife Opening	69	11/12	2	No	C
Savannah	70	3	5	Yes	H
Savannah	69	15-16	5	Yes	C
Savannah	69	7	5	Yes	C
Savannah	69	9	5	Yes	C
Savannah	69	15	3	No	C
TOTAL			39		

4. The need to work with naturally occurring tree species with mast production potential to optimize hard mast production and ensure a continuous mast supply would be met in several ways. Regeneration harvests already described above work towards this goal. Because desired mast trees are not the biggest component of the area's vegetation, it is desirable to release mast producing trees where they occur by

cutting yellow poplar and other trees which produce less valuable food for wildlife. This would be done in all the thinning units as shown in Table 2c.

Although the Asiatic Chestnut trees are not a native component of the vegetation in this area, they were planted several decades ago to provide hard mast, in an environment lacking in native American chestnuts. They would be released to continue their contribution to hard mast production.

5. Thinning of the 973 acres as discussed above also responds to the need to use normal forest management techniques on appropriate sites to provide forest products while optimizing hard mast production.

Tree planting is another normal forest management technique which would be used to establish an element of diversity which is declining in the area, because of the comparatively short life span and shade intolerance of aspen. Two acres of aspen would be planted near Desert Branch.

6. Recognizing the need to consider the best timber harvest operation method for steep areas close to the North Fork of Cherry resulted in the proposal to use helicopter logging for 522 acres of the thinning and release units and 15 acres of the regeneration harvest (Compartment 70 stand 7), as noted in tables above and below. In addition 9 acres of wildlife openings and savannas would be helicopter logged.

Table 2c Thinning and Release Harvests in the Proposed Action

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002	Slope %
Thinning	69/7	237	112	C	89	150	68	21
	69/9	82	61		89	180	79	11
	69/10	193	103		89	180	81	23
	69/11	87	41		89	160	78	20
Thinning	69/15	146	110	C	56	140	76	19
	69/16	164	24		89	160	74	40
Thinning	69/16	164	49	H	89	160	74	40
Thinning	69/15	146	12	H	56	140	76	19
	69/17	97	13		56	140	76	40
	69/18	60	49		56	150	84	32
Thinning	69/2	104	64	H	56	120	77	44
	69/1	108	59		89	120	77	45
	69/22	158	110		89	200	82	46
	69/7	237	59		89	150	68	21
	69/9	82	5		89	180	79	11
Thinning	70/9	66	39	H	83	150	90	40
	70/4	112	63		83	140	90	41
Release	70/6	117	2	Cut and Leave	89	150	97	43

Thinning: 451 acres by conventional skidding
522 acres by helicopter logging
Release: 2 acres

7. This proposal for helicopter logging also meets the need for enhancing scenery values near the highway, the river, and the town of Richwood and preventing the introduction of elements which could detract from the experience of viewers. If these areas were logged conventionally, then skid trails would need to be constructed. For helicopter logging, no skid trails are used. Chainsaw operators walk into the area and cut all the trees to be harvested; then the helicopter crew attaches chokers to these tree length logs. The helicopter cable is attached to the chokers and bundles of logs are lifted up and carried to a large landing (2-5 acres). The logs are then stacked and hauled from the landing by truck. The landings for the helicopter logging are expected to be located along the existing Desert Branch Road and the newly constructed road as shown on the attached map.

To address the need for trails with a view, a good location for cutting a vista was chosen near the ridgetop portion of the Fork Mountain Trail. Because the harvest area is located below a dropoff, less frequent maintenance would be needed to retain the vista over time.

8. Construction of 1.3 miles of new road meets the need to provide access for timber harvest both for conventional skidding of logs and helicopter logging. This road would be located on relatively flat terrain near the ridgetop. No existing road or skid trail provides access in this area. The road mileage is within the Forest Plan standards and guidelines for road mileage allowed in 6.1 areas. Management of the road after the timber harvest would provide some additional opening habitat and it would be closed to public motor vehicle use, as is the existing road, in order to maintain remote wildlife habitat conditions within the OA.

The Proposed Action, as described above, will be analyzed during the Environmental Analysis process. As part of this process, other alternatives will be generated based on input received from the public or resource specialists. These alternatives will conform to general direction set forth in the Forest Plan, as does the proposed action. Actions contrary to the Forest Plan may be considered, but they would require a Forest Plan Amendment in order to be implemented. Issues relevant to this proposed action will be developed from public and specialist input. The analysis of the proposed action and alternatives will identify the potential direct, indirect, and cumulative impacts of activities within each alternative. Mitigating measures will be developed as needed based on anticipated effects. Henceforth, this alternative may be referred to as either the Proposed Action or as Alternative 1.

The Forest Supervisor of the Monongahela National Forest will make the following decisions based on the interdisciplinary analysis presented in the Environmental Assessment. Should the Proposed Action be implemented as described above, or should mitigating measures be added? Should an alternative to the Proposed Action be implemented instead? Should no new management actions in the area be implemented? The Forest Supervisor's decision will be identified in a Decision Notice and made available to the public. The Decision Notice will also provide specific direction to ensure compliance with resource objectives and all applicable regulations.

CHAPTER II – ISSUES & ALTERNATIVES

ISSUES USED TO FORMULATE ALTERNATIVES

Introduction

The purpose of soliciting comments during the scoping period is to determine whether there are any unresolved issues, which affect the proposed action. Many issues and concerns, originating from public comment and agency concerns, are identified for analysis.

The comments received during scoping were evaluated using the following criteria:

- Can the issue be resolved by applying Forest, Regional, or National policy or direction?
- Has the issued been addressed in the Forest Plan?
- Can the issue be resolved by applying Forest Plan standards and guidelines?
- Can the issue be addressed through designing protective measures or addressed through the analysis process?

For a summary of the scoping process, and the disposition of comments received during the scoping period, please see Appendix A. Issues that remained unresolved after the evaluation were considered "unresolved" and were used to formulate alternatives to the proposed action and were used in the analysis of the alternatives. The unresolved issues are described below. These issues are unresolved in that several different ways of responding to them are possible, under the current Forest Plan, laws and regulations.

Issue 1 - Water Quality in the North Fork of Cherry

Concerns were expressed during the scoping period that the proposed action, especially timber harvesting and road construction, could affect water quality on the North Fork of Cherry including sedimentation, streamflow, and riparian effects.

Activities that disturb soils could cause downstream sedimentation to stream channels, including perennial, intermittent and ephemeral channels. Streamflow effects of concern are stormflow and peakflow. Riparian effects that are of concern are changes in non-perennial stream stability, large woody debris recruitment, and related hydrologic function of those channels. These effects can result from soil disturbance and removal of trees.

Ecological Landtype (ELT) maps were used during the development of the proposed action in order to protect areas categorized as having riparian vegetation. Those ELT's where the potential vegetation type is Yellow Birch-rhododendron or Hemlock-rhododendron were excluded from timber harvest except for some of the upland area of Compartment 69 stand 18. Use of the ELT maps to place riparian buffers would tend to make such buffers wider than recommended minimums in this area, especially for permanent and intermittent streams. This is in keeping with the site specific concern to protect the values associated with the North Fork of Cherry. Excluding riparian ELT's

from projects would provide greater buffers to those riparian areas and allow the riparian vegetation types to develop in those areas over time.

A heightened awareness of water quality issues in the North Fork of Cherry is indicated for several reasons. The North Fork of Cherry contains the water intake for the city of Richwood. The North Fork of Cherry is a popular trout fishery, with liming activities and special regulations in place to enhance trout fishing.

Units of measure used to evaluate alternatives:

- Acres of conventional logging
- Miles of road construction within the watershed
- Influence on Water Yield (harvest acres)

Issue 2 - Visual Resources in the area seen from the Highland Scenic Highway (WV Rt. 39/55), the city of Richwood, and the North Fork of Cherry

Visual impacts of logging include the appearance of skid trails as lines on the landscape, and patterns caused by clearcuts and similar harvests in the normally unbroken vista of tree crowns. The scenic highway allows frequent views of the nearby hillsides, but there are no vistas or other areas where people stop to enjoy the view. Views from the city of Richwood, on the other hand, would be more than a quick snapshot for many people, especially views from the high school football stadium and shopping plaza. Views from the river itself would be likely to be blocked by riverside trees, except during the leaf off period.

The Highland Scenic Highway is a National Forest Scenic Byway. Management of areas seen from such scenic routes would normally be sensitive to the scenic values.

Units of measure used to evaluate alternatives:

- Acres of conventional harvest in foreground from viewing areas
- Acres of conventional harvest in middleground from viewing areas
- Acres of even aged regeneration harvests, wildlife openings or roads which can be seen from viewing areas

Issue 3 - Wildlife Openings

Very small acreages, about one percent, of national forest land provide opening habitat. The Forest Plan standards and guidelines indicate that 5% of National Forest land should be in permanent openings for wildlife habitat within management prescription 6.1. While wildlife openings provide a type of early seral habitat not widely available on the national forest, some consider them to be a source of fragmentation effects. They can be very expensive to maintain on the highly productive forest soils present here, where forest trees grow back quickly.

Units of measure used to evaluate alternatives:

- Acres of wildlife openings

- Acres of even aged regeneration harvests which provide temporary opening habitat

Issue 4 - Clearcutting and Uneven aged management

Concerns were expressed that the proposal included too much clearcutting and suggestions were made that an alternative be developed that does not include clearcutting. This issues centers on the negative feelings individuals have towards clearcutting in general and concerns that clearcutting causes impacts to the viewing landscape, especially in the areas seen from Richwood and during travel on the highway. (Although clearcutting was specifically mentioned in the comments, two-aged and shelterwood treatments have been included with the concern over clearcutting because they produce similar impacts to the viewing landscape, and can also be described as clearcuts with reserve trees.) The forested landscape in this area is unique in that it currently forms an almost unbroken, continuous, tall, tree canopy. Some feel that the uniqueness of this environment in a large scale landscape which includes private land, houses and yards and much even-aged regeneration cutting justifies its maintenance. Individual tree selection cutting is one way to allow continuous forest cover while still providing timber products.

Units of measure used to evaluate alternatives:

- Acres of clearcutting, shelterwood, and two-aged harvest
- Degree of change in the viewing landscape, measured by the total project acreage

ALTERNATIVES INCLUDING THE PROPOSED ACTION

Introduction

Section 102(2)(e) of the National Environmental Policy Act (NEPA) states that all Federal agencies shall "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources."

An environmental assessment (EA) must also "rigorously explore and objectively evaluate all reasonable alternatives" [40 CFR 1502.14 (a)]. The courts have established that this direction does not mean that every conceivable alternative must be considered, but that selection and discussion of alternatives must permit a reasoned choice and foster informed decision making and informed public participation."

The range of alternatives presented in this EA was determined by evaluating public and internal comments on the Proposed Action, and the Purpose and Need for the project, described in Chapter 1. Other influences included 1) Forest Plan goals, objectives, desired future conditions, and standards and guidelines, 2) federal laws, regulations, and policy, and 3) economic viability. Within these parameters, the alternatives display a reasonable range of outputs, treatments, management requirements, mitigation measures, and effects on resources.

Many valuable suggestions for management of the national forest were presented during the scoping process, which do not require an Environmental Assessment, for example, surveys and monitoring projects and maintenance of existing roads and trails. These ideas may be done under any and all of the alternatives, including the no action alternative.

Mitigations common to all alternatives

The Forest Plan includes many standards and guidelines which serve as design standards for specific projects. Their purpose is to mitigate potential effects of forest land management under the Forest Plan. These standards and guidelines are routinely used, and are considered as requirements for any project. Thus they were not specifically listed in the Proposed Action sent out to the public, but are listed and referenced here, with a site specific emphasis as appropriate. In addition, some mitigations are listed which are being added in order to comply with recent developments in light of requirements for protection of certain Threatened, Endangered and Sensitive (TES) species, or for public safety.

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.). Water-barring roads and skidroads, and gravelling roads and landings directs water onto vegetated slopes away from streams, and reduces soil erosion losses on road, trail and landing surfaces.

Mulching should be the immediate mitigation on disturbed areas, and seeding should be secondary due to any climatic factors that would prevent immediate revegetation of any of the sites. If the closure of the timber sale occurs in the fall during an undesirable time for site preparation for seeding, mulch must be applied to the disturbed area so that no bare soils are exposed through winter and periods of high rainfall. Log landings and helicopter landings may be left as wildlife openings. Mitigation measures to prevent erosion would be applied.

Mitigation of potential sediment effects in the road construction would include: installation of substantial cross-drainage structures for surface water control using culverts and/or dips; energy dissipaters where needed at culvert and dip outfalls; hardening the road surface with gravel for surface stability; and prompt revegetation of disturbed soils.

Leave all conifer trees within the harvest areas. Protect them from felling and skidding damage when possible.

Use West Virginia Best Management Practices (BMPs) in all National Forest timber harvesting unless more restrictive measures are required by the Forest Plan. Examples of more restrictive measures in this EA include helicopter logging in some of the more sensitive harvest areas, and Forest Plan filterstrips which are more restrictive than the state BMPs.

Leave all shagbark hickory and den trees in all harvest units.

Retain all cull trees and snags unless they pose a safety hazard.

Include in the timber sale contract a prohibition on felling, skidding, and hauling during the first week of WV deer gun hunting season.

Monitor snag retention in cutting units. If there exists an average of less that 6 snags/acre greater than 9", manually create additional snags.

Protect all known bat roost trees.

If monitoring activities result in the discovery of a maternity site in or near the area, roost trees used by a maternity colony will be protected by establishing a zone centered around the maternity roost site following Indian Bat protocol in cooperation with the Forest Service and the WVDNR.

Maintain a no-cut buffer between one and two chains (66-132') between the clear-cuts/openings and rock outcrops to minimize effects of increased sunlight and wind on rock outcrops, thus protecting rock dwelling species. Leave no rock outcrop as an isolated island in the middle of a clear cut, or other opening. In all cases no mechanized equipment should operate within the rock outcrop areas, except for the area above the rocks during harvest for the trail vista.

Close and post as such those sections of the Fork Mountain Trail crossing or running within two tree lengths of the boundaries of harvest units in stands 69/10 and 11 during cutting of those units.

Maintain a 50-foot no felling zone along the Fork Mountain trail. (However, hazardous trees may be felled within this zone.)

Remove all slash within 25 feet of the trail and lop and scatter all slash within 100 feet of the trail to lie within 18 inches of the ground.

Include in the timber sale contract a prohibition of hauling on WV 39/17 during the specific hours when school buses are using that road. This mitigation would keep the log truck traffic off the roads in this area during the time students would be going to or from school.

Cultural resource sites, including rockshelters, would be avoided. No trees would be felled and no ground disturbance would occur on known sites.

Should additional or potential prehistoric or historic sites be located during the course of project implementation, the Forest Archaeologist would be notified and activity would

stop in that area until the size and nature of the resource can be determined, as specified in the standard timber sale contract clause.

No cutting units would be located within 200 feet of the North Fork of Cherry, as shown on maps.

Alternative 1 - Proposed Action

Alternative 1 is the Proposed Action as described in Chapter 1, and presented to the public during the public scoping period. This alternative proposes timber harvest, road construction, creating wildlife openings and water holes, chestnut release, and cutting a vista along the trail. It was developed to meet the purpose and need for action described in Chapter 1. This action will include some road maintenance on the Handle Factory Hollow Road, WV 39/17, in cooperation with the WV Department of Highways. This work would consist of placement of gravel on some sections of the road so it would better sustain timber hauling. Refer also to the comparison of alternatives table at the end of this chapter. Additional gravel and maintenance would also be included on FR 946.

The issues were addressed in this alternative as follows:

- Water Quality in the North Fork of Cherry: By incorporating helicopter logging and thus restricting roads and skid trails on slopes near the river.
- Clearcutting and Uneven aged management: By choosing even aged management including clearcutting
- Visual Resources: By restricting clearings in the visually sensitive areas
- Wildlife Openings: By providing openings for wildlife habitat

Mitigations for Alternative 1

Protect perennial streams with a 100-foot riparian strip width on each side of the channel, but allow removal of trees to a minimum of 75% full canopy closure. Intermittent stream riparian protection is 100 feet each side of channel for watershed area of 50 acres or more, and 50 feet each side of channel for watershed area less than 50 acres, with a minimum 50% canopy closure requirement. Ephemeral stream riparian protection is a variable strip width from 20 feet wide (each side of channel) at the top of the channel system, widening out to 50 feet wide (each side of channel) at the lower end of the ephemeral reach, but allowing timber harvest within the strip with no specified canopy closure limit. Within the riparian strip for each type of channel, no trees would be harvested that are growing within the channel, or on its banks No site preparation, or felling of un-merchantable trees would be done within the strip.

Leave all topwood and slash scattered throughout clearcuts.

Use bulldozer for clearing of wildlife openings from July 15 through October 15. Clearing for log landings may occur as needed outside of these times, consistent with requirements for TES species.

Place the wildlife savannah in compartment 69 stand 9 close to the rock ledge in stand 6 to help release and regenerate the sassafras in the area. This savannah would be above the rock outcrop ledge and would also maintain the one to two-chain buffer while still releasing sassafras.

Post and close the sale area to public use during times of helicopter logging to protect public safety. This would affect all use of the trail, hunting and other dispersed uses off-trail, and use of FR 946. It would not affect use of the state roads. These closures would be seasonal, during the period between Oct. 15 and May 15. During the two weeks of WV deer gun season, no helicopter use would occur, and the area would be open.

No trees would be marked to cut within 2 tree lengths of the road right of way for WV39/55, which would be approximately 200 feet.

Alternative 2

Alternative 2 was developed to address concerns from the public that helicopter logging is expensive, and may have negative effects on small local sawmill and logging businesses. Much of the Opportunity Area is operable for timber harvest, and harvest is limited mainly by Forest Plan Standards requiring less than 40% of the area to be directly disturbed. Thus an alternative to harvest only by conventional logging methods is possible, without dramatic reductions in the acreage to be logged from the proposed action, and without large increases in the mileage of new roads to be constructed.

About 1.3 miles of new road would be constructed to provide access for conventional and helicopter logging in Compartment 69, which is the same as in Alternative 1. About 0.7 mile of existing temporary road would be reconstructed at the end of Forest Road 730 to provide access to Compartment 70. Forest Road 730 would be restored for active timber hauling. This work would consist of pre-haul road maintenance. FR 730 is not located within the boundaries of the opportunity area.

The work on WV 39/17 described in Alternative 1 is also included.

A short section of the Fork Mountain Trail, FT 236 will be relocated farther from the wetland, thus protecting water quality. Construction of a boardwalk and two wildlife viewing platforms is a connected project that would best be done when the trail relocation is done. It helps to meet the need to enhance a visually sensitive landscape having few trails with a view.

Another project would include the planting of spruce in the two-acre wildlife opening created in c70/s3. This small project would establish an element of diversity in the area for long term enhancement of the conifer component.

This alternative meets the need for action described in Chapter I as follows.

1) Establishment of young age classes on 2.7 percent of the area provides for future age class distribution. This would be done by regenerating two areas using the shelterwood method, one area using the two aged harvest method, and one area using the clearcut method. These methods are designed, as described under Alternative 1, to promote the species diversity of the early seral habitat.
2) Mature habitat is provided as described in Alternative 1.
3) Opening habitat is provided in the same manner as in the proposed action, except that openings established as helicopter landings are not included.
4) Hard mast production is enhanced by thinning in a comparable way to Alternative 1. Although the acreage thinned is similar to Alternative 1, about half of it would be on area thinned in the Camp 29 sale in the 1980's using the skid trail system from that sale; therefore it would be second time commercial thinning. This means that fewer of the stands with the most crowding are being released. In the second time thinning, stocking levels are not quite as dense as in previously unthinned areas, and crown vigor is better, producing more mast.
5) Normal forest management methods to achieve vegetative diversity and provide forest products are used in the area outside of the steep riverside slopes. Aspen would be planted as in the Proposed Action. In addition, spruce would be planted in the two-acre wildlife opening created in c70/s3. The spruce planting would establish an element of diversity in the area for long term enhancement of potential WV Northern flying squirrel habitat.
6) Some areas of slopes over 40% are included in conventional logged areas as inclusions. These inclusions are more prevalent within the area of second entry thinning in Compartment 70. The skid trail system is substantially in place. No areas would be included where slopes exceed 55%.
7) The visually sensitive landscape is protected by avoiding logging and other activities within one quarter mile of the river. The visual variety along the trail is enhanced by providing views of the wetland, and a vista where the mountain slopes may be viewed. Such views are scarce on trails within the Ranger District and would be provided by construction of a boardwalk and two wildlife viewing platforms. This would help to meet the need to enhance a visually sensitive landscape that currently has few viewpoints along the trail. A short segment (approximately 0.1 mile) of the Fork Mountain Trail FT 236 would be relocated to avoid the wetland, thus protecting water quality.
8) Access is provided for timber harvest by conventional means. An average maximum skid distance of ½ mile from a haul road was used to determine the access needs. This distance resulted in construction of 1.3 miles of new road as described in Alternative 1. It also resulted in using an existing temporary road on the eastern side of the area, reconstructing it, and adding it to the forest's permanent road system. Thus, about 1/3 of the acres harvested within Compartment 70 would result in hauling of forest products on the 6.5 mile long FR 730. Normal road maintenance of Forest system roads may not require as much gravel, because less hauling is expected during the winter under this alternative.

The issues were addressed in this alternative as follows:

- Water Quality in the Cherry River: By reducing logging on the steeper slopes closest to the river, and by relocating a short segment of trail
- Clearcutting and Uneven aged management: By choosing even aged management including clearcutting, but reducing the clearcutting acreage from 34 to 19.
- Visual Resources: By restricting logging with associated skid trails in the visually sensitive areas, and by enhancing views from the trail
- Wildlife Openings: By providing openings for wildlife habitat

Table 3a – Alternative 2, Timber Harvest Projects and Stand Description

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002
Regeneration Shelterwood	69/10 69/11	193 87	16 9	C	89 89	180 160	81 78
Regeneration Shelterwood	69/9 69/10	82 193	9 11	C	89 89	180 180	79 81
Regeneration Two Aged	69/15	146	14	C	56	140	76
Regeneration Clearcut	70/5	270	19	C	89	120	92
Thinning	69/7 69/9 69/10 69/11	237 82 193 87	112 63 103 41	C	89 89 89 89	150 180 180 160	68 79 81 78
Thinning	69/15 69/16	146 164	112 24	C	56 89	140 160	76 74
Thinning	69/12	59	44	C	89	110	83
Thinning	70/1 70/2 70/3 70/4 70/5 70/7 70/9	56 64 124 112 270 66 66	6 34 111 29 180 17 13	C	83 83 83 83 89 83 83	170 140 120 140 120 150 150	83 91 97 90 92 95 90
Release	70/6	117	2	Cut and Leave	89	150	97

H Helicopter Logging
C Conventional Skidding

Totals:
Shelterwood: 45 acres by conventional skidding
Two Aged: 14 acres by conventional skidding
Clearcutting: 19 acres by conventional skidding
Thinning: 889 acres by conventional skidding
Release: 2 acres by cut and leave

Table 3b – Alternative 2, Wildlife projects

Wildlife Opening or Savannah	Compartment	Stand	Acres	Waterhole (Yes or No)	Logging Method
Wildlife Opening	70	7	1 (½ perm. ½ let grow back)	Yes	C
Wildlife Opening	70	11	1 (½ perm. ½ let grow back)	No	C
Wildlife Opening	70	302	1	No	C
Wildlife Opening	70	301	3	No	C
Wildlife Opening	69	10	2	Yes	C
Wildlife Opening	70	3	2 Plant spruce	No	C
Wildlife Opening	69	11-12	2	No	C
Savannah	70	3	5	Yes	C
Savannah	69	15-16	5	Yes	C
Savannah	69	7	5	Yes	C
Savannah	69	9	5	Yes	C
Savannah	69	15	3	No	C
TOTAL			35		

Mitigations for Alternative 2

Use mitigations listed for all action alternatives.

Provide a higher level of riparian resource protection than the Forest Plan, and a higher level than the Proposed Action, Alternative 1.
Protect perennial streams with a minimum 100-foot riparian strip width on each side of the channel, with no harvesting of trees within the strip except as necessary to meet riparian area management objectives. The remainder of the riparian area, if any, from 100 feet out to the edge of any actual riparian vegetation, would be managed to maintain a minimum 70 sq. ft./acre basal area of standing timber. Intermittent streams with a watershed area of 50 acres or more have no timber harvest within 50 feet either side of the channel; and a minimum of 70 sq. ft/acre of basal area beyond 50 feet out to the edge of any actual riparian vegetation. Intermittent streams with less than a 50 acre watershed area, and all ephemeral streams, have no timber harvest within 25 feet either side of the channel; and a minimum basal area of 40 sq. ft./acre beyond 25 feet out to the edge of any actual riparian vegetation (except that for clear cut harvest units there is no timber harvesting within 50 feet either side of the channel.) Also, for perennial, intermittent and

ephemeral stream types, there is no site preparation permitted within the 100 foot, 50 foot and 25 foot strips, respectively.

Leave all topwood and slash scattered throughout clearcuts.

Use bulldozer for clearing of wildlife openings from July 15 through October 15, except that landings may be cleared outside of these times, consistent with requirements for TES species.

Alternative 3

Alternative 3 was developed to address Issue 3 while continuing to provide timber products. This issue focused on concerns about maintaining an unbroken forest canopy. Several site specific and general factors led to this alternative. Visual concerns limit even aged management close to the highway and the river. An unbroken forest canopy is a key feature of the scenery on hillsides in the area. Selection harvests are appropriate to regenerate shade tolerant species, which are present. Sugar maple is a shade tolerant species that is present throughout the area in varying amounts. Seedlings and saplings of sugar maple are present in the understory in areas which were thinned in the mid 1980s. Recognizing this, selection harvest was proposed in areas with substantial amounts of shade tolerant species on highly visible slopes. Selection harvesting has the purpose of enhancing and maintaining vegetation that is able to regenerate in the understory. Shade tolerant tree species will not continue to grow into large trees unless they receive a degree of release, either by a series of regular timber harvests, or some natural thinning event such as tree mortality. No wildlife openings or regeneration harvests would be included, in order to maintain the unbroken forest canopy. Helicopter logging would be used on highly visible slopes to further enhance the scenic resources. The road work on WV 39/17 as described in Alternative 1 is included.

This alternative meets the need for action described in Chapter I as follows.

1. This alternative provides for no age class distribution as described in the Forest Plan, and very little early seral habitat. The Forest Plan allows the use of uneven aged silviculture in Management Prescription 6.1. It may be used on small patches of a timber type, in order to retain a portion of the type, or to protect soil or water resources. Young trees are established in the understory with this management method, and they must be released periodically (every 15 years or so) in order to eventually produce timber or mast.
2. Mature habitat is provided by provided as described in Alternative 1.
3. No opening habitat is provided, except for the open areas needed to serve as landings and roads for timber harvest.
4. Hard mast production would be enhanced by thinning in a comparable way to Alternative 1, although the acreage thinned is less. No regeneration of the shade intolerant species which produce mast would be provided. These species include sassafras, fire cherry, black cherry, oak, and others. Thus, maintenance of a continuous mast supply under this alternative would be restricted primarily to sugar maple and beech, which is expected to be reduced by the beech bark

disease. However, mast producing trees currently in the overstory would not all be cut, and would continue to provide enhanced mast production as a result of the thinning effect of this type of harvest. Normal forest management methods to achieve vegetative diversity and provide forest products are used in the area outside of the steep riverside slopes.

5. Use of normal forest management activities to achieve vegetative diversity and provide a mix of forest products is done by using thinning and single tree selection harvest. Thinning is as described under Alternative 1, but on a smaller acreage. Selection harvest methods are used in order to continue to provide forest products while still maintaining a continuous forest cover. Tree species diversity in the long term may include shade tolerants such as sugar maple, beech, hemlock, and possibly red spruce.

6. Helicopter logging would be used on the steeper slopes, including slopes over and under 40%.
7. The visually sensitive landscape is protected by using helicopter logging within the area of the river, on steeper slopes at a distance from the river (Compartment 70), and on some gently sloping area which is not accessible by road. The visual variety along the trail is enhanced by providing a vista where the mountain slopes may be viewed. Such views are scarce on trails within the Ranger District. A short segment (approximately 0.1 mile) of the Fork Mountain Trail FT 236 would be relocated to avoid the wetland, thus protecting water quality, as in Alternative 2.
8. No new access is provided for conventional timber harvest, thus, conventional logging is restricted to areas easily accessed from the existing FR 946.

The issues were addressed in this alternative as follows:

- Water Quality in the North Fork of Cherry: By incorporating helicopter logging on the steeper slopes
- Clearcutting and Uneven aged management: By choosing uneven aged management on visually sensitive slopes, and by choosing not to use even aged regeneration harvests at this time, even in the area not easily viewed. Young seedlings would be a habitat element that is present only in the understory
- Visual Resources: By using helicopter logging on slopes easily seen, and having no even aged regeneration cuts
- Wildlife Openings: By eliminating all wildlife openings as sources of fragmentation and because of the difficulty of maintenance

Table 4 – Alternative 3, Timber Harvest Projects and Stand Description

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002
Thinning	69/7	237	117	H	89	150	68
	69/9	82	77		89	180	79
	69/10	193	30		89	180	81
Thinning	69/10	193	102	C	89	180	81
	69/11	87	50		89	160	78
Thinning	69/15	146	134	C	56	140	76
	69/16	164	24		89	160	74
Individual Tree Selection Cutting	70/2	64	59	H	83	140	91
	70/3	124	124		83	120	97
	70/4	112	101		83	140	90
	70/5	270	256		89	120	92
	70/7	66	66		83	150	95
Release	70/6	117	2	**Cut & Leave**	89	150	97

H Helicopter Logging C Conventional Skidding

Totals: Thinning: 310 acres by conventional skidding
224 acres by helicopter logging
Individual tree selection: 606 acres by helicopter
No Wildlife openings would be constructed
No road construction would be done

Mitigations for Alternative 3

Use the same riparian protection measures as Alternative 2.

Post and close the sale area to public use during times of helicopter logging to protect public safety. This would affect all use of the trail, hunting and other dispersed uses off-trail, and use of FR 946. It would not affect use of the state roads. These closures would be seasonal, during the period between Oct. 15 and May 15. During the two weeks of WV deer gun season, no helicopter use would occur, and the area would be open. Include in the timber sale contract a prohibition on helicopter logging during the WV deer gun season. Include in the timber sale contract a prohibition on any logging activities during the first week of WV deer gun hunting season.

Alternative 4

Alternative 4 is the very similar to the Proposed Action, Alternative 1, except that new road construction was eliminated in order to respond to Issue 1 to protect water quality in the Cherry River. By eliminating the new road, and using conventional logging only in the areas accessible to the existing road, there were changes in the areas that would have helicopter logging. Wildlife openings planned on helicopter landings along the new road

were also eliminated, and replaced with helicopter landings along the existing road. No new roads would be constructed. The road maintenance on WV 39/17 as described in Alternative 1 is included here also. Other changes from Alternative 1 is that the spruce planting would be done in the wildlife opening in stand 70/3 and the trail relocation and wildlife viewing towers and boardwalk would be done (same as in Alternative 2).

This alternative meets the need for action described in Chapter I as follows. Chapter I provides more detail on the need for action that is particularly pertinent to Alternative 4.

1. The need to provide age class distribution with the associated early seral habitat is met by regenerating two areas using the shelterwood method, one area using the two aged harvest method, and one area using the clearcut method. These methods are designed, as described under Alternative 1, to promote the species diversity of the early seral habitat. Spruce planting of one wildlife opening would enhance the species diversity of the early seral habitat beyond that which is expected to occur naturally, and soils are suitable for spruce planting.
2. The need for mature habitat is met by providing a pool of potential habitat as described for Alternative 1.
3. The need for opening habitat would be met in the same manner as in the proposed action, except that some savannas and openings would not be constructed. Because there would be no continued road access to the area of Compartment 69, stand 7 and 9, openings and savannas there would be difficult to maintain in the long term, and thus none would be planned for those areas.
4. The need to work with naturally occurring tree species with mast production potential to optimize hard mast production and ensure a continuous mast supply would be met in the same manner as in the proposed action, except that slightly fewer areas would be regenerated to provide for the future mast supply.
5. The need to use normal forest management techniques on appropriate sites to provide forest products while optimizing hard mast production would be met in the thinned areas, as in Alternative 1.
6. The need to consider the best timber harvest operation method for steep areas close to the North Fork of Cherry results in using helicopter logging on such sites. In addition, helicopter logging would be used for gently sloped areas not currently accessible to a road.
7. Scenery values near the highway, the river, and the town of Richwood would be enhanced by the use of helicopter logging in highly visible areas, as in the proposed action. The need for trails with a view is met by cutting a vista along the trail and by constructing wildlife viewing platforms to view the open area of the wetland.
8. The need to provide access for timber harvest is met by using more and longer helicopter skid lengths instead of constructing or reconstructing additional road. The existing road will continue to provide access. In meeting the need for timber harvest access in this way, access for maintenance of wildlife openings and savannas would also be restricted, thus limiting the number of openings to be made under this alternative.

The issues were addressed in this alternative as follows:

- Water Quality in the Cherry River: By incorporating helicopter logging and eliminating new road construction
- Clearcutting and Uneven aged management: By choosing even aged management including clearcutting, but reducing the clearcutting acreage from 34 to 19.
- Visual Resources: By restricting clearings in the visually sensitive areas
- Wildlife Openings: By providing openings for wildlife habitat

Table 5a – Alternative 4, Timber Harvest Projects and Stand Description

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002
Regeneration Shelterwood	69/10 69/11	193 87	16 9	C	89 89	180 160	81 78
Regeneration Shelterwood	69/9 69/10	82 193	9 11	H	89 89	180 180	79 81
Regeneration Two Aged	69/15	146	14	C	56	140	76
Regeneration Clearcut	70/5	270	19	C	89	120	92
Thinning	69/7 69/9 69/10	237 82 193	117 68 19	H	89 89 89	150 180 180	68 79 81
Thinning	69/10 69/11	193 87	86 41	C	89 89	180 160	81 78
Thinning	69/15 69/16	146 164	110 24	C	56 89	140 160	76 74
Thinning	69/16	164	49	H	89	160	74
Thinning	69/15 69/17 69/18	146 97 60	12 13 49	H	56 56 56	140 140 150	76 76 84
Thinning	69/2 69/1 69/22 69/7 69/9	104 108 158 237 82	64 59 110 59 5	H	56 89 89 89 89	120 120 200 150 180	77 77 82 68 79
Thinning	70/9 70/4	66 112	39 63	H	83 83	150 140	90 90
Release	70/6	117	2	Cut and Leave	89	150	97

H Helicopter Logging C Conventional Skidding

Totals:
Shelterwood: 45 acres by conventional skidding
Two Aged: 14 acres by conventional skidding
Clearcutting: 19 acres by conventional skidding
Thinning: 261 acres by conventional skidding
726 acres by helicopter logging
Release: 2 acres

Wildife openings are the same as in the proposed action, except that only those that have reasonable access for potential maintenance are included.

Table 5b – Alternative 4, Wildlife Projects

Wildlife Opening or Savannah	Compartment	Stand	Acres	Waterhole (Yes or No)	Logging Method
Wildlife Opening	70	7	1 (½ perm. ½ let grow back)	Yes	H
Wildlife Opening	70	11	1 (½ perm. ½ let grow back)	No	H
Wildlife Opening	70	302	1	No	C
Wildlife Opening	70	301	3	No	C
Wildlife Opening	69	15	2	No	C
Wildlife Opening	70	3	2 Plant spruce	No	H
Wildlife Opening	69	11-12	2	No	C
Savannah	70	3	5	Yes	H
Savannah	69	15-16	5	Yes	C
Savannah	69	15	3	No	C
TOTAL			25		

Mitigations for Alternative 4

Use the same riparian protection measures used in Alternative 2.

Leave all topwood and slash scattered throughout clearcuts.

Use bulldozer for clearing of wildlife openings from July 15 through October 15, except that landings may be cleared outside of these times, consistent with requirements for TES species.

Post and close the sale area to public use during times of helicopter logging to protect public safety. This would affect all use of the trail, hunting and other dispersed uses off-trail, and use of FR 946. It would not affect use of the state roads. These closures would be seasonal, during the period between Oct. 15 and May 15. During the two weeks of WV deer gun season, no helicopter use would occur, and the area would be open. Include in the timber sale contract a prohibition on helicopter logging during the WV deer gun season.

Alternative 5 - No Action

The "No Action" alternative is based on the premise that ecosystems change, even in the absence of active management. It is a "status quo" strategy that allows current activities and policies, such as recreation administration, road maintenance, and fire suppression. It

proposes no actions that are contained in the action alternatives described above. This alternative provides a baseline for comparison of environmental consequences of the action alternatives to the existing condition (36 CFR 1502.14) and is a management option that could be selected by the Responsible Official.

The issues were addressed in this alternative as follows:

- Water Quality in the Cherry River: By including no new activities
- Clearcutting and Uneven aged management: By choosing to do no timber management at this time
- Visual Resources: By providing for no timber harvest at this time
- Wildlife Openings: By providing no new openings for wildlife habitat

Alternative 6

Alternative 6 meets the purpose and need for action in a way similar to Alternative 1. It includes similar timber harvest, chestnut release, road construction, creating wildlife openings and water holes, cutting a vista along the trail and road maintenance on WV 39/17, with some changes in timber harvest, wildlife openings, and trail related projects.

As in Alternative 2, trail relocation, boardwalk and wildlife viewing platforms, and spruce planting will be done. This alternative also would leave uncut areas within a minimum of 100, 50 and 25 feet from perennial, intermittent, and ephemeral stream channels, as described in Alternative 2.

The clearcut harvest unit in stand 70/7 would not be implemented in this alternative, because of the high density of ephemeral stream channels. Much of the acreage in this unit would be in riparian buffer strips, thereby reducing the effective regeneration area to a few acres. The helicopter thinning area in stands 69/17 and 18 would also be dropped. This area has numerous grapevines. Dropping these units would avoid the cutting of trees with grapevines. Although the Forest Plan does not stipulate that trees with grapevines not be cut, it does stipulate that grapevine control will not be done in MP 6.1 areas unless necessary to achieve wildlife habitat management objectives (Forest Plan, p. 168). Felling trees within this area would be likely to result in felling of grapevines, which are not common throughout the area.

Three wildlife openings totaling 4 acres from the Proposed Action would also not be created. Openings in stands 70/7 and 70/11 would be helicopter logged in the Proposed Action; dozer access to these sites would be old skid trails. Dropping these openings would avoid the need for a dozer or some other machinery to travel the skid trails to access the sites. The opening in stand 69/11 and 12 would be dropped to avoid an area with small drainages and somewhat moist ground conditions.

Another change from the original proposed action is that approximately ½ mile of temporary road would be constructed to reduce the skidding distance for areas in stand 69/7.

This alternative meets the need for action described in Chapter I as follows. Chapter I provides more detail on the need for action that is particularly pertinent to Alternative 6.

1. The need to provide age class distribution with the associated early seral habitat is met by regenerating three areas using the shelterwood method, one area using the two aged harvest method, and one area using the clearcut method. These methods are designed, as described under Alternative 1, to promote the species diversity of the early seral habitat. Spruce planting of one wildlife opening (same as in Alternative 2) would enhance the species diversity of the early seral habitat beyond that which is expected to occur naturally, and soils are suitable for spruce planting. Aspen planting would be done, as in Alternative 1.
2. The need for mature habitat is met by providing a pool of potential habitat as described for Alternative 1.
3. The need for opening habitat would be met in the same manner as in the proposed action, except that some openings would not be constructed, and the temporary road would be maintained as a linear wildlife opening.
4. The need to work with naturally occurring tree species with mast production potential to optimize hard mast production and ensure a continuous mast supply would be met in the same manner as in the proposed action, except that slightly fewer areas would be regenerated to provide for the future hard mast supply.
5. The need to use normal forest management techniques on appropriate sites to provide forest products while optimizing hard mast production would be met in the thinned areas, as in Alternative 1, except for not thinning the helicopter area in stands 69/17 and 18. In these areas, the species diversity represented by grapevines would be emphasized instead of the hard mast production potential.
6. The need to consider the best timber harvest operation method for steep areas close to the North Fork of Cherry results in using helicopter logging on such sites.
7. Scenery values near the highway, the river, and the town of Richwood would be protected by the use of helicopter logging in highly visible areas, as in the proposed action. The need for trails with a view is met by cutting a vista along the trail and by constructing wildlife viewing platforms to view the open area of the wetland. Relocation of part of the trail would enhance water quality by removing that portion of the trail from the wetland area, same as in Alternative 2.
8. Construction of 1.3 miles of new road and ½ mile of temporary road meets the need to provide access for vegetation management for conventional skidding of logs, helicopter logging, and wildlife opening maintenance. This road would be located on relatively flat terrain near the ridgetop. No existing road or skid trail provides access in this area. The road mileage is within the Forest Plan standards and guidelines for road mileage allowed in 6.1 areas. Management of the road after the timber harvest would provide some additional opening habitat and it would be closed to public motor vehicle use, as is the existing road, in order to maintain remote wildlife habitat conditions within the OA. The temporary road would be closed by removing culverts, installing dips or waterbars, and with revegetation after use. The temporary road would reduce the skidding distance to the conventionally logged area in stand 69/7, in accord with Appendix M of the Forest Plan.

