Fiscal Year 2009
Monitoring and Evaluation Annual Report

Francis Marion National Forest

Revised Land and Resource Management Plan

United States Department of Agriculture
Forest Service
Southern Region

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Forest Supervisor's Certification

I have evaluated the monitoring results and recommendations in this report. I have directed that the Action Plan developed to respond to these recommendations 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.

With these completed changes, the *Revised Land and Resource Management Plan* is sufficient to guide management activities unless ongoing monitoring and evaluation identify further need for change.

Any amendments or revisions to the Forest Plan will be made using the appropriate National Environmental Policy Act procedures.

/s/Paul Bradley September 10, 2010
Paul Bradley **Date**
Forest Supervisor
Francis Marion and Sumter National Forests

Executive Summary of Monitoring and Evaluation Results and Report Findings

The *Revised Land and Resource Management Plan* (Forest Plan) provides guidance on how the Francis Marion National Forest (FMNF) will be managed. Monitoring determines how well goals and objectives are being met, if standards and guidelines are being properly implemented and whether environmental effects are occurring as predicted. Monitoring results are used to determine if programs should be adjusted or if changes in Forest Plan direction are needed.

Summary of Key Findings

Ecosystem Condition, Health and Sustainability

An analysis of the Geographic Information System (GIS) database identifies 49,426 acres of longleaf pine forest types. The Forest Plan objective is to have 44,700 acres in this forest type within ten years and 53,500 in the long term. Of this acreage, 38,679 acres occur in Management Area 26 (Sandy Ridges and Sideslopes). Longleaf pine ecosystems and related fire-dependent communities are primarily being maintained by periodic prescribed burning. No acres were planted with longleaf pine in fiscal year (FY) 09. However, the decision for the Honey Hill Habitat Restoration Project has been signed, and it is anticipated that planting longleaf pine will begin in 2013-2014. The Hellhole project has been scoped, and it is anticipated that the decision will be signed in the summer of 2010.

The GIS database shows 38,610 acres of mixed pine/hardwood forest types, 699 acres less than reported for FY2008. It is over 2.6 times the objective. The GIS database shows 5,027 acres of mixed pine-hardwood types in Management Area 27 – Loamy Ridges, Flats and River/Creek Bottoms. This is 195 acres less than reported for FY2008. Though this number is below Forest Plan objectives, it should be considered in context with the number of mixed stands that exist across the Forest. Mast-producing hardwoods are common in hardwood stands, mixed stands and scattered throughout pine stands.

The Forest burned fewer acres in FY 2009 than FY 2008 due primarily to a State wide burn ban that was issued by the South Carolina Forestry Commission. The burn ban was in response to the 19,130 acre Hwy 31 Fire, which occurred on April 22, 2009 in Horry County. As a side note, the Forest continued to increase acres burned during the dormant season.

Prescribed burning in the last 5 years within the red-cockaded woodpecker (RCW) habitat management area (HMA) remained near 50%. The area managed for RCW has changed since the LRMP was signed in 1996, and the RCW HMA is no longer an accurate tool for identifying RCW habitat.

The trend for prescribed burning longleaf pine forest types remains above 60 %. Fire is critical to restoring and maintaining this fire-dependent community, and thus the percent burned needs to increase in the future.

The forest has burned approximately 48 % of management area (MA) 26 in the last 3 years. This reflects a slight increase from FY 08 to FY 09. The intent is to remain on a 2 to 3 year cycle in MA-26 with 50 percent of the area being burned over a three year period.

The current levels of treating 30,000-40,000 acres per year falls short of the 53,000 acres needed to maintain RCW habitat**.** Fire is critical to restoring and maintaining RCW habitat and fire-dependent communities. The Francis Marion National Forest is using various strategies to increase the number of acres burned annually.

The Francis Marion RCW Population, a primary core recovery population and third largest in the US, has exceeded its recovery goal as described in the Recovery Plan. The population has continued to expand in some areas of the forest, especially in the core prescribed burning area, and decline in other areas. Inactive clusters tend to be concentrated in the Wildland Urban Interface (WUI) and/or areas where minimal management has allowed undesirable midstory succession to occur. Adequate foraging and nesting habitat continues to be the most limiting factors for the RCW on the forest.

As of 1 January 2009, there were 395 active RCW clusters on the Francis Marion National Forest, up from 363 in 2007 and 350 in 2006. Based on the combined monitoring results from 2006-2008, there are 378 potential breeding groups (PBG's), 17 single male groups (SMGs) and 65 vacant clusters on the FMNF. The Recovery Plan for the Red-cockaded Woodpecker (*Picoides borealis*): *Second Revision* (Recovery Plan) identifies the minimum population size for delisting the Francis Marion Primary Core population at 350 PBG's. As such, it appears that the FMNF population has exceeded the recovery goal by 28 PBG's.

The FMNF (conducted another red-cockaded woodpecker translocation and monitoring project. This project is being conducted in cooperation with the University of Georgia, Southeast Regional Partnership for Planning and Sustainability (SERPPAS), US Forest Service (USFS), and the Southern Range Translocation Cooperative (SRTC). This is the second year that the FMNF has participated in the project. Based on allocations determined at the 2009 Southern Range Translocation Cooperative (SRTC) meeting, four pairs of sub-adults were translocated to the Ocala National Forest, five pairs and one female went to the Talladega National Forest, and five pairs were translocated to the Joseph E. Jones Ecological Research Center at Ichauway. This translocation project not only saved the government money in terms of RCW monitoring, but also identified approximately 11 budded and pioneered clusters. The budded clusters would not have been found during our typical annual monitoring activities.

One of the largest Carolina Gopher Frog (*Lithobates capito*) breeding events in the past 10 years was documented in April 2009. Hundreds of individuals were documented in known breeding wetlands. Dipnetting for larval Carolina Gopher Frogs was conducted by USFS and Department of Natural Resources (DNR) personnel on June 2, 2009. Carolina Gopher Frog tadpoles and questionable tadpoles were collected and sent to the Riverbanks Zoo in Columbia, SC. These tadpoles were successively raised at the Riverbanks Zoo, and the zoo now has 3 subadult Carolina Gopher Frogs. The frogs will be kept in captivity at the zoo in order to study the species' feeding habits and lifespan. Genetic material will be collected and analyzed for comparison with other *Lithobates capito* populations.

While evaluating a potential reroute for the ATV trail, nine new subcolonies of pondberry (*Lindera melissifolia*) were discovered near an existing pondberry population, consisting of approximately an additional 1000 stems.

Five populations for America chaffseed (*Schwalbea americana*) were prescribed burned in 2009. Biological personnel met with fire personnel to determine how these areas, as well as the remainder of the American chaffseed sites, could best be managed and prescribed burned in 2010. Site visits by Forest Service personnel and partners suggest that the only known sites for the sensitive Carolina dropseed (*Sporobolus pinetorum*) and the sensitive pineland dropseed (*Sporobolus curtisii*), and one federally listed plant, Canby's dropwort (*Oxypolis canbyi*), are in decline due to lack of prescribed burning.

Laurel wilt was discovered on the forest in 2009, and several sites for pondberry and the sensitive pondspice (*Litsea aestivalis*), were monitored for incidence of the disease. Research and forest health personnel determined that the diameter of pondberry stems on the forest was too small to be entered by Ambrosia beetles carrying the disease, though pondspice stems are larger and could be affected. Pondspice has been infected with laurel wilt in Florida.

Laurel wilt is causing widespread mortality of red bay trees across the eastern portions of the district. Laurel wilt is responsible for the defoliation and mortality of red bay trees in nearby Hunting Island State Park in South Carolina. Monitoring of pondberry for the onset of laurel wilt adjacent to and within the FMNF is being conducted by faculty members at the Citadel.

No early successional habitat is being created through even-aged forest regeneration, though some is now in the planning stages. Thinning stands to moderate basal areas followed by prescribed burning create openings in the forest canopy that somewhat mimics early successional habitat. GIS records show 1,058 acres in permanent openings and wildlife openings, and no acres in the 0-3 year age class.

Several moderate to high quality seasonal wet savannas were identified as a result of inventories within the Hellhole Analysis Area in 2009. Dr. Jean Everett evaluated 31 seasonally wet savannas identified by the Forest Service, and found that 17 of the 31 were of moderate to high quality.

During fish surveys, it was observed that large woody debris is lacking in coastal stream systems. Hansbarger and Dean (1994) stated that fish inventory was difficult due to the abundance of downed trees and wood in the streams.

Crayfish and mussel shells were collected in conjunction with the fish community monitoring in 2003 (refer to the 2006 Monitoring Report).

There are 15 recreational fishing ponds on the Francis Marion totalling 44 acres. Largemouth bass and bream are the primary fish in the ponds. A few of the ponds have been stocked with catfish and grass carp for aquatic plant control. All ponds were checked for fish population balance, water quality, and aquatic plant presence in 2009.

The two main activities that cause air pollution within the Francis Marion National Forest are motor vehicle use and prescribed fires. Both of these activities emit pollutants that can increase

ozone and fine particulate matter concentrations. Although emissions from these activities can be significant, ambient monitoring conducted near the Francis Marion National Forest indicates that the national ambient air quality standards are not being exceeded for either of these pollutants. No negative impacts to visitors or vegetation within the Forest are expected.

Southern pine beetle populations returned to endemic levels during FY 2009. In the field assessments of several timber sales and units with streams or wetlands on the Francis Marion NF during 2009, BMPs were fully implemented and effective at protecting water quality, soil productivity and associated resources.

Sustainable Multiple Forest and Range Benefits

In FY09, 3.0 million cubic feet (MMCF) were offered for sale, down slightly from the 3.1 MMCF offered for sale in FY07. Long term sustained yield capacity is 63 MMCF/year. The main silvicultural practices employed in FY09 were first thinning, biomass thinning and pre-commercial thinning. Prescribed fire was used to release tree seedlings and saplings as well as reduce hazardous fuel loadings. Approximately 2,228 acres of thinning harvest were sold in FY 2009.

The Swamp Fox Passage of the Palmetto Trail (in compliance with the *2009 Operations and Maintenance Plan* and *2009 Sign Plan)* has been re-blazed, and new trail signs were installed at all points where the trail crosses a road. Also, mile markers have been installed along the 47-mile trail.

There continues to be infrastructure changes/improvements to the Wambaw Cycle Trail system in an attempt to mitigate impacts to the natural resources around the trail (as well as improve trail experience so riders want to stay on the trail). An assessment of the management, layout, and physical attributes of the Wambaw Cycle Trail was initiated in FY 2008 and completed in April 2009. The soil type, trail location and incompatible uses greatly affect the impacts of OHV trail on riparian and soil resources, hampering our efforts on the Francis Marion.

The second round of National Visitor Use Monitoring (NVUM) was conducted on the Forests in FY 2002 and FY2008. The results of both surveys show the following trends in recreation use. Overall national forest visits were down 3%. The annual visits in 2002 were 1,328,000 and that fell to 1,283,700 in 2008. Overall use was down slightly in the six-year period between 2002 and 2008.

The Francis Marion NF acquired two tracts in FY2009: a purchase of 55 acres in Berkeley County and a donation of 197 acres in Charleston County.

Organizational Effectiveness

The Francis Marion road system use by the public and commercial users has remained heavy, even during a weakened economy. Emphasis has continued on maintaining and reconstructing roads to meet the objective maintenance level, meet current design standards and best management practices, and reduce negative impacts to resources with the focus on watershed health. Road projects to support timber activities continue to focus on road surfacing and drainage repair and replacement. No new miles of road were constructed in FY 09.

The Forest's new construction road miles continue to be near zero and significantly lower than the target projected in the plan. This is being driven by the completeness of the road system as it relates to the timber program's specified road needs. Miles of road reconstruction continue to fall behind the ten year plan target due to a stagnant budget and low value timber sales. This is much lower than the plan target and lower than the 20% acceptable value established in the plan. This will affect the road system in future years by requiring more expensive road work and reduction in serviceability of the system. The forest has not been able to close significant mileage of roads to reach the percentage of closed roads in the plan.

The Francis Marion continues to conduct road condition surveys to determine the condition of the road system and the amounts of annual and deferred maintenance. Road decommissioning was not done in FY 09 to allow spending these program dollars on higher priority open roads. The forest is maintaining an increased number of maintenance level 2 roads. The decreased level of maintenance will also reduce the quality or restrict access to some areas of the forest for the traveling public.

The forest continues to identify and monitor archaeological sites and historic buildings at risk. Heritage resource specialists are working with law enforcement, other Forest Service employees, and the public to document and deter unauthorized forest activities that damage historic properties. The full scope of archaeological site looting, vandalism, and other threats is not known due to the small sample of sites monitored. The use of metal detectors to dig for artifacts on historic sites is a growing concern.

Chapter 1. Introduction

The Francis Marion National Forest is approximately 252,840 acres in size and is located on the lower coastal plain of South Carolina. The *Revised Land and Resource Management Plan* (Forest Plan) was approved on December 18, 1995 and guides all natural resource management activities and sets management standards for the Forest. Part of the mission of the Forest Service is to protect and manage the resources of the national forest so that they best demonstrate the sustainable multiple-use management concept. The Forest provides a number of goods and services for the public including timber, outdoor recreation, water, wildlife, fish and wilderness.

Forest Plan monitoring and evaluation is conducted to determine if the Forest is moving toward or achieving the desired conditions for resources. Forest Service resource specialists, universities, state resource agencies and contract specialists conduct surveys and inventories on a variety of natural resources annually.

