National Forests in North Carolina

FY 2011 Monitoring and Evaluation Report

Nantahala * Pisgah * Uwharrie * Croatan

Schweinitz's sunflower – an endangered plant found on the Uwharrie National Forest

Forest Supervisor's Office
160A Zillicoa Street
Asheville, North Carolina 28801
(828) 257-4200

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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 is scheduled to begin in late 2012. The Uwharrie National Forest plan revision was underway in 2011, to be completed in 2012. A revised Croatan National Forest plan went into effect in 2003. A 5-year Review of the Croatan Plan was completed in FY 2009. The various plans are available online.

The Annual Monitoring and Evaluation Report for FY 2011 is organized into broad resource topic areas.

The red-cockaded woodpecker, an endangered species, is intensely monitored on the Croatan National Forest and at numerous other locations throughout the Southeast. Managing the national forest to assist in the recovery of this bird is a major focus of the Croatan Land and Resource Management Plan.

KEY FINDINGS AND CERTIFICATION

- Visitor safety and accessibility were focus areas in recreation management for FY 2011
- Timber stand improvement activities continue to exceeded plan projections.
- Regeneration tree harvesting on the Uwharrie National Forest (NF) was at 25% of the amount projected by the 1986 plan, while thinned acres exceeded the amount projected. Revised timber projections will be in effect beginning in 2012, based on the revised management plan.
- Croatan harvests consisted almost entirely of thinned loblolly stands (not projected in the 2002 management plan), while acres harvested and regenerated on the Nantahala and Pisgah NFs totaled approximately 20% of the amount projected in the 1994 plan amendment.
- Red-cockaded woodpecker monitoring show an increase in FY 2011 over FY 2010, but remains below the amount desired by the RCW recovery plan.
- Species richness calculations for neotropical migratory birds indicate and overall trend from 1997 through 2012 of static to slightly declining. The Croatan NF shows the widest range between high and low years (2003 and 2007 respectively).
- Ruffed grouse monitoring in 2011 flushed more birds than any time in the past 20 years. This may be the first indication of a slightly upward population trend.
- Monitoring for the effectiveness of Best Management Practices applied at timber operations revealed no sediment delivery to streams in 176 out of 177 sites checked, or a 99.4% effectiveness rate.

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 2012, an amendment will be undertaken for the Nantahala and Pisgah National Forest plan that would update direction for managing prescribed fire and non-native invasive species in the Linville Gorge Wilderness. Another amendment - to update direction for uses of the Chattooga Wild and Scenic River will be completed. The revised Croatan National Forest Plan is sufficient to guide forest management. For the Uwharrie National Forest, plan revision should be complete in 2012.

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

Kristin M. Bail 9/28/2012

Kristin M. Bail
Forest Supervisor

Date

FY 2011 Monitoring Results

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 2011, visitor information continued to be improved at kiosks at many recreation areas and trailheads. Increased accessibility was emphasized, including improved access to information boards and providing text in larger point sizes. Visitors can electronically access recreation area information through a newly-designed NFsNC website, www.fs.usda.gov/nfsnc/. Through the National Recreation Reservation Service, www.recreation.gov and through a toll-free number, forest visitors can learn about NFsNC facilities, and can make camping/lodging reservations at 23 recreation areas. Visitor Safety was an integral component of national forest recreation, with these key elements: • Promote broader connection with forest visitors, including increased outreach and information to youth and younger adults; outfitter-guides; campground hosts; concessionaires and others. • Provide safety messages in NFsNC-specific Information Resources. Visitor safety received increased emphasis through all visitor information mediums (publications, information boards, website, public news media). • Implement safety features identified in shooting range safety plans • Continue annual developed recreation area hazard analyses, including inspections and appropriate safety signage. Districts posted Flash Flood Hazard warning signs at identified recreation areas. • Provide public notification during project activities including prescribed burning and vegetation management activities. Bear awareness and safety was an increased focus, including public education and installation of bear-proof trash containers.

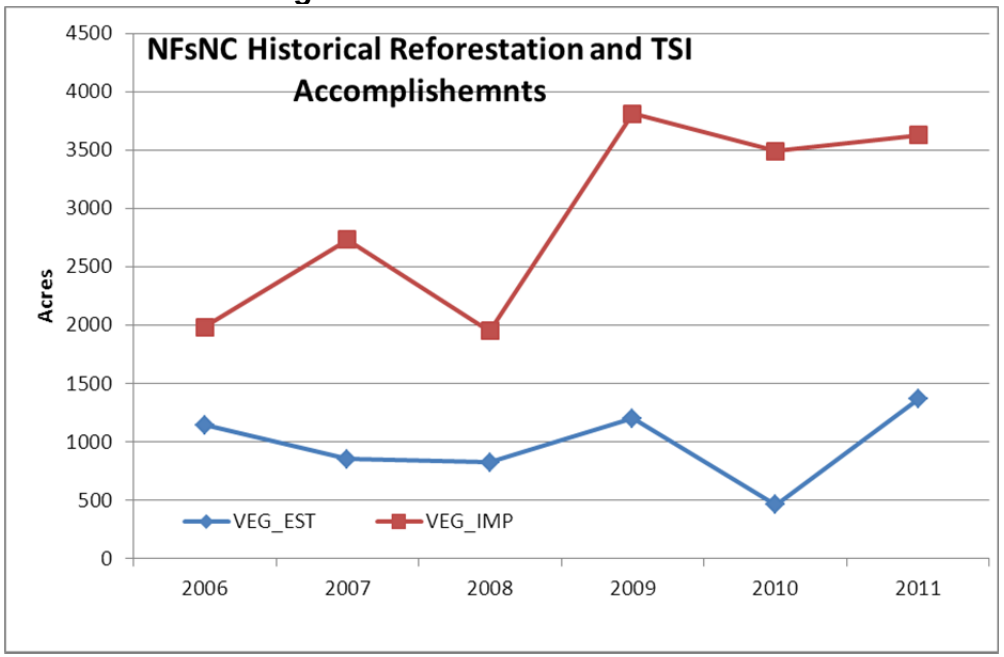
Monitoring Item	Results
To what extent are management activities appropriate for moving areas of the Forest toward the desired conditions for recreation?	Chainsaw certification classes for volunteers were conducted throughout NFsNC, helping insure improved trail maintenance and reduce hazards from dying hemlocks and other trees. Campground hosts provide visitor information and on-site presence at most of the Forest's developed campgrounds. **Other highlights in the effort to move the Forest towards desired recreation conditions include:** Horse Cove and Rattler Ford Campgrounds: Enrollees from Oconoluftee Job Corps Center honed their carpentry skills as they replaced picnic table benches and tops; re-roofed kiosks; and repaired split rail fencing. The pilot project helped strengthen the partnership between North Carolina's western forests and the Job Corps Center's burgeoning Facilities and Carpentry Programs, while upgrading these two campgrounds. **(**Nantahala National Forest) Panther Top Shooting Range: Volunteer members of Mountain Country Rod and Gun Club keep the grounds and facilities at this popular shooting range exceptionally well-maintained, including collecting and recycling shells. **(**Nantahala National Forest) Dirty John Shooting Range: Access was greatly improved by paving Forest Road 711 from SR 1310 to this site; a system for visitors to purchase daily use permits from local vendors was implemented; and shooting target frames at 25, 50, and 100 yards were repaired and/or replaced weekly. **(**Nantahala National Forest) Roan Mountain Recreation Area: The recreation area's rehabilitation was completed, and the site was opened in time for peak bloom season and the Rhododendron Festival; at Cloudland, and animal-proof trash receptacles were added; the on-site Visitor Information/Interpretive Center was staffed during peak season. (Pisgah National Forest) Sliding Rock Day-Use Area: A rotation of four lifeguards helped enhance public safety; the 75-vehicle parking lot was repaved and striped. (Pisgah National Forest) Cradle of Forestry: A new roof was constructed over the outdoor amphitheater to provide protection from sun and inclement weather. (Pisgah National Forest) Recreation Site Decommissioning: Seven underutilized recreation areas, each in need of extensive rehabilitation, were identified for decommissioning in Pisgah National Forest. An action plan including engineering site visits and assessments; specialists' reviews; and

Monitoring Item	Results
	extensive public involvement, was implemented to complete NEPA requirements and public comment needs for the projects. District-specific decision memos are signed and process is ready for decommissioning in 2012. (Pisgah National Forest)
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. • A new accessible fishing platform was constructed at North Mills River day use area. (Pisgah National Forest). • The accessible hike/bike trail at Flanners Beach/Neuse River Recreation Area was repaved, and a new restroom with accessible route was installed in the day use area. (Croatan National Forest). • At Roan Mountain, an accessible route was improved from the garden area to a newly-rehabilitated overlook; at Cloudland, accessible picnicking opportunities were enhanced and a new eight-unit restroom provides barrier-free facilities. (Pisgah National Forest) • Accessible restroom facilities were installed at Woodrun Trail Complex (Uwharrie National Forest) and at Wolf Ford Horse Camp (Pisgah National Forest).
Are Visual Quality Objectives being met? Is the scenery being maintained or enhanced?	NO REPORT
National Visitor Use Monitoring	NO REPORT

<u>Goal or Desired Condition</u>: 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, FY 2011 SPB = Southern Pine Beetle HWA = Hemlock Woolly Adelgid	**<u>Croatan</u>** Establishment of desirable regeneration (natural or artificial): **0 acres** Landscape burning to restore desirable understory conditions: **10,802 acres** SPB Prevention: **123 acres** HWA Treatment: **0 acres** **<u>Uwharrie</u>** Establishment of desirable regeneration (natural or artificial): **79 acres** Landscape burning to restore desirable understory conditions: **1,640 acres** SPB Prevention: **421 acres** HWA Treatment: **0 acres** **<u>Nantahala/Pisgah</u>** Establishment of desirable regeneration (natural or artificial): **1,292 acres** Landscape burning to restore desirable understory conditions: **9,997 acres** SPB Prevention: **0 acres** HWA Treatment: **900 acres**
Timber Stand Improvements (TSI), FY 2011	<u>Croatan</u>: **143 acres** <u>Uwharrie</u>: **185 acres** <u>Nantahala/Pisgah</u>: **3,304 acres** Total TSI: **3,632 acres** Plan Projected TSI Treatment: **2,487 acres**

Figure 1. Reforestation and TSI



Monitoring Item	Results
Acres Harvested in FY 2011 by Method, and Plan Projection	

Uwharrie		
Method	**FY 2011 Harvested Acres**	**Plan Projections**
Even-Aged/ Two-Aged	96	400
Uneven-Aged	0	0
Thinning	394	310
Salvage	0	N.A.
TOTAL	**490**	**710**

<table>
<tr><th>Monitoring Item</th><th>Results</th></tr>
<tr><td>Acres Harvested in FY 2011 by Method, and Plan Projection</td><td>
<table>
<tr><th colspan="3">Nantahala/Pisgah</th></tr>
<tr><th>Method</th><th>FY 2011 Harvested Acres</th><th>Plan Projections</th></tr>
<tr><td>Even-Aged/ Two-Aged</td><td>560</td><td>2,767</td></tr>
<tr><td>Uneven-Aged</td><td>0</td><td>500</td></tr>
<tr><td>Thinning</td><td>53</td><td>N.A.</td></tr>
<tr><td>TOTAL</td><td>613</td><td>3,267</td></tr>
<tr><th colspan="3">Croatan</th></tr>
<tr><th>Method</th><th>FY 2011 Harvested Acres</th><th>Plan Projections</th></tr>
<tr><td>Even-Aged/ Two-Aged</td><td>3</td><td rowspan="4">The thinning is occurring in predominantly loblolly stands that must removed before longleaf restoration can occur.</td></tr>
<tr><td>Thinning</td><td>1016</td></tr>
<tr><td>Special Harvest</td><td>81</td></tr>
<tr><td>TOTAL</td><td>1,100</td></tr>
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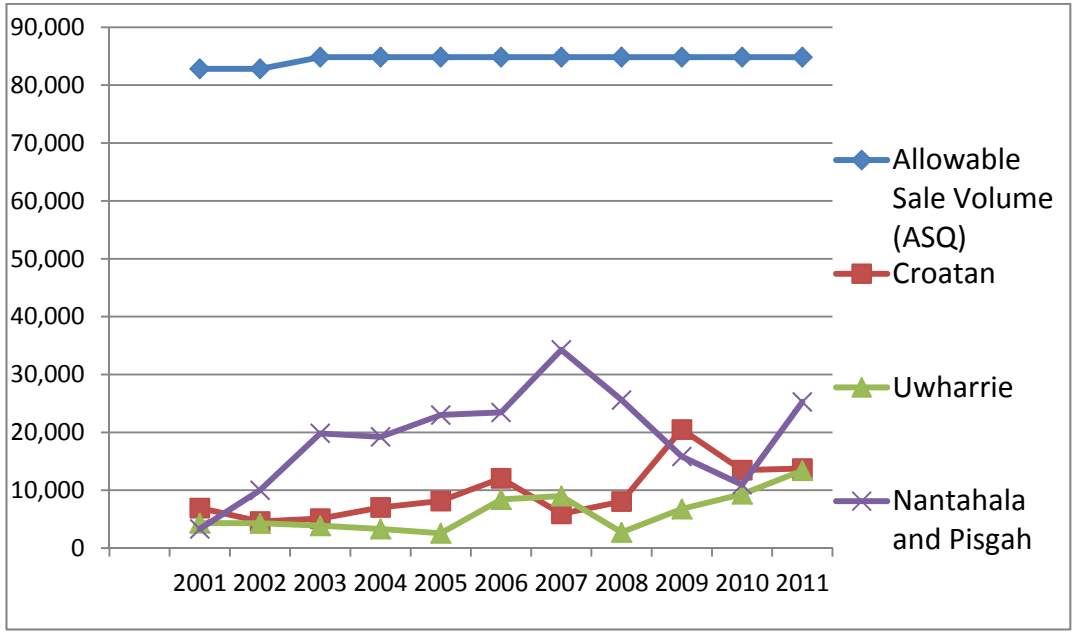
Figure 2. Timber Sale Volume
The quantity of timber sold each year from the National Forests in North Carolina continues to be only a fraction of the amount allowed under the forest plans. The majority of harvesting on the Uwharrie and Croatan consists of thinning loblolly stands, whereas for the Nantahala and Pisgah National Forests, regeneration harvests predominate.



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

Wildlife Habitat Management, Early Successional, Open, and Special Habitats

- 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.

- In FY2011, approximately 1,706 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 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.

- In FY11, approximately 265 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).

- Approximately 23,452 acres of prescribed burning in FY11 resulted in open understory conditions favored by many wildlife species. While prescribed burning acres are down slightly compared to the last 7 years, they have increased dramatically since the late 1990s, which ultimately increases wildlife habitat diversity and stability.

Figure 3. Wildlife habitat managed through vegetation management, 1991-2011.

