National Forests in North Carolina

FY 2010 Monitoring and Evaluation Report

Nantahala * Pisgah * Uwharrie * Croatan

Monitoring Gray's lily on Roan Mountain.

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CONTENTS

PREFACE

Forest plan monitoring and evaluation reports are essential elements for maintaining valid and effective Land Management Plans. Nantahala and Pisgah National Forests operate under a plan signed in 1987 and significantly amended (Amendment 5) in 1994. Revision of this plan will begin no earlier than FY 2013. The original plan for the Uwharrie National Forest was signed in 1986. In 2010 the National Forests in NC reinitiated the plan revision process for the Uwharrie NF, and expect to have a revised forest plan in early 2012. A revised Croatan National Forest plan went into effect in FY 2003. The forest plans and associated documents are available online at http://www.fs.usda.gov/nfsnc.

The Annual Monitoring and Evaluation Report for FY 2010 is organized into broad resource topic areas. A summary of the historical context for management of the four forests is available online at http://www.fs.usda.gov/nfsnc under the heading Land and Resources Management/ Planning.

KEY FINDINGS AND CERTIFICATION

- Improvements to recreation facilities took place on every district of the National Forests in North Carolina.
- Timber stand improvement activities exceeded plan projections by 40%.
- Nantahala/Pisgah timber harvest acres were 9% of plan projections; Uwharrie harvest acres were 47% of plan projections; Croatan harvest acres consist primarily of thinning loblolly stands (no specific amount designated in the plan).
- Numerous projects to control the spread of non-native invasive species occurred on the Nantahala and Pisgah National Forests.
- Over 500 acres of Hemlock Woolly Adelgid infestations were treated on the Nantahala and Pisgah NFs.
- Seventy-five cultural resources sites were monitored, 67% of which were recorded as stable.
- There was an increase in red-cockaded woodpecker populations from 2009 to 2010. All active clusters (60) were monitored and banding was completed at 93% of known nests.
- Seventeen new subpopulations of federally listed plant species were located.
- Approximately 11 miles of aquatic habitat were restored on the Nantahala and Pisgah NFs.
- Monitoring indicates that the decommissioning of trails in the upper Tellico River drainage was found to be extremely effective in eliminating erosion and sources of sediment.

Forest Supervisor's Certification

I have evaluated the monitoring results and I have directed that the Action Plan be implemented according to the time frames indicated, unless new information or changed resource conditions warrant otherwise. I have considered funding requirements in the budget necessary to implement these actions.

During FY 2010, the Plan for Nantahala and Pisgah National Forests and the revised Croatan National Forest Plan were sufficient to guide forest management on those Forests. For the Uwharrie National Forest, the plan revision process was reinitiated in 2010 and a Final Land and Resource Management Plan is expected to be completed by early 2012.

Any amendments or revisions to the Forest Plans will be made using the appropriate National Environmental Policy Act (NEPA) procedures.

/s/ Marisue Hilliard *August 1, 2011*

Marisue Hilliard
Forest Supervisor

Date

FY 2010 Monitoring Results

Recreation

Goal or Desired Condition: A wide variety of recreational opportunities are provided with increased opportunities for non-motorized recreation. Activities, facilities, and programs are accessible to the extent possible.

Monitoring Item	Results
To what extent are management activities appropriate for moving areas of the Forest toward the desired conditions for recreation?	During 2010, visitor information was improved at kiosks at many recreation areas. Increased accessibility was emphasized, including improved access to information boards and providing text in larger point sizes. Hazard tree removal in developed recreation areas and in many dispersed concentrated use areas became a heightened emphasis in 2010, largely due to hemlocks dying from Hemlock Woolly Adelgid infestations. **Croatan National Forest** • Cedar Point and Flanners Beach/Neuse River Recreation Areas: Rehabbed six campsites; replaced worn fire rings and picnic tables; repaired/replaced water hydrants and electrical pedestals, and improved the campground loop trail at Flanners Beach. **Nantahala National Forest** • Tsali Trail Complex: Brushed and logged out trail system two times, provided periodic maintenance as needed, replaced information kiosks, improved posted information at trailhead, and provided trail maps. • Swan Cabin: Chinking was replaced in this 1931 structure . • Whitewater Falls: Replaced steps and completed heavy trail maintenance on a half-mile section of trail near the observation area; maintained trails and cleared overlooks; replaced two benches along the trail to the observation deck and

Monitoring Item	Results
	repaired split rail fence. • Balsam Lake Lodge and Day-Use Area: Improved lodge facilities including upgraded energy-efficient lighting and five new ceiling fans in bedrooms, and new cooking stove; maintained trails around facilities, including overlooks; concreted two sections of trail that lead to accessible fishing platforms over Wolf Creek; treated large accessible fishing pier with wood preservative. • Nantahala River Gorge: Repaired bridge and rock work at the put-in; dredged put-in and take-outs; maintained one mile of bike trail down the river. • Dirty John Shooting Range: Repaired and/or replaced shooting target frames at 25, 50, and 100 yards weekly; improved vegetation on grassy backstop. • Jackrabbit and Hanging Dog Recreation Areas and Bristol Fields Horse Camp: Replaced table and tent pads in nine sites; replaced one set of steps; replaced worn grills; replaced sand on the beach and repaired swimming area buoy system; replaced roof and doors on vault toilet building at Bristol Fields. **Pisgah National Forest** • Roan Mountain Recreation Area: The area was open to the public for only one month in 2010, with no fees, during ARRA-supported rehabilitation. Staffed on-site Visitor Information/Interpretive Center and repaired water fountain, planters, retaining wall; graded and graveled large parking area. • Silvermine Group Campground: Installed two new accessible tables and improved barrier-free access around vault toilet. • Sliding Rock Day-Use Area: Rebuilt lifeguard stand/deck and repaired access road. • Cradle of Forestry: Purchased and installed new sound system, screen, and projector for Main Theater; introduced new movie, “There’s Magic at the Cradle,” and upgraded projector system in Small Theater; replaced exhibit animals with new taxidermy; planted native trees for Nursery Display; and provided a number

Monitoring Item	Results
	of special events and programs, with emphasis on accessibility. **Uwharrie National Forest** • Badin Lake Campground: Replaced picnic tables and repaired drinking water fountains. • Badin Lake Group Campground: Repaired stone fire grills; installed water hydrants closer to each of the three group sites; repaired campground access road; removed hazard trees. • Canebrake Horse Camp: Installed new water hydrant for filling RV tanks; replaced and/or repaired horse-hitching posts, picnic tables and grills at campsites. • West Morris Mountain Campground: Replaced fire rings and removed hazard trees. • Flintlock Shooting Range was temporarily closed in May 2010 for safety reasons.
To what extent has accessibility improved?	Approximately one-fifth of the Forest's developed recreation sites were inspected for condition, accessibility and development scale consistency, and the resulting data was compiled into the INFRA record. • Improved accessible put-in/take-out at Nantahala River's Ferebee Memorial Recreation Area (Nantahala National Forest). • New accessible restroom and other improvements at Flanners Beach/Neuse River Recreation Area (Croatan National Forest). • New accessible bathhouse and other improvements at North Mills River Recreation Area (Pisgah National Forest). • New accessible restrooms at Badin Lake Group Camp and Woodrun Trailhead (Uwharrie National Forest). • Fires Creek Recreation area: Paved the parking lot; relocated the restroom

Monitoring Item	Results
	facility and the trail to the facility to make it accessible.
Are Visual Quality Objectives being met? Is the scenery being maintained or enhanced?	Scenery impact analyses were conducted for vegetation management projects on the Nantahala and Pisgah National Forests. Design features were incorporated allowing these projects to meet assigned Visual Quality Objectives per Land and Resource Management Plan standards.

Goal or Desired Condition: Attributes and resources of special interest areas including wilderness, research natural areas, and areas registered by the North Carolina Natural Heritage Program are maintained.

Monitoring Item	Results
Attributes and Resources of Wilderness	Wilderness resources and attributes were maintained on the six wilderness areas across Nantahala and Pisgah National Forests. Efforts to achieve goals of the 10-Year Wilderness Stewardship Challenge continued with development of a wilderness education plan for Middle Prong and Shining Rock Wilderness areas, and NNIS surveys in Southern Nantahala, Joyce Kilmer-Slickrock, and Linville Gorge Wilderness areas.

Roads and Trails

Monitoring Item	Results
Amount of trails constructed/reconstructed	Nantahala/Pisgah: 66 Uwharrie: 7 Croatan: 6
Miles of roads maintained to standard	Nantahala/Pisgah: 1,051 Uwharrie: 35 Croatan: 125

Monitoring Item	Results
Miles of road constructed/reconstructed/ Decommissioned	**Nantahala/Pisgah:** Constructed: 0 Reconstructed: 24 Decommissioned: 5.5 (System) and 10.6 (Unauthorized) **Croatan:** Constructed: 0 Reconstructed: 2 Decommissioned: 0 **Uwharrie:** Constructed: 0 Reconstructed: 0 Decommissioned: 0

Cultural and Heritage Resources

General direction: Heritage resources, which are listed on or eligible for the national register of historic places or the national register of historic landmarks, are protected. Suitable sites are developed and/or interpreted for public use and enjoyment.

General direction: Cultural resources, historic properties or archeological sites, which are listed on or eligible for the National Register of Historic Places (NRHP) or are designated National Historic Landmarks, are protected. Suitable sites are developed and/or interpreted for public use and enjoyment.

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Cultural Resources Identified in Relation to Acres Surveyed</td><td>Table 1. Cultural Resources identified and surveyed.
<table>
<tr><th></th><th>Sites & Properties Identified</th><th>Acres Surveyed</th></tr>
<tr><td>FY 2010</td><td>106</td><td>1.943</td></tr>
<tr><td>ALL-TIME TOTAL</td><td>6,269</td><td>193,838</td></tr>
</table></td></tr>
<tr><td>Sites Monitored</td><td>Table 2. Effects on cultural resource sites.
<table>
<tr><th>Forest</th><th>Number of Sites</th><th>Sites Stable</th><th>Adverse Cultural Effects*</th><th>Adverse Natural Effects**</th></tr>
<tr><td>Nantahala</td><td>30</td><td>20</td><td>8</td><td>2</td></tr>
<tr><td>Pisgah</td><td>21</td><td>16</td><td>4</td><td>1</td></tr>
<tr><td>Croatan</td><td>12</td><td>10</td><td>0</td><td>2</td></tr>
<tr><td>Uwharrie</td><td>12</td><td>4</td><td>7</td><td>1</td></tr>
<tr><td>Total:</td><td>75</td><td>50</td><td>19</td><td>6</td></tr>
<tr><td>Percent:</td><td>100%</td><td>67%</td><td>25%</td><td>8%</td></tr>
</table>
*Effects from FS actions or public use / activities.
**Effects from weathering / natural conditions.</td></tr>
<tr><td>Tribal Relations Activities</td><td>The Forest continues to work in partnership with the Eastern Band of Cherokee Indians, local communities and universities on the National Historic Trail of Tears and the NC Rock Art Project. Relationships with the Federally recognized Catawba Indian Nation are expanding as the Uwharrie Forest Plan Revision continues. A process for the gathering of forest products by Tribal members is being further developed.</td></tr>
<tr><td>Public Interpretation</td><td>The Forest is working with several partners to record and preserve rock art. The Uwharrie NF has developed plans to host a Windows On the Past project documenting the historic Lawrenceville town site in FY 2011. A poster contest has been initiated with schools to increase awareness of archeological site preservation needs on the Uwharrie NF.</td></tr>
</table>

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Cultural Resources
Site Protection</td><td>
Seventy-five cultural resources, including prehistoric archeological sites, historic structures, home sites and cemeteries, susceptible to vandalism or looting, potential impact from project implementation, visitor use and/or natural deterioration were visited and formally assessed and documented. The Forest is working with the NC Office of State Archeology (SHPO) to identify Croatan National Forest sites susceptible to flooding and sea level fluctuation / rise to prioritize site preservation needs.

Table 3. Monitored Sites.
<table>
<tr><th>Forest</th><th>Prehistoric Sites</th><th>Historic Sites</th><th>Prehistoric / Historic Sites*</th><th>Total Sites Monitored</th></tr>
<tr><td>Nantahala</td><td>16</td><td>7</td><td>7</td><td>30</td></tr>
<tr><td>Pisgah</td><td>15</td><td>4</td><td>2</td><td>21</td></tr>
<tr><td>Croatan</td><td>11</td><td>0</td><td>1</td><td>12</td></tr>
<tr><td>Uwharrie</td><td>9</td><td>0</td><td>3</td><td>12</td></tr>
<tr><td>Total:</td><td>51</td><td>11</td><td>13</td><td>75</td></tr>
</table>
*Some sites are multi-component, prehistoric & historic.

Most Forest management projects such as recreation developments and timber harvest have not adversely impacted cultural resources. However, 25% of sites monitored have been subjected to adverse cultural impacts. Several sites along roads and trails across the Forest have been successfully stabilized with hardening and vegetation. Restoration of eight fire lookouts, two Civilian Conservation Corps picnic shelters, and a historic bridge continued, all to be completed in 2011. Two lookout towers and several historic structures are deteriorating and still require maintenance.
</td></tr>
</table>

Monitoring Item	Results
Cultural Resources Site Protection	**Nantahala National Forest:** On the Cheoah Ranger District unauthorized collection of artifacts was encountered along a road bank. Site preservation signage should be put in place at nearby interpretive locations. Two sites are being eroded by changing lake levels and wave action. Both need to be monitored during low water level periods and necessary preservation implemented. Vegetation is encroaching on a historic cemetery and needs to be removed. On the Nantahala Ranger District a site has been adversely impacted by a prescribed fire dozer line. This impact needs to be mitigated as soon as possible. A historic cabin needs to be stabilized as soon as possible. On the Tusquitee Ranger District several sites have been better protected by the relocation of trails. Two historic cemeteries need to be cleared of impacting vegetation.  *Site Protected By Trail Relocation*  *Historic Cemetery*  **Pisgah National Forest:** On the Appalachian Ranger District a historic barn is deteriorating rapidly. It is planned for re-assessment in 2011. On the Grandfather Ranger District two prehistoric archeological sites are being impacted, one by unauthorized OHV/motorcycle use and one by looting. Access across the site with OHV impacts needs to be eliminated or the nearby designated trails need to be closed. An unauthorized bicycle trail impacted a prehistoric and historic site on the Pisgah Ranger District. Those responsible for the damage assisted the Forest Service with repairs.

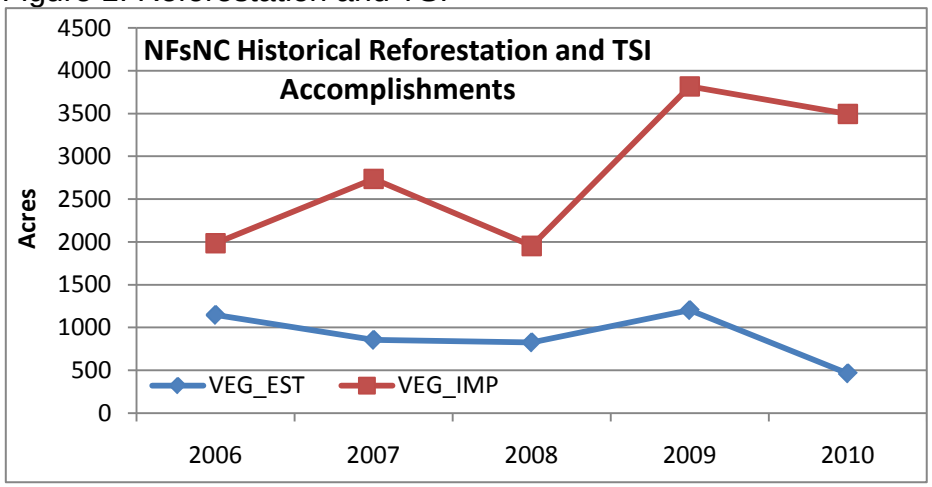
Monitoring Item	Results
Cultural Resources Site Protection	 *OHV Impacted Site on Grandfather Ranger District* **Uwharrie National Forest:** Two sites on the Uwharrie Ranger District have been impacted by FS timber and road activities. One site is also eroding due to natural conditions. Four sites are being adversely impacted by OHV and horse trail use. A previously preserved site has been destroyed by OHV impacts. These sites need to be stabilized immediately and the impacts mitigated. Until their preservation is complete the nearby designated trails should be closed. Increased awareness for site preservation (signage) needs to be implemented.  *OHV and Horse Site impacts*

Monitoring Item	Results
Cultural Resources Site Protection	**Croatan National Forest:** Most sites on the Croatan Ranger District are stable. Two sites are eroding along rivers and plans need to be developed and actions implemented to preserve these sites before they are lost.  *Site eroding along river*

Forest Management

Goal or Desired Condition: A variety of silvicultural treatments are used to provide a continuous supply of wood products, with emphasis on high quality hardwoods (Nantahala/Pisgah).

