

# Francis Marion National Forest

## Monitoring and Evaluation Annual Report

Fiscal Year 2004



U. S. Department of Agriculture  
Forest Service  
Southern Region



**Francis Marion  
National Forest**

**Fiscal Year 2004**

**Monitoring and Evaluation Report**

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**[www.fs.fed.us/r8/fms](http://www.fs.fed.us/r8/fms)  
September 2005**

The salt marsh pictured on the cover is just one of the many features of the Fancis Marion National Forest.

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# Acronyms

ASQ	Allowable Sale quantity
BCD	Biological Conservation Database
BMP	Best Management Practices
BVET	Basin-wide Visual Estimation
DBH	Diameter at breast height
EPA	Environmental Protection Agency
FS	Forest Service
FW	Forest-wide
FY	Fiscal Year
GIS	Geographic Information System
HMA	Habitat Management Area
IM	Inventory and Monitoring
MA	Management Area
MIS	Management Indicator Species
MMCF	Million cubic feet
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NVUM	National Visitor Use Monitoring
OHV	Off-highway vehicle
PETS	Proposed, endangered, threatened, and sensitive species
PPM	Parts per million
PSD	Prevention of Significant Deterioration
RPA	Resource Planning Act
SAMI	Southern Appalachian Mountains Initiative
SC	South Carolina Department of Health & Environmental Control
DHEC	South Carolina Department of Health & Environmental Control
SCDNR	South Carolina Department of Natural Resources
SPB	Southern Pine Beetle
T&E	Threatened and endangered
USDA	United States Department of Agriculture

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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/ Jerome Thomas  
JEROME THOMAS  
Forest Supervisor

September 27, 2005





# Executive Summary of Monitoring and Evaluation 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 is used to assess how well goals and objectives are being met, if standards and guidelines are being properly implemented and whether environmental effects are occurring as predicted. Evaluation of monitoring results is 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

The Francis Marion continues to achieve 110 per cent of the Forest Plan objectives for longleaf pine forest type restoration through reforestation and prescribed burning activities. No acres were planted with longleaf pine in FY 2004.

Southern pine beetle populations were at very low levels during FY 2004.

Prescribed burning decreased from 41,547 acres in FY03 to 31,536 acres in FY 2004. This was due primarily to a wet summer and lack of available personnel resulting in fewer acres of growing season burns (i.e. April to September). Of the total 49,250 acres in longleaf pine or mixtures of longleaf with loblolly pine about 60 per cent has been burned by prescription in the last 5 years, creating good conditions for the longleaf pine ecosystem. Approximately 75 percent of Management Area 26, which has as a goal of restoring and maintaining the longleaf ecosystem, has been burned in the last 3 years.

No early successional habitat is being created through even-aged forest regeneration. Thinning

stands to moderate basal areas followed by prescribed burning create openings in the forest canopy that somewhat mimics early successional habitat. However, as these stands grow and mature they can no longer be managed to provide this habitat.

The Red-cockaded Woodpecker (RCW) population on the Francis Marion has increased steadily from 314 potential breeding groups (PBG) in 1999 to 345 in 2004. The 2003 Revised RCW Recovery Plan identifies the minimum population size for delisting (what does delisting mean?) the Francis Marion Primary Core population at 350 PBG.

Success of the Francis Marion RCW population can be attributed to artificial cavity installation, prescribed burning, and mechanical mid-story control programs. Restoration efforts in 2004 included installing 186 artificial cavities and mechanical mid-story control on 1,100 acres. In August 2004, two hurricanes did minor damage on the forest destroying 75 cavity trees. About 50 percent of the RCW clusters occur at the wildland urban interface and are threatened by encroachment by woody vegetation. In the last 5 years, 50 percent of the RCW Habitat Management Area has been prescribed burned.

The Francis Marion National Forest is home to one of two populations for flatwoods salamander in South Carolina. A recovery plan for the species has not been completed: however the species requires ephemeral wetland herbaceous pond habitat surrounded by fire-maintained pine ecosystems. Although prescribed fire was conducted in habitat for flatwoods salamander in 2004, additional mid-story control and frequent prescribed fire are still needed to restore and maintain habitats for both Carolina gopher frog and flatwoods salamander particularly in the Wando area on the forest.

American alligator, bald eagle, Bachman's sparrow, West Indian manatee and wood stork are all stable. Migrant loggerhead shrike is not known to occur here although habitat is stable; status of Rafinesque's big-eared bat, southeastern myotis, shortnose sturgeon, and Atlantic sturgeon are unknown since the species are difficult to detect.

Our knowledge of proposed, endangered or threatened species (PETS) plant distributions including habitat associations and habitat threats, continues to increase. Management and monitoring of PETS species on the Forest is ongoing. Populations occurring at the wildland/urban interface continue to be threatened by woody species encroachment



associated with the lack of prescribed fire but efforts to manage these sites, at a manageable scale, are increasing. Monitoring for two federally endangered plants, American chaffseed and pondberry, was conducted in 2004 through partnership with the South Carolina Native Plant Society.

Forest and Aquatic communities monitored included ephemeral wetlands, stream fish communities and habitat, aquatic macroinvertebrate community, anadromous and catadromous fishes, and pond game fish. Large woody debris, an important component for habitat structure, was found lacking in sampled streams.

Prescribed fire emissions on the Francis Marion National Forest continue to be the most important Forest Service activity impacting air quality, since it releases fine particles into the atmosphere. In FY 2004, the amount of fine particulate matter released into the atmosphere was less than the FY03 levels.

We have not noticed any substantial water quality problems in implementing the forest plan standards, which include Best Management Practices (BMP). Measures in "Forest-wide Standards" such as FW-97, FW-99, FW-105, FW-106, FW-109, and FW-115 may augment BMP sufficiently to limit water quality effects to acceptable levels on the National Forest.

### **Sustainable Multiple Forest and Range Benefits**

Timber harvest needs to increase significantly to meet objectives in the Forest Plan. In FY 2004, .8 million cubic feet (MMCF) were offered for sale. The allowable sale quantity is 33 MMCF/year during the 10-year period.

The main silvicultural practices employed in FY 2004 were commercial thinning harvest, release of seedlings and saplings using prescribed fire, and pre-commercial thinning.

National Visitor Use Monitoring was done on the Francis Marion and the Sumter National Forests in 2002. This monitoring estimated visitor use for all activities including recreational facilities and trails. Sampling strategy does not allow separation of the use by forest. Visitor use on both forests for fiscal year 2002 was 1.1 million national forest visits. There were 1.5 million site visits and an average of 1.3 site visits per national forest visit. There were approximately 52,864 wilderness site visits on both the Francis Marion and Sumter National Forests.

A part of this monitoring survey was a visitor satisfaction survey. Most visitors were satisfied with the scenery, condition of the natural environment, conditions of the recreation facilities, the feeling of safety, the helpfulness of the employees. All visitors were found to be less satisfied with the cleanliness of the restrooms, the availability of information on recreation and the interpretive displays, signs and exhibits.

Currently the Francis Marion meets the Forest Plan objective of more than 160 miles of trails.

The Francis Marion is still short of achieving some of the probable activities anticipated in the Forest Plan (e.g., horse camp, and horse trail miles, new campground, canoe access points and new OHV trail miles.)

The Francis Marion has more than 2,200 PAOT annually in developed sites. No developed sites were constructed or expanded in 2004. However, the Wambaw Cycle Trailhead had a major rehabilitation in 2004, with new toilets, a host site, vehicular barriers, signage, new roof on picnic shelter, warm-up loop, and redesigned parking area.

Monitoring identified natural threats to archaeological sites. The most serious damage occurred on sites that are being eroded by maintenance and use of Atlantic Intracoastal Waterway. In addition to natural threats other priority assets have been damaged by unauthorized activities such as the use of off road vehicles other than on designated trail.

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.

An additional 1,336 acres were acquired on the Francis Marion National Forest during this fiscal year.

### **Organizational Effectiveness**

Forest roads continue to receive heavy use by the public and commercial users. Emphasis has been 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 for timber activities have continued to focus on surface and culvert replacement. No new miles of road were constructed in FY 2004.

# Chapter 1. Introduction

The forest new construction road miles continue to be much lower than the Forest Plan target. Miles of road reconstruction are only slightly below the ten-year plan target. Significant miles of roads to reach the percentage of closed roads in the Forest Plan have not been closed.

An Integrated Resource Review (IRR) was conducted on the Francis Marion National Forest on July 13 – 15, 2004. Issues related to early successional habitat, growing season fires, hardwood management, conversion of loblolly to longleaf pine, first thinnings, management of acquired lands, and the Planning/National Environmental Policy Act (NEPA) process were discussed and recommendations made for resolution. A report entitled “Final Report of the Integrated Resource Review Francis Marion National Forest” is available to review.

