Environmental Assessment
For
Amendment 10
Nantahala & Pisgah National Forests
Land and Resource Management Plan

August, 2000

I. Purpose and Need for Action

Proposed Action

The USDA Forest Service (USFS) proposes to amend the Nantahala & Pisgah Land and Resource Management Plan (Forest Plan) to add management direction and standards for protection of the endangered Indiana bat. The new direction and standards are derived from the reasonable and prudent measures in a Biological Opinion (Effects of Implementing the Nantahala and Pisgah Forest Plan on the Indiana Bat, April 2000) issued by the USDI Fish and Wildlife Service (FWS). The forest plan amendment is enclosed as Appendix A.

Purpose and Need for Action

The endangered Indiana bat was found on the Nantahala National Forest in July, 1999 as Forest Service and Tennessee Technological University biologists teamed up to survey for the species. A summer maternity colony was found along Santeetlah Creek. This is the first documented occurrence of Indiana bat (IB) reproduction south of Kentucky. There were no documented summer occurrences of the species in this area previously.

Following the procedures of the Endangered Species Act, the USFS submitted a biological assessment (October, 1999) of the effects on IB from likely future actions as outlined in the Forest Plan. The USFS determined that some actions have the potential for inadvertent "taking" of Indiana bats from April 15 to October 15, but that forest plan standards provide a level of protection to ensure that activities are not likely to jeopardize the continued existence of the species or impede its recovery.

Through their Biological Opinion, the FWS agrees that likely future activities with existing Forest Plan standards are not likely to jeopardize the continued existence of the IB. The FWS believes that these counties in North Carolina-Graham, Cherokee, Macon, and Swain—are most likely to harbor Indiana bats during summer months, and that any incidental taking of IB would occur there. The FWS issued an incidental take statement for the 4 counties (above) and a set of terms and conditions to minimize the take. Outside the 4 county area, the expected presence of IB is at such undetectably low levels that probable future actions are not likely to adversely affect the Indiana bat (Biological Opinion, p 65).

The terms and conditions to minimize incidental take of IB would become new direction and standards in the forest plan, as amended by the action considered now. Additional information of the related events are documented in the USFS Biological Assessment and the FWS Biological Opinion (see www.cs.unca.edu/nfsnc/…)

Forest Plan Amendment History

The forest plan is programmatic. It establishes a framework for project-level decision making. The relevant components of the forest plan include: goals, objectives, desired conditions, management prescriptions (management areas), standards, and monitoring tasks. The forest plan does not compel the agency to carry out projects, but instead, it sets sideboards for the amount, type, and the way projects are implemented.

The Forest Plan was approved in 1987. Up through 1990, it was amended to include several regional initiatives. In 1994, an update of the Forest Plan was approved through a significant amendment. Known as Amendment 5, it is the current forest plan for the Nantahala and Pisgah National Forests. This version updates the components of a forest plan and packages together all previous amendments. Since Amendment 5, only non-significant, locally specific amendments have occurred. A list of amendments follows.

Amendment #	Date	Topic
1	1987	Suppression of Southern Pine Beetle
2	1989	Vegetation Management in the Appalachians
3	1989	Scenic Byway Program and fuelwood permits
4	1990	Reduces emphasis on clearcutting
5	1994	Significant Amendment
6	1992	Boundary adjustment correction (Highland RD)
7	1995	Management area designation of acquired land (Appalachian RD)
8	1996	Visual Quality Objective modification on Vengeance Creek (Tusquitee RD)
9	1997	Joyce Kilmer Trail management standards
10	2000	Proposed Action: Management for Indiana Bat

Now, the USFS proposes the 10^{th} amendment to the plan for the purpose of adding new standards to minimize take of the endangered Indiana bat.

Decision to be made

The decision to be made is whether or not to amend the plan by adding new direction and standards to minimize take of the Indiana bat, as stipulated by the FWS reasonable and prudent measures in the biological opinion.

II. Alternatives Including the Proposed Action

Public Participation

The public was notified about the BO through a news release on April 10, 2000. The FWS published the BO on their web site. The National Forests in North Carolina established a link from their web site to the BO, so people could have access to that information.

A scoping record was published and mailed to interested parties on April 13, 2000. The document was available on the NFsNC website during the comment period, which lasted until May 15, 2000.

The public was given a copy of the plan amendment (in draft), the proposed action, purpose and need for action, and potential issues with the proposed action. We asked the public to comment on two alternatives: the no action (existing forest plan) and the draft plan amendment (proposed action).

Public comments are framed around 4 categories as summarized below: See Appendix A for responses to comments.

A. Comments related to the accuracy of the Biological Opinion

What people said: Several statements in the biological opinion were challenged. Some people suggested that the BO (and BA) overestimates habitat due to reliance on assumptions about stand age as a proxy for canopy cover. Some people suggested that the BO ignores foraging habitat and that bats prefer fragmented habitat, which they contend, are errors. Some people suggest that guidelines should include the numbers of living trees and hard numbers on numerical take limits. Other people suggested that standards may be too restrictive, such as the intermittent stream standard. They contend that this standard has no scientific basis.

B. Comments related to the range of alternatives

What people said: Some people wanted to see an alternative with no logging and only restoration activities. Some people wanted all the conservation recommendations built into the proposed action. Other people wanted restrictions that follow Romme's model. Some people wanted standards applied to the entire Nantahala and Pisgah NF's, rather than the 4 county area.

C. Comments related to the accuracy of survey methods.

What people said: Some people suggested that Mistnetting and Anabat survey methods be used in combination to determine occupancy of IB. Some people wanted both: a) surveys for occupancy and b) apply the standards for every project. Some people suggested that even harvest areas may provide roosting sites, but without surveys in these areas, how would this information be collected.

D. Comments related to the environmental effects and issue in the scoping record.

What people said: Some people suggested that timber supply should not be an issue since the Endangered Species Act takes precedence by requiring conservation at whatever the cost. Some people said that the new standards may benefit more species that the Indiana bat. Other people suggested that standards related to streams could cause adverse effects to oaks (and other intolerant) species.

Issues with the Proposed Action

1. What effect will the new standards have on programs and desired condition outlined in the current forest plan?

Discussion: There are several new standards that might change the desired conditions or outputs in the forest plan. The analysis of environmental effects will examine the following: 1) a new standard about intermittent streams and whether or not it would affect the long term sustained yield capacity for timber supply; 2) whether or not retaining snags would affect the scenic attributes of the forest, specifically viewing foreground; and 3) whether or not the habitat suitability index standard would affect likely future projects.

2. What are the expected costs of implementing the new standards and the change in delivery of service if new standards are incorporated?

Discussion: The proposed action increases management requirements, which could add additional time and costs for administering the national forest. As part of the environmental analysis, we will discuss the anticipated costs and the change of service as this new work is incorporated into the management system.

3. What are the effects of the proposed action on other endangered, threatened, or sensitive species?

Discussion: While the new standards are beneficial to minimize incidental take of the Indiana bat, would they have any adverse effects on other species? A biological evaluation will be conducted and documented as part of this analysis.

4 Should the new standards be applied to areas beyond the 4 counties?

Discussion: The BO identifies a 4 county area as potential occupied habitat. An analysis should consider the effects if the plan amendment expanded to the entire Nantahala and Pisgah NF.s

Alternatives Considered in Detail

Three alternatives respond to the purpose and need for the proposed action, including responses to Issue 4 with the proposal.

A. No Action. This alternative sets the baseline from which to compare other alternatives. It meets the requirements of NEPA (40 CFR 1502.14(d)) to include a no action alternative. The standards in the current Forest Plan (through Amendment 9) would continue. No additional standards would be incorporated in order to comply with the reasonable and prudent measures of the BO for the Indiana bat.

B. Proposed Action. This alternative responds to the purpose and need for action by incorporating standards in the Forest Plan that meet the reasonable and prudent measures of the BO for the Indiana bat. The Forest Plan would be amended with new management direction and standards (Appendix A) to minimize incidental take and provide guidance for monitoring the species. This alternative will be analyzed using two timing sequences as follows.

B-1. Short Term. The immediate effect of the plan amendment is localized to the 4 county area of Graham, Swain, Macon and Cherokee counties.
B-2.-Long Term. The long term effect of the plan amendment is broader to encompass the entire Nantahala and Pisgah NFs. By using the FWS list for threatened or endangered species (see Appendix A, Plan Amendment 10, General Direction 14), a timing mechanism is built into the plan amendment to accommodate any new occurrances of the IB. Over the long term, it may be possible for IB to occupy habitat over the entire Nantahala and Pisgah NFs. Therefore, effects over the entire Nantahala and Pisgah NF's are analyzed for the long term.