Monitoring Item	Results
Restoration and Improvement of Forest Vegetation SPB = Southern Pine Beetle HWA = Hemlock Woolly Adelgid	Croatan Establishment of desirable regeneration (natural or artificial): **34 acres** SPB Prevention: **400 acres** HWA Treatment: **0 acres**

Monitoring Item	Results
Restoration and Improvement of Forest Vegetation SPB = Southern Pine Beetle HWA = Hemlock Woolly Adelgid	<u>Uwharrie</u> Establishment of desirable regeneration (natural or artificial): **64 acres** SPB Prevention: **56 acres** HWA Treatment: **0 acres** <u>Nantahala/Pisgah</u> Establishment of desirable regeneration (natural or artificial): **365 acres** SPB Prevention: **0 acres** HWA Treatment: **503 acres**
Timber Stand Improvements (TSI), FY 2010	<u>Croatan</u>: **0 acres** <u>Uwharrie</u>: **167 acres** <u>Nantahala/Pisgah</u>: **3,329 acres** Total TSI: **3,496 acres** Plan Projected TSI Treatment: 2,487 **acres** Figure 1. Reforestation and TSI 

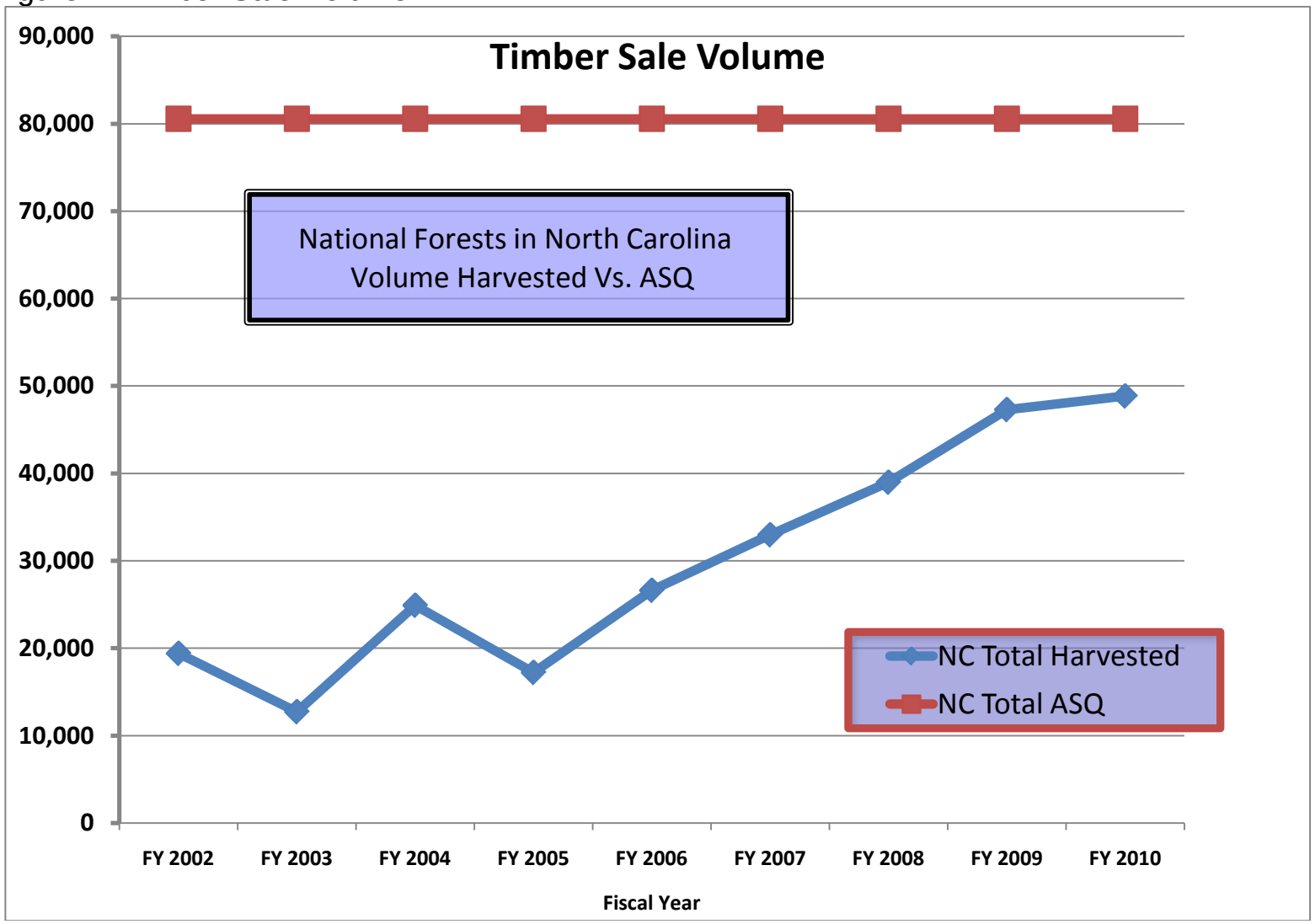
Monitoring Item	Results
Acres Harvested in FY 2010 by Method, and Plan Projected Harvest	Table 4. Harvested Acres

Croatan		
Method	**FY 2010 Harvested Acres**	**Plan Projections**
Even-Aged/ Two-Aged	21	The thinning is occurring in predominantly loblolly stands that must removed before longleaf restoration can occur.
Uneven-Aged	0	
Thinning	902	
Salvage	0	
TOTAL	**923**	

Uwharrie		
Method	**FY 2010 Harvested Acres**	**Plan Projections**
Even-Aged/ Two-Aged	0	400
Uneven-Aged	0	0
Thinning	331	310
Salvage	0	N.A.
TOTAL	**331**	**710**

Nantahala/Pisgah		
Method	**FY 2010 Harvested Acres**	**Plan Projections**
Even-Aged/ Two-Aged	274	2,767
Uneven-Aged	4	500
Thinning	10	N.A.
Salvage	0	N.A.
Permanent Land Clearing	7	N.A.
TOTAL	**295**	**3,267**

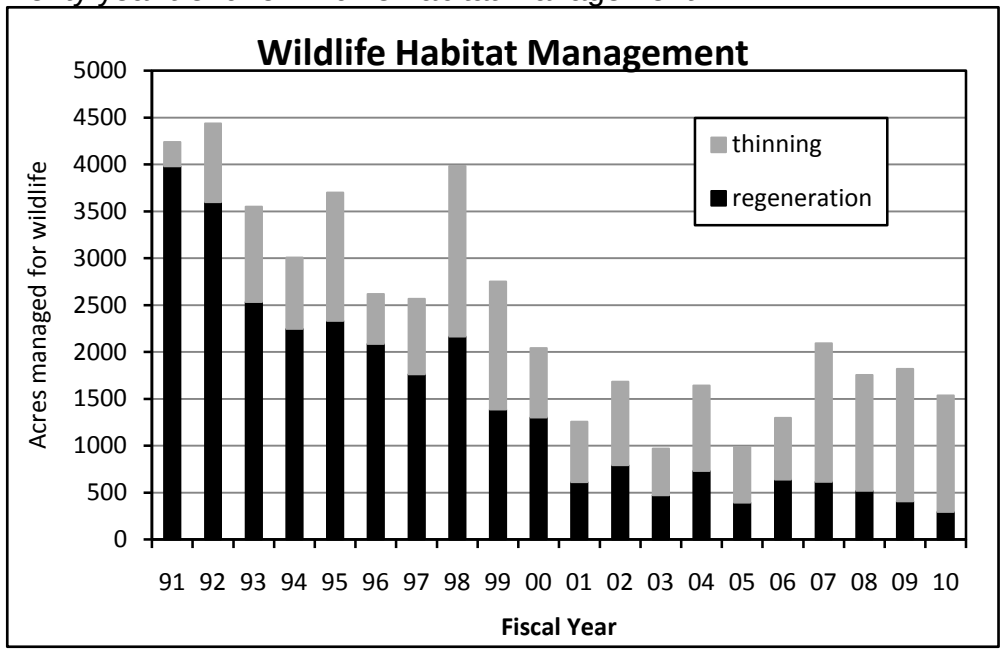
Figure 2. Timber Sale Volume

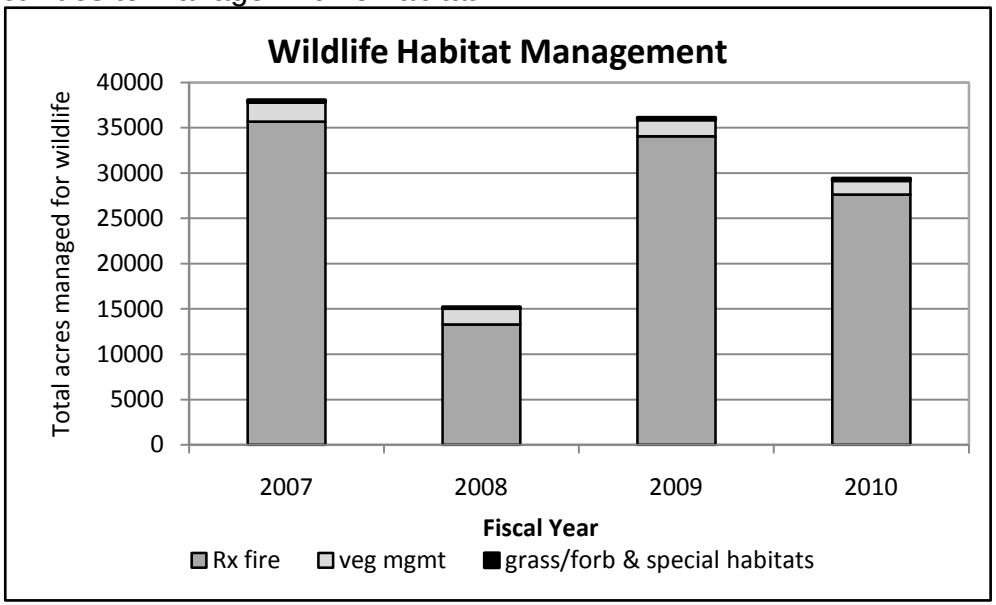


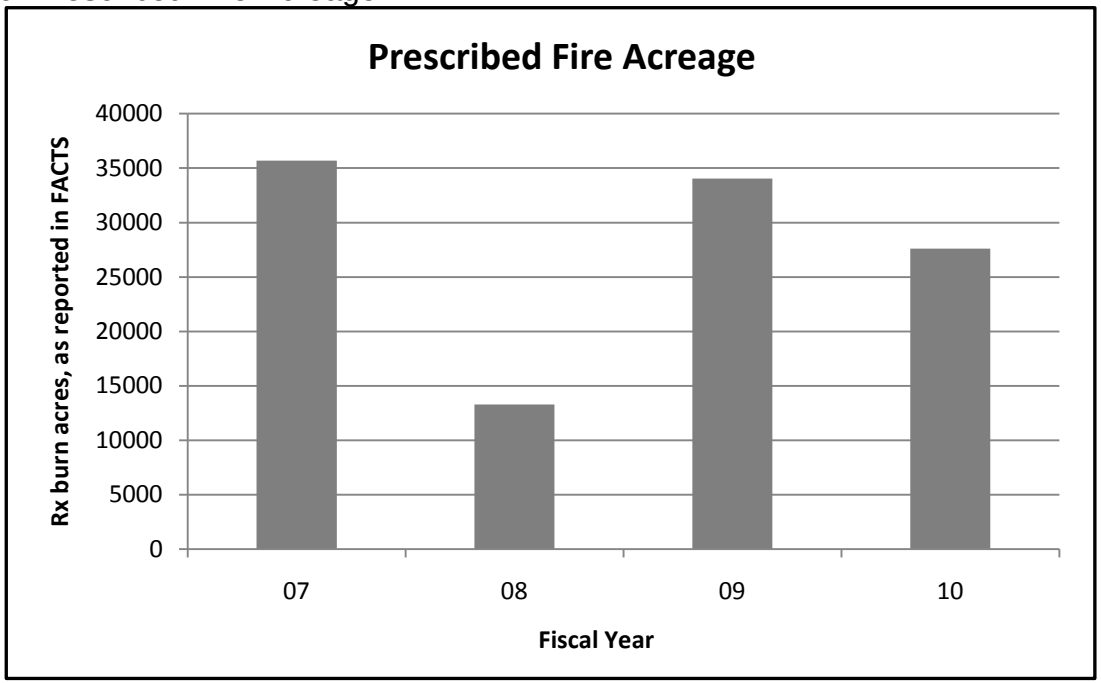
Biological Resources

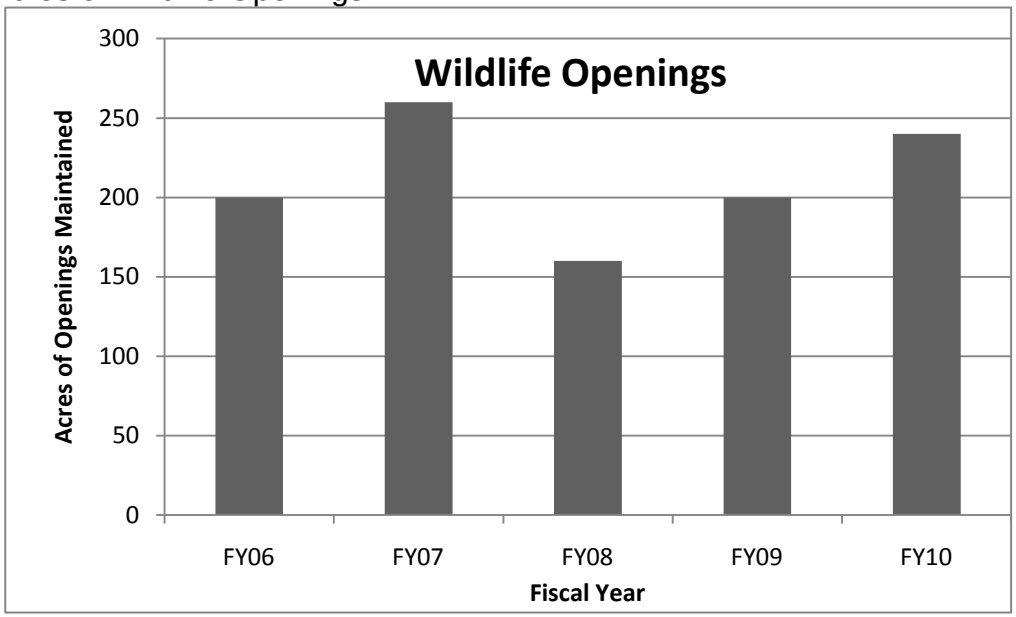
Goal or Desired Condition: Maintain, and where possible, enhance the diversity of plant and animal communities.

Monitoring Item	Results
Trends in Creation of Early Successional Habitat	Terrestrial wildlife population trends across the Forest are proportional to the amount and quality of suitable habitat, and in the case of game species, social influences such as hunting pressure. Some species are habitat-specific, requiring a single type of habitat or dependence on a certain parameter, such as butterfly species' relationship to open grassy habitats and appropriate larval host and nectar plants. Other species require a diversity of habitats and parameters throughout their life history, such as white-tailed deer and ruffed grouse, making it difficult to associate trends in any one habitat type or management activity with population trends. The three main types of wildlife habitat management include prescribed fire, vegetation management, and maintenance of grass/forb and other special habitats. Figure 3. Prescribed Fire Treatment. 

Monitoring Item	Results
Trends in Creation of Early Successional Habitat (cont.)	In FY2010, approximately 1,500 acres of wildlife habitat were managed across the four forests using regeneration harvest or thinning to increase habitat diversity through the creation of early successional habitats or to reduced canopy cover. This type of habitat management favors species preferring early successional or more open forested habitats. While the amount of wildlife habitat management through vegetation management activities is less than it was 20 years ago, levels have remained relatively stable over the last 10 years. Figure 4. Twenty year trend for wildlife habitat management. 

Monitoring Item	Results
Trends in Creation of Early Successional Habitat (cont.)	In FY2010, approximately 250 acres of grass/forb and other special habitats (e.g. wetlands) were maintained or restored. While this is just a small portion of the total wildlife habitat management across the forest, maintenance of special habitats ensures continued wildlife diversity and presence of species relying these habitats (e.g. butterflies, bog turtles). Figure 5. Activities to manage wildlife habitat. 