The Francis Marion National Forest is about 252,840 acres in the lower coastal plains of South Carolina. The *Revised Land and Resource Management Plan* (Forest Plan), approved on December 18, 1995, directs management activities. National forest lands are managed to provide goods and services for timber, outdoor recreation, water, wildlife, fish, and wilderness following multiple-use goals and objectives.

Monitoring and evaluation is an integral part of the Forest Plan designed to ensure the goals and objectives are being achieved, standards and guidelines are being followed, and environmental effects occur as predicted. Forest Plan monitoring and evaluation determines if the Francis Marion is moving toward or achieving the desired conditions for resources as described in the Forest Plan.

Monitoring is conducted by field reviews of projects and by inventory and survey work carried out annually. Forest Service resource specialists, universities, state resource agencies, and contracted specialists accomplish this work.



# Chapter 2. Monitoring Results and Findings

This chapter includes the monitoring questions and tasks defined in Chapter 5 and Appendix B of the Forest Plan. Appendix B 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 49,250 acres of longleaf pine forest types on the Francis Marion NF. This is 110% 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 39,752 acres of longleaf pine forest types in Management Area 26.

##### *Findings*

No additional action is needed.

#### 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 burning on a 2 – 4 year cycle. The red-cockaded woodpecker population is maintained and the longleaf pine ecosystem is maintained, restored and enhanced.

**Table 2-1. Monitoring Item and Results for FY 2003 and FY 2004**

Monitoring Item	FY 2003 Results	FY 2004 Results
Annual acres and location of longleaf pine management type stands burned on a 2 to 4 year cycle during the growing season (April – September). growing season	16,502 acres	10,000 acres
Percentage of the 160,000 RCW Habitat Management Area (HMA) which has been burned in the last 5 years.	48% (Percentage of FYs 1999, 2000, 2001, 2002, 2003)	50% (Percentage of FYs 2000, 2001, 2002, 2003, 2004)
Percentage of the longleaf pine forest types which has been burned in the last 5 years.	62% (Percentage of FYs 1999, 2000, 2001, 2002, 2003)	60% (Percentage of FYs 2000, 2001, 2002, 2003, 2004)
Percentage of Management Area 26 that has been burned in the last 3 years.	36% (Percentage of FYs 2001, 2002, 2003)	75% (Percentage of FYs 2002, 2003, 2004)

Findings

- The forest burned fewer acres in FY 2004 than in FY 2003. A wet summer and lack of available personnel resulted in fewer acres of growing season burns. Thus the annual acres of growing season burns on a 2-4 year cycle dropped about 6,000 acres and fell short of meeting objective 5.
- Burning in the last 5 years within the RCW HMA increased by 2 percent to 50 percent. This increasing trend needs to continue since we are still below requirements for a burning cycle of 2 to 5 years and the need to maintain the RCW population.
- The trend for burning longleaf pine forest types in the last 5 years decreased by 2 percent

to 60 percent. Fire is critical to restoring and maintaining this fire-dependent community and thus the percentage burned needs to increase in the future.

- As of FY 2004 the forest has burned approximately 75 percent of MA 26 in the last 3 years. This is more than double the percentage estimated in FY 2003. Most of the burning program occurs in Management Area 26 and was not updated in FY 2003 into the Continuous Improvement Stand Conditions (CISC) database (i.e., Treatment layer). The estimate for FY 2004 is based on information from district personnel. In the future, the district needs to update the CISC database to better reflect its prescribed burning program. Finally, due to burning being constrained at urban interfaces, personnel and budget constraints Standard MA26-2 should be deleted. This would require a Forest Plan amendment.

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

Information

his 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 next 90 years. 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 37,919 acres of mixed pine/hardwood forest types, and increase of 636 acres over the figure reported for FY 2003. It is over 2.5 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 4,905 acres of mixed pine-hardwood types in management area 27. This compares with 3,646 acres in the FY 1996 report. 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/co-dominant 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 have 30 percent of the dominant and/or co-dominant 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*

An action plan was developed in 1998 to establish plots to obtain this information. However, due to budget limitations they were not established.

*Findings*

Baseline information will be used in 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 have 30 percent of the dominant and/or co-dominant 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.

- Specific items will be established during study area in management area 27.

*Results*

An action plan was developed in 1998 to establish plots to obtain this information. However, due to budget limitations they were not established.

*Findings*

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

**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 overcrowded 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

983 acres of thinning harvest were offered for sale in FY 2004.

Findings

No additional action is needed.

**9. What are the current amounts and locations of The Nature Conservancy (TNC) plant communities? (B-19)**

Information

This monitoring question is responsive to goals 1, 2 and 8. Throughout the forest’s landscape, there is an ecologically sound distribution of vegetative communities.

- Forest Service Region 8 and TNC plant communities.

Results

None

Findings

Delete this monitoring item – this item was deleted several years ago, as use of the TNC Community Classification System was discontinued.

**10. 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, 7 and 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.

- Number of active RCW clusters
- Number of groups nesting

Results

The RCW population on the Francis Marion has increased steadily from 314 potential breeding groups (PBG) in 1999 to 345 in 2004. The 2003 *Revised RCW Recovery Plan (need exact title)* identifies the minimum population size for delisting the Francis Marion Primary Core population at 350 PBG.

Success of the Francis Marion RCW population can be attributed to installing artificial cavities, prescribed burning and mechanical mid-story control programs. Restoration efforts in 2004 included installation of 186 artificial cavities and 1,100 acres of mechanical mid-story control. In August 2004, two hurricanes did minor damage destroying 75 cavity trees. Approximately 50 percent of the RCW clusters occur at the wildland urban interface and are threatened by encroachment by woody vegetation.

Findings

The Francis Marion RCW Population, a primary core population, has increased since 1989, and is close to meeting population objectives for delisting as described in the *Revised RCW Recovery Plan* (1993).

**11. 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.

*Results*

Table 2-2 displays status of PETS animals on the Francis Marion National Forest.

The Francis Marion National Forest is home to one of two populations for flatwoods salamander in South Carolina. A recovery plan for the species has not been completed; however the species requires ephemeral wetland herbaceous pond habitat surrounded by fire-maintained pine ecosystems. Although prescribed fire was conducted in habitat for flatwoods salamander in 2004, additional mid-story control and frequent prescribed fire are still needed to restore and maintain habitats for both Carolina gopher frog and flatwoods salamander particularly in the Wando area on the National Forest.

**Table 2-2. Status of PETS animals on the Francis Marion National Forest**

Species	Status
<b>American Alligator</b>	Federally threatened (due to similarity to the alligator); populations stable on the forest; some evidence of poaching
<b>Bachman’s Warbler</b>	Federally endangered; last seen on the forest in 1963.
<b>Bald Eagle</b>	Federally threatened; increasing in the state; five nests on the forest w/ 5 chicks fledged in 2004
<b>Flatwoods Salamander</b>	Federally threatened; eleven breeding ponds of which only 4 have exhibited activity in the last 20 years; one flatwood salamander larvae detected in 2003 and none in 2004; habitat prescribed burned in 2003
<b>Red-cockaded Woodpecker</b>	Federally endangered; Increasing to 345 potential breeding groups in 2004
<b>Shortnose Sturgeon</b>	Federally endangered; One fish caught and tagged in the Santee River adjacent to National Forest land in 2002
<b>West Indian Manatee</b>	Federally endangered; north of the range of the species; 19 documented citations in the Intracoastal Waterway
<b>Wood Stork</b>	Federally endangered; birds are seen foraging on the forest (ex. Tibwin) but are not known to nest here
<b>Carolina Gopher Frog</b>	Sensitive; census by Dr. John Fauth in 2003 of 6 breeding ponds on the forest, detected a single male calling
<b>Bachman’s Sparrow</b>	Sensitive; population increasing in the general forest area but declining at wildland/urban interface
<b>Migrant Loggerhead Shrike</b>	Sensitive; migratory subspecies not confirmed on the Forest to date
<b>Atlantic Sturgeon</b>	Sensitive; species detected in Santee River; status unknown
<b>Rafinesque’s Big-Eared Bat</b>	Sensitive; 2003 survey conducted by Wendy Hood with Coastal Carolina University detected no Rafinesque’s big-eared bats or southeastern myotis
<b>Southeastern Myotis</b>	Sensitive; 2003 survey conducted by Wendy Hood with Coastal Carolina University detected no Rafinesque’s big-eared bats or southeastern myotis

American alligator, bald eagle, Bachman’s sparrow, West Indian manatee, and wood stork are all stable on the forest; Bachman’s warbler and migrant loggerhead shrike are not known to occur here though habitat is stable; status of Rafinesque’s big-eared bat, southeastern myotis, shortnose sturgeon, and Atlantic sturgeon are unknown since the species are difficult to detect.