C. Amend Plan for all Nantahala/Pisgah NFs immediately. This alternative responds to people who suggested that plan amendment should apply to all WNC forests immediately (Issue 4). The direction and standards would be applied to the entire Nantahala and Pisgah NF's immediately. Therefore, no timing mechanism would be built into the plan amendment as structured in Alternative B. The wording in Appendix A, General Direction 14 would change to : "Apply the following management direction for the protection and recovery of Indiana bat."

Alternatives Considered but not Analyzed in Detail

After public comments on this proposal were received, some respondents wanted a halt to all logging on national forests. This suggestion is outside the scope of this proposal. The purpose and need for this proposal is to incorporate the reasonable and prudent measures of the FWS to minimize incidental take. The Biological Opinion did not infer that the timber program would jeopardize the continued existence of the Indiana bat, but instead, the FWS rendered a non-jeopardy opinion. There is no evidence that suggests the timber program and recovery of Indiana bats are incompatible.
A few suggestions were made to refine the alternatives. Responses to these suggestions are disclosed in Appendix B of this assessment.

III. Environmental Consequences

This chapter outlines the environmental consequences of the proposed action and the alternatives to the proposed action. Alternative A, no action, describes the current condition and the baseline from which to compare other alternatives. Then, the effects of action alternatives describe the change from the baseline.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, like the temporary loss of timber productivity in forested areas being used as a power line right of way.

The forest plan would not in itself cause irreversible or irretrievable commitments of resources because it does not compel the agency to carry projects on the ground or water. Instead, it sets sideboards for the amount, type, and the way projects are implemented.

Direct, Indirect and Cumulative Effects

The direct, indirect and cumulative effects are described for each resource area in this chapter. The effects of Alternative A, no action, are disclosed in the Final Supplement to the Final Environmental Impact Statement (FEIS) for the Nantahala and Pisgah Forest Plan. These effects set the baseline for comparing Alternatives B and C.

Estimates of effects for Alternatives B and C address the following question: Would the change in direction and standards change the environmental effects from Alternative A, and if so, what is the nature of the change? Alternative B1 shows the effects over the 4 county area. The effects of Alternatives B-2 and C are combined because their geographic extents are the same.

BIOLOGICAL RESOURCES

Timber Resources

This section specifically addresses Issue 1 regarding the effect of long term sustained yield capacity if new intermittent stream standards are adopted.

Direct and Indirect Effects

Alternative A: The Forest Plan emphasizes high quality hardwood (Plan III-1), which are unique in size and density on the N/P Forests. Characteristics of high value hardwood depend on community type, age and site index (FEIS, III-67). Higher site potentials will produce a greater varieties and sizes of trees, and they provide wildlife foods, natural scenery, and timber values.

Long term sustainability of high value hardwoods depends on continual growth of trees sufficient to offset removals. Since 1994, the forest plan limits removals to less than 34 million board feet (MMBF) per year (Plan, E-6). The upper harvest levels projected in the Plan are 3,267 acres, by using 2,532 (two aged method), 500 (selection method) and 235 (even-aged method). Actual harvest levels since 1994 have been declining. In 1999, about 1,600 acres were harvested.

About 528,000 acres are designated in management areas allowing timber production (FEIS, S-6), but only 275,800 acres were scheduled and needed to meet the long term expected harvest levels (ie harvested and regrown over multiple rotations).

High value hardwoods are generally shade intolerant trees, such as northern red oak. These trees grow slowly when crowns are shaded, and regeneration methods are designed to reduce shading to seedlings and saplings. Before the 1994 Plan, clearcutting was the predominate harvest method and maximum growth could occur. But now, 2-aged and selection methods have replaced clearcutting, with the expectation that some growth losses will occur. Expected growth losses would be 6 percent (2-aged method) and 12 to 33 percent (selection method) (FEIS, Volume II, B-36 and B-37).

Despite the reduction of growth, the regeneration harvests sustain the tree species composition of the stand. This contrasts with unmanaged stands-that without natural disturbance-would shift through time from shade intolerant to shade tolerant trees (FEIS, Volume 1, IV-39).

Choosing this alternative would maintain the Plan in its current state, with the effects and expected outputs outlined above.

Effects common to Alternative B and C: Species composition might be affected by adopting the standard for intermittent streams, which requires only single tree gaps for 75 foot length. (Note: there is already a requirement for perennial streams.) This requirement may shift species toward shade tolerant species and reduced growth by as much as 33 percent (see above). The following analysis estimates how many acres might be affected by the intermittent stream standard.

Process to delineate perennial and intermittent streams

Stream coverages used in riparian analysis are a combination of two sources: streams digitized from 1:24,000 USGS topographic maps (bluelines); and streams modeled from 30-meter Digital Elevation Models (DEMs). The bluelines accurately represent many perennial and some intermittent streams. The modeled streams were combined with these to get a more complete representation of smaller intermittent streams that do not appear on topographic maps.

Standard hydrologic functions in the GRID module of ArcInfo were used to model streams from DEMs. From the elevation values, information about flow direction and accumulation can be calculated. Streams can then be delineated when a certain threshold

of flow accumulation is reached. Based on field knowledge of where first order streams occur, this threshold value was adjusted iteratively until a realistic network of streams was generated. Using this method, first order streams were estimated to begin wherever there are approximately 14 acres draining to the same spot. Modeled streams were generated for the Little Tennessee, Hiwassee, French Broad, and Catawba River basins.

Stream orders were assigned to the combined stream coverages (bluelines plus modeled first orders) using a computer program written by the USDA Forest Service PNW Research Station. This program uses the Strahler system to assign an order to each stream reach upstream from an outlet or mouth. For the purposes of this analysis, first order streams are considered intermittent; the second order streams and above are considered perennial.

Buffering perennial and intermittent streams

Buffer zones around streams were generated using ArcInfo, based on riparian guidelines in this amendment. Perennial streams were buffered 100 feet on each side and intermittent streams were buffered 30 feet on each side. Buffer zones were then overlain with other existing GIS layers to derive information about attributes such as ownership, management areas, and forest types within the buffers. Total miles of stream and buffer area were calculated for just the four county area (Table III-1), and for the entire Nantahala and Pisgah National Forests (Table III-2).

Table III-1 Alternative B1. Miles of stream and total buffer areas for Cherokee, Graham, Macon and Swain Counties. Totals are reported for all USFS ownership and just management areas suited for timber production. Suited MAs are 1B, 2A, 3B, 4A, and 4D.

	Four County Area	
	USFS land	Suited MAs
Miles of perennial streams (order > 1)	802	513
Perennial buffers (acres)	19,869	12,730
Miles of intermittent streams (order = 1)	1,288	858
Intermittent buffers (acres)	8,816	5,872
Total buffers (acres)	28,685	18,602

Table III-2. Alternative B2 and C. Miles of stream and total buffer areas for the Nantahala and Pisgah National Forests. Totals are reported for all USFS ownership and just management areas suited for timber production. Suited MAs are 1B, 2A, 3B, 4A, and 4D.

	Nantahala		Pisgah	
	USFS land	Suited MAs	USFS land	Suited MAs
Miles of perennial streams (order > 1)	1,180	665	1,376	635
Perennial buffers (acres)	29,029	16,443	33,243	15,371
Miles of intermittent streams (order = 1)	1,673	1,036	1,648	778
Intermittent buffers (acres)	11,407	7,060	11,029	5,198
Total buffers (acres)	40,436	23,503	44,272	20,569

The term "Suited MA's" in the tables refer to management areas where timber production are allowed. In the Plan, these are 1B, 2A, 3B, 4A, 4D. If all timber stands in these management areas were scheduled for harvest, then the upper threshold of effect from the intermittent stream standard would be 5,872 acres for Alternative B1, and 12,258 acres for Alternatives B2 and C.

Since all timber stands in the suited MA's are not scheduled for timber production, the amount affected is overestimated. An average of 52 percent of suited MA's are estimated in the Forest Plan for long term timber management. Assuming this proportion would be applied to the areas affected by intermittent streams, then the effect would be 3,053 acres for Alternative B1 and 6,374 acres for Alternatives B2 and C.

Short Term (5 year) Effect

To estimate the effect over the next five years (the time period for the Plan and the Biological Opinion), we conducted the following analysis.

Analysis of 0 – 10 year old stands within stream buffers

To assess the potential effects of new streamside guidelines on timber production, stream buffers were overlain with stands currently age 0 – 10 years. Only stands with land class values suitable for timber production were selected to represent the layout of timber harvests over the last 10 years. The analysis was done for the entire Nantahala National Forest, where stand information has been most recently updated. A total of 631 stands were identified as 0 – 10 years old (Figure III-1). These stands primarily represent harvest units since 1990, although a small number of them could reflect errors in coding or entry into GIS. The amount of area inside intermittent and perennial stream buffers was calculated for each stand, or harvest unit. Statistics based on these calculations were generated separately for intermittent buffers (Table III-3 Fig. III-2) and perennial buffers (Table III-4, Fig III-3).