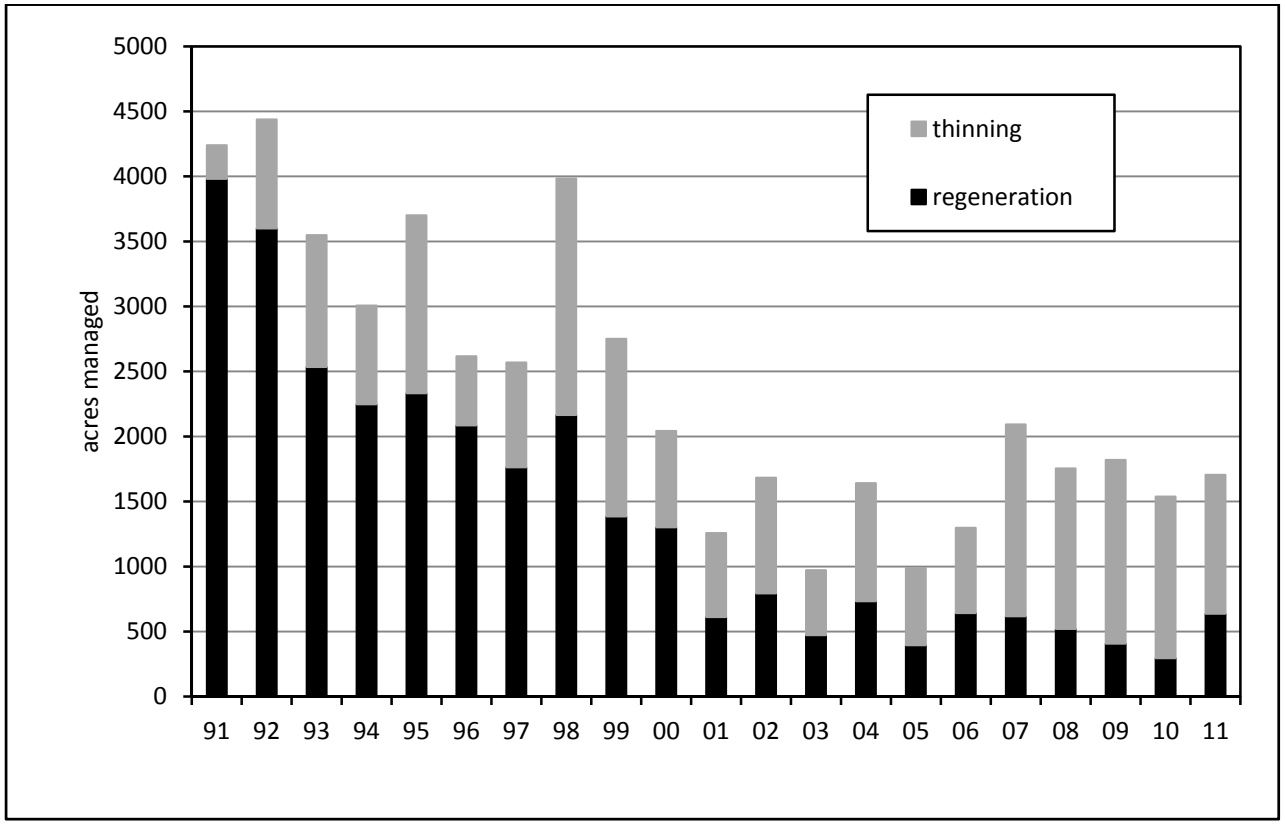


Figure 4. Activities to manage wildlife habitat, 2007-2011

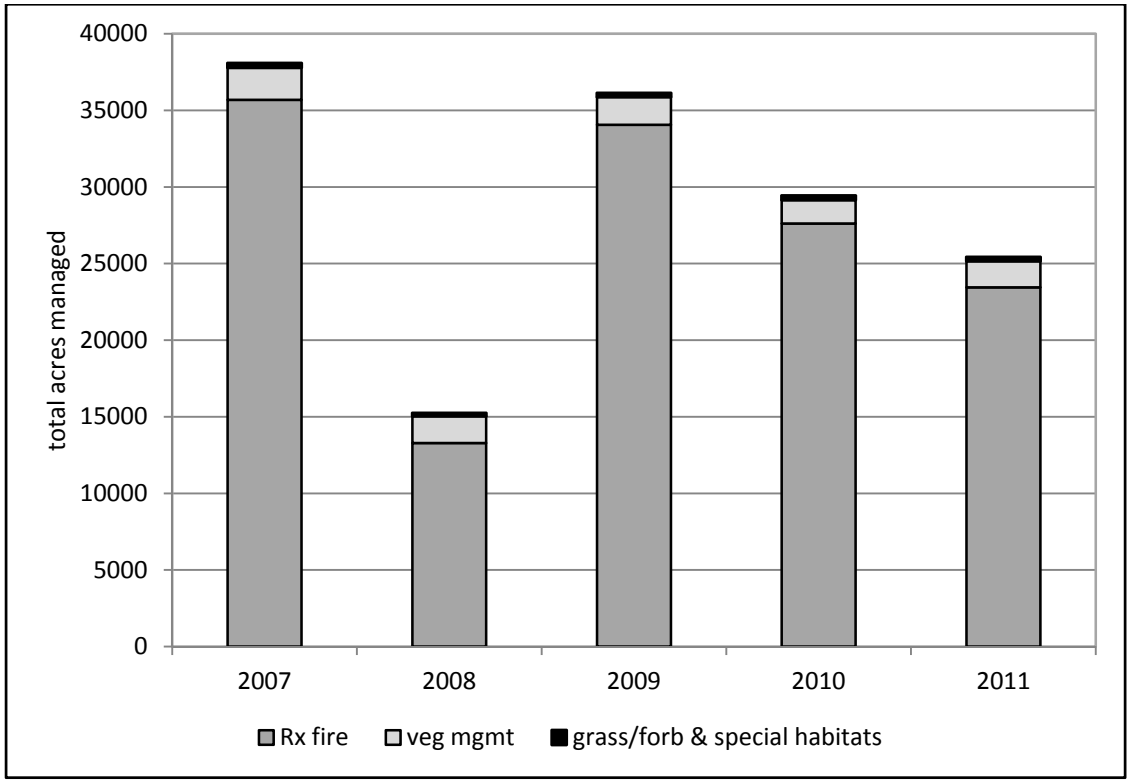


Figure 5. Wildlife habitat managed through the use of prescribed fire, 2007-2011

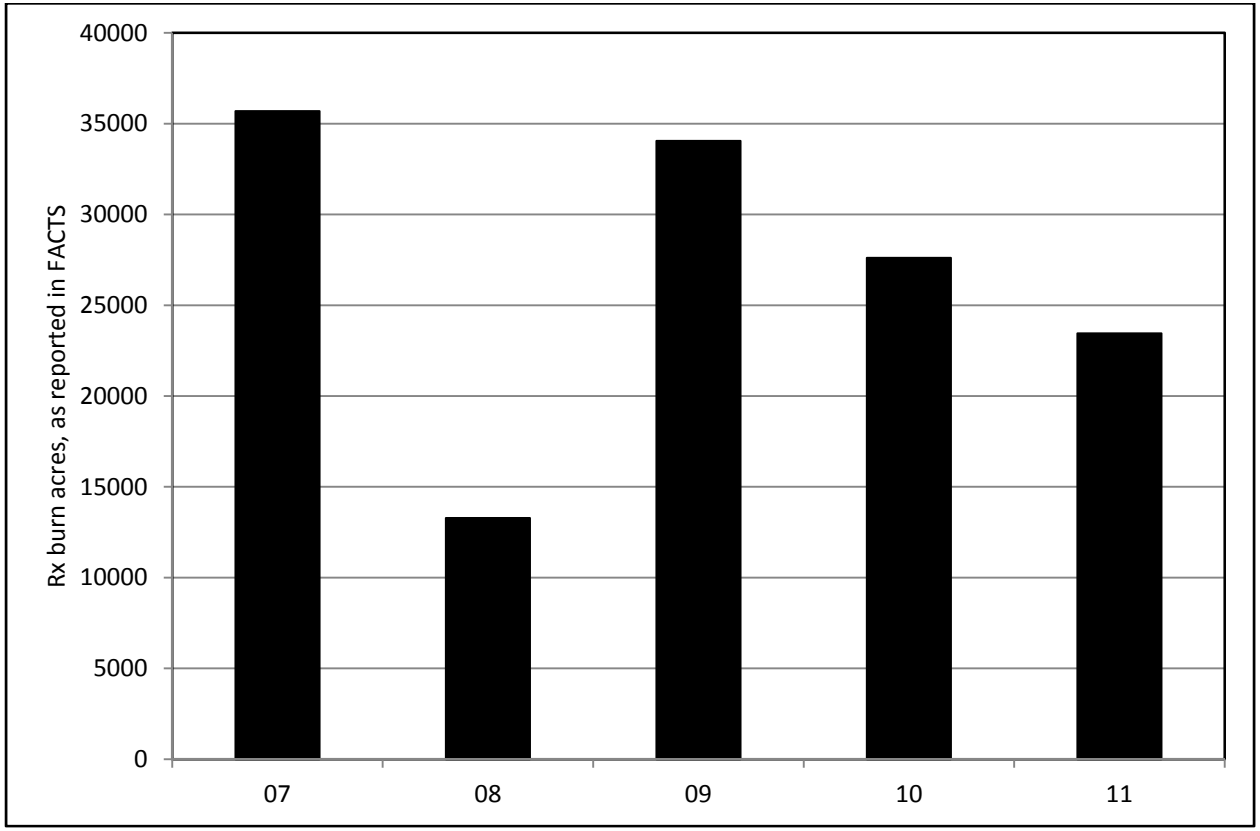
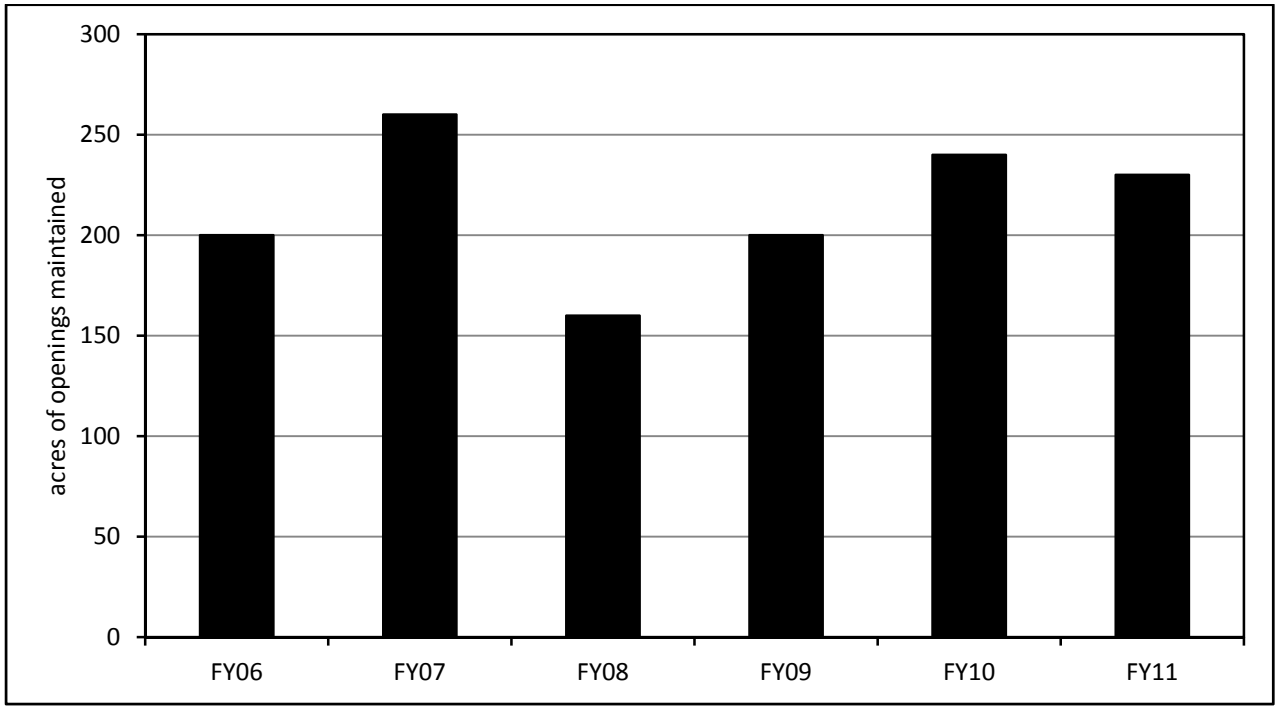


Figure 6. Acres of wildlife openings managed, FY06-FY11



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.

Wildlife and Fish

Federally-listed Species

Two federally-listed species, red-cockaded woodpecker (*Picoides borealis*) and Indiana bat (*Myotis sodalis*) have reporting requirements associated with a recovery plan or biological opinion. An update on the status of the red-cockaded eoodpecker on the Croatan National Forest is included below. A separate report relevant to the Indiana bat is available as an appendix to this document. Additionally, monitoring of federally-listed aquatic species are discussed in the section of the report titled(Rare Aquatic Species)

Red-cockaded Woodpecker (RCW)

The RCW population on the CNF showed an increase in 2011 from 2010. We documented 68 potential breeding groups and banded a total of 93 nestlings. This number surpasses our previous peak (in 2000) of 62 potential breeding groups. The RCW Recovery Plan estimates that the CNF RCW population should have been 101 potential breeding groups in 2010, a goal that we did not 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. See below for more detail.

Most existing RCW habitat on the district does not meet Recovery Plan Standards and has not 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 is an unmet need for new habitat where artificial cavities could be utilized to “grow” RCW clusters. 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. The CNF 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 and 2011 combined with tighter air quality rules significantly impacted our ability to do prescribed burning in critical habitats. In 2011 we burned 2,194 acres of RCW habitat in the growing season and 1,130 acres of habitat in the dormant season. The inability to fully utilize prescribed fire as it was in the past has contributed to the CNFs 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 cluster (a total of 74) and banding was completed at 80% 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 were completed for nestlings at all 54 known nests.

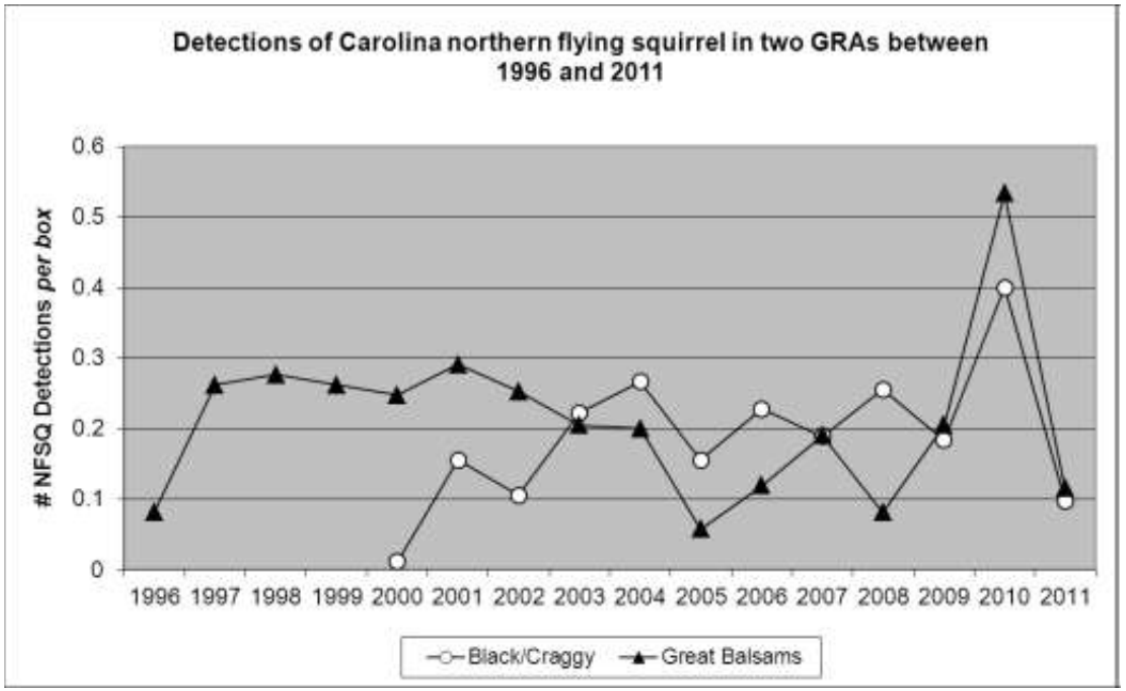
Guidelines set forth in the Recovery Plan state that all clusters and cavity trees should be monitored between March and July every year. Due to limited resources, the CNF only has the capacity to monitor clusters that are active or have recently gone inactive on a yearly basis. Guidelines also state that surveys for new cavity trees and clusters should be conducted at least every 10 years. The last time that was done on the CNF was in 1988, when 33% of the existing habitat was monitored. Every active cluster on the CNF is monitored for new cavity trees during population monitoring, although the survey 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 10 years. This has never been done on the CNF and currently we don't have the resources available to do this large scale (over 11,000 acres) monitoring.

Carolina Northern Flying Squirrel

Carolina northern flying squirrel (CNFS) monitoring consisted of winter nest box surveys, acoustic surveys, and live-trapping. Captured animals were weighed, measured, ear-tagged, and released. Acoustic surveys were conducted in previously un-surveyed areas of the Unicoi Mountains, Great Balsams, and Roan Mountain to fill in distribution and elevation range gaps. This monitoring effort is huge, and we greatly appreciate the efforts of our partners.