Findings

All known flatwoods salamander breeding ponds occur in the Wando Area of the forest, which has been extremely difficult to burn due to presence of the wildland/urban interface and the abundance of fuels since Hurricane Hugo. Active management in the Wando area of the forest is needed to recover the flatwoods salamander and to prevent listing of the Carolina Gopher frog.

**12. 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

Table 2-3 displays status of PETS plants on the Francis Marion National Forest:

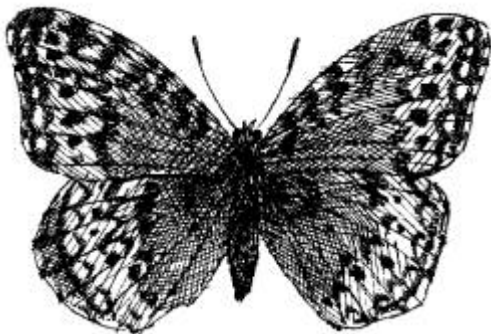


Table 2-3. Status of PETS plants on the Francis Marion National Forest	
Species	Status
<b>American Chaffseed</b>	Seven distinct populations including over 1,274 plants; 3 populations exhibiting very low numbers primarily due to encroachment with woody vegetation; total numbers of plants has increased since 1999.
<b>Canby’s Dropwort</b>	One small population known from the forest; stable to decreasing. Population not observed in 2002 (Pat McMillan, personal comment).
<b>Pondberry</b>	8 sites including 2 populations exhibiting low numbers due to encroachment with woody species.
<b>Incised Groovebur</b>	Sensitive; 5 sites known from the forest
<b>Carolina Spleenwort</b>	Sensitive; 1 site known from the forest
<b>Many-flowered Grass-pink</b>	Sensitive; 1 site known from the forest
<b>Cypress-knee Sedge</b>	Sensitive; no sites known but habitat occurs here
<b>Pondspice</b>	Sensitive; 42 sites known from the forest
<b>Boykin’s Lobelia</b>	Sensitive; 6 sites known from the forest
<b>Loomis’ Loosestrife</b>	Sensitive; no sites known but habitat occurs here
<b>Loose Watermifoil</b>	Sensitive; 1 site known from the forest
<b>Climbing Heath</b>	Sensitive; 4 sites known from the forest
<b>Pineland Plantain</b>	Sensitive; 10 sites known from the forest
<b>Yellow Fringeless Orchid</b>	Sensitive; 6 sites known from the forest, many declining due to lack of fire
<b>Crested fringed orchid</b>	Sensitive; 13 sites known from the forest
<b>Awned Meadow Beauty</b>	Sensitive; 26 sites on the forest
<b>Shortbristle Sedge</b>	Sensitive; 2 sites on the forest
<b>Coastal Beaksedge</b>	Sensitive; 1 site on the forest
<b>Pineland Dropseed</b>	Sensitive; status unknown
<b>Carolina Dropseed</b>	Sensitive; 7 sites on the forest
<b>Carolina fluffgrass</b>	Sensitive; 6 sites on the Forest



Monitoring for two federally-endangered plants, American chaffseed and pondberry, was conducted in 2004 through partnership with Jeff Glitzenstein and Donna Streng.

The number of American chaffseed plants has increased to 1,274 from 995 in 1999. Three sites remain at very low numbers and are at the verge of local extinction, including two at the wildland/urban interface, and another at a highway right-of-way that was likely exposed to herbicides. American chaffseed requires a regime of prescribed burning on a 2-3 year basis.

Eight sites for pondberry are known, of which 5 sites would benefit from removal of encroaching woody vegetation, including those at Echaw Road, Honey Hill and Hoover Road. Three sites appear to be healthy, comprised of numerous stems, though none produced fruit in 2004.

The Forest Plan tiers to existing recovery plan for Threatened and Endangered (T&E) species and Forest Service Manual direction for viability for sensitive species. Specific requirements for protection are included in standards and guidelines in the Forest Plan and as project-level mitigation.

### *Findings*

Our knowledge of PETS plant distributions including habitat associations and habitat threats continues to increase. Management and monitoring of PETS species is ongoing. Populations occurring at the wildland/urban interface continue to be threatened by woody species encroachment associated with the lack of prescribed fire, but efforts to manage these sites, at a manageable scale, are increasing.

Recovery criteria for the delisting of pondberry include the permanent protection of 25 self-sustaining populations throughout the range of the species (Recovery Plan for Pondberry, 1993). Based on monitoring conducted in 2004, 4 geographically distinct populations for pondberry appear to be viable, though no fruits were observed at either of these populations. Pondberry appears to be approaching recovery objectives for the species within South Carolina.

Recovery criteria for the reclassification of American chaffseed as stated in the “American Chaffseed Recovery Plan” (1995), include the

protection of 50 viable sites for the species based on biennial monitoring over a 10-year period. At the time the recovery plan was written, 72 extant sites were known with the majority (42 sites) known from South Carolina. Monitoring on the forest since 1999 suggests that 3 sites of American chaffseed are viable (greater than 100 individuals), and that active management is still needed to achieve recovery objectives. Population enhancement at suitable sites where individuals occur at low numbers should be investigated.

### **13. 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 that 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*

GIS records show 773 acres in permanent openings and wildlife openings. No acres in the age 0-3 year age class are recorded. Road and utility rights-of-way are estimated to be 800 acres. No early successional habitat is being created through even-aged forest regeneration. Thus, the forest presently has a total of 1,573 acres compared to the 5,000 to 10,000 acres required under Objective 12. Thinning stands to moderate basal areas followed by prescribed burning create openings in the forest canopy that somewhat mimics early successional habitat.

## *Findings*

The Forest needs to begin doing even-aged regeneration harvesting to meet Objective 12 and begin providing additional habitat for maintaining viable populations of early successional native species.

### **14. 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 that 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:

- 7,887 acres of pine types over age 80
- 8,901 acres of hardwood types over age 100
- 473 acres of mixed pine-hardwood types over age 100

#### *Findings*

No additional action is needed.

### **15. 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 that supports viable populations of native wildlife species. Provide opportunities to enjoy non-consumptive uses of wildlife such as bird watching.

- Population trend to MIS bird species.

#### *Results*

Prescribed burning returned to near pre-Hugo levels in 2004 restoring a portion of the forest to a random mosaic of understory conditions enhancing habitat for ground gleaners and salliers.

Modest amounts of thinning, restoring hardwood, planting supplemental foods and maintaining wildlife opening added to the diversity and quality of habitats on the forest for other woodland birds.

Data to estimate trends remain in transition because the new Regional database is still under construction.

#### *Findings*

Emphasis needs to be placed on efforts to bring the Regional database into operational use for estimating forest-wide trends.

### **16. 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 that 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*

Combinations of prescribed burning, planting supplemental foods and maintaining wildlife openings have incrementally improved habitat conditions on portions of the forest for wild turkey. The spring poult to hen ratio indicates weather conditions were favorable in producing higher than average survival among fledglings.

## *Findings*

Continue an aggressive prescribed burning program, restoring mast producing hardwood stands and increasing silvicultural activities to reduce basal areas in pine stands to maintain and develop quality nesting and brood rearing habitat for wild turkey.

### **17. 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 that 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*

Combinations of prescribed burning, planting supplemental foods and maintaining wildlife opening have incrementally improved habitat conditions on portions of the forest for quail.

Data to estimate trends remain in transition because the new Regional database is still under construction.

#### *Findings*

Emphasis needs to be placed on efforts to bring the Regional database into operational use for estimating forest-wide trends.

### **18. Are we maintaining viable populations of rare plants and the habitat to support them? (B-36)**

#### *Information*

This monitoring question is responsive to goals 1, 2 and 8 and objectives 4, 5, 9, 13 and 14. PETS plant  
16

populations/plant communities are being managed to promote viable populations of all native plant species.

- Approximate size and vigor of PETS population/ acres, composition, and structure of plant communities.

#### *Results*

See the results under monitoring item B-26.

#### *Findings*

This item is already covered by monitoring item B- 26 and can therefore be deleted.

### **19. 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 that 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*

No new data on amphibians other than PETS as reported under monitoring question #11.

#### *Findings*

No additional action is needed.