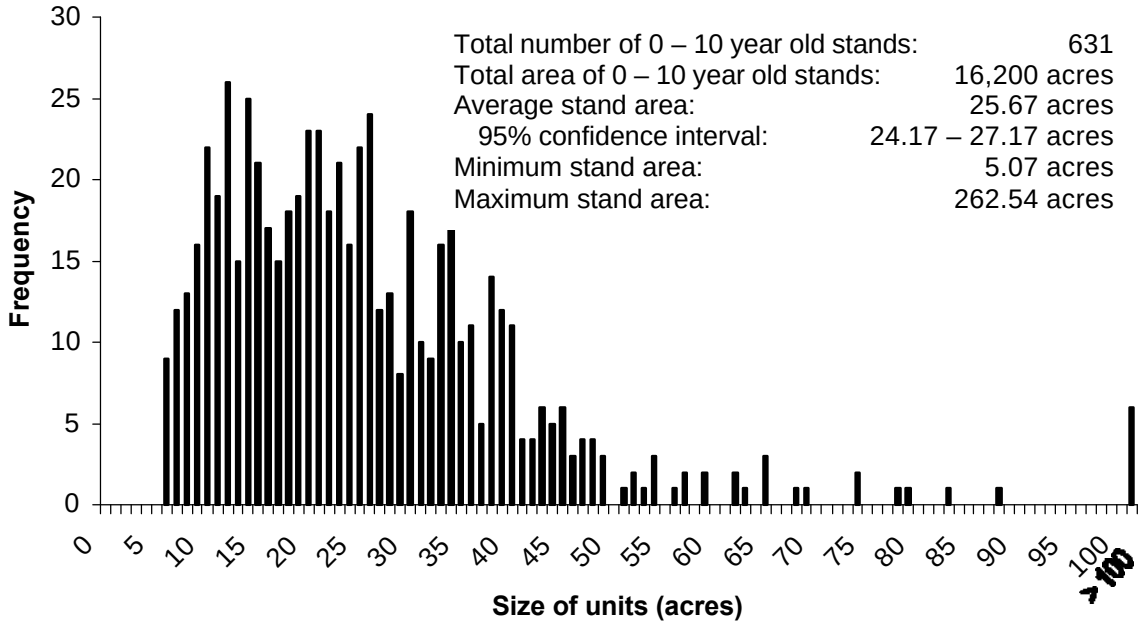


Figure III-1. Size distribution of stands identified as 0 – 10 years old on the Nantahala National Forest.

Table III-3. Statistics on intermittent stream buffers in 0 – 10 year old stands on the Nantahala National Forest.

Overall:	
Total area of intermittent stream buffers inside 0-10 year old patches:	257 acres
Overall percent of 0-10 year old patches occupied by intermittent stream buffers:	1.52%
Individual 0-10 year old stands:	
Average stand area:	25.67 acres
Average intermittent stream buffer inside a stand:	0.39 acres
Average percent of a stand occupied by intermittent stream buffer:	1.17%
95% confidence interval:	1.01 – 1.32%
Maximum percent of a stand occupied by intermittent stream buffer:	14%
Minimum percent of a stand occupied by intermittent stream buffer:	0%

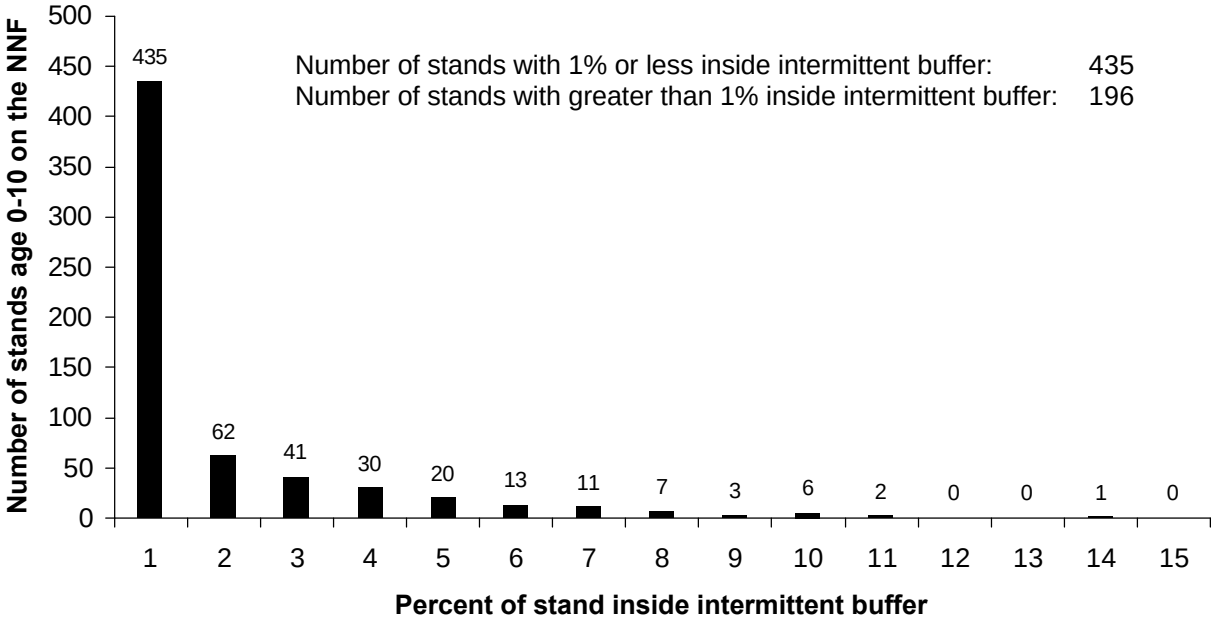


Figure III-2. Frequency distribution of the percent of a stand occupied by intermittent stream buffers on the Nantahala National Forest.

Table III-4. Statistics on perennial stream buffers in 0 – 10 year old stands on the Nantahala National Forest.

Overall:	
Total area of perennial stream buffers inside 0-10 year old patches:	356 acres
Overall percent of 0-10 year old patches occupied by perennial stream buffers:	2.19%
Individual 0-10 year old stands:	
Average stand area:	25.67 acres
Average perennial stream buffer inside a stand:	0.56 acres
Average percent of a stand occupied by perennial stream buffer:	1.55%
95% confidence interval:	1.11 – 1.99%
Maximum percent of a stand occupied by perennial stream buffer:	87.72%
Minimum percent of a stand occupied by perennial stream buffer:	0%

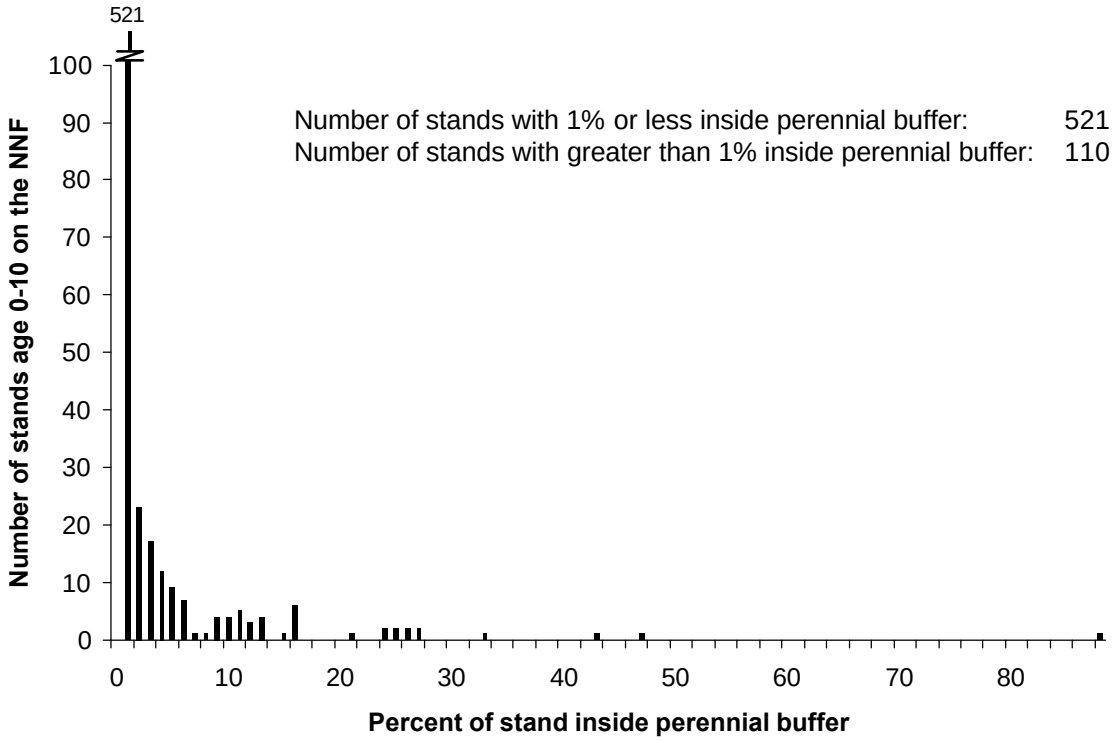


Figure III-3. Frequency distribution of the percent of a stand occupied by perennial stream buffers on the Nantahala National Forest.