Monitoring Item	Results
Trends in Creation of Early Successional Habitat (cont.)	Approximately 28,000 acres of prescribed burning in FY2010 resulted in open understory conditions favored by many wildlife species. While prescribed burning acres are down slightly compared to the last several years, they have increased dramatically since the late 1990s, which ultimately increases wildlife habitat diversity and stability. Figure 6. Prescribed Fire Acreage. 

Monitoring Item	Results
Trends in Creation of Early Successional Habitat (cont.)	Figure 7. Acres of Wildlife Openings 
Restoring Native Diversity	Control of nonnative invasive plant species (NNIS) is prioritized across the forests based on threats to federally listed species, Region 8 sensitive species, NFsNC locally rare species, rare plant communities, and high quality plant communities within special interest areas. Emphasis is also given to control areas with identified cooperators or volunteers and control on adjacent non-USFS lands. Secondary emphasis is controlling infestations of prioritized NNIS in project areas. All the control work in FY 2010 occurred in the mountain forests since there currently is no NEPA for treatment on the Uwharrie and Croatan NFs for control of invasive plant species. In 2010 four sites with federally listed plant species had invasive plant control projects surrounding occupied habitat (Table 5).

Monitoring Item	Results
Restoring Native Diversity	Table 5. NNIS control projects across Nantahala and Pisgah NFs in FY 2010 with known subpopulations of T&E or Region 8 sensitive species.

Site	Ranger District	Priority	Invasive Species
Federally Listed Species			
Nolichucky Gorge	Appalachian	Impacts to *Spiraea virginiana*	OB, JK, MR
Pink Beds	Pisgah	Impacts to *Helonias bullata*	P, OB, MR
Whiteoak Creek	Nantahala	Impacts to *Spiraea virginiana*	JK
Cheoah River	Cheoah	Impacts to *Spiraea virginiana*, Appalachian Elktoe, Spotfin Chub	OB, K, LJ, P, TH, M, PT, MR, D
Region 8 Sensitive Species			
Nantahala Gorge	Nantahala	Impacts to *Trillium simile, Megaceros aenigmaticus*, and *Hydrothyria venosa*	P
Roan Mountain	Appalachian	Impacts to *Lilium grayi*	C, OB
Linville Gorge Area	Grandfather	Impacts to *Liatris turgida*	PT, TH, JS, MR, S
Cheoah River	Cheoah	Impacts to Junaluska salamander, *Megaceros aenigmaticus*	OB, K, LJ, P, TH, M, PT, MR, D

OB= Oriental Bittersweet (*Celastrus orbiculatus*)
JS = Japanese Spiraea (*Spiraea japonica*)
C = Coltsfoot (*Tussilago farfara*)
LJ = Japanese honeysuckle (*Lonicera japonica*)
P = Privet (*Ligustrum sinensis*)
JK = Japanese Knotweed (*Reynoutria cuspidatum*)
PT = Princess Tree (*Paulownia tomentosa*)
TH = Tree-of-heaven (*Ailanthus altissima*)
MR = Multiflora Rose (*Rosa multiflora*)
K = Kudzu (*Pueraria montana*)
M = Mimosa (*Albizia julibrissin*)
D = Chinese Yam (*Dioscorea polystachya*)
S = Chinese Silvergrass (*Miscanthus sinensis*)

Monitoring Item	Results
Restoring Native Diversity	In 2010 ongoing effectiveness monitoring of previous treatments for various NNIS indicated very effective control via cut-stem treatment on larger vines of Oriental bittersweet, princess tree, mimosa, privet, and multiflora rose. Foliar treatments were most effective on Japanese knotweed, privet, Japanese honeysuckle, Japanese spiraea, and multiflora rose, although were not as effective as cut stem treatments. The four most difficult species to control include garlic mustard, oriental bittersweet, Chinese yam, and coltsfoot. Considering the ability of the first three species to persist and thrive within a closed canopy indicates these remain the most aggressive NNIS within the NFsNC mountain forests.

Goal or Desired Condition: Maintain viable populations of existing native wildlife, fish, and plants. Threatened and endangered plant and animal species are protected, managed or recovered consistent with the Endangered Species Act; and sensitive species are conserved.

Monitoring Item	Results
Status of Threatened and Endangered Species	**Monitoring Rare Plant species** There are 398 rare plant species documented across the four forests in the National Forests in North Carolina. Eleven of these are federally listed, 133 are Region 8 sensitive, and 254 are locally rare. Given the number of rare plant species documented, the top monitoring priorities continue to be the federally listed species. The NFsNC has prioritized monitoring these 11 species based on known or suspected threats within specific sites, project level commitments, and a pledge to visit all the sites within a five year cycle. **Federally Listed Plant Species** A few new sites with federally listed plant species were located in FY 2010. Three new *Spiraea virginiana* subpopulations were located along the Cheoah River on the Cheoah Ranger District. One new *Houstonia montana* subpopulation was discovered on Roan Mountain on the Appalachian Ranger District by Jamey Donaldson, who was managing the goat herd on Jane Bald for the 3rd year as a volunteer. Thirteen new small *Lysimachia*

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Status of Threatened and Endangered Species (cont.)</td><td>
asperulifolia subpopulations were located on the Croatan National Forest in FY 2010. These changes are reflected in Table 6 which shows the distribution of the species across the four National Forests in North Carolina.

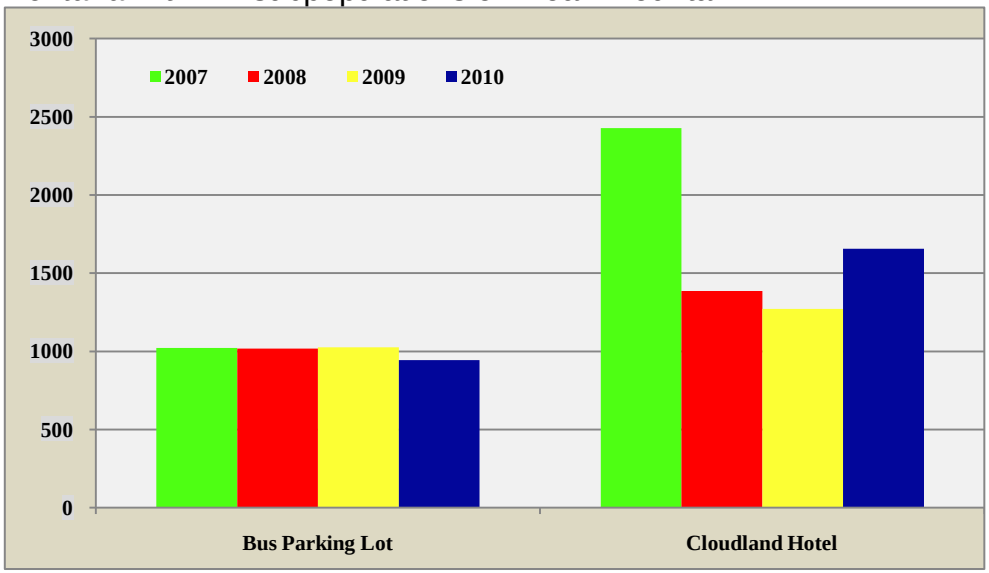
Table 6. Distribution of federally listed threatened and endangered (T&E) plant species across the NFsNC.
<table>
<tr><th>Species</th><th>Pops</th><th>Subpops</th><th>Forest</th><th>Districts</th></tr>
<tr><td>Gymnoderma lineare</td><td>25</td><td>57</td><td>Pisgah, Nantahala</td><td>Cheoah, Nantahala, Pisgah, Appalachian, Grandfather</td></tr>
<tr><td>Isotria medeloides</td><td>3</td><td>4*</td><td>Pisgah, Nantahala</td><td>Nantahala, Grandfather</td></tr>
<tr><td>Spiraea virginiana</td><td>3</td><td>39</td><td>Pisgah, Nantahala</td><td>Cheoah, Nantahala, Appalachian</td></tr>
<tr><td>Hudsonia montana</td><td>3</td><td>33</td><td>Pisgah</td><td>Grandfather</td></tr>
<tr><td>Helonias bullata</td><td>2</td><td>15</td><td>Pisgah, Nantahala</td><td>Pisgah, Nantahala</td></tr>
<tr><td>Houstonia montana</td><td>4</td><td>20</td><td>Pisgah</td><td>Appalachian</td></tr>
<tr><td>Geum radiatum</td><td>2</td><td>22</td><td>Pisgah</td><td>Appalachian</td></tr>
<tr><td>Solidago spithamaea</td><td>1</td><td>8</td><td>Pisgah</td><td>Appalachian</td></tr>
<tr><td>Liatris helleri</td><td>4</td><td>16</td><td>Pisgah</td><td>Grandfather</td></tr>
<tr><td>Helianthus schweinitzii</td><td>8</td><td>22</td><td>Uwharrie</td><td>Uwharrie</td></tr>
<tr><td>Lysimachia asperulifolia</td><td>4</td><td>67</td><td>Croatan</td><td>Croatan</td></tr>
</table>
Pops = Populations, Subpops = Subpopulations
*Recently extirpated from all four sites, restoration efforts completed for two sites

The NFsNC botanists met in 2009 to discuss a strategy to monitor the federally listed plant species. Various intensities and frequencies of monitoring were determined for the subpopulations present across all the districts. Frequency of monitoring, varying from yearly to once every 10 years, was determined for each subpopulation based on previous
</td></tr>
</table>

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Status of Threatened and Endangered Species (cont.)</td><td>
commitments from NEPA decisions and known or suspected threats (Table 7). All 11 T&E plant species monitoring frequencies were prioritized based on their species abundance on the NFsNC, their threats, and management needs. These priorities are used as a guide for annual monitoring with current budgets and time constraints. If a demonstrable threat becomes evident, the monitoring frequency for an individual species or population may be modified.

Table 7. Frequency and methodology of monitoring T&E species across the four forests in the National Forests in North Carolina.
<table>
<tr><th>Species</th><th>Methodology</th><th>General Frequency</th><th>Appropriate Monitoring Schedule</th></tr>
<tr><td>Gymnoderma lineare</td><td>Rapid Assessment/Transects</td><td>4-5 years</td><td>All season including winter</td></tr>
<tr><td>Isotria medeloides</td><td>Assess if still extant</td><td>Annual till determined no longer extant</td><td>May - June</td></tr>
<tr><td>Spiraea virginiana</td><td>Stem counts, with refined methodology from UNCA researchers</td><td>3-5 years</td><td>June - July</td></tr>
<tr><td>Hudsonia montana</td><td>Census</td><td>5 years</td><td>June - Sept</td></tr>
<tr><td>Helonias bullata</td><td>Demography/Census/Estimate</td><td>Annual, 3-10 years</td><td>April - May</td></tr>
<tr><td>Houstonia montana</td><td>Transects and refined methodology for other sites to reduce trampling while monitoring</td><td>Annual, 3-10 years</td><td>July - August</td></tr>
<tr><td>Geum radiatum</td><td>Demography/ Observations</td><td>Annual, 3– 10 years</td><td>July</td></tr>
<tr><td>Solidago spithamaea</td><td>Rosette count, refine in 2011</td><td>4-5 years</td><td>July - Sept</td></tr>
<tr><td>Liatris helleri</td><td>Demography/Assess rosettes</td><td>5 years</td><td>August - Sept</td></tr>
<tr><td>Helianthus schweinitzii</td><td>Census/ Demography</td><td>Annual, 3-5 years</td><td>Sept - Nov</td></tr>
<tr><td>Lysimachia asperulifolia</td><td>Census /transects</td><td>Annual, 3-5 years</td><td>May - June</td></tr>
</table>

Two sites, Roan Mountain and the Cheoah River, represent the majority of T&E subpopulation occurrences. These monitoring commitments have been the botanists' top
</td></tr>
</table>

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	priority for the past few years as well as for project level monitoring. <u>A synopsis of monitoring for the federally listed plant species in 2010 follows:</u> ***Houstonia Montana*, Roan Mountain Bluet**: Nineteen separate subpopulations are documented for this species, all within the Appalachian Ranger District. All except one of these occurs on Roan Mountain. One new small subpopulation was discovered in 2010. Two subpopulations on Roan Mountain were monitored in 2010 for the fourth consecutive year. The two subpopulations continue to vary (Figure 8). Figure 8. Change in area coverage (centimeters square) from 2007-2010 for *Houstonia montana* within 2 subpopulations on Roan Mountain.  The bus parking lot subpopulation declined in extent, area coverage, by 8% from 2009 (Table 8). This decline was more dramatic, 36%, in the number of occupied plots. This larger decline could be an artifact of the sampling design since a slight adjustment of the plot grid along the transect line from year to year could change the number of occupied

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Status of Threatened and Endangered Species (cont.)</td><td>
plots. However, the extent should not vary significantly.

In contrast, the Cloudland Hotel subpopulation increased dramatically from 2009 to 2010 both in the number of occupied plots (173 to 245) and the coverage (1272 cm^2 to 1656cm^2). This 30% increase in area coverage was almost represented in a 42% increase in the number of occupied plots. On the parking lot site, the occupied plot numbers may be inflated due to the sampling design.

Table 8. Annual percent change in coverage and occupied plots from 2007-2010 for Houstonia montana within two subpopulations on Roan Mountain.
<table>
<tr><th>Year</th><th>Parking Lot</th><th>Cloudland Hotel</th><th>Parking Lot</th><th>Cloudland Hotel</th></tr>
<tr><th></th><th colspan="2">Percent Coverage</th><th colspan="2">Occupied plots</th></tr>
<tr><td>2007-2008</td><td>0.4% decline</td><td>43.0% decline</td><td>13.0 % decline</td><td>7.0% decline</td></tr>
<tr><td>2008-2009</td><td>1.0% increase</td><td>8.0% decline</td><td>18.0% increase</td><td>2.0% decline</td></tr>
<tr><td>2009-2010</td><td>8.0% decline</td><td>30.0% increase</td><td>36.0 % decline</td><td>42.0% increase</td></tr>
</table>

The contrast in monitoring data between the two sites may be associated with habitat differences. In the parking lot, Houstonia montana is primarily rooted in the gravel and has little competition from other plants. In contrast, at the old Cloudland Hotel site, Houstonia montana is primarily in a grassy bald with competition from grasses, sedges, herbs, and shrubs.

Three other very small (less than 50 total stems) subpopulations were counted in 2010. Their stem numbers have been relatively stable (varied less than 5% during the past five years). As in 2009, three other subpopulations were noted to be present in 2010, although no detailed quantitative data was recorded.