Figure 7. North Carolina Wildlife Resources Commission detections of Carolina northern flying squirrels between 1996 and 2011 in the two GRAs with the largest squirrel box networks. Data courtesy of the NCWRC, Wildlife Diversity Section.



Sensitive Species

Carolina Gopher Frog (*Lithobates capito*): In collaboration with the NCWRC, five wetlands on the Croatan National Forest are being monitored for changes in hydrology, water chemistry, vegetation characteristics and amphibian use.

Additionally, gopher frog populations were monitored at several sites, including one area on the Croatan National Forest, where species' reproduction was observed (i.e. egg masses were documented). After 2 years of surveying for gopher frogs, only seven populations of this species are known to occur in North Carolina. We greatly appreciate the work of our partner in this effort. Habitat restoration efforts will begin on the Forest in FY13.

Neuse River Waterdog (*Necturus lewisi*): During FY11, the NCWRC conducted surveys for the Neuse River waterdog at 28 known historic sites within the Neuse River basin, including several sites on or adjacent to the Croatan National Forest. The

species was documented at eight of these sites, including two sites adjacent to, but not on, the forest. We greatly appreciate the work of our partner in this effort. These surveys will continue into FY12 and FY13.

Brook Floater (*Alasmidonta varicosa*): During FY11, brook floater populations were monitored in the Johns River, Wilson Creek, and Upper Creek systems on the Pisgah National Forest as a collaborative effort between the Forest, NCWRC, USFS, and NCDOT. This monitoring was to verify range expansion and document survival of mussels introduced in FY09 and FY10 as part of population augmentation efforts. The range of this species is currently almost twice what it was when biologists started monitoring efforts almost 10 years ago. Mulberry Creek will be added to monitoring efforts beginning in FY13.

Peregrine Falcon (*Falco peregrinus*): Sites monitored in FY11 include those with previous Peregrine nesting activity, sites with suitable habitat, and those with reported Peregrine sightings. Efforts focused on territories surveyed in 2010 (NCWRC 2010), with a combined effort of 178.25 observer hours. Pairs were present at eight of the 15 sites, and three produced fledglings. It was unclear if a pair was present at the historical eyrie on Shortoff Mountain. Nesting at Victory Wall was disrupted by common ravens. Looking Glass Rock experienced late cycle nest failure. Falcons returned to an eyrie on the west side of Whiteside Mountain, after nesting on the east side in 2010, prompting another adjustment of the closure order. A second year female was on territory at Dunn's Rock and a second year male harassed the resident pair at NC Wall. This monitoring effort is huge, and we greatly appreciate the efforts of the NCWRC.

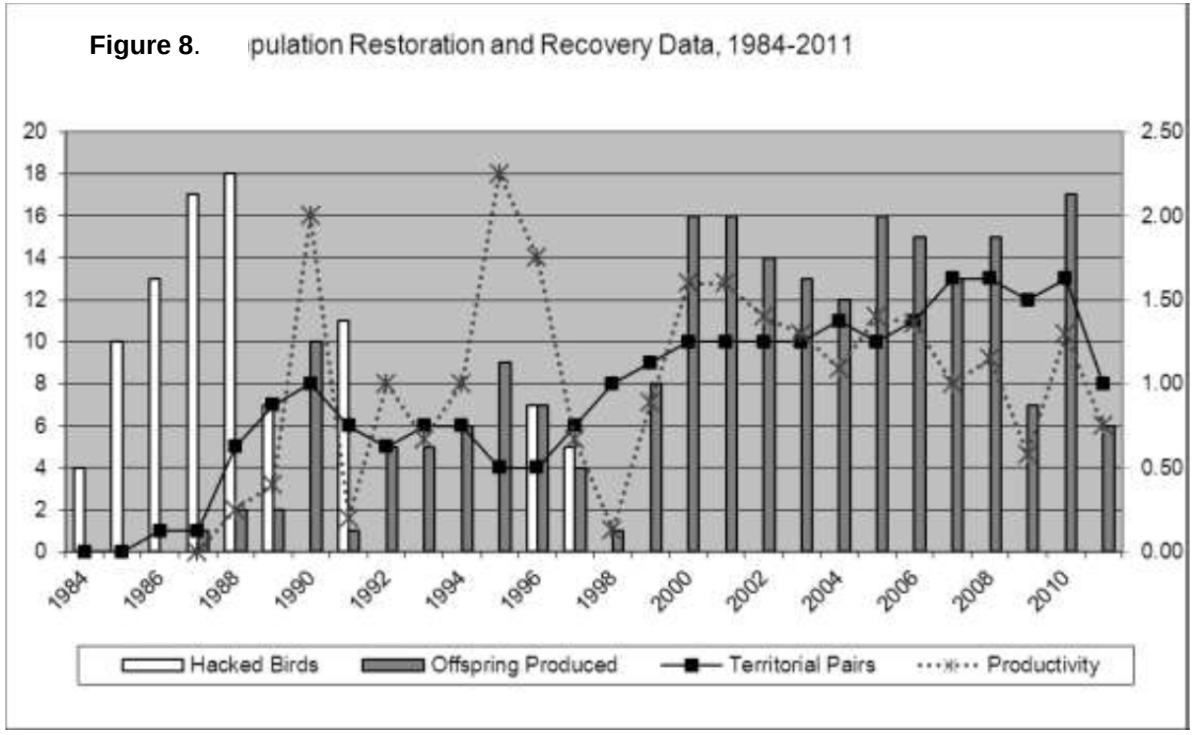


Figure 8.

Mountain Chorus Frog *(Pseudacris brachyphona*): During FY11, NCWRC biologists documented 16 new breeding habitats for this species, including six locations in Clay County (Nantahala National Forest). Additionally, the Forest documented 15

new breeding sites on the Nantahala National Forest in FY11. Despite this increase on populations on the forest, a majority of the known locations of the species are on private property or are in areas highly vulnerable to disturbance (e.g. roadside ditches). We greatly appreciate the work of our partner in this effort.

Hellbender (*Cryptobranchus alleganiensis*) and Mudpuppy (*Necturus maculosus*): In collaboration with the NCWRC and many other partners, more than 50 aquatic surveys were conducted for the two species. This effort resulted in one new record for the mudpuppy adjacent to the Nantahala National Forest. This is the only confirmed record of the species on or adjacent to the Nantahala or Pisgah National Forest. Additionally, hellbenders were documented at 35 sites (including many on or adjacent to the Forest), including 12 new sites (one of which is on the Pisgah National Forest that expanded the known range of the species more than 4 miles upstream). However, despite intensive survey efforts, no hellbenders were found at eight sites where they occurred historically, including one of the best known populations on the South Toe River. Captures were heavily skewed toward adults; juveniles or larvae were detected at only seven sites. This monitoring effort was huge, and we greatly appreciate the work of the NCWRC in this effort.

Southern Pigmy Salamander (*Desmognathus wrighti*): Pigmy salamanders found during surveys for the Courthouse Project (Pisgah National Forest) updated a 40-year old record for the species.

Seepage Salamander (Desmognathus aeneus): During FY11, the NCWRC compiled a total of 55 existing locality records for the species in North Carolina. These data support the view that the distribution of *D. aeneus* in North Carolina is confined to the extreme western portion of the state, with records being restricted to Cherokee, Clay, Graham, Macon, and Swain counties.

Northern Saw-whet Owl (*Aegolius acadicus pop.1):* Southern Appalachian Raptor Research conducted saw-whet owl monitoring at Big Bald (Pisgah and Cherokee National Forests) for the NCWRC. During FY11, listening surveys, captures of banded individuals, and radio tracking provided information on habitat use, migration routes and habitat use, and roost sites, but not nest locations. Playback call surveys and trapping conducted in 2010-2011 confirm the presence of NSWO in the Big Bald habitat for 10 months (February – November). The capture of six 'return' NSWO, originally banded at Big Bald in previous years, and then recaptured in 2006, 2008 and 2009 respectively, demonstrates site fidelity. Return captures also indicate that adult birds remain on territory during the winter months, or return in late spring to use the northern hardwood forest habitat at Big Bald. The capture of immature birds in late summer with a small amount of retained juvenile feathering supports the possibility of resident NSWO nesting in the Big Bald habitat. Probable NSWO eggs, collected post breeding season at two boxes in 2008 and 2009 respectively, also supports the possibility of resident NSWO nesting in the Big Bald northern hardwood forest habitat. An adult female NSWO with an active brood patch was captured on 9 May 2011 and radio-tracked to a lower elevation acidic cove forest location, supporting the use of the bald/hardwood forest habitat by breeding NSWO. Breeding population status remains undetermined, since no *active* nests have been located, warranting more study over the 2012 breeding season.

Estimated 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 1. MIS Estimated Population Trends

Nantahala and Pisgah National Forests

Species	Population Trend
Black bear	Increasing
White tailed deer	Static to Slightly Decreasing
Pileated woodpecker	Static
Ovenbird	Static
Rufous-sided towhee	Decreasing
Pine warbler	Static
Acadian flycatcher	Static
Ruffed grouse	Static
Brook, brown, and rainbow trout	Static, despite high natural variability
Largemouth bass	Static, despite high natural variability
Blacknose dace	Static, despite high natural variability
Smallmouth bass	Static, despite high natural variability

Croatan National Forest

Red-cockaded woodpecker	Static, despite lack of habitat management

Uwharrie National Forest

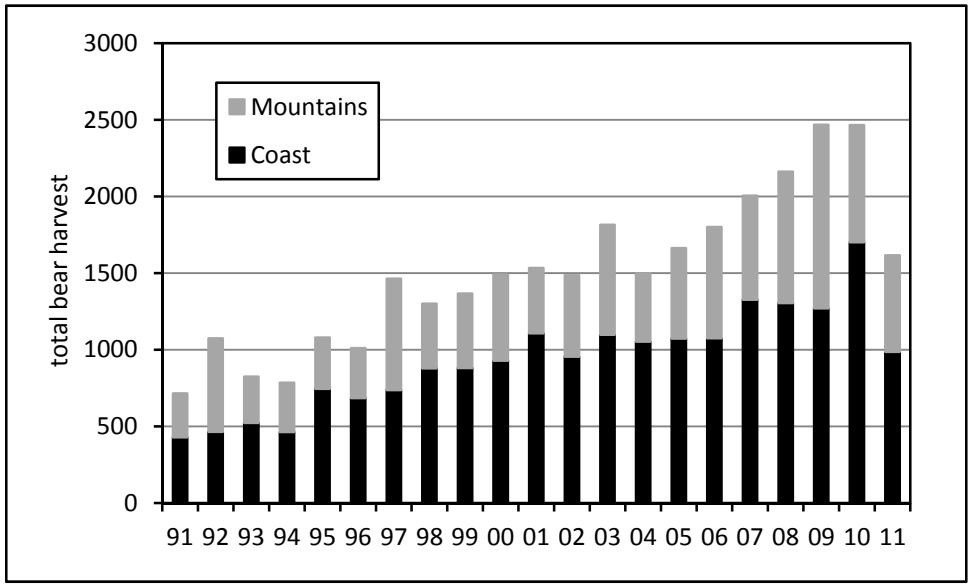
White tailed deer	Increasing
Gray squirrel	Static in Cycles
Turkey	Increasing

In FY12, a new Land and Resource Management Plan will go into effect for the Uwharrie National Forest. In future monitoring and evaluation reports, the following management indicator species will be discussed for the Uwharrie National Forest: pileated woodpecker, brown-headed nuthatch, acadian flycatcher, northern bobwhite quail, and scarlet tanager.

Black Bear (*Ursus americanus*): Historically, black bear thrived throughout North Carolina. By the early 1900s, 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 have experienced a dramatic increase despite decreases in harvest during FY11.

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 9. Total Bear Harvest Trend, 1991-2011.

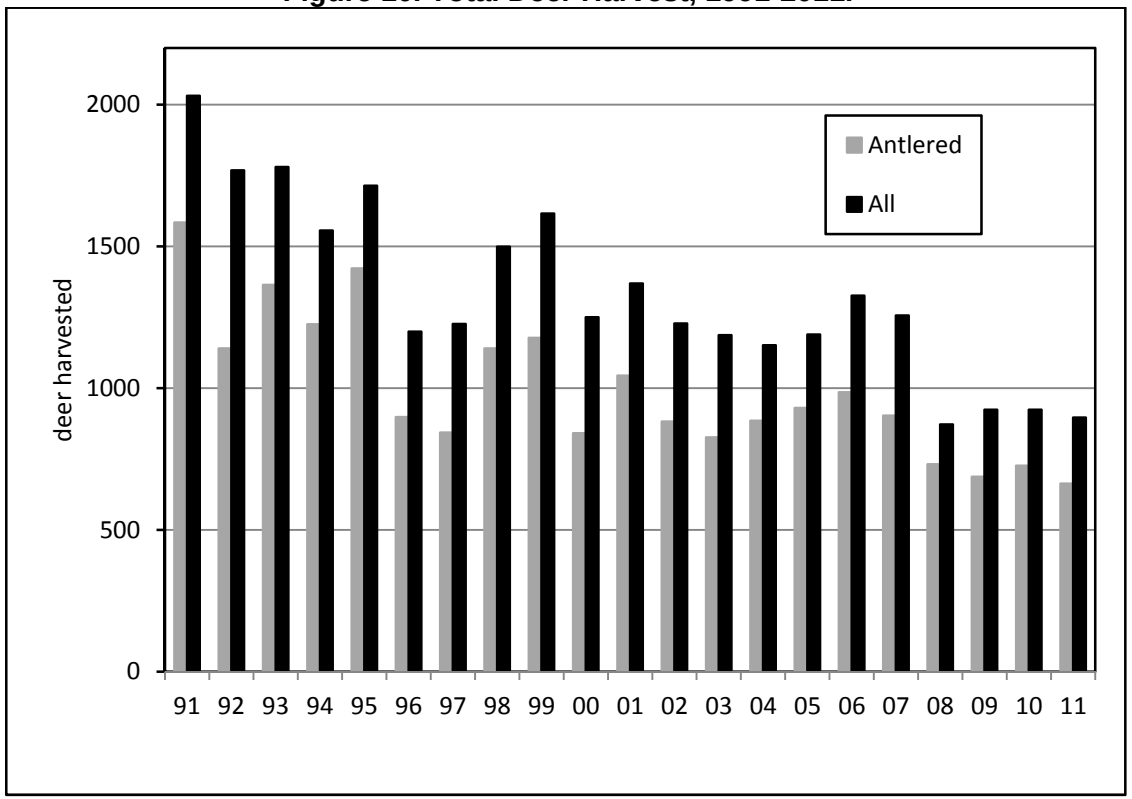


Data courtesy of the NCWRC, Wildlife Management Division.

White-Tailed Deer (*Odocoileus virginianus*): 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 10. Total Deer Harvest, 1991-2011.