Chapter 2. Monitoring Results and Findings

Chapter 2 of this report includes the monitoring questions and tasks defined in Chapter 5 and Appendix B of the Forest Plan. Appendix B of the Forest Plan contains the detailed monitoring task sheets. In this report, the monitoring questions are numbered consecutively with the corresponding task sheet in parentheses based on the page number in Appendix B.

Issue 1. Ecosystem Condition, Health and Sustainability

Sub-Issue 1.1 - Biological Diversity

1. Are the acres of longleaf forest type increasing at a rate to achieve objective (B-4)?

Information

This monitoring question is responsive to goals 1, 6, 7 and 8 and objective 4. **Objective 4** is to increase the longleaf pine forest type to 44,700 acres within 10 years. The longleaf pine ecosystem is maintained, restored, and enhanced.

- Acres of longleaf pine forest type.

Results

The GIS database shows 49,426 acres of longleaf pine forest types on the Francis Marion NF. This is 111% of the objective.

Findings

No additional action is needed.

2. Are the acres of longleaf forest type in Management Area (MA) 26 increasing at a rate to achieve objective (B-5)?

Information

This monitoring question is responsive to goals 1, 6, 7 and 8 and objective MA26-Objective-1. **MA26-Objective-1** is to have 40,000 acres of longleaf pine forest type within the next 10 years in MA 26. The longleaf pine ecosystem is maintained, restored, and enhanced.

- Acres of longleaf pine forest type in management area 26.

Results

The GIS database shows 38,679 acres of longleaf pine forest types in management area 26.

Findings

The acreage of longleaf pine forest types is at 96.7% of the objective in the Francis Marion Forest Plan.

3. Are sufficient longleaf pine management type acres being burned on a 2 to 4 year growing season burn cycle to achieve objectives (B-6)?

Information

This monitoring question is responsive to goals 1, 6, 7 and 8 and objectives 1 and 5. **Objective 1** is to maintain a red-cockaded woodpecker population of 450 clusters. **Objective 5** is to restore the role of growing-season fires on 16,000 acres of longleaf forest types in the next 10 years and on 40,000 acres in the long term by prescribed burning on a 2 – 4 year cycle. The red-cockaded woodpecker population is maintained, and the longleaf pine ecosystem is maintained, restored, and enhanced.

- Annual acres and location of longleaf pine management type stands burned on a 2 to 4 cycle during the growing season (April – September).
- Percent of the 160,000 RCW Habitat Management Area (HMA) acres which has been prescribed burned in the last 5 years.
- Percent of the longleaf pine forest types which has been prescribed burned in the last 5 years.
- Percent of MA- 26 that has been burned in the last 3 years.

Results

Table 2-1, below, summarizes monitoring items.

Findings

The Forest burned fewer acres in FY 2009 than FY 2008 due primarily to a State wide burn ban that was issued by the South Carolina Forestry Commission. The burn ban was in response to the 19,130 acre Hwy 31 Fire that occurred on April 22, 2009 in Horry County. As a side note, the Forest continued to increase acres burned during the dormant season.

Prescribed burning in the last 5 years within the RCW HMA remained near 50%. The area managed for RCW has changed since the LRMP was signed in 1996, and the RCW HMA is no longer an accurate tool for identifying RCW habitat.

The trend for prescribed burning longleaf pine forest types remains above 60 %. Fire is critical to restoring and maintaining this fire-dependent community, and thus the percent burned needs to increase in the future.

The forest has burned approximately 48 % of MA-26 in the last 3 years. This reflects a slight increase from FY 08 to FY 09. The intent is to remain on a 2 to 3 year cycle in MA-26 with 50 percent of the area being burned over a three year period.

However, the current levels of treating 30,000-40,000 acres per year falls short of the 53,000 acres needed to maintain this burn cycle**.** Fire is critical to restoring and maintaining RCW habitat and fire-dependent communities. The Francis Marion is using different strategies to increase the number of acres burned annually.

Table 2-1. Monitoring Item and Results for FY 2006-2009

Monitoring Item	FY06-Results (acres)	FY07-Results (acres)	FY08-Results (acres)	FY09-Results (acres)	Desired Condition
Annual acres burned on 2 to 4 year cycle during the growing season	11,409	10,501	13,510	5,298	See Objective 5
Percent of RCW HMA burned last 5 years	50%	50%	50%	50%	See Objective 1 Prescribed burning cycle of 2 – 5 years throughout the entire HMA (ROD – RCW FEIS and standard FW-83)
Percent of longleaf pine forest types burned during the last 5 years	62%	60%	60%	67%	See Objective 1
Percent MA-26 burned during the last 3 years	27%	25 %	44%	48%	MA-26-G-1 states "Restore expand and maintain the longleaf pine ecosystem and related fire-dependent communities." Standard MA-26-2 states burn pine stands on a 2 – 3 year cycle.
*****This is an estimate from district personnel. The RCW HMA is not available in a GIS layer and is not currently an accurate measure of habitat that is being managed for the benefit of RCW.					

4. Are the acres of mixed pine/hardwood stands increasing at a rate to achieve the objective (B-8)?

Information

This monitoring question is responsive to goals 1, 6, 7 and 8 and objective 11. **Objective 11** is to increase the acres managed as mixed pine/hardwood forest types to 14,800 in the long-term. The amount of mixed pine and hardwood stands has increased, and mast-producing hardwoods are common.

- The acres managed as mixed pine/hardwood forest types.

Results

The GIS database shows 38,610 acres of mixed pine/hardwood forest types, 699 acres less than reported for FY 2008. It is over 2.6 times the objective.

Findings

No additional action is needed.

5. In management area 27, are the acres managed as mixed pine/hardwoods increasing at a rate to achieve the objective (B-9)?

Information

This monitoring question is responsive to goals MA-27-G-1 and MA-27-G-3 and objective MA 27-O-1. **Objective MA 27-O-1** is to have 6,700 acres managed as mixed pine/hardwood forest types to 14,800 in the next 90 years. Mixed pine/hardwood stands are found throughout this area on a variety of sites. Mast-producing hardwoods are common in hardwood stands, mixed stands and scattered throughout pine stands.

- The acres managed as mixed pine/hardwood forest types in management area 27.

Results

The GIS database shows 5,027 acres of mixed pine-hardwood types in management area 27. This is 195 acres less than reported for FY 2008. The context of the current mixed pine-hardwood acreage under objective 11 (forest-wide) above should be remembered when looking at the figures for management area 27.

Findings

No additional action is needed.

6. In management area 27, do loblolly pine stands by age 40 have 30 percent of the dominant/codominant canopy classes in mast-producing hardwoods (B-10)?

Information

This monitoring question is responsive to goals MA-27-G-3 and MA 27-O-2. **Objective MA 27-O-2** is to have loblolly pine stands by age 40 with 30 percent of the dominant and/or codominant canopy classes in mast-producing hardwoods. Mast-producing hardwoods are common in hardwood stands, mixed stands and scattered throughout pine stands.

- 40 year old plus loblolly pine canopy class composition in MA 27.

Results

The results for FY 2009 are the same as those discussed in the FY 2004 monitoring report.

Findings

Baseline information will be used in the Forest Plan revision and to establish what conditions are needed to achieve desired results.

7. In management area 27, what conditions are needed in stand regeneration and development to achieve the objective (B-11)?

Information

This monitoring question is responsive to goals MA-27-G-3 and MA 27-O-2. **Objective MA 27-O-2** is to have loblolly pine stands by age 40 with 30 percent of the dominant and/or codominant canopy classes in mast-producing hardwoods. Mixed pine/hardwood stands are found throughout this area on a variety of sites. Mast-producing hardwoods are common in hardwood stands, mixed stands and scattered throughout pine stands.

- We expect specific items to be established during study in management area 27. This may need to be addressed when the plan is revised.

Results

Specific items have not been established.

Findings

This item would require a significant number of permanent plots to monitor. The Forest has not established such plots.

8. Are pine stands being thinned as planned (B-17)?

Information

This monitoring question is responsive to goals 4, 6, 7 and 8 and objective 9. **Objective 9** states create conditions on 38,000 to 50,000 acres of pine stands which release over crowded live crowns. The Forest continues to contribute to the long term economic stability, manage a sustainable forest, provide for wildlife habitat needs and sustain biological diversity.

- Acres of pine stands thinned.

Results

2,228 acres of thinning harvest were sold in FY 2009.

Findings

No additional action is needed.

9. Are red-cockaded woodpecker (RCW) clusters maintaining 350 or greater potential breeding groups (B-24)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7and 8 and objectives 1, 4, 5 and 9. Provide a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. The Forest provides adequate habitat for various animals whose populations were previously threatened by dwindling populations.

- # of active RCW clusters
- # of groups nesting

Results
Awarded and completed 2009 RCW monitoring contract (121 clusters).

Awarded and completed 2009 RCW cavity contract (41 restrictor plates, 60 inserts, 4 replacement inserts, 14 drilled starts, 10 drilled cavities).

Identified, delineated and awarded 1,000 acre ARRA mastication contract.

Identified and began delineation of additional 751 acre ARRA mastication contract. These ARRA mastication projects are designed to reduce hazardous fuel loads and improve habitat for species such as the RCW.

Completed 2009 Interagency transfer agreement with National Park Service/King's Mountain National Military Park. Habitat for the RCW was enhanced on approximately 88 acres. A total of $31,900 was transferred to the National Park Service, which equates to a cost per acre of $362.50.

Via a 2009 STEP student, conducted RCW surveys on approximately 4,000 acres. These surveys identified 3 new active RCW clusters, several new potential starts, one new RCW nest tree, and 3-4 new active cavity trees. STEP student was able to gain experience in feral pig trapping, NNIS identification and control, multiple use management, T&E species management, etc.

Conducted another red-cockaded woodpecker translocation and monitoring project on the Francis Marion. Project is being conducted in cooperation with the University of Georgia, Southeast Regional Partnership for Planning and Sustainability (SERPPAS), USFS, and the Southern Range Translocation Cooperative (SRTC). This is the second year that we have participated in the project. Larry Wood is the translocation biologist and funded through SERPPAS. Funding for the 2010 translocation project has already been approved by SERPPAS. Approximately 100 RCW clusters were monitored during 2009. Approximately 218 nestlings were banded and sexed in 92 clusters. Based on allocations determined at the 2009 Southern Range Translocation Cooperative (SRTC) meeting, four pairs of sub-adults were translocated to Ocala National Forest, five pairs and one female went to the Talladega National Forest and five pairs were translocated to Joseph E. Jones Ecological Research Center at Ichauway. This translocation project not only saved the government money in terms of RCW monitoring, but also identified approximately 11 budded and pioneered clusters. The budded clusters would not have been found during our typical annual monitoring activities.

Findings

The Francis Marion RCW Population, a primary core recovery population and third largest in the US, has exceeded its recovery goal as described in the Recovery Plan. The population has continued to expand in some areas of the forest, especially in the core prescribed burning area, and decline in other areas. Inactive clusters tend to be concentrated in the WUI and/or areas where minimal management has allowed undesirable midstory succession to occur. Adequate foraging and nesting habitat continues to be the most limiting factor(s) for the RCW on the forest.

10. Are populations of all existing PETS animal species being maintained or increased (B-25)?

Information

This monitoring question is responsive to goals 1, 5, 6, 7 and 8 and objectives 1, 2, 4, 5, 9, 11, 12, 13, 14, and 15. The Forest provides adequate habitat for various animals whose populations were previously threatened by dwindling populations.

- Numbers of PETS animals and related habitats.

A contract to inventory known and potential breeding ponds for the federally threatened flatwoods salamander (now classified as the frosted flatwoods salamander) was delayed again in 2008 due to lack of rainfall; therefore, pond filling during the breeding season didn't occur. Known frosted flatwoods salamander habitat was prescribed burned in 2008, and ecotones around select ponds were mechanically chipped. Prescribed burning is necessary for maintaining herbaceous upland and pond ecotones required by the species. Designation of critical habitat was proposed by the U.S. Fish and Wildlife Service for the frosted flatwoods salamander, including approximately 1,176 acres within the Wando area of the forest.

Results/Findings

The revised final rule for critical habitat designation was published in the Federal Register in 2008. This final rule split the previously threatened flatwoods salamander (*Ambystoma cingulatum*) into two distinct species: frosted flatwoods salamander (*Ambystoma cingulatum*) and reticulated flatwoods salamander (*Ambytoma bishopi*). The frosted flatwoods salamander is now federally listed as threatened and the reticulated flatwoods salamander is federally endangered. The rule also designated critical habitat for the two species, which included 1,176 acres of critical habitat for the frosted flatwoods salamander on the FMNF.

Initial observations of flatwoods salamanders on Francis Marion National Forest (FMNF) were made by Julian Harrison in the early 1950s through 1970 (Harrison 2003). See Figure 2.1 below. Subsequent observations were made during flatwoods salamander surveys by Moulis and Seyle (1987) and Moulis and Williamson (1998). More recent observations of flatwoods salamanders on FMNF were made fortuitously. John Fauth captured four adults in October 1995 and a single larva in 2003 in Old Railroad Pond (Mark Danaher, pers. comm. 2009; Harrison 2003), William Resetarits encountered an adult on Hoover Road in June 1997 (Mark Danaher, pers. comm. 2009), and a single adult was captured in Hoover Pond in 2002 (Harrison 2003). Unsuccessful surveys for flatwoods salamanders on FMNF were conducted in 1991 by USFS employees(Mark Danaher, pers. comm. 2009), 1995 (Bennett 1995), 2000 (Humphries 2000), 2001 (Harrison 2001, Waldron 2001), 2003 (Harrison 2003), and 2009 (Palis 2009).