Expected value over next 5 years

If harvest amounts and layout remain consistent over the next five years with what they have been during the past ten years, some projections can be made about the influence of new riparian standards. Based on harvests from 1990 – 1999, harvests from 2000 – 2004 on the Nantahala National Forest could be expected to cover 8,100 acres, distributed in 315 stands. Of those total acres, 177 could be expected to fall within perennial stream buffers and 123 could be expected to fall within intermittent buffers (estimate for Alternative B1). For Alternative B2 and C, the estimate would be approximately 354 acres within perennial stream buffers and 246 acres for intermittent buffers. (Notes: 1) Estimates for Alternatives B2 and C assumes that Pisgah NF harvest schedules would be similar the Nantahala harvest schedules; 2) These estimates may change with field inventories of intermittent streams.) As cited above, this represents an average of 1.2 percent of an individual timber stand area.

Cumulative Effects

Focal analysis of landscape-scale effects

Geographic analysis methods were employed for evaluating the quality of summer Indiana bat habitat across the entire Nantahala and Pisgah National Forests. The techniques are referred as focal, or neighborhood, analysis, and a detailed description of these methods can be found in Appendix D of the BA (USFS, 10/18/1999). Briefly, GIS coverages of stands on the two forests were divided into equal size grid cells 300 feet on a side (roughly 2 acres each). Each cell was then evaluated for the amount of USFS land in the surrounding 8,000 acres (2 mile radius) that met various habitat requirements of the Indiana bat. Results of focal analyses for three habitat components were combined into a Habitat Suitability Index (HSI). The three components included in the index are: optimal density of live 16" dbh potential roost trees, suitable density of dead 9" dbh potential roost trees, and optimal overstory canopy cover (see BA, 10/18/99 for definitions).

For each habitat component, analyses were run for baseline conditions and potential conditions in 2004 (with no timber harvest activities or natural disturbances). Baseline conditions were derived from forest stand data updated to reflect all activities on the NNF through October 1999.

Focal analysis results

Results from focal analysis provide an indication of the abundance and spatial distribution of Indiana bat habitat across the forest. The mean values represent the percent of USFS land, on average, within a two mile radius of any location on the forest that has the specified habitat component. Interpretation of the habitat suitability index is slightly different, since it is the average of three other variables (see explanation in 10/18/1999 BA). The range of possible HSI values is 0 to 100.

Results from analysis of the four county area (Table III-5; Alternative B1) and the entire Nantahala/Pisgah (Table III-6; Alternatives B2 and C) show potential increases in some habitat components over the five year period. The component with the largest potential increase is optimal density of live 16" dbh potential roost trees. This is due to a large number of stands that will reach 70 years old during this period. The change in the mean HSI value reflects the potential improvement in overall habitat suitability. Values reported here differ slightly from those reported in the BA due to data updating efforts since October 18, 1999.

Table III-5. Mean values from focal analysis of four county area.

Habitat component	Baseline mean value	Potential mean value in 2004	Potential increase
Optimal density of live 16" dbh potential roost trees	49	59	10 (20%)
Optimal canopy cover	61	62	1 (2%)
Suitable dead 9" dbh potential roost trees	65	69	4 (6%)
Habitat suitability index	58	63	5 (9%)

Table III-6. Mean values from focal analysis of Nantahala and Pisgah National Forests.

Habitat component	Baseline mean value	Potential mean value in 2004	Potential increase
Optimal density of live 16" dbh potential roost trees	53	62	9 (17%)
Optimal canopy cover	64	64	0
Suitable dead 9" dbh potential roost trees	67	70	3 (4%)
Habitat suitability index	61	65	4 (7%)

Habitat Suitability Index model

To ensure that potential increases in habitat suitability are not negated by future activities, focal analysis techniques will continue to be applied throughout the planning process. A computer program has been developed that will analyze HSI values in the vicinity of a proposed project using focal analysis. With this program, HSI values for baseline and post-project conditions can be compared, as required by standard 14(4a) in the proposed amendment.

Financial costs of new standards

To survey projects for Indiana bat using mistnets and anabat technology takes 2 nights per square kilometer. With 2 people working, it takes about $4 per acre as the average survey cost. If the highest disturbance activities would all be surveyed (use 1300 acres for this analysis) for the 4 county area (Alternative B1), then about $5,200 are needed. About $10,400 would be needed for the entire Nantahala/Pisgah NF's (Alternatives B2, C). This assumes a financial planning rate of $200 per person day.

Projects would most likely slow down in the future due to field checks, additional analysis requirments and additional documentation. There is no current data on the frequency of field checks, so cost comparisons are based on assumptions. If we assume 1 field check day per 10 acres of activity, then the cost of implementing Alternative B1 is about 130 days or about $26,000 (above Alternative A) and $52,000 for Alternatives B2 and C. The average cost of field checks as a percentage of the budget (using only figures for NFTM timber sale preparation –not other funding sources) would be approximately 8 percent average increase in costs. These figures are only a first estimate based on assumptions. The information will be verified as the terms and conditions in the Biological Opinion are implemented.

Biological Communities and Wildlife Management-Indicator Species (MIS) Potentially Affected by this Decision

The February 1994 "Final Supplement to the Final Environmental Impact Statement (EIS) Land and Resource Management Plan-Amendment Five, Nantahala and Pisgah National Forests" (FOREST PLAN) documented the projected effects of proposed alternatives to biological communities and habitats for wildlife MIS on pages IV-13 through IV-35. This evaluation included nine biological community types/special habitats and thirty-eight (38) wildlife MIS. The final list of wildlife MIS used in this analysis is listed on pages III-45 through III-48 of the FOREST PLAN. For this analysis, we will use the same biological communities/special habitats and wildlife MIS as used in the 1994 EIS.

Terrestrial Plant and Animal Species Communities and Habitats that Change by Alternative

Direct and Indirect Effects

Under alternative B1, it is estimated that implementation of the intermittent stream buffer standard could potentially involve up to 5,872 acres of national forest acreage within management areas designated as suitable for commercial timber production in the four county area. Alternatives B2 and C, which would apply the intermittent stream buffer standard to all management areas suitable for commercial timber production on both the

Nantahala and Pisgah National Forests, could potentially involve up to 12,258 acres, which would constitute approximately 1.2 percent of the total national forest acreage for the two forests. However, given the restrictions on individual canopy gap size and spacing between gaps, it is anticipated that less habitat would be affected by the implementation of the intermittent stream buffer standard in either alternative B or C.

Some biological communities/special habitats and wildlife MIS may be affected by the proposed amendment.

Old-Forest Communities (100+ years old)

The 1994 FOREST PLAN established specific standards and guidelines for providing for small, medium, and large patches of old growth across the Nantahala and Pisgah National Forests. Given the greatly reduced timber harvesting level implemented since the 1994 FOREST PLAN was signed, a greater proportion of the two forests may provide conditions more similar to that of old growth forest.

Old-growth forest, and associated wildlife MIS that flourish in a landscape dominated by more mature forest conditions, are projected to increase under all three alternatives, but potentially, at slightly greater rates for alternatives B and C. The acres of older-aged forest under alternative B1 will be confined to national forest lands in the four county area (Graham, Macon, Cherokee, and Swain counties); while projected increases most likely would occur across the Nantahala and Pisgah National Forests under alternatives B2 and C. Wildlife species potentially affected that may benefit from these conditions include eastern black bear, pileated woodpecker, cerulean warbler, white-breasted nuthatch, blackburnian warbler, yellow-throated warbler, and summer roosting habitat for bats.

The retention of live trees within 30 foot restrictive buffers along intermittent streams, retention of standing live trees with exfoliating bark, retention of hollow, den, or cavity trees >9 inches dbh, and retention of live trees in the vicinity of 1/3 of larger snags within regeneration units will improve the availability of large dead and downed woody debris in timber regeneration units. This will improve habitat conditions within units for many forest-floor invertebrates, amphibians, and terrestrial gastropods.