Solidago spithamaea, Blue Ridge goldenrod : Eight subpopulations of this unique goldenrod were historically documented on the NFsNC, all on Roan Mountain. Seven are known to be extant. For the second year, two of the smaller subpopulations were tracked by counting the number of clumps and rosettes. During the last three years this species has remained fairly constant, declining less than 5% from 2008-2010. One of the largest
</td></tr>
</table>

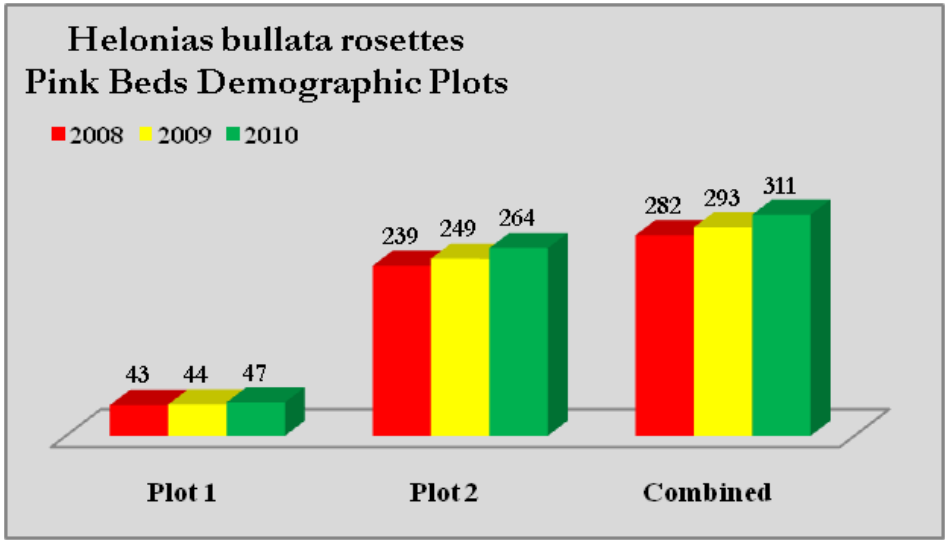
Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	subpopulation for this species occurs in association with a *Geum radiatum* subpopulation that has been monitored for the past six years. This species was noted in 2010 and appeared to have no overt threats. ***Geum radiatum,* Appalachian avens:** All 22 subpopulations of *Geum radiatum* are known from the summit communities on Roan Mountain. With incorporation in a demographic study administered by Chris Ulrey, ecologist for the Blue Ridge Parkway, clumps for five of the subpopulations have been tracked for the last 3 to 6 years. Data recorded within the demographic study include clumps, denoted by a separation distance of at least 25 centimeters, number of rosettes per clump, and number of flowers per clump. In 2010, all three of the five sites had the same number of patches, while one of the sites increased in patch size by 1% and the other sites declined by 3%. The decline at the one site was due to the death of 2010 seedlings. In 2010 no seedlings were recorded at any of the 5 tagged sites. This trend of low seedling recruitment has been evident during the length of this study. Six other small subpopulations were also tracked in 2010 by rosettes per clumps. They did not vary in patch or rosette numbers from 2009. ***Helonias bullata,* Swamppink:** Fourteen discreet subpopulations of swamp pink have been documented across the Pink Beds on the Pisgah Ranger District since 2000. An additional 16 subpopulations have been historically delineated since the early to late 1970s. Periodic searches for the historically known subpopulations have not been successful. Since the data was collected prior to GPS instruments, the resolution may be too coarse to precisely relocate and differentiate with currently known subpopulations. In the last two years, half of these historical subpopulations have been carefully searched for. Of these, only one has been relocated. In 2010, five historical subpopulations were carefully searched for. None of the subpopulations were relocated. Monitoring was completed across three of the recently documented subpopulations in 2010. Precise rosette counts were recorded for two of the subpopulations while estimates were determined for the remaining larger subpopulation. Based on the estimates and counts, these three subpopulations appear relatively stable although a trend cannot be ascertained until data is collected for a greater length of time. Both flooding (recent beaver activity), and non-native invasive plants are known to be threatening the Pink Beds area but none of the three subpopulations were

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Status of Threatened and Endangered Species (cont.)</td><td>
threatened.

The remaining monitored subpopulation of Helonias bullata is located downslope of the Cradle of Forestry amphitheater which was constructed in 2006. Rosette counts have been estimated along 50 meter lengths within the larger drain downslope of the amphitheater. In 2010 the estimates increased by 821 rosettes from 2009, which represents a 28% gain. These estimates have been periodically gathered along this creek segment for almost 20 years (Table 9). This small drain was chosen since it supports a nearly continuous occurrence of Helonias bullata. It is believed the previous high count recorded in 1991 was decimated by a localized flood in the mid 1990’s. About 13 inches of rain fell within the immediate vicinity of the Pink Beds from a single rain event that only lasted several hours. Since that event the subpopulation has recovered to about 93% of its former rosette number. It does not appear that the construction of the amphitheater upslope of a segment of this drain has effected this subpopulation although it should be noted the data gathered is coarse and only an estimate.

Table 9. Periodic changes in Helonias bullata rosette estimates along a stream segment from 2007 to 2010 in the Pink Beds area.
<table>
<tr><th>Year</th><th># of Rosettes (Estimate)</th><th>Flowering Stems</th></tr>
<tr><td>1991</td><td>4025</td><td>96</td></tr>
<tr><td>1998</td><td>2195</td><td>Survey timing inappropriate for observing flowers</td></tr>
<tr><td>2000</td><td>2819</td><td>2</td></tr>
<tr><td>2008</td><td>2943</td><td>5</td></tr>
<tr><td>2010</td><td>3762</td><td>18</td></tr>
</table>

In addition, two macroplots were established in 2008 within a portion of stream segment. The macroplot demographic data (patches, rosettes and leaves) have been collected for the past three years. The demographic data did not vary by patch number although there was an increase in rosette numbers (282 to 311) and number of leaves (2172 to 2542) during the last three years (Figure 9). While this data indicates relative stability for the last three
</td></tr>
</table>

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	years, it will be gathered for a few more years to ensure no adverse trends from the amphitheater construction and the more recent 2010 construction of a roof overtopping a portion of the amphitheater. Figure 9. Change in *Helonias bullata* rosette numbers from 2008 to 2010 in two macro plots in the Pink Beds.  ***Gymnoderma lineare*:** This lichen is known to occur across every mountain ranger district except the Tusquitee. Fifty-seven subpopulations are currently known. In FY 2008, a new rapid assessment form that records coverage estimates and health of the lichen, was developed by the US Fish and Wildlife Service, Blue Ridge Parkway, and USFS. In FY 2010, an assessment was completed across seven of the currently known subpopulations. Three historical subpopulations were not relocated. Two of the remaining four subpopulations were healthy. One of the assessed subpopulations was located within boulders along streams; the remaining three subpopulations were on high elevation rock outcrops surrounded by Spruce-Fir forest. The two unhealthy subpopulations had 40-60% of their squamules either covered with black growths or dried up and turning a pale whitish

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	color (Figure 10). Figure 10 Healthy *gymnoderma* on left and unhealthy *gymnoderma* on right.  ***Isotria medeloides,* Small whorled pogonia:** This diminutive orchid is known historically across four subpopulations on the Nantahala and Grandfather Ranger Districts. Recent monitoring within the northeastern US indicates this rare species benefits from reduction in the overstory and midstory canopy. One-third of the surrounding canopy and sub-canopy trees were previously felled across the historic subpopulation at Curtis Creek. Many of the overstory Canadian hemlock trees have recently died at an historic Wine Spring site increasing light levels at the forest floor. Searches across these two sites in 2010 were unsuccessful. ***Spiraea virginiana,* Virginia spiraea:** This shrub is known across the NFsNC within the Nolichucky River Gorge, in the Cheoah River, and in Whiteoak Creek. Non-native invasive (NNIS) plants are threatening all 39 of these subpopulations. Visits were made to 20 of the subpopulations in 2010 along the Cheoah River. One previously located (2007) small subpopulation was determined to be no longer extant after three unsuccessful searches

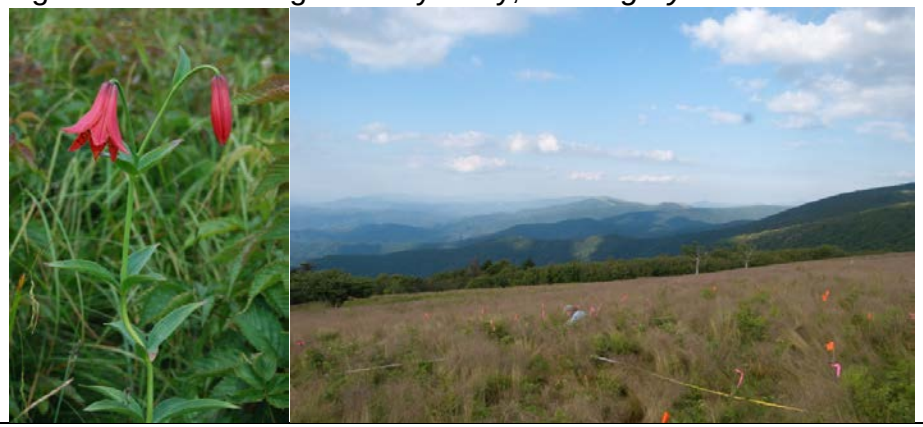
Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	over the last three years. Three new subpopulations were located within the Cheoah River by UNCA professors and students while conducting a study on the impacts of Virginia Spiraea from long-arm mowing. NNIS were treated across two of the occupied sites in the Nolichucky Gorge, the one site at Whiteoak Creek, and 20 sites along the Cheoah River. The NNIS control work in 2010 was the third consecutive year of treatment along the Cheoah River. In the Nolichucky River Gorge two of the four recently relocated subpopulations were monitored. The two subpopulations were covering the same aerial extent as recorded in 2009. The same aerial extent was assessed at 10 of the subpopulations along the Cheoah River. This coarse estimate did not vary from the previously recorded numbers for these subpopulations recorded in 2008. Only one remaining *Spiraea virginiana* clump with four stems was recorded at the Whiteoak Creek site following treatment. This recent decline is believed to be both from a Japanese knotweed infestation as well as a recent heavy storm event that scoured the stream bank. One of the newly discovered subpopulations by the swinging bridge was unintentionally treated with herbicide (triclopyr 3A) by the NC Department of Transportation while completing routine bridge maintenance. In order to discourage the translocation of herbicide to the roots all the stems were cut at the stem base within a few days of the herbicide treatment. All three clumps previously located at this site survived the herbicide treatment and shoots were resprouting at all of the cut stems. It is thought the herbicide treatment was less detrimental to the Virginia Spiraea because all the stems were previously densely covered with grape vines, which were heavily impacted by the herbicide. A subsampling monitoring protocol of Virginia Spiraea stems was developed by the UNCA researchers and is believed to provide a more accurate assessment of subpopulation trends. This protocol will be incorporated in a portion of the Cheoah River sites in 2011. ***Hudsonia Montana,* Mountain golden heather:** All the known populations for this sub-shrub occur on the Grandfather Ranger District. A complete census of the subpopulations has been completed approximately every 10 years since 1982. An update to the census was completed in 2008 or 2009 and will be recompleted in 2012 or 2013.

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	***Liatris helleri,* Heller's blazing star:** There are 16 subpopulations for this species recorded within the Linville Gorge Wilderness and Big and Little Lost Cove Cliffs. Eight subpopulations were noted (qualitative presence with flowers and/or fruits) during the monitoring surveys conducted for *Hudsonia montana* on Shortoff Mountain, the Chimneys, and Table Rock. Another subpopulation was identified as *Liatris turgida* based on the current USFWS separation between the two species. In 2006, tagged individual clumps were distinguished to detect any possible impacts from rock climbing activities at Little Lost Cove Cliff. In 2009 the population was to be re-sampled. However, it was impossible to monitor given extensive damage from plant poachers. A reassessment of the site in 2010 indicates no additional impacts from poachers at this site. About 2/3 of the clumps tagged and/or counted in 2006 remain at this site. In addition, clumps were counted at two sites within Linville Gorge Wilderness. Both of these sites had a 10-20 % decline from previous counts in 2001. A more complete assessment for this species is planned for 2011. ***Helianthus schweinitzii,* Schweinitz's sunflower:** There are 22 separate subpopulations of this federally endangered sunflower currently present or previously documented on the Uwharrie National Forest. Monitoring, consisting of stem counts was completed across four subpopulations in 2010. Three of the subpopulations were stable, the other roadside subpopulation declined. The decline is believed to be reflective of a continual decline in light intensity at the forest floor. Mitigation for construction of a sewer line across the roadside edge of the largest subpopulation for this species documented on the Uwharrie NF was to transplant all the potentially impacted individuals. Eighty-seven individual plants were transplanted in 2009 to a slightly enlarged natural forest gap within a natural fire-maintained mature Piedmont Longleaf Pine Forest. Each individual transplant was tagged. Of the 87 individuals transplanted in March, 2009, 64 individuals (74% success rate) survived to the fall of 2010. This survival rate represents a 15% decline from the fall of 2009. Twenty-one of these individuals produced flowering stems in 2010 which was a decline by 14. This is likely due to excess browsing occurring at the site. Forty-five of the extant 64 individuals were observed with browsing impacts. ***Lysimachia asperulifolia,* Roughleaved loosestrife:** Sixty subpopulations of rough-

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	leaved loosestrife have been previously documented on the Croatan National Forest. Except for a single population, all the occurrences of rough-leaved loosestrife occur within the southern third of the Croatan NF. In 2010, searches were completed to update documented occurrences within the area east of Hibbs Road and a portion of Pringle Road. Given that this species is rhizomatous and can dramatically change in population size without periodic prescribed burns, both areas differed in vigor of the populations. The Hibbs Road area has not burned for at least 25 years. Within this area four previously known large subpopulations were not relocated. The new search located 11 dispersed subpopulations in different locations within this area. While it is interesting that so many new subpopulations were located, it should be noted that eight of these had fewer than 20 stems. Only one subpopulation had more than 50 stems. These 11 new subpopulations total 279 stems. In contrast, the Pringle Road area has been consistently burned on a three-year frequency for 10 years or more. Two new subpopulations were located where only two were previously known. All four of these subpopulations have more than 50 stems and total more than 800 stems. As a result of the subpopulation updates in 2010, sixty-seven separate occurrences are now documented on the Croatan NF. **A synopsis of monitoring for the federally listed T&E wildlife species in 2010 follows:** ***Picoides borealis*, Red Cockaded Woodpeckers (RCW):** The RCW population on the Croatan NF showed an increase in 2010 from 2009. We documented 58 potential breeding groups and banded a total of 89 nestlings. Although an increase from 2009, this number remains down from the peak (in 2000) of 62 potential breeding groups. The RCW Recovery Plan estimates that the Croatan NF RCW population should be at 101 potential breeding groups by 2010, a goal that we have not been able to meet. Midstory control in existing RCW clusters and the inability to quickly create new habitat are the limiting factors for RCW population growth on the CNF. Most existing RCW habitat on the district does not meet Recovery Plan Standards and has not met ever met them. These standards are hard to achieve and it will take many years, many timber rotations and very thoughtful interdisciplinary planning to move current conditions towards them. There has not been a substantial effort to maintain existing habitat

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	or open up new areas for potential breeding groups, even though this was agreed to when the USFS signed the RCW Recovery Plan. This is due in part to the amount of time it takes to implement vegetation management projects on the ground, but also to a lack of interdisciplinary planning regarding the district's timber operations. There has also been significant turnover in the biologist position on the Croatan NF which has contributed to a loss of focus on maintaining and creating RCW habitat. The Croatan NF has been unable to maintain some historic, recently inactive, and even active clusters to previous conditions or Recovery Plan standards. Many years of unusually dry weather and a drought in 2010 combined with tighter air quality rules significantly impacted our ability to do prescribed burning in critical habitats. In 2010 we burned 0 acres of RCW habitat in the growing season and 17,995 acres of habitat in the dormant season. The inability to fully utilize prescribed fire as it was in the past has contributed to the CNF's inability to maintain some historic, recently inactive, and even active clusters to previous conditions or Recovery Plan standards. Guidelines set forth in the Recovery Plan state that population monitoring should be done every breeding season (March – July) and should include all active clusters. All active clusters are monitored for breeding status and banding occurs at approximately 90% of known nests. Guidelines also include complete identification of every bird in each breeding group. In 2010 we were able to monitor all active clusters (a total of 60) and banding was completed at 93% of known nests. Guidelines also state that fledge checks should be done at every cluster to identify which banded nestlings were able to successfully fledge the nest. Fledge checks for nestlings were attempted at all 43 known nests however only 40 were completed due to lack of time and resources. Guidelines set forth in the Recovery Plan state that all clusters and cavity trees should be monitored between March and July every year. Due to limited resources, the Croatan NF only has the capacity to monitor clusters that are active or have recently gone inactive on a yearly basis. Guidelines also state that surveys for new cavity trees and clusters should be conducted at least every ten years. The last time that was done on the Croatan NF was in 1988, when 33% of the existing habitat was monitored. Every active cluster on the Croatan NF is monitored for new cavity trees during population monitoring, although the survey

Monitoring Item	Results
Status of Threatened and Endangered Species (cont.)	method identified in the Recovery Plan may not always be used. Guidelines set forth in the Recovery Plan state that foraging habitat should be monitored at least every ten years. This has never been done on the Croatan NF and currently we don't have the resources available to do this large scale (over 11,000 acres) monitoring. ***Glaucomys sabrinus***, **Carolina northern flying squirrel:** Monitoring Carolina northern flying squirrels (CNFS) consists of winter nest box surveys and acoustic surveys. NCWRC and Forest staff checked each nest box, finding 47% of them containing CNFS nest material, but only 11% occupancy. When a next box is occupied, the squirrels are captured and tagged. Long-term monitoring data was analyzed by NCWRC and USFS Research Biologists. Recent results of this study are forth-coming. Additionally, the NCWRC tested acoustical monitoring techniques for CNFS across the Nantahala and Pisgah National Forests. Forest staff will continue to participate in these monitoring efforts. Considerable effort was invested by the NCWRC in monitoring populations of the Carolina northern flying squirrel across the Nantahala and Pisgah National Forests. Pages 122 through 126 and 157 through 160 of NCWRC (2011) summarize this work. We greatly appreciate the work of our partners in this effort. ***Microhexura montivaga,*** **Spruce-fir moss spider:** UFWS and NFsNC continue to learn how to effectively inventory for and monitor this species. Just prior to retirement, Dr. Peter Coyle (recognized species expert for the SFMS) located several new populations of the spider within high elevation habitats of Black Mountains near Mount Mitchell on the Pisgah National Forest and Mount Mitchell State Park.