John Palis and Joyce Marie Klaus were contracted to survey 19 isolated wetlands on the FMNF in 2010. Steve Bennett (SC State Herpetologist) and Danny Carlson assisted John Palis with surveys on March 16, 2010. Three larvae, ranging in total length from 40-42 mm, were captured in 6 person-hours of dipnetting from a previously undocumented breeding wetland. The first larva was captured by Danny Carlson after 3.75 person-hours of dipnetting. The larvae were all captured in the same area of the pond (GPS point 32°58'47"N, 79°47'10"W). The three larvae were retained by Steve Bennett and taken to the Riverbanks Zoo in Columbia. They will be raised to a larger size so that a small tissue sample can be removed without causing harm. These tissue samples will be utilized for genetic analysis. This will be the first genetic material taken from Frosted Flatwoods Salamanders in South Carolina. John Palis returned to this breeding wetland on March 17, 2010 and collected three more larvae.

Figure 2.1. Flatwoods salamander larva captured on 16 March 2010 in Pond 116-09

One of the largest Carolina Gopher Frog breeding events in the past 10 years was documented in April 2009. Hundreds of individuals were documented in known breeding wetlands. Dipnetting for larval Carolina Gopher Frogs was conducted by USFS and DNR personnel on June 2, 2009. Carolina Gopher Frog tadpoles and questionable tadpoles were collected and sent to the Riverbanks Zoo in Columbia, SC. These tadpoles were successively raised at the Riverbanks Zoo and the zoo now has 3 subadult Carolina Gopher Frogs. The frogs will be kept in captivity at the zoo in order to study the species' feeding habits and lifespan. Genetic material will be collected and analyzed for comparison with other *Lithobates capito* populations.

Approximately 1,040 acres in compartments 115 and 116 were burned during 2008 and 2010. These compartments hadn't been burned since 2003. Compartments 115 and 116 contain known breeding wetlands for the Carolina Gopher Frog and Frosted Flatwoods Salamander, as well as habitat for the federally endangered American chaffseed (*Schwalbea americana*) and pondberry (*Lindera melissifolia*). It is hoped that compartments 115 and 116 will now be managed with an appropriate fire return interval of 2-3 years. The aforementioned compartments and others between Highway 41 and Cainhoy Road are typically referred to as the Cainhoy area. The Cainhoy area of the FMNF supports some of the highest densities of threatened, endangered and sensitive species on the forest. This area is the only place where the Frosted Flatwoods Salamander has been documented on the FMNF. The Cainhoy area supports a high density of seasonally flooded isolated wetlands, which coupled with the surrounding uplands, creates ideal habitat for unique flora and fauna. Several of these isolated wetlands are known to harbor rare pondspice, Carolina Gopher Frog, the federally endangered pondberry, and the federally threatened Frosted Flatwoods Salamander. These wetlands occur in one of the most rapidly urbanizing areas of the forest. Unfortunately, due to smoke/safety issues associated with this wildland urban interface, an adequate prescribed burning regime is literally impossible. Lack of prescribed burning has resulted in unnatural vegetative conditions within isolated wetlands and the adjacent uplands, limiting their suitability for species such as the Carolina Gopher Frog and Frosted Flatwoods Salamander. Plans are underway to introduce prescribed fire back into compartment 114, which has suitable and known habitat for the Frosted Flatwoods Salamander, RCW, pondberry, pondspice, and the Carolina Gopher Frog. This will take intense planning and collaboration with partners and nearby companies (i.e., Nucor Steel and BP).

11. Is the number of populations of existing PETS plants being maintained or increased (B-26)?

Information

This monitoring question is responsive to goals 1, 2, 5, 6, 7 and 8 and objectives 13. Plant species with viability concerns are found to be more common than previously thought. The number of PETS plant populations is being maintained or increased.

- Location and number of existing PETS plant populations.

Results

Rare plant surveys were conducted on approximately 4,000 acres within the Hellhole Analysis area. Several subcolonies for the sensitive sparse-flowered plantain were located along select roadsides within the area (extension of an existing population). Subcolonies for the sensitive awned meadow beauty were confirmed (extension of existing populations). Design criteria for activities

associated with the Hellhole management proposal will improve habitat and not impact individuals for these species.

While evaluating a potential reroute for the ATV trail, nine new subcolonies of pondberry were discovered near an existing pondberry population, consisting of approximately an additional 1000 stems.

Five populations for America chaffseed were prescribed burned in 2009. Biological personnel met with fire personnel to determine how these areas, as well as the remainder of the American chaffseed sites, could best be managed and prescribed burned in 2010. Three sites for American chaffseed need to be prescribed burned in 2010. Site visits by Forest Service personnel and partners suggest that the only known sites for the sensitive Carolina dropseed (*Sporobolus pinetorum*) and the sensitive pineland dropseed (*Sporobolus curtisii*), and one federal listed plant Canby's dropwort (*Oxypolis canbyi*) are in decline due to lack of prescribed burning.

Laurel wilt was discovered on the forest, and several sites for pondberry and the sensitive pondspice were monitored for incidence of the disease. Research and forest health personnel determined that the diameter of pondberry stems on the forest was too small to be entered by Ambrosia beetles carrying the disease, though pondspice stems are larger and could be susceptible to Ambrosia beetles. Pondspice has been infected with laurel wilt in Florida.

Findings

More intensive monitoring of all pondspice records on the Forest (54 known total), will be conducted in 2010 to determine the possible impact of laurel wilt on pondspice in the future. In addition, studies through the Citadel have been initiated, to determine genetic structure of pondberry populations and to whether they would benefit from the introduction of female plants (currently there are few female plants and thus less fruits are produced). Danny Gustafson from the Citadel obtained a US Fish and Wildlife Service (USFWS) permit to collect pondberry fruits and grow female plants under greenhouse conditions.

Digital databases for PETS plants need to be maintained on the Forest. The structure of these databases shall be consistent with corporate databases throughout the Region or Forest when possible.

Appropriate fire and biological staff need to ensure that endangered and sensitive species, botanical areas, and underrepresented plant communities are prescribed burned on a regular basis as needed to maintain and enhance them. Meetings shall occur at minimum annually to determine prescribed burning needs for these species and communities.

12. Are we maintaining viable populations of early successional native species and the habitat to support them (B-27)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 12 and 13. **Objective 12** is to maintain 5,000 to 10,000 acres of early successional habitat in the short and long term. Provide a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. Provide opportunities to enjoy a variety of recreational uses of wildlife.

- Acres in grass-forb habitat (acres in 0-3 year class, permanent openings, wildlife openings, road rights-of-way, utility rights-of-way) in the short and long term.

Results

No early successional habitat is being created through even-aged forest regeneration, though some is now in the planning stages. Thinning stands to moderate basal areas followed by prescribed burning create openings in the forest canopy that somewhat mimics early successional habitat. GIS records show 1,058 acres in permanent openings and wildlife openings, and no acres in the 0-3 year age class.

Findings

The Forest needs to begin doing even-aged regeneration harvesting in order to meet Objective 12 and begin providing additional habitat for maintaining viable populations of early successional native species. The Honey Hill and Hellhole projects will begin to address this need.

13. Are we maintaining viable populations of older forest native species and the habitat to support them (B-28)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 1, 2, 9, 11, 14, and 16. Provide a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. Provide opportunities to enjoy a variety of recreational uses of wildlife.

- Acres in late successional habitat (pine > 80 years, hardwood > 100 years, and mixed >100 years).

Results

GIS records show:
10,479 acres of pine types over age 80
13,757 acres of hardwood types over age 100
922 acres of mixed pine-hardwood types over age 100

Findings

No additional action is needed.

14. Are we maintaining viable populations of native bird species and the habitat to support them (B-29)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 1, 2, 3, 4, 5, 8, 9, 11, 12, 13, 14, 15, and 16. Provide a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. Provide opportunities to enjoy non-consumptive uses of wildlife such as bird watching.

- Population trend of management indicator species (MIS) birds.

Results

Bird Points: FM, 110 points, call counts

Technical report, *Population Trends and Habitat Occurrence of Forest Birds on Southern National Forests, 1992-2004* (General Technical Report NRS-9) indicates that mean observations per count for pileated woodpeckers have slightly declined from the early 1990s on the Francis Marion National Forest. However, declines in the South Atlantic Coastal Plain generally have been negligible.

Prairie warblers, on the other hand, have increased in the South Atlantic Coastal Plain while mean observations on the Francis Marion National Forest show sharp declines.

Findings

The Regional database needs to be made operational in order to make estimates on Forest-wide trends.

Likely reasons for the decline in pileated woodpeckers are tied to lack of old growth trees as a result of Hurricane Hugo in 1989 and an ever increasing density in the pine midstory component. Likewise, post Hurricane Hugo damaged stands in the past have provided suitable habitat for the prairie warblers but now may no

longer be suitable. Pine and mixed forest stands are now transitioning into larger pole-sized stands and are no longer providing ideal habitat.

15. Are we maintaining viable populations of turkey and the habitat to support them (B-30)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 2, 3, 11, 13, and 16. Provide a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. Provide opportunities to enjoy consumptive uses of wildlife such as hunting and fishing.

- Population index trend of Eastern wild turkey.

Results

Turkey Brood Survey: Collection of casual observations on all Districts

Technical report, *Population Trends and Habitat Occurrence of Forest Birds on Southern National Forests, 1992-2004* (General Technical Report NRS-9) indicates that mean observations per count have slightly declined for turkey from the early 1990s on the Francis Marion National Forest. However, the declines in the South Atlantic Coastal Plain have been sharper.

South Carolina Department of Natural Resources data indicate a slight increase in brood recruitment and a statewide downtrend in turkey harvest.

Findings

Two main reasons for the likely decline are increased urbanization and midstory/understory growth that are impacting desired habitat across the region. Biomass treatments completed two years ago have improved brood habitat for turkeys, and it is anticipated that we will see an increase in brood recruitment.

Continuing an aggressive prescribed burning program, restoring mast producing hardwood stands and increasing silvicultural activities that reduce basal areas in pine stands are needed to continue the maintenance and development of quality nesting and brood rearing habitat for wild turkey.

16. Are we maintaining viable populations of quail and the habitat to support them (B-35)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 4, 5, 9, 13, and 16. Provide a diversity of wildlife species. Provide quality habitat

which supports viable populations of native wildlife species. Provide opportunities to enjoy consumptive uses of wildlife such as hunting and fishing.

- Population index trend of northern bobwhite quail.

Results

Quail Call Counts: 4 routes

Technical report, *Population Trends and Habitat Occurrence of Forest Birds on Southern National Forests, 1992-2004* (General Technical Report NRS-9) indicates that mean observations per count have sharply declined for quail from the early 1990s on the Francis Marion National Forest. However, the declines in the South Atlantic Coastal Plain have not been as steep.

Findings

Declines in quail are most likely associated with a large number of forest stands moving from seedling/sapling-size to pole-size trees. There has been little thinning and no regeneration harvest on the Francis Marion for almost 15 years, so brood rearing habitat is very limited. Biomass treatments that were completed two years ago have improved habitat for quail.

17. Are we maintaining viable populations of native amphibians and the habitat to support them (B-37)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8 and objectives 2, 11, 13, and 14. Provide for a diversity of wildlife species. Provide quality habitat which supports viable populations of native wildlife species. Provide opportunities to enjoy non-consumptive uses of wildlife such as photography and viewing.

- Number of individuals sighted.

- Acres of temporary pond habitat.

Results

Beginning in 2007, FM personnel installed 3 North American Amphibian Monitoring Program (NAAMP) frog routes on the FMNF. These three routes are known as Cherry Hill, Huger, and Ten Mile. Each route consists of 10 stops and is run three times per year. Species richness for all NAAMP routes in the US can be quickly found by going to www.pwrc.usgs.gov/naamp/index.cfm?fuseaction=app.speciesRichnessMap. The

primary goal of these frog routes is to assess frog and toad population trends using a calling survey technique.

From 2003 to the fall of 2008, the coastal plain really had not had any significant rain events to recharge amphibian breeding wetlands. As such, amphibian breeding was fairly low in the coastal plain up until the fall of 2008. After an extended period without adequate rainfall and wetland inundation, the rains finally came in 2009, and some of the largest choruses of frogs and toads were heard on the FMNF. One of the largest Carolina Gopher Frog (*Rana capito*) breeding events in the past 10 years was documented in April 2009. The Carolina Gopher Frog is a forest sensitive species and state endangered in South Carolina. Carolina Gopher Frogs were again documented on the FMNF from historical wetlands in the Cainhoy area during February 2010. Other than the Frosted Flatwoods Salamander (*Ambystoma cingulatum*), the Carolina Gopher Frog is one of the rarest and most sensitive amphibians on the FMNF.

Overall, frog and toad trends on the FMNF appear to be stable**,** but long-term monitoring is needed to account for temporal variation and the complex life histories of our native amphibians. Species such as the Carolina Gopher Frog and Frosted Flatwoods Salamander are in a critical state and are highly susceptible to local extirpation without proper protection and habitat management.

FM personnel completed annual Flatwoods Salamander/herpetofauna Surveys with Stephen H. Bennett (SCDNR).

Findings

No additional action is needed.

18. Are we maintaining viable populations of native species and the habitat to support them (B-38)?

Information

This monitoring question is responsive to goals 1, 2 and 8 and objectives 13 and 14. Throughout the Forest landscape, there is an ecologically sound distribution of plant communities and PETS plant habitats.