The issues were addressed in this alternative as follows:

- Water Quality in the Cherry River: By incorporating helicopter logging, and by not clearcutting in one stand that has many ephemeral drainage channels (Compartment 70/7) and by dropping wildlife openings with associated tractor use on old skid trails.
- Clearcutting and Uneven aged management: By choosing even aged management including clearcutting, same as the proposed action, but reducing the clearcutting acreage from 34 to 19.
- Visual Resources: Same as the proposed action, but restricting clearings in the visually sensitive areas, and providing trails with a view by constructing a vista and wildlife viewing platforms.
- Wildlife Openings: Same as the Proposed Action except that three wildlife openings totaling 4 acres would not be created, and one opening would be planted with spruce.

Table 6a – Alternative 6, Timber Harvest Projects and Stand Description

Type of Cut	Stand	Stand Acres	Treatment Acres	Logging Method	Forest Type	Basal Area	Age in 2002
Regeneration Shelterwood	69/10 69/11	193 87	16 9	C	89 89	180 160	81 78
Regeneration Shelterwood	69/10	193	5	C	89	180	81
Regeneration Shelterwood	69/9 69/10	82 193	9 6	C	89 89	180 180	79 81
Regeneration Two Aged	69/15	146	14	C	56	140	76
Regeneration Clearcut	70/5	270	19	C	89	120	92
Thinning	69/7 69/9 69/10 69/11	237 82 193 87	112 61 103 41	C	89 89 89 89	150 180 180 160	68 79 81 78
Thinning	69/15 69/16	146 164	110 24	C	56 89	140 160	76 74
Thinning	69/16 69/15	164 146	49 3	H	89 56	160 140	74 76
Thinning	69/2 69/1 69/22 69/7 69/9	104 108 158 237 82	64 59 110 59 5	H	56 89 89 89 89	120 120 200 150 180	77 77 82 68 79
Thinning	70/9 70/4	66 112	39 63	H	83 83	150 140	90 90
Release	70/6	117	2	Cut and Leave	89	150	97

H Helicopter Logging C Conventional Skidding

Totals:
Shelterwood: 45 acres by conventional skidding
Two Aged: 14 acres by conventional skidding
Clearcutting: 19 acres by conventional skidding
Thinning: 451 acres by conventional skidding
451 acres by helicopter logging
Release: 2 acres

Wildlife openings are the same as those in the Proposed Action except that the openings in stands 69/11 and 12, 70/7, and 70/11 are dropped, and spruce would be planted in the opening in stand 70/3.

Table 6b – Alternative 6, Wildlife Projects

Wildlife Opening or Savannah	Compartment	Stand	Acres	Waterhole (Yes or No)	Logging Method
Wildlife Opening	70	302	1	No	C
Wildlife Opening	70	301	3	No	C
Wildlife Opening	69	15	2	No	C
Wildlife Opening	69	10	2	Yes	C
Wildlife Opening	69	9	2		C
Wildlife Opening	70	3	2 Plant spruce	No	H
Savannah	70	3	5	Yes	H
Savannah	69	15-16	5	Yes	C
Savannah	69	7	5	Yes	C
Savannah	69	9	5	Yes	C
Savannah	69	15	3	No	C
TOTAL			35		

Mitigations for Alternative 6

Use the same riparian protection measures that were used in Alternative 2.

Leave all topwood and slash scattered throughout clearcuts.

Use bulldozer for clearing of wildlife openings from July 15 through October 15, except that landings may be cleared outside of these times, consistent with requirements for TES species.

Post and close the sale area to public use during times of helicopter logging to protect public safety. This would affect all use of the trail, hunting and other dispersed uses off-trail, and use of FR 946. It would not affect use of the state roads. These closures would be seasonal, during the period between Oct. 15 and May 15. During the two weeks of WV deer gun season, no helicopter use would occur, and the area would be open.

Alternatives considered, but dropped from full analysis.

An alternative to consider only restoration activities and no logging projects was considered. The only true restoration project identified was reconstruction work on WV 39/17 to bring the state secondary road into closer compliance with national Forest design standards which would be expected to help reduce flood and sediment effects in Handle Factory Run. There were several reasons for dropping this as a restoration project/alternative. The road is not under Forest Service jurisdiction and is currently well maintained to provide public access. It is located very close to the stream channel, in some places forming the stream bank. Any improvements in road drainage would not be able to mitigate this problem of road location, and minor improvements in sediment production could be achieved by some very expensive roadwork. This project was also considered to be not ready for implementation, in that a newly formed local watershed interest group will be prioritizing watershed work in the area of Richwood, and this road may not be the highest priority for them.

An alternative to use helicopter for all logging was considered but dropped from full consideration. It was not considered in detail since the existing road provided access to some gently sloped areas where conventional logging would not be difficult and helicopter logging is more expensive than conventional logging.

An alternative to use prescribed fire to enhance oak mast production was considered but not developed in detail. Other areas of the National Forest may be more conducive to safe and effective use of fire because of their moisture regime. Frequent rainfall in all seasons results in few years when burning could be scheduled. Northern hardwoods and mixed hardwood forests such as those in the project areas are not considered to be fire-dependant ecosystems.

An alternative to connect FR 946 to FR 730 to avoid hauling through Richwood was dropped from detailed analysis. It was briefly considered in order to avoid negative effects of hauling over WV 39/17 through Richwood. Effects of hauling logs on this road are described under transportation effects. Use of FR 730 for hauling of the timber removed from the eastern portion of the project area is fully considered in Alternative 2. Connecting FR 730 to FR 946 was not fully developed as an alternative for the transportation system for the following reasons. Forest wide standards and guidelines provide the following principles of transportation planning: "Keep the miles of road to a minimum, considering the access needs and protection of resources. . . Minimize the cost of road construction and management programs." (Forest Plan, pp. 97-98) Virtually all of FR 946 would still be needed for hauling, and the connection with WV 39/17 would still be needed for other access, since it already exists and is a shorter distance to medical care in case of accident (1-5 miles of hauling or travel to the state road versus 7-12 miles if it did not exist). Two and three tenths miles of new construction would be needed, with the same addition to the road maintenance program, thus increasing costs. The additional cost of new construction connecting the two forest roads would be over $309,000. The local road density for the Desert Branch OA would be 1.56 miles per square mile, more than the average forest wide local road density allowed by the Forest Plan. This is not considered to be a violation of the Forest Plan, since the low current density Forest wide, does allow for some areas to exceed the forest wide average. The

expected revenue from the sale would still exceed the cost of the roads. However, the revenue from the sale would be negative when all the costs of sale preparation and associated projects are considered. Considering the high revenues generated from the other alternatives, and the strong direction in the Forest Plan to reduce the road miles and costs, road mileage and costs were considered to be enough to remove this option from consideration. In addition, the presence of gated through roads is considered to be a problem for law enforcement, especially of game laws, and this road has a history of gate breaching.

Table 7

Comparison of Alternatives for the Desert Branch Project Area

ACTIVITY	Amount of Activity by Alternative					
	Alt 1 Proposed Action	**Alt 2 No helicopter**	**Alt 3 No Openings**	**Alt 4 No new roads**	**Alt 5 No action**	**Alt. 6**
Clear-cut *(acres)*	34	19	0	19	0	19
Two-aged *(acres)*	14	14	0	14	0	14
Shelterwood* *(acres)*	45	45	0	45	0	45
Total Even age Regen harvest *(acres)*	93	78	0	78	0	78
Thin *(acres)*	973	889	534	987	0	902
Individual Tree Selection *(acres)*	0	0	606	0	0	0
Wildlife Openings *(acres)*	16	12	6**	12	0	12
Savannahs *(acres)*	23	23	0	13	0	23
					0	
Total Acres Conventional Logging	559	1002	310	335	0	557
Total Acres Cut	1105	1002	1140	1090	0	1015
Timber Volume-Helicopter Units (CCF)	4357	0	5408	6058	0	3580
Timber Volume-Conventional Units (CCF)	6556	9130	2723	3613	0	6165
Estimated Total Timber Volume *(CCF)*	10913	9130	8131	9671	0	9745
Number of Waterholes	6	6	0	3	0	5
Plant spruce *(acres)*	0	2	0	2	0	2
Aspen planting*** *(acres)*	2	2	0	2	0	2
Release chestnut *(acres)*	2	2	2	2	0	2

(Comparison of Alternatives for the Desert Branch Project Area Continued)

Road improvement WV 39/17	Yes	Yes	Yes	Yes	No	Yes
Road construction	1.3 miles (2.5 acres)	1.3 miles (2.5 acres)	0	0	0	1.3 miles (2.5 acres)
Road reconstruction *(acres)*	0	.75 mile (less than 1 acre)	0	0	0	0
Temporary road	0	0	0	0	0	0.5 mile
Vista opening *(acres)*	< 1	< 1	< 1	< 1	0	<1
Trail relocation *(miles)*	0	.1	.1	.1	0	.1
Boardwalk wildlife viewing area	No	Yes	No	Yes	0	Yes
Soil Disturbance *(acres)*	60	106	33	39	0	60
Conventional Harvest in Foreground *(acres)*	0	33	0	0	0	0
Conventional Harvest in Middle Ground *(acres)*	395	781	196	191	0	395
Openings or regeneration seen from viewing areas *(acres)*	0	0	0	0	0	0
Middle Ground Road Construction and Reconstr. *(miles)*	0.6	1.3	0	0	0	0.6 Temp 0.5

*Requires second cut in 3-5 years.
**Acreage included in thinning acreage.
***Requires cutting trees.

CHAPTER III - ENVIRONMENTAL EFFECTS

This chapter discloses the effects of each alternative and forms the scientific basis for comparing the alternatives presented in Chapter II. Effects can be direct, indirect or cumulative. Direct effects occur at the same time and place as the actions causing them. Their causes are usually obvious. Indirect effects are those resulting from means other than direct effects. They may occur at the same or later time or at a different place than the actions that cause them. Their causes are not always obvious as they may stem from effects on other environmental elements. Examples could include the change of scenery for recreationists or shifts in wildlife populations resulting from changes in habitat.

Cumulative effects are the combined effects of these actions with other past, present, or reasonably foreseeable future actions. Cumulative effects may be confined to the Project Area, or may occur outside the Project Area. For this project, unless otherwise specified, the cumulative effects boundary is the Project Area. The affected environment for each resource describes past actions, or history of the area. The effects of these past actions in developing the existing condition, in combination with the effects of each alternative are described. For most resources, the major source of cumulative effects is past, present, and future activities on the same land. For some resources, past, present and future activities on nearby lands, or within the region may cause cumulative effects.

For each factor, direct, indirect and cumulative effects are discussed in relation to the particular context in which they may occur. A natural boundary that helps define the cumulative effects of each alternative is the watershed boundary of the North Fork of Cherry. A Watershed Assessment of conditions within the watershed of the Cherry River, including the North Fork of Cherry, has recently been completed. Information used to develop this Assessment was also used to help define the effects of Alternatives in the Desert Branch Project Area.

The North Fork of Cherry watershed consists of mostly National Forest lands, with about 8% private land. The Gauley Ranger District is also composed mostly of lands in National Forest ownership. For this reason, most cumulative effects would consist of effects of National Forest management, rather than management of private or other lands. The cumulative effects of managing the Monongahela National Forest under the standards and guidelines outlined in the Forest Plan are disclosed in the Final Environmental Impact Statement for the Forest Plan. All of the projects and environmental impacts of the Desert Branch project are within the scope of the FEIS for the Forest Plan, unless otherwise described in the effects section.

There are no timber harvests currently occurring or planned within the project area, other than those described in Chapter II, on National Forest lands. Timber harvest on National Forest lands within the North Fork of Cherry and the Cherry River watersheds is being planned, but details are not yet firm, and potential cumulative effects of these harvests and potential harvests which would probably occur in future entries were considered to

the extent possible. No new recreational or other developments are planned within the project area. Other reasonably foreseeable events considered in the cumulative effects analysis were: continuing maintenance and use of existing roads, trails and recreational developments; effects of weather, high water and storm damage; ongoing acid precipitation; stream liming; deer browsing; stocking of fish; and non-native insects or diseases currently present within the watershed or project area. No known private land activities are reasonably foreseeable, other than those consistent with past management of these lands, such as: continuing timber harvest; building, home and road maintenance and use; and possibly construction of new dwellings, driveways or roads. A list of expected activities, occurrences or projects that was considered in the cumulative effects analysis is included in the project files.

The Forest Service mission is to manage National Forests and Grasslands for multiple land uses and sustainable resources. Environmental effects of proposed actions are evaluated in terms of effects on individual resources and the ecosystems and ecological landscapes of which these resources are a part.

This chapter incorporates an ecological perspective of the Desert Branch Project Area by describing how natural and human disturbances, past, present, and future, influence terrestrial and aquatic ecosystems. The Environmental Effects display how proposed management activities are expected to affect these terrestrial and aquatic ecosystems (as well as the "human dimension" of these ecosystems).

Most of the Effects of the Alternatives are described in the context of maintaining the natural ecosystems of the Desert Branch Project Area. Ecosystem factors discussed include the basic factors of watershed and soil values, and biotic factors, primarily vegetation and wildlife. Monitoring for biodiversity impacts is an integral part of National Forest management and has been a part of surveys done as part of the analysis process that contributed to designing the projects and evaluating potential effects.

VEGETATION EFFECTS

Forest Type/Ecological Land Type

Affected Environment: The Forest Types (FT) and Ecological Land Types (ELT), as described in the Introduction in Chapter I, are used to evaluate one component of vegetation and the effects on it. Forest Types represent a general category of existing tree vegetation. Ecological Land Types are determined based on the dominant tree species that have the potential to grow in the absence of fire or some other major disturbance. Both Forest Type and ELT are determined based on field sampling techniques.

Based on the ELT's, potential vegetation in the Project Area includes sugar maple-basswood or sugar maple-basswood/wood nettle over much of the area. Other ELT's found in the OA include sugar maple-red oak, sugar maple-beech, and sugar maple. These ELT's have a high species diversity of trees, shrubs and forbs, and include some of the most productive sites on the Forest. (Detailed maps of the ELT's are included in the project file.)

The ELT's along the North Fork of Cherry, Desert Branch, and Handle Factory Hollow are yellow birch-rhododendron and hemlock-rhododendron, which are considered to be riparian ELT's. One area above the North Bend picnic area is red spruce-hemlock-rhododendron.

Within this OA, approximately 62 percent of the National Forest System land has a FT of Mixed hardwoods. This is very inclusive forest type, which generally includes a variety of primarily hardwood trees, with no single species making up more than 50% of the stand. Nineteen percent of the area is typed as Yellow poplar-black cherry-white ash, 17 percent is typed Yellow poplar-red oak-white oak, and 1 percent is typed as Northern hardwoods (beech-birch-maple). The other 1 percent is in existing openings. The Yellow-poplar-black cherry-white ash and Yellow poplar-red oak-white oak forest types have at least 50 percent of the stocking in one or more of the indicated species.

Overall, tree vegetation in the OA includes primarily yellow poplar, sugar maple, beech, red oak, red maple, black cherry, basswood, sweet birch, and yellow birch. Other species include cucumber tree, Fraser magnolia, ash, chestnut oak, black locust, and hemlock. Smaller amounts of white oak, scarlet oak, sassafras, hickory, and black gum are also present. Overall, yellow poplar is the most prevalent tree species, occurring most consistently and in greater density than every other species in most of the stands. Seventy percent of the area has over 20% yellow poplar, according to stand data.

The beech seems to be more concentrated in the eastern part of the OA; there does appear to be some correlation of higher percentages of beech with some of the lower percentages of yellow poplar. Beech comprises up to 30% of stand basal area in a few stands, but many stands have no beech component recorded in the data. Red oak seems to be most common in the stands on the western end of Fork Mountain Ridge. It was also noted on the ridges west of Mill Knob. Compartment 69, stand 23 has a large red oak component, making up 56% of stand basal area. Three other stands have more than 20% red oak: Compartment 69, stands 9, 15 and 21. Most of the rest of the area has less than 10% red oak. Basswood, sugar maple and black cherry also occur in most of the stands but don't make up as large a proportion of each stand. Since most of the OA is on a north facing side slope it is logical that oaks would not be as common, although red oak does occur in most of the stands as a small percentage. Black cherry occurs more on the wide ridge top areas or on less steep benches on the side slopes than it does in other parts of the OA. Sugar maple is very prevalent in the understory, as suggested by the ELT's.

Based on the potential and current vegetation, the trend for this area over a very long period of time would be towards species tolerant of shade (sugar maple, basswood, beech, and hemlock) and away from species less tolerant of shade such as yellow poplar, oak, and black cherry. With these conditions, regenerating intermediate to intolerant species in this LTA would be difficult to do unless there are large numbers of seedlings present in the understory prior to removing the overstory. However, yellow poplar is a prolific seeder and should be able to regenerate easily without advance regeneration if an opening is created. Many of the old skid trails have yellow poplar seedlings or saplings growing in them.

Existing overstories include such large percentages of the very shade intolerant yellow poplar, primarily because heavy turn of the century logging removed the shade and regenerated primarily intolerant tree species. Fire may have played a role, particularly on the western slopes above Richwood, along Fork Mountain Ridge, and on the Ridge west of Mill Knob. Fire has been shown to increase the amount of oaks in cove hardwood and northern hardwood stands (Lorimer, 1992), and therefore may have been a factor in the number of oaks present. Although fire has been very uncommon in recent years, one stand, compartment 69 stand 23, burned in the spring of 1992.

Deer browsing on seedlings is a normal part of the ecosystem, and different species have different "methods" of surviving it. For example, yellow poplar produces abundant seeds, so that some will survive; its seedlings grow rapidly, so its leader will soon be above the height that deer can reach. For all trees, survival of the leader, or growing tip of the tree, is a major factor allowing a tree to survive and grow in competition with other trees. Whether in clearcuts or in natural openings caused by storm damage, grapevines, or tree mortality, deer browsing can affect the composition of a stand. Within the past several years, effects of deer browsing on regenerating clearcuts have become more pronounced. These effects may be a result of increased deer populations (Forest and State wide), and they may be a result of deer spending more time browsing in clearcuts. Effects include open trampled areas with little vegetation, areas with reduced species diversity, such as fern or grass and sedge patches, and areas where tree species diversity is limited to species whose method of surviving deer damage have been more successful than the methods of other trees.

Another factor which can be expected to affect tree species composition and diversity in the area over time, is the presence of insects or diseases which can reduce or eliminate certain species. Three serious introduced pest species are expected to affect the area in the very near future. The county is within the gypsy moth quarantine area, which means that large numbers of male moths have been found in sampling traps, and egg masses have been found within the county. A hatched gypsy moth egg mass was noted on a red oak in stand 69/18 in May 2002. The scale insect which marks the advancing front of the beech bark scale complex is known to be within 6 miles of the area, and is possibly within the area. The hemlock wooly adelgid (HWA) has been observed in small numbers at the Falls of Hills Creek, which is approximately 8 miles from the OA, and on some hemlocks along the North Fork of the Cherry River within the OA. There are no known serious disease or insect pests expected to affect primarily yellow poplar.

Gypsy moth populations tend to be heavier and cause more damage in areas where susceptible trees are a large component of the vegetation. Such trees in this area are primarily basswood and red oak, with yellow poplar being very unpalatable to the insect. The beech bark scale complex can dramatically reduce the numbers of large diameter beech trees in an area, with many beech sprouts forming in the understory of the affected area. Some trees will be found to be resistant, but the only way to determine resistance is to see which trees live. It is expected that long term seed/mast production from beech trees will decline in any area affected by the disease. Since sprouting is the primary

means of regeneration of this species, the effect on species occurrence will not be as severe as it is expected to be on mast production. The HWA has the potential to greatly reduce the numbers of hemlocks within this area and across much of the hemlock range. The Monongahela National Forest is cooperating with the USDA Forest Health Protection unit in Morgantown, WV, in projects designed to test control methods for the HWA.

Management effects on Forest Type: Management emphasis focuses on working with the naturally occurring tree species composition to optimize mast and vegetation diversity (Forest Plan, p. 165). Although uneven-aged silviculture or natural succession vegetative management may be used, even-aged silvicultural methods are emphasized in MP 6.1 areas to create open understory conditions for turkey and stand diversity for bear. The most desirable silvicultural system is generally dependent on the species desired in the new stand (tolerant of shade or intolerant of shade) or visual concerns in the cutting area. Some species, such as red oak, are classified as intermediate in tolerance, but they do not develop well under the shade of other trees and require direct sunlight in order to develop into large trees. Most tree species considered desirable for mast production within the area can only be regenerated using even aged methods, because they require sunny conditions to continue developing. The only shade tolerant mast producing species in the area is beech. Tree species that do not occur naturally within or near the area could not be regenerated naturally, but must be planted.

The naturally occurring tree species composition can be manipulated to increase long term species diversity and mast production potential primarily through regeneration harvest.

Clearcutting is one way to regenerate the shade intolerant species in the Project Area (Forest Plan, page 174), and provide a balanced age class distribution. A balanced age class distribution to achieve vegetative diversity for habitat enhancement of wildlife species such as turkey and bear is one of the goals of the Monongahela Forest Plan. Clearcutting would normally be limited to areas where it is essential to meet Forest Plan objectives and involves at least one of seven situations. One of these seven situations is "to provide for the establishment and growth of desired trees or other species that are shade intolerant." Yellow poplar is the most common intolerant that would be regenerated here. Red oak and black cherry are important mast producers and valuable timber species, and they are classified as intermediately tolerant and intolerant of shade. Clearcutting provides the light conditions necessary to regenerate and grow these and other intolerant species.

Effects of the Proposed Action - Alternative 1: The primary effect of the proposed action on forest tree species composition would occur as a result of the regeneration harvests. The proposed clearcut area in stand 70/7 is predominantly yellow poplar. However the understory has numerous sugar maple or beech seedlings and saplings. Clearcutting is the optimum method to regenerate primarily yellow poplar, particularly when shade tolerant species such as sugar maple and beech are present in the understory. Other methods of regeneration that leave more sources of overstory shade may be

unsuccessful in developing a component of yellow poplar and other intolerant species. Black cherry makes up part of the overstory in the proposed clearcut area in stand 70/5; clearcutting in this area would allow black cherry regeneration to better compete with the more shade tolerant sugar maple and beech that are already established in the understory. Clearcutting in this area would enhance diversity by maintaining some shade intolerant species in an area that is overall trending towards shade tolerant species. The CDS records show approximately 1200 cherry seedlings per acre over the stand; black cherry seedlings survive well and grow rapidly when exposed to full sunlight (USDA, 1990). However, both black cherry and yellow poplar would be at a competitive disadvantage under the partial shade that would result from either the shelterwood or two aged methods in both of these areas since large numbers of sugar maple and beech seedlings and saplings are present. In both of these areas, clearcutting would allow shade intolerant species such as yellow poplar or black cherry to better compete with the more shade tolerant, and already established, sugar maple or beech in the new stands. Therefore, clearcutting is the optimum method in both these areas to provide for the establishment of a diversity of young intolerant trees, especially yellow poplar and black cherry.

The proposed shelterwood regeneration areas in stands 69/9, 10, and 11 on the ridges south and west of Mill Knob were selected with consideration for regenerating black cherry. The black cherry seedling counts range from 2600 to 6700 per acre in the CDS records for these stands. The density of black cherry seedlings in these stands varies over the area; the proposed shelterwood areas were selected where there appeared to be higher amounts of black cherry seedlings in the understory. Large numbers of sugar maple seedlings and saplings are also present, but the black cherry seedlings are more numerous and larger than those found in stand 70/5. Although we expect to regenerate black cherry, we expect other species currently present in the stands to be represented in the new stands; this would be a result of advanced regeneration, seedling development, sprouts, wind blown seeds, and/or seeds present in the forest floor. Shelterwood harvest is an appropriate method to regenerate black cherry and other species in stands 9, 10, and 11.

The two-aged regeneration area was chosen in an area with some advance red oak regeneration. Stand 69/15 is approximately 38 percent red oak. About 1800 red oak seedlings per acre are present on the forest floor. This is not enough to expect the stand to regenerate a primarily oak stand, given that there are many more sugar maple, black cherry, and striped maple seedlings already present. The oak trees left from the overstory would provide some continued mast and seed production. The advance red oak regeneration would be expected to provide for an oak component in the new stand. Cultural treatments may be required in the new young stand to maintain the seedling oak component to maturity, but such treatment is not included in this analysis, since it would be likely to be recommended 10 or more years after regeneration. The oak trees left in the overstory could be killed or suffer substantial declines following gypsy moth attack, which is a reasonably foreseeable future occurrence. If this happens, then oak percentages in the regenerated stand would be less than currently exists there. Two aged regeneration cutting is an appropriate method to regenerate stand 15.

Thinning harvests would not change the existing forest types, but would have a slight effect on tree species composition within the areas thinned. Within the thinned stands, where mast producing species would be favored to be retained, oaks and other mast producers would increase as a percentage. Overall the yellow poplar component would be somewhat reduced and oaks and cherries would be slightly enhanced in thinned stands.

Cumulative Effects: Cumulative effects are analyzed within the Ranger District, where land use patterns would naturally favor the more shade tolerant species, and the yellow poplar, black cherry and red oaks regenerated here will not be common in the seedling and sapling size classes. Some species, such as black cherry, would tend to be gradually eliminated from stands under uneven-aged management (USDA, 1990). Of the approximately 158,000 acres on the Gauley Ranger District, about 54,000 acres, or 34%, are or will be in wilderness, MP 6.2, and mature habitat/old growth designations. These areas would naturally evolve into shade tolerant species associations because they will have no timber management on them. In addition, approximately 20,000 acres are in MP 2.0, which is designed for uneven-aged management. Therefore, at least 74,000 acres, about 47% of the Ranger District, would either naturally develop or be managed for shade tolerant species. Even-aged regeneration harvest would favor shade intolerant species such as yellow poplar, black cherry, and red oaks in those areas regenerated. If similar portions of all 6.1 and 3.0 areas were regenerated to intolerant species every 15 years, in 100 years, less than 20% of the area would have been regenerated and contain mostly intolerant species. Cumulatively, across the district, such harvests would help maintain those species as part of the forest cover.

Although deer browsing would occur in the clearcuts, shelterwoods, and two-age cuts, it is not expected to have a significant effect on forest type. Although deer are present in the area, the presence of a diversity of species of seedlings in the understory indicates that deer browsing should not be a major problem in this area. Yellow poplar, a preferred browse species, is present as understory seedlings in a few areas, and sugar maple, another preferred source of browse for deer, is also very prevalent. Future browsing by deer could increase, and would have effects on understory composition in thinned and unthinned areas which could lead to decreased diversity of trees and understory plants, with an increase in species that are resistant to browsing, such as striped maple and beech.

Cumulative effects of gypsy moth defoliation and regeneration harvests are that young stands, for 15 years following regeneration, are less likely to be defoliated than more mature stands. Mortality in young stands due to gypsy moth is also reduced. (Gottshalk, 2004) If gypsy moth produces a serious infestation in the area within 5 years of the thinning harvest, the cumulative effects of the thinning and the gypsy moth could be similar to a heavier thinning harvest, however, dominant oak trees are more likely to survive than those that are more crowded by surrounding trees (Gottshalk, 2004). Since the very resistant species, yellow poplar, would be removed to favor susceptible species such as oak, the effects of gypsy moth could be more noticeable than in unthinned areas. Basswood trees would not be favored to retain in the thinning areas, and thus gypsy moth

effects on basswood may be less severe. The species composition changes would not be substantial enough, even considering future potential timber harvests in the same or adjacent areas, to have any indirect or cumulative effect on changing the regeneration potential of any tree species now growing in the area.

Beech and hemlock are expected to decline within the ranger district with or without thinnings and regeneration harvests. Although thinnings and regeneration harvests would temporarily release these species, no cumulative effects of timber harvest and other actions on species composition or forest type are expected with the effects of HWA and Beech Bark Disease.

Effects of Alternatives 2, 4, and 6: Effects from regeneration harvests in Alternatives 2 and 4 would be similar to those of the Proposed Action except that two of the shelterwood units would be combined and the clearcut in stand 70/7 would not be included. A total of 45 acres would be regenerated by the shelterwood method in two units rather than in three as in the Proposed Action. Effects from Alternative 6 would be the same as those in Alternatives 2 and 4 except that the 45 acres of shelterwood harvest would be in three units (as in the Proposed Action) rather than in two units. This allows for placement of the regeneration harvest within these stands in the specific locations where there is more advanced regeneration of black cherry seedlings, but it does provide more shading of the smallest harvest unit. Monitoring would need to determine when to harvest the overstory to remove the shade, which would be expected to be needed within 3 to 5 years of the first harvest.

Effects from thinning would be similar to those in the Proposed Action except for variations in the amount of acres thinned, as shown in the Comparison of Alternatives Table in Chapter 2. In Alternative 4, thinning would occur in the same stands as in the Proposed Action. Thinning would occur on 14 more acres in Alternative 4 that would be wildlife openings or savannahs in the Proposed Action. In Alternative 6, thinning would occur in the same stands as in the Proposed Action except for not occurring on 71 acres in the proposed helicopter thinning area in stands 69/15, 17, and 18.

Cumulative Effects: Cumulative effects within the project area over time from regeneration harvest would be same as those in the Proposed Action except on the 15 acres in stand 70/7 that would not be harvested. In Alternative 2, thinning in stands 69/12 and 70/1, 2, 3, 4, 5, 7, and 9 would occur in areas that were thinned in the Camp 29 Timber Sale in the 1980's. Thinning guidelines at that time focused on releasing healthy mast producing species where possible, as do current guidelines. Cumulative effects of the second entry thinning and the previous thinning would not be sufficient to change the forest type, but the relative proportion of black cherry compared to yellow poplar is expected to increase slightly. The percentage of striped and sugar maples in the understory will be higher in the second entry thinning areas than in the areas thinned for the first time, an effect similar to the longer term cumulative effects of repeated thinning (or selection harvest) on the same area. Cumulative effects of thinning in Alternatives 4 and 6 would be the same as in the Proposed Action except for occurring on 14 more acres in Alternative 4 or on 71 fewer acres in Alternative 6.

Cumulative effects on Forest Type within the Ranger District would be similar to those of Alternative 1.

Effects of Alternative 3: There would be no even-aged regeneration cuts in this alternative. Therefore the effects on species composition and diversity from the regeneration cuts in the Proposed Action or Alternatives 2 or 4 would not occur in this alternative.

Individual tree selection would enhance regeneration of shade tolerant species such as sugar maple, which is already present in the understory. Because the area was mostly all thinned in the mid-1980's, this would be similar to the "second entry" of a selection harvest system. Thus regeneration of primarily sugar maple in the understory would be released to grow into sapling sized trees by the next entry, along with establishing small seedlings within the stands as well. This cutting would accelerate movement of forest types towards the sugar maple-basswood types, in the long term, consistent with the ELT's. Other effects of this cutting would be very similar to those described for the proposed action under thinning. However, under uneven aged management, good quality shade tolerant trees should be retained to a greater extent, so that a good seed source exists in perpetuity. Thus the black cherry and oaks that were favored during the last cut should not be retained to as great a degree as in the thinned areas. Because we are working with the naturally occurring tree species diversity, the only shade tolerant species that would be enhanced in the area are sugar maple, and beech, with the possibility of some hemlock or spruce developing in the understory over a long time period. However, the presence of the HWA is likely to preclude the development of a hemlock component.

Cumulative Effects: This type of management in the long term could result in stands of sugar maple, changing the forest type classification to one that has less species diversity than the current forest types. The effects of beech bark scale under this type of cutting over several entries is difficult to predict, in that the beech sprouts expected in the aftermath forest could prevent the establishment of sugar maple without producing large beech trees. Hemlock and spruce could regenerate in the understory but hemlock wooly adelgid and distance from a spruce seed source is likely to limit the development of these species in the long term. District wide, uneven-aged management would result in a forest composed mainly of shade tolerant species and a gradual reduction of intolerant species such as yellow poplar, oaks, and black cherry, similar to the cumulative effects of Alternative 5.

See Chapter II for acreage details on each alternative.

Effects of the No Action Alternative - Alternative 5: With no timber harvest activities, the Forest Types should remain the same for some time, with a gradual shift towards the sugar maple ELT's. Without natural disturbances such as fire and disease to regenerate oak species, there would be a slow decrease in the number of oaks and oak mast. Also, in

this alternative black cherry present in the understory would die off and species composition would slowly change to shade tolerant species.

Fires on the Gauley Ranger District have been rare in the past several years partially due to the fire suppression efforts of the National Forest and surrounding communities, the generally moist conditions on the district, and because railroad started fires have become less common. The lack of fire is favorable to fast-growing species such as yellow poplar, sugar maple and birch. Without periodic fires to remove competing vegetation, oak if present would require special cultural work in order to be maintained in perpetuity.

The gypsy moth and/or the beech bark scale complex could have the effect of a light thinning in many stands under this alternative, similar to the effects described above for thinning and single tree selection harvests. They would have the tendency to remove the mast production trees instead of releasing them to grow more vigorously, as does thinning.

Cumulative Effects The long term cumulative effects on Forest Type and species composition are expected to be similar to effects of Alternative 3 in that the forest type is likely to include fewer intolerant tree species, in the long term. The cumulative effects of No Action at this time, and a return in future entries to the even aged regeneration methods specified in the Forest Plan, would be to increase the shade tolerant trees that could be regenerated. However, natural disturbance patterns could result in effects similar on a large scale to the effects of even aged regeneration harvests.

There are no anticipated significant direct, indirect, or cumulative effects related to Forest Type and ELT with any of the alternatives.

Forest Health And Stocking

Affected Environment: A broad definition of forest health which is based on dictionary definitions and recognizes a human element to forests is "a condition of forest ecosystems that sustains their complexity while providing for human needs" (O'Laughlin, Livingston, Thier, Thornton, Toweill, and Morelan, 1993). Another definition which does not recognize human needs is "a condition typified by succession and disturbance functions occurring within the natural range of amplitudes and periodicities" with a "natural rate of nutrient and energy flows within forests." (Hagle, 1994) Both definitions recognize that forest ecosystems can be "healthy" through a broad range of conditions and successional stages.

Woody plant vegetation is the defining characteristic of a forest ecosystem. These ecosystems may be "healthy" even during periods when many individual components of the ecosystem are diseased. Disease, including rot, is a part of the forest ecosystem. A certain level of tree disease and insect damage is present within all forested ecosystems, and even levels which appear very high may well allow for sustaining the complexity of forested ecosystems.

In general, to avoid devastating pest effects, promoting species diversity among trees is beneficial. Thus, retaining species which are less common in the area during partial harvests, and using regeneration methods which promote many different species are beneficial for promoting resilience in the face of any potential disease or insect problems.

Wood rots are the disease organisms that cause the most timber value loss from forests within the United States. Within this OA, many of the larger sugar maples show advanced signs of rot fungi. These trees are probably much older than the surrounding yellow poplars and black cherry trees, and were left as small or unmerchantable in the stand-originating harvest shortly after the turn of the twentieth century. They may also have survived fires during that time period. These factors may explain the very evident rot fungi. Although they cause value loss for timber production, these fungi are a normal part of the ecosystem and their effects are expected to increase as all trees age. Even with partial cutting removing many trees with evidence of wood rot fungi, current policy does not provide for removing culls, nor would all trees with rot be detected. Trees with some rot would continue to increase in size, and some would respond to thinning by increasing growth rates. Rotten and partially rotten trees have ecosystem values as they stand and provide dens and food for wildlife, and when they fall and provide large woody debris on the forest floor. Wood rot, when combined with weather effects from wind, snow, and ice, can be a disturbance factor causing natural large- or small-scale regeneration, as the trees fall.

Almost all of the stands contain a large number of trees (or high basal area) per acre. About 93 percent of the National Forest in this Project Area is at a stocking level greater than 80 percent of the average maximum trees per acre that stands in this area can reach, as indicated by the Allegheny Hardwood Stocking Guide (Roach, 1977). This has resulted in crowding of crowns and competition for sunlight, moisture, and nutrients. At stocking levels above 80 percent, mortality begins to increase and volume growth on individual trees slows. Thinning would provide an immediate increase in the space and resources available for the remaining trees to grow. Mortality from competition between trees is becoming more noticeable in this area. Snags of various sizes, and woody debris on the forest floor are starting to increase as the forest ages, providing habitat and ecosystem effects that can be considered to be a healthy part of stand dynamics. The individual tree mortality that is a natural result of crowded conditions within a stand allows the remaining trees to grow and expand into the crown and root space of the dead trees. If many trees die at one time, stand regeneration may occur in the area.

Twenty percent of the OA, or 553 acres, was thinned about 12 years ago, during the Camp 29 Timber Sale. Thinning guidelines generally used for the sale indicated that 1/3 of the stand basal area would have been cut. Because this is not a heavy thinning, and growth in crown size and tree diameter has occurred since then, many of the stands thinned would again qualify for a silvicultural thinning under the Allegheny Hardwood stocking guides.

One purpose of management in this MP 6.1 area is to produce a mix of forest products (Forest Plan, p. 164), including timber products. When trying to grow commercial timber

(Roach, 1977), no stands should be thinned below 60 percent. Thinning below this level encourages development of heavy understories and invasion of herbaceous plants that compete with the desired species. Although this is not desirable for commercial timber, it may be desirable for reasons such as visual enhancement or wildlife habitat.

Effects of the Proposed Action and Alternatives 2, 3, 4, and 6: Basal area thinning would reduce the number of trees per acre. Leaving the healthy vigorous trees of good form and favoring mast producing trees such as oak allows growth to be concentrated on trees that have the potential to grow the fastest while maintaining mast production in the area. By removing overtopped, diseased or damaged trees throughout the stand, basal area thinning results in cutting over most of the proposed thinning areas. It also results in small scattered canopy gaps and a generally thinner canopy over the entire thinned area. This type of thinning provides a partial release to all of the residual trees in the stand.

With increased growing space after the thinning, residual trees could be expected to have a slightly better survival rate, decreasing the numbers of standing dead trees with their contribution to large woody debris on the forest floor. All trees with potential to contribute to this ecosystem element would not be removed in thinning. Some are unmerchantable because of size, form, or amount of rot. Others would be left because thinning guidelines call for removing only 1/3 of the stocking, or because rot is not detected. Tree tops would not be removed from the site in any of the treatment area, and pulpwood sized material including topwood would not be removed in the helicopter logged treatments, thus providing for some woody debris, both immediately and in the long term. Expected impacts from gypsy moth, beech bark scale disease complex and other forest pests may also contribute to the downed woody material, and future thinning of the forests in the area.

Clearcutting, two-aged cutting, and shelterwood cutting would create new, fully stocked stands, similar to Compartment 69 stand 8, Compartment 70, stand 13 in this area and others throughout the rest of the District where these types of harvests have occurred.

The effects on stocking/tree vigor would be similar for all these alternatives except for the amount of National Forest land affected; the percentage of the National Forest land impacted ranges from 18% (Alternative 3) to 33% (Alternative 4). An additional 606 acres (20 %) would be harvested by individual tree selection in Alternative 3. While that harvest would not have the same objectives as thinning, it would also result in increased growth on residual trees while enhancing regeneration of shade tolerant species.

Overall effects for thinning would be similar for all of the action alternatives except for the location and amount of acreage thinned. See Chapter II for stand by stand details of acreage.

Effects of the No Action Alternative - Alternative 5: More of the area would become overstocked over time. Individual tree vigor would decline because trees would continue to compete for the available growing space and trees could become more susceptible or vulnerable to insects or disease. Some natural thinning would occur as mortality occurs

due to competition between trees, or as a result of future insect and disease effects, but individual tree vigor would remain lower than if the stands were thinned through management activities.

Cumulative Effects: After reduction of the basal area to the minimum desired stocking level stands tend to grow back to the 80 percent stocking level or more within 15 to 20 years. After 15 to 20 years of growing, the stands could again be commercially thinned. This has been shown to be the case within the OA in the areas thinned in the mid 1980's which are now classified as eligible for additional thinning. Trees to be removed are expected to be fewer and larger than was the case in the previous thinning. Cumulative effects of the two thinning harvests on stocking are similar to effects of just one thinning harvest in a naturally less dense stand.

Thinning in Alternative 2 would include approximately 450 acres that were thinned in the Camp 29 Timber Sale. Thinning in the Proposed Action, Alternative 3, Alternative 4, and Alternative 6 would not occur in most areas thinned in the Camp 29 Timber Sale, other than on approximately 15 acres in Compartment 69, stand 11.

Thinned areas would result in larger individual trees with greater seed bearing capacity. After several years of growth the trees would begin to compete for growing space making thinning a viable option once again. In future entries thinning may also occur in areas that were not thinned this entry. Proposed and any future thinning would maintain stocking in the 60 to 80 percent of stocking level. This would help keep the stands healthy and allow the residual trees to grow well, while utilizing timber harvested. Timber removed for products would not be available to provide snags or large woody debris on the forest floor. Thinning would not preclude future uneven-aged management cuts in the visually sensitive areas, although it is often used as an even-aged management tool. On a district wide basis, thinning from this project would help maintain forest health on 0.51 to 0.95% of the approximately 104,000 acres of the district that are not in wilderness or MP 6.2 areas depending on the alternative. About 10,000 acres on the Ranger District have been thinned since 1986, including some acreage thinned twice. It is not reasonable to expect thinning to exceed this rate within the next 20 years, and thinning is likely to cover less acreage as stands become more mature. Although individual tree vigor would thus have been improved on less than 10% of the district acreage, and could affect less than 20% of the Ranger District in approximately 40 years, this would not be a significant effect on forest health and stocking.

Cumulatively, Alternative 5, no action, would result in increased mortality, more and smaller snags, and lower tree vigor when compared to the action alternatives, but district wide, the difference would be insignificant.