Monitoring Item	Results
Sensitive Species Monitoring	**<u>Region 8 Sensitive Species</u>** ***Lilium grayi, Gray's Lily:*** The rarest and perhaps most threatened Region 8 sensitive plant species within the NFsNC is Gray's Lily. Eleven occurrences are documented within the NFsNC, all in the Pisgah NF, the majority on the Roan Mountain massif. Little information is known on long-term trends. Periodic observations at specific sites vary widely on counts and may be reflective of either a large fluctuation in population extent from year to year or impacts from a fungal outbreak which can affect flowering abundance as well as plant vigor and persistence. In addition, deer and rabbits browse the lily. Jamey Donaldson is monitoring the impacts of goat browse on this species while managing the goat herd on Jane Bald. A series of five meter radial macroplots were installed three years ago to evaluate any detrimental impacts from the goats. In 2010, another four macroplots were installed within an area where the grassy bald vegetation has been maintained with either a track mower or hand-held brush cutters for more than 15 years. While it is too early to examine any trends with this species both from the mechanical and mammalian vegetation management, it is interesting that the species continues to persist within these areas. The number of individuals within the plots varies from 13 to more than 200. Figure 11. Monitoring for Gray's Lily, *Lilium grayi* 

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Sensitive Species Monitoring</td><td>
Periodic reviews of other sensitive and locally rare plant species populations also occurred across the eight districts in FY 2010. These reviews were completed by USFS botanists, contractors, NC Natural Heritage Program botanists, and private individuals. One new species to the NFsNC was located; Matelea decipiens within the Uwharrie NF. A complete list of the reviewed species is provided below.

Table 10. Sensitive and locally rare species populations that were updated in FY 2010.
<table>
<tr><th>District</th><th>Species updates</th></tr>
<tr><td>Uwharrie</td><td>Matelea decipiens, Helianthus laevigatus, Amorpha schwerinii, Fothergilla major, Symphyotrichum georgianum, Carex impressinervia, Sedum glaucophyllum, Smilax hugeri, Eurybia mirabilis, Parthenium auriculatum, Stewartia ovata</td></tr>
<tr><td>Croatan</td><td>Dionaea muscipula, Solidago verna, Polygala hookeri, Rhynchospora macra, Agalinis virgata, Cirsium lecontii, Malaxis spicata, Thalictrum macrostylum, Ponthieva racemosa</td></tr>
<tr><td>Appalachian</td><td>Hypericum mitchellianum, Geum geniculatum, Prenanthes roanensis, Packera schweinitzii, Silene ovata, Chamerion platphyllum, Rubus idaeus ssp. strigosus, Alnus viridis ssp crispa, Hydrastis canadensis</td></tr>
<tr><td>Grandfather</td><td>Fothergilla major, Tsuga caroliniana, Shortia galacifolia var. brevistyla, Hexastylis contracta, Liatris turgida, Anticlea glauca, Thermopsis mollis, Dicentra eximia</td></tr>
<tr><td>Pisgah</td><td>Rhododendron vaseyi, Hydrothyria venosa, Arisaema triphyllum ssp. stewardsonii,</td></tr>
<tr><td>Nantahala</td><td>Hydrothria venosa, Megaceros aenigmaticus, Euphorbia purpurea, Silene ovata, Tsuga caroliniana, Danthonia epilis, Hydrastis canadensis</td></tr>
<tr><td>Tusquitee</td><td>Trillium rugelli, Carex purpurifera, Gentianopsis crinita, Viola appalachiana, Sporobolus heterolepis, Symphyotrichum Rhiannon, Calamagrostis porter,</td></tr>
<tr><td>Cheoah</td><td>Solidago simulans, Rudbeckia triloba var. pinnatiloba, Trientalis borealis, Euphorbia purpurea, Amelanchier sanguinea</td></tr>
</table>
</td></tr>
</table>

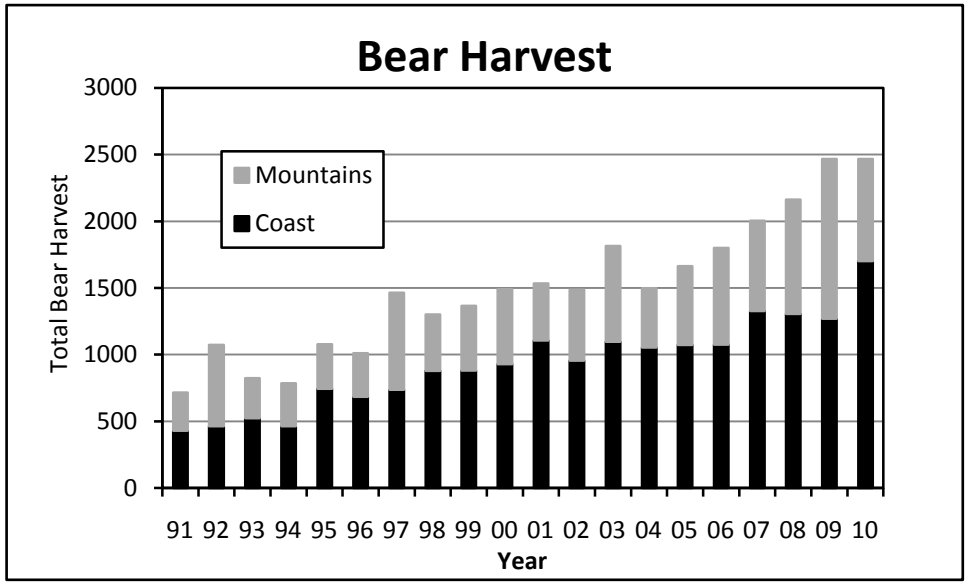
Monitoring Item	Results
Sensitive Species Monitoring	**<u>Region 8 Sensitive Wildlife Species</u>** **Carolina gopher frog *(Rana capito)*:** In FY10, new populations of the Carolina gopher frog were found on the Croatan National Forest. Of 29 known historic populations of the Carolina gopher frog, only 7 were confirmed during 2010 monitoring by the NCWRC and USFS. All of these populations are on public lands, including the Croatan National Forest. Please refer to pages 73 through 78 of NCWRC (2011) for a summary of inventory and habitat restoration efforts by the NCWRC and USFS for the gopher frog on the Croatan National Forest. **Eastern hellbender (*Cryptobranchus alleganiensis*)**: In 2009, the range of the hellbender was expanded by several miles in the Fires Creek watershed on the Nantahala National Forest. In 2010, three new populations were located, one of which was in Macon county adjacent to the Nantahala National Forest. However, despite intense monitoring efforts in four historically occupied streams, one of which was located adjacent to the Pisgah National Forest, no hellbenders were found. **Peregrine falcon *(Falco peregrines)*:** Forest staff actively manage rock climbing on approximately 10 sites across the Nantahala and Pisgah National Forests to protect peregrine falcon nesting. Forest wildlife staff also assist the NCWRC with nesting and fledging monitoring at several of these sites. Notable observations on the Forest include the failure of the eyrie at Shortoff Mountain for the first time in the history of the monitoring program, nesting success on Looking Glass Rock for the first time in three years, and shifting of the eyrie on Whiteside Mountain to the east face of the cliff. Considerable effort was invested by the NCWRC in monitoring nesting success of peregrine falcons across the Nantahala and Pisgah National Forests. Pages 114 through 121 of NCWRC (2011) summarize this work. We greatly appreciate the work of our partners in this effort.

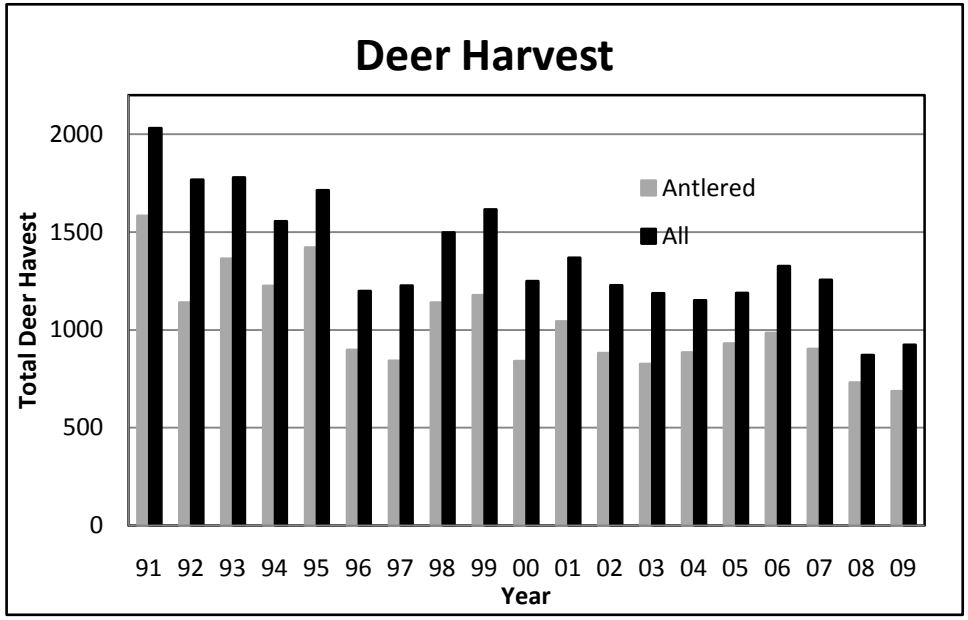
<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Forest Concern Species Monitoring</td><td>Mountain chorus frog (Pseudacris brachyphona): Historically, only seven populations of the mountain chorus frog were known from North Carolina, all in Cherokee County. Since 2008, surveys by the NCWRC have documented almost 50 new locations for the species, including the first confirmed record on the Nantahala National Forest. Forest wildlife staff will continue to work with the NCWRC to identify and restore habitat for this species.

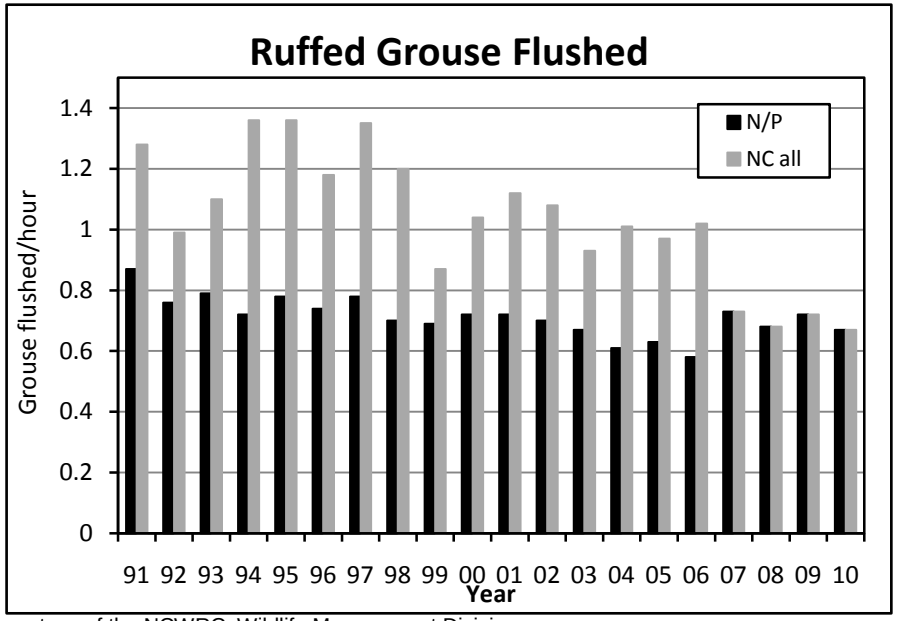
Considerable effort was invested by the NCWRC in monitoring mountain amphibian populations across the Nantahala and Pisgah National Forests. Pages 96 through 105 of NCWRC (2011) summarize this work. We greatly appreciate the work of our partners in this effort.</td></tr>
<tr><td>Trends for Management Indicator Species</td><td>Table 11 estimates population trends for Management Indicator species (MIS) across the Forests, based on habitat and population survey data. Some habitats and species are monitored annually, and others on a less frequent cycle, depending on the particular species and habitat requirements.

Table 11. MIS Estimated Population Trends
<table>
<tr><th>Species</th><th>Estimated Population Trend 2010</th></tr>
<tr><th colspan="2">Nantahala and Pisgah National Forests</th></tr>
<tr><td>Black bear</td><td>Increasing</td></tr>
<tr><td>White tailed deer</td><td>Static to Slightly Decreasing</td></tr>
<tr><td>Pileated woodpecker</td><td>Static</td></tr>
<tr><td>Ovenbird</td><td>Static</td></tr>
<tr><td>Rufous-sided towhee</td><td>Decreasing</td></tr>
<tr><td>Pine warbler</td><td>Static</td></tr>
<tr><td>Acadian Flycatcher</td><td>Static</td></tr>
<tr><td>Ruffed grouse</td><td>Static</td></tr>
<tr><td>Brook, brown, and rainbow trout</td><td>Static, despite high natural variability</td></tr>
<tr><td>Largemouth bass</td><td>Static, despite high natural variability</td></tr>
</table></td></tr>
</table>

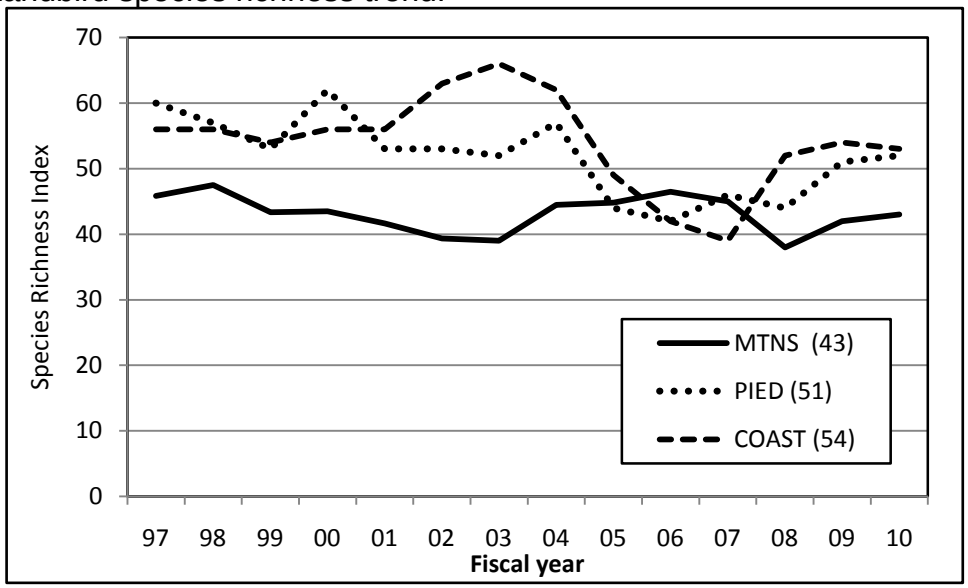
<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Trends for Management Indicator Species</td><td>
<table>
<tr><td>Blacknose dace</td><td>Static, despite high natural variability</td></tr>
<tr><td>Smallmouth bass</td><td>Static, despite high natural variability</td></tr>
<tr><th colspan="2">Croatan National Forest</th></tr>
<tr><td>Red-cockaded woodpecker</td><td>Decreasing due to lack of habitat management</td></tr>
<tr><th colspan="2">Uwharrie National Forest</th></tr>
<tr><td>Black bear</td><td>Increasing</td></tr>
<tr><td>White tailed deer</td><td>Increasing</td></tr>
<tr><td>Gray Squirrel</td><td>Static in Cycles</td></tr>
<tr><td>Turkey</td><td>Increasing</td></tr>
</table>
</td></tr>
</table>

Monitoring Item	Results
Trends for Management Indicator Species	**Black Bear** Historically, black bear thrived throughout North Carolina. By the early 1900's, largely because of persecution by early settlers and subsequent habitat modification, black bear were mostly restricted to remote mountains and coastal swamps. During the last 30 years, through dedicated management by the North Carolina Wildlife Resources Commission and habitat management by the U.S. Forest Service, black bear populations are experiencing a dramatic increase, as evidenced by black bear harvest. Harvest data is a cost-effective way to monitor bear populations. Additionally, the Forest assists the NCWRC with bait station surveys in the mountains. Figure 12. Total Bear Harvest Trend.  Data courtesy of the NCWRC, Wildlife Management Division.