### **20. 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*

District efforts to map maritime communities in 2004 resulted in 2,223 acres. Much of this habitat is of low quality (75%) because of hurricane damage, or because conversion to loblolly pine on acquired lands. The potential exists to restore maritime communities dominated by live oak and cabbage palmetto through thinning or loblolly pine removal efforts.

No other rare community mapping efforts occurred in 2004.

### *Findings*

No additional action is needed.

## **21. 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*

Hansbarger and Dean did fish inventory sampling in Francis Marion streams in 1993 by (1994). A total of 53 streams were sampled across the forest post Hurricane Hugo. Stream population monitoring efforts in some of these same streams began in 2002 and continued through 2004 (Table 2-4). Repetitive sampling in streams varied from year to year due to drought conditions (2002), above average rainfall (2003) and below average rainfall (2004). Dry stream channels were encountered with drought and below average rainfall. Stream channels were indiscernible with the swampy conditions produced by above average rainfall. Seventeen of the original 53 streams were resurveyed in 2002-2003. The discussion in this report does not include 1993 streams that were not resurveyed. Two additional streams were surveyed in 2003 and 2004 that were not surveyed in 1993.

**Table 2-4. List of fish survey sites in the Francis Marion National Forest. Site numbers correspond to sites in Hansbarger and Dean (1994). UT = unnamed tributary.**

Stream	Site #	Watershed	Quadrangle	# Species Captured			
				93	02	03	04
Cooter Creek	12	Awendaw Creek	Ocean Bay	3	10		
Steed Creek	30	Awendaw Creek	Ocean Bay	9	11		
Fogarty Creek	54	Wando River	Cainhoy			3	3
Old House Creek	55	Wando River	Cainhoy			3	5
Harleston Dam Creek	50	Quinby Creek	Ocean Bay	3		7	
Northampton Creek	14	Quinby Creek	Ocean Bay	10	4	6	
Muddy Creek	24	Huger Creek	Huger	7	1		
UT Fox Gully	4	Huger Creek	Bethera	10		4	
Bullhead Run	2	Wadboo Creek	Cordesville	14		2	
UT Wadboo Creek	22	Wadboo Creek	Bonneau	5		4	
Beauford Branch	21	Wedboo Creek	Alvin	8	8	8	
Wedboo Swamp	9	Wedboo Creek	Alvin	6	9		
Dutart Creek	32	Dutart Creek	Jamestown	3		2	
Gal Branch	34	Echaw Creek	Cedar Creek	9		6	
Gravel Run	46	Echaw Creek	Jamestown	8		3	
UT Echaw Creek	36	Echaw Creek	Honey Hill	11	4	13	
Red Bluff Creek	7	Red Bluff Creek	Honey Hill	7		9	
UT Mill Branch	40	Wambaw Creek	Santee	8	9	5	
UT Wambaw Creek	44	Wambaw Creek	Santee	7	3	6	

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.

Hansbarger and Dean (1994) collected 35 fish species in 53 streams across the forest in 1993. Repeated sampling in 17 of those streams from 2002-2003 produced 26 species (Table 2-5). The same 17 streams in 1993 contained 29 species. Eight species captured in 1993 were not present in those 17 streams in 2002-2003. However, one species, the common shiner may have been misidentified since its range does not extend into South Carolina. Three species captured in 2002-2003 were not present in those 17 streams in 1993, although they were represented from other 1993 sampled streams. One species, the golden topminnow, captured in the 2003-2004 surveys was not present in the 1993 surveys. The number of species captured by watershed in 1993 and 2002-2004 is displayed in Table 2-6.

**Table 2-6. Number of species captured per forest watershed.**

Watershed	# Species Captured	
	1993	2002-2004
Awendaw Creek	10	14
Wando River	4	7
Quinby Creek	11	11
Huger Creek	11	4
Wadboo Creek	17	4
Wedboo Creek	12	22
Dutart Creek	3	2
Echaw Creek	19	14
Red Bluff Creek	7	9
Wambaw Creek	12	15

**Table 2-5. Species captured by backpack electrofishing. A total of 19 different streams were sampled in 2002-2004. Seventeen of these streams were sampled in 1993.**

Species		1993	2002	2003	2004
	# Watersheds	9	6	9	1
	# Streams	17	9	15	2
<i>Amblyopsidae</i>					
<i>Chologaster cornuta</i>	swampfish		x		
<i>Amiidae</i>					
<b>Amia calva</b>	bowfin			x	
<i>Anguillidae</i>					
<i>Anguilla rostrata</i>	American eel	x	x	x	x
<b>Aphredoderidae</b>					
<i>Aphredoderus sayanus</i>	pirate perch	x	x	x	
<b>Atherinidae</b>					
<i>Labidesthes sicculus</i>	brook silverside	x			
<b>Catostomidae</b>					
<i>Erimyzon oblongus</i>	creek chubsucker	x	x	x	
<b>Centrarchidae</b>					
<b>Acantharchus pomotis</b>	mud sunfish	x	x	x	x
<i>Centrarchus macropterus</i>	flier	x	x	x	
<i>Enneacanthus gloriosus</i>	bluespotted sunfish	x	x	x	
<i>Enneacanthus obesus</i>	banded sunfish	x		x	
<i>Lepomis auritus</i>	redbreast sunfish	x			
<i>Lepomis gibbosus</i>	pumpkinseed			x	
<i>Lepomis gulosus</i>	warmouth	x	x	x	
<i>Lepomis macrochirus</i>	bluegill	x	x	x	
<i>Lepomis marginatus</i>	dollar sunfish	x	x	x	
<i>Lepomis punctatus</i>	spotted sunfish	x		x	
<i>Micropterus salmoides</i>	largemouth bass	x			
<b>Cyprinidae</b>					
<i>Luxilus cornutus</i>	common shiner	x			
<i>Notemigonus crysoleucas</i>	golden shiner	x	x	x	x
<i>Notropis chalybaeus</i>	ironcolor shiner	x			
<i>Notropis cummingsae</i>	dusky shiner	x			
<i>Notropis petersoni</i>	coastal shiner	x	x		
<b>Esocidae</b>					
<i>Esox americanus</i>	redfin pickerel	x	x	x	x
<i>Esox niger</i>	chain pickerel	x			
<b>Elasmomatidae</b>					
<i>Elasmoma zonatum</i>	banded pygmy sunfish	x	x	x	
<b>Fundulidae</b>					
<i>Fundulus chrysotus</i>	golden topminnow			x	x
<i>Fundulus lineolatus</i>	lined topminnow	x			
<b>Ictaluridae</b>					
<i>Ameiurus natalis</i>	yellow bullhead	x	x	x	
<i>Ameiurus nebulosus</i>	brown bullhead	x		x	
<i>Noturus gyrinus</i>	tadpole madtom	x		x	
<b>Percidae</b>					
<i>Etheostoma fusiforme</i>	scalyhead darter	x	x		
<b>Poeciliidae</b>					
<i>Gambusia holbrooki</i>	Eastern mosquitofish	x	x	x	x
<i>Heterandria formosa</i>	least killifish		x		
<b>Soleidae</b>					
<i>Trinectes maculatus</i>	hogchoker		x		
<b>Umbridae</b>					
<i>Umbra pygmaea</i>	eastern mudminnow	x	x	x	x

All species captured in 2002-2004 were native to the Santee Cooper Drainage (Warren, et al. 2000). In addition, the population status of these species is considered to be currently stable throughout all or a significant portion of their range. One native species, the ironcolor shiner, captured in 1993 (in 5 of the 17 streams) but not during 2002-2004 is considered vulnerable. The vulnerable population status indicates that the species may become endangered or threatened by relatively minor disturbances to its habitat or that it deserves careful monitoring of its distribution and abundance to determine its status. Introduced species were present in the 1993 surveys in streams that were not surveyed in 2002-2004.

The trophic composition of the fish assemblage remains, for the most part, unchanged since 1993. Insectivores dominate the community, which indicates that the invertebrate food source is stable. Two predators present in 1993 were absent in the 2002-2004 surveys. However, redfin pickerel were abundant and occurred in all but two streams. Another predator, bowfin, was present in the 2003 surveys, possibly due

to higher water levels in the streams. Two omnivore species were present in the streams. Omnivore species increase as the physical and chemical habitat deteriorates.

Most species captured in these streams are classified as intermediate in their tolerance to human influences and adept at exploiting particular types of disturbances. One species captured in 1993 samples is considered intolerant, or very sensitive, to human influences. Intolerant species are among the first to be decimated after disturbances and the last to re-colonize after normal conditions have returned. The ironcolor shiner is an intolerant species and was absent in the 2002-2004 surveys. Tolerant species increase in the population with environmental degradation. In the streams sampled, there was no increase in tolerant species.