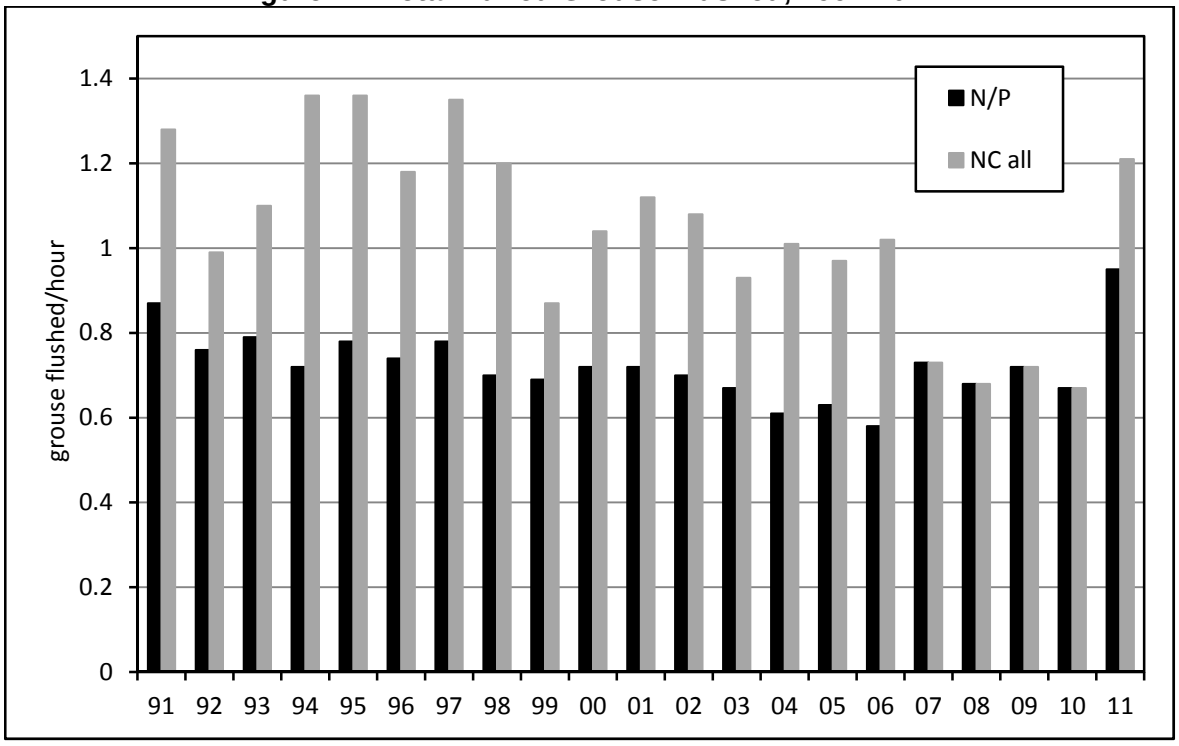


Data courtesy of the NCWRC, Wildlife Management Division.

Ruffed Grouse (*Bonasa umbellus*): Ruffed grouse occur only in the mountains of North Carolina, including the Nantahala and Pisgah National Forests. They occupy a variety of habitats 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 remained fairly stable on the Forest, FY11 data reveals the highest flush rates in 20 years. This may be attributable to milder than average winters, increased reproductive success, as well as active vegetation management on the Forest (see above). Bird populations are naturally highly variable-- it is likely that none of the flush rates in the figure below are outside this variability.

Figure 11. Total Ruffed Grouse Flushed, 1991-2011.



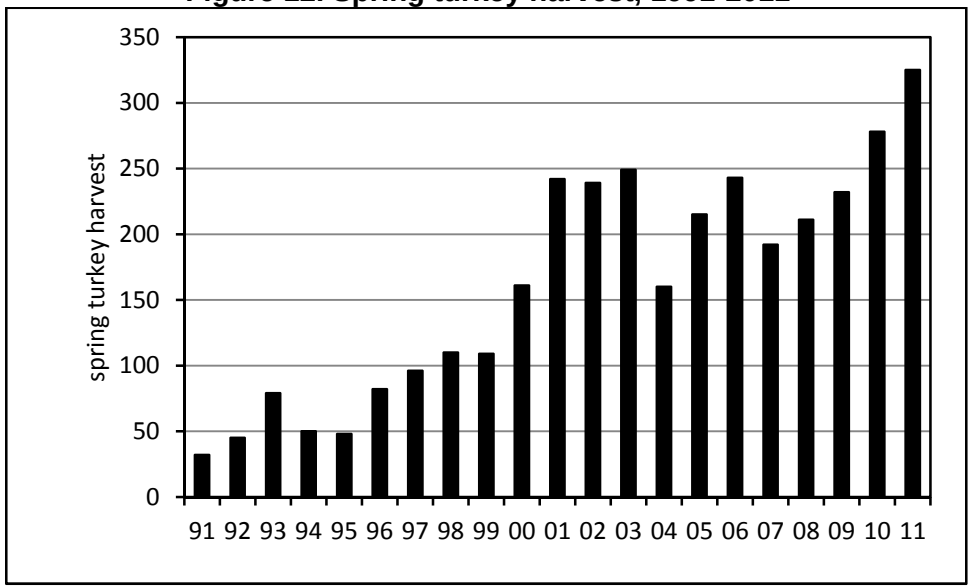
Data courtesy of the NCWRC, Wildlife Management Division.

Wild Turkey (*Meleagris gallipavo*): Wild turkey occur across North Carolina, but are management indicators for the Uwharrie National Forest. They occupy a variety of habitats throughout their life history, ranging from open early successional habitats to woodlands and other forested areas.

During the last 30 years, through dedicated management by the North Carolina Wildlife Resources Commission and habitat management by the U.S. Forest Service, wild turkey populations on the Uwharrie National Forest have experienced a dramatic increase.

Harvest data is a cost-effective way to monitor turkey populations. Turkey are often documented in other bird surveys, but these efforts are not always conducted in suitable areas or during suitable times of the year to reliably document population trends.

Figure 12. Spring turkey harvest, 1991-2011



Data courtesy of the NCWRC, Wildlife Management Division

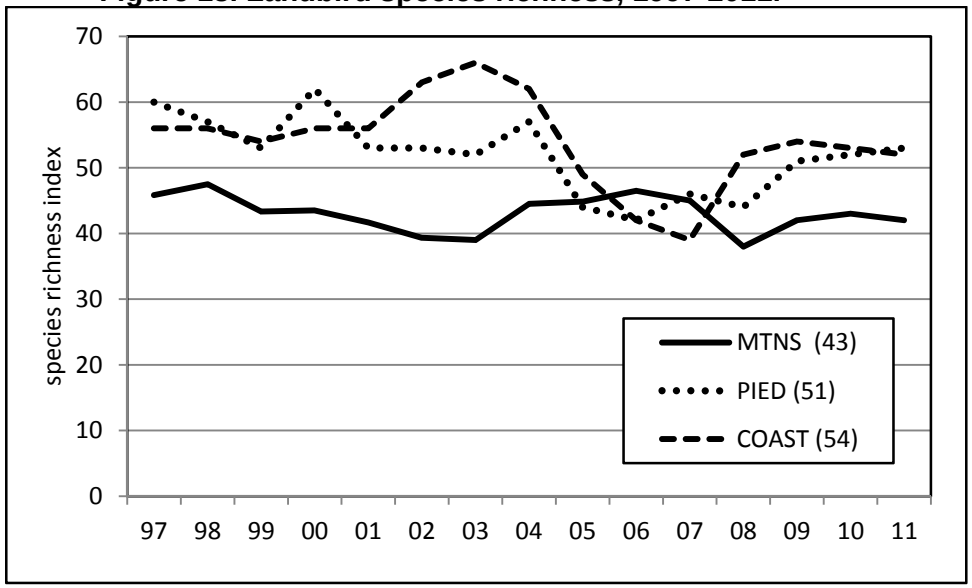
Forest neotropical migratory bird surveys were accomplished through 10-minute point counts on 353 established plots across the National Forests in North Carolina (114 points on the Nantahala NF, 144 points on the Pisgah NF, 55 points on the Uwharrie NF, and 40 points on the Croatan NF) during the spring of 2011.

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.

Figure 13. Landbird species richness, 1997-2011.



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 102 through 103 of NCWRC (2011) summarize this work.

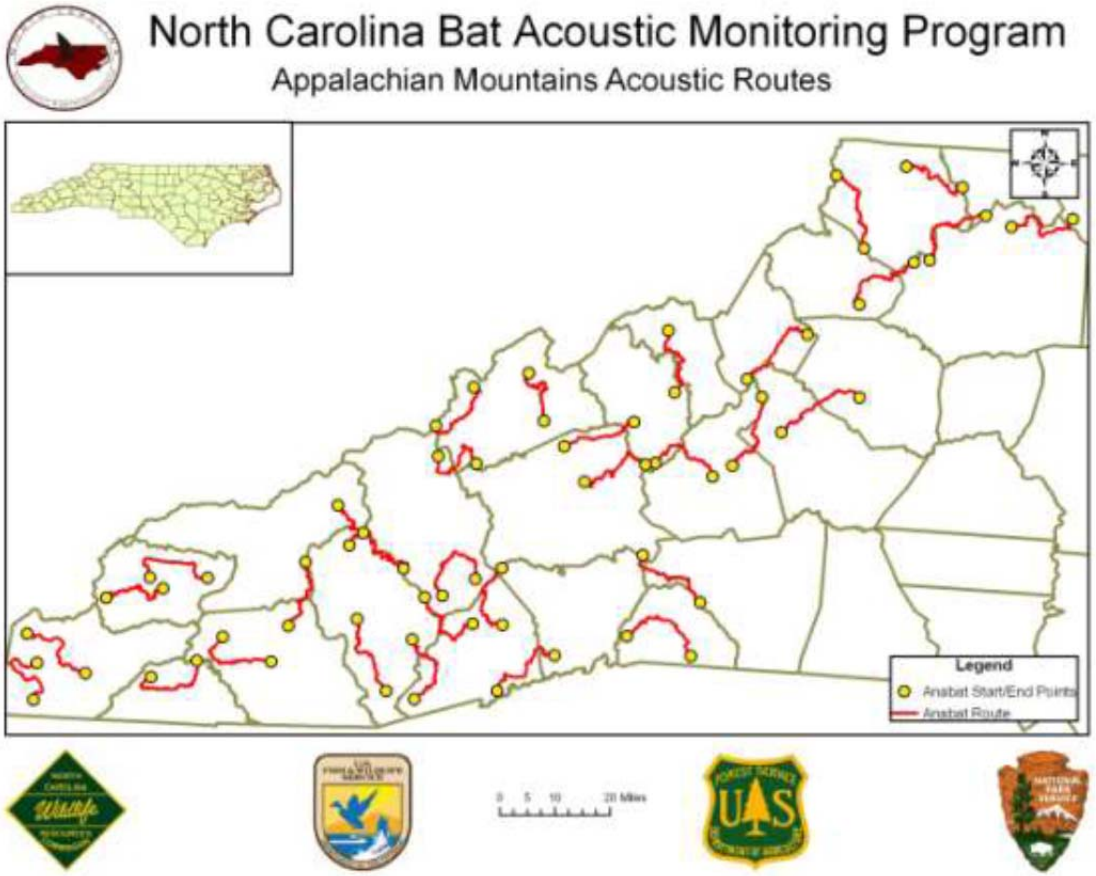
The 2011 Bat Blitz provided an inventory of public lands within one hour drive from Crossnore, NC. Thirty one sites were netted with a total 446 captures of nine species (see below). Establishment of these sites provided important relative abundance data and the potential for long-term monitoring at sites in under-sampled portions of the western region.

Bat species captured during the 2011 Bat Blitz:

- Rafinesque's big-earred bat (*Corynorhinus rafinesquii rafinesquii*)
- Big brown bat (*Eptesicus fuscus*)
- Eastern red bat (*Lasiurus borealis*)
- Hoary bat *(Lasiurus cinereus)*
- Seminole bat (*Lasiurus seminolus*)
- Eastern sall-footed bat (*Myotis leibii*)
- Little brown bat (*Myotis lucifugus*)
- Northern long-earred bat (*Myotis septentrionalis*)
- Tri-colored bat (*Perimyotis subflavus*)

Acoustic bat surveys were conducted along eight transects across the National Forests in North Carolina to establish bat community baselines in light of the recent spread of White-nosed Wyndrome (WNS) in cave-dwelling bat populations, and as part of the North Carolina Bat Acoustic Monitoring Project (NCBAMP). These routes were part of this larger monitoring effort. A preliminary analysis of the 2011 data from NCBAMP yielded a total of 15,233 Anabat sound files, with 3,100 of those being bat call files. Of those 3,100 bat call files, 1,169 of those were identified to a tree bat species and 1,221 were identified to a cave hibernating species of bat. An additional 710 call files were categorized as "unknown species."

Figure 14. NCBAMP Transects, Western NC.



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). Bat hibernacula surveys and surveillance for White Nose Syndrome (WNS) at 12 caves and/or mines in six counties in Western North Carolina. We also visited an additional 12 sites in five counties in late winter/early spring to do WNS Surveillance. By the end of winter/spring 2011, four counties in NC had been determined positive for WNS (Avery, Yancey, McDowell, Transylvania), with an additional county considered “suspect” (Buncombe).

Considerable effort was invested by the NCWRC in monitoring bat populations across the Nantahala and Pisgah National Forests. We greatly appreciate the work of our partner in this effort.

Aquatic Habitat Monitoring

- Preliminary water quality and habitat monitoring was conducted throughout the Santeetlah Creek Watershed (Nantahala National Forest) in preparation for watershed restoration (liming) to mitigate past effects of acid deposition. This watershed contains optimal habitat for native brook trout.

- Approximately 12 miles of aquatic habitat were restored to native fish and invertebrate communities on the South Toe River (Pisgah National Forest) by removing a dam, and approximately 2 miles of aquatic habitat were restored to native brook trout on Tipton Creek (Nantahala National Forest) by replacing an existing crossing with a passable structure.

- Habitat diversity was restored in approximately five miles of stream along the North Mills River and South Mills River (Pisgah National Forest). Techniques included streambank and riparian area stabilization and instream pool-riffle enhancement.

- Approximately 225 acres of shoreline and mid-depth reservoir habitat was enhanced in 2011 on Fontana, 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. We greatly appreciate the work of our partner in this monitoring effort.

- Approximately 9 miles of aquatic habitat were restored to native fish and invertebrate communities on the Cheoah River (Nantahala National Forest) through gravel augmentation. In addition to native warmwater stream species, the Cheoah River also supports populations of two federally-listed aquatic species, the spotfin chub (Erimonax *monacha*) and appalachian elktoe (*Alasmidonta raveneliana*).

- The forest monitors warmwater stream communities in cooperation with the North Carolina Division of Water Quality's Bioassessment Group. This is an extensive state-wide monitoring effort where each basin is studied intensively on a 5

year cycle. These reports are available online (http://h2o.enr.state.nc/esb/bar.html). We greatly appreciate to work of our partners in this monitoring effort.

- 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.

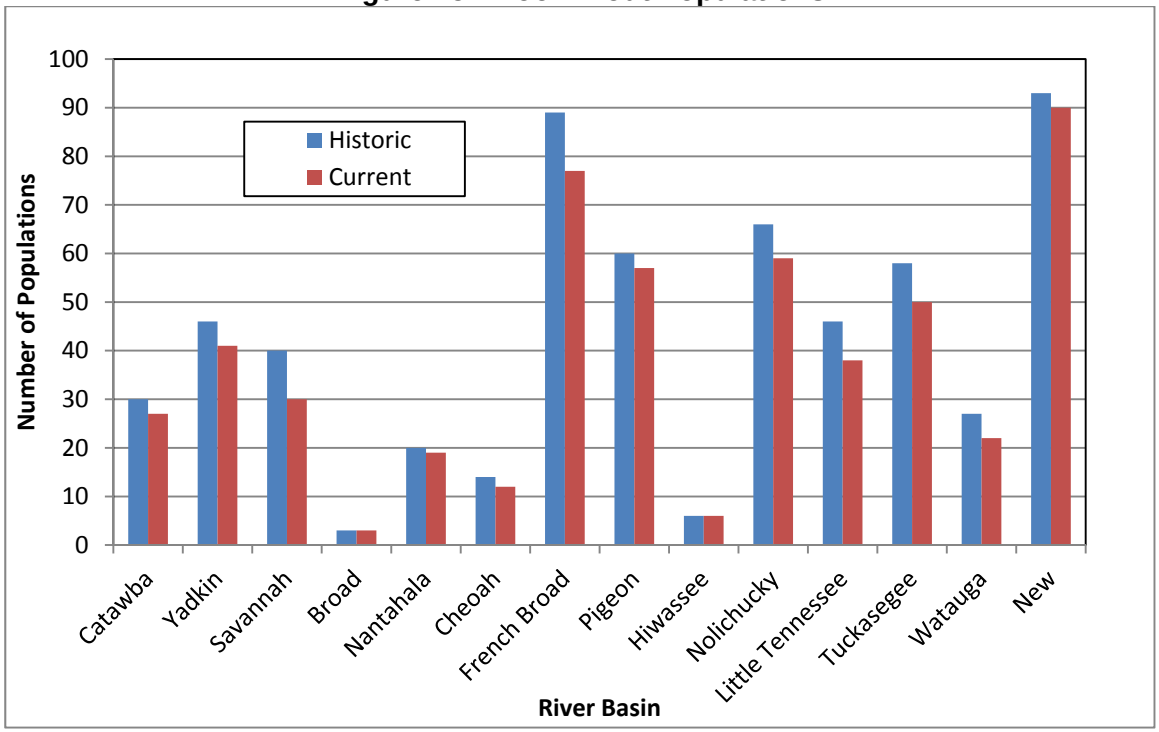
- During FY11, brook floater (*Alasmidota varicosa*) populations were monitored in the Johns River, Wilson Creek, and Upper Creek systems on the Pisgah National Forest as a collaborative effort between the Forest, NCWRC, USFS, and NCDOT. This monitoring was to verify range expansion and document survival of mussels introduced in FY09 and FY10 as part of population augmentation efforts. The range of this species is currently almost twice what it was when biologists started monitoring efforts almost 10 years ago. Mulberry Creek will be added to monitoring efforts beginning in FY13.