Monitoring Item	Results
Trends for Management Indicator Species	**White-Tailed Deer** White-tailed deer occur throughout North Carolina, including the National Forests in North Carolina. Because deer occupy such a wide range of habitats across the entire state, harvest data is a reliable, cost-effective means to monitor population levels. While down since the early 1990s, deer harvest remained fairly stable until 2008. This is at least in part attributable to changes in the hunting population and declining license sales. Because of this, it may be necessary to adjust deer population monitoring to other indices in the future. The NFsNC assists the NCWRC with deer check stations across the state. Figure 12. Total Deer Harvest Trend.  Data courtesy of the NCWRC, Wildlife Management Division.

Monitoring Item	Results
Trends for Management Indicator Species	**Ruffed Grouse** Ruffed grouse occur only in the mountains of North Carolina, including the Nantahala and Pisgah National Forests. They occupy a variety of habitat throughout their life history, ranging from open early successional habitats to woodlands and other forested areas. Grouse populations are monitored using several methods, including hunter flush rate, drumming counts, and point counts. The Forest monitors grouse populations through drumming and point counts; however this data has been sporadically collected over the years. Hunter flush rate is a much more reliable indicator of grouse populations. While hunter flush rates have declined overall across the mountains of North Carolina, they have remained fairly stable on the Forest. This may be attributable to habitat loss associated with urbanization, as well as active forest management on the Forest (see above. Figure 14. Total Ruffed Grouse Flushed.  Data courtesy of the NCWRC, Wildlife Management Division.

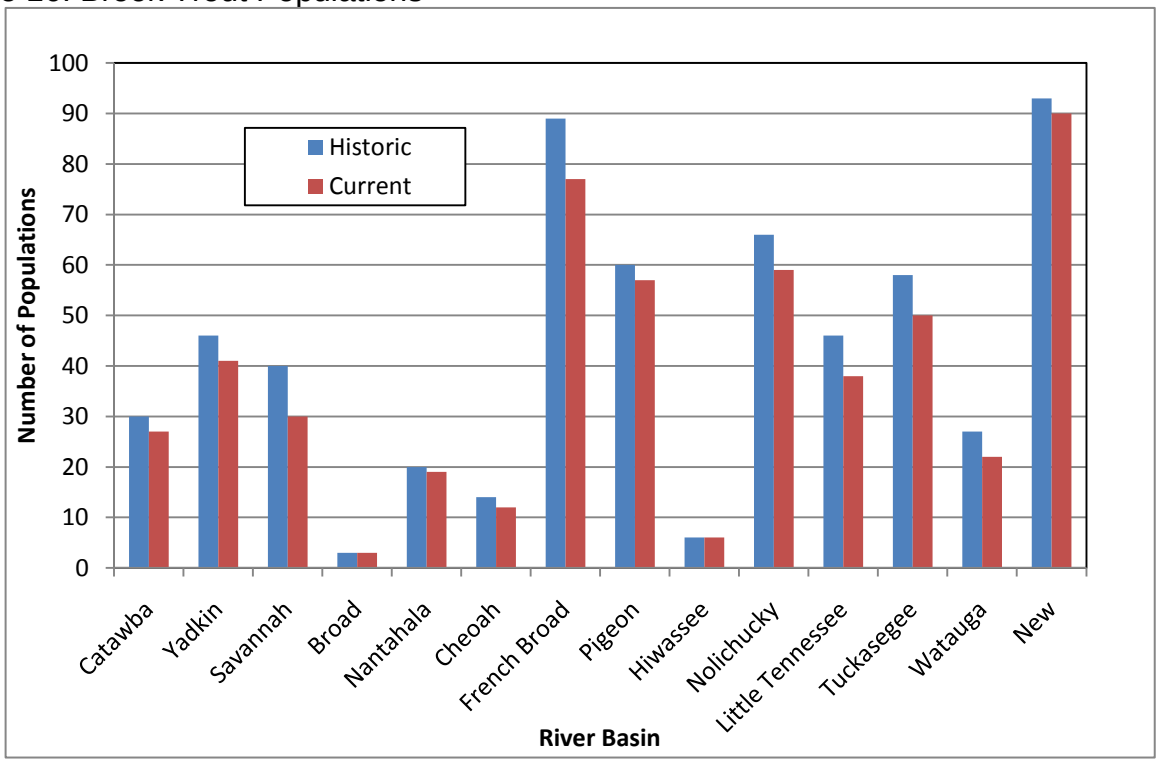
Monitoring Item	Results
Regional Landbird Survey	**Neotropical Migratory Songbirds** Forest neotropical migratory bird surveys were accomplished through 10-minute point counts on 353 established plots across the National Forests in North Carolina (114 points on the Nantahala NF, 144 points on the Pisgah NF, 55 points on the Uwharrie NF, and 40 points on the Croatan NF) during the spring of 2010. When this monitoring strategy was initiated (over 10 years ago), survey sites were identified across the landscape to proportionately represent forest types and age classes. Over time, forest type and age have changed, while bird survey sites remained the same. Therefore, utility of the dataset to monitor bird population trends relative to specific ages or forest types has diminished. However, the data is still very useful to observe overall bird (and particularly migratory songbird) diversity on the National Forests in North Carolina. For example, for some bird species, trends were declining slightly as sample site conditions (and therefore habitat suitability) changed over time. However, the species still occurred elsewhere within the overall sample area (perhaps as a result of land management and improved habitat suitability). This change in monitoring scale (from individual stand to landscape) better represents current forest management practices. Three diversity indices were calculated for each year of survey data: Species Richness (S), Shannon-Weiner (H), and Simpson (D). Species richness is a measure of the number of species present within the habitat (or sampled area). It is the simplest of the diversity indices to calculate and interpret. The Shannon-Weiner index utilizes species richness and species' proportion in the community. Basically, H takes species commonness (or rareness) into consideration. Similarly, Simpson's Diversity takes species' abundance into consideration, but emphasizes rarity less. For this report, species richness (S) will be discussed. Monitoring of extremely common or rare species will be addressed in other parts of this report as appropriate.

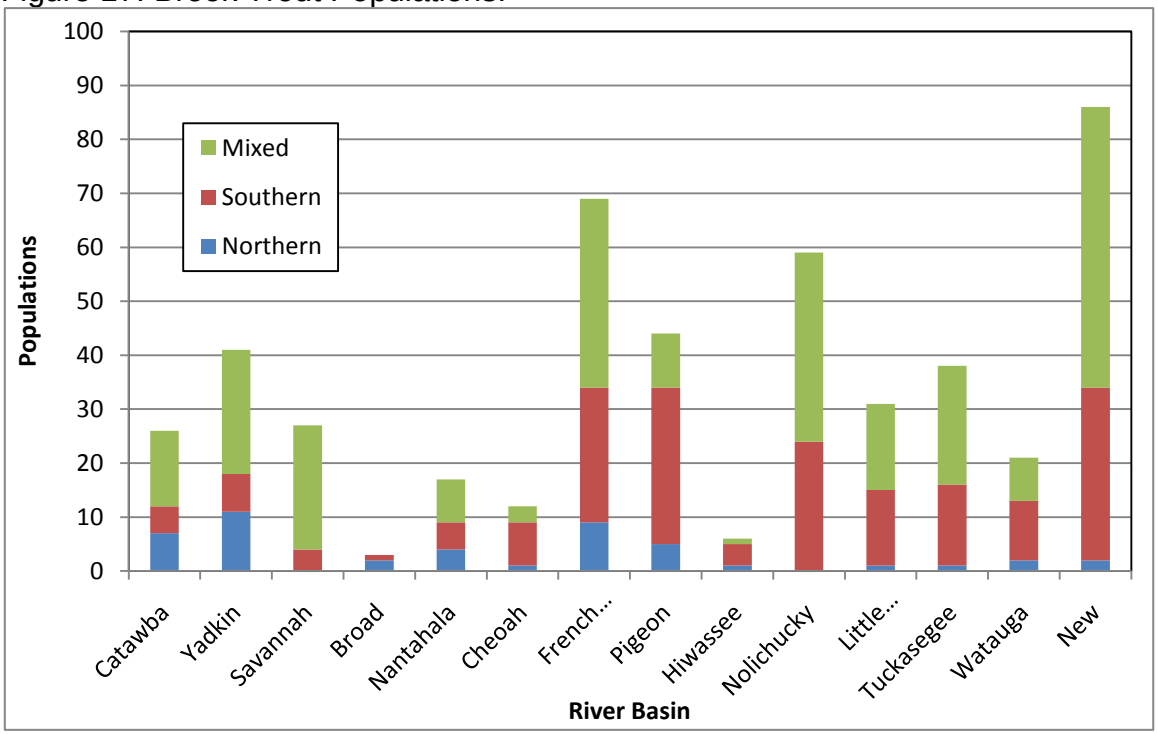
Monitoring Item	Results
Regional Landbird Survey	Figure 15. Landbird species richness trend.  Community composition and diversity change with even subtle changes in the landscape, which is why the figure above displays separate indices for mountain, piedmont, and coastal bird communities. While species richness across the forest has oscillated over the years, the overall trend is static to perhaps slightly decreasing. The influences of natural variability in bird populations make it difficult to discern a distinct trend using this type of data. Also, the values used to calculate species richness are based on actual monitoring data, not the landscape's ability to support maximum diversity. It should be an objective of the forest to improve migratory songbird diversity through active, appropriate land management activities designed to maximize habitat diversity. Considerable effort was invested in monitoring golden-winged warbler populations across the Nantahala and Pisgah National Forests. Pages 109 through 111 of NCWRC (2011) summarize this work.

Monitoring Item	Results
Bat Monitoring	**Bats**: Acoustic surveys were conducted along four transects across the Pisgah and Uwharrie National Forests to establish bat community baselines in light of the recent spread of white-nosed syndrome (WNS) in cave-dwelling bat populations. These (and additional) transects will be monitored over the next several years to track potential effects of the WNS fungus on NFsNC bat populations. Other State and Federal agencies are conducting similar efforts to increase survey coverage and sample size. Data from these surveys is forthcoming. Known bat hibernacula were monitored by the NCWRC since the Forest has no staff currently qualified to do the surveys (several staff are currently seeking qualifications to assist NCWRC personnel). Caves and mines surveyed on the Nantahala and Pisgah National Forest include Bull Pen Mine, Whitewater Road Mine, Blowing Springs Cave, and Celo Knob Cave. The following nine species of bats have been documented as occurring on the Forest: • Big brown bat(*Eptesicus fuscus*) • Silver-haired bat (*Lasionycteris notivagans*) • Tri-colored bat (*Perimyotis subflavus*) • Eastern small-footed bat (*Myotis leibii*) • Unidentified myotis species (*Myotis sp.*) • Rafinesque's big-earred bat (*Corynorhinus rafinesquii*) • Little brown bat (*Myotis lucifugus*) • Northern long-earred bat (*Myotis septentrionalis*) • Indiana bat (*Myotis sodalis*) Additionally, several abandoned mines on the Nantahala and Pisgah National Forest were monitored for the presence of *Geomyces destructans*, the fungus responsible for white-nose syndrome: Limekiln, Pseudosaltpeter, Windcave, Cranberry Iron, and Isom Mica. Summer roost surveys and annual mist-netting surveys in the Harmon Den and Fontana areas of the Nantahala and Pisgah National Forests documented the presence of three

Monitoring Item	Results
Bat Monitoring	species of bats: • Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) • Little brown bat (*Myotis lucifugus*) • Eastern small-footed bat (*Myotis leibii*) Considerable effort was invested by the NCWRC in monitoring bat populations across the Nantahala and Pisgah National Forests. Pages 127 through 137 of NCWRC (2011) summarize this work. We greatly appreciate the work of our partners in this effort
Coldwater stream fish populations trends	Approximately six miles of aquatic habitat were restored to native fish and invertebrate communities on Cathy's Creek (Pisgah National Forest) and Connelly's Creek (Nantahala National Forest) by replacing existing crossings with passable structures. Habitat diversity was restored in approximately five miles of stream along the North Mills River and Baldwin Branch (Pisgah National Forest). Techniques included streambank and riparian area stabilization and instream pool-riffle enhancement. Also, approximately 200 miles of stream were protected during project-level inventory and NEPA compliance.
Reservoir Fish Communities	Reservoir habitat enhanced in 2010 include shoreline with on Fontana and Santeetlah Lakes on the Nantahala National Forest and Badin Lake on the Uwharrie National Forest, and midstory enhancement on Hiwassee and Chatuge Lakes on the Nantahala National Forest. The NCWRC monitors reservoir fish populations annually and have identified this enhancement as one of the most effective ways to improve fish population stability and angler success. Reservoir fish communities exhibit high annual variability in age class structure and biomass, although overall trends in reservoir fish species populations have remained stable during the last 10 years.
Warmwater stream fish populations trends	No report for 2010

Monitoring Item	Results
Aquatic rare species and habitat including freshwater mussel populations	Freshwater mussel and spotfin chub populations continue to be monitored in the Little Tennessee, Cheoah, and Nolichucky Rivers through cooperative efforts with the USFWS and NCWRC to implement the recovery plan for the endangered Appalachian Elktoe (*Alasmidonta raveneliana*) and spotfin chub (*Erimonax monachus*). In addition, aquatic habitats suitable for all freshwater mussels continue to be inventoried to improve the reliability of mapped species' ranges and distributions across the National Forests in North Carolina. Despite regional declines in some species' populations, no declines have been documented on the NFsNC. In fact, the known range and distribution of freshwater mussels and the spotfin chub on the forests remains stable as inventories of suitable habitat are completed. During FY10, several rare mussel and fish species were reintroduced to the Cheoah River on the Nantahala National Forest by the NCWRC, UWFWS, USFS, and other partners. Reintroduced species include: Appalachian elktoe (mussel, E), wavy-rayed lampsussel (mussel, S), rainbow (mussel, S), spotfin chub (fish, T), and wounded darter (fish, S). Long-term success of these species is currently being monitored.
Native Species Restoration (brook trout)	**Brook, Brown, and Rainbow Trout** During FY2010, Forest fisheries staff assisted the NC Wildlife Resources Commission (NCWRC) with revisions to the North Carolina Trout Monitoring Plan, which sets long-term monitoring goals and objectives. Therefore, no population-level monitoring occurred on the Forest. The new plan will be implemented beginning in FY2012. However, brook trout restoration monitoring and strain identification continued. Since the early 1990s, the NFsNC and NCWRC have been locating and mapping brook trout populations across the western mountains. This effort was completed in FY09, identifying 531 populations across 14 river basins. It is estimated that 70% of these populations are on the Nantahala and Pisgah National Forests.

Monitoring Item	Results
Native Species Restoration (brook trout)	Figure 16. Brook Trout Populations  Due largely to habitat loss on private land, brook trout populations have been lost over the last several decades. This trend is not as apparent on the forests; however, other causes of population decline are being examined, such as acid deposition and climate change. Reproduction was documented in two restored brook trout populations during FY2010: Cherry Creek and West Prong Hickey Fork. These populations will continue to be monitored to ensure restoration success. Genetic strain identification is complete on approximately 500 of the brook trout populations

Monitoring Item	Results
Native Species Restoration (brook trout)	referenced above. It is estimated that 70% of these populations are on the Nantahala and Pisgah National Forests. The objective of this work is to identify where Southern Appalachian brook trout occur across Western North Carolina. The NFsNC, along with the NCWRC and other agencies and organizations, are part of the Eastern Brook Trout Joint Venture (EBTJV), working towards the restoration of native brook trout across its range. Figure 17. Brook Trout Populations. 

Soils and Hydrology

Goal or Desired Condition: Riparian areas, floodplains, wetlands, and their existing ecosystems are perpetuated and enhanced. Water quality and soil productivity are maintained.

Monitoring Item	Results
Acres of soil and water improvement	70 core acres 560 integrated acres
Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?	In March of 2010 Forestry Best Management Practices (BMPs) were monitored on the Nantahala and Pisgah NFs to determine whether or not BMPs were being implemented and effective in controlling sediment and other pollutants during timber sale activities. Fifteen harvest units and 14 roads from the Baldwin Gap, Farmer Branch, Peachtree, Shadeline, Shinwhite, and Slipoff timber sales were selected for the review. Specific BMPs were selected from the *Nantahala Pisgah Land and Resource Management Plan*, the *North Carolina Forest Practice Guidelines Related to Water Quality Regulations* and the 7730/2520 letter dated November 28, 1990, "*Specified Road Construction and Water Quality*." A total of 314 individual BMPs were checked for implementation, effectiveness, and visible sedimentation to streams. For all BMP Categories surveyed ("Total Percent" row in Table 12) the rules were implemented without departure 90.1% of the time. Visible sediment was not entering the stream 94.1% of the time. A non-critical amount of visible sediment is a low volume, short term sediment source that does not adversely affect aquatic habitats. A critical amount of visible sediment is a large volume, which may be deposited over a long term, and the component structure of the stream is altered, which adversely affects aquatic habitats. A stream that has a critical sediment source is obvious, even to the casual observer.