American eel were captured in five of the nine streams sampled in 2002 as compared to only two streams of 53 in 1993. However, this may be attributed to a more intense sampling design. In 2003 and 2004, captured American eels were pit tagged and recorded. Captured eel of 147 mm and larger in length were pit tagged and released. Eels smaller than this could not be tagged. American eel were captured in seven streams in 2003. Four of these streams were dry in 2002 and were not sampled.

Two American eels were recaptured in Old House Creek in 2004. Additional eels captured from the stream were pit tagged. American eel captured on Northampton Creek were also tagged. Other 2003 sampled streams where American eel had been tagged were dry in 2004.

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

### *Findings*

Twenty-six species have been captured in 17 streams across the Francis Marion National Forest. Repetitive sampling has occurred in those streams when water level conditions were favorable.

All of the fish captured are considered native to the watershed. The population status of native species is considered to be currently stable throughout all or a significant portion of their range, with the exception

of the American eel. The ironcolor shiner, a species considered vulnerable, was not captured during the sampling period. This species was captured in 5 of the 17 streams in 1993 surveys.

Insectivores dominate the fish community in sampled streams across the forest, which indicates that the invertebrate food source is stable. Over the sampling period, there was no significant change in trophic composition that would indicate any physical or chemical deterioration of sampled streams.

Most species captured in the sampled streams are classified as intermediate in their tolerance to human influences, adept at exploiting particular types of disturbances. There were no intolerant species captured, however there was no increase in tolerant species. The ironcolor shiner, an intolerant species, was not present in the sampled streams.

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

## **22. 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 mussels were collected in conjunction with the fish community monitoring in 2003.

Crayfish collected during fish community surveys are listed in Table 2-7 and identified in Eversole and Jones (2004). Mussel species collected are listed in Table 2-8.

**Table 2-7. Crayfish species collected in 2003.**

Watershed/Stream	Species	Collected
Wando River		
Fogarty Creek Site 54	<i>Procambarus (Scapulicambarus) troglodytes</i>	<b>1 male Form I, 1 male Form II, 1 female</b>
Quinby Creek		
Harleston Dam Creek Site 50	<i>Procambarus (Ortmannicus) ancylus</i>	<b>2 females, 3 males</b>
Wadboo Swamp		
Bullhead Run Site 2	<i>Procambarus (Scapulicambarus) troglodytes</i>	1 male , 3 females
	<i>Procambarus (Ortmannicus) lepidodactylus (?)</i>	1 male Form II
UT Wadboo Creek Site 22	<i>Procambarus (Scapulicambarus) troglodytes</i>	<b>2 male Form II, 1 female</b>
Wedboo Creek		
Beauford Branch Site 21	<i>Procambarus (Scapulicambarus) sp. could either be troglodytes or clarkii</i>	
Dutart Creek		
Dutart Creek Site 32	<i>Procambarus (Scapulicambarus) troglodytes (?)</i>	<b>2 males</b>
Gravel Run Site 46	<i>Procambarus sp.</i>	
Red Bluff Creek		
Red Bluff Creek Site 7	<i>Procambarus (Ortmannicus) ancylus</i>	2 male Form I
	<i>Procambarus (Ortmannicus) chacei</i>	3 males, 2 females
Wambaw Creek		
UT Wambaw Creek Site 44	<i>Procambarus (Scapulicambarus) troglodyte</i>	<b>1 male Form I, 1 female</b>
	<i>Procambarus sp.</i>	<b>1 male Form II</b>

**Table 2-8. Mussel species collected in 2003.**

Watershed/Stream	Site #	Species
Huger Creek		
UT Fox Gully	4	<i>Elliptio complanata</i> <i>Elliptio sp.</i>
Wadboo Swamp		
Cane Gully	1	<i>Elliptio sp.</i> <i>Unio merus sp.</i>
Wadboo Swamp	22	<i>Unio merus sp.</i>
Echaw Creek		
Gal Branch	34	<i>Elliptio sp.</i>
Wambaw Creek		
Keepers Creek	N/A	<i>Elliptio complanata</i> <i>Elliptio sp.</i> <i>Unio merus sp.</i>

### Findings

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

### **23. What is the status and trends in freshwater mollusk and crayfish communities in relationship to management activities and habitat conditions? (B-41 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.

- Assess changes in abundance and distribution of mollusks and crayfish annually across the Forest in streams representative of the 11 watersheds across the forest.

### Results

This monitoring item is addressed under monitoring item B-40.

### Findings

Delete this monitoring item.



**24. What is the status and trend in anadromous and catadromous fish populations in freshwater streams 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.

- Repeated quantitative sampling of freshwater fish communities annually in streams representative of the 11 small watershed across the forest. Determine the use of forest streams and habitat type through tagging procedures.

*Results*

This monitoring item is addressed under monitoring item B-39.

*Findings*

Delete this monitoring item.

**25. 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.

*Findings*

There was no fish population or water quality monitoring conducted in 2004.

**Sub-Issue 1.2 - Forest and Range Health**

**26. 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 were at very low levels during 2004.

*Findings*

No additional action is needed.

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

Information

This monitoring question is responsive to goal 8. Maintain air quality.

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

Results

Prescribed fire emissions on the Francis Marion National Forest continue to be the most important Forest Service activity impacting air quality, since it releases fine particles into the atmosphere. In FY 2004, the amount of fine particulate matter released into the atmosphere was less than the FY 2003 levels (Table 2-9). The four fine particulate monitoring sites closest to the forest had increases in both the 24-hour and annual average fine particle concentration in 2004, but the National Ambient Air Quality Standard (NAAQS) was not exceeded (Table 2-10). Fine particulate matter data is also collected at Cape Romain National Wildlife Refuge (data source: <http://vista.cira.colostate.edu/views/>), but the results cannot be used for NAAQS determination. The 2001 through 2003 annual average fine particulate matter concentration at Cape Romain is 8.1 micrograms per cubic meter.

**Table 2-9. Francis Marion National Forest Emissions of Fine Particulates (tons per year)**

Fiscal Year							
97	98	99	00	01	02	03	04
525	943	812	844	973	649	1142	867

The combustion of fossil fuels and prescribed fires from Forest Service activities also release nitrogen oxides, which can contribute to increases in ground-level ozone. The two ozone monitors within or near the Forest had no days where the ozone concentrations in 2004 were considered unhealthy for sensitive people. Both of the sites continue to be below the NAAQS for ozone (Table 2-11) in 2004.

**Table 2-11. Summary of Ozone Monitoring Data in Relation to Proposed National Ambient Air Quality Standard.\***

Monitor County	Year	Fourth highest 8-hour average	3-Year Average
Berkeley	1999	0.083	0.080
	2000	0.080	0.082
	2001	0.071	0.078
	2002	0.074	0.075
	2003	0.070	0.072
	2004	0.073	0.072
Charleston	1999	0.080	0.078
	2000	0.076	0.076
	2001	0.068	0.075
	2002	0.075	0.073
	2003	0.074	0.072
	2004	0.071	0.073

\* The ozone standard would be violated at a site is the 3-year average of the fourth highest 8-hour average ozone concentration is 0.085 ppm or higher.

**Table 2-10. Monitoring Results for Particulate Matter 2.5 Microns (PM10) and Smaller\***

Location	Site ID	2002 24-hour 98 <sup>th</sup> percentile (ug/m <sup>3</sup> )	2002 Annual Average (ug/m <sup>3</sup> )	2003 24-hour 98 <sup>th</sup> percentile (ug/m <sup>3</sup> )	2003 Annual Average (ug/m <sup>3</sup> )	2004 24-hour 98 <sup>th</sup> percentile (ug/m <sup>3</sup> )	2004 Annual Average (ug/m <sup>3</sup> )	3-year Average	3-year Average
Berkeley County– Monks Corner	450150005	20	10.1	21	10.2	27	13.7	22.7	11.33
Charleston County	450190048	27	11.6	22	10.8	27	12.3	25.3	11.57
Charleston County	450190049	25	10.9	22	10.7	29	12.0	25.3	11.20
Georgetown County	450430009	27	12.5	27	12.3	28	12.5	27.33	12.43

\* The National Ambient Air Quality Standard is violated if the average of 3-years of annual means is 15 ug/m<sup>3</sup> or greater (multiple community oriented monitors can be averaged together), or the 3-year average of the 24-hour concentration for the 98th percentile (using the maximum population oriented monitor in an area) is the 65 ug/m<sup>3</sup> or greater. Source: <http://www.epa.gov/air/data/geosel.html>

## *Findings*

Fine particles in the atmosphere can reduce visibility, and they also can increase the risk of heart attacks or respiratory problems for people. Ground-level ozone can also have an adverse impact to people's health. The monitoring result for both of these pollutants indicates the air quality on the National Forest does not exceed the NAAQS. It should be noted that sulfates are the primary type of fine particulate matter measured in rural areas of the eastern United States. Currently, the Environmental Protection Agency is reviewing the fine particulate NAAQS and if they lower the daily NAAQS to 30 ug/m<sup>3</sup> or the annual standard to 12 ug/m<sup>3</sup> then no portions of the Francis Marion National Forest are expected to exceed the NAAQS.

