

**APPENDIX G**

**HURRICANE TIMBER SALE  
and  
ASSOCIATED ACTIVITIES**

**MANAGEMENT INDICATOR SPECIES  
HABITAT EVALUATION**

# Appendix G

## Management Indicator Species Habitat Evaluation

### Hurricane Project

#### Introduction

An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. The assessment provides a checkpoint of project level activities, the change in habitat used by MIS, and the likely contribution to forestwide trends.

#### Process

The amount of habitat changed by the project is checked for consistency with the Forest Plan and the recent trends in activities. If any inconsistencies are uncovered, then further investigation should be made to determine effects on MIS. However, if the project activities are consistent with recent trends, then effects of habitat changes to MIS should remain constant.

To process and document the information efficiently, a series of tables are used as follows.

- 1) **Tables MIS-1 and MIS-2** are reproductions of the biological communities and special habitats examined in the Forest Plan (Plan EIS, III-48 to III-52) and the associated MIS.
- 2) **Tables MIS-3 and MIS-4** list the biological communities and special habitats, along with forestwide estimates and the estimated change in habitat by the activities in the various alternatives.
- 3) **Table MIS-5** reverses the previous tables to show each species and the habitats they are indicating. Also, an estimate of their population trend is shown. More information about MIS habitats and population trends is documented in the MIS Assessment, a document continuously being updated.

The process shows effects of the alternatives on MIS. It provides another checkpoint for the decision maker to be aware of project level effects.

**Table MIS-1. Biological communities and associated MIS (using Plan EIS, Table III-8).**

<b>Biological Community</b>	<b>MIS</b>
Fraser fir forests	Fraser fir, golden-crowned kinglet, Carolina northern flying squirrel
Red Spruce/fraser fir forests	Golden crowned kinglet, Carolina northern flying squirrel, solitary vireo
Grassy and heath balds	Mountain oat-grass, Catawba rhododendron
Northern hardwood forests	Carolina northern flying squirrel, twisted stalk, solitary (blue-headed) vireo
Carolina hemlock bluff forests	Golden-crowned kinglet, Carolina hemlock
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary (blue-headed) vireo
Oak and oak/hickory forests	Red oak, white oak, hickories
White pine forests	White pine (natural community only)
Yellow pine mid-successional communities	Pine warbler (low elevational shortleaf/Virginia pine)
Xeric yellow pine forests	Pine warbler (pine/oak/heath low elevation habitats) pitch pine, table mountain pine, turkey beard, mid-successional)
Reservoirs	Index of biotic integrity, largemouth bass, bluegill
Forested seep wetlands	Golden saxifrage, umbrella leaf, mountain lettuce
Bogs	<i>Sphagnum spp.</i>
Mountain ponds and ephemeral pools	Spotted salamander (vernal pools)
Barrens and glades	Prairie dropseed, slender wheatgrass
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages
Open rock outcrops and cliffs	Raven, peregrine falcon, Biltmore sedge, wretched sedge, mountain oat-grass
Caves	Bats (all cave-using species)
Alluvial forests	Two-lined salamander (mid-late successional stages), raccoon (all forest types), mink
Coldwater streams	Brook, brown, and rainbow trout; sculpin, blacknose dace
Coolwater streams	Smallmouth bass, white sucker, moxostoma spp., index of biotic integrity
Warmwater streams	Index of biotic integrity, smallmouth bass, freshwater mussels, spotfin chub