Early Successional (0-10 years old)

The rate at which early successional habitat is being created or maintained across the Nantahala and Pisgah National Forests is far less then that projected in the FOREST PLAN. Given the current reductions in acres treated by timber harvesting since 1994, and the gradual loss of high elevation old field habitat, it is questionable that current population levels for many early successional associated wildlife species, such as rufous-sided towhee, field sparrow, eastern meadowlark, white-eyed vireo, common yellowthroat, yellow-breasted chat, chestnut-sided warbler, golden-winged warbler, magnolia warbler, American woodcock, bobcat, and cottontail rabbit can be maintained

across the two forests. It may also result in reduced population numbers and/or altered population distribution for popular wildlife species, such as white-tailed deer, ruffed grouse, and eastern wild turkey.

Alternative A would continue the Forest Plan rate. Minor reductions in early successional habitat are projected to occur in Alternative B1 but restricted to the four county area, while these reductions could potentially occur over a much broader area under alternatives B1 and C. The retention of intermittent stream buffers increases the complexity in being able to harvest timber, potentially resulting in even less habitat for early seral dependent wildlife species. The requirement to not exceed a five percent decrease in HSI could result in less acres being treated by timber harvesting. Habitat capability for early successional dependent species is projected to decline for both alternative B2 and C. Species projected to experience the greatest impact would be those more closely associated with riparian areas, such as American woodcock and ruffed grouse.

Eleven to Twenty Year Old Forest

While the current rate of timber harvesting is well below levels projected in the FOREST PLAN, the greatest impact of this decline will be experienced over the next five to ten year period. Alternative A will continue to perpetuate this decline into the future. There may be additional minor reductions in the availability of this habitat type under both alternatives B2 and C, but restricted to the four county area under alternative B1. The species projected to experience the greatest impacts from this will be the ruffed grouse, which is declining throughout the Southern Appalachian Mountains.

Soft Mast Producing Species

Reduced timber harvesting levels, and subsequent declines in the creation of early successional habitats, is occurring at rates well below levels projected in the FOREST PLAN. These reduced timber harvest levels are resulting in the reduced availability of softmast species, such as blackberry, blueberry, dogwood, crabapple, hawthorns, spicebush, viburnums, and wild grape, that become established and flourish in young seral stands. Wildlife MIS, such as white-tailed deer, eastern wild turkey, eastern black bear, ruffed grouse, cedar waxing, raccoon, and gray squirrel rely heavily upon softmast foods during certain times of the year. This dependence is magnified at an even greater rate during years of poor hardmast production. During years of poor hardmast production, population lows for these species can become more accentuated when softmast food sources are unavailable. The lack of preferred food items for black bear during periods of food shortages can result in increases in the severity and frequency of bear-human conflicts. During those times of poor food availability, highway and depredation mortality rates can be expected to increase.

Alternative A is projected to maintain existing conditions. Minor reductions in the distribution and availability of softmast foods are projected to occur under both alternatives B2 and C, but confined to a smaller geographic area under alternative B1.

However, the availability of some softmast species that can flourish under partial shade conditions, or within small gaps, such as wild grape and spicebush, should remain relatively unchanged.

Hardmast Producing Species

Under alternative A, hardmast capability across the two forests is projected to decline in the long-term. Using the trends in reductions in acres treated by commercial timber harvesting over the last five years as an indicator, hardmast producing forest types and overall hardmast production capability across the Nantahala and Pisgah National Forests has been rising as the forests become older. However, assuming a continued reduction in timber harvesting, and growing difficulty in prescribe burning many upland hardwood stands, it is projected that hardmast production levels will eventually level out and ultimately decline in the long-term. The lack of silvicultural treatments and prescribed fire is currently resulting in the loss of hardmast producing capability in scarlet oak/chesnut oak stands across the two forests. Many of these stands are approaching the age where oak decline is causing substantial mortality and loss of hardmast production. Many of these stands are being gradually converted to forest types, such as striped maple, sassafrass, rhododendron, and mountain laurel, which provide little to no mast. The long-term consequences would be reduced habitat capability for wildlife species dependent upon hardmast, such as eastern black bear, eastern wild turkey, white-tailed deer, gray squirrel, many small rodents (i.e. deer mice, woodrats, etc.).

In the short term, it is projected that hardmast availability potentially will be higher under alternatives B2 and C, due to the retention of hardmast producing trees as a result of limiting opening size to 30 feet and minimal spacing between openings to 75 feet along intermittent streams, retaining shellbark and shagbark hickories, and retaining living residual trees in the vicinity of one-third of all large (>12 inches) snags with exfoliating bark. Assuming that hardmast producing trees will be retained, the stipulation that limits reductions in bat habitat suitability to no more then a five percent change is projected to also improve hardmast capability in the short-term.

Continuous Areas with Low Disturbance Levels

The effects of implementing alternatives B2 or C are not expected to deviate substantially from the effects projected in the 1994 EIS.

Continuous Areas with Moderate Disturbance Levels

The effects of implementing alternative B2 or C are not expected to deviate substantially from the effects projected in the 1994 EIS.

Large and Small Snags and Dens

The snag and den tree standard currently in the 1994 FOREST PLAN, page III-23, states as follows: "Retain about 2 snags per acre during stand regeneration. Snags should be 15 inch dbh or greater, wherever possible. Retain bear dens, standing live an dead den trees of 22 inches or greater, except where human safety is of concern. Favor snags along edge of openings or combined with other leave trees. Page L-48 states "Retain all standing live and dead den trees equal to or greater than 22 inches dbh in all management areas except where public health and safety is a concern". Remaining with these standards, as proposed for alternative A, will continue to provide for population viability of snag and cavity/den dependent species. Given the high proportion of the Forest being designated as management areas unsuitable for commercial timber production, small and large snags, and den/cavity trees are, and should be, abundant across the two forests.

Snag, den, and cavity habitat is projected to slightly improve under both alternatives B and C, but at different scales. When considering that commercial timber harvesting using either clearcutting, shelterwood, two-aged shelterwood, or salvage methods are projected to only occur on a maximum of approximately 10,000 acres (less then 1 percent of national forest lands), between the years 2001 and the life of the FOREST PLAN (2003), improvements in these habitat components are projected to be of a minor nature.

The retention of 30 foot buffers along intermittent streams will improve the availability of older and larger trees to serve as future high quality snags, den trees, and cavity trees interspersed within timber regeneration areas. Leaving all standing snags greater than 3 inches dbh, as practicable, will improve the availability of snag habitat within timber regeneration areas. Leaving one-third of the larger snags buffered by live residual trees will also increase the longevity residual snags, as well as provide trees for future snag recruitment. Habitat capability for species such as woodpeckers, American kestrel, eastern screech owl, eastern wood-pewee, Acadian flycatcher, tree swallow, white-breasted nuthatch, eastern bluebird, Carolina wren, tufted titmouse, and bats, as well as other species that rely upon standing snags, will improve. Surveying of standing snags, den trees, and/or cavity trees prior to removal will reduce the likelihood that roosting bats (both common and uncommon species) will be directly harmed. Retaining as many hollow, den, or cavity trees greater than 9 inches dbh, as practicable, will improve habitat capability for species such as eastern black bear, white-breasted nuthatch, northern flicker, eastern screech owl, great-crested flycatcher, Carolina chickadee, raccoon, gray squirrel, bats, other small mammals, invertebrates, and reptiles that rely upon cavity/den habitat. Snag, den tree, and cavity habitat capability is projected to increase both in the short-term and long-term.

Riparian Habitat

The retention of 30 foot buffers along intermittent streams, and designation of Indiana bat summer habitat as a riparian related value in the delineation of riparian area boundaries, should reduce the likelihood of direct mortality, as well as improve habitat capability, for riparian associated species.

Travel and Dispersal Corridors

Retention of 30 foot buffers along intermittent streams will provide travel and dispersal corridors into and through timber regeneration areas, as well as areas for recolonization, for salamanders, small mammals, spiders, terrestrial snails, and other invertebrates displaced as a result of timber harvesting.

Large Contiguous Forest Areas

While implementation of the management direction and standards for protection of the endangered Indiana bat may break-up the size of regeneration units, the effects of implementing either alternatives B1, B2, or C are not expected to deviate substantially from the effects projected in the 1994 EIS. These standards will have little to no effect on the Forest Interior Bird Patches or the Black Bear Patches.