Other projects such as road building and wildlife improvements would impact a small part of the land by removing forests, thus having no significant impact on stocking and tree vigor within this project area. There are no direct, indirect, or cumulative significant effects on stocking and tree vigor with any of the proposed alternatives.

Age Class Distribution

(See the write-up and Table 1 on Age Class Distribution in Chapter I)

Affected Environment: At the DFC, the forest is to be a mosaic of tree stands and openings with a vegetative diversity that would enhance the habitat of wildlife species being featured in the area. One way to achieve such diversity is to move the forest towards a balanced age class distribution, which also helps to ensure a long-term supply of mast and timber. The Forest Plan direction for balanced age class distribution states that for oak, hickory, and mixed hardwood stands, the normal rotation age would be 200 years. Since the entire OA falls into mixed hardwood categories, the normal rotation age for the entire area would be age 200. Because of the 10-year quiet time restriction after management activities (Forest Plan, page 173) and allowing for an average of 5 years to complete major projects, reentry cycles in a MP 6.1 area are estimated to be every 15 years. Therefore, the amount of Area regenerated per entry will be up to a maximum of 8% of the Forest Land in N.F. ownership within a compartment (Forest Plan, page 174). For compartment 69 (1950 acres) up to 156 acres could thus be regenerated. For compartment 70 (1018 acres) up to 81 acres could be regenerated according to this guideline, for a total of 237 acres, maximum. Currently, the forest in this area is concentrated in the 61 to 90 year age classes, with 97.8 percent of the acreage in that age range. Thirty-one acres (1 percent) are in the 0 to 15 year age class. These areas were regenerated 14 years ago, and will thus immediately move into the next class. The 16 to 31, 31 to 45, and 45 to 60 year age classes are not currently represented. The element of diversity associated in earlier and later age classes is lacking in the Project Area. Table 1 shows the existing age class distribution.

The reason for providing age class diversity under Forest Plan guidelines for MP 6.1 areas is to provide a sustained yield of resources associated with forest stands over time, including forest products and wildlife habitat. The entire forest is very similar in age because it originated around the same time. One way that we can create young timber stands within this area is to harvest and regenerate an older stand. If some factor restricts harvest in any particular area, the acreage should be excluded from consideration for regeneration cuts, in order to be able to provide a sustained yield. The North Fork of Cherry is potentially eligible for designation as a Recreational River under the Wild and Scenic River Act. The quarter-mile zone along this river covers approximately 1155 acres. (See Economic and Social Effects section for more discussion.) The Forest Service manages such areas to protect the values which make the river eligible. Considering also the scenic values of WV 39/55, it is considered appropriate to restrict regeneration harvests within the ¼ mile distance of the river and road within this OA, at this time. The visually sensitive area as viewed from Richwood covers approximately 345 acres; therefore a total of approximately 1500 acres could be removed from consideration for even aged regeneration harvests because of visual resource and river considerations. Forest Plan standards and guidelines for visual management (Forest Plan p. 171) require that these areas meet the Retention visual quality objective for the Foreground and Middleground, which would restrict most openings in these areas to 2 and 5 acres. Other acreages that are not available to provide the basis for an even age class distribution are the acres of wildlife openings and mature habitat. Tables 8, 9 and 10 show the acreage and percentage which would be in each age class if the entire area

was considered for even aged regeneration, and if the acres in the visual zone, 5% in wildlife openings, and 5% in mature habitat were excluded.

Providing a balanced age class distribution can be done by regenerating trees on a regular basis, through harvest methods such as clearcutting, shelterwood, and group selection. Natural events such as fire, insects and disease create varying age classes. However, these events are unplanned, and can not be counted on to provide the amount or distribution of acreage in regeneration that the Forest Plan recommends.

Effects of Alternatives 1, 2, 4, and 6: The Proposed action would regenerate 93 acres (34 by clearcutting, 45 by shelterwood, and 14 by two-aged cutting). Alternatives 2, 4, and 6 would regenerate 78 acres (19 by clearcutting, 45 by shelterwood, and 14 by two-aged cutting). All of these alternatives would regenerate less than the maximum of 8 percent of the National Forest forested acreage allowed by the Forest Plan in any single entry (Forest Plan, page 174). They would also regenerate less than the 8 percent needed to create a balanced age class distribution. However, the Proposed Action does regenerate the amount of acres desirable for balancing the age classes in this OA when the visual concerns, wildlife openings, and mature habitat are considered. This means that a sustained yield of the wildlife habitat and timber products desired under the Forest Plan can be provided from the area outside the visually sensitive areas. Within the visually sensitive areas, the effects on age class distribution would be similar to the no action alternative as described below.

Cumulative effects: The long term effects of Alternatives 1, 2, 4, and 6, when combined with multiple entries for regeneration harvest would be to provide "a mosaic of tree stands and openings with a near optimum quantity and dispersion of the habitat elements that feature the wild turkey and black bear along with associated wildlife species (Forest Plan, p. 165). Mast, browse, and cover would be available continuously over the entire area not seen from the river or road in stands of various ages and size classes. There would be an abundance of tree species present in the area. If management near the river continues in a similar way to this entry, with no regeneration harvests in the area seen from the road or river, then the effects of repeated entries with similar management would be as described below under Alternative 3. On a district wide basis these alternatives would regenerate 0.09% to 0.11% of the forest not in wilderness or MP 6.2 areas. Regeneration harvests in one of these alternatives and potential regeneration harvests in other project areas on the district would help to provide the "mosaic" of tree stands as described in the Forest Plan, p. 165).

Alternative 3: Since Alternative 3 does not regenerate any acres by even-aged management cutting, it would not create any acres in the 0 to 15 year age class. However, it does start moving 606 acres toward uneven-aged stands, which provide trees of certain species in the various age and size classes throughout the area.

Cumulative Effects of Alternative 3: Repeated management similar to Alternative 3 would provide "a continuous canopy with a diversity of tree sizes and ages throughout. There would be an emphasis on shade tolerant vegetation and associated wildlife" (Forest

Plan, p. 115). This is the desired future condition from Management Prescription 2. This type of management in the long term does not comply with Forest Plan guidance for Management Prescription 6.1, although uneven aged management is permitted in small patches of a timber type to retain a small portion of the type. Forest Plan Desired Future Conditions for Management Prescription 6.1 call for optimization of age class distribution, and a "mosaic of tree stands and openings" (p. 165). These elements of the Forest Plan DFC will not be met under alternative 3 in the long term in this project area.

Effects of the No Action Alternative - Alternative 5: No stands would be added to the 0 to 15 year age class nor would the area move towards a balanced age class distribution. Natural disturbances could provide for some creation of the 0 to 15 year class, but such events are random and could affect a small area, or an extremely large area. Therefore these events can not be counted on to meet the desired distribution across age classes or the area. However, as the stands age and the individual trees become over mature and more susceptible and vulnerable to disease and insects, the creation of large stands of younger trees would become more likely, by natural processes such as ice and snow or wind. This alternative would have the biggest impact on balancing the age classes because it would not provide even acreages in various age classes. Within the next 15 year period, the risk of large areas of tree mortality leading to natural regeneration would be very similar to the existing risk, but over time this risk would gradually increase.

The following table displays the existing age class distribution and the age class distribution that would result from each alternative compared with the Desired Future Condition for Balanced Age Classes under the Forest Plan.

Even though the OA covers 3,013 acres, Tables 8, 9, and 10 are based on 2,968 acres since 45 acres are either on private land or are included in either the highway or river.

Table 8 - Existing age class distribution in 2002 and age class distribution in 2017, after completion of all projects, compared to the acres needed for a balanced age class distribution.

Based on GIS Acreages

Age Class	Existing Acres-2002	Alt. 1 Acres 2017	Alt. 2 Acres 2017	Alt. 3 Acres 2017	Alt. 4 Acres 2017	Alt. 5 Acres 2017	Alt. 6 Acres 2017	Balanced Acres*
MH								148
Openings	35	74	68	35	58	35	68	148
0-15	31	93	80	0	80	0	80	202
16-30		27	27	31	27	31	27	202
31-45		0	0	0	0	0	0	202
46-60		0	0	0	0	0	0	202
61-75	496	0	0	0	0	0	0	202
76-90	1739	489	489	496	494	496	489	202
91-105	667	1661	1665	1739	1670	1739	1663	202
106+	0	624	639	667	639	667	641	1258
Totals	2968	2968	2968	2968	2968	2968	2968	2968

The 0-15 year age class would include the 2 acres of spruce planting in a created opening in Alternatives 2, 4, and 6.

*The National Forest guidelines call for 5% of the area within the OA to be in openings (both Private and National Forest Land). Five percent of 2968 acres would be 148 acres. The National Forest guidelines also call for 5% of the area to be in mature habitat (MH in the table).

Table 9 - Percentages for the existing age class distribution and the age class distribution that would result in 2017 from each alternative compared with the DFC for Balanced Age Classes under the Forest Plan.

Based on GIS Acreages

Age Class	Existing %	Pro. Act.	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Balanced %
MH								5.0
Openings	1.2	2.5	2.3	1.2	1.9	1.2	2.3	5.0
0-15	1.0	3.1	2.7	0.0	2.7	0.0	2.7	6.8
16-30	0.0	0.9	0.9	1.0	0.9	1.0	0.9	6.8
31-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8
46-60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8
61-75	16.7	0.0	0.0	0.0	0.0	0.0	0.0	6.8
76-90	58.6	16.5	16.6	16.7	16.6	16.7	16.6	6.8
91-105	22.5	56.0	56.0	58.6	56.3	58.6	56.0	6.8
106+	0.0	21.0	21.5	22.5	21.6	22.5	21.5	42.4
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 10 - Desired Desert Branch Age Class Distribution by 15-year Age Classes when 1500 acres are removed from consideration for even aged regeneration cutting.

Based on GIS Acreages

Age Class	Compartment 69 Acres	Compartment 70 Acres	Total OA Acres	Percent of OA
Mature Habitat	97	51	148	5.0%
Openings	97	51	148	5.0%
Visual Zone	1088	412	1500	50.5%
0-15	51	39	90	3.1%
16-30	51	39	90	3.0%
31-45	51	39	90	3.0%
46-60	52	38	90	3.1%
61-75	51	39	90	3.0%
76-90	51	39	90	3.0%
91-105	51	39	90	3.1%
106-120	52	38	90	3.0%
121-135	51	39	90	3.0%
136-150	51	39	90	3.1%
151-165	51	39	90	3.0%
166-180	52	38	90	3.0%
181-200	53	39	92	3.1%
Totals	1950	1018	2968	100.0%

Cumulative Effects: The clearcutting and fires in the early 1900's created the even-aged stands that exist on the Monongahela National Forest and adjacent private land. Proposed clearcutting, shelterwood, and two-aged cutting along with any future regeneration harvests of approximately 3 percent of the area per entry would help move the forest towards a distribution of balanced age classes, to provide a sustained yield of resources associated with a variety of age classes over time. (See Table 10, above). Even-aged regeneration cutting of 7 to 8 percent of the area each entry would move the entire OA towards a balanced age class distribution, but with visual concerns along the Highland Scenic Highway and the river, such a distribution is not likely in the foreseeable future.

Timber harvesting, natural disturbance, or old field regeneration on adjacent private lands may create some stands in the younger age classes near the project area. However, this would not affect the variety of age classes within the project area, or compliance with Forest Plan standards and guidelines for age class distribution. Reasonably foreseeable future timber harvests on adjoining timber industry lands would be expected to continue at a similar rate to recent harvests, with around 10% of the area in regeneration harvest in each decade.

Natural events such as insects (gypsy moth), disease, fire or wind can also help create age class distribution, but these events are not foreseeable. The HWA is not likely to contribute to age class distribution since the hemlock is not a major component of any stand but is present in clumps, scattered trees, or in strips along rivers and streams.

With any of the alternatives there are no known significant direct, indirect or cumulative effects on achieving a balanced age class, although Alternatives 3 and 5 do not move towards balancing age classes.

Other Vegetation

Affected Environment: Multi-flora rose, a shrub species which is a noxious weed within the state of West Virginia, is present within the OA. It is listed in the CDS data as occurring within some of the forest stands near Richwood, and appears to be growing in some areas where grapevines form arbors in the tree tops. It also occurs in small numbers on FR 946, where road maintenance by mowing appears to keep it from reaching the seed production stage. This plant is very common on residential lands near the OA, and throughout the state. Its seeds are spread by birds, and they are probably in the soil throughout the OA, but their germination and growth are restricted by shading. Other plants which the state considers to be noxious weeds grow in the Richwood area but have not been recorded within the OA. Most of these plants thrive in open or disturbed areas.

TES plants are discussed in the TES section of this document.

Grapevines are present in some areas in the Project Area but do not appear to be common overall. A few scattered grapevines were seen in stands 69/9 and 10. They are common in some parts of stand 69/18. They also appear to be common in a hollow extending from Desert Branch up into stand 69/7. Much of the area in the hollow is mapped as a riparian ELT type. Grapevines are a valuable source of wildlife food for species such as black bear, wild turkey, ruffed grouse, quail, raccoon and many songbirds. Grapevines can also provide structural diversity by forming canopy gaps. These gaps are formed when the grapevines weaken the tree by shading out the tree crown (Horsley, 1988, page 48) and then pulling the tree down with the added weight. Currently these gaps are not common because grapevines are overall uncommon in the area and the trees are healthy enough to support the added weight and compete for sunlight in the canopy. Because of the value of grapevines for wildlife, controlling them in a MP 6.1 area is not recommended unless necessary to achieve other wildlife management objectives.

Effects of the Proposed Action and Alternatives 2, 3, 4, and 6: Multiflora rose may become established along the new road corridor (Proposed Action and Alternatives 2 and 6), where road maintenance mowing and brush cutting along the road banks would tend to keep these plants small and restrict seed production. In the thinned areas, additional multiflora rose plants may become established, and those already present would increase in size, since light on the forest floor would increase. This effect would decrease over a period of about 10 years, as the tree crowns expand and gradually provide shading comparable to that of the current condition. This would affect other understory plants as well. Within the area previously thinned, no multiflora rose plants have been recorded in plot data. This same effect is expected in all the thinning and selection harvest areas under all action alternatives, since the continous canopy cover is expected to be maintained after harvest, and this plant thrives in very sunny environments.

In the even aged regeneration harvests, multiflora rose and herbaceous plants which thrive in sunlight would be likely to increase following the harvest. Any such plants which restrict the growth and development of forest tree regeneration would be noted during stocking surveys. Based on results from regeneration harvests throughout the ranger district, and the abundance of forest tree seedlings already present in the regeneration areas, multiflora rose and other invasive plants are not expected to restrict forest tree regeneration, which would eventually grow up and shade these plants, hindering their further development.

Little effect on grapevines is expected in any of the alternatives. There is a possibility that a few grapevines in thinned stands may receive incidental release and an increase in growth or vigor or be cut by accident during tree felling. Accelerated growth of grapevines can occur where direct sunlight reaches the understory, such as in woodland openings produced by logging or windfall (Shutts, 1974, page 53). In Alternative 6, thinning would not occur in stands 69/17 and 18, thereby minimizing the chance of incidental release or inadvertent cutting of grapevines in the area.

Overall, there would be no significant direct, indirect, or cumulative impacts on herbaceous understory plants, grapevines or noxious weeds.

Cumulative Effects: Multiple entries on the same lands may have the effect of providing periodic release to whatever understory plants have become established. The most likely plants in this area to experience this periodic release are striped maple and sugar maple, as described above in effects of Alternative 2. Multiflora rose may be maintained over time. Future entries on the same lands for thinning will be likely to have effects similar to those described above for Alternative 2, if entries are repeated at 15 year intervals. Multiflora rose did not show up in plot data in the area previously thinned, possibly because of crown closure in the 15 years since thinning. Effects from this project may help maintain multiflora rose and other understory plants across the district through periodic releases, but these effects are expected to be minor and would be further reduced as trees grow and shade increases.

Aspen

Affected Environment: Aspen, a native species to the area, provides an important food source for a variety of wildlife species. The buds and leaves are eaten by many wildlife species, while the inner bark is eaten by both beaver and deer. Aspen is a shade intolerant tree that needs disturbed openings to reproduce. It does not thrive well in closed canopy mature stands. Although it is not common in this project area aspen is known to occur in at least one stand.

Direct and Indirect Effects: The planting of 2 acres to aspen in the Proposed Action and Alternatives 2, 4, and 6 would increase the percentage of this species in the project area while maintaining its presence into the future, but on a very small part of the area.

Alternatives 3 and 5 would not enhance or reproduce aspen within the project area. Aspen, being a shorter-lived tree than many of the others in the area would likely die out before the other trees unless natural disturbance events occur near some of the existing trees. Under these alternatives the existing aspen would further decrease from the species composition of the forest.

Cumulative Effects: Aspen is not a common tree species in this part of West Virginia. Since it reproduces best on disturbed sites open to full sunlight, aspen could be found on disturbed private land around homes and farms. Disturbance on private land will probably continue and aspen there would reproduce. On forested areas, such as the Monongahela National Forest or land owned by logging companies, aspen could not be reproduced unless disturbance such as fire or logging were to occur. In this project area planting is the best method for regeneration of aspen because the existing aspen is too few and too far apart for suckering to occur. Management to enhance aspen has the potential to increase the percentage present, although the amount planned for planting is extremely small. Aspen is highly preferred by gypsy moths, and this could result in the planted trees being weakened or killed by gypsy moths in the future. The amount of aspen to be planted is so small that the effects of all alternatives are insignificant, and virtually the same for all alternatives, including no action.

Because of the small amount that exists or that is proposed for management, there are no significant direct, indirect, or cumulative effects on aspen from any of the alternatives.

Conifer

Affected Environment: The Forest Plan states that the conifer component should ultimately range from 5 to 25 percent of the total area, with stands being small in size, irregular in shape, and dispersed throughout the area (Forest Plan, page 166). The conifer content within the area is 1 percent. According to the CDS data, hemlock occurs in 9 stands ranging from a low of 1% to 14% in stand 70/7. Only those trees greater than one inch DBH are counted towards the percentage of conifer. Hemlock seedlings less than one inch DBH could gradually increase the conifer component in some stands, but any such increase would be small as those seedlings not very numerous. No other conifer species were noted in the area, except for a few red pines in a clump along the North Fork of Cherry and an individual sawtimber sized red spruce in stand 70/10. Although hemlock is not recorded in the other stands, isolated or widely scattered individual hemlocks are present in some of the other stands. Hemlock does occur in some scattered clumps, but is nowhere a major component of any stand. Other than small clumps, no areas seem to be reverting to conifers.

Effects of the Proposed Action and Alternatives 2, 3, 4, and 6: According to compartment and stand data conifers make up a small percentage of the stocking in stands 69/2, 11, 16, and 70/7 which are proposed for harvest treatments. However, conifers are mostly found on the lower slopes of these stands outside of the harvest units. Within the potential harvest units, conifer would most likely be located within riparian protection zones. A few scattered conifers may be located where they could be cut or damaged; thus there is the potential to negatively affect the conifer percentage. Cutting them could remove the only conifer seed source for that area thus lengthening the time it would take to reach a conifer percentage of 5 percent. Much of the hemlock in stand 70/7 is found on the side ridges near stands 301 and 302 and on the slopes just east of Camp 29 Run. The proposed cut in this stand (in Proposed Action) is located in the cove area between the ridges where the hemlock is found. The cove is dominated by yellow poplar. The proposed clearcut would not have a significant affect on conifers, as it would not include areas with concentrations of conifers. This clearcut would not occur in Alternatives 2, 4, and 6. The hemlock in stands 69/2, 11, and 16 is generally located along the North Fork of Cherry and the Desert Branch riparian areas, which would not be included in harvest units.

In some areas, the hemlocks could be slightly enhanced by release where they occur within a thinning area. Hemlocks would not be marked as trees to be cut, except in those cases where an occasional hemlock may have to be removed in order to construct a road, log landing site, or skid trail. In Alternative 3, individual tree selection would have the potential to release hemlocks over the area harvested. However, of the stands harvested, only 70/7 has any hemlock as part of the stand according to the CDS data. Uneven-aged management would favor shade tolerant species such as hemlock, in the long term. However, the HWA has the potential to decimate the hemlocks within the area and across the hemlock range if the current trend continues, regardless of the alternative chosen.

The USDA Forest Service Forest Health Protection has been doing test releases of potential predators for HWA in several areas in the hemlock range including some releases in West Virginia.

Effects on hemlock in the uncut areas would be the same as in Alternative 5.

The spruce planting would slightly increase the conifer percentage (Alternatives 2, 4, and 6).

All conifer would be left within the harvest areas. Conifers would be protected from felling and skidding damage when possible. This would maintain the current conifer level and maintain a seed source for potential regeneration of conifers.

Effects of the No Action Alternative - Alternative 5: The conifer percentage would be expected to gradually increase as existing hemlocks grow large enough to be counted in the percent conifer calculations, provided that a control for the HWA can be found. However, this percentage is expected to remain quite small since hemlock is uncommon in this area. The greatest increase in hemlock would be expected in the riparian areas along the North Fork of Cherry and along Desert Branch, consistent with the ELT's for those areas. No significant adverse effects would be expected under this alternative.

Cumulative Effects: With the conifer component currently at about 1 percent of the area, the likelihood that they were not abundant prior to 1900, and the low potential to be a big part of the future vegetation, it is unlikely to expect the conifer percentage to reach the upper conifer percentage of 15 to 25 percent. The proposed activities without mitigation could reduce the current 1 percent level. Future regeneration cutting of 3 to 8 percent of the area along with thinning could reduce this even more. With the proposed mitigation protecting conifer, this effect would not occur. Riverside and streamside areas where hemlock could be expected to develop are not harvested in any alternative. Future harvests could occur within the areas excluded from harvest under these alternatives, which could release any hemlocks occurring there. There would be no significant direct, indirect, or cumulative effects on conifer for any of the alternatives. With the mitigations, this project and any future projects are unlikely to change the conifer percentage within the OA, absent any major conifer planting in future projects. There are no cumulative effects of planned harvests with hemlock wooly adelgid effects. Increases in hemlock percentages that may occur as a result of the project are unlikely to offset hemlock decline that may occur as a result of the hemlock wooly adelgid.

Mast

Affected Environment: Wildlife food, in the form of mast is produced by several species in this Project Area. Oak and beech are two of the most important mast producing species. Both are utilized by many species of wildlife. Yellow poplar is by far the most abundant mast producer in the area, but its mast is less preferred by wildlife species. Other mast producers that can be found in the area include black cherry, cucumbertree, basswood, maple, and birch. There are several other mast producers that

can be found in the area but are not as numerous. They include grape, greenbrier, black locust, hickory, sassafras, blackberry, black gum, elderberry, and hemlock.

In addition, there is a clump of several Chinese chestnut trees in stand 70/6. These trees are part of a planting of 47 Chinese chestnut seedlings in 1951. Approximately 8 trees are still living; they are gradually being overtopped by the surrounding trees.

Effects of the Proposed Action and Alternatives 2, 3, 4, and 6: It has consistently been shown that well-spaced trees produce more seed than those which are growing close together (Daniel et al, 1979, page 149). Daniel states that the effect of thinning is most pronounced in the 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. Increasing tree spacing provides trees with a higher proportion of the crown which is fully exposed and therefore in a more likely condition to bear flowers and fruit, thus increasing mast production.

In areas thinned, trees would be selected for potential mast production and/or desirable form for timber production. Therefore, mast producing trees such as oaks and black cherry would generally be favored as crop trees.

Increases in mast production from thinning would occur in the Proposed Action and Alternatives 2, 3, 4, and 6. The greatest opportunity to enhance oak mast production through thinning would be on Fork Mountain in stand 69/15 and on the ridge west of Mill Knob in stands 69/9, 10, and 11, because they have more oak than the rest of the area. Individual tree selection in Alternative 3 would stimulate mast production on residual trees, but would enhance succession to shade tolerant species, mostly maple. Beech, a valuable mast producing tree, would also be expected to increase over time. The mast production value of beech would be expected to decline because of the expected consequences of the beech bark scale disease.

The Proposed Action and Alternatives 2, 4, and 6 would regenerate 45 acres by shelterwood and 14 acres by two-aged cutting. The proposed shelterwood locations were chosen in areas that have black cherry regeneration. Shelterwood harvest in these areas would reduce the amount of mast in the short term, but would enhance mast production over the long term. The two-aged cutting location was chosen in an area that would allow the regeneration of oaks. Regenerating a stand without fire would still regenerate new oak trees but their numbers would likely be fewer. This is evident by looking at the ELT's of the area. They indicate that most of the Project Area is moving toward non-oak potential vegetation *(see the discussion on Forest Type in this section).* Although the number of oaks is expected to be lower in the new stand, the regenerated oaks would come into peak mast production about the time the existing oak trees are declining in mast production. This should prolong the time that oak would provide mast in the project area. Since the leave trees would be oaks, they would continue to produce mast as the new stand develops to mast producing size.

The Proposed Action and Alternatives 2, 4, and 6 would regenerate 19 acres by clearcutting in stand 70/5. A clearcut in this area would be expected to regenerate black cherry, maple, beech, and basswood. The Proposed Action would also include a 15-acre clearcut in stand 70/7. Regeneration of this area would be predominantly yellow poplar, reflective of the current species composition on this site. The clearcut areas were chosen in areas with very little or no oaks in the overstory. Therefore, the clearcuts would have negligible effect on oak mast production, and would be expected to increase the long term diversity of mast producing species.

Approximately 1.3 miles of new road would be built in the Proposed Action and in Alternatives 2 and 6. Alternative 2 would also include approximately 0.7 mile (0.4 mile within the OA) of additional road construction, but this road would be constructed along an existing corridor with negligible effect on vegetation other than some minor brushing along that corridor. Alternative 6 would include approximately ½ mile of temporary road at the end of the new road that would be built in it or in the Proposed Action or Alternative 2. Road cuts provide openings that are suitable for some mast producers. In this area, within 3 to 5 years after a road is closed mast producing vegetation such as blackberry and elderberry become more abundant along the road. The Proposed Action and Alternatives 2, 4, and 6 would include wildlife openings and savannahs. Openings on the Gauley Ranger District generally stimulate blackberry mast production; that would be expected to happen in this area. Mowing or maintenance would reduce the growth of blackberries in those areas mowed, but blackberries would be expected to develop in those areas not mowed. The Proposed Action would include 39 acres in wildlife openings and savannahs. Alternatives 2 and 6 would include 33 acres of openings; some of the opening locations would vary between these alternatives. Alternative 4 would include 23 acres of openings. These comparisons do not include the two acres that would be planted to spruce.

The Proposed Action and Alternatives 2, 3, 4, and 6 would enhance mast production and maintain the current variety of mast producing plants. In these alternatives the mast production and variety would not be expected to change much for the next couple of entry periods (about 15 years per entry period).

Release of the chestnuts would enhance vigor of these trees and maintain them for a longer period of time. Some increase of mast from these trees would be expected.

Effects of the No Action Alternative - Alternative 5: Mast production for the next 15 years or so would be similar to that being produced in the area now, or slightly less as competition for light and moisture continues. If the period of no action were to continue for a long time, the variety of mast and oak mast production would be expected to decline. Beech mast would be expected to gradually increase in the absence of the beech bark disease. However, when the beech bark disease begins to affect the area, many of the beech trees would be expected to die, thereby reducing the mast production of that species. Black cherry would be expected to decline in the long term as existing black cherries would age and start declining. This is expected to occur when the black cherry trees reach or exceed 120 years of age. Sassafras and greenbrier mast would slowly

decline, as these species are in the understory and need openings in the canopy to maintain them in the stands or to regenerate them. Yellow poplar and cucumbertree would remain about the same but slowly their mast production would also decline as these shade intolerant species are replaced by shade tolerant species. Mast production of maple would be expected to increase as this species begins to dominate the vegetation component of the area in a shade tolerant forest. The other mast producing species mentioned above would not increase in abundance and are not expected to provide much mast in the future unless openings are created. Cumulative effects of this alternative with the reasonably foreseeable effect of gypsy moths would be that oak mast production would be likely to further decrease following gypsy moth outbreak.

The chestnut trees would be likely to decline as they are overtopped and shaded by surrounding trees.

Cumulative Effects: As stated earlier in this document the current condition of the forest is based heavily on the past actions of clearcutting and fire. Clearcutting of that magnitude is something that would not happen now or in the foreseeable future.

The effects of future timber harvests of providing a variety of age classes will provide a continuous source of a variety of mast.

Fire will continue to be controlled; however, a wildfire could occur in the area. A fire in one of the regenerated areas, or one affecting general forest understory would favor the survival of oak seedlings by removing other competing seedlings.

Gypsy moth is another concern for the foreseeable future. If the moth were to reach epidemic levels, the vegetative diversity and current species composition would be expected to change. Oak would die out faster, since it is a favorite food source for the moth. With this loss of oak, mast production would decline. However, since much of the area has a high component of yellow poplar (and would, even after thinning), it is possible that the gypsy moth may not reach high populations in the area, and oak mast production may not experience a significant decline.

Beech bark disease is gradually moving toward the area. In the absence of beech bark disease, beech would increase, especially in the areas with uneven-aged cutting, under Alternative 3. However the arrival of the beech bark disease is likely to result in a large amount of beech mortality. None of the proposed harvests under any alternative would have expected effects on eliminating clones of beech that are resistant to the beech bark scale complex (Mackenzie, 2001). This is the case because of the sprouting potential of beech, and their longevity in dense shady understories of regenerating stands.

Managing the project area by thinning and regenerating up to 3 to 8 percent every 15 years or so would maintain a good diversity of mast producing species and mast production. The percentage of oak trees should continue to decline; however, thinning would favor oak allowing them to increase individual tree mast production, while regeneration harvests could regenerate some new oaks. The variety of age classes with

oak, created by these regeneration harvests, would allow oaks to reach peak mast production at different times, thus extending the period that this species would be an important mast producer for the area, over the long term.

There are no known direct, indirect, or cumulative significant effects on mast that would occur with any of the alternatives or the Proposed Action. However, the selection harvest in Alternative 3 would reduce the diversity of mast producing tree species, in the long term.

SOIL AND WATERSHED EFFECTS

Watersheds

Affected Environment: The project area is located within the watersheds of the North Fork of Cherry River with a small area within the South Fork of Cherry River. No projects are planned within the South Fork Cherry. The named perennial tributaries of the North Fork of Cherry include Handle Factory Hollow, Desert Branch, and Camp 29 Run in addition to a few non-named ones. Numerous smaller intermittent and ephemeral streams occur throughout the project area.
Both perennial and non-perennial streams lack large woody debris and are far below their resource potential in this regard, as determined during field review by hydrologist and other specialists. This has happened because the source for natural recruitment of large woody debris (large trees) was disrupted during the extensive logging of the early 1900's.

Only those watersheds where project activities occur and might have an impact were analyzed. Since no activities would occur within the South Fork of Cherry River only the North Fork of Cherry River watershed was analyzed for cumulative effects. Any substantial or measurable influence from project area activities is not expected to extend further downstream than the North Fork of Cherry River.

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 normally involves road and skid trail construction, have documented erosion and sedimentation. Direct and indirect effects on aquatic resources were evaluated for the influence each alternative would have on the potential to increase stream sediment by soil disturbing activities. Streamflow effects documented by research include stormflow and peakflow of streams that drain small study watersheds. The type and magnitude of expected effects were estimated by comparing watershed conditions, type of harvesting and roading practices, and the proportion of areas treated with those research results.

Other studies have reported on the structure, function and composition of riparian ecosystems and their resources, riparian values and benefits, and on the effects of riparian management. Riparian resource effects include non-perennial stream stability, large woody debris recruitment, and related hydrologic function of those channels. Factors considered included the location of proposed harvest units, location and amount of road construction, reconstruction and ground-based skidding, the presence of functioning

stream channels within and near harvest areas, and the presence of sensitive landforms such as steep slopes, coves and wetlands.

Proposed activities that disturb soils include road construction and reconstruction, temporary road and skid road construction and use, and log landing and helicopter landing site development. Development of wildlife openings and savannahs also disturbs soil, and to a limited extent harvesting trees may expose small amounts of soil for short duration. Short term soil disturbance also occurs during road maintenance and drainage improvement activities, but these types of projects generally result in long-term reductions in soil erosion and sediment delivery to streams by correcting the source areas of erosion and reducing flow concentration on roads.

Proposed activities that directly affect streams and riparian areas include construction and use of roads and skid roads that cross streams and enter riparian areas, directly occupying the land and stream channel, and removing 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.

Proposed activities that have the potential to alter watershed hydrologic processes and affect streamflow conditions, particularly stormflow and peakflow characteristics, include primarily road and skid road construction and timber harvesting.

Background information and discussion of the findings of watershed management and forest hydrology studies on sediment, stormflow and peakflow effects have appeared in previous environmental assessments. That background information and discussion from the Limestone and Pheasant Mountain Opportunity Areas EA (pages 35-37) and the May/Little River EA (Appendix E) is incorporated by reference. Site specific hydrologist's input with more detail is in the project file.

The implementation of Forest Plan Standards and Guidelines, BMPs, and site specific mitigation measures as listed for each alternative in Chapter II would substantially reduce potential adverse effects on water quality, and aquatic and riparian resources. All activities performed on National Forest land are subject to mitigation measures as prescribed in the Forest Plan (pages 79-81, Appendices M, R, and S, and the Fisheries Amendment.) Timber has been harvested in this area before, and site specific mitigation measures as proposed here are effective in reducing adverse impacts to aquatic and riparian resources and sediment delivery to streams. Locations and amounts of the proposed harvesting have been designed to further reduce the potential for adverse effects.

Past and Present Actions: Streams within the North Fork of Cherry watershed and the river itself generally are stressed aquatic ecosystems. Fine sediment levels in many streams have been observed to be higher than desirable. Stream alkalinities are low, influenced by acidic bedrock and acid deposition. Relatively small amounts of acid mine drainage also impair stream water quality. The State limes the river and some streams to

improve water quality for trout. Most perennial tributaries are well shaded, except for some sections of streams with adjacent roads or other clearing for development. Although the river corridor is also largely well shaded, there are portions along the highway with riparian clearing that has removed shade and the potential future source of LWD. Otherwise, riparian areas are generally well-vegetated forest that is in the process of maturing after the widespread logging in the early part of the 1900s. Riparian forests are providing some of the aquatic and riparian values and functions needed for a healthy ecosystem, but are lacking in some aspects because they are still too young to be a fully functional riparian ecosystem. The aquatic habitat of most streams suffers from a general lack of LWD and pool habitat, a residual and long-lasting effect of the early 1900s logging.

Timber harvesting has been a major land use within the watershed in the past, and continues to be at present for both federal lands and private lands. The majority of the watershed was logged in the early 1900's, and extensive watershed damage no doubt resulted from that historic logging. Streams and the river are largely lacking in large woody debris (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. Fine sediment levels in many of the streams within the watershed are suspected to be higher than desired, although no recent data is available to substantiate this.

In recent decades, National Forest timber harvesting has been conducted within the North Fork of Cherry watershed. Since 1983, a little less than 3000 acres of thinning harvest, 232 acres of selection harvest, and 308 acres of clearcut have been accomplished within the North Fork of Cherry watershed on federal lands, according to district records. The North Fork of Cherry watershed is approximately 23,900 acres, and National Forest harvesting between 1983 and 2001 represents a little less than 15 percent of that watershed acreage. Those harvested acres are scattered throughout the watershed, and distributed in time, so effects from those activities were dispersed

Road construction, temporary roads, and skid roads were constructed for most of these harvest areas. Other National Forest roads occur within the watershed; old roads, skid roads, and old railroad grades occur throughout the North Fork of Cherry watershed. Numerous Forest Service system roads are part of the long-term transportation system, and they occupy many of the tributary watersheds of the North Fork of Cherry. Many of these old and present day travelways are minor but long-term sources of sediment to streams and the North Fork of Cherry. Maintenance activities on those roads reduce long-term sediment, but nearly all roads cause some sediment effects.

Old coal mines and their associated roads also occur within the North Fork of Cherry watershed. These old mines are inactive, restored or abandoned, and are fairly small.

The West Virginia DNR treats a number of locations in the North Fork of Cherry watershed with limestone sand, by annual dumping of dumptruck loads of it into some of

the headwater channels and the river itself. The primary purpose of doing this is to ameliorate the adverse effects of acid deposition on those streams and in the river, but some neutralization of acid from old mines is an additional effect of those treatments. Limestone sand treatments improve water quality in the river, making it more suitable for the stocked and native trout fishery, and other aquatic organisms. However, some aquatic specialists believe that the limestone sand introductions also increase fine sediment levels in streams, adversely impacting trout spawning sites and other physical habitat.

State roads and highways are located within the watershed boundary. These are long-term transportation facilities that have been in place for decades or longer, often in historic locations. They have a long-term sedimentation impact on aquatic resources. The primary transportation route through the watershed is State Highway 39/55, which closely follows the North Fork of Cherry from Richwood to its headwaters at Darnell Run. The highway occupies the river's riparian area and/or filterstrip for much of this distance, and has adverse effects on riparian and aquatic resources through riparian clearing, loss of LWD to the river, and primarily sedimentation. State road and highway management and maintenance, and flood damage repair activities generate substantial amounts of sediment that adversely impact the river.

Floods play an important role in channel sediment relationships, sediment flushing, creating and distributing habitat, and floodplain development. For the major flood events in this part of West Virginia, the over-riding factor of significance in valley flooding is the magnitude and intensity of the storm, and topographic factors like soil depth and slope steepness. Forested land-use conditions have less effect than the quantity of precipitation itself on downstream flooding for major flood events, because the size and timing of the precipitation event dominates the flood characteristic.

Major flooding occurred in the North Fork of Cherry in the summer of 2001. A thunderstorm tracked across the middle and upper parts of the North Fork of Cherry watershed on the afternoon of July 26. Twelve-hour recorded rainfall amounts ranged from 2.5 to 4.5 inches over the county that day. In Richwood, 2.8 inches was recorded. A widespread storm affected the area on July 28 and 29. Recorded rainfall amounts ranged from 5.5 to 6.1 inches over the area for that storm system. Because of the general nature of the storm, it may be inferred that the entire OA received between 5.5 and 6 inches of rain over those two days. Rainfall over the previous month had been above average so soil moisture was high before these storms. Richwood measured 14.3 inches of rainfall for the month.

The rainfall volume and intensity overwhelmed the river channel's capacity to transport flow and sediment, and channel damage occurred. The flood flows accelerated channel bank erosion, and mobilized huge amounts of sediment and river bedload, scouring some reaches of channel, and depositing in other reaches. Upland erosion also occurred, with damage to many roads including ruts, rill and gulley erosion, blowouts, deposition, plugged culverts, ditchline erosion, and slumps and slides. Many other roads were damaged, but the most severe damage occurred along State Highway 39/55. Sediment entered the river from runoff related erosion and slumps and slides along the highway.

More sediment effects in the river resulted from all the highway repair activities that followed.

Additional major flooding occurred in November 2003. Rainfall totals of approximately 4 inches fell on November 19 over much of the area. The soils were still wet from heavy rains about a week earlier. Although the flooding on the North Fork of the Cherry did not reach the levels of 2001, flooding from the South Fork of the Cherry River was higher and contributed to heavy flooding in Richwood. Another factor in the flooding was that overall streamflows and ground moisture were high from excessive precipitation over the preceding year.

Within the North Fork of Cherry watershed, private lands are limited to approximately 1900 acres. The dominant land use on these private lands is timber management, but private homes and the city occupy some acreage. Logging has occurred within most of the private lands in the watershed, and continues at present, using conventional logging methods with skid trails and roads.

Roads on private lands are believed to be a substantial source of sediment to the North Fork of Cherry. A fairly dense system of general purpose and timber management roads and skid trails occur on these lands. Many of these historic roads are not well located for erosion and sediment control, being near streams and having steep grades. These roads have been in place for a long time, are used today, and will continue to be used for the foreseeable future.

Private home development occurs in Handle Factory Hollow, along Joes Branch and near Little Hacking Run, in limited areas of their headwaters, and to a limited extent along the North Fork of Cherry. Again, many of these homes have been in place for decades or longer, and will continue as dwellings in the future. They are typically located in limited areas of flatter land along or near streams, often within the filterstrip of streams, and they are a small source of long-term added sediment. Clearing of land around structures often results in permanent removal of riparian vegetation.

The city of Richwood occupies a small portion of the watershed near and along the mouth of the North Fork of Cherry. City developments occupy the lower hillside, mostly on the west side of the river and are concentrated there. Some business and industrial developments occupy the flood plain near the river, while houses occupy floodplain and steeper sideslopes west of the river. Most of the land around houses on the steeper slopes is wooded. These developments have a long-term effect on the river in terms of permanent riparian clearing, elimination of LWD recruitment in those portions of the river, sedimentation from periodic earth disturbance and road maintenance, and a variety of chemicals, hydrocarbons and de-icing substances in road runoff.

Alternative 1 – Proposed Action: Watershed stormflow and peakflow studies referenced in the background documents for this analysis were done on entire small watersheds, and generally involved more drastic treatments than those proposed here. Those studies reported effects for the entire watershed, but not 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.

No functioning stream channels were found within any of the proposed harvest units in Handle Factory Hollow. Soil disturbance within the stands 17 and 18 thinning harvest, and in a small portion of stand 15, is being largely eliminated by using helicopter yarding; no roads or skid trails would be constructed.

Conventional ground-skidding in stand 15 is on gentle slopes on and near the ridgetop, and no functioning stream channels were found.