- 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 lampmussel (mussel, S), rainbow (mussel, S), spotfin chub (fish, T), and wounded darter (fish, S). Long-term success of these species is currently being monitored. This monitoring continued into FY11 and will be reported in the future.

- During FY2011, 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.

Figure 15. Brook Trout Populations



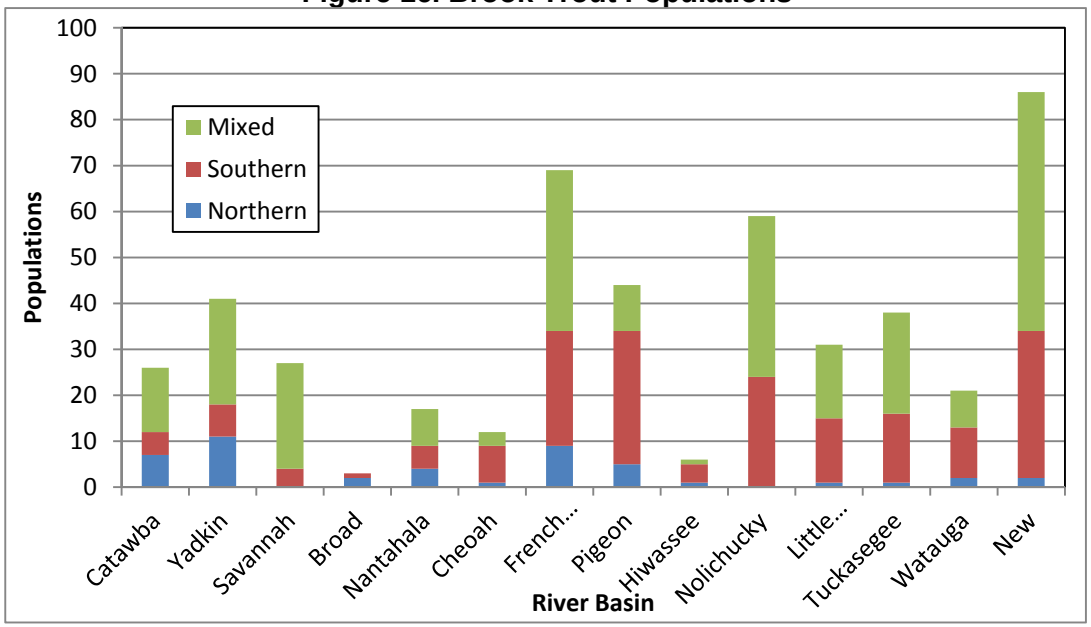
Due largely to habitat loss on private land, brook trout populations have been lost over the last several decades. This trend is not as apparent on the forests; however, other causes of population decline are being examined, such as acid deposition and climate change.

Reproduction was documented in two restored brook trout populations during FY2011: 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 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 16. Brook Trout Populations

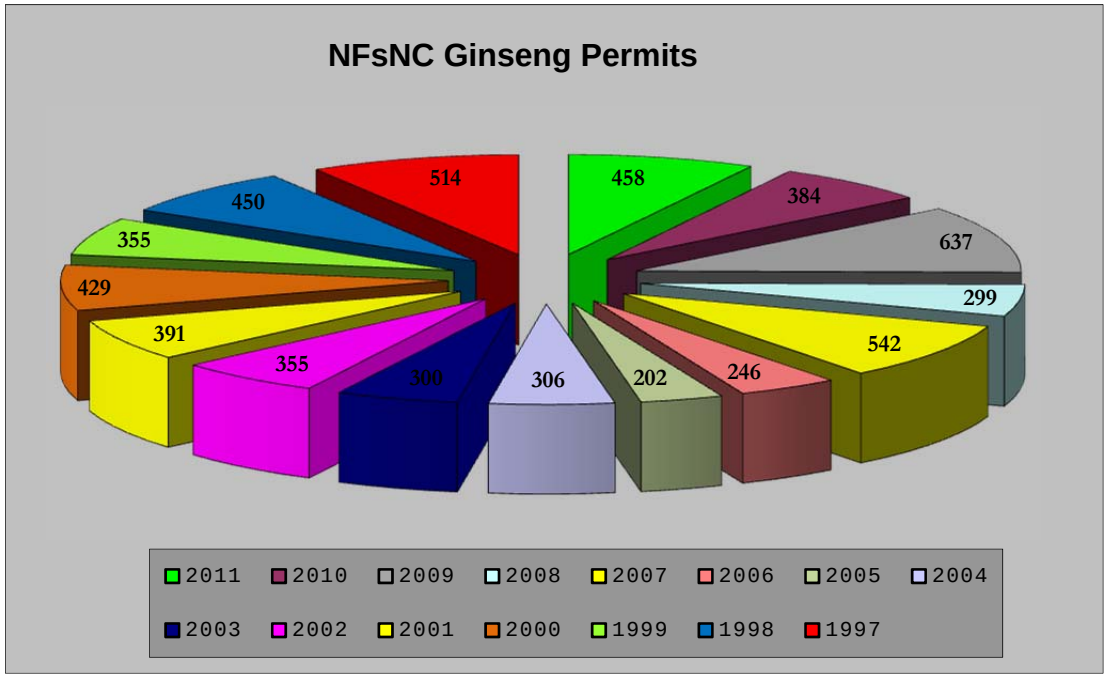


Plants

American Ginseng Monitoring

The National Forests in North Carolina continues to lead all national forests in issuing permits for American Ginseng (*Panax quinquefolius*). Permit numbers have varied during the last 15 years (Figure 17). In general the permit numbers gradually decline from 1997 to 2005. During the last 5 years the permit numbers have varied from 299 to 637, but have been higher than the previous 10 year annual average.

Figure 17. American Ginseng Permits Issued on the Nantahala and Pisgah NFs from 1997-2011.

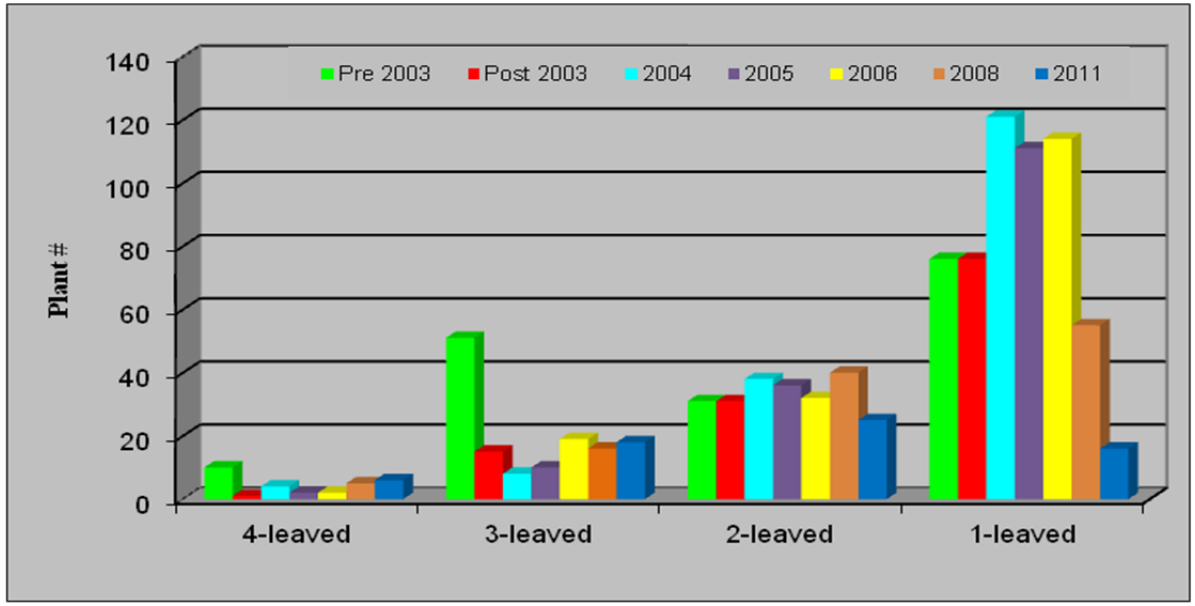


Very few controlled harvest studies have been done across the range of American ginseng. In 2003, US Forest Service botanists in NC began a simulated harvest study within a protected population of 168 plants on the Pisgah National Forest. All fruiting three- and four-leaved plants, 46 in total, were harvested. The average age of the harvested ginseng were 13.8 years for the

three-pronged plants and 22-23 years for the four-pronged plants, with one of the four-prongs being 45 years of age. All mature seeds were carefully planted two centimeters deep during the initial harvest and during each subsequent monitoring date in 2004-2006, 2008, and 2011. No further harvesting was conducted. One year following the harvest, the number of plants in the population had recovered to pre-harvest levels; however there was a dramatic shift in age class representation. Prior to the harvest non-flowering one- and two –leaved plants represented 63% of the population. By comparison, in 2004 and 2005, these individuals represented 93% of the population (Figure 18). After 8 years the number of mature individuals had not recovered to pre-harvest levels. In 2003, there were 61 three- and four-leaved individuals that could have been legally harvested. In comparison, only 24 individuals could have been legally harvested from the same population in 2011 (Figure 18). During the study no evidence was seen of harvest other than the initial harvest of 28% of the population.

Nine four-pronged plants and thirty-six three-pronged plants were removed. All seed was sowed back into the area in a manner calculated to optimize successful germination. The plot was re-sampled five times over the following 8 years. No further harvest was conducted, and no evidence of poaching was seen. After 8 years, less than half the original number of three- and four-prong plants were present, compared to pre-harvest conditions, indicating a very slow recovery rate, even from this conservative, one-time harvest.

Figure18. Representation of American Ginseng size classes from 2003-2011 within a protected population, after a single, limited harvest conducted in 2003



While American ginseng is the most well-known collected species within the National Forests in the Southern Appalachians, other medicinal species are also experiencing increasing collection pressures. In the last 6 months of 2011 over 2 tons of black cohosh (*Actaea racemosa*) collection permits were issued within NC Federal Forests. This increase may be related to the US economic job market, reflective of harvesters collecting at profits, $3-4 per dried pound wholesale value, much lower than previous years In comparison in the mid 1990s there was a spike in black cohosh collections when the wholesale value was four to five times higher than the current value.

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

One new and one historical *Helonias bullata* subpopulation was located in FY2011 as well as two new *Lysimachia asperulifolia* subpopulations. These changes are reflected in Table 2 which shows the distribution of the species across the four National Forests across North Carolina.

Table 2. Distribution of federally listed threatened and endangered (T&E) plant species across the NFsNC.

Species	Pops	Subpops	Forest	Districts
Gymnoderma lineare	25	57	Pisgah, Nantahala	Cheoah, Nantahala, Pisgah, Appalachian, Grandfather
Isotria medeloides	3	4*	Pisgah, Nantahala	Nantahala, Grandfather
Spiraea virginiana	3	39	Pisgah, Nantahala	Cheoah, Nantahala, Appalachian
Hudsonia montana	3	33	Pisgah	Grandfather
Helonias bullata	2	17	Pisgah, Nantahala	Pisgah, Nantahala
Houstonia montana	4	20	Pisgah	Appalachian
Geum radiatum	2	22	Pisgah	Appalachian
Solidago spithamaea	1	8	Pisgah	Appalachian

Species	Pops	Subpops	Forest	Districts
Liatris helleri	4	16	Pisgah	Grandfather
Helianthus schweinitzii	8	22	Uwharrie	Uwharrie
Lysimachia asperulifolia	4	69	Croatan	Croatan

Pops = Populations, Subpops = Subpopulations

*Recently extirpated from all four sites, restoration efforts completed for two sites

A synopsis of monitoring for the federally listed species in 2011 follows:

Houstonia montana: Nineteen separate subpopulations are documented for this species, all within the Appalachian Ranger District. All except one of these occurs on Roan Mountain. Two subpopulations on Roan Mountain were monitored in 2011 for the fifth consecutive year. The two subpopulations continue vary however both increased in overall extent in 2011 (Figure 19).

The bus parking lot subpopulation increased in extent, area coverage, by 18% from 2009 ((Table 3).This is in spite of a 21% decline in the number of occupied plots. The increase in overall coverage is due to greater density within the occupied plots. This increase may not be as large as recorded since it 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 plots. Long-term monitoring will help to sort the actual or sampling design fluctuations.

As recorded during the previous year, the Cloudland Hotel subpopulation increased dramatically from 2010 to 2011 both in the number of occupied plots (245 to 290) and the coverage (1656 centimeters square to 2847). As for the parking lot site the occupied plot numbers could be inflated due to the sampling design.

Figure 19. Change in area coverage (centimeters square) from 2007-2011 for *Houstonia montana* within 2 subpopulations on Roan Mountain.

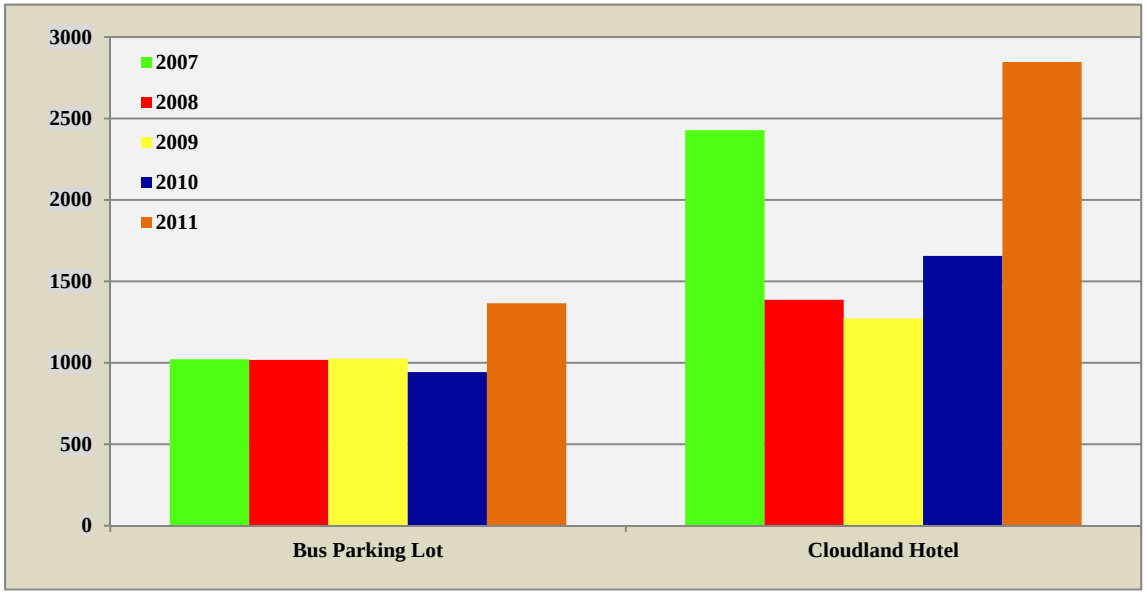


Table 3. Annual percent change in coverage and occupied plots from 2007-2010 for *Houstonia montana* within 2 subpopulations on Roan Mountain.