### **Sub-Issue 1.3 - Watershed Condition**

#### **28. 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 a monitoring station on Turkey, Wambaw and Awendaw Creeks.

##### *Results*

In 2003, a monitoring report by Koman and Hansen summarized the existing information on the Francis Marion National Forest concerning water quality. The report findings and results were based on few data obtained and information, but they are still applicable for this level of analysis. Most of the streams in the coastal plain have eroded into deep marine deposits of the past geologic epochs. The stream gradients are generally low, and channels generally have substantial adjacent floodplains and wetlands, which detain surface waters for extended periods. The bottomland hardwoods that dominate riparian areas and most

stream banks tend to stabilize channels.

Existing conditions of concern include the fishery consumption advisories for excessive mercury in certain species and fecal coliform in waters used for shellfish harvesting. Sediment dominates channel substrates, but this is common in areas dominated by marine deposits.

Indicators of brackish water from the 2003 report in Wambaw Creek were not sampled or discussed in detail. Since then, it has come to our attention that tidal saltwater concentrations (salinity >0.48 parts per thousand as defined by SC DHEC Water Classifications and Standards) are sometimes present. Elevated salt concentrations are an apparent result of water storage and low flow releases associated with upstream dams, which allow tidal entry of salt water from the Atlantic Ocean into the Santee River and upstream into Wambaw Creek. The frequency and significance of the tidal influence has not been determined for Wambaw Creek and other lower Santee tributaries. However, as funding permits, sampling may be conducted to better characterize the salinity occurrence and impacts.

##### *Findings*

No additional action is needed.

#### **29. Is the forest in compliance with State Best Management Practices (BMP)/ (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 BMP.

##### *Results*

In most instances, BMP are fully implemented and effective at protecting water quality, soil productivity and associated resources. We have not detected any substantial water quality problems in implementing the forest plan standards, which include BMP.

Measures in Forest-wide Standards such as FW-97, FW-99, FW-105, FW-106, FW-109 and FW-115 may augment BMP 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.

Past monitoring of BMP of forestry operations on the Francis Marion and within the coastal plain (SC Forestry Commission), show BMP to be effective at maintaining water quality and soil productivity. In 2004, it was assumed that BMP were properly checked by sale forester and administrator as to being implemented and effective. Inspections and documentation are required and part of each sale record. No reports associated with timber implementation were received suggesting any problems with implementation or effectiveness of BMP or forest standards.

Prescribed burning was evaluated on several sites. BMP were implemented. There was some concern about localized areas within landscape treatments because they burned too intensely along with the frequency of burning and its potential effects on site productivity. Some of the prescribed burning issues are being addressed with agreements with the College of Charleston, Southern Research Station (Wetland Center) and the forest.

### *Findings*

No additional action is needed.

## **Issue 2. Sustainable Multiple Forest and Range Benefits**

### **Sub-Issue 2.1 - Recreational Opportunities**

**30. 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 that 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*

In FY 2000 approximately 15,068 acres were found to be greater than ½ mile from an open road. About 10,606 acres were found to be contained in eleven blocks 250 acres or greater in size.

No information was collected for FY 2004.

#### *Findings*

Finding in FY 2000 show at the current rate of acreage increase the objective can be met by the end of the ten-year planning cycle.

The next update of this information will occur in FY 2005.

**31. 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), roaded natural (126,219), semi-primitive motorized (21,147), semi-primitive non-motorized (13,549). Visitors enjoy a diversity of recreational opportunities.

- The condition of each ROS class

## *Results*

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

No information was collected in FY 2004.

## *Findings*

The next update of this information will occur in FY 2005.

### **32. 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*

National Visitor Use Monitoring (NVUM) was done on the Francis Marion and the Sumter National Forests in 2002. This monitoring estimated visitor use for all activities including recreational facilities and trails. Sampling strategy does not allow separation of the use by forest.

Visitor use on both forests for fiscal year 2002 was 1.1 million national forest visits. There were 1.5 million site visits and an average of 1.3 site visits per National Forest visit. There were approximately 52,864 wilderness site visits on both the Francis Marion and Sumter National Forests.

Of the non-wilderness visitors, about 79 percent were male and 21 percent were female. More than 80 percent of our visitors were between 21 and 60 years old. Most visitors, more than 90 percent, were white, about 5 per cent were black and about 3 per cent were Asian. There were no international visitors. Visitors stay an average of 8.1 hours. Just fewer than 11 percent stayed overnight on the forests. The top activities were hunting, fishing, relaxing, other non-

motorized activities, and viewing natural features. The top facilities or areas that were used were non-motorized trails (includes hiking, biking, horseback trails), other forest roads, picnic areas, boat launches, and designated wilderness.

Of the wilderness visitors, about 84 percent were male and 16 percent were female. More than 72 percent of users were between the ages of 21 and 60. Most visitors to wilderness are white, more than 99 percent. Visitors stay an average of 9.6 hours.

In addition to the NVUM data, visitor use information is derived from additional sources including fees collected at fee sites, empirical observation by staff, Sewee Visitor Center reporting, and the occasional use of traffic counters. Highest developed recreation use on the Francis Marion occurs at the Sewee Visitor Center, and Buck Hall Recreation Area while highest used trails include Wambaw Cycle Trail, Swamp Fox National Recreation Trail (part of the Palmetto Trail), and the Tuxbury Horse Trail in that order.

## *Findings*

The next update of this information will occur in FY 2005. The NVUM will be re-surveyed in fiscal year 2007.

### **33. Are the distribution, design, location, capacity and condition of the recreational facilities and trails meeting the needs of the users? (B-14)**

#### *Information*

This monitoring question is responsive to goals 3, 4 and 8 and objectives 7 and 8. **Objective 7** states, "Increase the developed recreational facilities capacity to 2,200 people-at-one time (PAOT) within the next 10 years." **Objective 8** states, "Increase the trail system to 160 miles within the next 10 years." There are more opportunities for developed recreational activities.

- Users satisfaction with facilities and trails.

## *Results*

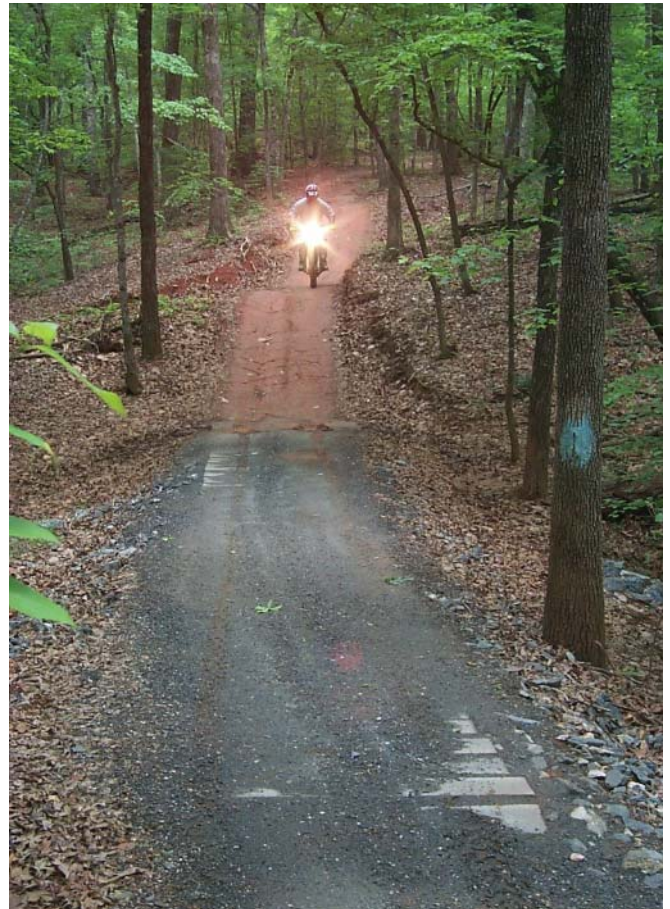
National Visitor Use Monitoring was done on the Francis Marion and the Sumter National Forests in 2002. This monitoring estimated visitor use for all

activities including recreational facilities and trails. Sampling strategy does not allow separation of the use by forest. A part of this monitoring survey was a visitor satisfaction survey. The sample does not allow for site-specific information but does give generalized information on overall satisfaction with the facilities and services on the forests as a whole.