**Table MIS-2 Special Habitats and associated MIS (using Plan EIS, Table III-9).**

Special Habitat	MIS
Old Forest Communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)
Soft mast producing species	Wild grape ( <i>vitus spp.</i> ), cedar waxwing (all communities soft mast)
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary (blue-headed) vireo
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer
Contiguous areas with low disturbance (< 1 mile open travelway/4 square miles)	Black bear (all communities)
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)
Large contiguous forest areas	Ovenbird (in breeding range, moderately productive sites), northern parula warbler (in breeding range, requires cover and riparian habitats) veery, solitary (blue-headed) vireo
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit
Den trees (>36" dbh)	Black bear (large dens)
Snags and dens (>22" dbh)	Pileated woodpecker, raccoon (moderate sized dens)
Small snags and dens	Gray squirrel, white-breasted nuthatch, yellow-bellied sapsucker (breeding populations)
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming), Jordan’s salamanders

**Table MIS-3 Biological communities, forest wide estimates, and expected changes resulting from the various alternatives.**

<b>Biological Community</b>	<b>Forest wide Estimate</b>	<b>Estimated Changes</b>
Fraser fir forests	See below	None Affected
Red Spruce/Fraser fir forests	14,700 ac	None Affected
Grassy and heath balds	18 occurrences	None Affected
Northern hardwood forests	52,000 ac	None Affected
Carolina hemlock bluff forests	6 occurrences	None Affected
Cove forests	Rich= 107,500 ac Acidic= 174,500 ac Cove (other) =2,800ac	Proposed harvest units in regeneration harvest ( Alt. "B" 72, Alt. "C" 85 acres, Alt. "D" 90 acres) should result in an increase in natural regeneration of oak and hickories within this community type in the long term.
Oak and oak/hickory forests	High El R.Oak: 40,500 ac Mesic Oak/H: 283,340 ac Dry Mesic Oak/H: 21,7000ac	Proposed harvest units in regeneration harvest (Alt. "B" 61acres, Alt. "C" 139 acres, Alt. "D" 59 acres) should result in an increase in natural regeneration of oak and hickories within this community type in the long term.
White pine forests	WP/Oak : 17,600 ac	None Affected.
Yellow pine mid-successional communities	13,400 ac	None Affected
Xeric yellow pine forests	17,400 ac	None Affected
Reservoirs	36,000 ac	None Affected
Forested seep wetlands	22,000 ac	Occurrence of < 1 acre in alternatives "B", "C" or "D"
Bogs	10 occurrences	None Affected
Mountain ponds and ephemeral pools	27 ponds/pools (22 ac) 9 Beaver Ponds (3 ac)	None Affected
Barrens and glades	1 occurrence (300ac)	None Affected
Shaded rock outcrops and cliffs	66,282 acres (high probability)	Occurrence of < 1 acre in alternatives "B", "C" or "D"
Open rock outcrops and cliffs	141 occurrences (800 ac)	None Affected

**Table MIS-3 Biological communities, forest wide estimates, and expected changes resulting from the various alternatives continued.**

Caves		None Affected
Alluvial forests	21,000 ac Alluvial Forest 55,000 ac other flood prone areas	None Affected
Coldwater streams	5,060 mi	None Affected
Coolwater streams	400 mi	None Affected
Warmwater streams	210 mi.	None Affected

**Table MIS-4 Special Habitats, forestwide estimates, and changes of the various alternatives.**

<b>Special Habitat</b>	<b>Forestwide Estimate</b>		<b>Estimated Changes</b>	
	<u>Special Habitat</u>	<u>Forestwide estimate (2000)</u>	<u>Alt B</u>	<u>Alt C</u>
Old Forest Communities (100+ years old)	171,000 acres	Same	Same	Same
Early successional (0-10 years old)	26,800 acres, 5 year average of 2040 ac forestwide, downward trend	Increase 133 ac	Increase 224 ac	Increase 149 acres
Early successional (11-20 years old)	46,290 acres, peak of upward trend	No Change	No Change	No Change
Soft mast producing species	13,144 acres early seral, highest potential on 5,800 ac, downward trend	Increase in all regeneration units through canopy release: 133 ac increase	Increase in all regeneration units through canopy release: 224 ac increase	Increase in all regeneration units through canopy release: 149 ac increase
Hard mast producing species (>40 years old)	681,000 acres, increasing trend	Decrease of good hard mast producing species by 23 ac;  Decrease of limited hard mast producing species by 58 acres and moderate by 87 acres	Decrease of good hard mast producing species by 39 ac;  Decrease of limited hard mast producing species by 58 acres and moderate by 127 acres	No decrease in good hard mast producing species; Decrease of limited hard mast producing 58 acres poplar cove type 91 acres poplar-white oak-red oak cove
Mixed pine-hardwood forest types (successional stage and hard mast)	52,521 acres, increasing trend	None affected	None affected	None affected
Contiguous areas with low disturbance (<1 mile open travelway/ 4 mi <sup>2</sup> )	160,832 acres	None affected	None affected	None affected
Contiguous areas with moderate disturbance (<1 mile open travelway/ 2mi <sup>2</sup> )	576,240 acres	None affected	None affected	None affected