Harvesting in the Desert Branch watershed amounts to more than half of its watershed area. None of the proposed activities directly affect the main stream or its riparian area, and the Desert Branch wetland is not directly affected by any of the proposed harvesting or road building.

The wetland in Desert Branch would be protected from adverse effects because timber harvest and road construction stay well away from the wetland and the main stream channel. Filterstrip and riparian area protection for these activities exceed that needed to protect the wetland resources, and the potential for damaging amounts of sediment from upstream is being controlled through implementation of sediment mitigation measures described in Chapter 2. The trail relocation and revegetation of the portion near the wetland would remove a current source of sedimentation.

To a small extent, planting of aspen would have potential to affect the Desert Branch wetland since the planting sites are located adjacent to or within the wetland.

Proposed harvesting within the watershed includes helicopter harvesting below FR 946 in stands 15 and 16, and a small amount of helicopter harvesting in the southern end of stand 2. The helicopter harvesting method ensures that no road construction or skid roads would be constructed below the road in stand 16, protecting these steeper slopes and coves with functioning channels from earth disturbing activities. Landings would be located above the road, nearer the ridgetop and away from streams. These measures would substantially reduce the risk of sediment impacts in the ephemeral channels in stand 16.

A 14 acre two-aged harvest and 110 acres of thinning in stand 15 would be conventionally logged. These units are located above FR946 and occupy gentle

topography on the upper slopes of Fork Mountain. No functioning stream channels were found within these units. Standard mitigation measures described in Chapter II for truck roads, skid roads and landings would minimize the potential for substantial erosion of soil, and stream sedimentation would not be a concern.

There are numerous ephemeral and intermittent stream channels within stands to be harvested that could potentially be affected. The majority of those channels have been protected through the design and layout of the harvest units, because the streams and their riparian areas have been excluded from the areas to be harvested. Some channels in stands 7, 10 and 11 are within areas proposed for harvest, but these would be protected with mitigation measures as described in Chapter II, and in the Forest Plan. Skid roads would have short-term use to accomplish the harvesting, and then be closed out, waterbarred, and revegetated to control sediment. Application of these mitigation measures would protect streams in the Desert Branch watershed from substantial adverse effects of sediment.

See the soils section of this EA for more discussion related to the new road construction. The road location does not cross functioning stream channels, and stream filterstrips would thus be protected. Mitigation measures described in Chapter II also contribute to reducing the amount and duration of soil exposure to erosive forces, and would substantially reduce the risk of sediment transport and delivery from the road to ephemeral and intermittent streams in the headwaters of Desert Branch. There are likely to be very minor short and long-term sediment effects from the new road construction, but those effects would be very small and not significant, because of the location, design and mitigation measures used.

Despite avoidance of many of the riparian areas in the layout and design of proposed harvest units in the Desert Branch watershed, some riparian areas associated with small headwater channels would be impacted by harvesting in that long-term potential for LWD recruitment would be reduced by the removal of some trees. A reduced potential for large woody debris to modify the effective gradient of the channel and reduce flow energy would be one likely effect. Others include a reduction in habitat diversity and sediment storage, and a reduced capacity for low flow increases. The magnitude of this effect would be less than if Forest Plan riparian guidelines were being applied alone, because the riparian guidelines being used in this alternative protect a portion of the vegetative community along intermittent and ephemeral stream channels, including some of the overstory trees in the stand. These guidelines allow the harvesting of some trees from the streamside areas, which reduces the potential future source of LWD to those channels. Most of the channels that would be affected are ephemeral, although intermittent channels in stands 10 and 11 would be thinned, as well as a short reach of perennial stream in stand 11. The thinning treatments would remove approximately one third of the trees in the areas being harvested.
Riparian areas and sources of within-channel LWD are being largely protected in both the short and long term by mitigation, and because many cutting units are located away from stream channels.

Stormflow effects reported in the literature from timber harvest had more effects than are likely from any harvest under alternative 1, for the following reasons. Effects were from treatments of entire small watersheds, where vegetation regrowth was retarded by use of herbicides for several years following timber harvest. In addition, skid trail and road effects were included, since no helicopter logging was considered.

The proposed action is likely to have some relatively minor stormflow related effects in the Desert Branch watershed, because timber harvesting and a small amount of new road construction would occur. Although the proposed timber harvest is a fairly large proportion of the total watershed area, nearly all of it is thinning on the more gentle upper slopes and along the ridgetop, away from the Desert Branch stream channel and other non-perennial channels. As discussed above, 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 risk of increased sedimentation in the short and long term is low and not significant for all the thinning areas, because of the logging systems being used, harvest unit and landing locations, retaining 2/3 of the basal area, harvesting a small proportion of the watershed, and the absence of aquatic and riparian resources within the proposed harvest units.

Stormflow effects from the shelterwood cuts would be less than for clearcut areas, and clearcut effects generally are not large, even in the growing season. Stormflow effects would be further reduced from effects of clearcutting in the literature, since the shelterwood cuts occurs in portions of several different non-perennial tributaries of Desert Branch. None occupies an entire small watershed that would be close to the size of those reported on in the referenced research findings. Regeneration is expected to rapidly follow the first cut. By the time of the second cut, when the majority of the rest of the trees would be removed, the ground surface would be protected by a dense seedling and sapling cover.

The proposed clearcut does not occupy the main Camp 29 hollow; it is situated in a moderately deep cove off the main stream channel, and has an intermittent and ephemeral stream channels within the unit. Slopes are moderately steep, and there is a relatively higher risk of adverse effects within this harvest unit, primarily associated with stormflow effects. This unit would be logged by helicopter, so no roads or skid roads would be constructed to or within the harvest area, protecting the slopes, cove and functioning stream channels from any substantial earth disturbing activities. The helicopter landing would be located along FR946, nearer the ridgetop and away from streams. These measures would substantially reduce the risk of upland erosion and sediment effects to channels in the Camp 29 Run watershed. The risk of such sedimentation is low and not significant.

Clearcutting removes more of the trees at one time than the other types of harvest discussed, even with the mitigation which restricts cutting near channels. Beyond the

riparian protection areas the clearcut harvest would remove the overstory and much of the understory, and this would also reduce the long-term potential for recruitment of LWD to those nearby channels. This is because even though the clearcut trees are outside the designated riparian protection strip, some of those trees nearer the channels would eventually fall into the channels and provide additional LWD if they were never harvested. The potential adverse effect on the intermittent and ephemeral channels in the Camp 29 Run hollow is not significant, because the riparian protection provides a portion of the potential future LWD, and because relatively short sections of those channels would be impacted. But LWD related adverse effects would be greater than for the no action or other types of harvest discussed, for the sections of channel within the clearcut unit boundary.

The helicopter harvesting method ensures that no road construction or skid roads would be constructed within the units, protecting the steeper slopes, coves and functioning channels from earth disturbing activities. Helicopter landings would be located in areas of gentle sideslope, nearer the ridgetop and away from streams. These measures would substantially reduce the risk of upland erosion and sediment effects to ephemeral and intermittent channels in the helicopter thinning areas. The risk of such sedimentation is low and not significant.

Mitigation measures and expected effects for thinning harvest, both for conventional and helicopter harvesting, were discussed earlier in the Proposed Action for Desert Branch watershed. That mitigation and discussion of effects is applicable for the thinning harvest areas in this section as well. Numerous ephemeral and several intermittent stream channels occur within these thinning areas, including C69 stands 1, 2, 7, 9 and 22. An intermittent channel occurs at the southern boundary of the C70 stand 4 thinning area. Despite the anticipated riparian effects of thinning that were described earlier, they are not considered to be substantial because the majority of future sources of LWD would still be retained. Riparian areas and sources of within-channel LWD are being largely protected in both the short and long term by the riparian protection mitigations.

A 19 acre clearcut in stand 5 would have no significant adverse effects in terms of sediment, riparian values and LWD, and stormflow or peakflow effects. Despite the fact that this 19-acre clearcut would be harvested using ground-skidding, it is located high in the watershed, in gentle terrain near the ridgetop, and near the end of the existing FR946 road. No functioning stream channels occur within the clearcut unit boundary, and adjacent channels would be protected with filterstrip and riparian protection measures.

Overall, stormflow and peakflow effects in Desert Branch, Camp 29 Run, and Handle Factory Hollow resulting from the Proposed Action are expected to be small and not significant, and of short duration. Although small measurable increases in stormflow, and possibly storm peakflows, during the growing season are possible in some of these drainages, no significant adverse effects are expected, and any such increases would be attenuated in the downstream channel system. Indirectly, this could result in a minor tendency for increased channel erosion within and for a short distance downstream from some of the harvest areas, primarily near the regeneration units. Effects on peakflow in

Desert Branch would be extremely small, and it is not likely that any measurable increases would be observed.

In the C70 stand 7 clearcut, LWD related adverse effects would be greater than in the thinning harvest areas, for the sections of channel within the clearcut unit boundary, but those effects are still not significant. Stormflow and peakflow related adverse effects are expected to be minor and relatively short-term, and not significant. Although small measurable increases in stormflow during the growing season are possible, no significant adverse effects are expected, and any such increases would be attenuated in the downstream channel system. In the Camp 29 Run clearcut, small but measurable increases in stormflow and possibly peakflows are likely to occur during the growing season, from within the harvested area. Those stormflow related effects are expected to be of short duration and not significant.

Cumulatively, no significant or even measurable effect on stormflows or flood peaks in the North Fork of Cherry River are expected from any of the proposed harvesting and road construction in the Proposed Action.

The primary water supply for the city of Richwood is the North Fork of Cherry River, located at a water intake in the river downstream from the mouth of Desert Branch. Water quality protection in the North Fork of Cherry is of particular concern with regard to sedimentation, and the potential for adverse effects that sediment would have on the water supply. Concerns for minimizing erosion and sediment delivery to the river have been addressed in the location and design of the proposed harvesting and road building projects, and in the mitigation measures that are being used to protect filterstrips and riparian areas, and minimize sediment. Erosion is being effectively controlled in all watersheds. Sediment delivery to the North Fork of Cherry resulting from the proposed activities is expected to be very minor, short-term and not significant. No significant adverse effects on the Richwood water supply are expected from these activities.

Overall effects in the Proposed Action are expected to be minor and short-term. The proposed harvest areas have been located and designed to avoid highly sensitive riparian areas along the main stream channels. The proposed new road construction is on a moderately sloped ridge top area. Considerable acreage of ground-based thinning would be done, but it occupies the more gentle terrain higher on the mountain and avoids much of the intermittent and ephemeral channel systems. Mitigation measures for truck roads, skid roads and landings would minimize the potential for substantial erosion of soil, and stream sedimentation effects would be minor. Riparian area protection exceeds that required by the Forest Plan, although some loss of potential future LWD would occur by harvesting some trees in and near the riparian areas. That riparian effect would not be significant.

Cumulative Effects of the Proposed Action: 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, Rte 39/55 highway maintenance, flood damage repair activities, homesite and municipal

development along the river, and coal mining. The affected area for the analysis of cumulative effects for aquatic and riparian resources is the North Fork of Cherry River watershed.

The effects of past, present, and reasonably foreseeable future actions on watershed related values within the North Fork of Cherry are described for Alternative 5, No Action. These cumulative effects would be the same for this alternative, with the addition of effects from Alternative 1.

The Desert Branch Proposed Action adds considerable acreage of harvesting (1105 acres) to the total harvested in the past within the North Fork of Cherry watershed (See description under Alternative 5, No Action), but the percentage of the watershed harvested is still relatively small, and would not cause a significant cumulative effect on erosion and sedimentation, stormflow and peakflow or riparian resources.

Additional miles of road provided by this alternative are very small when compared to the road network in place within the watershed. The road's location close to the ridgetop, its design, and lack of direct and indirect effects on stream channels indicate that any contribution to cumulative sediment production, streamflow effects and riparian values from construction or maintenance would be very small.

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 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 would likely remain the preferred method of harvesting in other portions of the Desert Branch OA, particularly the steeper slopes. Timber harvesting in future entries would have minor, short-term effects, as long as current mitigation measures are applied.

Based on field observations of past National Forest timber harvesting and road building activities within the Desert Branch OA and the North Fork of Cherry watershed, and on the information gathered for this analysis, aquatic and riparian resources would be maintained and protected in implementation of the Proposed Action. Substantial adverse effects of activities have been mitigated. Sediment delivered to streams is expected to be minor and short-term because of the project design and mitigation applied. Application of the riparian mitigations provides greater protection to riparian resources and streams than the Forest Plan requires, although some loss of potential future LWD would occur. Stormflow and peakflow related adverse effects are expected to be minor and relatively short-term, and not significant. Small but measurable increases in stormflow and possibly peakflows are likely to occur during the growing season from within the Camp 29 Run clearcut, but are expected to be of short duration and not significant.

Combining proposed projects with past actions and foreseeable future actions, both on federal and non-federal lands, there would be no significant cumulative effect on water

quality, aquatic resources or riparian resources. Beyond the project area boundaries, downstream effects from these activities on National Forest lands are expected to be insignificant. It is not likely that these effects would be observable in the North Fork of Cherry. No significant adverse effects on water quality, drinking water quality, or the North Fork of Cherry or other project area streams would occur.

Alternative 2: All harvesting in C69 is restricted to the more gentle slopes in the higher elevations. All of the conventional ground skidding in C69 from Alternative 1 is included in Alternative 2, with minor changes in the total thinning acreage and the number of shelterwood units. There are no substantial differences in adverse effects from either of these minor changes. All other C69 harvesting by ground skidding methods and the road construction remain exactly the same as in Alternative 1.

Mitigation measures for road construction and ground-based harvesting remain the same as in Alternative 1, with one exception in riparian area management practices. The riparian management guidelines used in Alternative 2 provide a higher level of riparian resource protection than in the Proposed Action, Alternative 1. This higher protection level is accomplished by retaining more trees in all streamside zones. This better protects the riparian ecosystem components and the potential future sources of LWD to intermittent and ephemeral stream channels within the proposed areas of harvesting. Most of the relatively minor adverse effects that would still occur under the Proposed Action, Alternative 1, would be mitigated by increasing the uncut areas near streams. The thinning treatments would remove approximately one third of the trees in the areas being harvested, but the uncut areas near all streams better protect the majority of potential LWD source trees. Riparian resource protection in areas of shelterwood, two-age and clearcut harvesting would also be improved over that provided in the Proposed Action, Alternative 1. Greater amounts of LWD in these small headwater channels, over the long-term, would mean more wood incorporated into the channels to reduce the effective channel gradient and reduce flow energy. Habitat diversity and sediment storage conditions would be improved, and there would be a greater capacity for low flow improvement. Although the riparian mitigations used in the Proposed Action, Alt. 1, were determined to largely protect riparian resources, and that adverse effects from their use would not be significant, the riparian protection in Alternative 2 provide a greater degree of protection and potential adverse effects would be less.

In C69, effects from the proposed activities in Alternative 2 are less than in Alternative 1, because there is less total harvesting, and because the riparian management practices better protect small headwater channels and their riparian areas.

Also in C69, construction of the wildlife viewing platforms, and to a lesser extent, the planting of aspen, has some potential to effect the Desert Branch wetland, because they are located adjacent to, and within the wetland. Construction within the wetland has the potential to increase soil disturbance through construction activities and use of the area by people, and thus to increase production of sediment. If subsurface or surface flow is altered, it could affect wetland hydrology and vegetation. Construction of one viewing platform is planned on a ridge of solid material within the wetland (between the 2

streamcourses shown on the map). The boardwalk would be designed to allow continuous flow, similar to the existing condition of the area. These design features, along with prompt mulching of any areas disturbed by construction, would result in no significant effects on the wetland hydrology or on sedimentation from this activity. Direct effects of shading the wetland surface by the boardwalk used to access the viewing platform would reduce or eliminate wetland vegetation immediately under the boardwalk. Because the boardwalk is less than 200 feet long, this effect would occur on less than 1000 square feet of wetland surface, and thus would have no significant effect. The platform at the west end of the wetland has less potential to affect the wetland, because it is located very close to the existing trail on a ridge. It would not directly affect wetland vegetation, and is not expected to increase pedestrian traffic within the wetland itself. In addition, relocation of approximately 0.1 mile of the Fork Mountain trail would reduce foot traffic in the riparian area just upstream from the wetland area.

In C70, proposed activities are substantially different than in Alternative 1. Some harvest areas have been dropped, while substantial additional acreage of ground-based thinning has been added.

The higher elevations in the Camp 29 Run watershed would be thinned with ground skidding. A small amount of ephemeral stream channel occurs within this thinning, but would be protected with use of mitigation measures listed in Chapter II. Other mitigation measures used in Alternative 1 would be used here. The terrain in this upper part of stand 5 is mostly gentle slopes, and ground skidding should pose no substantial concern for erosion and sedimentation. Forest Road 946 traverses the upper Camp 29 Run watershed, providing good access to the area, eliminating the need for new road construction there and minimizing skid distances. In Camp 29 Run, adverse effects to riparian resources would be very small and not significant. Likewise, adverse effects from sedimentation and potential increases in stormflow would be small, short-term and not significant.

Road construction effects would be the same as in Alternative 1. However, sediment production effects during use of the road may be different than those under Alternative 1, since the design of the road provides for partial gravel surface, compared to complete gravel surfacing under Alternative 1. If road is used during wet periods, some rutting could result in increased sediment production. Conventional logging normally does not require use of roads during the winter, and such use is not planned. Normal practice is to restrict hauling during wet periods, which would greatly limit any potential for greater sediment production than in Alternative 1.

Road reconstruction would have minor adverse effects in terms of sediment, riparian impact and stormflows. The road bed exists on the ground and is currently closed to use and revegetated. It occupies gentle terrain on the upper slopes of Fork Mountain, with good conditions for reconstruction, and limited impacts to channels. Reconstruction would be done to bring it up to a standard suitable for log truck traffic, and previously described road mitigation measures would be used. Potential for increased sediment

production would be greater than in Alternative 5, No Action, since the road would be used by vehicles.

Effects in the clearcut unit in Compartment 70 Stand 5 are the same as in Alternative 1, except that the potential for adverse riparian effects along small adjacent channels is further reduced. Effects from the stand 5 clearcut are minor, short-term and not significant.

In C70, the primary difference in proposed harvesting from that in Alternative 1 is the substantial addition of thinning acres by conventional ground-based skidding. They occupy terrain that varies from gentle to moderately steep, but with steeper slopes adjacent to some of the small intermittent stream channels that occur within these stands. Numerous ephemeral and intermittent channels dissect the landscape. These proposed thinning acres are within an old timber sale area in which thinning was done by ground skidding. Skid trails from that old harvesting exist on the ground, and would be used for this harvesting as much as possible, thus minimizing the need for additional new skid trails and roads. Some new skid trail construction is likely to be needed.

The thinning harvest in these portions of C70 have an increased potential to impact aquatic and riparian resources. Although the skid trail network is largely in place, soil would be disturbed in re-opening these skid routes and using them. Skid distances are moderately long, with some longer than one half mile. Skid routes cross multiple channels, and there are many channel crossings within these thinning areas. Skidding on some steep slopes would be needed to reach the harvest areas. Mitigation measures are the same for this thinning area as for C69, but the potential for adverse effects from soil displacement and sedimentation of non-perennial streams is greater in C70. Such effects are mostly short-term, lasting for the period of time in which the skid roads are open and in use, until they are closed, waterbarred and revegetated, and an effective erosion control cover has become established. Generally this may take up to a year or so. Sediment that has been deposited in the headwater channels is likely to be retained there for an extended period of time, being flushed downstream over time during stormflow events.

Riparian resources would be protected within these thinning areas because no trees would be harvested at the specified distances from stream channels. A cumulative effect of the previous thinning harvest on this acreage is that some trees have already been removed from riparian areas along the intermittent and ephemeral streams in the area. Most of the skid road related effect of tree removal has already taken place, but riparian effects from them are still long-term.

Some stormflow related effects are possible and would be similar to those described under Alternative 1 for thinning. These effects would be minor and not substantial.

Overall, the risk of effects from sedimentation in the small non-perennial tributaries to the North Fork of Cherry are greater than elsewhere in the project area, mostly in stands 2, 5 and 7. Some of that risk can be reduced through sale administration controls on activities, new skid road placement, wet weather shutdown, and prompt closure, all of

which are standard measures in National Forest harvesting activities. But some sedimentation effects are unavoidable, and would be greater within these thinning stands in C70. However, there would still be no significant sedimentation effects with this alternative.

Adverse riparian resource effects and stormflow related effects in these thinning harvest areas in C70 are minor, mostly short-term, and not significant.

Cumulative Effects of Alternative 2: The cumulative effects of Alternative 2 activities, combined with past, present and reasonably foreseeable future actions within the North Fork of Cherry watershed, are not substantially different than those in the Proposed Action (Alternative 1). But substantial thinning acreage has been added, mostly in C70, and some of it has a higher risk of sedimentation effects. Those greater sediment effects are expected to be mostly short-term, as described above, and would be largely confined to the non-perennial headwater channels on the mountain-sides. Sedimentation effects from these C70 activities could be detectable in the river, mostly during the period of the active harvesting and for moderate size storm events, but those effects would be very small, and would not violate state water quality standards.

Cumulative effects to riparian resources would be very minor and not significant, because of the degree of protection provided by the 100, 50 and 25 foot minimum uncut areas adjacent to perennial, intermittent, and ephemeral channels.

Combining Alternative 2 projects with past and present actions and foreseeable future actions, both on federal and non-federal lands, there would be no significant cumulative effect on water quality, aquatic resources or riparian resources. It is not likely that any more than minor sediment effects would be observable in the North Fork of Cherry. No significant adverse effects on water quality, drinking water quality, or the North Fork of Cherry or other project area streams would occur.

Alternative 3: Alternative 3 incorporates much of proposed harvesting and road development of the Proposed Action within C69, where effects of thinning and road construction would be the same. As described in the Alternative 2 discussion, riparian protection measures provide a higher level of riparian resource protection than that of the Proposed Action, and more than that required by the Forest Plan. Adverse effects on LWD are less from C69 activities than in the Proposed Action, and about the same as in Alternative 2.

The trail relocation would reduce foot traffic in the riparian area just upstream from the Desert Branch wetland area.

In C70, although the acres harvested in Alternative 3 are greater, all of it is by individual tree selection using helicopter logging in which approximately one-third of the basal area is removed. In terms of the reduction in basal area, individual tree selection has about the same effect as the thinning harvest used in the other alternatives. There would be no ground skidding in compartment 70 in this alternative, so none of the existing skid roads

would be used, and no new ones would be constructed. There would be no new road construction, and the temporary road reconstruction in Alternative 2 would not occur. Helicopter landing sites would be used along existing road access, and these are in the higher elevations and away from stream channels. Despite the large number of acres harvested, almost all ground disturbance in C70 would be prevented by use of these mitigation measures. Also, the uncut areas near stream channels provided by riparian measure described above would be used, and adverse effects on riparian resources would be minor, short term and not significant.

In C70, the proposed harvesting would have overall less adverse effects than the Proposed Action, because there would be less acreage clearcut and the riparian guidelines that would be used require more retention of trees in riparian areas. There would be substantially less sediment effects than Alternative 2, primarily because of the use of helicopter logging under this alternative in C70, where ground logging was used under alternative 2. Adverse effects from sedimentation, riparian resource effects and stormflow related effects from the harvest areas in C70 would be minor, mostly short-term, and not significant.

Cumulative Effects of Alternative 3: The cumulative effects in Alternative 3 are slightly less than either the Proposed Action or Alternative 2, because the effects of the alternative are less. The risk of sedimentation effects is less overall, and substantially less in C70. The risk of minor but observable sediment effects in the North Fork of Cherry described in Alternative 2 have been essentially eliminated by use of helicopter harvesting in C70. Cumulative effects to riparian resources would be very minor and not significant, because of the degree of protection provided within riparian areas, and within 50 and 100 feet of channels. The risk of effects on stormflow and peakflows within the harvest areas and downstream in the North Fork of Cherry is minor, short-term and not significant.

Combining Alternative 3 projects with past and present actions and foreseeable future actions, both on federal and non-federal lands, there would be no significant cumulative effect on water quality, aquatic resources or riparian resources. Beyond the project area boundaries, downstream effects from these activities on National Forest lands are expected to be insignificant. It is not likely that these effects would be observable in the North Fork of Cherry. No significant adverse effects on water quality, drinking water quality, or the North Fork of Cherry or other project area streams would occur.

Alternative 4: Alternative 4 is very similar to the Proposed Action in the number of acres harvested, the harvest types (thinning, shelterwood, two-age and clearcut), and the locations of that harvesting. The major difference occurs in C69. No new road construction would take place in the Desert Branch watershed, reducing the amount of ground-skidding substantially. This eliminates the potential short and long-term adverse effects from sedimentation of new road construction (even though those effects are minor in the other alternatives). Stormflow effects in Desert Branch could potentially be slightly less than in the Proposed Action, because of the elimination of new road

construction and reduced amount of skid roads. But that difference would be extremely small.

This substantially reduces the area north of Desert Branch that can be ground skidded. Ground skidding stops in the western portion of stand 10, substantially reducing the associated earth disturbance, erosion potential, and risk of sediment effects from ground skidding in Desert Branch. The remainder of the harvesting north of Desert Branch would be by helicopter harvesting. Although the harvested acres are about the same, the risk of sedimentation effects in Desert Branch are somewhat less than in the Proposed Action. Potential sediment effects are short-term and not significant.

Adverse riparian effects are less in this alternative than in the Proposed Action. Intermittent and ephemeral channels in the ground skidding and helicopter harvesting units would retain more of their potential long-term source of LWD. Any potential riparian effects are minor, short-term and not significant.

Effects from the trail relocation, boardwalk, and wildlife viewing platforms would be the same as in Alternative 2.

Cumulative Effects of Alternative 4: The cumulative effects of Alternative 4 are less than the Proposed Action and Alternatives 2 and 6, and not much different from Alternative 3. Alternative 4 ground skidding is very limited and in areas of low sensitivity to stream sedimentation. Helicopter harvesting eliminates most ground disturbance effects. New road construction in C69 is dropped. The uncut areas near stream channels provide a higher level of protection to riparian vegetation and potential future LWD.

The risk of sedimentation effects is less overall compared to the Proposed Action, and substantially less in C70 compared to Alternative 2. The risk of minor but observable sediment effects in the North Fork of Cherry described in Alternative 2 have been essentially eliminated by dropping most of those harvest acres, helicopter logging in stands 4 and 9, and dropping the stand 7 clearcut. Cumulative effects to riparian resources would be very minor and not significant, because of the degree of protection provided by riparian mitigations used. The risk of effects on stormflow and peakflows within the harvest areas and downstream in the North Fork of Cherry is minor, short-term and not significant.

Combining Alternative 4 projects with past and present actions and foreseeable future actions, both on federal and non-federal lands, there would be no significant cumulative effect on water quality, aquatic resources or riparian resources. It is not likely that these effects would be observable in the North Fork of Cherry. No significant adverse effects on water quality, drinking water quality, or the North Fork of Cherry or other project area streams would occur.

Alternative 5 – No Action: The No Action alternative proposes to do no timber harvest, road construction, reconstruction, or any of the other ground disturbing activities in other

alternatives. Normal road maintenance work on existing Forest Service system roads (such as FR946) would continue, 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 other alternatives. Aquatic and riparian resources and stream sediment conditions would remain in their current condition over this planning period as a result of past, present and reasonably foreseeable actions within the watershed.

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 improve, especially in the ephemeral, intermittent, and smaller perennial stream channels. Road locations and maintenance adjacent to the river and to some of the other stream channels would maintain open conditions and a perennial source of sediment for the major stream channels. However, stream habitat diversity, pools, sediment storage, channel stability and water storage would all increase over the long-term because of large woody debris.

Alternative 6: Alternative 6 is similar to the Proposed Action except that 90 fewer acres would be harvested and it adds approximately 0.5 miles of temporary road in C69 stands 7 and 9. The potential effects of the temporary road in terms of surface runoff and sedimentation are minor and short term. This is because the temporary road will be located to avoid functioning stream channels to the extent possible, and will be situated high on the ridge with little watershed area above it. Little surface and subsurface runoff will be intercepted by it, reducing the potential for substantial erosion. Also, the temporary road will be constructed to a standard necessary to protect downslope soils and streams. Mitigation measures needed to accomplish this should include surface stone where needed to provide a stable driving surface and reduce rutting, and frequent cross-drainage to control water and turn it off the road surface in small, manageable quantities. This will reduce the potential for water coming off the road to erode soils downslope and deliver sediment to functioning stream channels. "Rolling" the vertical alignment of the temporary road is a measure that would provide additional soil and water protection by helping to control surface runoff. At the completion of the harvesting served by the temporary road, it should be closed by removing culverts, installing dips or waterbars, and with prompt revegetation. If these measures are implemented, adverse effects from construction and use of the 0.5 miles of temporary road will be minor and short term.

Also, the temporary road replaces a portion of the skid road that would be used in certain other alternatives. In some other alternatives, such as the Proposed Action, long skid distances are required in stands 7 and 9 to transport the harvested timber to the log landing. The use of temporary road to reduce long skid distances is expected to slightly reduce the potential for soil erosion and sedimentation. Effects would be slightly less than in certain other alternatives in those stands, and are not expected to be significant.

This alternative would not include 71 acres of thinning in the Handle Factory Hollow watershed. However, since this area would be logged by helicopter, the difference

between Alternative 6 and the Proposed Action would be very small. The clearcut in stand 70/7 would not occur, thereby eliminating any effects from that cut in the Camp 29 hollow. Also, four acres of wildlife openings in three areas would not be created. The amount of area that would be ground skidded in this alternative would be the same as that in the Proposed Action except for the dropping of one two-acre wildlife opening.

As described in Alternative 2, the riparian mitigations provide a higher level of riparian resource protection than that required by the Forest Plan, or that provided under the Proposed Action, Alternative 1. Adverse riparian effects are less in this alternative than in the Proposed Action for harvesting, but would be slightly higher from road or temporary road construction. However, since the temporary road would be near the top of a fairly wide ridge and away from stream channels, potential sedimentation effects would be minor. Also, the temporary road would reduce skidding distances for some of the area in stand 69/7, thereby reducing potential sedimentation from skidding. Intermittent and ephemeral channels in the ground skidding and helicopter harvesting units would retain more of their potential long-term source of LWD. Any potential riparian effects are minor, short-term and not significant.

Effects from the trail relocation, boardwalk, and wildlife viewing platforms would be the same as in Alternative 2.

Cumulative Effects of Alternative 6: The cumulative effects of Alternative 6 would be similar to that of the Proposed Action and Alternative 2, and not much more than in Alternatives 3 or 4.

The risk of sedimentation effects is substantially less in C70 compared to Alternative 2. The risk of minor but observable sediment effects in the North Fork of Cherry described in Alternative 2 have been essentially eliminated by dropping most of those harvest acres, helicopter logging in stands 4 and 9, and dropping the stand 7 clearcut. Cumulative effects to riparian resources would be very minor and not significant, because of the degree of protection provided by the riparian mitigations. The risk of effects on stormflow and peakflows within the harvest areas and downstream in the North Fork of Cherry is minor, short-term and not significant.

Combining Alternative 6 projects with past and present actions and foreseeable future actions, both on federal and non-federal lands, there would be no significant cumulative effect on water quality, aquatic resources or riparian resources. It is not likely that these effects would be observable in the North Fork of Cherry. No significant adverse effects on water quality, drinking water quality, or the North Fork of Cherry or other project area streams would occur.

Soils

Affected Environment: Soils form over time from underlying geologic parent material. This geologic material provides the basis for soil characteristics, and is classified into geologic "groups" that are made up of "formations". Formations are identified by their percentages of rock types, such as sandstone, siltstone, and shale. The Desert Branch

Project opportunity area lays within an area underlain by bedrock of the New River formation (Pennsylvania age and part of the Pottsville geology group), with a small amount of Upper Mississippian system bedrock in the lower elevations east of Camp 29 Run near the river. Bedrock is primarily sandstone, with some shale, siltstone and coal. The lithology of the New River and Kanawha Formation of the Pottsville Group have more shale in the western portions of the Gauley Ranger District. These shales appear to contain minerals that contribute alkalinity as evidenced by higher pH surface waters as compared to other dominantly Pottsville geology watersheds on the National Forest. This is also supported by less Northern Red Spruce growing on this portion of the forest.

Soil series over this geologic formation are Buchanan, Gilpin, Simoda, Mandy, Snowdog, Udifluvents and Fluvaquents. Udifluvents and the Fluvaquents soil series are not located in or near treatment areas, but may occur as small inclusions within the other soil mapping units. Although there is a small area mapped as soils with the Prime Farmland designation (Pope-Craigsville complex), treatments would not occur on these soil series resulting in direct effects, nor would there be any indirect effects on these soil series.

Soils generally range from moderate to severe sensitivity from the standpoint of erosion and slippage potential (see the Soils report). In particular, steep slopes, 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. The standards and guides listed in the Forest Plan are intended to minimize soil disturbance, erosion, compaction, rutting, and sedimentation associated with the implementation of management practices.
The soil series described below are common on the Gauley Ranger District.

BUCHANAN SERIES: The Buchanan series consists of soils that are very deep, moderately well drained, and slowly permeable. They formed 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, as is the available water capacity. Permeability is moderate above the fragipan (a water movement restricting layer) and slow in the fragipan. Depth to the fragipan ranges from 20 to 36 inches. Seeps may be present, and a seasonal high water table of 18 inches to 36 inches below the surface restricts the roots of water- sensitive plants. Depth to bedrock is greater than 60 inches. In the unlimed areas, reaction ranges from extremely acid to strongly acid. Equipment limitations (slope dependent), slippage, and erosion on skid trails and roads are the major management concerns.

GILPIN SERIES: The Gilpin series consists of moderately deep, well drained soils formed in residuum of nearly horizontal interbedded shale, siltstone, and some sandstone of the Allegheny Plateau. They are on gently sloping to steep, convex, dissected uplands. Fractured, bedded and rippable bedrock is at depths of 20 to 40 inches. The potential for surface runoff is negligible to high, and the permeability is moderate. In the unlimed areas, reaction ranges from extremely acid to strongly acid. Equipment limitations (slope dependent), slippage, and erosion on skid trails and roads are the major management concerns.

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

MANDY: The Mandy series consists of moderately deep, well-drained soils with moderate permeability. These soils formed in residuum weathered from interbedded siltstone, shale, and sandstone. They are on broad ridgetops and upper side slopes of mountains. The soil ranges from extremely acid through strongly acid throughout. The potential for surface runoff is low to very high. Permeability is moderate, runoff is very rapid, and available water capacity is very low to moderate. Potential productivity for trees is moderately high. Slope is a limitation for equipment use, and erosion on skid trails and roads are major management concerns. Wind throw is also of concern in regeneration cuts.

SNOWDOG SERIES: The Snowdog series consists of very deep, moderately well drained soils that formed in colluvial material derived from acid shale, siltstone, or sandstone. They are in coves, on side slopes and along drainageways in higher elevations of mountains. Permeability is moderate above the fragipan and slow to moderately slow in the fragipan. Depth to the fragipan ranges from 16 to 35 inches. The depth to bedrock is more than 60 inches. Available water capacity is very low or low, and runoff is rapid. The reaction in unlimed soils is extremely to strongly acid. Potential productivity for trees is moderately high. Erosion on roads and skid trails is a major management concern.

UDIFLUVENTS: Udifluvents are very deep, well drained to somewhat poorly drained soils that formed in alluvial material derived from soils underlain by siltstone, sandstone, or limestone. These soils in general have less clay than Fluvaquents. These soils are on nearly level floodplains along minor drainageways. The hazard of flooding ranges from frequent to rare. The available water capacity, permeability, fertility, and many other characteristics vary. Reaction ranges from extremely acid to strongly acid. The depth to bedrock is more than 60 inches. The major limitations of these soils are wetness and flooding. Major management concerns are road construction in wet areas and across intermittent stream channels, operating equipment on wet soils, and erosion generated by these activities.

FLUVAQUENTS: Fluvaquents are very deep, poorly drained soils that formed in alluvial material derived from soils underlain by siltstone, sandstone, or limestone. These soils are on nearly level floodplains along minor drainageways. The hazard of flooding

ranges from frequent to rare. The available water capacity, permeability, fertility, and many other characteristics vary. Reaction ranges from extremely acid to strongly acid. The depth to bedrock is more than 60 inches. The major limitations of these soils are wetness and flooding. Major management concerns are road construction in wet areas and across intermittent stream channels, operating equipment on wet soils, and erosion generated by these activities.

The impacts to the soil resources have been described based on the sensitivity of the soils and the amount of soil disturbance that would occur from the activities. In addition, an estimate of the percent change in soil productivity has been made for each alternative to determine whether proposed activities would decrease soil productivity by less than 15%.

The Draft 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 biological, hydrological, or ecological function", referred to here as soil productivity or soil quality. This measurement is applied to the landscape (opportunity areas) and the land unit (activity areas). Roads, trails, and administrative facilities such as campgrounds, are not included in measurements for loss of soil productivity. For this analysis, harvest units, helicopter landing sites, temporary roads, and permanent wildlife openings will be included in estimates for loss of soil productivity.

Potential effects on soils from management activities and connected actions consist of: 1) disturbance and exposure of soil; 2) increased soil compaction; 3) increased soil movement; 4) changes in soil moisture; 5) increased soil temperature; 6) nutrient leaching, and 7) changes in soil fertility.

Effects Common to Alternative 1, 2, 3, 4, and 6: Studies on the nearby Fernow Experimental Forest indicate that an estimated 10.6% of the total acres in a treatment area are disturbed by the use of skid roads, log landings, and any other miscellaneous areas disturbed in conventional skidding operations for timber harvesting (Kochenderfer and Edwards 1997). There would be little direct impact to soil productivity from helicopter harvesting, so it is expected that helicopter logging would not reduce soil productivity by more than 0.5%. It is estimated that 100% of the helicopter landing sites would have reduced soil productivity initially. These helicopter landing sites in the Desert Branch OA will be converted to wildlife openings where soil productivity will be mitigated to a level of performing biologic, hydrologic, and/or other ecologic functions. Additional wildlife openings are created throughout the Desert Branch OA, see Alternatives section for acreage and location. The acres of disturbance from these additional openings are used in the calculations below. Soil disturbance will also result from the creation of savannahs. The following table outlines the estimated reduction in soil productivity for each Alternative.

Table 11 Reduction in Soil Productivity by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Total Project Area Acres	3013	3013	3013	3013	3013	3013
Total Activity Acres	568	1002	310	364	0	565
Acres of Reduced Soil Productivity	60	106	33	39	0	60
% Reduction in Soil Productivity in Activity Area	10.6	10.6	10.6	10.7	0	10.6
Total % Reduction in Soil Productivity in Project Area	2.0	3.5	1.1	1.3	0	2.0

The Soil Surveys for Nicholas and Greenbrier counties indicate that mapping units present within the area in the Buchanan, Gilpin, Snowdog and Mandy soil series are rated moderate to severe (slope) for erosion potential. In addition, these soils are of concern for their moderate slippage potential. Although soil creep and slumping are natural erosion processes occurring on the landscape, these processes can be accelerated by soil disturbance. Disturbance in this context means compaction, toe slope removal, and saturation due to improper surface drainage. The amount of disturbed soil (acres) is shown in the Comparison of Alternatives Table in Chapter II.

Soil disturbance disrupts an orderly process of litter accumulation and decomposition. However, this disturbance will take place, to some extent, regardless of human interference. Natural disturbances (fire and wind-throw) to the organic layer are common in forested areas (Lyford, 1973). Timber harvesting activities, which include the construction of skid trails and log landings, can reduce soil productivity through disturbance by increasing soil erosion and compaction. Erosion reduces topsoil depth, washes away soil nutrients from the site, and reduces vegetative growth. Sediment can clog stream channels contributing to increased stream bank and channel erosion. Eroding soil particles may carry herbicides, pesticides, fertilizers and other chemicals to streams.

Soil compaction makes it difficult for seedlings to develop deep root systems. This can result in reduced plant growth. Compaction decreases the ability of the soil to absorb water, reduces soil macro-pore space, and may result in increased runoff and erosion. The Comparison of Alternatives Table in Chapter II shows the differences in soil disturbance by acres for each alternative. Compaction can occur to the soil resource where heavy machinery travels across the soil surface. This is mostly likely to occur on skid roads, log landings, and helicopter landings. It is recognized that it is desirable to maintain compaction in some areas of skid trails in order to provide foraging habitat for bats and other wildlife via wheel ruts and depressions for ponded water. Possible mitigations for soil compaction include chisel plowing or sub soiling the upper portion of the soil profile on roads, skid trails and landings after timber harvest is complete to disrupt the soil particles and increase the void space. As a result surface water infiltration and hydraulic conductivity will increase. Revegetation of the site with species that have deep penetrating roots systems is also a possible mitigation to decrease soil compaction.

Over time, normal freeze thaw cycles will also act to decrease soil compaction. However, soil properties will not return to exact levels prior to compaction.

Road and skid trail construction generally requires topographic changes that can alter drainage patterns, affect slope stability, disrupt soil profiles, and strip hillsides of topsoil and organic matter. However, a well designed and maintained road system gives the land manager ready access for fire protection and for application of cultural treatments. Pfister (1969) concluded in his study that the potential loss of timber-producing land is minor and can be reduced to zero if road width is kept to the minimum actually needed.