- Acreage of under-represented plant communities/PETS habitats

Results

Several moderate to high quality seasonal wet savannas were identified as a result of inventories within the Hellhole Analysis Area in 2009. Dr. Jean Everett (College of Charleston) evaluated 31 seasonally wet savannas identified by the Forest Service, and found that 17 of the 31 were of moderate to high quality. See Figures 2-2 and 2-3 below.

Figure 2-2. Tootache Grass Savannah on the Francis Marion National Forest.

Figure 2-3. Pitcher Plant Bog on the Francis Marion National Forest

Characteristics used to assess their quality including grass and forb diversity and abundance, rare species diversity and abundance, invasive species diversity and abundance, feral hog damage or rutting, structure, presence of longleaf, stand size and connectivity, and hydrology. In an assessment of the larger analysis area, Jeff Glitzenstein (botanist) identified an additional 16 high quality savannas. The Forest Service worked with both contractors, with Natureserve, and with Dr. Bob Peet of UNC-Chapel Hill, to revise the classification system for seasonally wet savannas on the forest, including those in longleaf woodlands and the longleaf pine – pond pine saturated woodland alliances.

In 2009, an agreement and contract were initiated to promote the development of herbaceous plant materials native to the Atlantic Coastal Plain. This project is stimulating the availability of native seed through the collection of at a minimum 20 pounds of seed from native grasses and forbs from National Forest lands in North and South Carolina. The Forest Service hired contractors to collect native seed from stands with a recent prescribed fire history, where plants will exhibit higher seed viability. Target herbaceous species were selected, based on their record for producing high rates of seed, and for providing ecosystem services such as site stabilization (native bunchgrasses), nitrogen fixation (native legumes), and food for wildlife and pollinators (native forbs). Following collection, the seed is cleaned and tested in cooperation with the USDA Seed Laboratory in Macon, Georgia.

Through an agreement with the Forest Service, the Clemson Pee Dee Research and Education Center (REC) is establishing one acre of production fields, and another two acres at the Francis Marion seed orchard in South Carolina. Seed harvested from native herbaceous propagation fields will be used for seeding projects on the National Forest. Propagation fields will also serve as demonstration areas for private and public landowners interested in producing and promoting native seed.

Also in 2009, the Forest received American Recovery and Reinvestment Act (ARRA) Funding to control non-native invasive plant species. On the Francis Marion National Forest, Japanese climbing fern and cogongrass were identified as primary species of concern. See Figure 2-4. Both species have the potential to invade longleaf pine and wetland ecosystems, and disrupt hydrologic regimes, fire intensity, biodiversity, forest regeneration, and wildlife and plant habitat. For phase one, contractors were required to map with a geopositioning system (gps), and flag, invasive plant populations within 4 compartments (3400 acres).


Figure 2-4. Japanese Climbing Fern on the Francis Marion National Forest

Findings

Fire-maintained seasonally wet pine savannas are some of the most biologically diverse plant communities in the southeast. Baseline information on the management, the distribution, the restoration, and extent of these plant communities, as well as other under-represented and high quality communities, and invasive plant populations, should continue.

Digital databases for underrepresented or high quality plant communities and invasive plant populations need to be maintained on the Forest. The structure of these databases shall be consistent with corporate databases throughout the Region or Forest. To determine restoration opportunities, understory communities should be evaluated and captured in FS VEG.
As part of the Atlantic Coastal Plain native plant materials initiative, contractors collected thirteen pounds of roughly cleaned, viable seed on the Francis Marion National Forest, including 4 species of native legumes, 6 species of native grasses, and 22 forbs.

In partnership with Clemson Pee Dee REC, a collaborative group of research, federal, state, and private entities was formed to improve the production, propagation, and use of native plant materials throughout South Carolina. Additional opportunities for working with partners to promote native herbaceous plant materials are being explored.

Of 1,287 acres surveyed for invasive plants as part of the ARRA funding, 125 infested acres (9.7% of acres surveyed) to date have been gps'd and flagged, most frequently containing Japanese climbing fern (213 of 217 polygons mapped). Mimosa (0.9%), Chinese privet (0.5%), Chinese stiltgrass (0.5%), and Sericea lespedeza (0.5%) were uncommonly found. No records for cogongrass were found. One cogongrass population consisting of three sites, occurring within a one mile stretch of forest service road right-of-way, is known from the forest.

19. What is the status and trends in stream fish communities in relationship to management activities and habitat conditions? What are current habitat conditions and trends (B-39 Amendment # 2)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8. Throughout the Forest landscape, there is an ecologically sound distribution of aquatic communities.

- Repeated quantitative sampling of fish communities, including diadromous species, in streams representative of 10 small watersheds across the Forest. Measure habitat parameters using BVET protocol where fish sampling is conducted.

Results

Stream fish inventory surveys were conducted in 1993 by Hansbarger and Dean (1994). Monitoring surveys were conducted in 2002, 2003, 2004 and 2006 (refer to the 2006 Monitoring Report). No fish or habitat surveys were conducted in 2009.

Habitat inventory protocol was developed in 2002 using BVET methods (Dollof et al 1993). Habitat inventory was attempted in 2003 and 2004. Dry conditions in 2003 and swampy conditions in 2004 restricted inventory to short segments of streams.

During previous fish surveys, it was observed that large woody debris is lacking in the coastal stream systems. Hansbarger and Dean (1994) stated that fish inventory was difficult due to the abundance of downed trees and wood in the streams.

Findings

No fish or habitat surveys were conducted in 2009.

Large woody debris, an important component for habitat structure, is lacking in the sampled streams.

20. What is the status and trends in aquatic invertebrate (aquatic insects, mollusks, crayfish) populations in relationship to management activities and habitat conditions (B-40 Amendment #2)?

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8. Throughout the Forest landscape, there is an ecologically sound distribution of aquatic communities.

- Population trends will be measured by methods appropriate to the aquatic group using defined protocols.

Results

Existing population conditions are unknown. Crayfish and mussel shells were collected in conjunction with the fish community monitoring in 2003 (refer to the 2006 Monitoring Report).

Findings

Inventories of benthic macroinvertebrate, crayfish and mollusk communities need to be accomplished.

21. What is the status and trend for pond game fish in relationship to management activities and habitat conditions (B-42 Amendment #2).

Information

This monitoring question is responsive to goals 1, 3, 4, 7 and 8. Throughout the Forest landscape, there is an ecologically sound distribution of aquatic communities.

- Sampling of game fish and water quality in established freshwater fish ponds annually across the Forest.

Results

There are 15 recreational fishing ponds on the Francis Marion consisting of a total of 44 acres. Largemouth bass and bream are the primary fish in the ponds. A few of the ponds have been stocked with grass carp for aquatic plant control and catfish. All ponds were checked for fish population balance, water quality and aquatic plant presence in 2009.

Appropriate management recommendations were summarized for each pond based on survey results. A total of 13 ponds were electrofished. Two ponds had balanced bass:bluegill populations, ten ponds were bass-crowded or near balanced

and one pond was bream-crowded. Twelve ponds would require the addition of lime to correct low alkalinity values. Ten ponds had some type of aquatic vegetation present, and the most common control measure was stocking sterile grass carp to rid most of the submersed aquatic plant species encountered.

Findings

All recreational fishing ponds were checked for fish population balance, water quality and aquatic plant presence in 2009. Management recommendations were made to enhance fishing populations and water quality.

Sub-Issue 1.2 - Forest and Range Health

22. How are insect and disease populations affecting goal/objectives attainment (B-3)?

Information

This monitoring question is responsive to goals 1, 2, 3, 4, 6, 7 and 8. Decrease the susceptibility of forest stands to insects and disease by changing or avoiding ecosystem conditions that favor future insects and disease epidemics.

- Location and population trends of southern pine beetle, fusiform rust and annosum root rot.

Results

Southern pine beetle populations returned to endemic levels during FY 2009. Laurel wilt is not one of the diseases mentioned in the monitoring item, but it reached the Francis Marion National Forest in FY 2009.

Findings

No additional action is needed.

23. Are National Ambient Air Quality standards for suspended particulate matter and ozone being met on the Francis Marion National Forest (B-18)?

Information

This monitoring question is responsive to goal 8 which is to maintain air quality.

- Compliance with NAAQS air particulate and ozone concentrations in the atmosphere [36 CFR 219.27(a)(12)].

Results

Prescribed fire on the Francis Marion National Forest continues to be the most important Forest Service activity impacting air quality since it releases fine particles into the atmosphere which can affect human health, safety and visibility conditions. In FY09, the amount of fine particulate matter released into the atmosphere by prescribed fire was slightly less than the previous year. (See Charts below).

Particulate Matter. Within national forests such as the Francis Marion, visitors do not want or expect air pollution to negatively impact plant and animal life, nor hamper their own outdoor activities while in the Forest. In addition, scenic views

within the Forest should not be obscured by man-made air pollution. Ultra-small particles that can cause beautiful vistas to become murky and cause negative health impacts to visitors are called fine particulate matter, or $PM_{2.5}$. These tiny particles, which are less than 2.5 microns in diameter, include sulfates and nitrates from fuel combustion activities, particularly coal-fired power plants and highway vehicles, as well as organic and elemental carbon compounds from wild and prescribed fires, gasoline and diesel engines, and other fossil fuel combustion. In order to reduce fine particulate matter concentrations, the United States Environmental Protection Agency (EPA) has developed two separate strategies. First, EPA has established a NAAQS for $PM_{2.5}$; the daily standard is set at 35 $\mu g/m^3$, while the annual standard is set at 15 $\mu g/m^3$. In addition to the NAAQS for fine particulate matter, EPA has also implemented the Regional Haze Rule, which calls for states and federal agencies to work together to improve visibility at all Class I areas, including Cape Romain National Wildlife Refuge, which is adjacent to the Francis Marion National Forest. It is up to the states and EPA to demonstrate that emission reductions of visibility impairing pollutants are reduced and that natural visibility is restored at all Class I areas by the year 2064.

In order to measure fine particulate matter concentrations as well as visibility near the Francis Marion National Forest, there are several nearby $PM_{2.5}$ monitoring stations operated by the South Carolina Department of Health and Environmental Control (DHEC) as well as a monitoring site at Cape Romain NWR operated by EPA under the Interagency Monitoring of Protected Visual Environments (IMPROVE) program.

Both the 24-hour and annual standards for fine particulate matter are set to protect human health from the harmful effects of this pollutant. Until recently, there were three nearby $PM_{2.5}$ ambient monitoring stations operated by DHEC, one north of the Forest in Georgetown County, and two south/southwest of the Forest in Charleston County. The Georgetown monitoring station was taken out of service in mid-2007. The two remaining monitoring stations are located 11.1 and 11.8 miles from the Forest, respectively. In addition, the IMPROVE monitor at Cape Romain NWR, just 0.9 miles east of the Forest, measures fine particulate matter concentrations along with visibility impairment. The measured values and trends at these monitors as compared to both the daily, and annual $PM_{2.5}$ NAAQS are shown in the graph below. Note that 2009 values for the IMPROVE monitor are not yet available. (Source: http://www.epa.gov/airexplorer)

As shown, neither daily nor annual fine particulate matter concentrations are exceeding the air quality standards near the Francis Marion National Forest. In fact, there appears to be a downward trend (improvement) in fine particulate matter concentrations near the forest. Therefore, visitors to the area should not be experiencing any negative health impacts due to elevated fine particulate matter concentrations.

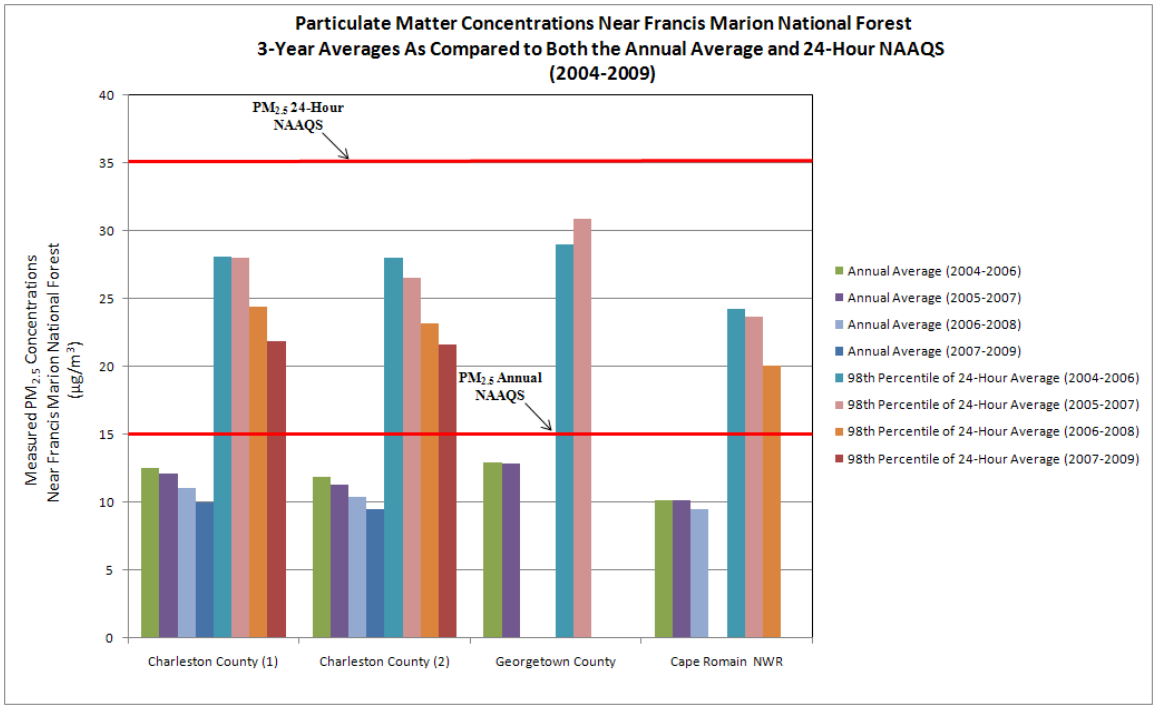


Chart 2-1. Particulate Matter Concentrations.