Year	Parking Lot	Cloudland Hotel	Parking Lot	Cloudland Hotel
	Coverage		Occupied plots	
2007-2008	0.4 % decline	43 % decline	13 % decline	7 % decline
2008-2009	1% increase	8 % decline	18 % increase	2 % decline
2009-2010	8% decline	30 % increase	36 % decline	42 % increase
2010-2011	45% increase	72% increase	21% decline	18% increase

Solidago spithamaea: Eight subpopulations of this unique goldenrod were historically documented on the NFsNC, all on Roan Mountain. Seven are known to be extant. For the 3 year two of the smaller subpopulations were tracked by counting the number of clumps and rosettes. During the last 4 years this species has remained fairly constant, declining less than 5% from 2008-2011 in rosette numbers. During the 4 year period the number of flowers has declined 23%. One of the subpopulations is being overtopped by taller trees which probably in causing the decline in flowers. One of the largest subpopulation for this species occurs associated with a *Geum radiatum* subpopulation at Roan High Bluff that has been monitored for the past 7 years. During the past 7 years *Solidago spithamaea* has also been noted at this site on the top of the cliff, on the sheer rock face, and in the bench and chute below the cliff. General observations indicate it has not varied substantially in density or abundance. Trampling impacts are not evident within any of the observed rosettes.

Geum radiatum: As for the previously two mentioned T&E species, all 22 subpopulations 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 4 to 7 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 2011 two of the five sites did not vary from 2010 in the number of patches. The other three sites declined slightly in patch numbers from 2010. Rosette numbers tend to be more variable from year to year but did not vary in total by more than four percent from the total numbers recorded across the five sites in 2010. The decline at the one site was attributed to yearling deaths. The two other sites decline is probably a result of impacts from freeze and thawing which dislodged fragmented rocks with adhering *Geum radiatum* clumps off the cliff face during the winter.

Helonias bullata: Sixteen discreet subpopulations of swamp pink have been documented across the Pink Beds on the Pisgah Ranger District since 2000. An additional 15 subpopulations have been historically delineated since the early to late 1970s. 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 2 years half of these historical subpopulations have been carefully searched for. Of these only one has been relocated. In 2011, three historical subpopulations were carefully searched for. One of the subpopulations was relocated.

Monitoring was completed across one subpopulation 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 2011, the rosette number estimates declined from 3762 to 2788 (Table 4). In contrast flowering was abundant along this segment with 112 separate stems recorded.

Table 4. Periodic changes in *Helonias bullata* rosette estimates along a small stream segment from 1991-2010 within the Pink Beds.

Year	Rosette Estimate	Flowering Stems
1991	4025	96
1998	2195	Survey timing inappropriate for observing flowers
2000	2819	2
2008	2943	5
2010	3762	18
2011	2788	112

In addition two macro plots were established in 2008 within a portion of this stream segment. In 2011, the demographic data indicated an increase of a single patch, no increase in rosette numbers (311) and a slight decrease in number of leaves (2542 to 2526) from 2010 to 2011. While this data from the two sampling regimes indicates relative stability for the last 4 years, it will be gathered for at least one more year to ensure no adverse trends from the amphitheater construction and the more recent, 2010, construction of a roof overtopping a portion of the amphitheater.

On March 22, 2011 the Pisgah Ranger District initiated a large landscape prescribed burn that included seven of the Pink Beds Helonias subpopulations at its southern perimeter. Based on firing methods and previous burns within the vicinity it was thought the fire would not affect the wet areas where the subpopulations occur. However during the burn the predicted relative humidity of 45% dropped to 19%. As a result one of the subpopulations (#15) was burned over. Another factor that resulted in the burn-over was a change in moisture content at this site. During the planning stages for the burn this area was partially inundated due to nearby beaver activity. However at the timing of the burn the beaver activity had moved upriver which resulted in much drier site conditions in subpopulation 15.

During the review of the burned subpopulation it appeared the primary impact was consumption of decaying leaves from the previous year. Rosette crowns were noted and appeared undamaged. Plots (1 by 1 meter) were established within two weeks of the burn within subpopulation 15 to determine if the burned rosettes were negatively affected. Rosette counts were taken for each plot as well as photographs. The plots were re-sampled in mid-July with preliminary results that slightly more rosettes were noted than previously counted following the burn.

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, recording coverage estimates and health of the lichen, was developed by the US Fish and Wildlife Service, Blue Ridge Parkway, and USFS. In FY 2011, an assessment was

completed across six of the currently known subpopulations. All of the subpopulations were present and appeared robust. All except one were located within boulders along streams; the remaining subpopulation was on a high elevation rock outcrops surrounded by Spruce-Fir forest. The one unhealthy subpopulation had 15-20% of their squamulos either covered with black growths or dried up and turning a pale whitish color.

Isotria medeloides: 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. As during the previous years, searches across these two sites in 2011 were unsuccessful.

Spiraea virginiana: The 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. 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 2011 was the fourth consecutive year along the Cheoah River, and the second treatments within the Nolichucky River and Whiteoak Creek.

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 2010. The same aerial extent was assessed at five of the subpopulations along the Cheoah River. This coarse estimate did not vary from the previously recorded numbers for these subpopulations recorded in 2008.

One remaining *Spiraea virginiana* clump with one visible stem was recorded at the Whiteoak Creek site in spring of 2011. This population continues to decline as a result of a Japanese knotweed infestation and apparently from a heavy storm event in 2010 that scoured the stream bank. Based on similar observations following herbicide NNIS treatments near another Virginia spiraea population along the Little Tennessee River (not on USFS lands), it may be the herbicide can translocate into Virginia Spiraea rhizomes that touch the targeted NNIS roots.

Hudsonia montana: 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 and 2013.

Liatris helleri: 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 2011 two subpopulations on Shortoff Mountain was counted and assessed for vigor and/or threats. Both populations were flowering abundantly in August. One subpopulation was noted to have an encroaching infestation of the non-native herb mullein (*Verbascum thaspsus*). Hundreds of individuals of this biennial plant were pulled to prevent it from overtopping the nearby Liatris helleri subpopulation. A more complete assessment for this species is planned for 2011.

Helianthus schweinitzii: 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 five subpopulations in 2010. Two subpopulations increased, two were stable, and one powerline subpopulation declined. The subpopulation within the powerline was difficult to adequately assess given recent mowing. A more complete assessment will be completed in 2012.

Lysimachia asperulifolia: Sixty-nine subpopulations of rough-loose loosestrife have been previously documented in the Croatan National Forest (CNF). Except for a single population, all the occurrences of rough-leaved loosestrife occur within the southern third of the CNF. In 2011 searches were completed to update historical occurrences along Whiteoak Road, Bouge Loop, Ocean, and Little Road. Given that this species is rhizomatous and can dramatically change in population size without periodic prescribed burns subpopulation abundance or presence varied (Table 5). The Little Road subpopulation in the northern portion of the district was not relocated. Twenty- subpopulations were searched for in the southern portion of the district. Of these ten were relocated. Those areas (4) with recent and more frequent prescribed burns including growing season fires had the largest subpopulation sizes. In contrast areas with less frequent fire and no growing season burns had fewer individual stems, some as few as five. One subpopulation that had not burned in over 15 years was only present along a partially shaded old roadbed. All four stems were not vigorous and barely visible.

Table 5. Observations on abundance and vigor across twenty-two *Lysimachia asperulifolia* subpopulations within the Croatan NF.

Previous Observations	Observation Date	Subpopulation abundance	Comments
1989, 1990, 1992, 1997	May 2011	10 subpopulations failed to find	Shaded overstory or dense shrub layer, no recent prescribed burns
Two new	May 2011	389 stems	In previous fireline
1989,1991,1992,1998, 2003	May, September 2011	6 subpopulations totaling 99 stems	With recent dormant season burns, would benefit from growing season burn
1989, 1991, 1998, 2003	May, September 2011	4 subpopulations totaling more than 3000 stems	With recent frequent burns including growing season, three with abundant Venus flytrap
1992	May 2011	4	Desperately in need of burn, overgrown shrub layer

As a result of the subpopulation updates in 2011 sixty-nine separate occurrences have been documented within the Croatan NF, although at least 20 have not been located for more than 15 years.

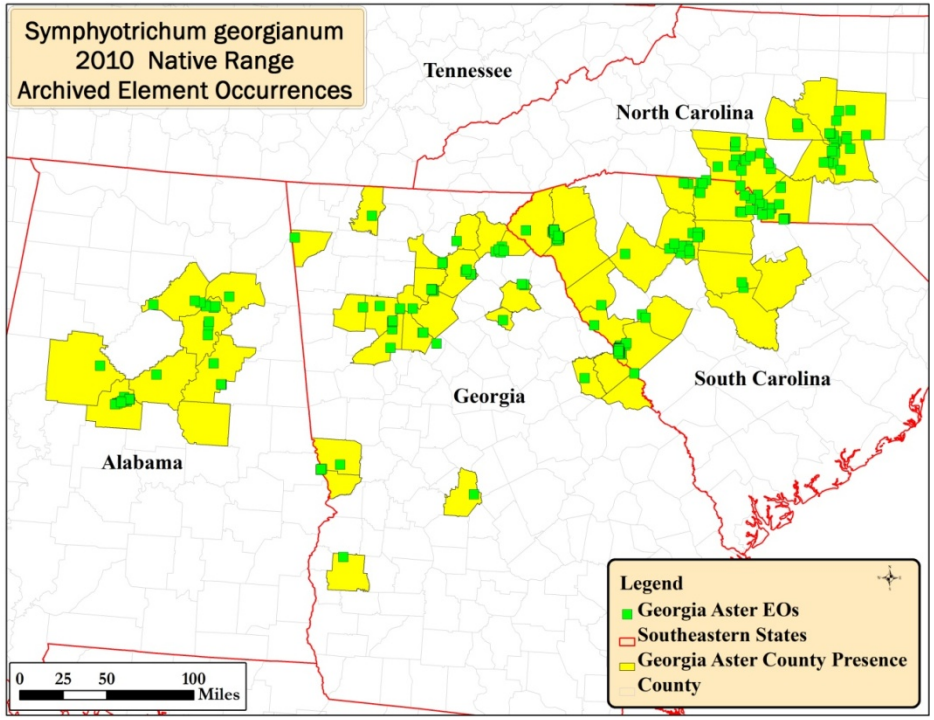
Other Rare Plant Monitoring

Georgia Aster

Georgia aster (*Symphyotrichum georgianum*) is a Region 8 sensitive plant and a federal candidate species. In 2010 a study investigating recovery strategies for Georgia aster was initiated as a guide to help determine the need to formally list this species. The study is evaluating levels of genetic variation among and within populations, systematically assessing rates of seed production and viability across the species' range, and determining whether patterns of low seed viability are associated with low levels of genetic variation. In conjunction with this proposal, methods for long term safeguarding of germplasm (seed) would be refined for this species, and germplasm accessions placed into appropriate facilities. Partners in the study include the USFWS, Atlanta Botanical Garden, State Botanical Garden of Georgia, UNC Botanical Garden, the Citadel, Sumter NF, Talladega NF, Chattahoochee NF and the Uwharrie NF.

During this 2 year study visits to as many as possible historical populations across its range were conducted (Figure 20). In North Carolina thirty-six of the sixty-one occurrences were revisited by the partners. Two new occurrences were located during this 2 year period by the partners. All seven of the occurrences within the Uwharrie NF were visited. One of the occurrences was located for the first time in 2010.

Figure 20. Natural range of Georgia Aster across North Carolina, South Carolina, Georgia, and Alabama.



Of the 36 visited sites within North Carolina, ten were not relocated. Five of these are believed to be extirpated. Of the remaining 26 occurrences, 21 were determined to have some level of threat, either from road construction, road maintenance, or residential encroachment. Eleven of the sites, including two on the Uwharrie NF, had a moderate infestation of non-native invasive plant species, in particular *Sericea lespedeza*. The only sites that have recently been managed with prescribed burns are two sites on the Uwharrie NF. While it is too early to examine any trends for the seven sites across the Uwharrie NF, all were stable from 2010 to 2011. The number of individuals, as recorded by stem number, within the plots varies from a low of seven to an estimate of more than 3000. Given the increase in prescribed burning across the Uwharrie NF, these lands plus three other powerlines

managed by Mecklenburg County Parks and Recreation represents the optimal locations in North Carolina to expand and conserve this rare Aster for the foreseeable future.

Periodic reviews of other sensitive and locally rare plant species populations also occurred across the eight districts in FY 2011. These reviews were completed by USFS botanists, contractors, NC Natural Heritage Program botanists, and private individuals. Several new populations were located across the NFsNC. Twenty-two new populations or subpopulations were located across the NFsNC. One species, *Scutellaria saxatilis*, was located for the first time in the Nantahala National Forest. A complete list of the reviewed species is provided below.

Table 6. Sensitive and locally rare species populations that were updated in FY 2011

District	Species updates
Uwharrie	*Helianthus laevigatus, Amorpha schwerinii, Symphyotrichum georgianum, Cirsium carolinianum*
Croatan	*Dionaea muscipula, Solidago verna, Lysimachia loomisii, Polygala hookeri, Rhynchospora breviseta, Rhynchospora harperi, Ponthieva racemosa*
Appalachian	*Prenanthes roanensis, Silene ovata, Lilium grayi, Alnus viridis* ssp *crispa, Hydrastis canadensis, Minuartia groenlandica, Buckleya distichophylla, Dicentra exima*
Grandfather	*Fothergilla major, Tsuga caroliniana, Shortia galacifolia var. galacifolia, Minuartia groenlandica, Sphagnum pylaesaei, Acrobolbus ciliatus*
Pisgah	*Rhododendron vaseyi, Peltigera venosa, Thermopsis fraxinifolia, Plagiochila caduciloba, Glyceria nubigena, Lycopodiella inundata*
Nantahala	*Peltigera venosa, Megaceros aenigmaticus, Carex woodii, Silene ovata, Tsuga caroliniana, Hydrastis canadensis, Cypripedium parviflorum var. pariflorum*
Tusquitee	*Frasera caroliniensis, Brachyelytrum aristosum, Megaceros aenigmaticus*
Cheoah	*Echinacea purpurea, Diarrhnea americana, Stachys clingmanii, Megaceros aenigmaticus, Frasera caroliniensis, Scutellaria saxatalis*

Non-native Invasive Plant Species

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 2011 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 three sites with federally listed plant species had invasive plant control projects surrounding occupied habitat (Table 7). Two of the control areas, Cheoah River and Linville Gorge, are ongoing American Recovery and Reinvestment (ARRA) projects.

Table 7. 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
Cheoah River	Cheoah	Impacts to *Spiraea virginiana*, Appalachian Elktoe, Spotfin Chub	OB, K, LJ, P, TH, M, PT, MR, D
Region 8 Sensitive Species			
Upper Chattooga River Watershed	Nantahala	Impacts to *Lysimachia fraseri*	S
Tellico Gap	Nantahala	Impact to *Silene ovata*	GM
Roan Mountain	Appalachian	Impacts to *Lilium grayi*	C, OB
Harmon Den	Appalachian	Impacts to Silene ovata	GM
Linville Gorge Area	Grandfather	Impacts to *Liatris turgida, Fothergilla major*	PT, TH, JS, MR, S
Foster Creek Bog	Pisgah	Impacts to Carex	MR, D, P, TH
Cheoah River	Cheoah	Impacts to Junaluska salamander, *Megaceros aenigmaticus*	OB, K, LJ, P, TH, M, PT, MR, D

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

Other control work across the Nantahala and Pisgah NFs was completed along roads and recent vegetation treatment projects. Principle targeted species were multiflora rose, oriental bittersweet, chinese silvergrass, princess tree, tree-of-heaven, and Japanese spiraea. Total control work was completed across 575 acres.