If the closure of the timber sale occurs in the fall during an undesirable time for site preparation for seeding on skid trails, temporary roads, and landing areas, straw mulch should be applied to disturbed areas so that no bare soils are exposed through fall and winter months or periods of high rainfall. Areas of particular concern would be slopes greater than 5 to 8 %, soils that are designated as having severe erosion potential because of their K factors, and soils disturbed in a designated filter strip. Also, it has been a long-time practice to rely on natural sources of mulch such as leaf litter, woody debris, and other vegetative matter to provide cover to these disturbed areas under the forest canopy; however these natural sources are not always timely in application and effective in completely covering the disturbed areas. Therefore, some risk is taken when relying on natural mulch sources to protect bare soil. Log landings and helicopter landings have recommended mitigation other than site rehabilitation such as wildlife openings to help soils recover from disturbance. Converting these areas to non-forested sites has minimal impact on issues such as deforestation, carbon sequestration, and alteration of the soil microbial types because the overall acreages of the areas are not significant. Therefore, these sites with converted soil productivity alteration are considered negligible.

Temperature affects the activity of all soil organisms, but not to the same extent. Each microorganism has an optimum temperature for growth and a range outside of which development ceases. Most soil organisms grow best in the 25 to 35 degree centigrade range, but they can survive and develop at both higher and lower temperatures. Some organisms grow at temperatures up to 65 degrees centigrade and have temperature optima at 35 to 45 degrees centigrade. Temperature affects population size and the rate of biochemical processes carried out by the microflora up to the optimum temperature for the transformation. Ordinary soil temperatures seldom kill bacteria. There will be no significant effects from the activities proposed in these alternatives to long-term soil temperature levels.

Timber harvesting may also affect nutrient run-off. Liken and Bormann, in an experiment at Hubbard Brook, New Hampshire, found that dissolved nutrient run-off levels in a clearcut watershed were 13 times higher than in an uncut area when regrowth of vegetation was prevented for 3 years by use of herbicides. However, when clearcut watersheds are allowed to naturally regenerate the export of nutrients is only slightly increased because of rapid uptake by new vegetation (as described by Aubertin and Patric (1972), Kochenderfer and Aubertin (1975), Galone (1989) and Kochenderfer and Edwards (1991)).

Effects Common to Alternative 2, 4 and 6: The Desert Branch wetland area primarily located in C-69 stand 13 has unmapped, unclassified hydric soils. This area is protected from disturbance in all actions and alternatives with a filterstrip and/or riparian buffer around most of the wetland that is greater than 100 feet. One exception to this is on the easternmost edge where the existing trail is located very close to the mapped wetland. Trail # 236 would be relocated outside the floodplain to an upland position on the sideslope, and the exposed soils on the existing trail will be revegetated. Moving the trail will decrease sediment, concentrated surface flow, and the presence of compacted soils in this area of the wetland. In addition, the wildlife viewing platforms, connecting trails, and aspen planting would be located within and adjacent to the wetland. The platform on the north edge of the wetland would be built on a ridge, nearly adjacent to the existing trail. The one in the central portion of the wetland would be constructed on an old railroad grade between two channels. A boardwalk would be required in order to access the viewing platform, and a section of connecting trail would be constructed on a ridge to access the boardwalk and viewing platform. Thinning is shown on the map adjacent to the wetland at this location, but because of the 50 foot mitigating uncut area adjacent to the trail (both existing and relocation), this harvest would actually maintain the minimum buffer around the wetland. Any soil disturbance created in the construction of the new trail system is not considered in the soil productivity loss analyses as stated in the Draft Soil Management Handbook (FSH 2509.18).

Effects Common to Alternative 1, 2, and 6: The 1.3-mile road construction in Alternatives 1 and 2 occurs on the Buchanan, and Gilpin soil series, which have moderate to severe erosion potential where these soils occur on steep slopes. The direct effects of building the new road would be an increase in the area of disturbed soils, compaction of the road area itself, and increased surface runoff connected with the decrease in permeability associated with the road. Sideslopes are primarily gentle or moderately sloping (8% to 35% slope). Thus, the potential for slope related problems are minimal. The placement of the new road in Compartment 69 stands 9, 10, and 11 is advantageous for reducing sediment during construction and during long-term maintenance. Road design features normally provide cross-drainage to remove surface water. Long-term compaction of the soil is the consequence of having a road, and in this watershed it would be a minimal impact to the overall soil resource. Permanent roads are not considered when calculating soil productivity losses according to the Draft Soil Management Handbook (FSH 2509.18). The road location is advantageous for reducing sediment during construction and during long-term maintenance because of the moderate slopes, and design features described in Chapter II.

Effects in Alternative 1: Helicopter logging is a timber harvest method being utilized on sensitive soils with steep slopes in Alternative 1, in the clearcut in C 70 Stand 5, and in thinnings and release as shown in Chapter 2 and on maps. A total of 59 acres of disturbed soil will be mitigated by the use of helicopters to remove the timber. See Comparison of Alternatives table in Chapter 2 for the soil disturbance acres by alternative. Kochenderfer and Edwards (1997) estimate that 10.6% of the total acres in a treatment are disturbed by the use of skid roads, log landings, and any other

miscellaneous areas in conventional skidding operations for timber harvesting. The use of helicopters to log the units with soils sensitive for steepness (slope), slippage, and wetness is not only a method of timber harvesting but also mitigation for reducing the amount of soil disturbance and the production of sediment. Helicopter logging significantly reduces the amount of soil disturbance because no skid roads are used to extract the timber. There is no need for any equipment to move across the soil surface in a unit planned for harvest, which reduces the potential for soils to become compacted, rutted, and eroded.

Effects in Alternative 2: Map units containing the Buchanan, Gilpin, Simoda, and/or Snowdog soil series are identified as sensitive soils for wetness. These soils exist across the entire Desert Branch OA in drainages and on areas where the sideslopes are a combination residual/colluvial landscape type. These soils may have seeps associated with them during wet times of the year. Seeps are an important wildlife water source and are important to watershed processes of hydraulic conductivity or movement of water through soils. The seeps need to be protected (1 seep / 10 acres) from disturbance (skid roads) as well as a canopy must be left over the seep to protect it from solar radiation as indicated in the Forest Plan (pg. 178.)

Map units in the Buchanan, Simoda and Snowdog series may have areas with a fragipan in the subsoil. This dense firm layer restricts water infiltration and root development. The fragipan also causes a perched water table to develop. When building skid trails through these colluvial soils in the conventional logging treatments, free water may flow from the soil profile depending on the depth of a cut across the sideslope. Forest plan standards and guidelines call for water breaks, dips or other means to keep this water off the road or skid trail. Alternative 2 proposes using conventional logging methods in Gilpin - Buchanan soils, which occur upslope of the Desert Branch wetland in C 69, stands 16 and 10. A combination of perched water tables and slippage potential may lead to slope failures in the future if these soils were inundated. This same recommendation holds true for the timber harvest in C-70 stands 7, 5, 4, and 2 on Snowdog soils. The Snowdog soil series is also rated sensitive for wetness and has a seasonal high water table at 12 to 30 inches (See map unit description.) Helicopter harvesting on these soils with wetness limitations would also be a means to mitigate soil wetness because minimal soil disturbance would occur.

Alternative 2 includes construction of 0.7 miles of road at the end of FS 730. This road extension would follow the path of a decommissioned temporary road. New soil disturbance would occur to bring this older roadbed up to standards for use. In addition, gravel would be added to provide roadbed stability. Refer to the hydrology report for soil resource effects pertaining to erosion and sediment production. The soils that exist in this area are the Mandy and Snowdog series. These soils are sensitive for wetness and slope. There is a slight risk of road failure due to water saturation of the roadbed and heavy hauling frequency if not mitigated to allow for adequate drainage. These Mandy and Snowdog soils on slopes greater than 30% are rated severe, and Mandy soils on slopes less than 30% are rated moderate for erosion concerns according to the soil

interpretations given by the USDA-Natural Resource Conservation Service soil survey reports.

Effects in Alternative 3: The Desert Branch wetland area primarily located in C-69 stand 13 has unmapped, unclassified hydric soils. This area is protected from disturbance in all actions and alternatives with a filterstrip and/or riparian buffer around most of the wetland that exceeds 100 feet. One exception to this is on the easternmost edge where the existing trail is located very close to the mapped wetland. Trail # 236 would be relocated outside the floodplain to an upland position on the sideslope, and the exposed soils on the existing trail will be revegetated. Moving the trail will decrease sediment, concentrated surface flow, and the presence of compacted soils in this area of the wetland.

Effects in Alternative 5: Alternative 5 – No Action would have no negative direct, indirect, or cumulative effects on the soil resource. However, there would be several positive indirect effects on the soil resource. If no timber harvesting were to occur in the Desert Branch OA, the soil resource would continue to accumulate and build organic matter. Non-disturbed soils would continue to go through the natural process of soil development. Natural succession plays a large role in soil building processes especially in the development of the organic layer of the soil surface. This does not imply that this same soil building process will not occur on the site if other Alternatives were chosen, but the soil building processes would occur in a lesser degree.

Effects in Alternative 6: Alternative 6 includes an additional 0.5 miles of temporary road. Refer to the hydrology report for soil resource effects pertaining to erosion and sediment production. During closure of the temporary road after harvesting, the roadbed surface should be ripped to a depth that ameliorates compaction and provides improved soil water infiltration rates and ease for root penetration into the subsoil, and seeded and/or mulched (depending on the time of year of mitigation) to prevent immediate erosion. These soils are rated severe for erosion concerns according to the soil interpretations given by the USDA- Natural Resource Conservation Service soil survey reports.

Cumulative Effects: The soil series described in the Desert Branch Project area are common on the Gauley Ranger District, including within areas of completed timber sales, where no significant effects on the soil resource have occurred. One such timber sale was partly within Compartments 69 and 70, where regeneration harvests and thinnings were done in the mid 1980's. Growth in young trees within the regeneration harvests indicates no reduction in soil productivity, and all soils disturbed by the timber sale are currently revegetated, except those in continuous use as trails or roads.

Cumulative effects on the soil resource would include effects of several periods of active erosion, compaction, or other soils effect on the same soil over time. The areas of helicopter logging would have very little cumulative effect of this timber sale when combined with past and future potential timber sales, because of the limited direct soils effects. Alternative 2 mitigates potential cumulative effects by the proposal to use

previously developed skid trails, roads and landings for thinning in Compartment 70, thus limiting the area of total soil disturbance.

Kochenderfer (1992) reported that the amount of exposed soil as a result of skid and truck roads decreases rapidly after logging. This is 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 area in skid roads decreased from 6.2 percent of the logged area in 1987 to 5.1 percent in the 1992 measurements. The percent of the 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 the heavily cut areas, would eventually revert to forest.

Timber harvesting activities temporarily disturb the forest floor by mixing the organic layers with mineral soil. Removal of a portion of the forest stand by harvesting results in increased sunlight reaching the forest floor, higher soil temperature and moisture, as well as increased decomposition and mineralization rate results from increased microbial activity. 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 significant input of nitrogen to many ecosystems (Youngberg and Wollum, 1970).
No cumulative adverse effects from nutrient leaching are anticipated from the proposed action of the next rotation period under any of the alternative. It is anticipated that an initial surge of nutrients would occur as the vegetation canopy is opened. Soil moisture, soil surface temperatures, and increased 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 available nutrients. A surge in growth would occur. Possible losses of nutrients to ground water and volatilization are expected to be offset by addition of nutrient rich leafy top and woody debris left on-site after the harvest.

Acid deposition has a cumulative effect on soil nutrients and their cycling. Continued research in the 1990s documents distinct decreases in soil calcium over a period of 4 to 5 years in both the Northeast (Johnson et. al., 1994a) and Southeast (Richter et. al., 1994.) The decreases were attributed primarily to the uptake of calcium by trees in excess of inputs from weathering. In addition, researchers also know that both acid deposition (Markewitz et. al., 1998) and a decline in atmospheric deposition of calcium may have contributed to the decrease in the availability of soil calcium in the East (Johnson et. al., 1994b.) Although some research would suggest that soil nutrient depletion should occur following biomass removals (Federer et.al, 1989; Hornbeck et.al, 1990; Weetman and Weber, 1972; Boyle et. al., 1973, Silkworth and Grigal, 1982; Federer et.al, 1989), follow-up research has not shown that to be the case (Knoepp and Swank, 1997; Johnson et al., 1997; Johnson and Todd, 1998). However, relationships among acid deposition, calcium availability, forest productivity, and soil productivity remain uncertain because of many of the unknowns about the relationships of input and outputs of soil calcium and

roles that other soil properties play in nutrient cycling and soil productivity (USGS, 1999; Grigal, 2000).

Project design could provide potential mitigation for possible cumulative effect of many entries for timber harvest in Desert Branch. Timber harvesting would occur at a much lower intensity than that studied in the research, thus much of the research related to potential soil nutrient depletion concerns is not directly applicable to the Desert Branch analysis. The literature has suggested that less intense harvests would be mitigation to potential soil nutrient depletion concerns (Adams et al., 2000). The types of harvests analyzed by researchers are often worst-case scenarios of removal of biomass, for example whole tree harvesting is looked at in the research reviewed by Federer et al., 1989. The Desert Branch timber harvest acreages for the alternatives are shown in Chapter II of the EA. Most of the harvests would leave about 2/3 of the basal area. Few of the areas to be harvested have been harvested in recent decades, and future entries for logging on the same acreage would not occur within the next 15 years. Future environmental analyses would be done for any proposed projects. Tree harvesting can remove varying amounts of nutrients from a stand. However, for the Desert Branch project, because of the relatively dispersed nature of the cuts, the vegetation removals are not expected to alter soil nutrient levels, particularly for nitrogen (Adams, 1999). Whole tree harvesting potentially has the greatest effect on the total Ca pool and there is no whole tree harvesting proposed in this OA, and clearcuts make up a small portion of the area. Therefore, any effects to nutrient cycling should be minimal. Although frequently hypothesized, nutrient deficiencies as a result of over story removal have not been reported in eastern hardwood forests (Adams, 1999). Most overstory removals in these forests would be the second or third removal harvest since 1900.

In addition to the lower intensity of the harvests themselves, as compared to the intensive management discussed in most of the research, several other factors would serve to lessen potential effects of soil nutrient depletion, should current hypotheses be borne out by future research. Only sawtimber will be removed in much of the sale; pulpwood will not be sold in the helicopter harvest units. Under the riparian mitigations included in Alternatives 2, 3, 4, and 6, no harvest will occur within 25 feet of any ephemeral channel in all harvest units (50 feet in even aged regeneration harvests), with the unharvested distance from larger stream channels being much longer. Topwood will not be removed in the helicopter units, and harvest will result in topwood being scattered over those units. Reentry periods under the current 6.1 management guidelines will be at least 10 years. Future entries may involve harvests on acreage that has had previous harvest, but in past timber sales, harvest on previously harvested acreage has usually involved smaller acreage. In addition, any future entries into the Desert Branch OA would undergo an effects analysis.

Uncut areas near stream channels, including the area left uncut near channels in Alternative 2, 3, 4, and 6, and to a lesser extent, the residual trees in thinned areas, would provide protection to streams in the Desert Branch watershed. The uncut trees near stream channels, under the Proposed Action, Alternative 1, would provide less protection to streams than would occur in the other action alternatives. These buffers should act to

intercept nutrient runoff from soils upslope. It would be expected that these nutrients, particularly nitrates leaching from the system, would 1) be taken up by vegetation growing in the buffer strips, 2) have more of a chance to encounter wet soils where denitrification would occur, and/or 3) enter the stream channel at a slower rate, allowing more opportunity for plant uptake.

Neither current research results nor local experience has indicated that soil nutrient depletion, especially soil calcium, as a result of proposed harvests would be likely to occur in the Desert Branch OA. However, none of the research has been conducted on soil types that are as sensitive to soil acidification as those soil types in the Desert Branch OA or those soil types that form over the Pottsville Group. Consequently, there may be a slight risk that unknown long-term effects to soil nutrient pools would occur, and based on the research, it is unlikely that these long-term effects would be easily detected.

For all the action Alternatives, no significant adverse direct, indirect, or cumulative effects on the soil resource would be expected given the use and implementation of mitigations outlined in the EA and Forest Plan standards and guidelines.

Wildlife

Affected Environment: The Forest Plan designates MP 6.1 to be managed for species intolerant of disturbance – i.e. wild turkey, black bear, and associated species. Some of these associated species include squirrels, woodpeckers, mice, deer, songbirds, bobcat, owls, hare and amphibians (see Forest Plan, L-2, for complete list). The Forest Plan recommends dispersion of habitat elements, such as enhanced mast production and balanced age classes, beneficial to the above species (p. 165).

Effects on "wildlife" cannot be generalized. A management method which creates habitat for one species may remove habitat for another. Therefore, one of the most basic objectives of wildlife management is to maintain a region's native wildlife populations, with a particular emphasis on threatened, endangered, or sensitive (TES) species (Hunter, 1990). TES effects are dealt with in another section of this chapter while this section evaluates the effects of the proposed projects on species in the turkey/bear association. Effects will be based on habitat management, mast and other food resources, and disturbance.

The Forest Plan objectives for wildlife management in this prescription emphasize the even-aged system of silviculture as a means of attaining diverse tree stands, openings, and open understory conditions, which have been noted to provide benefits for wild turkey and bear (Bailey and Rinell, 1968; Miller, 1975; Rieffenberger et al., 1981; Wunz, 1989; Wunz, 1990). Other species in the turkey/bear associations can benefit from the additional food, cover and nest sites provided by forbs, grasses, young seedlings, blackberries, etc., in young clearcuts (Robinson and Bolen, 1984).

The wood thrush, another species in this association, is an interior species which requires larger areas of overstory forest. Robbins (1979) estimates that 250 acres is the minimum forest area required to sustain viable breeding populations of this thrush. A challenge is to

maintain sufficient habitat for interior species while providing for the needs of desired edge and early successional species. Maintaining canopied stands of a sufficient size, along with younger stands throughout the landscape, provides that a certain animal requiring a specific seral stage would generally be able to find that habitat somewhere in the area.

Oak and hickory, two of the more preferred mast species on the National Forest are not very abundant within this project area. Currently, about ½ of the stands in compartment 69 contain at least 10 percent or greater of these two mast producers, while there are no stands in compartment 70 that are close to the 10% mark. Black cherry, also a mast producing species, can be found in 80% of all the stands and in about 20% of all the stands black cherry makes up more than 10% of the tree species.

Mast species, such as oak, hickory, sassafras, and black cherry, are shade intolerant or have intermediate tolerance to shade. Seedlings may sprout beneath an overstory canopy, but unless the overstory is removed by some natural disturbance or by silvicultural management, the majority of seedlings will die off or remain as stagnated understory trees. Other species occurring in this project area, which contribute to a varied food supply, include beech, yellow poplar, black gum, grapevine, greenbrier and aspen.

Frequent human disturbance has been found to detract from an area's potential to provide quality habitat for bears and turkey brood range (Bailey and Rinell, 1968; Miller, 1975; Still and Bauman, 1990).

Short-term disturbance from proposed projects would include soil disturbance during road construction, wildlife opening/waterhole creation, tree felling, and skidding; noise and other equipment presence; and increased human activities during project implementation. Long-term disturbance could occur after project completion if easier access provided by the new roads, although closed to public vehicular use, attracts more people into the area.

Alternative 1 - Proposed Action: The Proposed Action would create 93 acres of early successional habitat in six clearcut, two-aged, and shelterwood harvests dispersed throughout the project area. This would remove closed canopy habitat needed by some wildlife species; however, habitat for species needing young stand characteristics would be created. The open canopy conditions would last about 20-30 years which is about the time it takes for the trees to reach about 1/3 the height of surrounding trees. The 2 aspen plantings would have a similar effect on a smaller scale.

The creation of 16 acres of wildlife openings and 23 acres of savannahs, 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 savannahs would also create habitat for those species using a grassy open understory with moderate canopy cover. Turkeys 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, along with the 95 acres of early successional habitat mentioned above, 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 clearcut, two-aged, shelterwood, and open areas. 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 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 which leave snags and den trees in thinning and other cutting units (p. 175).

Deer populations within this project area and adjoining areas have been increasing slowly over the past decades with this trend expected to continue. 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).

Clearcut, two-aged and shelterwood harvests, aspen planting areas, and wildlife/savannah openings (134 acres) would create ground level vegetation available for browse, nesting and cover. In addition, slash left in clear cuts *(See mitigation #1)* would make it harder for deer to move around within these stands, minimizing browsing and retaining much of the new growth.

The thinning of 973 acres 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.

Six new waterholes would provide additional habitat for amphibians, and open water sources for many species. Studies have shown bats to forage for insects over waterholes

and road ruts, as well as use them for drinking (MacGregor, 1996). Some birds, snakes, and mammals could benefit from the increased food supplies provided by amphibians near these waterholes.

Under the proposed action the 2,423-acre pool of old growth would be reduced to about 1,030 acres or 34% of the project area. This area would provide characteristics, such as snags, large trees, cavities, decaying logs on the forest floor, and natural gaps dispersed throughout the project area. Woodpeckers, chickadees, squirrels and other species would benefit from insects, fungi, etc., available in these stands. These stands would have the potential over time to gain attributes such as mosses, epiphytes, and microorganisms (characteristic of older stands) before a final designation is made.

The Proposed Action would provide for 93 acres of regeneration harvest (clearcut, shelterwood, and two-aged) where some mast-producing species such as oak, black cherry, and hickory would regenerate. 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 the 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 season food sources.

Twenty-three acres of savannah would maintain an overstory canopy of various mast trees such as oak, hickory, black gum, and beech. Releasing these reserve trees should expand their crowns and increase mast production.

Aspen planted on 2 acres would provide diversity within the area as this species although present is not commonly found. Wildlife species that would benefit from the aspen plantings include ruffed grouse, purple finch, red squirrels, rabbits and mice.

The release of the Asiatic Chestnut trees will result in healthier trees that will produce more mast for wildlife consumption.

The Proposed Action would cut and skid trees on 559 acres of the project area, cut and helicopter log on 546 acres, and construct 1.3 miles of new road. Habitat disturbance during project implementation would occur from (1) soil disturbance and compaction during road construction, wildlife opening/waterhole 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.

Long-term disturbance would not change much from the existing condition as 1.3 miles of new road would be built onto the existing road system and this system will continue to be gated to public motorized travel.

Alternative 2: Early successional habitat effects would be slightly less as 20% fewer acres would be regenerated as compared to the Proposed Action. Two-aged and shelterwood harvest acres would remain the same while the acres of clearcut would be about ½ as much (21 acres, including the 2 acre of aspen regeneration). The effects of thinning would be less than in the Proposed Action as 84 fewer acres would be harvested (889 acres).

Savannah and waterhole effects would be the same as for the Proposed Action.

Planting red spruce on two acres of the created wildlife opening in stand 70/3 would enhance the conifer component of the project area. This would benefit several species in addition to the West Virginia Northern Flying Squirrel.

The effects of wildlife openings would be less as only 12 (including the 2 acres of spruce planting) not 16 acres would be created.

Mature habitat effects would be the same as for the Proposed Action.

Because about 20% fewer acres would be regenerated, the regeneration of mast would be less. This would indicate that without regenerating mast producing species, the mast crop would eventually begin to decline within the project area.

Effects of aspen planting would be the same as those in the Proposed Action.

Alternative 2 proposes silvicultural and wildlife habitat management over a total of 1002 acres in the project area and constructs 1.3 miles of road. Since no helicopter logging would occur all of the timber would be removed by ground skidding. More of the area would be logged using ground skidding (443 acres more) than in the proposed action. There would be slightly increased disturbance associated with this (mostly soil disturbance), but the short-term disturbance effects during project implementation would

be similar to the Proposed Action because fewer total acres (103 fewer acres) would be impacted.

Alternative 3: Regeneration harvests or wildlife openings/savannahs are not proposed under this alternative. Thus no early seral stage habitat would be created to benefit species preferring that habitat. Thinning would be done over 534 acres while individual tree selection harvest would be done on 606 acres. The effects of these two harvest methods would be similar to the Proposed Action because the total acres to be harvested are similar.

No wildlife openings/savannahs would be created to provide habitat for species preferring open grassy areas. Six acres of helicopter landings, however, would be managed as wildlife openings after harvesting is completed. Because of the amount of soil compaction in association with the creation and use of a landing will inhibit wood shrub and tree growth, maintenance of these openings by mowing may not be needed. Maintenance can be accomplished during the next entry when the lands will be used again. Because this alternative does not create any openings in the canopy from clearcuts or wildlife openings, other than those for landings, the potential habitat for closed canopy species would be greater than those in the Proposed Action or Alternative 2.

Mature habitat effects would be the same as in the Proposed Action.

No regeneration for hard mast, aspen planting or spruce planting would be done. Effects would be the same as Alternative 1 for chestnut release.

Alternative 3 proposes silvicultural and wildlife habitat management over a total of 1140 acres in the project area with no road construction. Of this area 830 acres would be helicopter logged while 310 acres would be logged by ground skidding. Because more of the area would be logged using helicopters, the short-term disturbance effects during project implementation would be less than the Proposed Action. This is because ground skidding would occur on about 50% fewer acres than the Proposed Action.

This alternative has slightly less potential than the Proposed Action and Alternative 2 for increased human entry into the area following the project. This is because no new road construction would occur and fewer acres would receive skid trails that are later used as paths for humans to follow.

Alternative 4: Alternative 4 would have 15 fewer acres of early successional habitat and 14 acres more thinning than would the Proposed Action. The effects of these activities would offset each other thus being the same as in the Proposed Action.

With 40% fewer wildlife openings and savannahs the benefits associated with them would be reduced.

Mature habitat effects would be the same as in the Proposed Action.

Effects of hard/soft mast regeneration would be similar to that of Alternative 2.

Effects of the aspen planting would be the same as that in Alternative 1. Effects from spruce planting would be the same as in Alternative 2.

This alternative proposes silvicultural and wildlife habitat management over a total of 1,090 acres, while not constructing any new roads. The effects of disturbance from project activities would be similar to those discussed in the Proposed Action.

This alternative has less potential than the Proposed Action for increased human entry into the area following the project because no new road construction would occur. However, there is more potential than in Alternative 3 because there would be more skid trails from the 335 acres that would be logged using that method.

Alternative 5: Little early successional habitat would occur other than in openings created by natural disturbances, such as fire, windthrow, and insect damage. Early successional species would find habitat spread in small patches throughout the area; some species needing larger areas of this type of habitat would probably decline as the existing clearcut 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. Any area sensitive species requiring larger expanses of closed canopy forest would be maintained at current levels, unless natural events regenerate large areas.

With no habitat management to enhance browse or mast availability, management activities would not have an impact on deer populations. However, populations would probably continue to grow because the project area and adjacent lands have more mast, browse and cover than is currently being utilized.

No additional waterholes would be created.

No trees currently producing mast would be removed; however, no mast trees would be regenerated for future sustainable yields. Cherry, some oaks, and hickory would not regenerate over wide areas unless there was 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 being replaced by younger trees. Deer populations could begin to decrease at this point.

Mast producing shrubs would remain in the under story but would not produce as much mast as in the proposed action where light conditions in the understory would be increased by management actions. Natural breaks in the canopy could be created by overstory tree mortality, however.

There would be no direct effects to any individual species from any management activities of equipment use, road compaction, soil disturbance, and vehicle traffic.

Access and use of the area would remain at the current levels with no indication of any increased use of the area.

Alternative 6: Alternative 6 would have 15 fewer acres of early successional habitat and 71 fewer acres of thinning than would the Proposed Action.

Effects from wildlife openings would be the same as in the Proposed Action except that three openings totaling 4 acres would be dropped. Since the savannahs would be the same as in the Proposed Action, effects from the savannahs would be the same.

Mature habitat effects would be the same as in the Proposed Action except for not thinning in stands 69/17 and 18.

Effects of hard/soft mast regeneration would be similar to that of Alternative 2.

Effects of the aspen planting would be the same as that in Alternative 1. Effects from spruce planting would be the same as in Alternative 2.

Alternative 6 proposes silvicultural and wildlife management over a total of 1015 acres in the project area and constructs 1.3 miles of road and ½ mile of temporary road. The effects of disturbance from project activities would be slightly less than those discussed in the Proposed Action since there would be no harvesting in the Camp 29 cove area of stand 70/7 and in the proposed helicopter thinning area in stands 69/17 and 18.

This alternative has similar potential as the Proposed Action for increased human entry into the area following the project. Although the temporary road would provide a pathway for foot travel after the project, effects would be similar to that of the Proposed Action since it would likely replace a skid trail rather than creating another travelway. The dropping of 71 acres of thinning and 15 acres of clearcutting would result in human activity in those areas being similar to what would result from Alternative 5.

Cumulative Effects: The project area is bordered on the north and east by National Forest land with a little private land along the North Fork of Cherry. Some of the private land but none of the National Forest Land was logged within the last ten years. The land south of the project is managed for timber production by an industrial landowner. Historically, management on these lands has been consistent with a general plan to regenerate about 10 % of their land each 10 to 15 years. Although this is heavier than what the National Forest Plan calls for (7 % every 15 years) it is very similar and would provide plenty of older stands of trees for wildlife use (see below for a discussion on 7 % regeneration of suitable stands). Several recent clearcuts have occurred on their land with the likelihood of more to occur in the next 10 to 20 years (before our next entry into Desert Branch). West of this project area is the town of Richwood. The management of this area will remain the same (residential) for a long time.

Cumulative effects of fragmentation on wildlife, for any of the Action Alternatives (See Fragmentation Effects), are not significant. None of the proposed activities in the

Proposed Action or Alternatives would create any isolated woodlots. Post management landscape would be composed of 2 to 25-acre openings in a mosaic of continuous forest canopy. The Desert Branch projects at the most would affect about 1,140 acres (Alternative 3) in timber cuts and wildlife management, and 1.3 miles of new road construction (This is about 38% of the entire project area). The Forest Plan on page 172 allows for a maximum of 40% of the area acres to be disturbed so that there is adequate escape cover for wildlife species. The Proposed Action and Alternative 4 would affect approximately 37 % of the National Forest land while Alternative 2 would affect approximately 33%. Alternative 6 would affect approximately 34%. Habitat for animals needing larger blocks of forested area would still be present in the sections of this OA not being managed at this time, and in adjacent land areas (which are mostly located on the National Forest).

Long-term disturbance to wildlife would be minimized because MP 6.1 provides for ten years of quiet time between the end of one set of major, companion projects and the start of another (Forest Plan, page 173), all Forest Service roads into the area are closed to public vehicle travel, helicopter logging if used in future harvests would require few if any new roads and skid trails, and because over 60 percent of the OA would not be disturbed each entry. In addition logging on the timber industry land adjacent to this OA would occur about every 10 to 15 years. This also allows for a quiet time, however some roads are currently and are expected to remain open to the public for most of the year.

If 7 percent of the suitable timber acres in the project area were regenerated over every 15-year entry period, when the objective of a 200 year rotation period is reached, at least 50 percent of the area would be in stands greater than 100 years of age. In addition, stands which are unsuited for timber harvesting and stands designated as mature habitat would provide habitat greater than 200 years old. The rest of the stands would vary from 0 to 100 years of age. This would provide for a variety of habitats across the project area.

Species, such as salamanders, whose populations decline when a clearcut is created, could experience lower population densities. For example, clearcuts which are made this entry would be approximately 15 years old at the time of next entry. If it takes populations of some species 20 years or longer to re-populate a clearcut, some populations may not have yet recovered when the next entry's clearcuts are done. This effect would be site specific to the clearcut acres. Populations adjacent to clearcuts should be maintained at current levels unless some large-scale natural disturbance would occur.

In general, it is not anticipated that any of the wildlife effects of the Proposed Action or alternatives would be significant for any species. This is because the percentage of the area being regenerated is under the 8% allowed by the Forest Plan in any of the alternatives, (p. 174); the amount of the area disturbed under any of the alternatives is within the Forest Plan standards and guidelines; the amount of road construction will not cause the road mileage to exceed the Forest Plan standards and guidelines; and the roads would be closed to public vehicular use. Early successional species may increase with certain management practices, while species needing large stands of overstory forest may decline in some sections of the project area. Other species may change their range to

avoid certain stands. It would not be expected that any species would disappear from the project area because of management projects.

In summary, it is not anticipated that any of the projects in the Proposed Action or alternatives would have significant direct, indirect, or cumulative effects on terrestrial wildlife populations in this project area or their viability.

Fisheries

Affected Environment: The North Fork of Cherry River is a stocked trout fishery from the Richwood City water intake (behind the Four Seasons Motel) upstream to the 3rd bridge. The project area borders a portion of this fishery.

Brook trout is an indicator of good water quality conditions in cold-water streams on the Forest. While suitable spawning and resident habitat for this species exists in all perennial streams within the project area, the quality of habitat may be affected by sedimentation. According to Forest Plan population objectives for trout, the population objective is 35 pounds of trout/acre in a mixed hardwood type.

Other fish species, including the candy darter as well as other aquatic life such as insects, hellbenders, and crayfish are a part of this ecosystem. (See the TES effects section of this document for information on the candy darter and hellbender.) Native trout and minnows are also found in Handle Factory Hollow and Desert Branch; however, these streams are not fished very often.

The North Fork of Cherry is slightly acidic and cannot support a year round trout population. For the past 5 years the WV DNR has been placing powdered limestone directly into the river and in several side tributaries with the intention to lower the acidity thus allowing the river to support a trout fishery and improve the aquatic ecosystem. A similar liming project has been going on in the Cranberry River with much success. WV DNR data shows that this project has been very positive for both trout year round survival and an increase of aquatic insects and invertebrates.

Recreational fishing prior to liming of the river occurred around the dates that the river was stocked. Since the liming, recreational fishing occurs throughout the year and is increasing yearly.

None of the alternatives if selected would have any impact on fisheries because no proposed activities would occur within these riparian areas. Some sediment may enter these streams from the proposed activities but the amount is expected to be minor and short term with the mitigating measures applied to exclude activities from riparian areas.

Cumulative Effect: Other timber sales will occur within this project area or within the watershed of the North Fork of Cherry with similar effects on the recreational fisheries, over the next few decades. One sale is in initial planning stage for the Hunters, Hacking, and Coats Run subwatersheds. No cumulative effects to the fisheries resource in the North Fork of Cherry from sediment production or removal of stream shade would occur

under any of the action alternatives, because the direct effects would be minor, short term and mitigated by location and erosion control methods. Any potential cumulative effects of planned timber harvests on acidity and nutrient status in the North Fork of Cherry, or the Cherry River are also mitigated by location, intensity of harvest, and the small proportion of acreage impacted in these watersheds, as well as by the ongoing liming of the river. Erosion control will occur along the river where banks are eroding, especially along the Fork Mountain Trail. The repair of these eroding bank areas will require heavy equipment to enter the stream for some short-term disturbance; however, by repairing these damaged stream banks the long term effects will be greatly reduced.

There are no known significant direct, indirect or cumulative effects to fisheries within the project area.

Management Indicator Species (MIS)

Affected Environment: Nine wildlife and one fish species are identified in the Forest Plan as Management Indicator Species. Species identified represent important game species, T&E species and species inhabiting specific ecosystems.

Using a variety of techniques, the Forest has monitored MIS species and their habitat since 1986. Wildlife monitoring data collected, including changes in available habitat, are summarized in annual Forest and Fish and Wildlife Monitoring Reports. Information from these published reports, as well as on-going or unpublished monitoring data, is incorporated here by reference.

The following includes discussions of present habitat conditions for MIS within the project area. Population and habitat trends on the Forest and in the project area are also discussed where information is available.

White-tailed Deer (*Odocoileus virginianus*)- 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 non-forested ecosystems providing 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). Habitat in the project area is currently meeting white-tailed deer food, cover and water requirements.

Approximately 2% of the project area is composed of developed and maintained wildlife openings, beaver dam areas and brushy areas where forage availability for deer is high. Existing openings have been constructed over the past 20 years in association with timber management activities. Adjoining private lands contains residential lawns, clear-cuts and seeded opening.

About 27% of the project area is currently capable of hard mast production,

predominately by oak, black cherry and beech. Historic large-scale disturbances in the late 19th and early 20th centuries (extensive logging, wildfires and chestnut blight) created an abundance of early serial habitat in a relatively compressed timeframe. Today, these areas have matured to 60 + year old stands that provide hard mast. These stands provide year-round food, but most importantly, winter food that can be a limiting factor for white-tailed deer.

According to Forest Plan population objectives for white-tailed deer, the Desert Branch population objective is 50.5 deer/square mile in a mixed hardwood type (Forest Plan 1986, Appendix L). Big Game bulletins, a yearly publication of the WV Division of Natural Resources, tracks 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 Desert Branch Opportunity Area (3,013 acres or 4.7 square miles) is located in the southern portion 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 12- Estimated Deer Populations in CWMA

Cranberry Wildlife Management Area					
Year	'97	'98	'99'	'00	'01
Buck Harvest	439	410	421	431	491
Est. population CWMA	4390	4100	4210	4310	4910
Est. deer Per sq. mi. in Desert Branch OA	10	9	9	9	14
Est. deer pop. In Desert Branch	47	42	42	42	66

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.

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 1983). All these foods are present in the project area.

Regenerated areas less than 15 years old (1%) are found within the project area and offer increased soft mast supplies during summer. Temporary and closed system roads, wildlife openings, the marsh in the Desert Branch drainage, and log landings provide soft mast and forage habitat.

Thickets of grape and greenbrier also, provide key feeding areas for black bear. Greenbrier thickets are found in several stands proposed for treatment. Grape arbors are not as common and occur mostly along upper slopes and ridge-tops.

Mid-successional and mid/late successional stands would provide shrubs and trees (dogwood, serviceberry, black gum, fire cherry) that produce soft mast. Currently there are no acres of this habitat within the OA, however, the 1% of regeneration areas is about to provide some of this habitat.

Mature hardwood stands provide important sources of year-round food, particularly fall and winter food such as acorns and nuts. Approximately 98% 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 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. The project area road density is 0.84 miles per square mile of local roads. This is below the recommended road density limit of 1.5 miles per square mile of local roads.

According to Forest Plan population objectives for black bear, in all 6.1 management areas the objective is .83-bear/square mile. 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.

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 6.1 management areas is 640-squirrel per square mile in a mixed hardwood type ecosystem. With 27 % of the area having hard mast

producing vegetation the populations of gray squirrels would be lower than the plan objectives. This small games 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.

Turkey (Meleagris gallopavo)– Wild turkey is 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 approximatley 35 acres of grass/forb habitat, created through forest management activities and the marsh area of Desert Branch.

Mature mixed hardwood forest types cover the majority of the project area. Eastern wild turkeys eat a variety of plant and animal matter as it is available but important fall and winter foods are the fruits, seed, or nuts from wild grape, oaks, beech, ash, dogwood and black cherry. The project area provides hard mast in the form of acorns and beechnuts and black cherry. Wild grape, ash and 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 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 6.1 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 Desert Branch Opportunity Area is 4.7 square miles and the Cranberry Wildlife Management Area (CWMA) is 461 square miles. Estimated turkey populations, based on harvest numbers, are shown in the table below.

Table 13 - Estimated Turkey Populations in CWMA

Year	'97	'98	'99'	'00	'01
Spring gobbler Harvest	68	66	64	45	60

Est. population CWMA	680	660	640	450	600
Est. turkey Per sq. mi. in CWMA	1.5	1.4	1.4	1	1.3
Est. turkey pop. In Desert Branch	7	7	7	5	6

Indiana bat (Myotis sodalis) – The Indiana bat occupies 26 known hibernacula in West Virginia (Forest BA). Population objectives in the Recovery Plan are two-fold based on hibernacula priority. Priority Two hibernacula (found in WV) recovery objectives includes those for Priority One hibernacula and in addition: protection and documentation of stable or increasing populations for three consecutive census periods at 50% of the Priority Two hibernacula in each state, and the overall population level must be restored to that of 1980. A revised draft recovery plan has been written.

There are no caves in the project area as well as within a five mile radius. Indiana bats have been noted to use habitat as far as 5 miles from a hibernacula as swarming areas. Some males can remain near the hibernacula year around (Stihler 1996). Potential habitat exists within the CWMA. Stands of mixed hardwoods greater than 70 years old (81% of the Project Area) could provide maternity and foraging habitats.

One Indiana bat was captured in August 1999 within the project area, as part of the forest monitoring of this species. This bat is believed to be a migrating bat as there are no known hibernacula or maternity colonies within or close to the project area. The site of this capture has been monitored yearly as outlined in the Indiana Bat recovery plan.

Virginia big-eared (Corynorhinus townsendii virginianus) – In West Virginia, 10 caves are known colony sites for VBEB. The criteria needed to downlist this species to threatened will be documentation of long-term protection of 95% of all known active colony sites and documentation of stable or increasing populations at 95% of known active maternity sites and hibernacula for a 5 year period. Research by Stihler has shown that VBEB's forage within 6.5 miles of the hibernacula. There are no known Virginia big-eared bat hibernacula or maternity caves within the CWMA or within a 6.5 mile radius of the project area.

Cheat Mountain salamander (Plethodon nettingi) – This small woodland salamander is found in red spruce and mixed deciduous forests above 2,700' in microhabitats that have relatively high humidity, moist soils and cool temperatures. The recovery objective is to remove the salamander from the list of federally endangered and threatened species.

Moving towards that end, recovery objectives listed in the Recovery Plan include: (a) Monitoring of ten populations over a period of ten years shows them to be stable or expanding, (b) 100 populations distibuted throughout its range are in protected ownership, (c) sufficient life history information exists to assure appropriate management as needed, and (d) monitoring and management programs are implemented on a continuing basis.

There is no known cheat mountain salamander habitat within the project area.