Ozone. Exposure to elevated ozone levels can cause human health concerns as well as negative impacts to vegetation. As with fine particulate matter, a national air quality standard for protection of both public health and the environment has been set for ground level ozone. The standard, set at 0.075ppm as the three-year average of the fourth-highest daily maximum eight hour average ozone concentration, serves as both the primary and secondary standard. In January 2010, EPA proposed to strengthen this standard to a level between 0.060 and 0.075ppm, and to add a secondary ozone standard based on a cumulative growing season value. EPA will make a final decision on whether to revise the ozone standard in late 2010. Until that time, the 0.075ppm standard remains in place.

There are two monitoring stations located near the Francis Marion National Forest which measure ozone. The monitoring site in Charleston County is just 1.2 miles from the nearest boundary with the Forest, while the monitoring site in Berkeley County is within 7 kilometers of the Forest. As shown on the graph below, at this point neither monitor has measured an exceedance of the current NAAQS for ozone. Given that the proposed NAAQS may be between 0.060 and 0.070ppm, however, these monitors may exceed the more stringent standard. (Source: http://www.epa.gov/airexplorer)

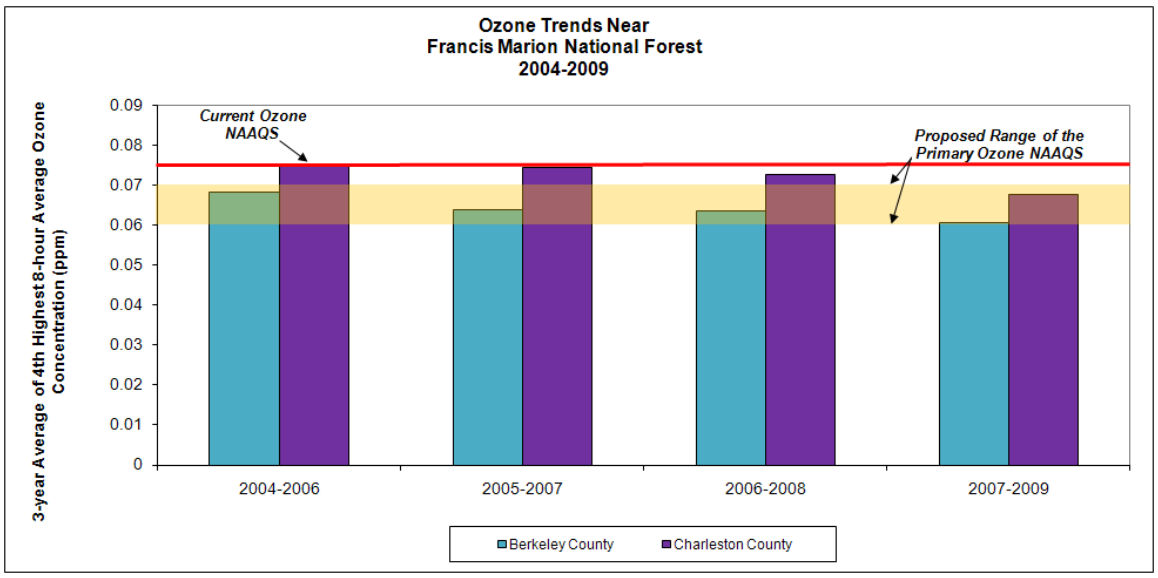


Chart 2-2. Ozone Trends over a 5-year period.

Pollution Within The Forest. The two main activities that cause air pollution within the Francis Marion National Forest are motor vehicle use and prescribed fires. Both of these activities emit pollutants that can increase ozone and fine particulate matter concentrations. Although emissions from these activities can be significant, ambient monitoring conducted near the Francis Marion National Forest indicates that the national ambient air quality standards are not being exceeded for either of these pollutants.

The chart below shows the annual particulate matter emissions from prescribed fire on the Francis Marion National Forest along with measured daily and annual fine particulate matter ambient concentrations. As shown, there does not appear to be a correlation between emissions and air quality concentrations.

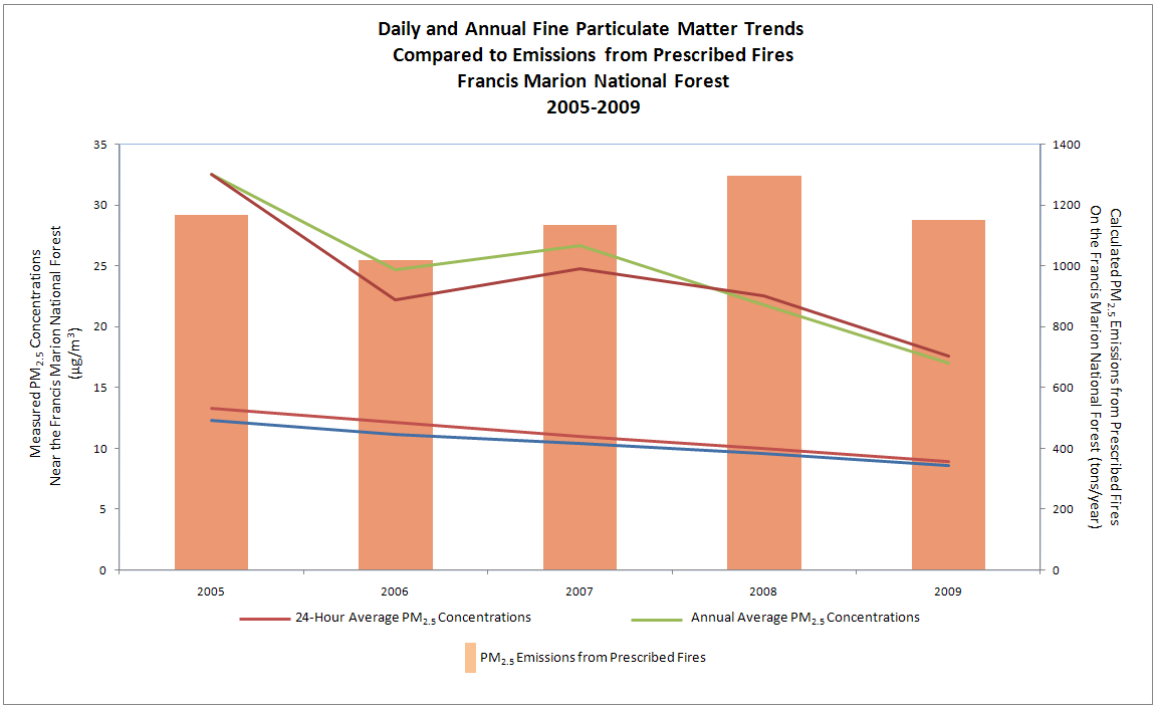


Chart 2-3. Emission Trends.

Findings

The two main activities that cause air pollution within the Francis Marion National Forest are motor vehicle use and prescribed fires. Both of these activities emit pollutants that can increase ozone and fine particulate matter concentrations. Although emissions from these activities can be significant, ambient monitoring conducted near the Francis Marion National Forest indicates that the national ambient air quality standards are not being exceeded for either of these pollutants.

Both fine particulate matter and ozone concentrations near the Francis Marion National Forest are meeting their respective air quality standards, and no negative impacts to either visitors to the Forest or to vegetation within the Forest are expected. Air quality within the Forest is being maintained, and in some cases appears to be improving. The adjacent Class I area, Cape Romain National Wildlife Refuge, shows a maintenance or improvement in fine particulate matter concentrations, and computer modeling indicates that future improvement in visibility will be achieved due to air pollutant emission reductions throughout the southeastern United States.

Sub-Issue 1.3 - Watershed Condition

24. Are Forest streams in compliance with state water quality standards (B-21)?

Information

This monitoring question is responsive to goals 1, 3, and 8. The Forest's streams, lakes, wetlands, and riparian areas are healthy, functioning ecosystems that produce sustained flows of high quality water.

- Average annual water quality measured at monitoring stations on Turkey, Wambaw and Awendaw Creeks.

Results

In 2003, a monitoring report by Plewa and Hansen summarized the existing information on the Francis Marion National Forest concerning water quality. The resources to replicate or improve upon this 2003 effort were not available for 2009.

The 2003 monitoring indicated that the streams in the coastal plain have eroded into deep marine deposits of past geologic epochs. The low stream gradients and extensive floodplains and wetlands adjacent to channels help detain surface waters for extended periods. The flat terrain might suggest that erosion or sediment is not a major issue. However on slopes 2% or over, marine sediments can be very erosive when exposed to severe rainfall or concentrated flow. Erosion and sediment can be major issues on steeper terrain if soils are heavily disturbed resulting in loss of organics and root support. Bottomland hardwood roots and woody debris are primary structural elements that contribute to stream stability and aquatic habitat. Best Management Practices (BMPs) are implemented to limit ground disturbing activities and their connections to surface waters, including streams, wetlands and riparian areas.

The 2003 monitoring effort identified existing conditions of concern from excessive methyl mercury accumulations in certain fish species and fecal coliform in waters used for shellfish harvesting. Sources of airborne mercury include deposition of coal burning pollutants. Locally, brackish waters may occur in the tidal influence zone and can be an issue relative to climate change and man induced hydrological changes. More information is now available on these issues.

Elemental mercury is converted to the toxic methyl mercury form due to sulfate reduction from the high sulfur, low pH, and anoxic conditions in wetlands. Certain organisms accumulate methyl mercury in the food chain, and high levels have been identified in intermediate organisms like mosquito fish. Methyl mercury becomes a major public concern in game fish such as the carnivorous

bowfin and large mouth bass. Essentially all the coastal black water streams with heavy contributions from wetlands are impacted, and the major rivers have fish consumption advisories based on monitoring to verify this. It should be assumed that other wetland dominated coastal waters have the same issues with methyl mercury conversion and bioaccumulation. Children and pregnant women should avoid fish from these sources and others should probably limit their intake. Methyl mercury is known to be especially damaging to babies and the young. Adults can eliminate small quantities.

Fecal coliform comes from a variety of sources of warm blooded animal and human waste. Specific sources are sometimes difficult to ascertain within the forest and for most practical purposes would be difficult to control except for human inputs. Outside sources can be numerous and may include cattle, pigs, raccoons, pets, faulty septic systems, and recreational uses. The water quality standards associated with shellfish gathering waters along the coast indicate sensitivity to very low levels of fecal increase. Activities that could increase inputs of fecal materials to coastal waters would be carefully evaluated, especially where drainage areas contribute to shellfish gathering waters, such as Awendaw Creek, for example.

Indicators of brackish water from the 2003 report in Wambaw Creek were not sampled or discussed in detail. In 2008 and 2009, tidal saltwater concentrations are intermittently present of up to 8.1 PSU (Practical Salinity Units) or 0.81% salt) were found at the Wambaw Creek Wilderness boundary on September 20, 2009 (Figure 2-5). Ocean salt water is about 3.5% salt or 35 PSU. Elevated salt concentrations are the result of water storage and low flow releases into the Santee River associated with upstream dams coinciding with high tides such as during new and full moon periods, low flows in tributary areas and possibly wind effects. The reduction in historic Santee River flows from the dam effects allows increased tidal entry of salt water from the Atlantic Ocean into the Santee River. This effect periodically extends upstream to at least Jamestown, SC and into tributary areas such as Wambaw Creek and the wilderness area. The frequency and significance of the tidal influence in Wambaw Creek is primarily during high tides such as full and new moons. Other sections of lower Santee River and tributaries such as Echaw Creek are also affected under conditions when the flows in the Santee River are low and tides are high. A past report by The Nature Conservancy has mapped the change in coastal vegetation below Highway 17 due to the frequency and extent of tidal salt water influence. It is obvious that the tidal affected areas have had changes in plant and aquatic organisms.

However, the Wambaw Creek water quality data taken at the wilderness boundary has complexities to consider in their evaluation. The water quality sonde (data logger) is installed at a fixed stage low enough that it is unlikely to be exposed. Salt water is denser than fresh water, so there may be periods of incomplete mixing of the water between denser salt water near the bottom and fresh water near the top that could suggest some inaccuracies could occur in the collected data. Although tidal action often produces velocities of moving water that can be seen on the surface, there is no way to tell the extent of mixing that is occurring.