Many of the projects areas identified above have had work completed for 3-4 years and are indicative of the commitment needed to adequately control a site. Every year smaller infestations are noted, however adequate control requires persistence. In 2011 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. Treatment by hack and squirt methods were found to be effective for princess tree and tree-of-heaven. 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 still remain 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: 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	NO REPORT SUBMITTED

Other Monitoring

Soil and Water

Monitoring Item	Results
Acres of soil and water improvement	99 core acres 77 integrated acres
Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?	***Forestry Best Management Practices*** In March of 2011 Forestry Best Management Practices (BMPs) were monitored on the Nantahala and Pisgah National Forests. The monitoring was done to determine whether or not BMPs were being implemented and effective in controlling sediment and other pollutants during timber sale activities. Twenty-three harvest units were selected for review from the Baldwin Gap, Chestnut Mountain, Fires Creek, Pressley Fields, Shope Creek and Slipoff Timber Sales. 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." This monitoring is intended to answer the Implementation Question "Are management practices in compliance with NC FPGRWQ?" A total of 413 individual BMPs were checked for implementation, effectiveness, and visible sedimentation to streams. By determining implementation rates, we are attempting to answers the question, "Have the rules been properly applied?" By determining effectiveness, we are attempting to answers the question, "Were the rules effective in preventing sediment or other pollutants from impacting water quality?" Determining visible sediment to streams, we are attempting to answer the question "Are we compliant with the NC FPGRWQ standard to prevent visible sediment from reaching stream channels?" For all BMP Categories surveyed ("Total Percent" row in Table 8) the rules were implemented without departure 93.7% of the time. There was a minor departure from the rules 2.7% of the time and a major and gross departure from the rules 2.4 and 1.2% of the time, respectively. Effectiveness of the rules was at least adequate 94.2% of the time. There was a minor or temporary impact to streams 2.2% of the time and a major short-term impact 1.9% of the time. There was a major long-term impact 1.7% of the time. Visible sediment was not entering the stream 96.4% of the time. Non-critical visible sediment reached the stream 2.8% of the time and visible sediment flow considered to be "critical" reached the stream channel 0.8% 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. 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.

Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?

Table 8. NFsNC 2011 Forestry Best Management Practices (BMP) Monitoring Results.

BMP Category	Implementation %				Effectiveness %					Visible Sediment %		
	Exceeds 4 Meets or	3 Minor Departure	2 Major Departure	Departure 1 Gross	Over Past 5 Improvement	Protection 4 Adequate	Impact 3 Minor/Temp.	Term Impact 2 Major Short-	Term Impact 1 Major Long-	Sediment 3 No Visible	Visible 2 Non-Critical	Critical Visible 1
Harvest Area Including Skid Trails/Log Decks	98.0 %	1.2 %	0.8 %	0.0 %	0.0 %	98.0 %	1.2 %	0.8 %	0.0 %	99.3 %	0.7 %	0.0 %
Skid Trail Stream Crossings	100. 0%	0.0 %	0.0 %	0.0 %	16. 7%	83.3 %	0.0 %	0.0 %	0.0 %	100. 0%	0.0 %	0.0 %
Roads	88.8 %	6.3 %	1.3 %	3.8 %	2.5 %	88.8 %	3.8 %	1.3 %	3.8 %	92.3 %	3.8 %	3.8 %
Road Stream Crossings	84.8 %	3.8 %	8.9 %	2.5 %	0.0 %	84.8 %	3.8 %	6.3 %	5.1 %	92.2 %	7.8 %	0.0 %
Total Percent	**93.7 %**	**2.7 %**	**2.4 %**	**1.2 %**	**0.7 %**	**93.5 %**	**2.2 %**	**1.9 %**	**1.7 %**	**96.4 %**	**2.8 %**	**0.8 %**

Conclusion: Monitoring shows that the Nantahala and Pisgah National Forests are adequately applying Best Management Practices during timber sale operations. If we consider BMPs applied during tractor logging, 145 out of 150 BMP checks were appropriately applied (96.7%). If we consider skyline logging units, 104 practices were monitored and all were implemented and effective (100%). If we consider temporary roads used or constructed for the timber sale, 29 out of 30 practices met the BMP rules (96.7%). All timber sale related BMPs (tractor, skyline and temporary roads) resulted in 278 out of 284 implemented and effective BMPs, or 97.9 percent. Considering tractor logging units, skyline logging unit and temporary roads, No visible sediment delivery to streams occurred in 176 out of the 177 BMPs checked (99.4%).

Legacy system roads continued to be the main source of inadequate BMPs and sediment delivered to streams. This year, just two of these roads (FR 982 and FR 6176) resulted in 18 of the 20 departures from

Are management practices in compliance with NC Forest Practice Guidelines Related to Water Quality Regulations (FPGRWQ)?	the rules identified on system roads. Two practices on FR 982 (Rule 28 – Located in MA-18 (SMZ) and Rule 29 – Drainage Not to Stream Channel) resulted in the only two critical visible sediment ratings given this year. Rocking of all or portions of Forest Roads 982 and 6176 would go a long way to improving water quality on the National Forests in North Carolina. **Figure 21. Example of properly implemented BMPs on the Shope Creek Timber Sale (skid trail crossing with a temporary bridge), including BMP 19 – Grade Carried Across Crossing, BMP 21 – Stable banks protected from erosion, BMP 22 – Minimum runoff into channel, and BMP 25 – Flow not obstructed; fish can pass.** 

Are directions and standards being met for riparian areas?	***Riparian Areas*** In 2011, Forestry Best Management Practices (BMPs) were monitored on the Nantahala and Pisgah National Forests. The monitoring was done to determine whether or not BMPs were implemented and effective in controlling sediment and other pollutants during timber sale and road reconstruction and maintenance activities. Twenty-three harvest units were selected for review from the Baldwin Gap, Chestnut Mountain, Fires Creek, Pressley Fields, Shope Creek and Slipoff Timber Sales. 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 9) and will be used here to address the Forest Plan Monitoring Question "Are directions and standards being met for riparian areas?" Of the 23 harvest units surveyed, 97.5 percent had BMPs implemented that met or exceeded the standard, while 1.7 percent (2 units) experienced a minor departure from the "Barriers used if within 300 feet of perennial or intermittent channel" and "Shade strips in place" standards (Table 2). The minor departures from the standards did not require corrective action since they did not result in notable adverse impacts. The remaining 0.8 percent (1 unit) experienced a major departure from the "Violation of MA-18 Streamside Management Zone (SMZ)" standard due to harvest in the riparian area. The "Violation of MA-18 (SMZ)" resulted in a decrease in stream shading for approximately 150 feet length of perennial stream, and thus may promote increases in stream temperature. Because of the narrow channel width, presence of mid-level and understory vegetation, and relatively short length of stream affected; the potential for adverse temperature fluctuations is low. Although exceptions to meeting directions and standards for riparian areas existed during the 2011 survey, riparian values and water quality were not adversely impacted.

Prevent visible sediment from reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).

Table 9. Number of harvest units by category of "Implementation", "Effectiveness", and "Visible Sediment" for selected Forestry BMPs used to characterize the protection of riparian areas relative to forestry activities surveyed in 2011.

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	15	1				15	1			16		
4. Drainage not to Stream Channel	23					23				23		
5. No Skidding in Ephemeral Channel	23					23				23		
6. Shade Strips in Place	15	1				15	1					
7. No Logging Debris in P/I Channel	20					20						
9. Violation W/I MA-18 (SMZ)	22		1			22		1		23		
Total	**118**	**2**	**1**	**0**	**0**	**118**	**2**	**1**	**0**	**85**	**0**	**0**
Percent in Class	**97.5 %**	**1.7%**	**0.8 %**	**0%**	**0%**	**97.5 %**	**1.7 %**	**0.8 %**	**0%**	**100.0%**	**0%**	**0%**

Prevent visible sediment from reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).

Burned Area Emergency Response (BAER) monitoring – Gum Branch Fire, Croatan N.F.

Background Statement: The Gum Branch BAER Monitoring Plan (May 19, 2010) identified the potential need for seed establishment & erosion control on Suffolk soil types, soils identified by the NRCS Soils Survey as having a high potential for erosion. These areas burned with low intensity with pockets of moderate intensity where the fire resided longer consuming down woody debris. No hydrophobic soil conditions were observed during the May 15, 2010 BAER review. Croatan District personnel from the fire and timber shops believed that there was not a need for treatment of these sites. Still, the BAER team recommended treatment of grass seed and pine straw mulch on these burned areas. However, the treatment was not implemented because of a temporary reduction in workforce during the summer of 2010. Instead, the sites were reviewed following several storms.

Precipitation between sampling periods (May 15, 2010 and March 24, 2011) is presented in Table 4. Since the data is from the Cherry Point, Marine Corps Air Station, within a mile of the monitored sites, it is a good representation of precipitation experienced at the sites. Precipitation during the summer and early fall was high, with intense storms during June, August, and especially September and October. Rainfall events of such intensity (up to 6.09 inches per day) had a high potential to erode the sites.

Table 10 Total monthly and maximum 24-hour precipitation values between sampling period (data from "mesowest.utah.edu", Cherry Point, Marine Corps Air Station (Station Identifier KNKT)).

Month & Year	Total Monthly Precipitation (inch)	Maximum 24-hour Precipitation (inch)
May 2010 (May 15-31)	1.05	0.38
June 2010	7.09	2.49
July 2010	3.90	1.19
August 2010	6.18	2.55
September 2010	11.53	4.98
October 2010	6.86	6.09
November 2010	1.40	1.04
December 2010	3.22	1.02
January 2011	2.73	2.00
February 2011	1.29	0.52
March 2011 (March 1-24)	1.40	0.65

Prevent visible sediment from reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).	Methods: Photos were taken at designated locations to reproduce images of respective sites along the shoreline areas of Hancock and Cahooque Creeks, largely in the suffolk soil type. Baseline photos were taken on May 15, 2010 just before the fire was designated as "controlled". The area was visited by District personnel on occasion following large storm events for a visual assessment of soil conditions, and the photo point sites were resurveyed on March 24, 2011. Visual observations, documented by photo point monitoring, revealed little evidence of soil erosion (see below) as a result of the Gum Branch Fire. Most of these sites experienced a low intensity burn, without soils becoming hydrophobic. Also, needle cast from the overstory helped to stablilize the sites by covering bare soils and reducing the risk of surface erosion. Erosion was noted on short sections of shoreline where wave action scours the bank during storm events. The fire appeared to have had little influence on erosion rates along this shoreline.

Figure 22. Site A, May 10, 2010 photo on left and March 24, 2011 photo on right for comparison. Note the absence of soil erosion and new forest litter.

Figure 23. Site C, May 10, 2010 photo on left and March 24, 2011 photo on right for comparison. Note the absence of soil erosion and new forest litter.

Figure 24. Site E, May 10, 2010 photo on left and March 24, 2011 photo on right for comparison. Note the absence of soil erosion and new forest litter.

Figure 25. Site H, May 10, 2010 photo on left and March 24, 2011 photo (approximate location) on right for comparison. Note the absence of soil erosion and new forest litter.

Conclusion: This monitoring documents the stability of the sites having a high potential for erosion on the Gum Branch Fire. Visible sediment was not found to be reaching stream channels in accordance with NC Forest Practices Guidelines Related to Water Quality (NC FPGRWQ).

Monitoring Item	Results
Design and implement management practices to maintain or improve the long-term inherent productive capacity of the soil resource.	***Soil Quality Monitoring*** In 2011, 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 2011 SQM is presented in Table 11. Monitoring was conducted in the mountains on the Pisgah and Nantahala National Forests and on the Piedmont on the Uwharrie National Forest. All timber sale units surveyed were predominantly ground-based harvested and had some degree of detrimental soil disturbance, however all disturbance was below the significant level. Several units, surveyed pre-harvest in 2009 and 2010, were resurveyed this year following logging. Although an increase in disturbed area occurred from pre-harvest, the units surveyed maintained appropriate land productivity.

The detrimental soil disturbance found in Farmers Branch Timber Sale in harvest Unit 4 in 2010 (15.7% detrimental disturbance) was mitigated in 2011 by subsoiling detrimentally compacted soils on skid roads and landings (Figure 21). Detrimental soil disturbance in this unit is now well below the 15% guideline and land productivity has been restored too much of the area. Eagle Fork Timber Sale Unit 2, determined to have a detrimental soil disturbance of 16.3% in 2009, is planned for mitigation during 2012.

Table 11. NFsNC 2011 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	Post	11	9.4	0	9.4
		3	Post	27	3.2	0	3.2
Pisgah	Shope Creek	23-12A	Post	12	9.3	2.2	10.9
		23-13	Post	9	2.5	0	2.5
		23-12B	Post	6	5.0	0	5.0
Nantahala	Slipoff	10	Post	24	3.6	3.3	7.0
		11	Post	19	6.3	0	6.3
Uwharrie	Wood Duck	1	Post	113	6.5	0	6.5
		2	Post	44	2.5	0	2.5
		3	Post	29	3.3	0	3.3
		4	Post	25	3.0	0	3.3
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**
		5	Post	46	2.1	0	2.1
Uwharrie	Old Ridge	1	Post	31	3.5	0	3.5
		2	Post	24	2.5	0	2.5
		3	Post	38	1.0	3.3	2.6
Uwharrie	Stinger	2	Post	53	10.1	0	10.1

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

Figure 26. Farmers Branch Timber Sale in harvest unit 4 subsoiling during 2011 to reduce soil compaction and detrimental soil disturbance from skid roads and landings.

Conclusion: Monitoring determined that there was not significant change in land productivity due to timber harvest activities surveyed in 2011. It appears that the National Forests in NC are successfully designing and implementing the extraction of timber to minimize soil disturbance, specifically minimizing excavated skid roads and the size of log landings. In the two cases where detrimental soil disturbance exceeded the significant level, mitigation of the soil disturbance has been completed or is in the planning stages. In instances where detrimental soil disturbance approaches the 15% guideline, decision makers may consider mitigation to reduce future "legacy" disturbance.

Tellico OHV Trail Decommissioning

The Forest Service contracted with a private firm to continue the assessment of closed sections of the Upper Tellico Off-Highway Vehicle Area. In April and May of 2011, erosion and sediment control effectiveness monitoring was conducted on approximately 20 miles of decommissioned and rehabilitated roads/trails within the Upper Tellico River Watershed (Table 12). 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 habitat for native brook trout.

Of the 41 road/trail sections surveyed, 72.5 percent had BMPs implemented that met the standard, while 20.1 percent experienced a "Minor Departure" from each of the rules except "Fish Passage", and 6.7 and 0.7 percent had a "Major Departure" and "Gross Departure" from the rules, respectively. "Major Departure" and "Gross Departure" required corrective action due to potential adverse impacts. BMPs were found to be adequately effective on 73.8 percent of the surveyed sections, "Minor/temporary Impacts" occurred 18.5 percent of the time, while "Major Short- and Long-term Impacts", requiring corrective action, occurred 6.4 and 1.3 percent, respectively. No visible sediment to stream channels was observed for 78.2 percent of the road/trail sections, while a "Non-critical" amount of sediment reached streams 16.8 percent. "Critical" amounts of sediment reached the stream on 5.0 percent of the surveyed sections. Results of the monitoring show that corrective action was required on the trail and at stream crossings on Trails 7, 8, 10A, and 11, and on the trail only on Trails 4 and 9. This information was used to plan and implement corrective action during 2011 and the winter of 2012. The 2012 monitoring of these same road/trail sections will document the need for further action.

Overall, decommissioning of the Upper Tellico OHV Area trail network was highly effective at reducing soil erosion and sedimentation to the Tellico River (Figure 22). As BMP effectiveness improves in the watershed, erosion and sedimentation rates should approach background or pre-disturbance levels. Therefore, we anticipate that stream turbidity during storm events will decrease and channel bed substrate will improve as sand and smaller sized particles are removed from these reaches of stream, thus providing high quality habitat for native brook trout.