West Virginia Northern flying squirrel (Glaucomys sabrinus fuscus)– Northern flying squirrels have been identified during nestbox checks in several areas of the CWMA. The preferred habitat of the WVNFS in the southern Appalachians is conifer/northern hardwood ecotones or mosaics consisting of red spruce and fir associated with beech, yellow birch, sugar maple/red maple, hemlock and black cherry (NFS Recovery Plan 1990). This area would not be considered suitable WVNFS habitat. Recovery objective is to remove the squirrel from the list of endangered and threatened species. Moving towards that end, recovery objectives listed in the Recovery Plan include: (1) Squirrel populations are stabel or expanding in a minmum of 80% of all geographic recovery areas designated for the subspecies, (2) sufficient ecological data and timber management data have been accumulated to assure future protection and management, and (3) Geographic recovery areas are managed in perpetuity to ensure that sufficient habitat for populatoin maintenance/expansion and habitat corridors, where appropriate elevations exist, to permit migration among areas.

There are no known locations of WVNFS within the project area.

Snowshoe hare (Lepus americanus)-This species occurs in second-growth beech/birch/maple forests and in young spruce stands both with dense rhododendrom cover. They are indicators of late early succession high elevation hardwood/conifer ecosystems. They feed primarily on beech, birch, blueberry brambles, grasses, hemlock, highbush cranberry, maples, red spruce, rhododendrom and serviceberry. In the winter when snow is deep, they are forced to prune higher branches. According to Forest Plan population objectives for snowshoe hare, the population objective is 54 snowshoe hare/square mile in a mixed hardwood type with spruce within 6.1 management areas. Snowshoe hare is a West Virginia small game species with a daily bag limit of 2, however WVDNR does not track annual harvest numbers. The Forest is currently working with the Northeast Forest Experiment Station in Parsons, WV to develop a monitoring plan for snowshoe hare.

Brook Trout - This species is an indicator of good water quality conditions in cold-water streams on the Forest. While suitable spawning and resident habitat for this species exists in all perennial streams within the project area, the quality of habitat may be affected by sedimentation. According to Forest Plan population objectives for trout, the population objective is 35 pounds of trout/acre in a mixed hardwood type.

Direct and indirect effects of Alternative 1 – Proposed Action: This alternative

proposes timber harvest, creating wildlife openings and waterholes, creating vistas, planting aspen, planting spruce, releasing chestnut and constructing new roads.

White-tailed Deer and Black Bear – Implementation of Alternative 1 would not directly affect white-tailed deer in the area. Indirectly, timber harvests and wildlife opening construction would create additional food and cover for white-tailed deer. Waterhole development would create additional water sources, and aspen plantings and releasing chestnuts would provide increased habitat diversity within the area. New roads would create some short term disturbance but the grass/forbs associated with this road would provide some much needed habitat variety.

Gray Squirrel –Direct effects to gray squirrel will be short-term in nature and may involve some individual mortality during logging if cutting occurs during the nesting season. Indirectly, timber harvests that promote regeneration or larger mast production of oak, hickory, maple, blackgum and beech would create additional food for gray squirrel. Retention of snag and cull trees in harvest areas will enhance nesting opportunities for squirrel.

Wild Turkey –Wild turkey numbers are likely to be limited by shortage of brood range in forested areas where pastures and crop fields are not common. Turkey will benefit from the creation of 39 acres of permanent wildlife openings proposed in Alternative 1. Wild turkey poults depend on insects, spiders and other invertebrates during the first month of life. These protein-packed foods are most abundant in openings.
Indirectly, timber harvests and wildlife opening construction would create additional food for turkey. Waterhole development would create additional water sources. New roads would create some short term disturbance but the grass/forbs associated with this road would provide some much needed habitat variety.

Indiana Bat – Indirectly, timber harvests would improve Indiana bat foraging habitat. Commercial thinnings may indiretly benefit Indiana bats by reducing canopy closure to a more optimal level for indiana bat foraging. Thirty-nine acres of forested land would be converted to openings with waterholes. Creating openings would change the type of potential foraging habitat available in the project area. Other indirect effects of harvesting include increase solar radiation around potential roost trees and travel and forage corridors will be created. Waterhole construction would provide additional water resources for drinking and foraging.

Virginia big-eared bat – Implementation of Alternative 1 will not directly affect Virginia big-eared bats. There are no known hibernacula near the project area.

Cheat Mountain salamander – There are no activities planned in known CMS habitat.

West Virginia northern flying squirrel – There are no proposed timber activities planned in suitable VNFS habitat therefore no effects are anticipated. Further information is found in the Biological Evaluation.

Snowshoe hare –There is no known snowshoe hare habitat within the project area, thus there will be no direct effects to snowshoe hare from this treatment.

Brook trout – This alternative would have little effect on brook trout. Helicopters will be used to log the steep slopes adjacent to the North Fork of Cherry and several of its tributaries. This will reduce the amount of skid trails and roads needed to harvest the area. With less soil disturbance and riparian guideline protection the amount of sediment entering the streams will be minimal and short term.

Direct and indirect effects of Alternative 2: This alternative was developed to address no helicopter logging, meaning that more ground skidding and roads would be needed to remove the timber. This alternative include similar management actions as those in Alternative 1 and additional road reconstruction.

White-tailed deer, black bear, gray squirrel, wild turkey, Indiana bat, Virginia big-eared bat, Cheat Mountain salamander, West Virginia northern flying squirrel, snowshoe hare, and brook trout – Refer to species discussion in Alternative 1 for all but road activities and spruce planting. Additional road reconstruction will increase human disturbance on area wildlife. It will also increase the number of acres of linear openings maintainable for turkey foraging. The planting of spruce will enhance potential West Virginia northern flying squirrel and snowshoe hare habitat.

Direct and indirect effects of Alternative 3: This alternative was developed to address fragmentation. This alternative will minimize the creation of openings, waterholes and aspen planting while providing wood products through thinning and individual tree selection harvest methods. As in Alternative 1 helicopter logging is planned for the steeper slopes along the North Fork of Cherry drainage.

White-tailed deer, black bear, gray squirrel, wild turkey, Indiana bat, Virginia big-eared bat, Cheat Mountain salamander, West Virginia northern flying squirrel, snowshoe hare, and brook trout – Refer to species discussion in the no action Alternative 5 for all but the thinning and individual tree selection harvesting. These harvests would not provide the early seral vegetation that clearcut, two-aged or shelterwood harvest would. This habitat is important to deer, bear, turkey, bats and hares. However the individual tree selection will provide small canopy breaks that will provide some of this habitat and thinning will open the canopy enough to enhance understory growth. This alternative would not construct any new road which would reduce soil movement and potential sediment impact to the trout and reduce future disturbance to wildlife, however, it would not provide for a linear opening of grass/forbs.

Direct and indirect effects of Alternative 4: This alternative was developed to address no new roads while using helicopters and conventional logging to accomplish similar activities as in Alternative 1. In this alternative there would be fewer clearcuts, wildlife openings, waterholes, and road construction. As in Alternative 2 spruce planting is proposed.

White-tailed deer, black bear, gray squirrel, wild turkey, Indiana bat, Virginia big-eared bat, Cheat Mountain salamander, West Virginia northern flying squirrel, snowshoe hare, and brook trout – Refer to species discussion in Alternative 1 for all but openings, spruce planting, waterholes, and new roads. Fewer openings (25 acres) and waterholes would have a slight negative effect on deer, bear, turkey, and bats over Alternatives 1 and 2, as there would be less early seral habitat and water sources for these species. Planting of spruce would have a slight favorable impact on the flying squirrel and hare as they both prefer this species in their habitat. No new roads would have a favorable impact of bear, turkey and dear as it would reduce disturbance but there would be a slight negative impact over Alternative 1 on deer, turkey, and bats as there be fewer linear openings.

Direct and indirect effects of Alternative 5 – No Action: It is a "status quo" strategy that allows current administrative activities and policies. However, the "No Action" alternative is based on the premise that ecosystems change even in the absence of active management.

The project area would remain a relatively even-aged forest made up of a wide variety of flora and fauna species. Current routine management activities would continue. No timber regeneration treatments are proposed. Existing wildlife openings would be maintained but no additional wildlife openings would be constructed and no additional "edge" would be created. The current level of permanent fragmentation would remain. Natural events such as "blow down" would still occur and may open small areas, creating short-term conditions similar to constructed openings. Edge conditions provided by 25 year old or less clearcut units would eventually decrease. Existing roads and trails would continue to be maintained. Late successional habitat will increase and older growth conditions would become more common.

White-tailed deer – There would be no direct effect to white-tailed deer from Alternative 5. The project area would continue to meet food, cover and water requirements for the white-tailed deer. Indirectly, within one or two years, the existing 31seedling/sapling acres would convert to sapling/pole habitat, reducing browse habitat. Deer would rely more on understory browse in older forested stands to satisfy their needs as no new seedling habitat will be created.

Black bear – There would be no direct effect to black bear from Alternative 5. The project area would continue to meet black bear food and water needs. As additional stands mature, the project area would offer better opportunities for tree denning and hard mast foraging, however long term (50 years plus) shade intolerant mast producing species may decrease, reducing food supplies. Black bear may find habitat conditions approaching optimal as the area develops greater amounts of larger diameter live and dead, standing and downed wood habitat.

Gray squirrel – There would be no direct effect to gray squirrel with Alternative 5. The project area would continue to meet food, cover and water requirements for gray squirrel. As stands mature, hard mast habitat would increase, while earlier successional stages would decrease; however long term (50 years plus) shade intolerant mast producing

species may decrease, reducing food supplies.

Wild turkey – There would be no direct effect to eastern wild turkey with alternative 5. The project area would continue to meet food, cover and water requirements for wild turkey. As stands mature through time, hard mast habitat would increase, however long term (50 years plus) shade intolerant mast producing species may decrease, reducing food supplies. No additional openings would be created to promote brood feeding areas. There will be no change in termal cover as current conifer habitat would remain stable.

Indiana bat –There would be no direct effect to Indiana bat with alternative 5.

Virginia big-eared bat - There would be no direct effect to Virginia big-eared bat with alternative 5.

Cheat Mountain salamander - There would be no direct effect to Cheat Mountain salamander with alternative 5.

West Virginia northern flying squirrel - There would be no direct effect to Virginia northern flying squirrel with alternative 5.

Snowshoe hare - There would be no direct effect to Snowshoe hare with alternative 5.

Brook trout – There would be no change from the existing situation; thus the trout population would not be impacted by this project.

Direct and indirect effects of Alternative 6: This alternative was developed to address access and fragmentation while using helicopters and conventional logging to accomplish similar activities as in Alternative 1. In this alternative there would be fewer clearcuts, acres of thinning, wildlife openings, waterholes, and road construction. As in Alternative 2 spruce planting is proposed.

White-tailed deer, black bear, gray squirrel, wild turkey, Indiana bat, Virginia big-eared bat, Cheat Mountain salamander, West Virginia northern flying squirrel, snowshoe hare, and brook trout – Refer to species discussion in Alternative 1. Fewer openings (4 few acres) and one less waterhole would have a slight negative effect on deer, bear, turkey, and bats in this alternative, as there would be less early seral habitat and water sources for these species. Also, there would be less browse for deer since there would be 15 fewer acres of clearcutting when compared to Alternative 1. There would be 71 fewer acres of thinning than in Alternative 1, thereby resulting is less mast production enhancement that would result from thinning. Planting of spruce would have a slight favorable impact on the flying squirrel and hare as they both prefer this species in their habitat. The temporary road would have negligible additional effects when compared to Alternative 1 as it would occur within timber harvest units would essentially be in lieu of a skid trail in the same area. It would be closed after use.

Cumulative Effects: 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 project area and surrounding landscape are even-aged regeneration harvest, road construction and possible impacts related to gypsy moth, beech bark disease, or hemlock wooly adelgid. Small patches of blowdown are the only naturally occuring activity occuring within the last 10 years.

For the purpose of this analysis, the geographic scope or cumulative effects analysis boundary used, includes all private and National Forest System lands within the Desert Branch OA. The rationale used to identify this boundary is that any changes in wildlife populations or use as a result of the project would be very unlikely to be observable outside of the project area. The surrounding landscape is predominantly forested and surrounding lands (both National Forest and private) are similarly forested. Also the level of past and anticipated future activity in adjacent opportunity areas surrounding the project area is comparable to that of the project area.

No action alternative: Vegetation would move toward more shade tolerant types in the absence of disturbance factors that create earlier successional habitat.

In all the action alternatives timber management would enhance several MIS that depend on mast, early seral vegetion, and habitat diversity, while protecting the habitat for others by minimizing sedimentation and disturbance.

For all the action alternatives and the no action alternative there would be no significant direct, indirect or cumulative impacts to the Management Indicator Species.

Fragmentation

Affected Environment: Fragmentation occurs when openings create breaks in continuous forest blocks. Openings are caused by natural disturbances such as wind throw, blowdown, and fire and anthropogenic factors such as farm fields, home sites, wildlife openings, roads, power lines, timber harvesting (regeneration cuts such as clearcuts, seed-tree harvests, and shelterwood harvests) and surface mining (Weakland 2000). Single-tree selection (thinning) and diameter limit harvesting are not considered fragmentation events at the landscape level. Timber harvesting effects on fragmentation are transitory because new openings create fragmentation, while older regenerated openings reach a point where they are no longer an opening in the forest canopy. The amount and impact of fragmentation depends on the configuration and spatial dispersal of the openings in the forest. Because of the "edge effect", the more irregular in shape and the more the dispersed openings are, the greater the fragmentation (Franklin and Forman 1987). Fragmentation changes light and moisture regimes at the micro site level. Site conditions can be altered enough to affect populations of wildlife dependent on intact, interior stands. It is important to understand that interior habitat conditions take time to

develop and fragmentation cannot only result in habitat loss but also ineffective habitat as well (Jules 1998).

Forest fragmentation issues common to the Midwestern U.S. (Donovan et al. 1995, Marini et al. 1995, Robinson et al. 1995, Rosenblatt 1999) or the urban and suburban Eastern Corridor (Robbins 1988, Rich et al. 1994) hold little relevance in Allegheny Highlands of West Virginia (Weakland 2000).

Species favored by fragmentation are those associated with edge and habitat diversity within patches (Forman and Godron 1986). Species that can be adversely affected by fragmentation are those requiring interior conditions for at least part of their life cycle (Forman and Godron 1986). Of the 126 neotropical migratory songbird species that breed in the central Appalachians and northeastern United States, 74 species are associated with edge conditions and 52 are interior species (Smith et al. 1993, Costello et al. 2000). Seven interior bird species have shown significant population declines regionally for the last 20 years. It is important to note, however, that 22 edge species are also showing declines over this same period.

In western Virginia, Conner and Adkisson (1975) noted that interior species such as the peewee and the warbler returned within 12 years following logging. The wood thrush returned to clear-cut areas when the stand reached pole-stage (about 20-30 years on the MNF). Across landscapes with 42% to 81% forested core area on the Monongahela National Forest, fragmentation effects on songbirds were apparent at very localized scales within 75-100 ft. of edge, with no pervasive landscape-scale effects noted (DeMeo 1999). Edge type (hard vs. soft) effects were noted, with overall nesting success higher at the edge of regenerating clearcuts than along road edges. The same study noted that wood thrush are associated with diverse forest understories resulting from edge creation on the Monongahela National Forest. In fact, numbers of other interior species such as worm-eating warbler, cerulean warbler, scarlet tanager, and eastern wood peewee were not significantly related to forest fragmentation within the aforementioned ranges. For interior species on the intensively managed Westvaco Ecosystem Research Forest, only ovenbird numbers were positively correlated with increasing percent core area of intact forest (Weakland 2000). Point survey counts done in June, 2002 indicate the presence of oven bird, scarlet tanager and wood thrush, but not worm-eating warbler, cerulean warbler or eastern wood peewee within the Desert Branch project area. Cerulean warbler surveys done previously did not reveal their presence in the area.

Interior habitat is an important consideration because some faunal and floral species appear to be interior-obligates (Harris 1984, Robbins 1988, Dononvan et al. 1995, Jules 1998). Donovan et al. (1995) hypothesized that 40% core area represented a threshold where there was no difference between source and sink habitats for neotropical migratory songbirds in the landscape. Research on the Monongahela National Forest confirms that no adverse effects occur to songbird nesting, reproduction, and survivorship in areas with as little as 42% core area, in a mixed mesophystic landscape (DeMeo 1999).

Some NTMB species are associated with interior conditions. NTMB habitat requirements are complex, because they spend part of the year in the tropics, and hence are also affected by habitat changes there. Increased edge between habitats generally has a negative effect on interior-related neotropical birds, due to temperature/structural requirements. Parasitism of interior NTMBs by edge species has been demonstrated on a landscape of small woodlots in an agricultural landscape (Temple 1984), but edge parasitism in large, forested landscapes (such as the Monongahela N.F.) is less well understood. DeGraaf and Angelstam (1993), working in a large forested landscape in New Hampshire, found no increase in nest parasitism rates with increasing forest edge. In contrast, the preliminary work of Nichols and Wood (1993) suggests parasitism as a cause of lower NTMB populations on two-age silvicultural treatments on the Monongahela.

Fragmentation is also of concern in disrupting corridors for movement of flora and fauna throughout a forest (Reese and Ratti 1988). Some plants and animals may not travel across forest edges. A fragmented forest thus can inhibit genetic mixing, resulting in isolated populations less able to adjust to catastrophic change (Council on Environmental Quality 1993, Reese and Ratti 1988).

The question of "How much fragmentation is acceptable?" must therefore consider both edge and interior species. Given that 3 times as many edge songbird species as interior species are showing population declines, the key challenge of land management might be to provide for edge species concurrent with protecting sufficient interior habitat (Ambuel and Temple 1983, Blake and Karr 1984, Askins 1993, Livaitis 1993, Costello et al. 2000). Many songbird species are associated with shrub-scrub habitats that are best provided in the central Appalachians by regenerating timber harvest areas (Conner and Adkisson 1975)

The most current information from landscape ecology studies points to the use of the ratio of interior forest to edge forest as the most meaningful parameter in assessing forest fragmentation and viability of interior species (Forman and Godron 1986, Laurence and Yenson 1991, Chen 1991). When the interior/edge ratios are 2:1 or greater, the area is presumed to provide adequate interior habitat. Ratios between 2-1.5:1 warrant monitoring. Ratios less than 1.5:1 are approaching a level of concern. As interior/edge reaches 1:1, the amount of interior equals the amount of edge. This is considered a significant threshold because the remaining interior patches are generally small, isolated, and unlikely to support viable populations of wildlife over time. However, a decision maker seeking to minimize fragmentation should avoid alternatives generating interior to edge ratios less than 1.5:1.

In the fragmentation analysis that follows, we elected to focus on interior species (information displayed based on 328-ft edge width), because interior habitat cannot be created-- it must develop through succession over many years. Edge habitat, in contrast, is easily created by man and develops within a few years of disturbance.

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. A recent assessment (Smith et at. 1993) of neotropical bird population trends in the Northeast U.S. (including West Virginia) is revealing. Before presenting these findings, we must caution that there is a potential error in assigning results from a broad area to a small portion of that area (the Monongahela National Forest). We also stress that the authors of this work themselves caution that the sampling intensity of their study data may be inadequate (Smith et al. 1993).

First, the total existing edge of openings in Desert Branch analysis area was determined using ArcView. The North Fork of Cherry and Highway 39/55 run parallel each other, crossing over each other at several points, with the road forming the northern boundary of the analysis area. Because of their proximity to each other and so as not to double count edge lengths, a polygon shape combining both the river and the road was developed. This total perimeter length (12.5 miles) was then divided by 2 to compensate for the fact that edge effects to the north of the boundary would not be included in this analysis.

A polygon created by a 10' buffer from road center was used to determine edge length for FR 946, Handle Factory Hollow Rd and the road from Rabbit Run. The perimeters of open marsh (C69/13), old clearcuts (C69/8, C70/13), and wildlife openings (C70/301, C70/302) were also measured. The Gauley Ranger District office compound was included in the river/road polygon. 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 was calculated at 19.25 miles. Refer to existing condition (Alternative 5) map.

Edge effect assessment further depends on the perimeter of interest (Chen 1991). Edge areas (ft^2) were calculated by multiplying non-forest edge length (ft) by a width of 49 feet and 328 feet to compute area of edge. For Eastern forests, these measures serve as edge width estimates based on forest structure (Ranney et at. 1981) and NTMB habitat requirements (Temple 1984), respectively. The 49-ft edge width serves as a forest structural edge width, i.e. forest edge characteristics are maintained up to 49' on both edge sides. It is estimated as the penetration width of sunlight at Eastern forest edges (Ranney et at. 1981). It is used in this analysis as the minimum forest edge width necessary to maintain forest function. The 328-ft edge width is used as the minimum edge width necessary to surround interior conditions for NTMBs in the Eastern U.S. (Temple 1984). It is the calculations relating to interior conditions that we will focus our analysis on. Edge areas were converted to mi^2 for reporting in the table below.

At present, approximately 7.6% of the 3,013-acre project area, or 230 acres, is non-forest or openings. (For the fragmentation analysis, those areas between the road and river are counted as openings, although they have forest cover. Therefore the amount of area shown in openings is higher than that shown for the other analyses.) This leaves 2,783 acres as forested. The existing condition shows approximately 67% forest core area (Interior area acres for the 328' edge width divided by (3,013) total OA area in acres times 100%). Core area is a useful measurement in evaluating an area's value in

Interior area acres for the 328' edge width divided by (3,013) total OA area in acres times 100%). Core area is a useful measurement in evaluating an area's value in providing interior habitat.

Table 14. Fragmentation of the Desert Branch Project Area

	Alternative 1 Proposed Action	***Alternative 2***	***Alternative 3***	***Alternative 4***	***Alternative 5 Existing Condition***	***Alternative 6***
Total OA Area (acres)	*3013*	*3013*	*3013*	*3013*	*3013*	*3013*
Total OA Area (mi²)	*4.71*	*4.71*	*4.71*	*4.71*	*4.71*	*4.71*
Open area edge length (mi)	*27.25*	*2615*	*19.45*	*23.90*	*19.25*	*26.18*
Edge/area	*5.78*	*5.55*	*4.13*	*5.07*	*4.08*	*5.56*
Open area acres	*358*	*341*	*230*	*319*	*230*	*340*
Open area mi^2	*0.56*	*0.53*	*0.36*	*0.51*	*0.36*	*0.53*
Forested area acres	*2655*	*2672*	*2783*	*2694*	*2783*	*2673*
Forested area mi^2	*4.15*	*4.18*	*4.35*	*4.21*	*4.35*	*4.18*
Based on 49-ft edge						
Edge area mi^2	*0.25*	*0.24*	*0.18*	*0.22*	*0.18*	*0.24*
Edge area acres	*160*	*154*	*115*	*141*	*115*	*155*
Interior area mi^2	*3.90*	*3.93*	*4.17*	*3.98*	*4.17*	*3.94*
Interior area acres	*2496*	*2515*	*2669*	*2547*	*2669*	*2518*
Interior/Edge ratio	*15.41:1*	*16.21:1*	*23.11:1*	*17.93:1*	*23.36:1*	*16.42:1*
Change in interior	*6.5%*	*5.7%*	*0*	*4.5%*		*5.5%*
Based on 328-ft edge						
Edge area mi^2	*1.69*	*1.62*	*1.21*	*1.48*	*1.20*	*1.63*
Edge area acres	*1082*	*1037*	*774*	*947*	*768*	*1043*
Edge plus open acres	*1440*	*1383*	*1004*	*1273*	*998*	*1383*
Interior area mi^2	*2.46*	*2.55*	*3.14*	*2.71*	*3.16*	*2.55*
Interior area acres	*1574*	*1632*	*2009*	*1734*	*2022*	*1632*
Interior/edge ratio	*1.45:1*	*1.57:1*	*2.60:1*	*1.83:1*	*2.64:1*	*1.56:1*
Change in interior	*22%*	*19%*	*<1%*	*14%*		*19%*
Based on 328-ft edge						
% Edge	*48%*	*46%*	*33%*	*42%*	*33%*	*46%*
% Core area	*52%*	*54%*	*67%*	*57%*	*67%*	*54%*

It should be noted that the Desert Branch project area is a small, narrow area located within the 5th order Cherry River Watershed. It is bordered on the west by the town of Richwood, in the south by timber industry land and to the north by private ownership and Forest Service land. Industry lands are managed for timber output, creating fragmented landscapes to the south. The town of Richwood and areas immediately surrounding the city limits add to the existing fragmented landscape to the west. The northern boundary is primarily forested at this time and provides a contiguous forest corridor to other areas.

See Chapter 2 for the Amount of Activity by Alternative.

Effects of the Proposed Action (Alternative 1): The proposed action would result in an additional 128 open acres scattered throughout the project area, 93 of which are timber harvest acres. The proposed action identifies 4 types of commercial harvest types, clearcuts, shelterwood, two-aged cuts and thinning. There is also timber removal associated with wildlife opening and savannah development and road construction.

Clearcutting involves the removal of an entire stand in one cutting. The Monongahela Forest Plan standards define a maximum size opening limit of 25 acres for clearcut, seed tree cut, and shelterwood removal harvests. The proposed action identifies 34 acres (19 acres in stand 70/5 and 15 acres in stand 70/7) proposed for clearcuts. Shelterwood cuts (45 acres) proposed here are similar in structure after the second cut to clearcuts. Two-age timber management, an alternative method to clearcutting is a harvest technique where a predetermined amount of basal area is left standing to grow for the next rotation. The resulting stand is comprised of two distinct age classes. There are 14 acres identified for two-age harvests.

A 1995/96 study done on the Monongahela National Forest by Duguay, analyzed the effects of clearcut and two-aged cutting practices approximately 15 years after harvest on breeding songbird abundance, daily nest survival rates and invertebrate biomass. Duguay found that no differences existed in breeding bird abundance or nest success between the two-age and clearcut treatments. Further, both total invertebrate biomass when most birds had young in the nest and bird species richness were higher in the two-age versus the clearcut treatment. Thus, from a songbird perspective, two-age timber management can be used as an alternative method to clearcutting within large tracts of mature forest in which agricultural areas are > 7 km away.

Results also showed that forest-interior birds were more abundant in the unharvested and two-aged periphery treatments (periphery stands were areas of uncut forest immediately adjacent to harvested stands) than in the clearcut treatment. Edge species were more abundant in the two-age treatment, while the abundance of interior-edge species did not vary among treatments. Canopy nesters were more abundant in the two-age periphery treatment than in the clearcut and clearcut periphery treatments, while shrub nesters were more abundant in the two-age than in the two-age periphery and clearcut periphery treatments. The abundance of ground nesters and cavity nesters did not vary among treatments. Ground gleaners were more abundant in the two-age than in the clearcut treatment.

Duguay found forest interior species present in all treatments, including the clearcut treatment. Concluding that factors other than the retention of residuals undoubtedly account for the presence of forest-interior species within harvested stands. It is possible that the vegetation in the clearcut treatment may have been tall enough after 15 years, to be viewed as closed canopy habitat by birds.

Duguay's results also suggest that although all bird guilds occurred and were found nesting in harvested treatments, forest-interior species had lower daily nest survival rates in the harvested and periphery treatments than unharvested treatment. Thus, it does appear that even 15 years after a harvest, these cuts are exerting negative effects on forest-interior birds.

Weakland (2000) completed a similar study to determine abundance and reproductive success prior to and immediately following a two-age harvest. Although two-age harvests appear to have significantly different vegetation structure 1-2 years after harvesting, they did not appear to significantly affect the abundance of most songbird species.

Thinning activities are planned in 973 acres across the Desert Branch landscape. Thinning is a type of partial harvesting used to improve the growth and quality of stands. Selection is a harvest that maintains a specific tree-diameter distribution in the stand through periodic removal of selected trees. Hence, for these types of cuts, there is less change in vegetation structure and bird communities than with even-aged regeneration harvest. Little information exists on forest bird response to uneven-aged management. Thinned stands typically retain much of the mature forest bird community (although often at lower numbers), and provide habitat for some early successional species that use the ground-shrub-sapling layer.

Unlike even-aged regeneration harvest, thinning maintains a mature tree component at all times and does not create a mosaic of different aged stands. This may benefit forest interior species because large tracts of forest with mature trees can be maintained (Thompson et. al 1992).

Thompson et. al. (1995) suggest that silviculturally sound harvesting in extensively forested landscapes is compatible with conservation of songbird species. Partial harvesting techniques such as thinning provides vertical heterogeneity and habitat for forest-interior and interior-edge species. Alternatively, even-age regeneration cuts such as clearcutting, and two-age and shelterwood harvesting, provides habitat for edge, interior-edge species and early successional species. Thus managers should use several silvicultural systems to attempt to balance age classes of stands on the forest to provide habitat for a variety of songbird species (Thompson et al. 1995).

Cumulatively, all the activities listed in the proposed action will reduce the remaining core area to approximately 52%. Moderate fragmentation, resulting in the range of 42% core area or greater, does not appear to have adverse effects on bird abundance or

viability (DeMeo 1999). The interior/edge ratio based on the 328' edge width is reduced from 2.6:1 to 1.45:1.

Effects of Alternative 2: Implementation of Alternative 2 would bring the interior to edge ratio to 1.5:1. It reduces the amount of core area to 54%. It provides 2% more interior habitat than the Proposed action by the reduction of clearcut acres from 34 to 19. The effects therefore are expected to be very similar to those explained under the Proposed Action.

Effects of Alternative 3: Implementation of Alternative 3 would provide the most intact core area (67%) with less than 1% change from the existing condition. The interior to edge ratio would be slightly less than the existing condition at 2.60:1. This alternative provides timber volume without creating fragmentation because individual tree selection and thinning are used as harvest methods. There would also be no new road construction or savannah development.

Although the harvest methods in this alternative do not contribute to fragmentation effects, there is an additional 167 acres of forest disturbance throughout the core area.

Effects of Alternative 4: Although no new roads will be constructed in this alternative, there are still 78 acres of clearcutting, two-aged and shelterwood harvests planned. Alternative 4 would provide a 1.83:1 interior to edge ratio and reduce the amount of core area to 57% if implemented.

Effects of Alternative 5: Since no management activities would occur, there would be no changes in the existing condition. The interior to edge ratio would remain at 2.64:1.

Effects of Alternative 6: Implementation of Alternative 6 would reduce the amount of core area to 54% with an interior edge ratio of 1.56:1. The increased interior habitat as compared to the Proposed Action is due to the reduction of clearcut acres from 34 to 19 and the wildlife opening acres from 16 to 12. The effects on fragmentation would be very similar to those explained under the Proposed Action.

Cumulative Effects: The Central Appalachians provide some of the largest, most intact forest areas in the East. At the same time, this region is facing increasing development pressure from highway and pipeline construction, home and service-sector development, and logging. In particular, recreational development and logging on private lands have increased in recent years because of favorable markets. West Virginia is approximately 76% forested, and recent surveys suggest that 35% of non-industrial private landowners plan to harvest their forests (Birch et. al 1992).

Although the figures presented in the table show increased fragmentation with each alternative except Alternative 3, it is important to remember the scale of this particular analysis. The Desert Branch project area is a small, somewhat narrow area, with substantial river and road influence on the edge length. Accuracy in analysis interpretation is certainly affected when focusing on such a small area. A better sense of

fragmentation effects would be established by considering a broader landscape, as discussed above.

It can be assumed that over time; the private timber company will continue actively logging their property. Some National Forest lands to the north and west will experience harvests similar to those described in this analysis. Rivers, towns, and residential lands are the major fragmenting features in the vicinity. It is hard to predict how private landowners will manage properties in the years to come. We can assume that because the land is currently forested, it will continue to provide forested habitat in the future, although it would be likely that some older stands will continue to be regenerated and become early forest successional habitat. However, as this happens, the earlier regenerated stands would be developing towards the older age classes.

No single silvicultural treatment can provide all conditions at any given time, but a range of conditions can be provided over time and space with some planning. No single habitat management practice covers all necessary conditions for all NTMB (DeGraaf et. al. 1992).

Impacts thru any harvest activities independent of the alternative chosen, will loose their fragmentation characteristics when the stands reach 25 years of age, thus reducing the long-term effects of fragmentation in this area. Wildlife openings and savannahs, although considered permanent, could be allowed to regenerate in the future if need be.

Within the next 10 to 15 years, 27 acres of regenerated clearcut units and their 1.4 miles of edge would no longer contribute to the reduction in core area because of the height of the vegetation in these clearcut units. These areas would no longer be considered openings and would not contribute to the loss of interior core habitat. This would mean a higher interior to edge ratio and a larger core percentage for the area for each alternative.

Old Growth

Affected Environment: The Forest Plan (pages 55 and 166) states that five percent of the National Forest lands should ultimately be in old growth. This old growth should be in small irregular shaped stands dispersed throughout the OA. Old growth as defined in the Forest Plan was not designated to provide large blocks for forest interior species (USDA, 1995) in management prescriptions that experience logging (MP's 2, 3, 4 and 6.1). This need is intended to be met in designated wilderness or near-wilderness areas (MP's 5, 6.2, 8, and 9). The intent of the Forest Plan in designating old growth stands in MP 6.1 areas is to provide "islands" of mature habitat attributes dispersed throughout a planning area (USDA, 1995).

A pool of old growth was identified that would meet the intent of the Forest Plan. This pool would mimic naturally occurring structural diversity to ensure that late successional habitat is available in the future. The pool provides wildlife habitat components such as snags for perches and foraging habitat for bark gleaning wildlife; dead and down material for feeding and cover, cavity/den trees, both live and dead; varied diameter classes; species diversity; multiple canopy layers; and canopy gaps.

There is very little true old growth forest on the Monongahela National Forest, and none within the Desert Branch Project Area, which was logged during the first part of the century. Most of the land in the Project Area contains a relatively contiguous second growth forest that returned to the area after logging. Stand ages range from 14 to 97 years of age, with 98 percent of the area in stands aged 68 to 97 (age classes 61-75, 76-90, and 91-105). After review of the Compartment Stand Data records, the 68-97 year old stands were checked to evaluate their old growth attributes. These attributes included; large trees, habitat types (species composition), structural diversity, woody debris greater than 12 inches, age, snags, and natural gap formation. This review was used to identify stands for the old growth pool. It showed that woody debris, snags and natural gaps were the most limiting attributes in all the potential stands. None of the stands met all the attributes. A pool of about 2,400 acres was identified with 600 acres in compartment 70 and 1,800 acres in compartment 69. A detailed listing by stand is found in the project record.

The age attribute was not a factor in the selection of the old growth pool or in ranking the old growth importance of each stand. This was the case because the stands are very close in age. The oldest stands in the project area are 97 years of age while the youngest stands in the pool are at age 68 (a 29 year difference or three age classes). For most of the area the rotation age is 200 years, thus the oldest trees have reached ½ the rotation age and the youngest are 29 years behind. In addition to the closeness in age, all stands are relatively young from an old growth perspective as they are 50 plus years away from true old growth based on age alone.

Effects of the Proposed Action (Alternative 1) and Alternatives 2, 3, 4, and 6: In each alternative the pool of potential old growth (2,400 acres) would be reduced due to management activities. The remaining pool was evaluated based on size and corridor locations.

In all the action alternatives the patch of Asiatic Chestnut would be released in stand 6 of compartment 70. This stand is considered a key part of the old growth because it provides a corridor for wildlife travel that leads to other old growth areas. Another concern is that the Asiatic Chestnut being an exotic species is not desirable. A field review of the stand of chestnuts showed that these trees were producing a good but declining mast supply (because of the canopy competition), were beginning to decline in vigor because of the over topping, and were not reproducing. For this project only the trees whose crowns touch or over shadow the chestnut trees will be removed and would create an effect similar to a small natural opening. The release of these trees would thus have minimal impacts to the old growth pool and would not prevent stand 6 of compartment 70 from being considered as old growth.

The Proposed Action would reduce the old growth pool to about 1,350 acres or 45 percent of the project area.

Alternative 2 would reduce the old growth pool to about 1,800 acres or 60 percent of the project area.

Alternative 3 would reduce the old growth pool to about 1,800 acres or 60 percent of the project area.

Alternative 4 would reduce the old growth pool to about 1,400 acres or 46 percent of the project area.

Alternative 6 would reduce the old growth pool to about 1450 acres or 48 percent of the project area.

In all of the action alternatives large corridors would be left along the entire length of the North Fork of Cherry and Desert Branch as well as large blocks of potential old growth near the town of Richwood in compartment 69 stands 17, 19, 20 and 21, and along the North Fork of Cherry in compartment 70. All the action alternatives protect a sufficient amount of potential old growth for identification at a later date.

Effects of the No Action Alternative – Alternative 5: Under this alternative none of the old growth pool would be impacted because there are no proposed activities. All stands within the pool would be available for consideration as old growth in the future. There would be no effects on potential old growth characteristics.

Cumulative Effects: Old growth habitat within the project area would have beneficial effects on species requiring this habitat for some part of their life cycle. It would have a minor negative effect on species requiring mast, as it is likely that mast production in these areas would decline over time. However, this effect would be very minimal since much of the rest of the area would be managed to optimize mast production.

National Forest land across the North Fork of Cherry and immediately adjacent to the Desert Branch OA could potentially be considered in the 5 percent old growth for those Opportunity Areas. This would add to the corridor acres although Highway 55 would bisect this corridor. It is also possible that some of the private forested land east of Handle Factory Hollow may not be harvested because of poor timber, steepness, riparian protection or the landowners' philosophy; however, these areas will most likely be few in number.

Over all there would be no adverse direct, indirect or cumulative effects from the pool of old growth habitat left or from the amount being removed from the old growth pool. In all the alternatives the old growth pool contains more than enough land for future designation as old growth under the Forest Plan standards and guidelines (p. 166).

Endangered and Threatened Species

"Management will protect or enhance habitat for threatened and endangered species and consider the needs of species identified as special or unique" (Forest Plan, page 84).

A biological evaluation (BE) was done to determine the effects of the projects in the Proposed Action and alternatives on threatened, endangered and sensitive species that have been identified as having part of their range on the Monongahela National Forest (MNF) (USDA Forest Service – Memo, Technical Update R9 Sensitive Species List). This effects section summarizes the data in the BE.

All the alternatives for the Desert Branch project would conform to requirements for protection of Threatened, Endangered and Sensitive species in the Monongahela National Forest Land and Resource Management Plan.

Determination was made as to the Likelihood of Occurrence (LOO) of each of the TES species and their potential habitat in the Desert Branch Project Area. This was based on habitat requirements, district TES species files, records from the Natural Heritage Section of the WV Division of Natural Resources (WVDNR), available research literature, various field surveys, and personal communication with TES species specialists. Evaluation was then made of the possible effects of the projects in the Proposed Action or Alternatives on those species and/or their habitat.

Endangered and Threatened Species

Nine federally listed species are listed as occurring on the MNF. Those species are: Virginia big-eared bat (*Corynorhinus townsendii virginianus*), Indiana bat (*Myotis sodalis*), West Virginia northern flying squirrel (*Glaucomys sabrinus fuscus*), Bald Eagle (*Haliaeetus leucocephalus*), Cheat Mountain salamander (*Plethodon nettingi nettingi*), Shale Barren rock cress (*Arabis serotina*), Virginia spiraea (*Spiraea virginiana*), Running buffalo clover (*Trifolium stoloniferum*), and the Small-Whorled pogonia (*Isotria medeoloides*).

The Biological Assessment for the recently completed amendment to the Forest Plan concluded that for all threatened and endangered species found on the MNF, with the exception of the Indiana bat, the continued implementation of the Forest Plan would result in a "no effect" or "may affect, not likely to adversely affect" determination for these species. The BA further concluded that continued implementation of the Forest Plan would result in a "may affect, likely to adversely affect" determination for the Indiana bat for all activities that involve tree cutting.

Conclusions drawn from the LOO table dictate the level of analysis needed for each Threatened or Endangered species. It was determined that the individual proposed projects are not likely to adversely affect the following listed species or designated critical habitat: Bald eagle, Cheat Mountain salamander, Virginia big-eared bat, Running buffalo clover and Shale barren rock cress due to lack of habitat or known occurrences. These species are not analyzed further. The West Virginia northern flying squirrel, Small whorled pogonia and Virginia spiraea are not known to occur in the Desert Branch project area however habitat for them may occur and they are evaluated below. The Indiana bat is the only endangered animal known to be present within the project area. The anticipated effects from the proposed projects are consistent with those disclosed in the Forest Plan.

Of the T & E species listed above and known to occur on the Monongahela National Forest only the Indiana Bat is known to occur within the Desert Branch Project Area. There are no records showing the occurrence of any other T&E species in this OA.

Indiana Bat - In August of 1999 a male juvenile bat was captured within this project area. Since then the area has been surveyed by mist netting with no other Indiana bats being found. The Indiana Bat Recovery Plan states that one bat capture does not represent a maternity colony, however the potential for one does exist. To help further evaluate the significance of this one capture, mist netting and other survey techniques were used over a 3 year period.

There are no known Indiana bat (*Myotis sodalis*) hibernacula in the Desert Branch project area. The closest known hibernaculum is located 18 miles away. The most recent 1987 cave survey revealed two Indiana bats using the cave at that time. Therefore the proposed project area does not provide winter habitat. However, bats tend to fall swarm around cave entrances not necessarily used as hibernacula. The closest non-hibernacula caves to the project area are Cherry run Cavelet (2.64 miles) and Middle of Nowhere sink located 2.57 miles from the project area.