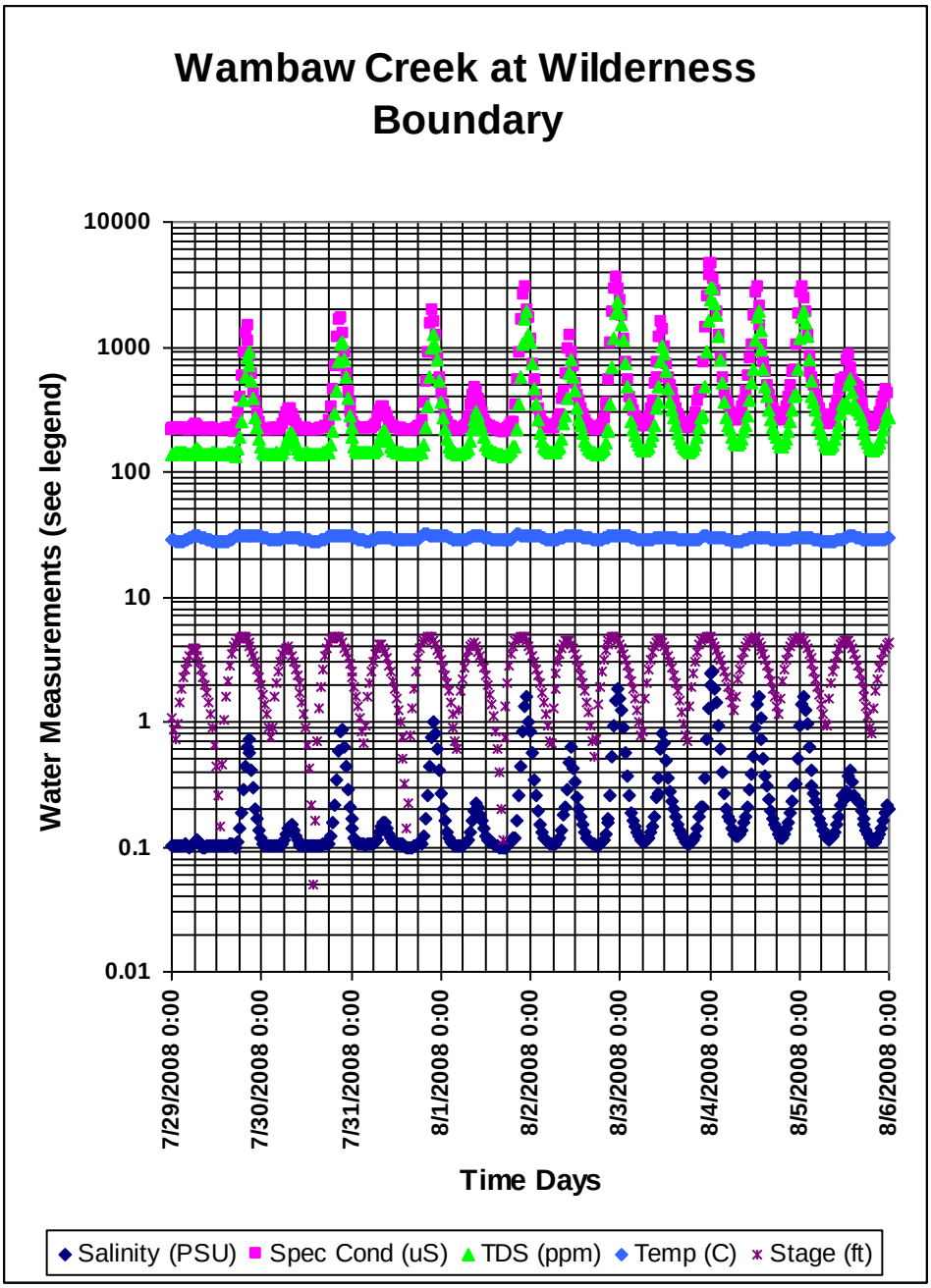
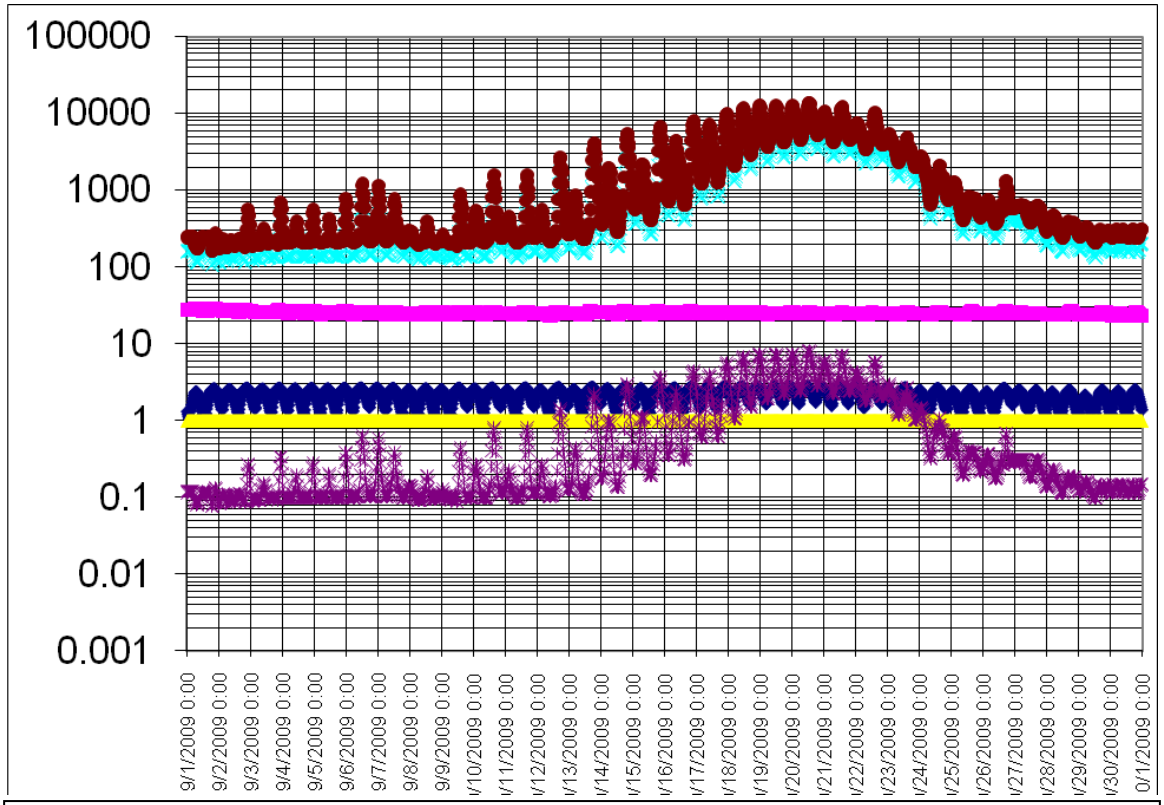


Figure 2-5. Water Quality Measurements at Wambaw Creek Wilderness

Wambaw Creek Wilderness is affected by periodic tidal influences due to the removal and diversion of water upstream from the Santee River in the Santee Cooper Project. Monitoring of the tidal salinity influences is affected by the elevation of the tides due to the moon and in some instances storm activity that increases tidal effect. The new moon was on August 1, 2008. There are periods of time in between new and full moons when the salinity effects are less. The

highest salinity measured in 2008 was 2.5 PSU. This equates to about 0.25% salt by weight and is considered brackish water. Salt water averages about 3.5% salt for comparison purposes.

Monitoring in Wambaw Creek in 2009 was in some ways similar to 2008 and in other ways had surprises that were not expected and still difficult to understand and explain. There were extended periods of time when salinity changes were limited. See Figure 2-6



Monitoring every 15 minutes or 96 readings per day, salinity (purple in PSU), water level (blue in feet), water density (yellow), temperature (degrees C, pink), total dissolved solids (light blue, ppm) and specific conductance (uS) produced an unusual period in September, 2009 where salinity stayed elevated for over a week from 9/16 to about 9/27, 2009. Peak salinity readings were 8.1 PSU, and still would be considered brackish water.

Figure 2-6 Salinity Monitoring in Wambaw Creek Wilderness.

Wind, unusual high tides, full moon (Sept. 23), flows in Wambaw Creek and the Santee River all could have contributed to the extent and duration of the salt influence which may involve some degree of either mixing with or separation from freshwater. The high values found in September 2009 were not expected. It should be noted that extended periods of time in 2009 also had relatively low salinity, even during tidal peaks.

The anomalies have not gone unnoticed and have increased our knowledge of the processes involved. The data suggests that periodic salt water intrusion into the Wambaw Creek Wilderness is even more severe than previously determined from the data in 2008, and the processes involved in sampling and interpreting the data are complex. There are other extended periods where brackish water is not found at the Wambaw Creek Wilderness, and we are looking to better define those conditions, whether they be flows from rainstorms or flows releases in the Santee River.

A substantial amount of new study is continuing and expanding to address many coastal water quality and hydrology issues within Turkey Creek and the Santee Experimental Forest. We are cooperating with these studies that are being developed by the USFS Center for Forested Wetlands and many partners. Last year, the Santee Experimental Forest was selected to be included as part of the National Experimental Forest and Range (EFR) network to represent the coastal issues. This has added substantial attention of water quality, hydrology, soil and other issues that are unique to coastal systems. Mercury, fecal coliform, nutrient, water and carbon cycling are among the issues being addressed in a variety of basic to intense project studies and research. Some of the studies highlight various aspects of vegetation management and prescribed burning activities that will be useful in technology transfer relative to management effects.

Findings

We did not fund water quality data collection for the five-year frequency. We feel that the Turkey and Wambaw Creek studies are providing information needed, and our partnerships and combined efforts with those developed by the Southern Research Station on the Santee Experimental Forest and others are producing in many ways more than was planned. Public contacts and/or informational materials may still be needed to increase public awareness of methyl mercury and fecal coliform issues common within the coastal plain.

25. Is the Forest in compliance with State Best Management Practices (BMPs) (B-45 new)?

Information

This monitoring question is responsive to goals 1, 3, and 8. The Forest's streams, lakes, wetlands, and riparian areas are healthy, functioning ecosystems that produce sustained flows of high quality water.

- Compliance with State BMPs.

Results

In the field assessments of several timber sales and units with streams or wetlands on the Francis Marion NF during 2009, BMPs were fully implemented and effective at protecting water quality, soil productivity and associated resources. We did not detect any water quality or soil productivity problems in implementing the forest plan standards within the timber sale areas evaluated, which include BMPs. Measures in Forest Wide Standards such as FW-97, FW-99, FW-105, FW-106, FW-109, and FW-115 may augment BMPs sufficiently to limit water quality effects to acceptable levels on the National Forest. The forest standards decrease the intensity of impacts allowed and increase stream protection widths or protection measures. In addition, proposals at the landscape level may include many types of treatments to address fuel reduction and habitat improvements. Past projects have typically dealt with dispersed treatments across the landscape.

The SC Forestry Commission has shown from past monitoring of BMP implementation in forestry operations within the coastal plain that BMPs are effective when properly implemented at maintaining water quality and soil productivity. The timber harvesting BMPs were implemented 100% of the time on the sampled timber sales on public lands. BMPs were properly checked by a sale forester, timber sale administrator and/or harvest inspector as to being implemented. Inspections and documentation were part of each sale record. Soil and water specialists also evaluated some areas for consistency. No reports associated with timber sale implementation were received, suggesting no problems with implementation or effectiveness of BMPs or forest standards.

A substantial amount of effort has gone into planning of prescribed burning, biomass, thinning, harvesting and other treatments to recognize soil limitations relative to compaction, displacement and rutting. Field conditions are being validated to insure that the sensitive soil types with high rutting potential or damage to wetland hydrology is identified prior to treatments, with added measures to limit when activities can occur. BMPs are also being integrated into other ground disturbing resource activities.

Prescribed burning was evaluated on several sites. BMPs were implemented, and there was some concern about localized areas within landscape treatments that burned too intensely and the frequency of burning and its potential effects on site productivity. Prescribed burning issues are being addressed with the Southern Research Station (Wetlands Center). These efforts are being updated each year and continue to expand to address pertinent issues relative to prescribed burning within the National Forest and along the wildland urban interface expansion boundaries of Mount Pleasant, Charleston and other smaller communities.

Work on Steed Creek Road's widening and bridge replacements needs continued monitoring. Most areas viewed showed signs that erosion control measures were being implemented. However, highway improvement projects need regular evaluation checks to ensure that the BMPs and standards are being met.

All terrain vehicle (ATV) trails were evaluated, and we found localized rutting and some unauthorized off trail uses in 2008 and 2009, especially associated with

the power and gas transmission line. The district now has been using some wet weather closures that help to reduce the rutting that occurs when the trail is too wet. Added maintenance has been used, and localized areas have been hardened with geomats. Some sensitive habitats have been fenced. Due to the amount of use, regular maintenance is part of the activity, and this would include returning and reshaping the dispersed sand accumulations back onto the trail tread. The district has increased communications with ATV users in efforts to notify them of closures and keep users on the trail and prevent off trail uses. Off trail uses have the potential to impact sensitive soils, wetlands, archeological sites, T&E habitats and species. Some damage is continuing, but the district has hired a full time recreation trail manager who is directing his attention to trail management. We continue to have issues, but trying to improve the conditions and reduce the off trail damage is helping.

Issues with unauthorized trails of one type or another continue. Even on designated trails, ATV and equestrian uses can cause resource damage that needs ongoing attention. User-created trails are creating resource issues because they are not properly evaluated and authorized, and some of these issues are expanding as use continues. Issues with unclassified roads are not well known, so future efforts will include identifying their location. Because they are not located, designed or managed to agency or forest standards and they have had no formal cultural, biological or other resource analysis, they are really outliers in our forest manage system of conducting quality work. Users in some instances are avoiding trail issues by going outside of the designated trail tread or using non system, unauthorized access routes. In the process, there is damage to soils, proposed, endangered, threatened, and sensitive (PETS) plants, wetlands and other resources. In some gas transmission pipe situations, the trail wear or impact may be deep enough to scar the pipe. Damage to the pipe can produce rust, and eventual failure can occur to these weakened areas, resulting in an explosion with many other effects.