Edge Effects

Edge effect is the result of the creation of openings, gaps, highway or long linear corridors of early successional vegetation interspersed within patches of older-aged mature forest. Increased nest predation and/or nest parasitism rates can result at certain levels of edge effect, as well as within more highly vulnerable areas of the Forest. A greater number of small sized early successional patches can result in potentially greater edge effects then fewer larger sized patches. The retention of unharvested travel corridors within timber regeneration units potentially can increase the effects of edge creation.

The effects resulting from the creation of edge should remain the same in alternative A, with slight increases in both alternatives B and C, but on different landscape scales. The overall effects of any potential increase in edge would be greater when stands are harvested in closer proximity to private lands that have been harvested, near agricultural areas, and within more isolated, fragmented blocks of forest service lands surrounded by private lands.

Cumulative Effects

All alternatives should provide habitat sufficient to maintain viable populations of all native and desirable non-native terrestrial animal species at the forestwide scale. However, under both alternatives B and C, there may be specific areas or watersheds that viable populations of some early successional species may not be achievable due to the cumulative effects of declining habitat manipulation for early seral species, and implementation of the management direction and standards for protection of the endangered Indiana bat.

Aquatic Resources

This analysis addressed the potential effects of implementing the alternatives on aquatic resources, where they differ from the existing effects analysis (refer to Final Supplement to the Final Environmental Impact Statement, Volume 1, pages III-57 through III-63).

There are two major differences from existing riparian area management direction outlined in the proposed amendment:

1. **General Direction 14(2), Standard (a)** expands riparian areas along intermittent streams to 30 feet on each side of the stream and limits tree removal from this area to single tree gaps at least 75 feet apart, and

2. **General Direction 14(2), Standard (b)** adds Indiana bat summer habitat as a riparian related value for the delineation of riparian areas, and adds that riparian management activities must leave 60 percent canopy cover beyond 30-foot streamside management zone on each side of perennial streams.

Potential effects of implementing this new direction on aquatic resources will be discussed below, and compared to implementation of existing LRMP direction

Alternative A: When implemented successfully, existing riparian area management standards and guides (reference Land and Resource Management Plan, Amendment 5, pages III-179 through III-189, and other Management Area descriptions, as applicable) adequately protect aquatic resources from potential negative effects of land management. Implementation of this alternative would allow management to continue under these conditions.

Large woody debris (i.e. tree boles, large limbs, and root wads) and smaller organic material such as leaves and twigs constitute the major inputs of organic material to low order streams, where it is apparent that wood has a significant role in energy flow, nutrient dynamics, and stream morphology, and in shaping the biotic community (Swanson et al. 1976, Keller and Swanson 1979, Anderson and Sedell 1979). While this influence is less observable in larger streams, the influence of organic material along the margins of larger systems is still important.

Significant differences in the amount and distribution of large woody debris (LWD) are evident (from streams across the Nantahala and Pisgah National Forests) from areas that have been managed versus areas that have not (e.g. wilderness) when similar stream types are compared (Figure III-4, Flebbe and Dolloff 1995, Flebbe (pers. comm.)). In this study, streams within wilderness areas (i.e. nonmanaged forests) had an average of 3.4 times as much functioning large woody debris than streams within nonwilderness areas (Flebbe and Dolloff 1995, Chi-square significant, $P < 0.001$).

Research has shown that streams flowing through wilderness and unmanaged riparian areas generally have more and larger LWD than streams surrounded by younger forests,

and therefore support more stable (and often more diverse) fish communities (Flebbe and Dolloff 1995). This older, structurally diverse riparian forest is the desired condition for streams across the Nantahala and Pisgah National Forests, which are supported by the successful implementation of existing LRMP standards and guides.

Flebbe and Dolloff (1995) found that trout generally select habitat units containing at least some LWD, that local LWD density and local trout density were positively related (Figure III-5), and that because wilderness streams generally contained more LWD, trout occupancy was greater than in nonwilderness streams (Chi-square significant, $P < 0.001$). This study and others (Boussu 1954; Bryant 1981; Grossman and Freeman 1986, Lisle 1986; et al.) did note, however, that in streams with lower LWD densities instream cover elements such as large boulders and undercut banks also support viable trout densities, and that these conditions occur more frequently in streams flowing through second growth forests.

Figure III-4. Amount of large woody debris (LWD) per kilometer for 4 streams on the Nantahala and Pisgah National Forests. Lost Cove Creek and Winespring Creek flow through managed forest areas (hatched bars), while right Fork Ravens Fork and Little Santeetlah Creek flow through wilderness areas (dotted bars).

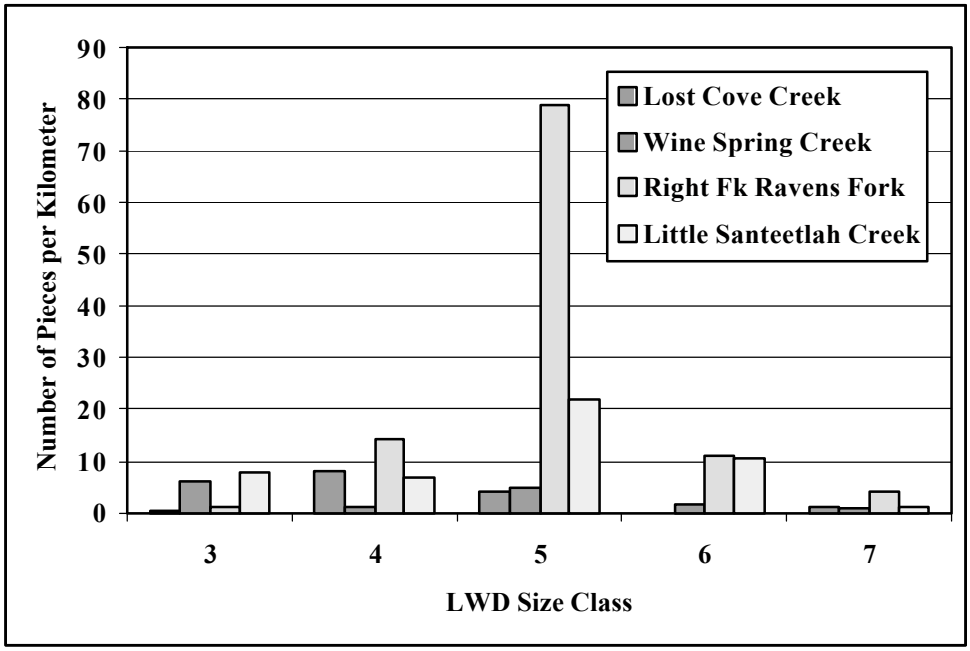
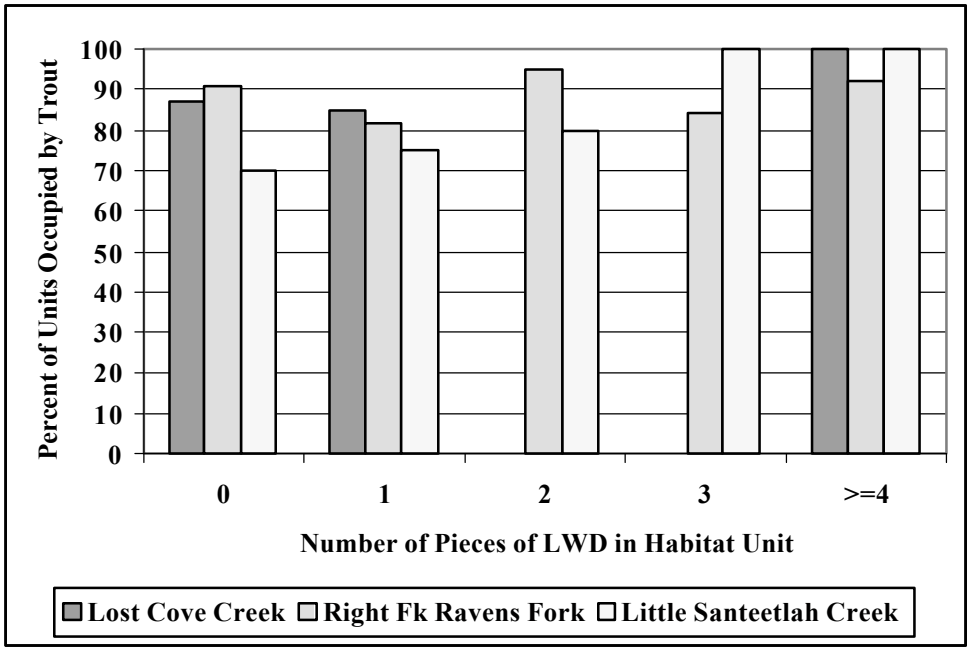


Figure III-5. Occupancy of habitat units with varying levels of LWD within three streams on the Nantahala and Pisgah National Forests. Lost Cove Creek flows through managed forest areas (hatched bars), while right Fork Ravens Fork and Little Santeetlah Creek flow through wilderness areas (dotted bars).