**Table MIS-4 Special Habitats, forestwide estimates, and changes of the various alternatives.**

<u>Special Habitat</u>	<u>Forestwide estimate (2000)</u>	<u>Alt B</u>	<u>Alt C</u>	<u>Alt D</u>
Large contiguous forest areas	38 patches 302,000 acres	None	None	None
Permanent grass-forb openings	3,000 acres	Increase 35 ac	Increase 23 ac	Increase 18 acres
Den trees (>36" dbh)	See Below <sup>1</sup>	None affected	None affected	None affected
Snags and dens (>22" dbh)	See Below <sup>1</sup>	None affected	None affected	None affected
Small snags and dens	Ave. at 80 year. Cove = 4/acre Upland = 3/acre Pine = 2/acre	Small number lost/damaged during harvest operations on: 133 acres	Small number lost/damaged during harvest operations on: 224 acres	Small number lost/damaged during harvest operations on: 149 acres
Downed woody debris, all sizes (foraging and cover habitats)	<u>High accumulation:</u> Small wood: 18,000 acres (ac) Large wood: 386,000 acres <u>Low accumulation:</u> Approximately 600,000 acres	Increase Small wood: 133 acres high accumulation area Cumulative: prescribe burn 30 ac, reduced small wood debris on low accumulation	Increase Small wood: 224 acres high accumulation area Cumulative: prescribe burn 15 ac, reduced small wood debris on low accumulation area	Increase Small wood: 149 acres, high accumulation area Cumulative: prescribe burn 15 acres, reduced small wood debris on low accumulation area.

<sup>1</sup>snag/den average densities across the N&P Forests listed in "small snags and dens"

## **Discussion**

### Cove Forest

Alternative B would temporarily convert about 72 acres of Acidic Cove Forest and Rich Cove Forest to an earlier successional stage by regeneration harvest. This temporary conversion would be approximately 85 acres in Alternative C and 90 acres in Alternative D. Species composition of earlier successional Cove Forests may be different than that of the current species composition. Site preparation and supplemental oak planting may affect species composition by encouraging oak species.

### Oak, Oak-Hickory Forest

All action alternatives would temporarily convert 61 acres (Alternative B), 139 acres (Alternative C), or 59 acres (Alternative D) of Oak and Oak-Hickory Forest to an earlier successional stage of Oak-Hickory Forest by regeneration harvest. Species composition of earlier successional Oak, Oak-Hickory Forest may be different than that of the current species composition.

### Shaded Rock Out Crops and Cliffs

This proposal may temporarily affect some small shaded rock outcrops in Alternatives B, C, or D by removal of the tree over story. This increase in additional light may affect temperature and moisture, which may, in turn, influence species composition. It is expected that, as the canopy recovers (within 15 years), the species composition will return to the approximate same composition. Therefore, this will not affect Forest trend.