The Forest and Districts are addressing many of the issues with the designated ATV trails, and this requires regular attention. They have improved monitoring and maintenance, working with trail riders associations, providing wet weather trail closures and other structural and design trail improvements that are responsive to the needs of both resources and users. However, some users are disrespectful of measures to provide a designed trail that intends to control use. Some go as far as cutting fences or locks, removing signs and wearing deep trenches. It will take an integrated effort with managers, users and law enforcement to address the issues.

Findings

The Forest and Districts are actively involved with addressing the issues and complying with BMPs and forest standards. The increasing trend of utilizing the SC Forestry Commission for BMP Compliance Checks has been an excellent way to achieve mutual goals and maintain some outside review and interaction for quality control of forestry management activities. Due to the critical importance of maintaining prescribed fire as a management tool, and the complexity of the

prescribed burning issues, continued quality control, study and monitoring is needed. A more formalized strategy may be needed on how to handle or mitigate specific types of unauthorized public use issues such as user created trails.

There are still some designated trail sections with recurring issues that may require some action (improvement, section relocation, etc.). Findings of the forest specialist team and USFS trail specialists have been assigned to help identify, map and propose ways to address the ATV trail issues. Increased signing, maintenance, wet weather closures, relocation of problem sections, education, cooperation with user groups and enforcement all seem to be needed. We have made some progress but are still in the process of trying to turn this program around into the quality we expect.

Issue 2. Sustainable Multiple Forest and Range Benefits

Sub-Issue 2.1 - Recreational Opportunities

26. Are the acres of land greater than ½ mile from an open road increasing at a rate to achieve the objective (B-2)?

Information

This monitoring question is responsive to goals 1, 3, 7 and 8 and objective 3. **Objective 3** is to increase the acres of land ½ mile from an open road or greater to 24,000 acres in this 10-year planning cycle. Road closure is emphasized in some areas of the Forest to enhance roadless area characteristics and to provide more semi-primitive recreational experiences. In addition, the Forest provides shelter and forage for a variety of neotropical migratory birds which can be enhanced by reducing open road density.

- Acres ½ mile from an open road and number of 250-acre blocks ½ mile from an open road.

Results

The total acreage that is at least ½ mile from an open road is 27,973 in FY2009. There are over 30 individual areas that are greater than 250 acres (based on FY2008 analysis).

Findings

The objective of having 24,000 acres of land that is greater than ½ mile from an open road had been accomplished. There are several areas that are greater than 250 acres but additional road closures could increase either the acreage of these areas or the number of them.

27. Are the activities creating or maintaining the desired Recreation opportunity Spectrum ROS classes (B-12)?

Information

This monitoring question is responsive to goals 3, 4, 6 and 8 and objective 6. **Objective 6** is to manage the following acreage to achieve the Recreation Opportunity Spectrum class conditions: rural (81,826 acres), roaded natural (126,219 acres), semi-primitive motorized (21,147 acres), and semi-primitive non-motorized (13,549 acres). Visitors enjoy a diversity of recreational opportunities.

- The condition of each ROS class.

Results

No targeted information was collected in FY 2009. However, ongoing ROS classification review is done throughout the year in conjunction with regular recreation site visits. No inconsistencies were found in FY 2009.

In FY 2000, specific ROS monitoring showed that management activities have created or are maintaining the desired ROS classifications. Several recreation areas were monitored, including areas within the semi-primitive ROS classifications.

Findings

Recreation opportunities in the most primitive category continue to be in wilderness and roadless areas.

28. What is the current use of recreational facilities and trails (B-13)?

Information

This monitoring question is responsive to goals 3, 4, and 8. The Forest is a popular place with a wide range of recreational visitors.

- Recreational visitor use of facilities/sites and trails.

Results

The second round of National Visitor Use Monitoring (NVUM) was conducted on the Forests in FY2008. The results of both surveys (2002 and 2008) show the following trends in recreation use. Overall national forest visits were down 3%. The annual visits in 2002 were 1,328,000 that fell to 1,283,700 in 2008.

Findings

Overall use was down slightly in the six-year period between 2002 and 2008.

29. Are the distribution, design, location, capacity and condition of the recreation facilities and trails meeting the needs of the users (B-14)?

Information

This monitoring question is responsive to goals 3, 4, and 8 and objective 8. The Forest Plan objective (**Objective 7)** to increase the developed recreational facilities capacity to 2,200 people-at-one time (PAOT) within the next 10 years

was dropped. Another objective (**Objective 8)** is to increase the trail system to 160 miles within the next 10 years.

- User satisfaction with facilities and trails

Results

The second round of National NVUM was conducted on the Forests in FY2008. (The NVUM survey combined both the Sumter and Francis Marion National Forests. Therefore the following information is not specific to the Francis Marion.)

- The following items were items that the forest did well or very well:
  - At day-use sites, bathroom cleanliness, parking, and feeling of safety ranked the highest in terms of satisfaction.
  - At overnight sites, parking, feeling of safety, and value for fee paid ranked the highest in terms of satisfaction.
  - At general forest sites (which include trails of all types, hunting, fishing, etc.), employees' helpfulness, condition of environment, roads and parking, feeling of safety, and value for fee paid ranked the highest.
- The following were items that people were the most dissatisfied with:
  - The restroom cleanliness in general forest areas (trailheads and dispersed sites) was not rated well. Over 44% of users in these areas were very dissatisfied with the conditions of the restrooms.
  - Users would like to have improved recreation information and signage at campgrounds and wilderness areas.

The Swamp Fox Passage of the Palmetto Trail (in compliance with the *2009 Operations and Maintenance Plan* and *2009 Sign Plan),* has been re-blazed, and new trail signs were installed at all points where the trail crosses a road. Also, mile markers have been installed along the 47-mile trail.

There continues to be infrastructure changes/improvements to the Wambaw Cycle Trail system in an attempt to mitigate impacts to the natural resources around the trail (as well as improve trail experience so riders want to stay on the trail). An assessment of the management, layout, and physical attributes of the Wambaw Cycle Trail was initiated in FY 2008 and completed in April 2009. The soil type, trail location and incompatible uses greatly affect the impacts of OHV trail on riparian and soil resources, hampering our efforts on the Francis Marion.

Findings

FY 2008 NVUM monitoring shows that certain areas can be improved in terms of user satisfaction.

30. Are miles of trails increasing at a rate to achieve objective (B-15)?

Information

This monitoring question is responsive to goals 3, 4, 6 and 8 and objective 8. The Forest Plan has an objective to increase the trail system to 160 miles within the next 10 years (**Objective 8)**.

- Number of miles of trails

Results

The total miles of trail is over 166 miles and meets the plan objective.

Findings

No additional action is needed.

31. Are activities creating or maintaining the desired Visual Quality Objectives (VQOs) (B-16)?

Information

This monitoring question is responsive to goals 2, 3, 4, 6 and 8 and objective 10 of the Forest Plan which is to manage the following acreage to achieve the VQOs classes: modification (186,788 acres); partial retention (38,648 acres); retention (4,179 acres); and, preservation (13,812 acres). The landscape around most travel routes continues to be managed to reduce the visual impacts of activities that might be seen by passers-by. Generally, visual quality is improved.

- The condition of each VQO class.

Results

No specific visual monitoring information was collected in FY 2009. However, ongoing visual review is done throughout the year in conjunction with regular field visits. No inconsistencies were found in FY 2009.

In FY 2000 specific visual monitoring showed that management activities have created or are maintaining the desired VQOs. Several projects were monitored.

Findings

No additional actions are required.

Sub-Issue 2.2 - Land Adjustments

32. Are lands being acquired which consolidate ownership, contain unique areas, enhance recreational opportunities, maintain public access and increase management efficiency (B-20)?

Information

This monitoring question is responsive to goal 5. The Forest is more consolidated, and land acquisitions include an array of unique plant and animal habitats, riparian areas, geological features, cultural resources and unique recreational opportunities.

- Annual land adjustments.

Results

The Francis Marion NF acquired two tracts in FY2009: a purchase of 55 acres in Berkeley County and a donation of 197 acres in Charleston County.

One purchase of 24 acres and a donation of 24 acres are anticipated to close in FY2010; both are in Charleston County.

The Francis Marion Assembled Exchange and the French Quarter Assembled Exchange are multi-year projects that will close in FY2011.

The Francis Marion National Forest has plans to sell the two offices and move into one office building to eliminate duplicate services.

Findings

New purchases are planned in the future.

Sub-Issue 2.3 - Heritage Resources

33. Are heritage sites protected (B-44 new)?

Information

This monitoring question is responsive to goal 2. Manage, protect and perpetuate natural and cultural values associated with these irreplaceable resources.

- Sample field condition assessment of sites eligible or listed on National Register.

The forest objective is to document and compare existing heritage resource conditions to the desired objectives through monitoring. Heritage resources include places such as archaeological and historical sites and traditional cultural properties. Heritage resources also include things such as artifact collections, historic maps and records, and special or sacred objects. Heritage resources are vulnerable, nonrenewable resources, and our goal is to preserve, protect, and interpret them for the public.

Results

Given the large number of heritage resources on the forest, the Forest Service uses a sampling strategy to select priority heritage assets (PHA) for monitoring. Monitoring archaeological sites and historic buildings determines if current administrative and field procedures are sufficient to protect significant cultural resources from damage or destruction by either human or natural forces. The results of this effort are presented in the table below.

Table 2-2 Heritage Resources Monitored on the Francis Marion National Forest	
Total number of assets monitored	2
ARPA investigations	0
Assets eroding by water	0
Assets damaged by forest users	0
Assets damaged by forest management	2
Assets undisturbed	0

Monitoring identified natural threats to two historic buildings. Both buildings continue to deteriorate from weathering, vandalism, etc and are in critical need of work to preserve these Priority Heritage Assets. Management activities are needed to seal broken entry ways (doors and windows), control vandalism and stabilize buildings to prevent further deterioration.

The full scope of archaeological site looting, vandalism, and other threats is not known due to the small sample of sites monitored. The use of metal detectors to dig for artifacts on historic sites is a growing concern.

Findings

The forest continues to identify and monitor archaeological sites and historic buildings at risk. Heritage resource specialists are working with law enforcement, other Forest Service employees, and the public to document and deter unauthorized forest activities that damage historic properties.

The forest needs to increase monitoring to determine the effects of unauthorized activities and uses on archaeological sites including use of off road vehicles, horse trails, and woods roads. The effects of management activities such as tilling wildlife fields and construction of firelines need to be evaluated as well.

Finally, the forest needs to develop heritage preservation plans (HPP) for at risk priority assets and implement a regularly scheduled monitoring program. The forest needs to assess its collections, including artifacts, photographs, and historical records, and develop a curatorial plan.

Issue 3. Organizational Effectiveness

34. Are probable activities, costs and outputs occurring as estimated in the Plan (B-22)?

Information

Specific items have been tracked and are summarized in the following table. The Forest Plan established a range of acceptable results of within 20 percent of estimated projections.

Results

Tables 2-3 and 2-4, below, show the trend in various activities across the Forest.

Findings

Factors such as uncertain weather, budget and staffing constraints, increasing urbanization, and smoke sensitivities will have an effect on the ability to sustain or significantly increase the acres burned. Stewardship and other types of partnerships are being used and need to continue to be used to maintain critical ecosystem components and control hazardous fuels.

The Francis Marion road system use by the public and commercial users has remained heavy, even during a weakened economy. Emphasis has continued on maintaining and reconstructing roads to meet the objective maintenance level, meet current design standards and best management practices, and reduce negative impacts to resources with the focus on watershed health.

Road projects to support timber activities continue to focus on road surfacing and drainage repair and replacement. No new miles of road were constructed in FY 09.

The Forest's new construction road miles continue to be near zero and significantly lower than the target projected in the plan. This is being driven by the completeness of the road system as it relates to the timber program's specified road needs. Miles of road reconstruction continue to fall behind the ten year plan target due to a stagnant budget and low value timber sales. This is much lower than the plan target and lower than the 20% acceptable value established in the plan. This will affect the road system in future years by requiring more expensive road work and reduction in serviceability of the system. The forest has not been able to close significant mileage of roads to reach the percentage of closed roads in the plan.

Table 2-3. Activities and Expenditures/Outputs

Activity	Unit of Measure	FY04	FY05	FY06	FY07	FY08	FY09	10 year Plan Estimate
Road Construction	*Miles*	*0.0*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*	*15*
Road Reconstruction	*Miles*	*6.3*	*1.7*	*36.7*	*2.0*	*2.8*	*0.0*	*63*
*Timber Roads**	*Miles*	*27.0*	*8.6*	*38.2*	*25.4*	*26.1*	*14.8*	*N/A*
Roads Decommissioned	*Miles*	*6.0*	*0.0*	*1.0*	*0.6*	*0.6*	*0.0*	*N/A*
Open Roads	*Miles*	*432.7*	*433.4*	*433.2*	*433.1*	*432.5*	*434.0*	*446*
Closed Roads	*Miles*	*127.2*	*131.0*	*131.0*	*131.0*	*142.2*	*140.8*	*172*
*Maintained Permanent Wildlife Openings***	*Acres*	*720*	*720*	*720*	*819*	*706*	*706*	*810*
Convert Loblolly to Longleaf	*Acres*	*0*	*0*	*0*	*0*	*0*	*0*	*7,700*
Establish Regeneration	*Acres*	*0*	*0*	*0*	*0*	*0*	*0*	*16,150*
Fertilization	*Acres*	*0*	*0*	*0*	*0*	*0*	*0*	*600*
Intermediate Stand Treatments	*Acres*	*0*	*2,000*	*4,223*	*947*	*657*	*1,228*	*22,500*
Regeneration Harvest	*Acres*	*0*	*0*	*0*	*0*	*0*	*0*	*3,600*
Thinning Harvest	*Acres*	*983*	*2,280*	*3,736*	*1696*	*2127*	*2,228*	*44,000*
Volume offered for Sale	*MMCF*	*0.8*	*2.6*	*6.2*	*3.2*	*3.1*	*3.0*	*33*
Winter Season Prescribed Burning	*Acres/Year*	*24,426*	*23,381*	*19,521*	*23,824*	*25,561*	*29,581*	*26,000*
Growing Season Prescribed Burning	*Acres/Year*	*7,110*	*11,862*	*11,409*	*10,501*	13,710	5,298	*4,000*
Annual Payments to Counties	*M$*	*908*	*929*	*938*	*937*	*844*	*674*	*68*
*Annual Budget****	*MM$*	*13.6*	*10.8*	*10.2*	*9.4*	*8.3*	*9.1*	*N/A*

* Timber roads are those roads under timber sale contract.