As organic matter (including both LWD and smaller material such as leaves and twigs) enters streams, aquatic invertebrate populations will respond with increases in species, which utilize organic material, including borers, gougers, and scrapers, and several groups, which utilize wood surfaces (e.g. Chironomidae, Heptageneidae, Baetidae, Nemouridae, Peltoperidae, Perlodidae, Limnephilidae, Rhycophilidae) (Dudley and Anderson 1982). Both structural (i.e. LWD) and residual (i.e. leaves and other small organic matter) nutrient sources become more available to the system, which can result in higher species richness and diversity. Hilderbrand et al. (1997) report that streams with greater structural complexity as a result of higher frequencies of functioning LWD support more diverse aquatic insect communities than streams lacking these structural elements.

It is expected that LWD will enter adjacent stream systems as trees lose limbs and eventually die. Aquatic invertebrate communities will respond accordingly, becoming dominated by species utilizing wood at some point in its life history (see above). However, lasting effects and long-term aquatic insect community dynamics will be largely influenced by the stream's ability to retain structural diversity (i.e. lower gradient streams retain LWD longer than higher gradient streams) (Rosgen and Fittante 1986). Aquatic insect communities within higher gradient streams will experience a greater frequency of short-term benefits, while those in lower gradient streams will experience less-frequent, long-term benefits of LWD presence. There is very little research

addressing the balance between these short- and long-term benefits, except to state that the process is a part of the natural succession of stream systems (Trotter 1990).

As with many groups of organisms, aquatic invertebrate and fish community dynamics have been proven to be cyclic and adaptable to surrounding conditions. For example, habitat suitability for a particular species may be improved with the input and retention of LWD, which is reflected in increased population levels of that species. But as the microhabitat (e.g. surface of the log) deteriorates and becomes less suitable, population levels respond accordingly. This process can take anywhere from several weeks (if environmental conditions cause rapid breakdown of woody material) to many years, and is thought to occur more rapidly with pine and other soft wood species than with hardwood species (Webster 1977).

Hall and Baker (1975) summarize many of the beneficial and adverse effects of organic debris on fish habitat. Most of the adverse effects concern water quality, particularly intragravel dissolved oxygen, and stream channel instability. Concerns about water quality involve increased biological oxygen demand (BOD) from large deposits of decomposing fine particulate organic matter, which can potentially affect fish spawning success. In most cases, this fine organic matter is flushed downstream before problems with BOD reach problem levels.

Although debris has been cited as a problem for instream fish movement (Merrell 1951, Holman and Evans 1964), this may have been overstated, as there is a plethora of literature documenting the benefits of LWD to habitat diversity and fish production, particularly addressing spawning and nursery areas and juvenile and adult instream cover (Narver 1971, Sheridan 1969, Hall and Baker 1975, Boussu 1954, Bryant 1981, et al.). Studies also clearly demonstrate that increased habitat diversity results in more diverse, stable fish communities (Fraser and Cerri 1982, Bisson and Sedell 1984). Results of these and other studies clearly document the importance of LWD for fish habitat.

Habitat for resident fish species will likely be improved as LWD enters the system through tree mortality. This, combined with increases aquatic invertebrate population levels, will result in the maintenance of, and potential increase in, fish population levels and trends-- especially for species whose habitat requirements are structurally-oriented (e.g. trout, bass). Such improvements will continue until LWD is decomposed or flushed downstream by high flows (Lisle 1986).

At the landscape level (i.e. across the Nantahala and Pisgah National Forests), measurable cumulative effects on the aquatic community and habitat will not differ from current levels and trends. In addition, rare aquatic species occurrence and population levels will not change, except as new populations are identified during survey activities and as a result of natural forces. Implementation of existing plan standards and guides through land management activities will continue to minimize potential effects to rare species through site-specific project design, effects analysis, and mitigation.

Alternatives B1, B2 and C: Implementation of this alternative will have the same potential effects as the No Action alternative (see above), except along intermittent streams. This item is briefly discussed below.

While diverse, older riparian vegetation along intermittent streams may improve downstream nutrient transport (via organic material such as leaves and small woody debris), there is no evidence from the primary literature to suggest that erosion and downstream sedimentation will be reduced. Locally, existing monitoring information suggests that intermittent streams across the Nantahala and Pisgah National Forests are not major sources of downstream sediment and that existing buffer requirements have been adequate to prevent downstream erosion and sedimentation (Burns, pers. comm.). Therefore, effects (positive or negative) to aquatic habitats and species are not likely to be observable or measurable. Rare species and associated habitats will continue to be supported across the Forests.

Maintenance of 60% canopy cover within designated riparian areas along perennial streams (except within the 30-foot no-cut buffer) is not likely to have measurable effects (positive or negative) aquatic systems. This restriction may affect the ability to manage riparian areas for riparian dependent values where Priority Leave Tree Species (reference Biological Opinion) dominate the stand. These species, however, which are primarily hardwood, are also the most valuable to stream systems as LWD. And therefore, maintenance of 60% canopy cover will insure that these species be left to grow old and decadent, and eventually reach local perennial streams. The benefits of LWD in perennial streams are discussed above. Since most of the canopy will be protected, LWD transport rates to local perennial stream channels are not likely to be substantially different among the alternatives.

Threatened or Endangered Species

There are 23 species on the federal threatened or endangered species list for Western North Carolina. Sixteen are endangered and 7 are threatened. A concise summary of the effects on these species for this EA follows. (Refer to Appendix C for details.)

The Biological Assessment for the Forest Plan (1994)(Alternative A for this analysis), concluded that the programmatic decisions made in the plan were not likely to adversely affect the federal listed species. During informal consultation, the FWS concurred with this finding as long as site specific analyses are conducted at the project level.

Alternatives B and C. When the existing and proposed standards are considered together, these alternatives would not change forest structure and composition substantially from conditions identified in the plan. Nearly three quarters of the forests are unsuitable for timber production. About 84 percent of the forests are hardwoods, the bulk of these forests are 70 to 100 years of age.

The forest structures in riparian communities are not expected to change substantially due to the new standards, except for localized short term effects in some areas that would not be harvested for timber due to the new standards.

The new standards in this amendment, along with existing plan standards and the requirement to follow recovery plans, are not likely to adversely affect threatened and endangered species. This determination requires informal consultation with FWS. The FWS has concurred with this finding as of July 25, 2000.

Due to either no effect on habitat or no occurrence records, the new standards would have no effect on the following species: Spreading Avens, Rock Gnome Lichen, Carolina Northern Flying Squirrel, Mountain Bluet, Mountain Golden Heather, Heller's Blazing Star, Spruce-fir Moss Spider, Blueridge Goldenrod, Red Wolf, and Eastern Cougar.

The new standards are not likely to adversely affect the following species: Swamp Pink, Small Whorled Pogonia, Noonday Globe, Virginia Spiraea, Dwarf-flowered Heartleaf, Bunched Arrowhead, Mountain Sweet Pitcher Plant, Green Pitcher Plant, White Iresette, Appalachian Elktoe, Spotfin Chub, Littlewing Pearlymussel, Indiana bat, and Virginia big eared bat. For a brief explanation of the species, their habits, and effects, please refer to Appendix C.

Sensitive Species or Forest Locally Rare Species

This section summarizes Appendix D, the biological evaluation for sensitive and locally rare species. Two types of effects may result from the new standards: either no impact or beneficial impact. For species that habit areas not suitable for Indiana bat, the new standards do not apply and would logically have no impact. But for species that use snags or riparian communities, the new standards would conserve these resources, having potential beneficial impacts. Table III-7 summarizes the impacts by life form. For more detail, Table D-1 provides a list of each species, the habitat, estimated number of populations, and the potential effect.

Table III-7: Potential Impacts to Regional Forester's Sensitive and Locally Rare Species from Implementation of Amendment 10

Group	Total # Species	Regional Forester's Sensitive Species		Locally Rare Species	
		no impact	beneficial	no impact	beneficial
Amphibian	10	1	1	3	5
Arachinids	6	5	0	1	0
Birds	12	1	0	9	2
Bivalves	11	0	5	0	6
Crustaceans	11	0	3	1	7
Fishes	29	0	5	0	24
Gastropods	24	6	0	15	3
Insects	19	4	5	8	2
Mammals	9	1	2	5	1
Mosses	56	18	4	25	9
Hornworts, Lichens, and Liverworts	34	18	4	10	2
Vacular plants	193	38	11	104	40
Reptiles	5	0	1	2	2
all species	419	92	41	183	103

SOCIAL and ECONOMIC RESOURCES

Recreation

Alternative A: The Nantahala and Pisgah National Forests offer a variety of recreational opportunities. The Recreation Opportunity Spectrum (ROS) is a way to classify the land by types of outdoor recreation settings. The ROS settings describe compatible recreational activities, environmental and social settings, and experiences. It also provides the basis for coordinating recreation opportunities with other resource needs and objectives.