### Forested Seep Wetlands

This proposal may temporarily affect some small shaded seeps in Alternatives B, C, or D by removal of the tree overstory. This small increase in additional light may slightly affect temperature and seep discharge, which may, in turn, influence species composition. It is expected that, as the canopy recovers (within 15 years), the species composition will return to the approximate same composition. Therefore, this will not affect Forest trend.

### Hard mast

Hard mast producing species greater than 40 years old have increased across the Nantahala and Pisgah National Forests since 1990 and 1980, as younger stands have matured into this age class. The harvest alternatives, along with other similar projects, will cumulatively reduce the amount of this habitat available, up to the forest annual average of cove and upland forest regeneration (approximately 1600 average acres per year). However, with the retention of hard mast species as leave trees, this reduction will have little affect on the total availability of hard mast in the local area and is not likely to change the trend across the aging National Forests. The advance oak treatment and supplemental oak planting will cumulatively contribute to the long term oak species composition.

### Early successional habitat

Implementation of Alternative B would contribute 133 acres of early successional habitat (EES), which is approximately 7% of the forest-wide 5-year trend, Alternative C would contribute 224 acres of EES or approximately 11%, while Alternative D would contribute 149 acres of EES or approximately 7%. Other projects across the forest will cumulatively contribute to the EES habitat. However, the forest-wide downward trend is expected to continue.

### Permanent Grass/forb

Permanent grass/forb habitat is below the Forest Plan standard across the Forest. Implementation of Alternative B would increase the grass/forb habitat by 35 acres. Alternative C would increase it by 23 acres and Alternative D by 18 acres. These increases would improve the condition of grass/forb across the analysis area; however, it would still be below the desired level of grass/forb habitat.

### Soft Mast

Soft mast species have declined across the Forest since 1980 and 1990, adversely affecting the availability of this habitat for associated species. The harvest alternatives and prescribe burns proposed will create conditions to increase this habitat, but in combination with other current vegetation management activities, this will not be sufficient to reverse the forest-wide downward trend.

### Down woody material

Down woody material has increased across the Forest since 1990 and 1980, due to the aging of the Forest and the effects of hurricanes, windstorms, and the southern pine beetle. This project would increase the amount of small diameter down woody material on the forest floor. The trend for down woody material in larger size classes would continue to increase, specifically in the area of the Northside project due to recent southern pine beetle attacks.

## **Evaluation**

First, many of the biological communities and special habitats in the project area are not affected by activities in the various alternatives. Second, the habitat changes cited above are consistent with the Forest Plan. Most of the habitat changes are needed to accomplish the multiple use goals of the Forest Plan. Finally, the cumulative effect of this project, along with other similar projects, would change habitats in amounts close to forestwide averages of the recent past. Therefore, population trends of MIS related to habitat changes on the forest would continue as cited in the most recent update of the MIS assessment.

Nantahala & Pisgah MIS species, estimated trend, and biological community or special habitat indicated by the species.

Species	Estimated population trend	Biological Community or Special Habitat					
		1	2	3	4	5	6
<b>Black bear</b>	Increase	Old forest communities	Hard mast producing species	Mixed pine-hardwood forest types	Contiguous areas with low disturbance	Den trees (>36" dbh)	Downed woody debris- all sizes
<b>Carolina Northern Flying Squirrel</b>	Static	Fraser Fir forests	Red spruce-Fraser Fir forests	Northern hardwood forests			
<b>White-tailed Deer</b>	Static to decreasing	Early successional (0-10)	Hard mast producing species	Mixed pine-hardwood forest types			
<b>Raccoon</b>	Increase	Alluvial forests	Snags and dens (>22 dbh)				
<b>Eastern cottontail</b>	Decrease	Early successional (0-10)	Permanent grass-forb openings				
<b>Gray squirrel</b>	Static	Hard mast producing species	Mixed pine-hardwood forest types	Small snags and dens			
<b>Bobcat</b>	Static	Early successional (0-10)					
<b>Mink</b>	Static	Alluvial forests					
<b>Bats</b>	Varies by species	Caves	Old forest communities				
<b>Pileated woodpecker</b>	Increase	Old forest communities	Snags and dens (>22 dbh)	Downed woody debris- all sizes			
<b>Golden-crowned kinglet</b>	Decrease	Fraser fir forests	Red spruce-Fraser fir forests	Carolina hemlock bluff forests			