Visitors' site-specific answers may be colored by a particular condition on a particular day at a particular site. For example, a visitor camping in a developed campground when all the forest personnel are off firefighting and the site has not been cleaned. Perhaps the garbage had not been emptied or the toilets cleaned during their stay, although the site usually receives excellent maintenance. The visitor may have been very unsatisfied with the cleanliness of restrooms.

In addition to how satisfied visitors were with facilities and services they were asked how important that particular facility or service was to the quality of their recreational experience. The importance of these elements to the visitors' recreational experience is then analyzed in relation to their satisfaction. Those elements that were extremely important to a visitor's overall recreational experience and the visitor rated as poor quality are those elements needing most attention by the forest. Those elements that were rated not important to the visitors' recreational experience need the least attention.

Tables 2-12, Tables 2-13, Tables 2-14 summarize visitor satisfaction with the forest facilities and services at day-use developed sites (such as picnic areas, boat ramps, rifle ranges, etc), overnight, developed sites and general forest areas (this includes all trails). Wilderness satisfaction is reported in Table 2-15. To interpret this information for possible management action, one must look at both the importance and satisfaction ratings. If visitors rated an element a 1 or 2 they are telling management that particular element is not very important to the overall quality of their recreation experience. Even if the visitors rated that element as poor or fair, improving this element may not necessarily increase visitor satisfaction because the element was not that important to them. On the other hand, if visitors rated an element as a 5 or 4 they are saying this element is very important to the quality of their recreational experience. If their overall satisfaction with that element is not very good, management action here can increase visitor satisfaction.



*Parson's Mountain OHV Trail hardening*

**Table 2-12. Satisfaction of Francis Marion-Sumter NFs recreational visitors at Developed Day Use sites**

Item Name	Item by Percent Response By					Mean * Satisfaction Of Visitors (n)	Mean * Importance To Visitor
	Poor	Fair	Average	Good	Very Good		
Scenery	0.0	3.3	8.3	30.0	58.3	4.4 (60)	4.4
Available parking	1.6	3.3	9.8	23.0	62.3	4.4 (61)	4.0
Parking lot condition	0.0	0.0	6.7	26.7	66.7	4.6 (60)	3.8
Cleanliness of restrooms	5.9	0.0	8.8	23.5	61.8	4.4 (34)	4.5
Condition of the natural environment	3.3	5.0	1.7	26.7	63.3	4.4 (60)	4.7
Condition of developed recreation facilities	0.0	5.4	7.1	30.4	57.1	4.4 (56)	4.2
Condition of forest roads	2.6	5.3	5.3	50.0	36.8	4.1 (38)	4.1
Condition of forest trails	0.0	0.0	5.1	25.6	69.2	4.6 (39)	4.4
Availability of information on recreation	6.0	2.0	12.0	20.0	60.0	4.3 (50)	4.0
Feeling of safety	0.0	0.0	3.3	25.0	71.7	4.7 (60)	4.5
Adequacy of signage	1.7	6.8	6.8	25.4	59.3	4.3 (59)	4.2
Helpfulness of employees	0.0	0.0	2.4	11.9	85.7	4.8 (42)	4.3
Interpretive displays, signs, and exhibits	15.4	0.0	46.2	38.5	0.0	3.1 (13)	4.1
Value for fee paid	6.3	0.0	0.0	18.8	75.0	4.6 (16)	4.3

\* Scale is: 1= not important 2= somewhat important 3=moderately important 4= important 5 = very important, n= number of responses on which rating is based.

Note: for items where there were insufficient response (less than 10 interviews) the item is not rated.

**Table 2-13. Satisfaction of Francis Marion-Sumter NFs recreational visitors at Developed Overnight sites**

Item Name	Item by Percent Response By					Mean * Satisfaction Of Visitors (n)	Mean * Importance To Visitors
	Poor	Fair	Average	Good	Very Good		
Scenery	0.0	4.5	9.1	22.7	63.6	4.5 (22)	4.8
Available parking	4.8	0.0	4.8	38.1	52.4	4.3 (21)	4.5
Parking lot condition	0.0	0.0	10.0	65.0	25.0	4.2 (20)	4.3
Cleanliness of restrooms	5.0	15.0	5.0	25.0	50.0	4.0 (20)	4.7
Condition of the natural environment	0.0	0.0	0.0	61.9	38.1	4.4 (21)	4.5
Condition of developed recreation facilities	6.3	0.0	0.0	68.8	25.0	4.1 (16)	4.6
Condition of forest roads	0.0	4.5	9.1	45.5	40.9	4.2 (22)	4.4
Condition of forest trails	0.0	4.8	14.3	52.4	28.6	4.0 (21)	4.7
Availability of information on recreation	18.2	13.6	13.6	18.2	36.4	3.4 (22)	4.2
Feeling of safety	0.0	4.5	0.0	54.5	40.9	4.3 (22)	4.7
Adequacy of signage	13.6	9.1	13.6	31.8	31.8	3.6 (22)	4.4
Helpfulness of employees	6.3	0.0	12.5	31.3	50.0	4.2 (16)	4.1
Interpretive displays, signs, and exhibits	--	--	--	--	--	--	--
Value for fee paid	0.0	0.0	10.0	45.0	45.0	4.4 (20)	4.6

\* Scale is: 1= not important 2= somewhat important 3=moderately important 4= important 5 = very important (n) = number of responses upon which this rating is based. Note: for items where there were insufficient response (less than 10 interviews) the item is not rated.



**Table 2-14. Satisfaction of Francis Marion-Sumter NFs recreational visitors in General Forest Areas**

Item Name	Item by Percent response by					Mean * Satisfaction Of Visitors (n)	Mean * Importance To Visitors
	Poor	Fair	Average	Good	Very Good		
Scenery	0.0	0.0	5.9	25.5	68.6	4.6 (51)	4.7
Available parking	2.0	2.0	7.8	31.4	56.9	4.4 (51)	4.3
Parking lot condition	2.0	2.0	8.2	30.6	57.1	4.4 (49)	4.1
Cleanliness of restrooms	18.2	12.1	21.2	30.3	18.2	3.2 (33)	4.2
Condition of the natural environment	2.0	2.0	6.0	38.0	52.0	4.4 (50)	4.7
Condition of developed recreation facilities	0.0	0.0	12.1	30.3	57.6	4.5 (33)	3.9
Condition of forest roads	4.4	2.2	6.7	40.0	46.7	4.2 (45)	4.0
Condition of forest trails	0.0	0.0	5.0	30.0	65.0	4.6 (40)	4.3
Availability of information on recreation	5.1	7.7	17.9	30.8	38.5	3.9 (39)	4.0
Feeling of safety	2.0	0.0	8.2	24.5	65.3	4.5 (49)	4.3
Adequacy of signage	8.2	2.0	8.2	34.7	46.9	4.1 (49)	4.1
Helpfulness of employees	8.7	0.0	0.0	30.4	60.9	4.3 (23)	4.3
Interpretive displays, signs, and exhibits	5.6	5.6	16.7	72.2	0.0	3.6 (18)	3.7
Value for fee paid	0.0	0.0	4.2	25.0	70.8	4.7 (24)	4.7
* Scale is: 1= not important 2= somewhat important 3=moderately important 4= important 5 = very important (n) = number of responses upon which this rating is based. Note: for items where there were insufficient response (less than 10 interviews) the item is not rated.							

Table 2-15 gives detailed information about how the wilderness visitors rated various aspects of the area. A general example of how to interpret this information: if the visitors had rated the importance of the adequacy of signage a 5.0 (very important) and they rated their satisfaction with the adequacy of signage a 3.0 (somewhat satisfied) then the forest might be able to increase visitor satisfaction. Perhaps 29 percent of visitors said the adequacy of signage was poor. The forest could target improving this sector of visitors for increased satisfaction by improving the signage for wilderness.