Effects from past management (turn of the century clear-cutting, clear-cuts, thinning, wildlife opening, roads) have produced the current condition, which is potential roosting habitat for this species. Other projects, such as wildlife ponds, have produced upland water sources that benefit bats, and openings (1.7% of project area) that are producing small amounts of edge and allowing solar radiation to hit trees along that edge. The adjacent landowner to the South (formerly Georgia-Pacific) is managing their land similar to that of the MNF, with more emphasis on regeneration cutting and road building. Other private land near Desert Branch is not providing much roosting habitat, as it is mostly residential home sites or within the town of Richwood, WV.

Future projects including additional waterholes and snag creation will have positive effects on bat species. Other projects such as regeneration harvest, wildlife openings and road construction would create some additional (less than 10% of the project area) unshaded potential roost habitat.

The action alternatives will have similar effects as described for the Proposed Action because the variation in total acres treated is minimal. These alternatives all have fewer acres of clear-cut, wildlife openings, and savannahs. With fewer openings created there would be fewer thermal roost trees and fewer acres in which to forage.

The No Action alternative will have no direct, indirect, or cumulative effect.

Neither the Proposed Action nor the Alternatives will affect hibernating bats or swarming bats. There will be no direct or indirect effect on the hibernaculum or swarming habitat because all activities will occur outside of a five-mile radius from the cave. Therefore, this project will not have any cumulative effect on this habitat component. The area was

cleared as a maternity colony after August 2002 when no more Indiana bats were found. Additional sampling in 2004 did not reveal the presence of Indiana bats.

None of the action alternatives are likely to adversely affect maternity, summer roosting and foraging bats because surveys indicate that few Indiana Bats use the area and that if one was in the area it is unlikely that it would be in a tree being harvested. The effects on the summer roosting and foraging habitats from the proposed activities are so minor, both in area and in scope; it is unlikely that suitability for the bat will actually change. The small changes in roosting habitat would be beneficial as the increased solar radiation on the 12 – 18 inch DBH trees retained in units provides a different habitat and if one of the action alternatives is implemented, the area will still be able to provide this habitat.

Because of this slight effect on habitat, there are minimal cumulative effects anticipated from this project, as concluded earlier. The public land surrounding the project area is also providing available habitat. No future projects have been identified in the project area, but long term management is likely to be similar to current management, with similar effects.

The direct effects of these action alternatives are that 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 that contains a roosting bat is removed intentionally or felled accidentally. If a bat using a roost tree that is removed is not killed during the removal, the roosting bat would be forced to find an alternative tree, potentially expending a significant amount of energy that would result in harm or harassment of the individual. This also constitutes take. However, all proposed activities fall within the scale and the scope addressed in the Forest Plan and within the level of take identified in the Incidental Take permit.
All shagbark hickory trees in cutting units will be retained except where public safety concerns exist, and any bat roost trees will be protected. Snags will be created in cutting units where less than 6 snags per acre are present.
Mist netting was done in 2002, for the third year, to fulfill the terms and conditions set forth in the USFWS Biological Opinion. If additional evidence of possible maternity colonies (lactating females or juveniles prior to August 15) had been discovered, the temporary 3-year, 2-mile radius buffer established around the discovery site would have been continued. Since no further evidence was discovered, the temporary 3-year, 2-mile radius buffer expired, and proposed activities may proceed. Search for the actual maternity colony was done using mist netting. If monitoring activities result in the discovery of a maternity site, roost trees used by a maternity colony will be protected by establishing a zone centered around the maternity roost site following Indian Bat protocol in cooperation with the Forest Service and the WVDNR.
If any new Indiana bat hibernacula are discovered, the MNF would develop an appropriate protection plan.

West Virginia Northern Flying Squirrel - The project area contains unsuitable habitat for the following reasons: 99 % of the conifer is eastern hemlock with no red spruce present;

the habitat occurs in a few small scattered pockets of hemlock as well as hemlock scattered throughout the area; there are no corridors connecting the patches of conifer; the conifer component for the project area is 1 percent of the total area; small patches of hemlock that are present are isolated from any known squirrel locations or mapped suitable habitat; and trapping surveys have been done for several years in the project area with no WVNFS being captured.

Indirect effects would be favorable because few conifer trees would be removed, thinning would release existing conifer and promote conifer regeneration, corridors would begin to develop, and in Alternatives 2, 4 and, 6 red spruce would be planted. Given these potential changes in vegetation, the current unsuitable habitat may have the ecological potential to become suitable habitat in the future.

Cumulative effects related to timber management on private land could affect WVNFS, however the species composition on adjacent private lands is similar to National Forest lands in the project area, thus habitat on those lands is unlikely to be present.

Small-Whorled Pogonia - The small whorled pogonia (*Isotria medeoloides)* prefers, dry, deciduous woods with acidic soil. Tree species commonly associated with this species include white oak (*Quercus alba*), white pine (*Pinus strobus*), flowering dogwood (*Cornus floridana*), and witch hazel (*Hamamelis virginiana*). Small whorled pogonia has been found on one site in Greenbrier County, WV.

Surveys have been completed in proposed cutting units, and elsewhere in the project area. No individuals were found in the areas surveyed. The determination would result in a "not likely to adversely affect" determination for the Proposed Action.

Virginia spiraea - Virginia spiraea (*Spiraea virginiana*) is known to exist on damp, rocky mountain riverbanks, usually at water's edge, that drain into the Ohio River basin. One small population occurs on the MNF, along the Greenbrier River in Greenbrier County. Twenty-six populations exist in West Virginia.

Potential habitat for the Desert Branch OA would be along the North Fork of the Cherry River. Since there are no proposed activities within the riparian areas of the river there would be no impacts to this species with any of the Alternatives.

Sensitive Species

Conclusions made in the LOO table dictate the level of analysis needed for each sensitive species. Any R9SS determined not to occur or unlikely to occur in the project area due to lack of habitat are not carried in further analysis. Effects analysis is completed for all sensitive species that occur or could possibly occur within the project area. An evaluation of direct, indirect, and cumulative effects from each alternative is made for these species. Sensitive species have been grouped into habitat types for effects analysis. The key to determining effects is evaluating how each alternative affects species habitat and in particular, how alternatives affect factors that limit a species' ability to thrive

(limiting factor). Several field visits in the fall, winter and spring of 1999 - 2002 helped determine what habitat could be affected by each alternative.

Three sensitive animal species, hellbender, candy darter and New River shiner and three sensitive plant species, blunt leaved grape fern, lance-leaf grape fern and long-stalked holly are known to occur in or along the North Fork Cherry River, within the project area. The animal and plant locations have been mapped and are outside the proposed activity areas. These and other sensitive animal and plant species that may occur in the area are listed in the habitat sections of this document below.

Affected Environment, Aquatic and Riparian Habitats: The perennial streams within the project area are: North Fork Cherry River (which borders the western and northern ends of the project area), Desert Branch, Handle Factory Hollow, Camp 29 Run, and two unnamed streams in compartment 70 (one just east of stand 11 in stand 6 and the other between stands 2 and 4). There are several other intermittent tributaries to these named streams.

Several streams within the area were field checked focusing on past management practices that created some problems in these systems. Unstable streambeds indicate that some systems have not recovered from the intensive harvests of the early 1900's. The location of Handle Factory Hollow Road (WV 39/17), which parallels the stream (often within 50 or less), has several ditch relief culverts that have no filter area below them to catch sediment before runoff enters the stream and one stream crossing where the road ditch enters the stream directly. Along the North Fork Cherry River (between the Forest Boundary and the first bridge) the old railroad bed location had several locations where the fill slope was slipping into the river. During high water, these areas would add sediment directly into the river system. This problem was corrected in 2000 with heavy maintenance work (stoning and stream bank stabilization). The amount of sediment entering the stream channel from the old railroad bed has been substantially reduced.

The aquatic/riparian zones in the project area provide potential habitat for the following sensitive species:

Species	**Limiting factor**
Hellbender	Low water quality
Candy darter	Low water quality
New River shiner	Low water quality
Appalachian darter	Low water quality
Kanawha minnow	Low water quality
Southern rock vole	Disturbance to individuals or habitat
Southern water shrew	Disturbance to individuals or habitat
A Tiger beetle	Disturbance to individuals or habitat
Long-stalked holly	Disturbance to individuals or habitat
White monkshood	Disturbance to individuals or habitat
Darlington's spurge	Disturbance to individuals or habitat
Butternut	Butternut canker and harvesting of live, healthy trees
Large-flowered Barbara's button	Disturbance to individuals or habitat
Bog buckbean	Disturbance to individuals or habitat
Appalachian blue violet	Disturbance to individuals or habitat

Appalachian oak fern	Disturbance to individuals or habitat
Netted chain fern	Disturbance to individuals or habitat
Blunt lobed grape fern	Disturbance to individuals or habitat
Lance-leaf grape fern	Disturbance to individuals or habitat

Potential Effect: Potential effects on riparian and aquatic areas from timber harvesting and the associated road building could be increases in stream sediment, decreases in canopy cover in riparian zones which increases the amount of light hitting the ground which changes the microclimate and can increase water temperature, decreases in the amount of woody debris available to streams, changes in species composition in a riparian area, and direct disturbance to the aquatic and riparian systems. All these effects can significantly reduce habitat quality for many terrestrial and aquatic species. Building roads too close to riparian areas or in areas that cross functioning channels can increase the sediment level in streams reducing water quality.

Direct and Indirect Effects: In the proposed action timber harvesting would occur next to the four perennial streams in this project area that could cause short term sediment to these streams: Along the North Fork of Cherry thinning using helicopters to move the logs to the landings would be done in compartment 69 stands 1, 2 and 22, and in compartment 70 stands 4 and 9. Thinning, both by helicopter and conventional ground skidding would occur on both sides of Desert Branch in compartment 69 stands 9, 10, 11, 15, and 16. Helicopter logging would also occur next to Handle Factory Hollow in compartment 69 stands 17 and 18. A clear-cut would occur near Camp 29 Run in compartment 70 stand 7. Another clear-cut would occur in compartment 70 stand 5 next to the unnamed stream just east of stand 11. Lastly, helicopter thinning would occur next to the unnamed stream that borders compartment 70 stand 4. The Proposed Action incorporates riparian mitigations with a 100 foot buffer on both sides of all perennial streams (North Fork of Cherry, Desert Branch, Handle Factory Hollow, and Camp 29 Run). For intermittent streams with a watershed area of 50 acres or more, a 50 foot buffer, on each side of the stream would be applied. For intermittent streams with a watershed area less than 50 acres, and for ephemeral streams the buffer on each side would vary from 20 feet wide at the top to 50 feet wide where it meets the other buffers. Tree removal, but not heavy equipment use, can occur within any of these filter areas as follows: For perennial streams a 75% full canopy closure must be left; for intermittent streams a 50% full canopy closure must be left; and for ephemeral streams a 0% canopy can be left. These buffers would provide an area for most of the sediment to be filtered out before entering a stream channel as well as maintaining a canopy (providing shade) over these streams allowing them further opportunity to recover from the turn of the century logging and leave adequate habitat for riparian species. The helicopter thinning on the steeper slopes along the North Fork of Cherry, Desert Branch and Handle Factor Hollow would provide an addition buffer to sediment movement into these streams because there would be no soil disturbance, as would occur with ground skidding equipment. Although some conventional logging using skidders would occur near Desert Branch, this logging would be over 500 feet from the stream in most cases and on the flatter ground within compartment 69 stands 7, 9, 10 and 11 or above Forest Road #946, thus no sediment should make it from these locations to the streams.

Construction of 1.3 miles of new road in compartment 69 stands 9, 10 and 11 would be located near the ridge line away from the fore mentioned streams, and would incorporate current road construction designs, thus this construction would have little affect on the aquatic systems.

The Proposed Action will have no direct or indirect effects on the aquatic and riparian habitats because the buffers will maintain canopy cover over streams and filter out almost all of the sediment before it reaches the streams, the road construction will not occur in the riparian areas, and Forest Road #946 as well as the new construction will remain closed to public motorized travel.

In Alternatives 2, 3, 4, and 6 a higher level of riparian area protection is being used (see the water quality section for more information). For perennial streams there would be a 100 foot strip on each side of the channel with no tree removal, while the remainder of the riparian area, if wider than 100 feet, would maintain a minimum of 70 sq. ft. of basal area; for intermittent streams with a watershed area of 50 acres or more there would be no tree removal within the first 50 feet, while the remainder of the riparian area would maintain a minimum of 70 sq. ft. of basal area; and for intermittent streams with a watershed of less than 50 acres and all ephemeral streams there would be no tree removal within 25 feet of the channel, while the remainder of the riparian area would maintain a minimum of 40 sq. ft. of basal area. Any negative affects from these alternatives on the aquatic habitat would thus be slightly less than the proposed action.

Total harvest acres for each alternative are similar, however, the amount of ground skidding that occurs per alternative varies because of the amount of or lack of helicopter logging. Alternative 2 would ground skid all of the harvested areas (1,002 acres); thus this alternative would have the greatest potential to impact the riparian areas with sedimentation. Alternatives 3 and 4 would helicopter as well as ground skid the harvested areas similar to the proposed action but unlike the proposed action they would not construct 1.3 miles of new road. For these reasons Alternatives 3 and 4 would have the least impact to the riparian areas. Alternative 6 would be similar to the Proposed Action except that no harvesting would occur in stands 69/17 and 18 next to Handle Factory Hollow and riparian areas would be protected with wider areas without tree removal or cutting than the proposed action.

Under the No Action Alternative there would be no soil disturbance that would potentially allow silt/sediment to enter the stream channels. Aquatic and riparian habitat would not be impacted thus there would be no adverse effects from this action.

Cumulative Effects: Cumulative effects on the aquatic and riparian areas from any of the action alternatives would be beneficial as the riparian protection would allow these areas to continue to heal from the turn of the century logging. Current aquatic and riparian conditions show the effects from this past land uses in the form of little down woody debris and scoured stream channels. The past land uses have had 70 years of healing and continuing to improve. Future projects in the area may include stream

habitat improvement, and trail relocation or construction. None of these projects will negatively affect the aquatic or riparian condition.

None of the action alternatives will result in a loss of viability for any of the species associated with this habitat as none of the limiting factors are adversely affected.

Rocky Habitats, Affected Environment: There are several stands with rock outcrops and ledges. 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:

Species	Limiting Factor
Southern rock vole	Disturbance to habitat
Eastern small-footed bat	Disturbance during hibernation
Allegheny woodrat	Disturbance to habitat
Timber rattlesnake	Disturbance during hibernation and direct killing of individuals
Green salamander	Disturbance to habitat
Highland rush	Disturbance to individuals or habitat

Potential 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.

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.

Effects of increased sunlight and wind on rock outcrops will be minimal. No rock outcrop would be left as an isolated island in the middle of a clearcut. In thinning units, a forest canopy would remain after cutting.

Effects of Alternatives: The Proposed Action will affect several stands with rocky outcrops. They include compartment 69 stands 1, 2, 6, 10, 14, 15, 16, 17, 18, and 22 and in compartment 70 stands 4 and 9. For most of these areas thinning will be the proposed silvicultural treatment. With the mitigation as described above these areas would be protected. This can either be flagged ahead of time or incorporated during the sale layout, by a qualified individual. One wildlife savannah in compartment 69 stand 9 was to be placed close to the rock ledge in stand 6 to help release and regenerate the sassafras in the area. This savannah would be above the rock outcrop ledge and will also maintain the two-chain buffer while still releasing sassafras. The trail vista is the only project that would affect rocky outcrops by removing trees within the buffer strip. This vista is located just off of the trail above a rocky ledge on which hikers could stand and enjoy the view of the surrounding mountains. The trees to be removed would be below the rock ledge in an area about 1/4 acre or less in size that would fan out and away from the ledge. The actual ledge area where the canopy will be opened will be about 10 to 20 feet in

length. During a survey of the site, it was found that there is potential for some of the listed species to utilize the area. However, because of the small impact there would be no direct, indirect or cumulative impact to these species.

Since effects to the rocky outcrops would be avoided, there would be no cumulative effects to this habitat from the Proposed Action. It does not appear from field visits that the rocky areas have been affected by any past projects other than being opened to sun light during the early 20th century logging and with the buffer area protection in regeneration units and the maintenance of a forest cover in thinning units, no projects in the foreseeable future would have any foreseeable effects.

Alternatives 2, 3, 4 and 6 will have the same effects as the Proposed Action on rocky habitats because they will harvest in or near the same stands and rock outcrops as in the Proposed Action. The stands of concern include some or all of those mentioned above with the same treatment as in the Proposed Action, so the effects would be the same as the Proposed Action. The No Action alternative will not have any direct, indirect, or cumulative effects as no activities are proposed and consequently, no rocky areas will be impacted.

None of the alternatives will result in loss of viability, as no disturbance to individuals will occur.

Affected Environment, Mature Habitats: The large majority of the project area is in second growth forest, which has regrown from the turn-of-the-century large-scale cutting. It includes stands of mixed mesophytic sites with a variety of trees including yellow poplar, sugar maple, beech, black cherry, and others with the majority being 70 to 105 years of age. Though there are no true old growth, or ecologically mature, stands in this OA, 96% of the forest in this OA could provide mature habitat for:

Species	Limiting factor
Northern goshawk	Disturbance to individuals during the nesting season and disturbance to habitat
Diana fritillary	Insecticide application
White monkshood	Disturbance to individuals and habitat
Nodding pogonia	Disturbance to individuals and habitat

Potential Effects: Potential effects to these habitats from proposed activities comes from timber harvest which opens up the forest canopy, which results in fragmentation, increased light to the forest floor, changes to the microclimates, and soil disturbance that could destroy sensitive plants or allow for non-native competition.

Effects of Alternatives on Mature Forest Conditions: Direct effects to mature forest conditions from the Proposed Action are that another 4% of the total project area would cease to be mature forest for the next 70 years leaving 92% of this area in mature forest once the projects are completed. The amount of interior habitat (the area unaffected by the edge effects of openings, roads, etc.) would decrease from 67% to 52%. Forty-two

percent is still fairly intact, and the only permanent fragmenting factor would be the 39 acres of openings and savannahs. The harvest units would continue to fragment the area for approximately 20 to 25 years, when the canopy of the regenerating trees closes.

There would not be any effects to sensitive plant or animal species in this habitat, as no populations are known to occur within any of the unit boundaries and proposed road locations. The indirect effects of the proposed action would be a slightly less area available for the above species.

Alternatives 2, 3, 4, and 6 have the same effects on mature forest conditions as the proposed action because the changes in the regeneration and thinning harvest methods do not affect the amount of mature habitat remaining after implementation and no known populations would be affected.

Cumulative effects to this habitat for each of the action alternatives would be minimal. Surrounding OA's as well as forested private lands have similar amounts of mature forest conditions so there is no shortage of dispersal areas for these sensitive species. Also, potential timber sales in early planning stages for other parts of the Cherry River would affect similar proportions of this habitat type.

The No Action alternative would have no direct, indirect, or cumulative effects as no activities are proposed. However, the forest would continue towards ecological maturity providing future benefits for mature habitat dependent species.

None of the alternatives would result in loss of viability, as effects to these species are minimal.

Affected Environment, Disturbed Habitats: Disturbed habitats within the project area include young timber stands, roadsides and wildlife openings and savannahs that provide either exposed soils, grass/forb or seedling/sapling seral stages or have more light to the under-story than does a forested stand. One sensitive species, the Diana fritillary would benefit from all of these disturbed types of habitats. Another, butternut, is shade intolerant and requires soil disturbance in order to reproduce. It could thrive in a savannah type of environment. The tiger beetle prefers open areas with sparse vegetation. Currently there are about 50 acres of open, disturbed habitat, not including roadside areas along Handle Factory Hollow Road or State Route 39/55. However, vegetation is mostly dense in these areas.

Species	Limiting factor
Butternut	Disturbance to individuals or lack of suitable habitat
Diana fritillary	Disturbance to individuals or lack of suitable habitat
A Tiger beetle	Disturbance to individuals or lack of suitable habitat

Potential Effects: Timber harvesting creates disturbed habitat by opening up the canopy and exposing the soils. This habitat however is temporary, usually for about 20-25 years, until the canopy is again closed and forest litter or vegetation covers the exposed soils. In the Proposed Action savannah and wildlife opening creation (39 acres) results in permanent disturbed habitat as it is maintained in the grass/forb stage. Road construction

(1.3 miles) disturbs ground and opens up the forest canopy. Aspen planting creates disturbance similar to a wildlife opening but then will be planted to aspen that will mature in about 20 to 25 years and shade out the grass/forbs.

Effects of Alternatives on Disturbed Habitats: The Proposed Action will create about 150 acres of disturbed habitat. This disturbed habitat includes the regenerated stands, wildlife openings and savannahs, aspen planting and new road construction, and skid trails used for ground skidding. Alternatives 2, 4 and 6 would also create additional disturbed habitat that could benefit these species. Alternative 2 and 6 would create about 130 acres while alternative 4 about would create about 120 acres. Alternative 3 would not regenerate any areas or create any wildlife openings or savannahs thus the amount of disturbed habitat created would be much less (about 30). This would be in the form of landings, and skid trails. The No Action alternative will not have any direct or indirect effects on the disturbed habitat type.

Cumulative effects: Cumulative effects to this habitat of past actions with the action alternatives would be to increase the available disturbed habitat. Since the turn of the century logging, this area has covered up the disturbed areas with forest litter and canopy closure without the creation of much additional disturbance. No foreseeable projects will add to or reduce the amount of disturbed habitat within the project area, although future timber entries will most likely happen in about 15 to 20 years and there is always the possibility of wildfire or blow down that create disturbance. Currently, this habitat type is lacking in the project area.

The No Action alternative will have the cumulative effects of further reducing the amount of disturbed habitat because, with the exception of any disturbance due to natural events such as fire and blow down, the existing disturbed habitat would continue to be lost as it reverted back to non-disturbed areas.

None of the alternatives will result in loss of viability for any species associated with this habitat type.

ECONOMIC AND SOCIAL EFFECTS

Affected Environment: The Monongahela National Forest recreation program provides outdoor recreation opportunities on the largest public land ownership in West Virginia. The program provides both dispersed recreation opportunities such as hunting, fishing, hiking, mountain biking, and driving for pleasure, and developed recreation facilities for public use. The national forest has a responsibility to assist local governments, businesses and non-governmental agencies in tourism efforts in support of local economies. The Highland Scenic Highway (HSH), a designated National Scenic Byway, brings national recognition and tourism potential. This highway forms part of the boundary for the Desert Branch OA. The HSH is important for transportation and tourism. It is also important in providing recreation opportunities and access to recreation lands within and adjacent to the project area.

The landscape within the viewshed of the HSH provides a high degree of scenic integrity. The area consists of massive, broad mountains separated by a narrow valley. The steep

hillsides are covered with an even textured hardwood forest. The North Fork of Cherry is a valuable scenic attribute when seen in the foreground. A rock outcrop at the end of the Fork Mountain ridge is visible from WV 39/55 as it leaves Richwood going east. The most visually sensitive viewer positions of the Desert Branch OA are on the HSH and from the city of Richwood itself.

Management of the vegetation within the viewshed of the HSH can have an effect on the scenic beauty experienced by the public as they travel this National Scenic Byway. Much of the study area is visible from the HSH and has a high degree of scenic integrity and beauty. Visibility of the landscape from the highway affords the opportunity to enhance the scenery within the viewshed or to introduce elements with potential to negatively detract from the experience of viewers. Integration of the management and operation of the HSH with other forest uses and resources is necessary to assure that this important tourism resource and associated trails and developed sites fulfill their economic and recreation potential and that the visually sensitive landscape is not negatively impacted.

The cultural human environment in and around the Desert Branch Project Area is made up of rural communities or small towns with strong ties to the land. Timber harvest, farming, mining, and tourism make up a large part of the economic base of the surrounding area. Richwood has a population of approximately 2,500 (2000 Census). A few hundred more people live in the surrounding communities. Economic activity in Richwood includes two sawmills, a few retailers, one supermarket, one motel, an outfitter store, several restaurants, some small manufacturing enterprises, and several other shops and stores. A large plywood plant is located in Craigsville, about 15 miles distant. Many people commute from Richwood to Summersville, about 25 miles away, for work. People in the Richwood area value the proximity of outdoor recreation opportunities and the views of the surrounding mountains from town. In addition, Richwood residents obtain noncommercial products from the surrounding forests, including firewood, berries, ramps, and nuts. Other minor products may include moss, ginseng, camphor vines, and grapevines. Public involvement in the NFMA and NEPA processes helped shape some of the types of projects proposed for this OA. An economic analysis is also part of the analysis and EA.

Executive Order 12898 requires federal agencies to make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its activities on minority and low income populations in the United States. Analysis based on Census data from 2000 indicates that none of the alternatives would have a disparity of impacts to minorities or low-income groups.

Recreation and Visual Quality

Affected environment: In MP 6.1 areas, a semi primitive nonmotorized recreation experience will be featured (Forest Plan, page 164). Travelways are normally closed to public vehicular use and are open for foot travel. Since the Desert Branch OA is located adjacent to the town of Richwood it provides these opportunities to people nearby. The

OA is bounded to the north by the North Fork of Cherry and the HSH. However, steep slopes along the river and highway discourage much travel into the OA originating from the highway. The river does provide easily accessible fishing opportunities along the highway. Hunting, hiking, fishing, and driving for pleasure (on the highway forming the OA boundary) are the primary recreation activities within this watershed. The Fork Mountain Trail is an important facility with tourism potential.

Other than the Fork Mountain Trail, there are no developed recreation areas in the Desert Branch OA. The Fork Mountain Trail runs approximately 6 miles from the North Fork of Cherry at the first bridge above the Gauley Ranger District office, then roughly along the north side of Desert Branch through the western end of the OA, and then along Fork Mountain along the southern boundary in the eastern part of the OA. This trail is used by hikers and mountain bikers. Future plans call for the linking of this trail to the Cranberry Tri-Rivers Rail-Trail with a bridge across the North Fork of Cherry near Rudolph Falls just downstream from the mouth of Desert Branch. After such a link is completed, a continuous trail between Richwood and the Cranberry Mountain Nature Center would exist. A small public park is located at Rudolph Falls, which is mostly used for fishing, swimming and scenic viewing. It could also experience increased use upon completion of the connection with the rail trail.
Forest Road 946 provides access to the western end of the OA. This road is gated at its intersection with the Handle Factory Hollow road, but it does provide easy access for foot travel in the area. Several local residents regularly use this road for hiking.

Hunting use occurs in the area, but does not appear to be heavy. Both the Fork Mountain Trail and FR 946 provide walking and biking access to the area.

Although no Wild and Scenic Rivers are present within or adjacent to the area, North Fork of Cherry was recommended for such designation by the WV Rivers Coalition. It has been found to be eligible for Wild and Scenic River designation. The classification it could be given if designated is Recreational. No decision has been made regarding such designation (Wild and Scenic River Study Report and EIS on Twelve Rivers in the Monongahela National Forest).

Much of the project area is highly visible from Richwood and from the HSH. Field checked maps in the project file show the visibility in the foreground and middleground.

The foreground viewing area within the OA covers a ¼ mile strip along the along the HSH and the river. Scenery variety in this area is classed as common, where features contain variety in form, line, color, and texture or combinations that tend to be common throughout the area (p. 12). This foreground is considered to be very sensitive (sensitivity level 1) to disruptions in the view. At least ¼ of the users of this primary travel route have a major concern for scenic qualities. This area has a Visual Quality Objective (VQO) of Retention. In Retention areas, management activities should not be visually evident. Activities may repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in these characteristics should not be evident to viewers, and openings should be less than 2 acres (USDA, 1974, p. 30).

The middle ground areas extend from the foreground up to the top of Fork Mountain. In Partial Retention areas, management activities may be evident but are to remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, and texture, which are frequently found in the characteristic landscape, but changes in these characteristics may be allowed if they remain visually subordinate to the characteristic landscape. Seen openings may be as large as 5 acres in this area. (USDA, 1974, p. 32, 45)

Areas not visible from the highway or the city of Richwood have a sensitivity level of 3, which is lowest sensitivity, and a VQO of modification. In Modification areas, management activities may dominate the characteristic landscape, but must at the same time use naturally established form, line, color, and texture (USDA, 1974, p.45).

Proposed Action and Alternatives 2, 3, 4, and 6: The Proposed Action and Alternatives 2, 3, and 4 have the potential to affect dispersed recreation opportunities through the sights and sounds of logging equipment. In the Proposed Action and Alternative 2 and 6, there would be noise associated with the construction of the new road. The noise from these operations would temporarily detract from the semi primitive nonmotorized recreational experience featured in this area. Visual effects would result from harvested stands in all of the logging alternatives. Openings from regeneration areas and wildlife openings would be created in the Proposed Action and Alternatives 2, 4, and 6. However, none of these openings would be seen from Richwood or the HSH. In order to see these openings, recreationists would have to walk into the vicinity. A person traveling along FR 946 or on the new road (Proposed Action and Alternative 2 and 6) would see some of these openings. The new road would not be visible from Richwood or the HSH. Other than the helicopter landing sites along FR 946, no openings would be created in Alternative 3.

Thinning or individual tree selection cutting would occur within retention areas in Alternatives 1, 3, 4, or 6. However, since no openings would be created, it is anticipated that the thinning would not be visually evident, other than causing the texture to appear a little less smooth. In addition, a 1-acre wildlife opening would be created in Alternatives 1, 2 and 4. In Alternative 2, cutting would occur on only one acre within the retention areas. Visual quality objectives would be met.

Alternatives 1, 2, 3, 4, and 6 would include thinning or individual tree selection cutting in partial retention areas. In addition, some of the regeneration cutting and wildlife openings and savannahs would occur in partial retention areas in Alternatives 1, 2, 4, and 6. Even though some of the openings would be within the partial retention areas, it is expected that distance, slope and vegetation would screen these areas from most viewers.

The remaining created openings would be in areas with a VQO of modification.

Research indicates that slash accumulations or dead trees are perceived as ugly (Ribe, 1990). Slash would be apparent for three to five years after cutting, but would diminish

in harvested stands as it breaks up and decays (Proposed Action and Alternatives 2, 3, 4, and 6). Slash would be masked in regeneration areas by the seedling/sapling development in the new stands (Proposed Action and Alternatives 2, 4, and 6). The slash should not be readily apparent from a distance. Because of the distance from the edge of cutting to the highway, no slash would be visible from the highway.

Thinning would enhance scenic beauty by stimulating faster growth on residual trees and reducing the number of smaller trees. In hardwood forests, larger trees are perceived as attractive, whereas a large number of smaller trees is less attractive to most viewers (Ribe, 1990). From a distance, the thinned areas may appear a little less densely covered by trees than the unthinned areas would, but no large openings would be created. The texture of the thinned areas may appear somewhat less smooth that that of the surrounding area. Visual effects from the Individual Tree Selection harvest areas in Alternative 3 would be similar to those of the thinned areas. In addition, thinning is likely to reduce tree mortality through reduced crowding and increased space for individual residual trees.

The proposed road would provide an additional travel way for hiking, biking, hunting, or horseback riding (Proposed Action and Alternatives 2 and 6). However since this road would branch off FR 946, which is gated to public vehicular use, this road is not likely to significantly increase use of the area, although it would invite travel along the ridge west of Mill Knob. Some users may welcome the additional travel way, while others may feel that a new road detracts from a natural experience. In Alternative 6, the temporary road could also invite foot travel further out the ridge west of Mill Knob although waterbars and dips may tend to discourage some travelers.

Conventional logging would be confined to those areas along the ridgetop not easily visible from Richwood or the HSH. The skid trails would provide travel ways on the ridgetop. However since they are on relatively level terrain, skid trails would have little effect in making access easier. In addition, waterbars on the closed trails may make them less attractive for some users. The temporary road in Alternative 6 would likely be similar to a skid trail in effects in this respect. Helicopter logging would be used for those areas on the slopes visible from Richwood or the HSH. (Proposed Action and Alternatives 3, 4, and 6). The use of helicopter logging would avoid the need to construct skid trails. Skid trails often appear as lines on slopes and are readily visible from a distance. They are often much more obvious during times of snow cover. Depending on the stands being logged at any particular time, the helicopter would be visible from the HSH or from Richwood. Some views of the helicopter carrying logs would be visible from the Cherry River Shopping Plaza when those stands in the Handle Factory Hollow area are being logged. This may attract some sightseers to the parking area to watch the helicopter logging. Some sightseers may park along pull offs along the HSH to watch the helicopter logging the slopes above that road. Therefore, the pull offs along the HSH may have heavier use during the time helicopter logging is occurring. It is also possible that the HSH could experience increased local traffic.

Under Alternatives 1, 3, 4, and 6, the sale area would be posted and closed to public use during times of helicopter logging to protect public safety. This would affect all use of the trail, hunting and other dispersed uses off-trail, and use of FR 946. It would not affect use of the state roads. These closures would be seasonal, during the period between Oct. 15 and May 15. During the two weeks of WV deer gun season, no helicopter use would occur, and the area would be open.

Logging activities would not occur during the first week of WV deer gun hunting season in all alternatives.

One aspect of helicopter logging is that it is relatively quick when compared to conventional logging systems. Some helicopter operations have moved as much as 120 CCF per day. Based on estimated helicopter unit volumes and typical helicopter logging rates, the number of helicopter logging days would be expected to range from approximately 30 to 35 days for Alternative 6 to 50 to 55 days for Alternative 4. Alternative 1 would have approximately 35 to 40 helicopter logging days. However, the expected amount of closure time would be greater than that of dividing the volume logged by helicopter by a typical helicopter day because weather conditions may prevent the helicopter from flying on some days. Some time may also be lost for general maintenance and other factors. On past sales, helicopter crews have generally not operated on Sundays, but have used it as a make-up day if they have gotten behind schedule. Therefore, it is not anticipated that closure of the area would be continuous through the life of the sale, but would be of a seasonal nature over a few years.

In Alternatives 1, 2, 4, and 6, the trail related improvements, including the vista, boardwalk, and trail relocation, would provide for more diversity of recreational experiences, but would be unlikely to result in increased use of the area. Only the trail vista creation would occur in Alternative 1. Only the trail relocation would occur in Alternative 3. All of the trail improvements would occur in Alternatives 2, 4, and 6.

In Alternative 2, there would be no sights or sounds of helicopter logging, nor would be there be any general closure of the sale area to public use. However, even though there would be no general closure of the sale area to the public, logging truck traffic would make FR 946 less attractive to hikers and bikers. Skid trails may provide more travelways in the area after the sale. Distance, vegetative screening and slope would make these trails difficult to see from the HSH.

In Alternative 3, since there would be no openings created other than the helicopter landing sites, there would be less potential to see artificially created openings. Individual tree selection would enhance regeneration of shade tolerant species such as sugar maple and beech on the slopes above the HSH. This alternative would have the largest acreage being harvested by helicopter.

In Alternative 4, effects would be similar to those of the Alternative 1 except that there would be no new roadway on the ridge west of Mill Knob. Some of the volume that would be conventionally logged in the Proposed Action would be helicopter logged under

this alternative, thereby increasing the amount of time the helicopter would be in the area. Also, the clearcut in stand 70/7 would not be included, thereby reducing the number and area of openings created.

Alternative 5 - No Action: The No Action Alternative would have minimal, if any effects, on recreation opportunities and visual quality in the Project Area. There would be no sights or sounds of timber harvesting or road construction in this alternative. The appearance of the forest would remain much the same in the short term, but would change gradually over time as the forest matures, trees die, and natural succession continues. These changes, as well as mortality from windstorms, insects, disease, and possible fire, would create openings in the current even-textured vegetation patterns. New patterns could be large scale, as would be happen if widespread mortality occurs, or small scale if caused by the death of a single or small group of trees. Openings would be filled naturally by new trees that may be of the same or of different species from the preceding stand. Over time, the succession would have the potential to result in different colors or textures. However, these changes would be considered natural and easily accepted by some viewers since they would not be caused by people.

Alternative 6: In Alternative 6, effects would be very similar to those of Alternative 1. Three wildlife openings, totaling 4 acres would not be created. The helicopter thinning area in stands 69/17 and 18 and a small portion of stand 69/15 would not be included. Also, the clearcut in stand 70/7 would not be included, thereby reducing the number and area of openings created. Since both of these areas would be helicopter logged in Alternative 1, not including these areas would reduce the time the helicopter is in the area by a few days when compared to Alternative 1.

Cumulative Effects: Current recreation use patterns and opportunities are expected to remain much the same in this area, with the exception of expected increased use on the Fork Mountain Trail by hikers and mountain bikers under all alternatives, including the no action alternative, especially if a link is established with the Tri-Rivers Rail Trail. Since FR 946 is closed to public vehicular use, the new road (Proposed Action and Alternatives 2 and 6) is unlikely to significantly increase use in the Project Area, but it is likely to cause a small increase in use in that area of the OA by providing an additional travel way for users. Other than providing easier nonmotorized access to the ridge west of Mill Knob and being visible to users in the area, the new road would not change the current semi primitive nonmotorized recreational opportunity spectrum featured in this area. The trail improvements would contribute to the visual variety of the District wide trail system. Combining the recreation use expected to occur on nearby lands, including private lands and the park at Rudolph Falls, and that expected within the project area as a result of the project, there would be small differences from that which would occur if no projects were implemented.

After the sale is complete, the roads would continue to receive custodial maintenance. The regeneration areas and wildlife openings (Proposed Action and Alternatives 2, 4, and 6) would increase visual variety in the area, although many users would prefer to see older stands as opposed to seedling/sapling stands. The wildlife openings would be

expected to draw wildlife and may enhance viewing of wildlife or hunter success. In addition wildlife openings and road corridors may provide berry-picking opportunities. In time some of the wildlife openings would have a tendency to revert back to forest without maintenance. Maintenance would retain the wildlife openings as openings. However even without maintenance, future entries may create new openings, or reuse some of them as log landings sites, thereby restoring them as wildlife openings. The future vegetation in the long term, would be a mosaic of stands of different size classes as described in the Forest Plan which would contribute to visual variety both as seen from a distance, and close up along the road or trail.

Since management activities would stimulate mast production and increase browse, a slight increase in turkey and deer populations may result in increased hunting use in the area. Mature habitat may result in some dead and dying trees visible, but the areas would be small when compared to the overall landscape. Activities on private lands in Handle Factory Hollow on the lands to the south are not expected to change in the future.

The effects of actions in Alternatives 1, 2, 3, 4, and 6 when combined with future expected timber harvest in the vicinity would not result in conditions that would detract from any potential future designation of the North Fork of Cherry under the Scenic River Act. Design, location and method of timber harvest in the future would also be expected to protect the scenic and recreational values of the river corridor.

Overall, no direct, indirect, or cumulative adverse effects to recreational use or visual quality are expected, other than temporary closure of the area to the public during helicopter logging.

Safety

Affected environment: Since this area is used by recreationists, particularly on the Fork Mountain Trail and Forest Road 946, some potential hazardous situations would exist for users. Logging truck warning signs would be posted on FR 946 warning hikers or bikers of logging traffic. One fairly common occurrence during logging or road construction/reconstruction activities is dust. Users in the area could experience some airborne dust during road work or logging activities. However, dusty conditions would be expected to be restricted to the work areas and not affect the general public.

Helicopter logging, while reducing the use of heavy machinery in some of the cutting area, does result in a potential hazard of logs being accidentally dropped from the helicopter. While this is rare, it does present a potential danger to people in the area. Therefore the sale area will be closed to the public during periods of helicopter logging. Closure may not include the entire sale area, but would include all areas within helicopter flight paths. In the conventional alternative (Alternative 2), there would be no such closure of the sale area. However, hikers along FR 946 would expect to encounter logging truck traffic. In the Proposed Action and Alternatives 2, 3, 4, and 6, approximately ½ mile of the Fork Mountain Trail would be within cutting units. During cutting of these units, that section of the Fork Mountain Trail would be closed. Also, this

trail crosses FR 946, which raises the possibility of trail users encountering log truck traffic.

Direct and Indirect Effects of Alternatives: No units would be located south of the Handle Factory Hollow Road in any of the alternatives. Helicopter logging was not considered in this area in any of the alternatives since there is no good site for a log landing on the south side of Handle Factory Hollow Road. Helicopter logging of this area would necessitate flying logs over the road and a powerline serving the residents of Handle Factory Hollow. Flying over the powerline would pose the potential for a log to fall on the powerline and interrupt service to the residents served by that line. Also, frequent brief closures would have been necessary to protect users on the road from the potential of falling logs.

Under the Proposed Action and Alternative 4, some helicopter logging would occur in the stands just north of the Handle Factory Hollow Road. During the times the area near the road is being logged, brief closures may be necessary to guard against the slight possibility that the helicopter may fly too near the roadway with a log. These closures would be a few minutes in duration, and should occur for a few days as the logging would progress away from the road.

Alternatives 1, 2, 3, 4, and 6 would result in log truck traffic on the Handle Factory Hollow Road and on the road through Weber City. Both of these roads serve residential areas. It would be expected that truck traffic could be fairly heavy (possibly averaging up to several trips per hour during the peak of logging activity for any of the alternatives). Truck traffic during the helicopter operations period for Alternatives 1, 3, 4, and 6 is expected to amount to 25 round trips per day by triaxle log trucks. The total number of haul days over an expected 2-3 year period is expected to be approximately 37 for Alternative 1, 47 for Alternative 3, 53 for Alternative 4, and 30 for Alternative 6. However, the number of trips could be somewhat less on some of the heavy hauling days, but this would be offset by a commensurate increase in the number of days with heavy hauling. There would also be hauling during conventional logging periods, but the number of trips per day would be considerably less, generally averaging five or so trips per day. These haul days would occur over the term of the sale, but would not be continuous over that period. It would be expected that there would be periods of hauling and then some periods of no hauling when there is no activity on the sale. Because of the narrowness and alignment of the road, the trucks would travel slowly on both of these roads. In addition, either the trucks or the other vehicles may have to stop and pull partially on the shoulder in places to allow vehicles to pass. Some residents may feel inconvenienced by the truck traffic.