Nantahala & Pisgah MIS species, estimated trend, and biological community or special habitat indicated by the species cont'd

			<b>Biological</b>	<u>Community or</u>	<b>Special Habitat</b>		
<b>Species</b>	<b>Estimated population trend</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Veery</b>	Static	Large contiguous forest areas					
<b>Blue-headed vireo</b>	Increase	Red spruce-Fraser fir forests	Northern hardwood forests	Cove forests	Large contiguous forests		
<b>Northern parula warbler</b>	Static	Large contiguous forests					
<b>Ovenbird</b>	Decrease	Large contiguous forests					
<b>Yellow-bellied sapsucker</b>	Decrease	Small snags and dens					
<b>Eatern towhee</b>	Decrease	Early successional (0-10)	Early successional (11-20)				
<b>White-breasted nuthatch</b>	Increase	Small snags and dens					
<b>Cedar waxwing</b>	Static	Soft mast producing species					
<b>Pine warbler</b>	Static	Yellow pine mid-late successional forest					
<b>Raven</b>	Static	Open rock outcrops and cliffs					
<b>Field sparrow</b>	Decrease	Early successional (0-10)					

Nantahala & Pisgah MIS species, estimated trend, and biological community or special habitat indicated by the species cont'd

			<b>Biological</b>	<u>Community or</u>	<b>Special Habitat</b>		
<b>Species</b>	<b>Estimated population trend</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Eastern wild turkey</b>	Northern mtns: increase; Southern mtns: decrease	Hard mast producing species	Mixed pine-hardwood forest types	Contiguous forest areas with moderate disturbance	Permanent grass-forb openings		
<b>Ruffed grouse</b>	Static	Early successional (0-10)	Early successional (11-20)	Downed woody debris			
<b>Peregrine falcon</b>	Increase	Open rock outcrops and cliffs					
<b>Eastern meadowlark</b>	Absent	Permanent grass-forb openings					
<b>Green salamander</b>	Static	Shaded rock outcrops and cliffs					
<b>Jordan's salamander</b>	Static	Shaded rock outcrops and cliffs					
<b>Spotted salamander</b>	Static	Mountain ponds and ephemeral pools					
<b>Blue Ridge two-lined salamander</b>	Static	Alluvial forests					
<b>Brook, Brown, Rainbow Trout and Sculpin</b>	Static	Coldwater streams					
<b>Largemouth Bass, Bluegill</b>	Static	Reservoirs					

Nantahala & Pisgah MIS species, estimated trend, and biological community or special habitat indicated by the species cont'd

			<b>Biological</b>	<u>Community or</u>	<b>Special Habitat</b>		
<b>Species</b>	<b>Estimated population trend</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Blacknose Dace</b>	Static	Coldwater streams					
<b>Freshwater mussels</b>	Varies by species	Warmwater streams					
<b>Smallmouth Bass, Whitehorse, Redhorse</b>	Static	Coolwater streams	Warmwater streams				
<b>Spotfin Chub</b>	Static	Warmwater streams					
<b>Red Oak</b>	Static	Oak and oak-hickory forests					
<b>White oak</b>	Static	Oak and oak-hickory forests					
<b>Buckeye</b>	Static	Cove forests					
<b>Basswood</b>	Static	Cove forests					
<b>Black cherry</b>	Increase	Cove forests					
<b>Hickory (all species)</b>	Static	Oak and oak-hickory forests					
<b>White pine</b>	Increase	White pine forests					
<b>Pitch and Table Mountain Pines</b>	Decrease	Xeric yellow pine forests					