Monitoring Item	Results
Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?	Table 12. NFsNC 2010 Forestry Best Management Practices (BMP) Monitoring Results.

BMP Category	Implementation %				Effectiveness %					Visible Sediment %		
	Meets or Exceeds 4	Minor Departure 3	Major Departure 2	Gross Departure 1	Improvement Over Past 5	Adequate Protection 4	Minor/Temp. Impact 3	Major Short-Term Impact 2	Major Long-Term Impact 1	No Visible Sediment 3	Non-Critical Visible 2	Critical Visible 1
Harvest Area Including Skid Trails/Log Decks	96.5%	1.4%	2.1%	0.0%	0.0%	96.5%	1.4%	2.1%	0.0%	100.0%	0.0%	0.0%
Skid Trail Stream Crossings	86.2%	6.9%	6.9%	0.0%	3.4%	86.2%	3.4%	6.9%	0.0%	89.5%	10.5%	0.0%
Roads	83.3%	12.8%	3.8%	0.0%	1.3%	87.2%	7.7%	3.8%	0.0%	90.0%	10.0%	0.0%
Road Stream Crossings	85.7%	9.5%	4.8%	0.0%	0.0%	88.9%	6.3%	1.6%	3.2%	89.7%	10.3%	0.0%
Total Percent	**90.1%**	**6.4%**	**3.5%**	**0.0%**	**0.6%**	**91.7%**	**4.1%**	**2.9%**	**0.6%**	**94.1%**	**5.9%**	**0.0%**

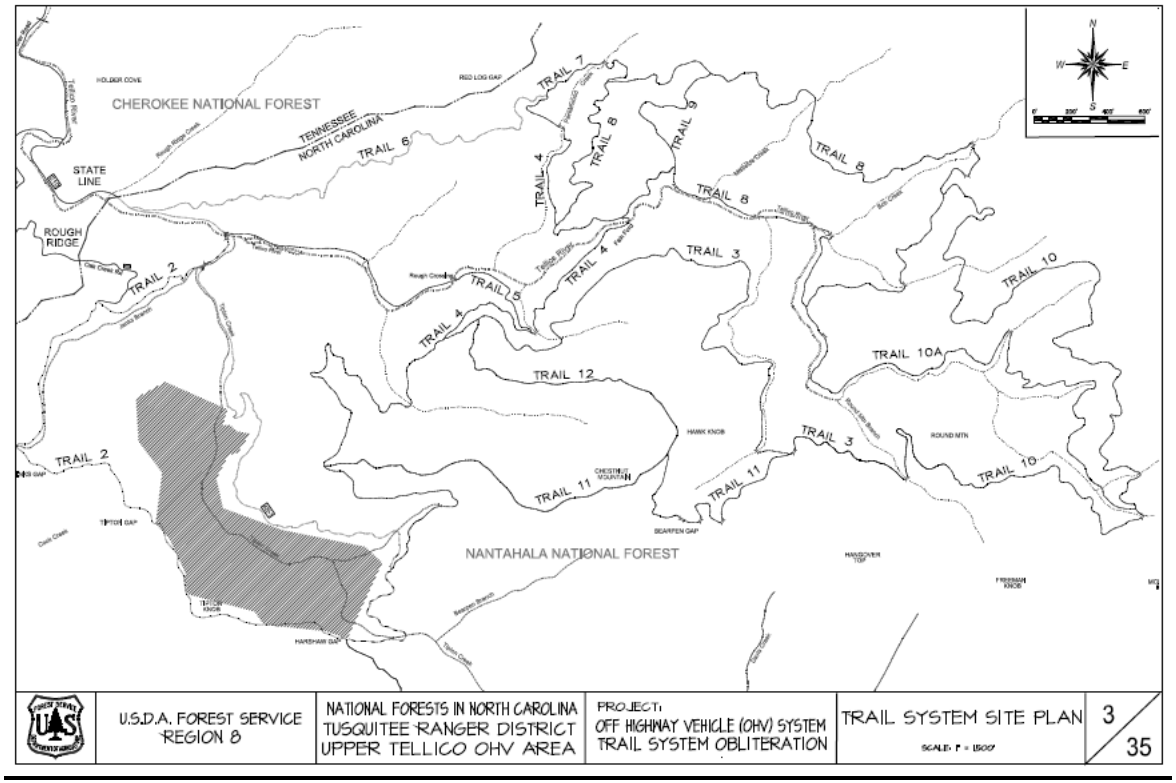
Conclusion: The 2010 monitoring indicated that the Nantahala and Pisgah National Forests are 94.1% compliant with the NC FPGRWQ standard to "Prevent visible sediment from reaching stream channels." The remaining nine percent of sites that are out of compliance are characterized by low sediment yields that do not adversely affect aquatic habitats (non-critical, 5.9%). Critical amounts of sediment were not found during monitoring. Forestry practices that most need improvement are those related to the logging transportation system, including haul roads and road/skid trail stream crossings. Improvement in implementation of the associated BMPs can provide the greatest improvement in water quality and compliance with NC FPGRWQ. Specific practices identified that need improving are *BMP 19 & 37 – Grade Carried Across Crossing*, *BMP 20 – Channel Disturbed Once/Least Possible, BMP 29 – Drainage Not to Stream Channels, BMP 30 – Barrier Used if within 300 feet of Perennial or Intermittent Channel,* and *BMP 40 – Minimum Runoff into Channel* (Figure 18).

Monitoring Item	Results
Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?	 Figure 18. Example of properly implemented BMPs on the Baldwin Gap Timber Sale, including BMP 19 & 37 – Grade Carried Across Crossing, BMP 29 – Drainage Not to Stream Channels, BMP 30 – Barrier Used if within 300 feet of Perennial or Intermittent Channel, and BMP 40 – Minimum Runoff into Channel.
Are directions and standards being met for riparian areas?	Fifteen harvest units and 14 roads from the Baldwin Gap, Farmer Branch, Peachtree, Shadeline, Shinwhite, and Slipoff timber sales were selected for the monitoring review. Specific BMPs were selected from the *Nantahala Pisgah Land and Resource Management Plan*, the *North Carolina Forest Practice Guidelines Related to Water Quality Regulations* and the 7730/2520 letter dated November 28, 1990, "*Specified Road Construction and Water Quality*." Six of the 44 BMPs reviewed were selected as a sub-set to characterize the protection of riparian areas (Table 13). Of the 15 harvest units surveyed, 98.7 percent had BMPs implemented that met or exceeded the standard, while the remaining 1.3 percent (1 unit) experienced a minor departure from the "Barriers

Monitoring Item	Results
Are directions and standards being met for riparian areas?	used if within 300 feet of perennial or intermittent channel" standard (Table 13). The minor departure from the standard did not require corrective action since it did not result in adverse impacts. Therefore, effectiveness was adequate to protect stream channels and meet directions and standards for riparian areas.

Table 13. Effectiveness of BMPs in Selected Harvest Units.

Rule (BMP)	Implementation				Effectiveness					Visible Sediment		
	Meets or Exceeds	Minor Departure	Major Departure	Gross Departure	Improvement Over Past	Adequate Protection	Minor/Temp. Impact	Major Short-Term Impact	Major Long-Term Impact	No Visible Sediment	Non-Critical Visible	Critical Visible
HARVEST AREA INCLUDING SKID TRAILS/LOG DECK												
3. Barriers Used if W/I 300ft P/I Channel	10	1				11				11		
4. Drainage not to Stream Channel	15					15				15		
5. No Skidding in Ephemeral Channel	15					15				15		
6. Shade Strips in Place	12					12						
7. No Logging Debris in P/I Channel	12					12						
9. Violation W/I MA-18 (SMZ)	10					10				10		
Total	**74**	**1**	**0**	**0**	**0**	**75**	**0**	**0**	**0**	**51**	**0**	**0**
% in Class	**98.7%**	**1.3%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**

Monitoring Item	Results
Prevent visible sediment from reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).	At the time of this monitoring, the Tusquitee Ranger District was in the process of obliterating 25.9 miles of Off-Highway Vehicle (OHV) trails in the 6,848 acre Upper Tellico River drainage. The purpose of the work was to greatly reduce the amount of soil leaving the trail system and entering the upper Tellico River and its tributaries, and thereby improve the habitat for native brook trout. Eleven OHV trails were partially or completely obliterated (recontoured). These include Trails 2, 3, 4, 5, 7, 8, 9, 10, 10A, 11 and 12. Figure 19 provides an overview of the Tellico River drainage trail system. The treatment began on July 2, 2010 and was completed in 2011. Figure 19. Overview Map of Tellico Trail System. 

Monitoring Item	Results
Prevent visible sediment from reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).	With the exception of Trail 2, the decommissioning of trails in the upper Tellico River drainage was found to be extremely effective in eliminating erosion and sources of sediment (Figure 20). A total of 480 sediment sources were identified from Trails 3, 4, 7, 8, 9, 10, 10A, 11 and 12 before the project began. Erosion was not observed at any of the previously identified sediment sources after trail treatments were complete. Figure 20. A section of Trail 12 before and after decommissioning.  A total of 80 culverts and 19 bridges have been removed as part of the trail decommission work in the Tellico River drainage. It is estimated that these crossings could have potentially contributed 632 cubic yards of sediment to streams. This calculation does not include the other identified sources of sediment. The trail decommission work had been tested by as many as 11 precipitation events between July 1 and October 8, 2010. During the decommissioning and up to the monitoring week, Murphy, North Carolina had received 10.33 inches of rain. The upper Tellico River drainage likely received more rainfall than what was recorded in Murphy since it is in a higher annual precipitation zone. Monitoring recommendations made to stabilize Trail 2 were implemented soon after the survey. It is anticipated that the Tusquitee Ranger District should start to see improving stream substrate conditions in the Tellico River and its tributaries as sand and smaller sized particles are removed from these reaches of stream.

Monitoring Item	Results
Design and implement management practices to maintain or improve the long-term inherent productive capacity of the soil resource.	In 2010, Soil Quality Monitoring (SQM) was conducted on the Nantahala, Pisgah, and Uwharrie National Forests using the Forest Soil Disturbance Monitoring Protocol (Page-Dumroese, et.al. 2009)[i]. The monitoring was done to determine if there was significant change in land productivity due to timber harvest activities. "Significant change" is defined as detrimental soil disturbance exceeding 15% of each individual harvest unit. A summary of the 2010 SQM is presented in Table 14. Monitoring was conducted in the mountains on the Pisgah and Nantahala National Forests and on the Piedmont on the Uwharrie National Forest. Significant change in land productivity due to timber harvest activities was measured only in the Farmers Branch Timber Sale in harvest unit 4. This unit had a detrimental soil disturbance of 15.7% due to skid trails and landings. No other detrimental disturbance was noted in the unit. The remaining timber sale units that were surveyed post-harvest all have some degree of detrimental soil disturbance, but were below the significant level. Eighteen units were surveyed pre-harvest. Detrimental disturbance was found in eleven of these pre-harvest units because of historical skid trails and landings. Table 14. NFsNC 2010 Soil Quality Monitoring Results with Detrimental Soil Disturbance.

Forest	Timber Sale	Unit #	Pre-harvest (Pre) or Post-harvest (Post)	Unit Area (acres)	Percent Detrimental Soil Disturbance		
					Skid Trails & Landings	Other within Unit	Total
Pisgah	Baldwin Gap	2	Pre		To be determined at time of report		
		3	Pre		To be determined at time of report		
		9	Post		To be determined at time of report		
	Shope Creek	23-12A	Pre	12	4.7	0	4.7
		23-13	Pre	9	1.2	0	1.2
		23-12B	Pre	6	0	0	0
Nantahala	Slipoff	8	Post	8	4.4	3.1	7.5
		10	Pre	24	0.3	0	0.3
		11	Pre	19	0	0	0
	Farmer Branch	1	Pre	25	0.6	0	0.6
		2	Post	20	3.2	0	3.2
		3	Post	10	6.5	0	6.5
		4	Post	14	15.7	0	15.7

Monitoring Item	Results
Design and implement management practices to maintain or improve the long-term inherent productive capacity of the soil resource.	

		5	Post	18	9.8	0	9.8
Uwharrie	Wood Duck	1	Pre	113	5.6	0	5.6
		2	Pre	44	1.5	0	1.5
		3	Pre	29	1.3	0	1.3
		4	Pre	25	1.3	0	1.3
		5	Pre	46	0.8	0	0.8
	Old Ridge	1	Pre	31	0	0	0
		2	Pre	24	0	0	0
		3	Pre	38	0	0	0
	Stinger	1	Pre	61	1.7	0	1.7
		2	Pre	53	1.3	0	1.3

Conclusion: Where detrimental soil disturbance exceeds the significant level, mitigation of the soil disturbance is necessary. In most cases, where ground based logging was the predominant logging system; mitigation of detrimental soil disturbance can be accomplished by subsoiling compacted skid trails and landings, and sowing the appropriate native grass seed. In the case of Farmer Branch T.S. Unit 4, mitigation is recommended including subsoiling (ripping) of skid trails and landings in the unit to bring detrimental soil disturbance below the 15% guideline. In instances where detrimental soil disturbance approaches the 15% guideline, consider mitigation to reduce future "legacy" disturbance.

To help guide the planning process, the NFsNC monitored a representation of timber sale units prior to those units being harvested. These surveys document pre-logging soil conditions and help in sale layout, e.g. length of skid trails and size of landings. Where detrimental disturbance from past activities remains, the degree of additional soil disturbance can be planned and kept below the guideline. Pre-harvest values for detrimental soil disturbance were relatively high at 4.7 and 5.6 percent for Shope Creek Unit 23-12A and Wood Duck Unit 1, respectively. Following the harvest of surveyed units, a post-harvest survey will be conducted to document change; for example, Shope Creek timber sale is planned for post-harvest monitoring in 2011.

AIR Quality

Monitoring Item	Results
Attainment status with the National Ambient Air Quality Standards (NAAQS)	Levels of fine particulate matter and ozone are measured at air monitoring sites within or near the Pisgah, Nantahala, Uwharrie and Croatan National Forests. Fine particulate matter is the leading cause of regional haze (also known as visibility impairment), while ozone can harm sensitive vegetation within the Forests. Additionally, at elevated concentrations these two pollutants can impair the health of both employees of and visitors to the National Forests. At this time, levels of pollution at all of the four National Forests in North Carolina are below their respective national ambient air quality standards (NAAQS), and air quality is considered healthy.[1] However, the Clean Air Act requires periodic review of the science upon which the NAAQS are based, as well as the standards themselves. If the science indicates a more protective and stringent air quality standard is necessary in order to protect public health or the environment, regardless of the cost of meeting such a standard, then EPA will propose and typically finalize the stricter standard. The US EPA is currently reconsidering the NAAQS for ozone, and it is likely that EPA will ultimately set a lower NAAQS which would cause many areas within North Carolina, including areas on all four Forests, to exceed the standard. If a portion of a National Forest does not meet the NAAQS and is designated nonattainment, then emissions from federal actions within the Forest (including prescribed burning activities) must be inventoried and assessed to ensure that those emissions do not cause or contribute to worsening of air quality in the region. As EPA is currently reviewing both the ozone and fine particulate matter NAAQS, this is an issue that could occur in the near future. Figures 21-23 show the measured ozone concentrations at air monitoring sites close to the four National Forests as compared to the NAAQS. The yellow bar shows the range of the more stringent proposed ozone standard.

[1] While ozone concentrations in Rowan County, near the Uwharrie National Forest, are currently above the NAAQS, the Forest itself is meeting the standards.

Figure 21. Ozone Trends Near the Pisgah and Nantahala National Forests.