Table12. Summary of 2011 Tellico OHV Area trail decommissioning by category of "Implementation", "Effectiveness", and "Visible Sediment" for selected Road/Trail BMPs used to characterize the reduction of erosion and sedimentation

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
TRAIL OR ROAD:												
Drainage Not to Stream Channel	33	3	4	1	0	32	4	3	2	34	3	4
Barriers Used if w/in 300' of P/I Channel	32	7	2	0	0	32	6	3	0	34	4	3
No Vertical Cuts if w/in 300' of P/I Channel	30	7	3	0	0	30	7	2	1	34	5	1
Rehabilitation w/in 30 days - Ground Cover Established	31	8	1	1	0	32	6	2	1	33	5	3
STREAM CROSSING:												
Stable Banks/Protected from Accelerated Erosion	8	8	2	0	0	7	9	2	0	11	6	1
Slopes Graded to a Stable Angle	15	3	0	0	0	16	2	0	0	16	2	0
Erosion Control Matting Installed	9	7	2	0	0	10	7	1	0	12	5	1
Minimum Runoff into Channel	8	7	3	0	0	8	7	3	0	12	4	2
Ground Cover w/in 10-days	13	4	1	0	0	14	3	1	0	12	6	0
Ground Cover Same Day (Areas w/in 25' of Crossing)	13	4	1	0	0	14	3	1	0	12	6	0
Seeding Areas Over 25' from Channel w/in 15-days	15	2	1	0	0	16	1	1	0	14	4	0
Flow Not Obstructed; Fish Can Pass	9	0	0	0	0	9	0	0	0	9	0	0
Total:	**216**	**60**	**20**	**2**	**0**	**220**	**55**	**19**	**4**	**233**	**50**	**15**
Trail or Road Percent:	**77.3**	**15.3**	**6.1**	**1.2**	**0.0**	**77.3**	**14.1**	**6.1**	**2.5**	**82.8**	**10.4**	**6.7**
Stream Crossing Percent:	**66.7**	**25.9**	**7.4**	**0.0**	**0.0**	**69.6**	**23.7**	**6.7**	**0.0**	**72.6**	**24.4**	**3.1**
Total Percent:	**72.5**	**20.1**	**6.7**	**0.7**	**0.0**	**73.8**	**18.5**	**6.4**	**1.3**	**78.2**	**16.8**	**5.0**
Stream Crossings: Total Observed: 146, Perennial: 72, Intermittent: 33, Seep: 41, & Fish Bearing: 16												

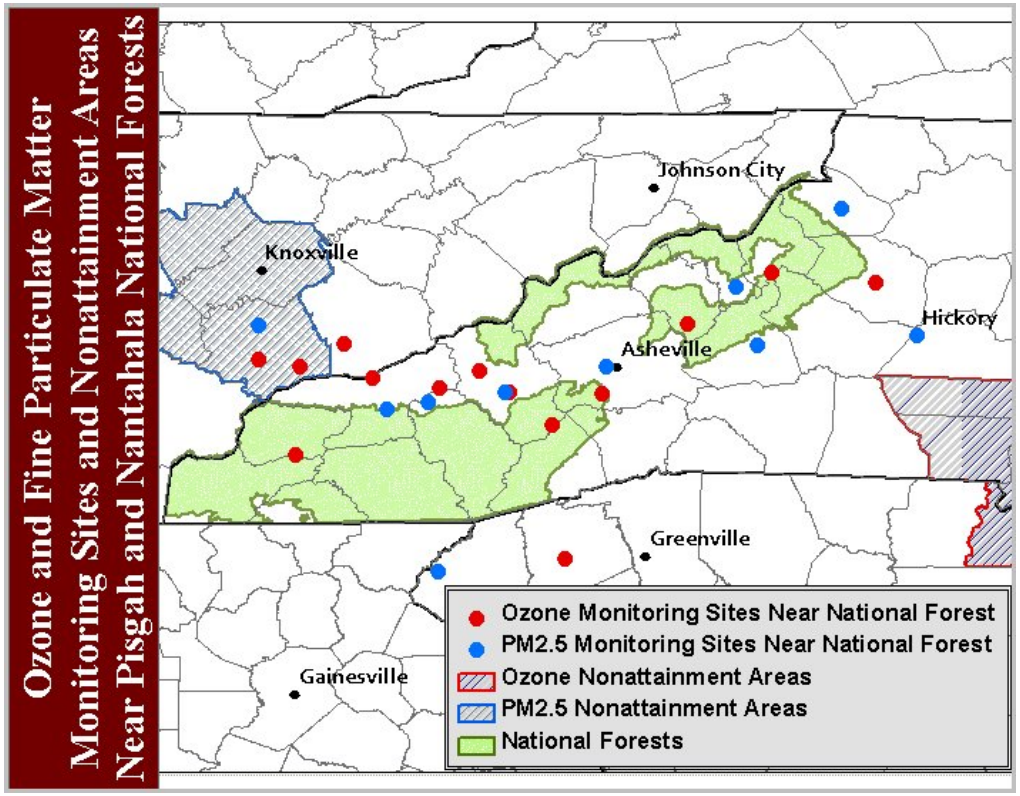
Figure 27. Example of a stabilized stream crossing and a section of decommissioned trail/road in the Upper Tellico River watershed in 2011.

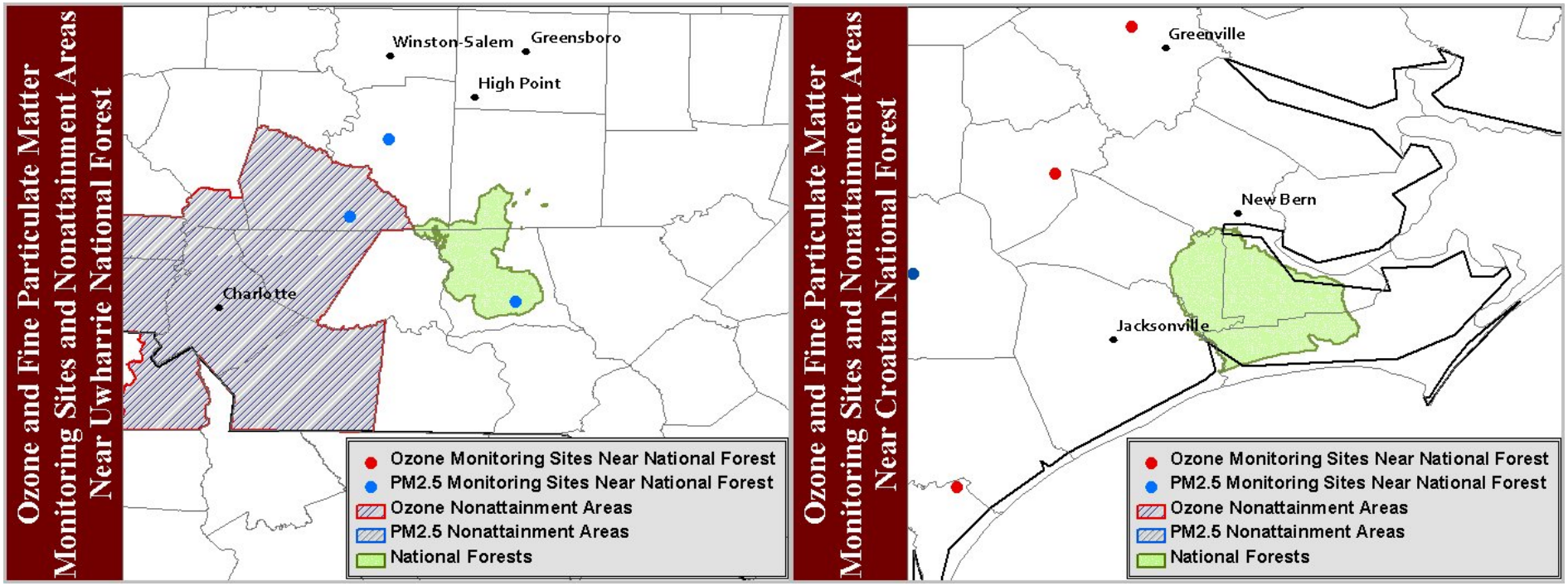
AIR QUALITY

Monitoring Item: Attainment Status with the National Ambient Air Quality Standards (NAAQS)

The criteria pollutants of most concern on the National Forests in North Carolina are particulate matter and ozone. Fine particulate matter is the leading cause of regional haze, while ozone can harm sensitive vegetation within the forest. Additionally, at elevated concentrations these two pollutants can impair the health of both employees of and visitors to the National Forests. The U.S. Environmental Protection Agency (EPA) has been directed by Congress to set national Ambient Air Quality Standards (NAAQS) for these and other pollutants, and state air regulators monitor ozone and fine particulate matter at several sites near the National Forests as shown in Figures 28, 29 and 30. The grey shaded areas are where measured concentrations exceed air quality standards.

Figure 28. Ambient Monitoring Sites and Nonattainment Areas Near Pisgah and Nantahala National Forests.





Figures 29 (left) and 30(right). Ambient Monitoring Sites and Nonattainment Areas Near Uwharrie National Forest and Croatan National Forest, respectively.

As shown in the figures above, all areas of the National Forests in North Carolina are attaining the air quality standards.

Lands/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 = 0
Pisgah = 0
Uwharrie = 0
Croatan = 0

Acres Acquired by Purchase, Donation, Exchange: Nantahala NF = 34.99
Pisgah NF = 0
Uwharrie NF = 0
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>
<tr><th>Forest</th><th>Recreation</th><th>Lands</th><th>Total</th></tr>
<tr><td>Nantahala</td><td>141</td><td>529</td><td>670</td></tr>
<tr><td>Pisgah</td><td>196</td><td>378</td><td>574</td></tr>
<tr><td>Croatan</td><td>8</td><td>94</td><td>102</td></tr>
<tr><td>Uwharrie</td><td>18</td><td>108</td><td>126</td></tr>
</table>

Of these permits state-wide, 1,109 are for land-based uses such as road easements and water systems, and 363 permits are for recreation activities such as outfitting, guiding, and whitewater rafting. There are a total of 1,472 permits state-wide.

Key projects include 23 State Highway projects and upgrading utility lines across North Carolina.

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.</td></tr>
</table>

Fire Management

Monitoring Item	Results						
National Fire Plan Accomplishments	Year	Prescribed Fire Accomplishments - National Forests in North Carolina					
			**Fuels	Wildlife	Timber/ Silviculture	Other (T&E)	Total Acres
	2011	Croatan	9,399	1,062	856	73	11,390
		Uwharrie	2,774	174	193	0	3,141
		Nantahala/Pisgah	9,947	96	3,333	124	13,500
		TOTAL					28,031
	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.

Roads/Trails

Monitoring Item	Results
Amount of trails constructed/reconstructed	NO REPORT SUBMITTED
Miles of roads maintained to standard	Nantahala/Pisgah: NO REPORT SUBMITTED Uwharrie: NO REPORT SUBMITTED Croatan: NO REPORT SUBMITTED
Miles of road constructed/reconstructed/ Decommissioned	**Nantahala/Pisgah:** Constructed: Reconstructed: Decommissioned: **Croatan:** Constructed: Reconstructed: Decommissioned: **Uwharrie:** Constructed: Reconstructed: Decommissioned: NO REPORT SUBMITTED

Cultural Resources

<u>General Direction</u>: Cultural resources, which are listed on or eligible for the National Register of Historic Places or are designated National Historic Landmarks, are protected. Suitable sites are developed and / or interpreted for public use and enjoyment.

Historic Yellow Mountain Lookout

Historic Trail of Tears

Table 31. Cultural Resources Identified in Relation to Acres Surveyed

	Sites & Properties Identified	Acres Surveyed
FY 2011	113	1,563
ALL-TIME TOTAL	6,382	195,401

Table 32.Site Condition and Effects on Cultural Resources.

Forest	Sites: Monitored	Stable	Effects*	Effects**
Nantahala	24	17	7	2
Pisgah	22	15	6	2
Croatan	9	6	3	1
Uwharrie	15	9	7	1
Total:	70	47	23	6
Percent:	100%	67%	33%	9%

*Effects from FS actions or public use / activities **Effects from weathering / natural conditions.

Tribal Relations

The forest continues to work in partnership with the Eastern Band of Cherokee Indians, the Cherokee Nation and the United Keetoowah Band of Cherokee on the National Historic Trail of Tears and the NC Rock Art Project. In addition to these federally recognized tribes the forest is consulting with the Catawba, the Tuscarora and the Muscogee Creek.

Public Interpretation

In addition to the tribes, the forest is working with several partners, NC Office of State Archaeology, local communities and universities to record and preserve rock art and interpret the Trail of Tears. The Uwharrie NF hosted volunteers on a Windows On the Past project documenting the historic Lawrenceville town site in FY 2011. The Eastern Band of Cherokee and local community organizations partnered to celebrate the history and 75th anniversary of the Joyce Kilmer Wilderness on the Cheoah Ranger District.

Cultural Resources Site Protection

Seventy (70) cultural resources, including prehistoric archeological sites, historic structures, home sites and cemeteries, susceptible to potential impact from project implementation, visitor use, natural deterioration and vandalism or looting were visited and formally assessed and documented.

Eroding Croatan shoreline site now stabilized.

Stabilized Stewart Cabin on Cheoah Ranger District

Stabilized Cemetery on Appalachian Ranger District

Table 33. NFsNC Sites Monitored in Fiscal Year 2011

Forest	Prehistoric Sites	Historic Sites	Prehistoric /Historic Sites*	Total Sites Monitored
Nantahala	6	17	1	24
Pisgah	12	7	3	22
Croatan	3	6	0	9
Uwharrie	10	5	15	
Total:	31	35	4	70

*Some sites are multi-component, prehistoric & historic.

Sixty-seven per cent (67%) of the sites monitored were stable. Most forest management projects such as recreation developments and timber harvest have not adversely impacted cultural resources. Natural degradation of sites along riverbanks has decreased on the Croatan NF and in areas of watershed restoration projects. Using barriers to block sites from unauthorized use by Off Highway Vehicles (OHV) has curtailed some impacts on the Uwharrie NF.

Vegetation re-established on Croatan shoreline site

Log barrier keeping use on Uwharrie OHV trail

Vegetation re-established along riverbank site and trail on Pisgah Ranger District

Most historic structures on the NFsNC, including the ten recently rehabilitated lookouts, are stable other than for some new graffiti. Civilian Conservation Corps (CCC) constructed structures including the English Chapel Bridge and Pink Beds Registry

Restored CCC Camping Registry Structure, Cradle of Forestry

Restored CCC English Chapel Bridge, Pisgah RD

Boardwalk constructed to alleviate impacts from a bicycle trail

Shelter on Pisgah Ranger District were reconstructed. A boardwalk was built to stop bicycle trail impacts across a prehistoric and a historic site.

However, 33% of sites monitored in 2011 have been subjected to adverse cultural impacts. A cemetery was inadvertently impacted by a prescribed burn and wildlife field plowing on the Croatan RD. Power line clearing impacted a historic tar kiln and a fire line impacted a historic cattle dipping vat. OHV use continued to impact five sites on the Uwharrie RD and two sites on the Grandfather RD. Horse trails use impacted two sites on the Uwharrie RD. Five of these sites had been previously identified as being impacted by OHVs and horses for several years and protection was recommended.

Cattle Dipping Vat impacted by fire line on Croatan RD

Prehistoric site impacted by user created horse trail, Uwharrie RD

Prehistoric site impacted by user created motorcycle trail, Grandfather RD

Heavy developed recreation use is impacting important cultural resources on the Nantahala and Pisgah NFs. Trail use along historic routes and railroads, as well as through cemeteries, is accelerating erosion of sites. Trail hardening and re-routing is effective and needs to be considered. Camping is exposing artifacts in some sites at campgrounds. Alternative ground cover methods should be considered and implemented.

Site impacted by heavy trail use along river, Pisgah RD

Site impacted by camping use, Nantahala RD

Cemetery impacted by user-created trail, Tusquitee RD

While law enforcement activities and monitoring continue, artifact looting is increasing at sites that are less accessible and more likely to contain undisturbed and rare cultural deposits. Historic structures without maintenance or FS presence are being misused and vandalized.

Site looted by vandals, Pisgah Ranger District

CCC constructed Ranger dwelling being vandalized, Appalachian Ranger District

FY 2012 Action Plan

1. **Complete the Uwharrie LRMP revision process.**

2. **Over the next two years prepare analysis for a Chief's decision to permit prescribed burning for recovery of mountain golden-heather in the Linville Gorge Wilderness.**

3. **Compile monitoring and evaluation information in preparation for the assessment phase of the Nantahala and Pisgah National Forest plan revision process.**

LIST OF PREPARERS

Ruth Berner – Forest Planner – M&E Report Coordinator

Jason Rodrigue - Silviculturist

Sheryl Bryan – Wildlife and Fisheries

Rodney Snedeker – Archeologist

Julie Moore – Special Uses/Lands

Dale Remington – Timber Sale Forester

Delce Dyer – Landscape Architect

Rachelle Powell – Wildlife Biologist

Brady Dodd – Hydrologist/Soil Scientist

Melanie Pitrolo – Air Quality Specialist