** Permanent wildlife openings also include waterfowl impoundments and greentree reservoirs but do not include maintained linear wildlife strips. In FY2008, the acres for permanent wildlife openings came from GIS. Changes in the acres are due to changes in the GIS layer and no changes were made in the number of acres maintained.

*** The budget allocation includes both the Sumter and Francis Marion National Forests and cannot be tracked separately. Annual Budget expenditures are adjusted for inflation and do not include any dollars allocated for grants and other specific programs.

Table 2-4. Status of Recreational Facilities, Trails and PAOTs

Activity	Unit of Measure	FY03	FY04	FY05	FY06	FY07	FY08	FY09	10 year Plan Estimate
Construct Boat Ramps	*# of Sites*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*
Construct Horse Camps	*# of Sites*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*
Construct Campgrounds	*# of Sites*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*
Construct Canoe Access	*# of Sites*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*5*
Construct OHV Trails	*Miles*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*20*
Construct Bicycle Trails	*Miles*	*7*	*0*	*0*	*0*	*0*	*0*	*0*	*10*
Designate Canoe Trails	*Miles*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*10*
Construct Hiking Trails	*Miles*	*7*	*0*	*0*	*0*	*0*	*0*	*0*	*10*
Construct Horse Trails	*Miles*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*20*
Recreation Capacity – Boat Ramps	*PAOTs*	*230*	*230*	*230*	*230*	*230*	*230*	*230*	*500*
Recreation Capacity – Horse Camps	*PAOTs*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*50*
Recreation Capacity – Campgrounds	*PAOTs*	*280*	*280*	*250*	*250*	*250*	*250*	*250*	*400*
Recreation Capacity – Canoe Access	*PAOTs*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*130*
Recreation Capacity – Other	*PAOTs*	*790*	*790*	*790*	*790*	*790*	*790*	*790*	*1,165*
-Trails, total	*Miles*	*166.1*	*166.1*	*166.1*	*166.1*	*116.1*	*166.1*	*166.1*	*160.5*
-OHV	*Miles*	*40*	*40*	*40*	*40*	*40*	*40*	*40*	*60*
-Bicycle	*Miles*	*63*	*63*	*63*	*63*	*63*	*63*	*63*	*10*
-Canoe	*Miles*	*35.8*	*35.8*	*35.8*	*35.8*	*35.8*	*35.8*	*35.8*	*22.5*
-Hiking	*Miles*	*57.3*	*57.3*	*57.3*	*57.3*	*57.3*	*57.3*	*57.3*	*30*
-Horse	*Miles*	*33*	*33*	*33*	*33*	*33*	*33*	*33*	*38*

The Francis Marion continues to conduct road condition surveys to determine the condition of the road system and the amounts of annual and deferred maintenance. Road decommissioning was not done in FY 09 to allow spending these program dollars on higher priority open roads. The forest is maintaining an increased number of maintenance level 2 roads. The decreased level of maintenance will also reduce the quality or restrict access to some areas of the forest for the traveling public.

39. Are projects being managed according to requirements and making progress toward achievement of desired future condition (DFC) for vegetation (B-46 new)?

Information

This monitoring question is responsive to goals 1, 2, 3, 6, 7 and 8.

- Do an Integrated Resource Review (IRR).

Results

No Integrated Resource Reviews (IRRs) were completed in FY 2009, but one is scheduled for FY2010.

Findings

An IRR is proposed to be completed in FY 2010.

Chapter 3. FY10 Action Plan and Status

Actions Not Requiring Forest Plan Amendment or Revision

a) Action: Inventory and then develop a monitoring program for aquatic macroinvertebrate communities across the Francis Marion National Forest, including aquatic insects, crayfish and mollusks.

Responsibility: Districts and SO staffs.

Date: FY2010

Status: Existing population conditions are unknown. Crayfish and mussel shells were collected in conjunction with the fish community monitoring in 2003 (refer to the 2006 Monitoring Report). Inventories of benthic macroinvertebrate, crayfish and mollusk communities need to be accomplished.

b) Action: Emphasis needs to be placed on efforts to bring the Regional database into operational use for estimating forest-wide trends related to compiling and analyzing bird point or harvest data for MIS, including northern bobwhite quail, eastern wild turkey, painted bunting, American swallow-tailed kite, prairie warbler and northern parula warbler. The region is working on the R8 Bird Database, which should have this functionality soon. Fish and mussel surveys are planned to occur in 2010 or 2011.

Responsibility: SO staff.

Date: on-going

Status: Data has been entered and analysis can be done at the Regional and Forest level, but information is currently not available at the District level. No further action will be taken. Emphasis will be placed on getting access to the information by Districts to use in project planning.

c) Action: Baseline data is needed to determine the acreage and extent of low basal area savannas which contribute towards early successional habitat on the Forest in order to meet Objective 12.

Responsibility: District staff.

Date: FY 2009 and FY2010

Status: Planning has begun on the first longleaf restoration project since Hurricane Hugo. Analysis of excess foraging habitat for RCW has been completed. Forest stands have been identified that could be regenerated to longleaf pine. The decision for the Honey Hill Habitat Restoration Project has been signed, and it is anticipated that the planting of longleaf pine will begin in 2011-2013. The Hellhole project has been scoped, and it is anticipated that the decision

will be signed in the spring of 2010. Baseline information on the distribution and extent of high quality seasonally wet longleaf pine savannas was acquired from the Hellhole Analysis Area in 2010.

d) Action: Increase the active management (i.e., prescribed burning, thinning) in the Wando area of the Forest in order to recover the flatwoods salamander and to prevent listing of the Carolina Gopher frog.

Responsibility: District staff.

Date: FY2009

Status: 1,176 acres of critical habitat were designated on the FMNF by the USFWS and was published in the Federal Register, Vol. 74, No. 26 on Tuesday, February 10, 2009. Also, the previously threatened *Ambystoma cingulatum* was separated into two distinct species (i.e., the federally threatened Frosted Flatwoods Salamander, *A. cingulatum*, and the federally endangered Reticulated Flatwoods Salamander, *A. bishopi*). A Frosted Flatwoods Salamander survey was conducted during 2009 by John Palis. However, no individuals were documented. USFS personnel and the SC State Herpetologist have conducted periodic surveys for the Frosted Flatwoods Salamander since 2007, but no individuals have been collected. Joyce Marie Klaus has conducted periodic surveys since 2006 as well, but has not documented any individuals either.

e) Action: Use certain percentages in the satisfaction chart from NVUM to measure if our recreation programs, facilities and settings are meeting the needs of our customers. After the 2008 NVUM, there will be some trend information to compare with 2002 data. We expect that some of our lowest rated items will have improved. At that time, develop actions to address the lowest rated elements.

Responsibility: SO staff.

Date: FY 2009

Status: Presently, we are using PAOTs to measure accomplishment for recreation capacity. NVUM report results are available and indicate that recreation use has dropped. The overall satisfaction results indicated that almost 79 percent of the visitors were very satisfied with the overall quality of their recreation experience. Less than 1 percent expressed any level of dissatisfaction.

f) Action: Digital databases for invasive plants, PETS plants, and underrepresented or high quality plant and animal communities, need to be maintained on the Forest. The structure of these databases shall be consistent with corporate databases throughout the Region or Forest when possible. To determine restoration opportunities, understory communities should be evaluated and captured in FS VEG.

Responsibility: District and Forest Program Managers

Date: 2011

Status: Ongoing

g) Action: Appropriate fire and biological staff should ensure that endangered and sensitive species, botanical areas, and underrepresented plant communities are prescribed burned on a regular basis as needed to maintain and enhance them. Meetings should occur annually to determine prescribed burning needs for these species and communities.

Responsibility: District and Forest Program Managers

Date: 2011

Status: Ongoing

Actions That Require Forest Plan Amendment or Revision

Francis Marion is scheduled for a forest plan revision pending the new planning rule.

References

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Appendices

Appendix A - List of Preparers

The following individuals contributed to this report:

Bill Hansen	Hydrologist
LaRue Bryant	Forest Engineer
Mary Morrison	Forest Planner
Jason Jennings	Soil Scientist
Robert Morgan	Archaeologist
Vacant	Wildlife Program Manager
Mark Danaher	Francis Marion Wildlife Biologist
Robin Mackie	Ecologist/Botanist
Mae Lee Hafer	Natural Resources Staff Officer
Stephen Wells	Fire, Lands and Minerals Staff Officer
Tony White	Planning, Engineering, Recreation, GIS, and Heritage Staff Officer
Joe Robles	Recreation Specialist
Robbin Cooper	Landscape Architect
Jay Purnell	Forest Silviculturist
Tim Dunfee	Fire/Aviation Management Officer
Dan Shea	Wildland Fire Planner
Geoff Holden	Forest GIS Coordinator
Melanie Pitrolo	Air Specialist
Jeanne Riley	Fisheries Program Manager
Peggy Nadler	Lands Program Manager

Appendix B - Amendments to Forest Plan

Amendment 1, October 2002 - This amendment provides direction for the preparation of site-specific Biological Evaluations (BE) including inventory requirements for Proposed, Endangered, Threatened, and Sensitive (PETS) species. The amendment makes the process of conducting BEs more efficient and consistent throughout the Southern Region of the Forest Service.

Amendment 2, May 2003 - This amendment revises the Management Indicator Species (MIS) List to increase efficiency and effectiveness of the Forest's monitoring program and project effects analyses.

Amendment 3, December 2004 - This amendment adds a standard to the Forest Plan that is needed to incorporate newly acquired lands into the Forest Plan and begin managing these lands through site specific projects.

Appendix C - Summary of Research Needs

The following research needs have been identified for rare species.

- **What is the distribution of American eel across the Forest? What habitat does the eel utilize? What is the population status?**
  Stream fish inventory surveys were conducted in 1993 by Hansbarger and Dean (1994). Monitoring surveys were conducted in 2002, 2003, 2004 and 2006 (refer to the 2006 Monitoring Report). No fish surveys were conducted in 2009. Habitat inventory protocol was developed in 2002 using BVET methods (Dollof et al 1993). Habitat inventory was attempted in 2003 and 2004. Dry conditions in 2003 and swampy conditions in 2004 restricted inventory to short segments of streams. During fish surveys, it was observed that large woody debris is lacking in the coastal stream systems. Hansbarger and Dean (1994) stated that fish inventory was difficult due to the abundance of downed trees and wood in the streams. No habitat surveys were conducted in 2009. Large woody debris, an important component for habitat structure, is lacking in the sampled streams. Fish surveys are planned for 2010.

- **What species of crayfish occur on the Forest and what is the distribution of crayfish across the Forest? What is the population status?**
  Existing population conditions are unknown. Crayfish were collected in conjunction with the fish community monitoring in 2003 (refer to the 2006 Monitoring Report). Inventories of benthic macroinvertebrate, crayfish and mollusk communities need to be accomplished.

- **What species of mollusks occur on the Forest and what is the distribution of mollusks across the Forest? What is the population status?**
  Existing population conditions are unknown. Mussel shells were collected in conjunction with the fish community monitoring in 2003 (refer to the 2006 Monitoring Report). Inventories of benthic macroinvertebrate, crayfish and mollusk communities need to be accomplished. Mussel surveys are planned to occur during 2010 or 2011.

- **What ecological factors are affecting the health of the federally-endangered pondberry at Honey Hill? How can this population best be managed?**
  Management of the pondberry at Honey Hill was addressed through an intensive monitoring and management study conducted by Jeff Glitzenstein and others with the SC Native Plant Society in 2005. In 2009, management of the area was addressed through the Honey Hill NEPA decision. In 2010, two research projects on pondberry have been initiated by professors at the Citadel.

- **What ecological factors are affecting the distribution of the federally threatened Frosted Flatwoods Salamander on the forest?**

- **What ecological and biological factors affect habitat selection and nesting success of swallow-tailed kites on the FMNF? How do forest management practices on the FMNF affect suitability and productivity of swallow-tailed kite habitat?**

- **What ecological and biological factors affect habitat selection, breeding success and tadpole/metamorph survival of the Carolina Gopher Frogs on the FMNF? What forest management practices are needed to maintain and enhance Carolina Gopher Frog habitat on the FMNF?**

- **What was the historic range and distribution of seasonally wet savannas on the Francis Marion? How can they best be managed/restored?**

FRANCIS MARION NATIONAL FOREST
FISCAL YEAR 2009 MONITORING AND EVALUATION ANNUAL REPORT

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