There are four classes of ROS on the Nantahala and Pisgah National Forests: semi-primitive nonmotorized (SPNM), roaded natural 1, (RN1), roaded natural 2 (RN2), and rural.

Each management area in the Forest Plan is characterized by at least one of the four ROS classes. Matching management areas with ROS is based on the area's capability to provide the desired recreation activities, settings, and experiences; and the compatibility of the ROS class objectives with the goals and desired physical and biological conditions for the other resources. Following Forest Plan direction, management areas are managed for ROS settings. The contribution of each management area toward a recreational setting is identified in the FEIS (Vol II, p. B-69). The acres for each setting are: Semi-Primitive Nonmotorized (SPNM): 228,677; Roaded Natural 1 (RN1) 118,259; Roaded Natural 2 (RN2) 661,936 ; Rural: 5,734.

Effects common to Alternatives B-1, B-2, and C: Each standard in the proposal was evaluated to determine if any change in setting would be produced. Considering the direct, indirect and cumulative effects of the new standards (which primarily restrict activity) the acres of ROS settings would not change with the implementation of each of these alternatives.

The acres suitable for timber harvest are found in ROS classes of RN1, RN2 and Rural. RN1 areas and timber harvesting would usuallyu occur together, since these areas are within ½ mile of frequently traveled roads, railroads, or trails used by motorized vehicles. The frequency of contacts among humans is high near roads and moderate along trails. There is evidence of human activities both by sight and sound.

In addition, trail construction and maintenance would fall under the exclusion for linear projects (General Direction 14.4 (a)). Hazard tree removal in any recreation area or along trails would be permitted through survey, or would occur between October 15 and April 15.

Scenic Resources

Alternative A: The Nantahala and Pisgah National Forests are well known for outstanding scenery. The natural beauty or inherent attractiveness of the Forest, as perceived by people, is classified into three classes for management purposes. These classes are Class A – Distinctive, Class B – Typical or Common, and Class C – Undistinguished. Class A landscapes are those with unusual, unique, or outstanding features, such as Whitewater Falls, and have the highest scenic value. Most of the Forest is Class B, which is typically scenic for the mountains of Western North Carolina. Very few acres in the mountains are Class C.

Three sensitivity levels are used as a measure of the concern for the scenic quality of the National Forest. Level 1 represents the highest sensitivity and generally includes those areas seen from primary roads and trails, such as the Blue Ridge Parkway, developed recreation areas, lakes, and major streams. Level 1 landscapes also include all Class A landscapes. These level 1 landscapes are further defined by distance zones—foreground, middleground, and background. These are the distances between the viewer and the area seen and are used as a frame of reference for the degree of detail apparent.

Visitors to the Forests have certain expectations about what they are going to experience. In general, they expect and prefer to see a near-natural appearing forest landscape. Because forest management activities may change the appearance of the forest, National Forest lands are assigned Visual Quality Objectives (VQOs). These objectives define the degree of visual change acceptable from forest management activities within a given landscape. The management objective for each VQO is as follows:

> Preservation : Only ecological changes are permitted.
>
> Retention: Management activities are not visually evident.
>
> Partial Retention: Management activities may be seen but are visually subordinate to and blend in with the surrounding landscape.
>
> Modification: Management activities may visually dominate, but harmonize with, the surrounding landscape.

At least one or a range of VQOs were determined for each management area in the Forest Plan. The table located on page III-82 in the Final Supplement to the Final Environmental Impact Statement, Volume I, Nantahala and Pisgah National Forests, lists the VQOs for each management area.

Effects common to Alternatives B-1, B-2, and C: The direct, indirect or cumulative effects of implementing each of these alternatives would not have an additional adverse impact to the scenery resource. Instead, scenery values would be enhanced by the designation and retention of residual trees as described in Standard 14.1 (e). Limiting openings in the upper canopy to single tree gaps within 30 feet each side of intermittent

streams and designing regeneration units with irregularly shaped boundaries where feasible (Standards 14.2 (a), (c)) will also enhance scenery values.

Heritage Resources

Effects to Heritage Resources for the Forest Plan (Alternative A) are described in the FEIS (III-10 to III-14; IV-11 to IV-13). Probability ratings were assigned to areas with the highest liklihood of finding archeological sites. The rating depends most heavily on slope, terrain, landform, geology, stream rank, and previous research results (FEIS, Vol 1, p IV-12). About 171,000 acres have moderate to high probability areas under 40 percent slope for management areas that allow timber production.

The direct, indirect, and cumulative effects of Alternatives B and C on Heritage Resources would be similar to those of Alternative A. Due to the implicit reduction of activity along intermittent streams for the new standards, the potential impact on Heritage Resources would likely be reduced from those cited in the FEIS. A site specific analysis is required for each project to avoid or mitigate any adverse effects on heritage resources.

PHYSICAL RESOURCES

Soil, Water and Air Resources

The alternatives were compared with standards in the current plan. The FEIS for the Forest Plan document effects on pages III-1 through III-10 and IV-2 through IV-11.

Air quality effects considered ozone, nitrate and sulfate emission, but focused on particulate matter from smoke, since precsribed fire is the activity most likely to affect air quality (FEIS, p IV-3). The alternatives in this analysis do not change any standards for prescribed fire, therefore, no additional effects would occur to air resources beyond those documented in the FEIS. The cumulative effect of prescribed fire of 662 tons per decade (Alternative A) would be approximately the same under Alternatives B and C.

Soil resource effects considered soil displacement on various side slopes due to the primary activity of road construction and timber harvesting activities. The alternatives in this analysis do not prescribe specific amounts of road construction or timber harvesting that would change from the Forest Plan. One standard, the intermittent stream standard, may cause some reduction in road construction and timber harvest activities in localized areas along intermittent streams. Therefore, the estimate of cumulative effect in the FEIS of soil displacement (129 Mcubic Yd) from road construction would be approximately the same under Alternatives B and C.

Standards in the Forest Plan adequately protect the perennial and intermittent streams and the near channel soil and water resources from adverse changes in water quality, quantity and timing. Past monitoring of timber harvesting activities with these operating standards has indicated compliance with the performance standards of the North Carolina

Forest Practice Guidelines Related to Water Quality (NC FPG). Implementation of the current mapping standard for MA-18 provides for an adequate supply of large woody debris (LWD), small woody debris (SWD) and leaf material for the stream, this would continue into the future. The effects on the soil and water resources of implementing this alternative are those disclosed in the FEIS as amended and would comply with the NC FPG.

The standards for implementing Alternative B and C are somewhat more restrictive of tree cutting activities in the riparian and near channel areas along perennial and intermittent streams than under Alternative A. The retention of a 60 percent canopy cover in the area from 30 feet to 100 feet adjacent perennial streams and retention of a 30 foot overstory canopy cover adjacent intermittent streams may reduce the potential amount of soil disturbance within these areas. Past monitoring of timber harvesting activities using the less restrictive standards or Alternative A has indicated compliance with the NC FPG, which suggests the implementation of this alternative would also comply with the performance standards of the NC FPG. However, with the somewhat reduced soil disturbance in the near channel areas with Alternative B, the potential risk of adverse impacts due to unforeseen events, such as large storms, should be very slightly reduced. There will be a small increase in delivery of LWD to intermittent channels, however, there is no basis to suggest this material would be transported to the perennial channels. Therefore it not projected that implementation of this alternative would change substanitally in the amount of LWD, SWD, or leaf material available to perennial streams when compared to Alternative A.

IV. List of Preparers

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V. List of Agencies and Persons Consulted

Federal Agencies
USDI Fish and Wildlife Service
National Park Service
Tennessee Valley Authority

State Agencies
NC State Clearinghouse
NC Wildlife Resources Commission
NC Department of Environment and Natural Resources
NC Forest Service

American Indian Tribes
Eastern Band of Cherokee Indians

Other Organizations
Appalachian Trail Conference
Appalachian Voices
Forest Guardians
Heartwood
National Wild Turkey Federation
Sierra Club
Southern Environmental Law Center
Southern Appalachian Multiple Use Council
Southern Appalachian Biodiversity Project
Southern Appalachian Forest Coalition
Western North Carolina Alliance
WNC Development Association
Wilderness Society
Wildlaw

Individuals
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Ed Stavish
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Lionel Trepanier
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