Since this truck traffic would be going through a residential area, timber hauling from the project area on WV 39/17 would not be permitted while school buses are on the road. This mitigation would keep the truck traffic off the roads in this area during the time students would be going to or from school. With this mitigation and lower speeds in this area, safety should not be jeopardized.

In the years after the sale is completed, there should be fewer snags in the thinned areas, as thinning is expected to result in fewer trees dying. Although the likelihood of a snag falling on a person is very low, a reduction of snags in areas used by people would further reduce this possibility. However the creation of snags in the cutting units as a mitigation for the Indiana bat would cancel the effects of fewer snags in the cutting areas. Snags along the trail would not be affected by timber harvest, since there is an uncut buffer.

Cumulative Effects: With mitigations, risks from potentially hazardous conditions would be minimized. The additional truck traffic increases the chance for accidents, and activities on private lands could result in additional truck traffic at any time, but mitigations should keep safety from being jeopardized. After sale activities are completed, any cumulative effects on safety would be negligible if any. The hemlock wooly adelgid, beech bark disease, snag creation connected with the sale, and gypsy moth could be expected to increase the amount of snags in the area, near trails and roads and thoughout.

Heritage Resources

Affected Environment: The vast majority of the watershed has felt the impact of human use. Some impacts, although not currently measurable, occurred between the 18th and early 20th centuries. These would have included impacts to forest species age and diversity, wildlife populations, soils, viewsheds, fragmentation/openings ratios, and the demographic profile of the area (Indian-to-colonial; low-to-moderate population density). The most dramatic changes, however, took place after the incorporation of the Cherry River Boom and Lumber Co. in 1901.

A total of five Heritage Resource surveys have been conducted either wholly or partially within the current analysis area between 1982 and 2001. The total area in acres covered and sites located by these surveys, both within and outside of the project area, are shown in the following table. Survey methodology has changed over the years. In addition, leaf litter from hardwood forests and vegetative cover can hide sites. Thus there is potential for discovery of additional heritage sites.

This previous survey data indicates that all but one of the heritage surveys were project-driven. Surveys have been conducted primarily for timber sales, followed in order of importance by energy extraction, roads, and lands. No archaeological site evaluations have been carried out in the project area.

Table 15 - Cultural Resources Surveys in the Desert Branch OA

Project Name	Total Acres	Acres in Current Project Area	Total Number of Sites Located	Sites Located in Current Project Area
Camp 29 TS	4590	3013	4	3

Project Name	Total Acres	Acres in Current Project Area	Total Number of Sites Located	Sites Located in Current Project Area
Road No. 946 Borrow Pit	1	1	0	0
GP Bolair Tipple Site Land Exchange	65	39	0	0
Gauley Ranger District Office Construction	2	2	0	0
Cherry River Watershed Assessment	3132	305	62	5
TOTALS	**7790**	**3360**	**66**	**8**

A total of eight heritage resources have been recorded in the Desert Branch Opportunity Area. Of these, four represent the remains of prehistoric resource exploitation and/or habitation, while three represent Euro-American historic period activities; one represents multicomponent prehistoric/20th century deposits. Table 16 presents information on each of these sites. Sites are presented by site number without reference to specific physical locations. Such locations will be made available to Forest personnel as part of planning for specific management actions.

Table 16 - Heritage sites in the Desert Branch Opportunity Area.

Site Number	Period
02-160	Unknown prehistoric
02-161	Unknown prehistoric
02-217	Late Archaic
02-414	Historic
02-415	Unknown prehistoric
02-416	Late Archaic/Historic
02-417	Historic
02-418	Historic

Prehistoric and Historic Patterns: Given the current state of research in the Opportunity Area, it is not possible to characterize prehistoric use of landscape. This inability is due to the fact that no site evaluations have been done. Thus, while sites have been identified, we do not know when they were occupied or what types of activities their inhabitants were engaged in. Some of the previously recorded prehistoric sites have a very high potential for yielding important information on prehistoric utilization of the area. Until these sites and potentially important open-air sites are evaluated, however, the prehistory of the project area will remain unknown. It is known that the area has a high potential for locating prehistoric resources based on the results of previous surveys, coupled with the facts that the project area lies near the confluence of three major rivers and a known prehistoric transportation route.

Not surprisingly, the results of archaeological surveys indicate that most historic period activity in the area was related to resource extraction, particularly logging. A comparatively small proportion of historic period sites located in the area were devoted to human habitation. The former community of North Bend was recently recorded as an historic resource; it lies just east of the project area, and investigation and evaluation of it would in all likelihood provide important information on the historic period occupation of

the project area. The historic period occupation of the area was, and continues to be, focused on the town of Richwood.

Proposed Action and Alternatives 2, 3, 4, and 6: An examination of the alternative management treatments to the Desert Branch Opportunity Area reveals that all the action alternatives would impact recorded heritage resources, if these resources were not avoided. All non-helicopter logging and other activities, such as the construction of wildlife savannahs and shelterwoods have a great deal of ground disturbance sufficient to destroy heritage sites associated with them from skidding, felling and, in the case of wildlife savannahs, plowing. The action alternative with the least amount of these types of disturbances is Alternative 4, followed in order of magnitude from least to most by Alternative 3, Alternative 6, the Proposed Action, and then Alternative 2. Since sites will be identified on the ground and avoided during treatment there would be no significant effects to heritage resources.

Should additional or potential prehistoric or historic sites be located during the course of project implementation, the Forest Archaeologist would be notified and activity in that area cease until the size and nature of the resource can be determined, as specified in the standard timber sale contract clause.

Alternative 5: No activities would occur in areas with known or previously undiscovered heritage resource sites. From the perspective of Heritage Resources protection, the No Action alternative would provide greatest protection to cultural resources, as no additional erosion, soil disturbance or additional opportunities for vandalism would occur**.**

The foreseeable indirect 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. Recreational use of the area is likely to increase slightly under all alternatives over time. Consequently, more individuals will become aware of site locations, thereby exposing them to potential vandalism and loss of scientific information. This situation would not be as much a cause for concern if at least some of the prehistoric resources in the OA were already evaluated and data from them safely retrieved.

Cumulative Effects: Cumulative effects of continued access to the area, increases in human recreational use of the area, and use of the area during future potential timber sales would allow potential for some additional vandalism or destruction of sites.

Transportation

Affected Environment: Local roads are generally closed with a physical barrier between entries. Collector roads are generally gated and maintained for recurring administrative use. This area contains 4.6 square miles of National Forest land, not including the North Fork of Cherry or any of the HSH. Thus the guideline would allow 6.9 miles of local roads and 4.6 miles of collector roads in this area. State roads such as the Handle Factory Hollow road and the HSH are not included in the density calculations

as they are not part of the transportation plan. Although the HSH runs several miles along the edge of the OA, it does not cut through it. Therefore, it does not increase the effects of road mileage within the OA.

Forest-wide, the miles of road are to be kept "to a minimum, considering the access needs and protection of resources." Lower road densities in 6.1 areas keep the area fairly remote, thus providing better habitat for wild turkey and black bear species associations. The remote habitat objective of MP 6.1 areas deals with disturbance, not fragmentation of habitat (Forest Plan, pages 181 and 182). Road densities are kept lower than in other management prescriptions to reduce disturbance by humans to these animals at critical times in their life cycles, such as brood rearing and nesting. Black bears require areas where natural hibernation cycles and cub raising will not be distracted by numerous human contacts.

Roads make it easier for more people to travel into or through an area. Open roads allow for motorized access; gated roads provide for foot, bike, or horse travel. Both often allow illegal access by ATV's, although this has not been a frequent problem on roads in the area. High densities of roads open for motorized and nonmotorized travel may also contribute to higher game harvest levels by legal hunting and by poaching, because of increased ease of access. Although ATV use has not been a problem associated with roads in the area, gate breaching by removal of locks has been a problem at times.

Road standards for construction, reconstruction, and maintenance are intended to be the minimum necessary to meet the intended uses (Forest Plan, p. 98). Intended uses vary by alternative, thus changing the necessary road standards.

Currently, FR 946, which is gated, provides access to the western part of this OA. It is 3.68 miles long, thereby providing 0.80 mile of road per square mile. This route provides for Forest Service administrative access and nonmotorized public use. Access to the eastern end of the OA is provided by FR 730, which is also gated and closed to public vehicular use. This road does not enter the OA, but ends near its eastern end. The HSH provides access along the northern edge of the OA, but travel into the OA from this route is discouraged by steep slopes along the road and the river. Most of the use originating from the HSH is focused on the river corridor. One exception to this is the trail entrance for the Fork Mountain trail at the first bridge east of the Gauley Ranger District Office.

Also within the OA is FR 388, which provides access to the Gauley Ranger District Office administrative site. This paved road is 0.2 miles long and is open to public traffic. Although it counts as part of the local road density, it has little additional effect since it is very close to the highway. The total local road density for the OA is 0.84 miles per square mile.

A roads analysis was done in March, 2002 and updated in November, 2002, and is part of the project file. The roads analysis answers specific transportation planning and resource effects questions, required by Forest Service policy in Region 9. The Roads Analysis

provides a summary of resource information developed and used for this EA, and provides the basis for the transportation effects section.

Proposed Action, Alternative 1: In the Proposed Action, approximately 1.3 miles of new local road would be constructed raising road density to 1.13 miles per square mile, less than the 1.5 miles per square mile allowed by the Forest Plan, p. 182, as an average for all 6.1 areas. The new road would provide access to the ridge west of Mill Knob, thereby facilitating forest management in that area; currently road access does not exist into this area.

The location of the new road would also shorten the flight distances for helicopter logging on the steep areas along the North Fork of Cherry. No roads would go through any of the steep areas along the river, but the new road would reduce the distance to that area from vehicular access. Location of the new road on the less steep upland area is consistent with Forest Plan standards and guidelines which indicate that roads should be located "on the best possible sites to protect resources and minimize the need for maintenance and future reconstruction." Skidding distances for timber to be conventionally logging would be longer than the ½ mile most often used in transportation planning. However, because all the conventional logging would not occur on steep slopes, the longer skid distances would comply with forest plan standards and guidelines associated with minimizing road mileage, without unacceptable resource damage.

Prehaul maintenance would be done on FR 946 to bring it up to current standards for the intended uses. The intended uses of this road under Alternative 1 would be conventional timber haul, all weather timber hauling, administrative vehicle travel, and public foot travel after sale completion. The road was constructed over 15 years ago, and new road design standards are now in place to protect watershed values. These standards include more frequent location of ditch relief culverts and energy absorbing outlet pads at many culvert locations.

The intended use of the road for all weather hauling requires a full stone surface, since hauling times may include snowy and rainy seasons, when a road with native, or dirt, surfacing would be subject to excessive rutting and erosion. The number of days when all weather hauling would be expected to occur would amount to about 37 days in all, in order for trucking to keep up with the speed of helicopter logging. The 37 days of hauling associated with the helicopter logging would be expected to occur over a 2-3 year period. The truck traffic on the road would be expected to include administrative and servicing vehicles as well as 25 round trips per day by triaxle trucks, or 18 round trips for tractor trailer trucks. The tandem axle trucks used for hauling on this road during previous timber sales are considered to be an older technology that is unlikely to be used for removal of sawtimber during helicopter logging. If these trucks were used, about 31 round trips per day would be required.

Some minor work would be done on the Handle Factory Hollow Road (WV 39/17). This work would consist of placement of gravel on some sections of the road, or in turnouts, so it would better sustain timber hauling and provide for public safety. WV 39/17 is a

very narrow public road. Two curves on the road are known to be inadequate for tractor trailer use, on the existing road, and within the existing state right of way. One of these curves is also inadequate for use by triaxle trucks, on the existing paved surface. This curve could be expanded with limited placement of road surfacing material, to allow use by the triaxle trucks needed for all timber hauling within the timber sale. Placement of road surfacing in this location, with the cooperation of the WV Dept. of Transportation, is expected to be an effect of all the action alternatives evaluated in this EA. The weight capacity of the existing bridge over the North Fork of Cherry is adequate to support trucking. Other effects on WV 39/17 may be to increase the need for state road maintenance in the area, as a result of concentrated periods of use.

The intended use of foot traffic after sale closure would require a relatively smooth walking surface that can be provided by the crushed rock surfacing that would be applied to accommodate trucking.

Alternative 2: Alternative 2 would include all of the road work in the Proposed Action, prehaul maintenance on FR 730 (6.59 miles), and the construction of approximately 0.7 mile of new road at the end of FR 730 on an existing temporary road/wide skid trail corridor.

The intended uses of all roads under Alternative 2 would not include all weather hauling, since no helicopter logging would occur. Thus, native or dirt surfacing with spot gravel would be sufficient, and hauling would normally not occur during time periods when road rutting and erosion would be excessive. Prehaul maintenance would still require additional culverts and outlet pads, in order to comply with current standards for watershed protection. Overall, the prehaul maintenance would be less expensive per mile than in the alternatives that have helicopter logging.

The new road would increase the road density to 1.21 miles per square mile. This road would enhance access to the eastern end of the OA. It would add 0.3 mile of local road to the Rabbit Run OA (26.108), thereby raising the local road density from 1.41 miles per square mile to 1.46 miles per square mile, less than the 1.5 miles per square mile allowed by the Forest Plan, p. 182. Forest Plan standards for road density apply to all 6.1 areas combined, and are not considered to be a maximum mileage for any one particular 6.1 area. Considering that the average road density is less than the required density for each of the affected OAs, the effects of Alternative 2 on Forest wide road density could not result in raising the overall density above that required by the Forest Plan.

Alternatives 3 and 4: In Alternatives 3 and 4, there would be no new road construction, but prehaul maintenance would be done on FR 946, and the work would be done on the Handle Factory Hollow Road. Since the intended uses include all weather hauling for helicopter logging, road standards would require full stone, as in Alternative 1. Since the amount of volume to be harvested using helicopters would vary from Alternative 1, the number of expected round trips for helicopter related hauling would vary. For Alternative 3, the total days of expected helicopter related hauling would be 47, with an expected 25 trips per day by triaxle, or 18 by tractor trailer. For Alternative 4, the total

days of expected helicopter related hauling would be 53, with 25 triaxle, or 18 tractor trailer round trips per day.

No road access would be provided to the ridge west of Mill Knob. Long term expected transportation needs would not be met by construction of roads in conjunction with the timber sales proposed in these alternatives. Although the lack of a road into this area would not preclude forest management, it would limit the area that could be reached by conventional logging. Some area that would optimally be harvested through conventional means would require the use of helicopter logging for harvest. Also, flight distances for helicopter logging on the steep areas along the North Fork of Cherry would be longer, thus increasing costs. Other activities could still be conducted in the area, but access would not be increased over that which currently exists.

Alternative 5: In the No Action alternative, there would be no new road construction, no reconstruction of FR 946, and no work on the Handle Factory Hollow Road. Therefore, there would be no change in the local or collector road densities or public access.

Alternative 6: Alternative 6 would include all of the road work in Alternative 1 (Proposed Action). It would also include approximately ½ mile of temporary road, which would reduce the skidding distance for stand 69/7. With the temporary road the maximum skidding distance for that area would be approximately ½ mile. Since the temporary road would be closed and waterbarred after use, the overall effects of this alternative would be very similar to those in Alternative 1.

Uses of the roads would be the same as in Alternative 1 except for having approximately 30 days of helicopter related hauling rather than 37.

Cumulative Effects: The Forest Plan guideline for road densities in all MP 6.1 areas Forest Wide is 1.5 mile of local roads and 1.0 mile of collector roads per square mile of National Forest land. (see Forest Plan pages 181, 182, and M-1). Forest-wide road mileage figures from the Infrastructure database (INFRA) indicate that there are 646 miles of collector roads and 878 miles of local roads on the Monongahela National Forest (D'Angelo, 2002). There are approximately 1,088 square miles in management prescriptions which allow road construction and use, excluding Management Prescription 5.0 (wilderness), 6.2, and the Dolly Sods North areas. Thus, the Forest-wide density for collector roads is 0.6 miles per square mile and that of local roads is 0.8 miles per square mile. Forest-wide road density is within the range allowed for management prescription 6.1 alone, which is the lowest road density standard and guideline. Thus, the cumulative effect of road densities in this project area, when combined with road densities for the entire National Forest, would not result in more than 1.0 miles per square mile of collector roads nor in more than 1.5 miles per square mile of local roads. It is unlikely that any future road construction within the area, or forest wide, would have the effect of increasing forest wide road densities above the standard for the 6.1 management prescription.

There would be no cumulative adverse effects from the construction of 1.3 miles of road in the Proposed Action and Alternative 6 and 2 miles of road in Alternative 2. With the access provided by FR 946, FR 730, and the new road, very little if any additional road would be needed in this OA in future entries. Because the new road construction provides for more than ½ mile of skidding distance to the area of conventional logging in all action alternatives, there is a possibility that additional road mileage may be needed in future timber sales. The road system would not provide direct access to the side slope area above the river or on those areas seen from Richwood.

Although FR 946 is gated, it does occasionally receive unauthorized vehicular use. Such use on FR 946 would likely lead to the same use on the new road (Proposed Action and Alternatives 2 and 6), thereby potentially slightly increasing the need for law enforcement activities in the area.

Some additional maintenance would be needed on the state maintained Handle Factory Hollow Road as a result of the log truck traffic. It is not likely that timber harvest will occur on private land in Handle Factory Hollow during the same period of time, since much has been harvested in the recent past. If such timber harvest would occur during the same time period it would result in even more traffic, and greater need for additional road maintenance. No long term changes in the road's condition or status are expected as a result of this project, in combination with potential future projects including timber harvest.

Long term maintenance would be needed on additional National Forest road mileage, as a result of the new road construction, but maintenance needs would be less than the long term needs for road maintenance anticipated by the current Forest Plan. Because of the road's location away from rivers, streams and steep slopes, long term road maintenance needs would be less than those on wetter, steeper, or more slide prone areas.

Economics

Affected Environment: The economy of the surrounding area is heavily dependent on activities including timber harvest, manufacture of forest products, mining, recreation, agriculture, and tourism.

Although many potential values are present within the area, those direct values and costs that are normally quantified are considered in the economic analysis. Indirect values and costs such as values of increased hunting license fees, revenues to local businesses, and tax revenues are not included, since quantifying them would be somewhat subjective.

Values of timber products are based on estimates of timber volumes to be removed through harvest. These volumes come from CDS data from the stands to be harvested. Base prices from April 2004 are used to calculate values, with some allowance for additional costs of helicopter logging based on distance of haul, and weight of wood by species. Details of the value and volume calculations are in the project file. Using the methodology describe above, an average price of $131.97/CCF for sawtimber was estimated. In the North Gauley Timber Sale, the helicopter logging cost estimate was

approximately $120/CCF. At the time of the economic analysis for the sale, the Forest Timber Sales specialist indicated that conventional logging costs generally run around $60/CCF. The conventional logging costs are factored into base stumpage prices. The difference between the helicopter costs and conventional costs was included, when estimating the expected timber value. Average flight distances and elevation differences for the different stands were estimated and used in the Helipace 3 program to determine an estimate of helicopter logging costs for the alternatives in this proposal. The Helipace 3 estimates range from an average cost of $163/CCF for Alternative 1 to $178/CCF for Alternative 4.

Effects of Alternatives: The following table focuses on incremental economic differences between the Proposed Action and the alternatives. The analysis includes only variable costs associated with the Proposed Action and each alternative. Since fixed costs, such as general administration and program management, do not change among alternatives, these costs are not included. Furthermore, the costs included in this analysis are only those incurred by the Forest Service. Costs incurred by timber purchasers and other parties are not included. Vegetation management project costs are based on average recent costs of doing the same type of work on the Gauley or Marlinton Ranger Districts.

Each alternative also produces other public benefits such as wildlife habitat and biological diversity. However, these benefits are not quantified in the economic analysis because it is difficult to estimate monetary values for them on a project basis. Also, costs of not having a standing older forest in the regeneration areas or wildlife openings are not quantified because they are subjective, and it is difficult to assign a dollar value to attributes of older stand as compared to those of young stands or wildlife openings. Values of noncommercial or personal use products such as firewood, ramps (a wild leek), or berries are also not quantified as it is difficult to assign a value to them. Whereas creating openings may reduce opportunities to obtain some products such as ramps, it would enhance opportunities for berry picking. Also, the area affected would be small when compared to the overall project area. Firewood gathering opportunities under all alternatives would be very limited since FR 946 is closed to public vehicular use.

With mitigating effects, we expect negligible effects on flood control, pest control, carbon sequestering, and the balance of geochemical cycles. We expect to have no or negligible economic costs from increased flooding, increased risk of death, injury, property damage from logging operations, increased fire risk, soil loss, or reduction of water quality. Since these costs are expected to be none or negligible, we will not attempt to quantify.

The Proposed Action and each alternative include a combination of revenues and costs associated with various activities that must be viewed as a single package.

Of the gross revenues derived from the National Forests, 25 percent is returned to the counties in which the National Forest is located. Each county's share is based on the proportion of the National Forest land in that county. Funds to be allocated to the

counties, shown in the table, from the Desert Branch Timber Sale would be calculated from the Net revenue less road construction, reconstruction, and prehaul maintenance costs.

Table 17 - Economic Comparison Between Alternatives

	Value/Unit	Proposed Action	Alter. 2	Alter. 3	Alter. 4	No Action	Alter. 6
Timber Volume Estimated							
Sawtimber CCF		9978	7861	7537	9025	0	8857
Pulpwood CCF includes topwood		935	1269	594	646	0	888
Revenues							
Sawtimber	$132/CCF	1317096	1037652	994884	1191300	0	1169124
Pulpwood	$2/CCF	1870	2538	1188	1292	0	1776
Helicopter Adjustment		-448771	0	-594880	-672438	0	-383060
Total Revenue		**$870,195**	**$1,040,190**	**$401,192**	**$520,154**	**0**	**$787,840**
Costs of Projects							
Sale Preparation	$17.59/CCF	191960	160597	143024	170113	0	171415
Sale Administration	$13.63/CCF	148744	124442	110826	131816	0	132824
Site Preparation	$191/acre	17763	14898	0	17763	0	14898
Regeneration Surveys	$63/acre	5859	4914	1625	5859	0	4914
Construct Wildlife Opening	$2141/acre	34256	25692	0	27833	0	25692
Construct Savannah	$2141/acre	49243	49243	0	27833	0	49243
Construct Waterhole	$954/each	5724	5724	0	2862	0	4770
Plant Spruce	$979/acre	0	1958	0	1958	0	1958
Relocate Trail		0	6141	6141	6141	0	6141
Boardwalk and connector		0	7590	0	7590	0	7590
Wildlife Viewing Platforms	$7800/each	0	15600	0	15600	0	15600
Road Construction 1.3 miles	Engineer est.	163926	163926	0	0	0	163926
Road Reconstruction 0.7 mile		0	94150	0	0	0	0
Road Prehaul maintenance	Engineer est.	128346	392466	128346	128346	0	128346
Temporary Road		0	0	0	0	0	5977
Road improvement WV39/17	Engineer est.	20292	20292	20292	20292	0	20292
Total Cost		**$766,113**	**$1,087,633**	**$410,254**	**$564,006**	**0**	**$753,586**
Total Net Revenues		**$104,082**	**-$47,443**	**-$9,062**	**-$43,852**	**0**	**$34,254**
Amount to Counties		**$139,408**	**$92,339**	**$63,139**	**$92,879**	**0**	**$117,325**

Project acres or units may be found in Table 7.
Helicopter adjustment reflects the difference between helicopter logging costs and conventional costs.

Regeneration Surveys for First and Third Year Surveys in Alternatives 1, 2, 4, 6 and one survey for Alternative 3 for unevenaged management. Cost for Alternative 3 estimated at cost of stand exam.
Estimate of road reconstruction cost of existing corridor to system road is based on engineering estimate of new system road.
Amount to counties is from the 25% fund.

In conventionally logged sales, local logging crews fell the designated trees, transport the logs to the landings, and transport the logs to the mill. In helicopter sales, the helicopter company crews come in and fell the designated trees and transport the logs to the landings. In past helicopter sales, local crews have been used to transport the logs from the landing to the mill. Therefore, some may feel that using helicopter logging takes jobs away from local people since the helicopter company crews are generally from the western states. However, these crew members also contribute to the local economy by buying food and other necessities during their time in the area.

Some small businesses in the area may be hesitant to bid on helicopter sales, but recent helicopter sale offerings on the Monongahela National Forest have received bids from small businesses. In 2000, the Forest Service received four bids for the Early Bird Timber Sale (a helicopter sale), a small business set-aside sale. In 2001, four bids were received on the North Gauley Timber Sale. Although the winning bidder was a large business, three of the bids were from small businesses. On the May-Little River Timber Sale six bids were received, four of which were from small businesses. The Pheasant Timber Sale received one bid, which was from a small business. Limestone received four bids, three of which were small businesses. The winning bidder on that sale was a small business. Based on the bidding patterns and results, it appears that small businesses are able to bid on helicopter sales and are sometimes successful in bidding.

Proposed Action and Alternatives 2, 3, 4, and 6: Based on current expected costs and revenues, the Proposed Action would yield the greatest net revenue followed by Alternatives 6, 4, 3, and 2. The Proposed Action would also yield the greatest payment to counties followed by Alternatives 6, 4, 2, and 3.

Alternative 5 (No Action): There would be no incremental revenues and costs associated with this alternative. Also the potential for future financial benefits from timber sales would be less under this alternative. This is due to the loss of timber volume related to mortality and slowed growth in overstocked stands. No payments to the counties would result from this alternative.

Cumulative Effects: The timber from the Proposed Action or Alternatives 2, 3, 4, or 6 would not have a significant impact on the local or regional economy. It, along with timber from other National Forest sales or from private lands would help maintain that aspect of the local or regional economy. Depending on the successful bidder, the logs would be expected to go to a mill within the region. The ripple effect would be the maintenance of jobs in the area and economic activity by those people holding the jobs.

Potential for economic benefits from timber sales within the project area would be maintained or enhanced by all of the alternatives in the long term.

Although a small increase in use of the Fork Mountain Trail is expected, particularly after the link to the Cranberry Tri-Rivers Rail-Trail is completed, that influence on the local economy is likely to be negligible. Any increase in hunter use is likely to be from local residents. None of the alternatives should have any negative impact on the HSH viewshed; therefore there should be no long term adverse effects on tourism in the area. We expect negligible or no change in the motel business or increased tourism revenues from the Proposed Action or any of the alternatives.

Overall, economic impacts from any of the alternatives are expected to be negligible, but the alternatives with timber harvesting would help maintain the area economy.

CHAPTER IV - CONSULTATION

FOREST SERVICE PARTICIPANTS

Interdisciplinary Team

Jane Bard ….. Team Leader/Silviculturist/Gauley Ranger District
Lewis Blodgett ….. Forester/Gauley Ranger District
Bill Schiffer …… Wildlife Biologist/New River Ranger District, Jefferson NF

Other Forest Service Participants

Barry Edgerton …… Hydrologist/Monongahela National Forest, Elkins, WV
Mike Owen …… Aquatic Ecologist/ Monongahela National Forest, Elkins, WV
Jan Garrett …… Botanist/ Monongahela National Forest, Elkins, WV
Stephanie Connolly ….. Soil Scientist/ Monongahela National Forest, Elkins, WV
Randall Biller …… Engineer/ Monongahela National Forest, Elkins, WV
John Barger …… Engineer/ Monongahela National Forest, Marlinton, WV
Greg Coberly ….. Engineering Technician/ Monongahela National Forest, Elkins, WV
John Calabrese ….. Archaeologist/ Monongahela National Forest, Elkins, WV
Tom Cain ….. Fisheries Biologist/ Monongahela National Forest, Elkins, WV
Linda Tracy ….. Geologist/ Monongahela National Forest, Elkins, WV
Tim Henry ….. South Zone Recreation Assistant/Marlinton Ranger District
Jay Martin ….. Biological Technician/Gauley Ranger District
Bill Kerr …… Landscape Architect/Monongahela National Forest, Elkins, WV (Retired)
Linton Wright …… Soil Scientist/Monongahela National Forest, Elkins, WV (Retired)
Jacob Dangelo ….. Transportation Planner/Monongahela National Forest, Elkins, WV
Karen Stevens …… Wildlife Biologist/Monongahela National Forest, Elkins, WV
Theresa Evans …… Wildlife Biologist/Monongahela National Forest, Elkins, WV
Dan Arling …… Wildlife Biologist/Monongahela National Forest, Elkins, WV

Adjacent Landowners

Roy C. and Hollie Moose, Richwood, WV
Edward B. and Constance B. Prendergast, Richwood, WV
Philip and Mary E. Ables, Richwood, WV
Georgia Pacific Corporation, Richwood, WV
Beulah M. Beely and Robert Smith, Vienna, WV
Delmas and Cyglenda Bennett, Fenwick, WV
Thomas J. Batten and Shawn Lee, Walker, WV
Clayton E. Bennett
James Smith
Willam R. and Gloria J. Swecker, Elkview, WV
James and Ada Overbaugh, Mt. Zion, WV
Ray Smith and Kathleen Ables, Richwood, WV
Stanley L. Neal, Jr., Richwood, WV
Derrick W. and Karen Workman, Richwood, WV
John Jackson and April Griffith, Richwood, WV
Elizabeth R. and Kelly L. Short, Clendenin, WV
Carol Sue Welch, Manassas, VA
James and Michaela Facemire, Richwood, WV
Donald L. And Charlotte Perrine, Richwood, WV
Jerry C. and Janet L. Wright, Summersville, WV
James and Sheila K. Facemire, Richwood, WV
Edgar P. Young, Richwood, WV
John Jackson, Richwood, WV
Ronald Lee and Ornie K. Deal
Kay Ann Smith, Richwood, WV
Donald P. Mick, Weston, WV
A. D. and Rowan Blosser, Richwood, WV

Other Agencies/Groups/Individuals Contacted

Allegheny Wood Products Inc., Petersburg, WV
Appalachian Restoration Campaign, Charlottesville, VA
B. A. Mullican Lumber and Manufacturing Co LP, Richwood, WV
Bryan Bailey, Buckhannon, WV
Judy L. Barr, Hagerstown, MD
Barth, Thompson & George, Charleston, WV
George Beam, Birch River, WV
Lawrence T. Beckerle, Craigsville, WV
Jim Bensman, East Alton, IL
Blue Ribbon Coalition Inc., Idaho Falls, ID
Blue Ridge Mountain Sports, Charlottesville, VA
Willie Boothe, Cyclone, WV
Jeremy Boyer, Portland, OR
Dave Braland, Fenwick, WV
James Buffman, Craigsville, WV
Cabot Oil and Gas Corporation, Charleston, WV
Patrick Campbell, Elkview, WV
Canaan Wildlife Refuge, Davis, W
Joseph T. Carney, Charleston, WV
Larry Case, Fayetteville, WV
Steven D. Cerulla, Buckhannon, WV
Chamber of Commerce, Richwood, WV
Charleston Gazette, Charleston, WV
Therese Chorun, Jersey City, NJ

CNG Producing, Bridgeport, WV
Coastal Lumber Company Inc., Buckhannon, WV
Columbia Carolina Corp., Old Fort, NC
Columbia Forest Products, Craigsville, WV
Columbia Natural Resources, Charleston, WV
Craigsville Chapter NWTF, Craigsville, WV
Donald Ray Crookshanks, Rainelle, WV
Cy Emer Logging, James City, PA
Deer Creek Wildlife Club Inc., Summersville, WV
George Deike, Cass, WV
C Mr. Harold Dial, Davis, WV
Div. of Environmental Protection, Charleston, WV
Vince Dudley, Charleston, WV
Earth Treks Climbing Center, Columbia, MD
Rich Edwards, Slaty Fork, WV
Burton Ervin, Cowen, WV
Kent Fleming, Terra Alta, WV
Forest Supervisor, Elkins, WV
Forest Watch, Morgantown, WV
Forest Watch Coalition, Elkins, WV
Larry Frontino, Summersville, WV
Dave Fulton, Williamston, WV
Carl Gainer, Richwood, WV
Georgia-Pacific Corp., Mount Hope, WV
Georgia-Pacific Corp., Lewisburg, WV
Georgia-Pacific Corp., Richwood, WV
James W. Glasscock, Richwood, WV
Governor's Office of E & C Development, Charleston, WV
Greenbrier Co. Trappers Assoc., Spring Dale, WV
Mason Grimmett, Mallory, WV
Jack Groves, Petersburg, WV
GSG Environmental Inc., Chicago, IL
Hacker Valley Sportsman Club, Diana, WV
Brian Hagenbuck, Easton, PA
Edward Hamon, Calvin, WV
Loyal T. Hamrick, Parkersburg, WV
Joe Harper, Seneca Rocks, WV
Larry Harris, Morgantown, WV
Shawn Head, Elkins, WV
Heartwood Forest Watch Coordinator, Wood River, IL
Heartwood Missouri, Columbia, MO
Heartwood Network Support, Columbia, MO
Preston Hedrick, Bartow, WV
John Herman, Hillard, OH
Highland Trails Chapter, Summersville
Ken Hotopp, Frostburg, MD
Don Hudspeth, Hico, WV
Bill Igo, White Sulphur Springs, WV
Jackson Jarvis, Cowen, WV
John Johnston, Princeton, WV
Richard Keiffer, Craigsville, WV
Charles Kelly, Elkins, WV
Kessler Lumber Co., Keyser, WV
Richard Killingsworth, Verona, WV
Alfred B. Kincaid, Fenwick, WV
Jim Kraft, Peterstown, WV
Steve Krichbaum, Staunton, VA
Kate Lambdin, Myra, WV
Rich Landenberger, Morgantown, WV
Devonal Langworthy, Uniontown, OH
Sam Leeson, Bridgeport, WV
Leslie Brothers Lumber Co., Cowen, WV
Eric Lindberg, Russellville, WV
Steve Liptak, Clarksburg, WV
Elizabeth Little, Hillsboro, WV
Mike Little, Richwood, WV
Little Kanawha Chapter, Parkersburg, WV
Wanda Long, Denver, NC
Alex P. Lopez, Sophia, WV
Alex P. Lopez II, Daniels, WV
Ed Lytwak, Arlington, VA
William L. MacDonald, Morgantown, WV
Marshall University, Huntington, WV
John McCoy, Barboursville, WV
Eli Chief McCoy, Charleston, WV
Harry McIlvaine, Rupert, WV
William P. McNeel, Marlinton, WV
Margaret Melly, Houston, TX
Richard L. Merrill, Ligonier, PA
Pamela C. Merritt, Kerens, WV
Mid Ohio Valley Chapter, New Martinsville, WV
Mid-Atlantic Bio Project, Indiana, PA
Missouri Heartwood, Columbia, MO
Mon Wilderness & Preservation Society, Washington, DC
Jeff Moore, Nitro, WV
Garnil Morris, Summersville, WV
Motorcycle Industry Council, Arlington, VA
Mountain RC&D Area, Fayetteville, WV
Mountaineer Chapter Trout Unlimited, Buckhannon, WV
Robert F. Mueller, Staunton, VA
Alva and Alice Mullens, Cowen, WV
Jack Newhouse, Cowen, WV
Charles Nichols, Bedford, PA
Charlie A. Nichols, Cross Lanes, WV
Mark Niggemyer, Fairmont, WV
Northern Panhandle OHV, Follansbee, WV
Larry Orr, Elkview, WV
Tom Pauley, Huntington, WV
PAW-SVO, Roanoke, VA
Pendleton Co. Comm., Franklin, WV
Penn West Trading Company, Corry, PA
Charles Piercy, Kingmont, WV
Pocahontas Co. Coon Hunters, Hillsboro, WV
Potomac Headwaters RC&D, Martinsburg, WV
Potomac Highlands OHV Club, Moorefield, WV
Potomac WMA, Franklin, WV
Preserve Appalachian Wilderness, Roanoke, VA
Quinney NR Research Library, Logan, UT
Bill Ragette, Culloden, WV
RBS Incorporation, White Sulphur Springs, WV
Curtis Richards, Beckley, WV
Richwood Public Library, Richwood, WV
Frank A. Roberts, Hendricks, WV
Judith Holyoke Schoyer Rodd, Charleston, WV
A. Craig Roland, Lenoir, NC
John Rossell, Dunmore, WV
Ruffed Grouse Society, Rice Lake, WI
Ruffed Grouse Society, Madisonburg, PA
Rupert Rod & Gun Club, Rupert, WV

Rocky Ryder, Bartow, WV
Johnny Sandy, Cowen, WV
Dave Saville, Morgantown, WV
Alfred G. Sawyers, Richwood, WV
Jim Sconyers, Terra Alta, WV
Bart Semcer, Bloomfield, NJ
Randy Sharp, Marlinton, WV
Paul Shaw, Fayetteville, WV
Sierra Club WV Chapter, Charles Town, WV
Francis D. Slider, Middlebourne, WV
Robert E. Smith, Clarksburg, WV
Arthur K. Snead Jr., Bartow, WV
Ralph Snider, Parsons, WV
Stump Creek Radio, Cass, WV
Jack Sturgill, Petersburg, WV
Charles E. Sullivan, Hedgeville, WV
Summersville Chapter Ducks Unlimited, Cowen, WV
Bruce Sundquist, Monroeville, PA
Hubert Teter, Beverly, WV
The Highland Voice, Charleston, WV
The Intermountain, Elkins, WV
The Nature Conservancy, Charleston, WV
The Nature Conservancy, Elkins, WV
The Plumhine-Strategic Resource Systems, St. Johns, MI
The Webster Republican, Webster Springs, WV
Alice J. Towne, Hedgesville, WV
Tri-State ATV Club, Mill Creek, WV
Tri-State ATV Club, Elkins, WV
Trout Unlimited, Westover, WV
Two Bros. Logging Corp., Goshen, VA
U.S. Army Corps of Engineers, Summersville, WV
U.S. EPA, Ofc. Of Fed. Act, Washington, DC
U.S. Fish and Wildlife Service, Elkins, WV
USDA Forest Service, Milwaukee, WI 53203
Valley Lumber & Fencing, Summersville, WV
Virginia Snow Mobile Assoc., Salem, VA
W. M. Cramer Lumber Co. – Marlinton, Inc., Marlinton, WV
Webfoot Chapter Ducks Unlimited, Cowen, WV
Webster Co. Trappers Assoc., Upperglade, WV
Westvaco Wood Dept., Covington, VA
Robert Wheeler, Chapmanville, WV
Susan Wiedman, Charlottesville, VA
Wilderness Watch, Missoula, MT
Charlie Willett, Elkins, WV
Scot J. Williamson, Stratford, NH
Gary Willison, Elkins,
Woodlands Mt. Institute, Franklin, WV
WV Bear Hunters Assoc., Hillsboro, WV
WV Chapter of Sierra Club, Lewisburg, WV
WV Coon Hunters Assoc., Fairmont, WV
WV Dept. of Natural Resources, Charleston, WV
WV Dept. of Natural Resources, Petersburg, WV
WV Division of Environmental Protection, Fairmont, WV
WV Division of Forestry, French Creek, WV
WV Division of Forestry, Fairmont, WV
WV Division of Natural Resources, Elkins,
WV DNR Nongame Natural Heritage Program, Elkins, WV
WV Forestry Assoc., Maxwelton, WV
WV Forestry Assoc., Meadow Bluff, WV
WV Forestry Assoc., Ripley, WV
WV Highlands Conservancy, Charleston, WV
WV Highlands Conservancy, McMurray, PA
WV Rails to Trails, South Charleston, WV
WV RVA, Nitro, WV
WV Scenic Trails Assoc., Forest Hill, WV
WV Sierra Club, Terra Alta, WV
WV Speleological Survey, Upper Tract, WV
WV Speleological Survey, Laurel, MD
WV Wild Turkey Federation, Charleston, WV
WV Wildlife Federation, Paden City, WV
WVMR, Independence, WV
John A. Yeager, Elkins, WV
Ken Yufer, Newton, WV
Stepfan Zakaib, Charleston, WV

Consulted but letters returned:

Paul C. Myers, Hendersonville, NC
Alex P. Lopez II, Daniels, WV
WV Rivers Coalition, Buckhannon, WV remailed
Ethan Allen Inc., Orleans, VT
Noel Shrout -- Southern WV Trail Riders, Kilsyth, WV
Mike Hinkle, Fenwick, WV
Top Dollar Logging, Franklin, WV remailed
James Randy Coots, Summersville, WV
Mongold Lumber Enterprises, Elkins, WV
Allegheny Chapter of TU, Elkins, WV
Bill Hitt, Richwood, WV
Sherman Bamford -- PAW-SVO, Roanoke, VA remailed
Paul F. Semmier – Mountain Trail Riders, Oakland, MD
Robert Bricker – Sierra Club, Morgantown, WV
Nelson Construction, Circleville, WV
David and Marilyn Colver, Cowen, WV
Thomas Shaw – TVS Logging, Philippi, WV
Bicycle WV Inc., Charleston, WV
Larry Endsley, Pittsburgh, PA
Eric Lundquist, Westerville, OH
Steve Henry, Poca, WV
James Baker, Madison, IN
Tom Rooney – Mid-Atlantic Bio Project, Indiana, PA
BA Mullican Lumber & Mfg Co., Maryville, TN

CHAPTER V – REFERENCES

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