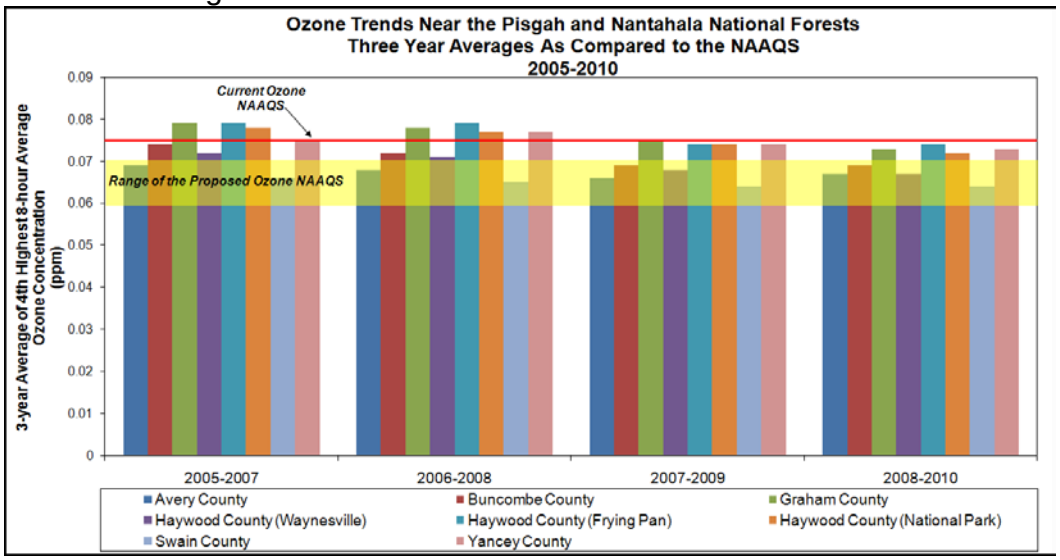


Figure 22. Ozone Trends Near the Uwharrie National Forest.

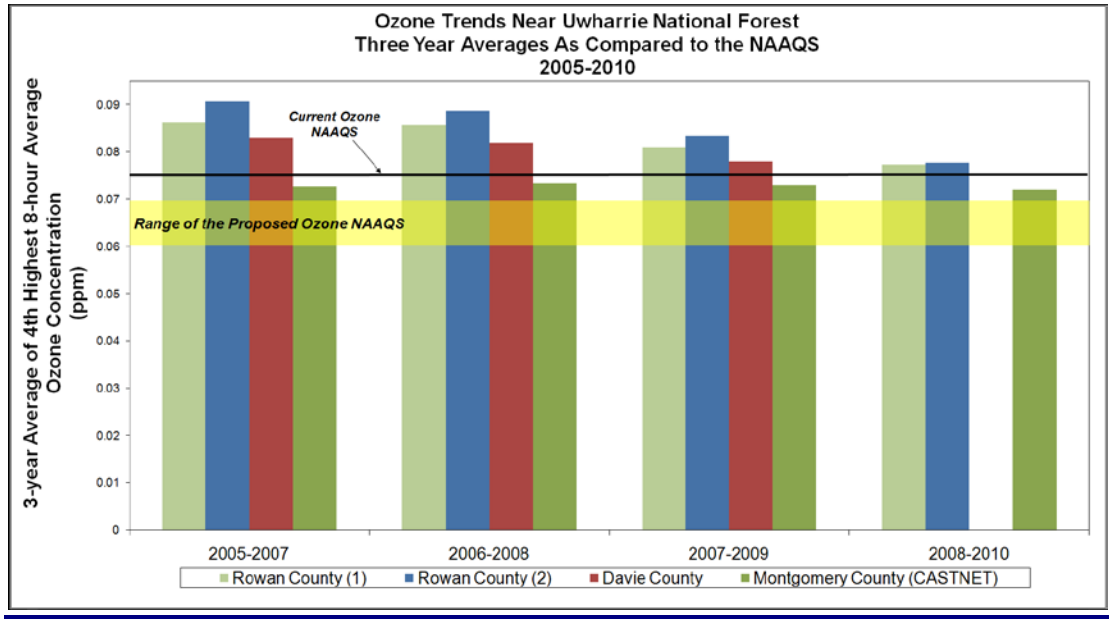
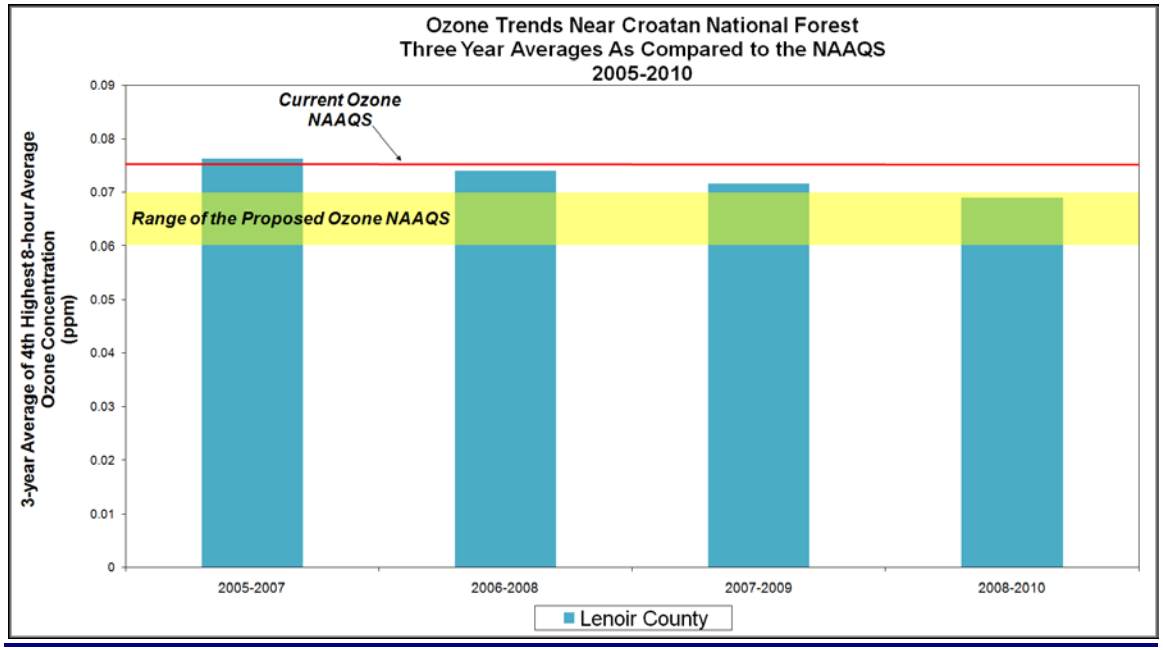


Figure 23. Ozone Trends Near the Croatan National Forest.



Figures 24-26 show measured fine particulate matter concentrations in comparison to the NAAQS. Note that none of the fine particulate matter monitors near any of the four National Forests are exceeding the current fine particulate matter NAAQS, but EPA is considering setting a lower standard in the future.

Figure 24. Particulate Matter Concentrations Near the Pisgah and Nantahala NFs.

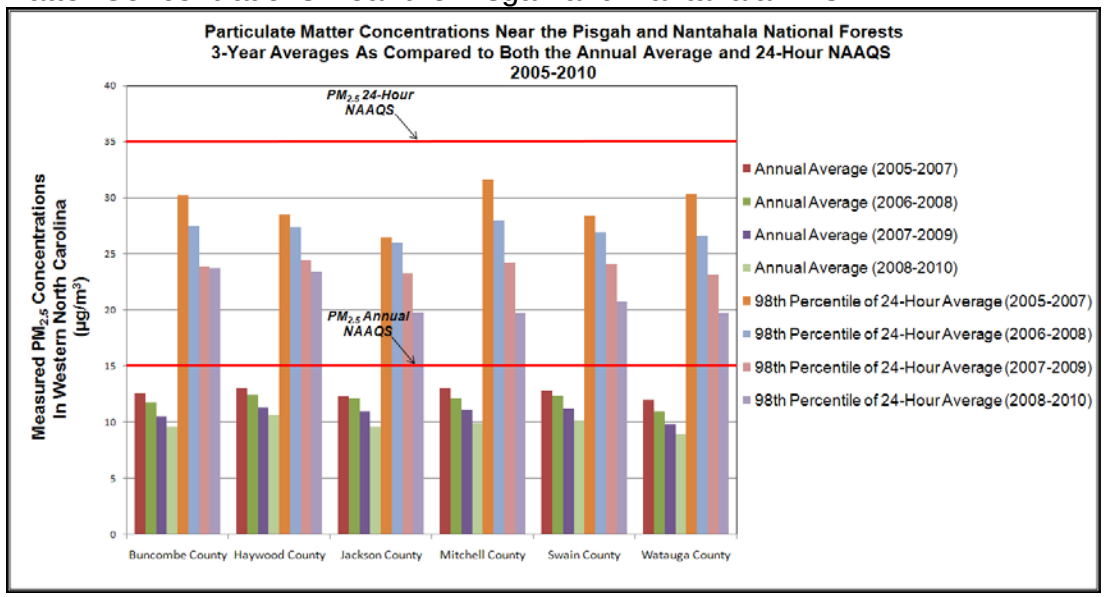


Figure 25. Particulate Matter Concentrations Near the Uwharrie NFs.

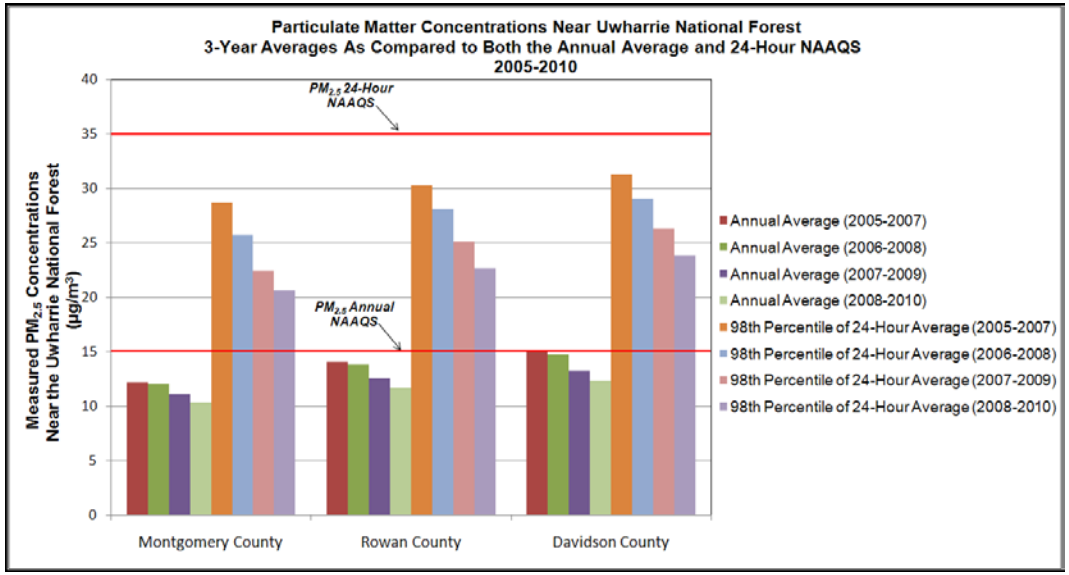
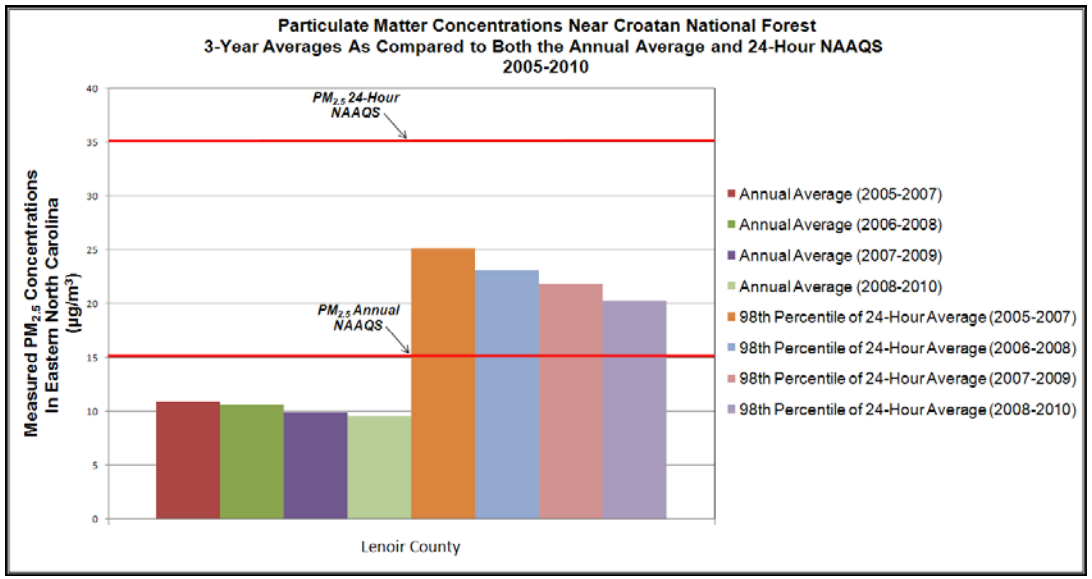


Figure 26. Particulate Matter Concentrations Near the Croatan NFs.



Lands and Special Uses

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Land Adjustment in Support of Land and Resource Management Plan Goals</td><td>Acres Conveyed by Exchange/Small Tracts or Admin Sale: Nantahala NF = 8.61
Pisgah = 0
Uwharrie = 0
Croatan = 0

Acres Acquired by Purchase, Donation, Exchange: Nantahala NF = 28.41
Pisgah NF = 88.13
Uwharrie NF = 275.99
Croatan = 0</td></tr>
<tr><td>Special Uses Compatible With LRMP Goals</td><td>Special use authorizations allow for the use of National Forest System lands for a wide variety of purposes. Some authorize facilities and services necessary for public health, welfare, and safety while others authorize uses of a private nature.

Table 15. Number of Special Use Permits by Forest

<table><tr><th>Forest</th><th>Recreation</th><th>Lands</th><th>Total</th></tr><tr><td>Nantahala</td><td>131</td><td>542</td><td>673</td></tr><tr><td>Pisgah</td><td>210</td><td>369</td><td>579</td></tr><tr><td>Croatan</td><td>7</td><td>91</td><td>98</td></tr><tr><td>Uwharrie</td><td>27</td><td>119</td><td>146</td></tr></table>
Of these permits state-wide, 1,121 are for land-based uses such as road easements and water systems, and 375 permits are for recreation activities such as outfitting, guiding, and whitewater rafting. There are a total of 1,496 permits state-wide.

Key projects include upgrading N.C. Highway Patrol Communication’s System Statewide, 27 State Highway projects, relicensing two hydroelectric projects and installing fiber optic lines across NC.</td></tr>
</table>

Monitoring Item	Results
Special Uses Compatible With LRMP Goals [cont.]	Program Emphasis is focused on the administration of existing permits and ensuring compliance with Title VI of the 1964 Civil Rights Act – processing new applications with an emphasis placed on energy uses.

Fire Management

Monitoring Item	Results						
National Fire Plan Accomplishments	Year	Prescribed Fire Accomplishments - National Forests in North Carolina					
			**Fuels	Wildlife	Site Prep	Other (T&E)	Total Acres
	2010	Croatan	15401			3428	18,829
		Uwharrie	2770	61		337	3,168
		Nantahala/Pisgah	7068	212	181	3274	10,574
		TOTAL					**32,571**
	2009	Croatan					21,786
		Uwharrie	1,867	580	125	160	2,732
		Nantahala/Pisgah					2,316
		TOTAL					26,834
	2008	Croatan	21,783	452		2,500 (botanical)	24,735
		Uwharrie	2,586	865	79		3,530
		Nantahala/Pisgah	7,123	452	112	40 (Stevens Act)	7,727
		TOTAL	31,492	1,769	191	2,540	35,992
	2007	Croatan	**18,379**	**494**			
		Uwharrie	1,064	346	3		
		Nantahala/Pisgah	7,678	647			
		TOTAL	27,121	1,487	3		28,611
	2006	Croatan	16,000	4,500	432		
		Uwharrie	1,819	335	225		
		Nantahala/Pisgah	5,796		294		
		TOTAL	23,615	4,835	951		29,401

**All fuel acres also benefit wildlife.

FY 2011 Action Plan

1) **Complete Nantahala/Pisgah Fire Plan Amendment**
2) **Complete EA and decision for Uwharrie NF non-native invasive plant treatments.**
3) **Complete the Final Forest Plan for the Uwharrie NF including the Final Environmental Impact Statement and have the Record of Decision ready for review and signature.**
4) **Implement an action plan for monitoring of mountain T&E species, per agreements with US Fish & Wildlife Service.**
5) **Initiate a forest-wide trails system strategy.**
6) **Plan ecosystem restoration/enhancement for 3,000 acres of longleaf pine ecosystem on the Croatan.**

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[i] Page-Dumroese, Deborah S., Ann M. Abbott, and Thomas M. Rice. 2009. Forest Soil Disturbance Monitoring Protocol. USDA FS Gen. Tech. Report WO-82b.