**Table 2-15. Satisfaction of Francis Marion-Sumter NFs Wilderness Visitors.**

Item Name	Item by Percent response by *					Mean ** Satisfaction Of Visitors (n)	Mean ** Importance To Visitors
	P	F	A	G	VG		
Scenery	0.0	0.0	0.0	17.9	82.1	4.8 (39)	4.7
Available parking	5.1	7.7	12.8	46.2	28.2	3.8 (39)	3.7
Parking lot condition	0.0	2.9	14.3	42.9	40.0	4.2 (35)	3.5
Cleanliness of restrooms	10.5	10.5	21.1	26.3	31.6	3.6 (19)	4.2
Condition of the natural environment	0.0	2.6	0.0	23.1	74.4	4.7 (39)	4.9
Condition of developed recreation facilities	0.0	0.0	0.0	47.4	52.6	4.5 (19)	4.0
Condition of forest roads	2.9	5.7	8.6	57.1	25.7	4.0 (35)	4.0
Condition of forest trails	0.0	2.6	7.9	31.6	57.9	4.4 (38)	4.4
Availability of information on recreation	9.4	9.4	18.8	34.4	28.1	3.6 (32)	4.1
Feeling of safety	0.0	0.0	7.7	28.2	64.1	4.6 (39)	4.6
Adequacy of signage	13.5	8.1	16.2	37.8	24.3	3.5 (37)	4.2
Helpfulness of employees	0.0	0.0	0.0	38.5	61.5	4.6 (13)	4.3
Interpretive displays, signs, and exhibits	--	--	--	--	--	--	--
Value for fee paid	--	--	--	--	--	--	--

\*Scale is: P = poor F = fair A = average G = good VG = very good  
 \*\* Scale is: 1= not important 2= somewhat important 3=moderately important 4= important 5 = very important  
 n= number of responses on which rating is based.  
 Note: for items where there was insufficient response (less than 10 interviews) the item is not rated

Results of the information show that for developed day use site, visitors were most satisfied with the scenery, the condition of the parking lots, the condition of the natural environment, the conditions of the forest trails, the feeling of safety, the helpfulness of the employees and the value for the fee paid. Visitors were less satisfied with the interpretive displays, signs and exhibits.

Results show that for overnight site visitors were most satisfied with the scenery, the condition of the natural environment, the conditions of the recreational facilities, roads and trails, the feeling of safety and the value for the fee paid. Visitors were less satisfied with the cleanliness of the bathrooms, the availability of recreational information and the adequacy of the signage.

Results show that for general forest areas (including trails, etc) visitors were most satisfied with scenery, available parking, parking lot condition,

condition of the natural environment, conditions of the recreational facilities, roads and trails, the feeling of safety, the helpfulness of the employees and the value for the fees paid. They were less satisfied with the cleanliness of the restrooms, the availability of information on recreational and interpretive displays, signs and exhibits.

Results show that wilderness visitors were most satisfied with scenery, condition of the natural environment, conditions of the recreational facilities, the feeling of safety, the helpfulness of the employees. They were less satisfied with the cleanliness of the restrooms, the availability of information on recreational and interpretive displays, signs and exhibits.

## Findings

All visitors were less satisfied with the same things, with the cleanliness of the restrooms, the availability of information on recreational and interpretive displays, signs and exhibits. Interim monitoring of satisfaction through surveys or other methods could also be employed as funds become available.

No trend information is available at this time. In 2007, NVUM will be done again. It will be done approximately every 5 years. Then there will begin to be enough information to develop trend information.

### **34. Are the number of PAOT and 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 objectives 7 and 8. **Objective 7** states, "Increase the developed recreational facilities capacity to 2,200 people-at-one time (PAOT) within the next 10 years." **Objective 8** states, "Increase the trail system to 160 miles within the next 10 years." There are more opportunities to enjoy developed recreational opportunities. There are more miles and variety of trails.

- Number of PAOT of developed sites.
- Number of miles of trails.

#### *Results*

Currently the Francis Marion meets the Forest Plan objective of more than 160 miles of trails.

The Francis Marion is still short of achieving some of the probable activities anticipated in the Forest Plan (e.g., horse camp, and horse trail miles, new campground, canoe access points and new OHV trail miles).

The Francis Marion has more than 2,200 PAOT in developed sites. No developed sites were constructed or expanded in 2004. However, the Wambaw Cycle Trailhead went through major rehabilitation in 2004 with new toilets, a host site, vehicular barriers, signage, new roof on picnic shelter, warm-up loop and redesigned parking area.

## Findings

No additional action is needed.

### **34. Are activities creating or maintaining the desired VQO? (B-16)**

#### *Information*

This monitoring question is responsive to goals 2, 3, 4, 6 and 8 and objective 10. **Objective 10** states, "Manage the following acreage to achieve the Visual Quality Objectives (VQO): modification (186,788), partial retention (38,648), retention (4,179), preservation (13,812)." The landscapes around most travel routes continue to be managed to reduce the visual impacts of activities that might be seen by a passer-by. Generally, visual quality is improved.

- The condition of each VQO class.

#### *Results*

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

No information was collected in FY 2004.

## Findings

The next update of this information will occur in FY 2005. No additional actions are required.

### **Sub-Issue 2.2 - Land Adjustments**

### **35. Are lands being acquired that 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. 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*

An additional 1,336 acres were acquired on the Francis Marion National Forest during this fiscal year.

Findings

No additional action is needed.

**Sub-Issue 2.3 - Heritage Resources**

**36. 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 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 2-16.

<b>Table 2-16. Archaeological Site</b>	
Total number of assets monitored	15
ARPA investigations	0
Assets eroding by water	4
Assets damaged by forest users	5
Assets damaged by forest management	0
Assets undisturbed	6

Monitoring identified natural threats to archaeological sites. The most serious damage occurred on sites that are being eroded by maintenance and use of Atlantic Intracoastal Waterway. In addition to natural threats other priority assets have been damaged by unauthorized activities such as the use of off-road vehicles other than on designated trail.

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.

There are two historic buildings and two fire lookout towers that are in need of repair, restoration or documentation.

*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 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

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

#### Information

Specific items have been tracked and summarized in Table 2-17 and Table 2-18. The Forest Plan established a range of acceptable results of within 20 percent of estimated projections.

#### Results

**Table 2-17. Probable activities effectiveness**

Activity	Unit of Measure	FY04	10 year Plan Estimate	
Road Construction	Miles	0.0	15	
Road Reconstruction		6.3	63	
Timber Roads		27.0	N/A	
Roads Decommissioned		6.0	N/A	
Open Roads		432.7	446	
Closed Roads		127.2	172	
Maintained		720	810	
Wildlife Openings		Acres	0	7,700
Covert Loblolly to Longleaf			0	16,150
Establish Regeneration			0	600
Fertilization	0		22,500	
Intermediate Stand Treatments	0		3,600	
Regeneration Harvest	983		44,000	
Thinning Harvest	0.8		33	
Volume offered for Sale	MMCF		24,426	26,000
Winter Season Prescribed Burning		7,110	4,000	
Growing Season Prescribed Burning		908	68	
Annual Payments to Counties	M\$	13.6	N/A	
* Annual Budget	MMS\$			

\* 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 2-18. Probable activities**

Activity	Unit of Measure	FY04	10 year Plan Estimate
<b>Construct</b>			
Boat Ramps	# of Sites	0	2
Horse Camps	# of Sites	0	1
Campgrounds	# of Sites	0	1
Canoe Access	# of Sites	0	5
OHV Trails	Miles	0	20
Bicycle Trails	Miles	0	10
Canoe Trails	Miles	0	10
Hiking Trails	Miles	0	10
Horse Trails	Miles	0	20
<b>Recreation Capacity</b>			
Boat Ramps	PAOT	350	500
Horse Camps	PAOT	0	50
Campgrounds	PAOT	100	400
Canoe Access	PAOT	0	130
Other	PAOT	1,165	1,165
<b>Total Trail Miles:</b>			
Trails, total	Miles	166.1	160.5
OHV	Miles	0	60
Bicycle	Miles	63	10
Canoe	Miles	35.8	22.5
Hiking	Miles	57.3	30
Horse	Miles	33	38

#### Findings

Forest roads continue to receive heavy use by the public and commercial users. Emphasis has been 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 for timber activities have continued to focus on surface and culvert replacement. No new miles of road were constructed in FY 2004.

New construction of road miles continues to be much lower than the Forest Plan target. Miles of road reconstruction are only slightly below the 10-year plan target. The percentage of closed roads in the Forest Plan has not been achieved.

The Francis Marion has continued to conduct road condition surveys to determine the condition of the road system and the amount of deferred maintenance. The FY 2004 survey placed deferred maintenance at \$12,407,423 on the 559.9 miles of forest roads. The forest road system mileage and deferred maintenance backlog will increase significantly in FY 2005 with the acquisition of two very large tracts of land. The road

decommissioning effort continues with most of the miles closed being non-system roads.

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. Stewardships and other types of partnerships are being used and need to continue to be used to maintain critical ecosystem components and control hazardous fuels.

We should drop the use of PAOT and use other measures related to the NVUM analysis discussed under monitoring question #32.

**38. Are projects being managed according to requirements and making progress toward achieving the desired future condition (DFC) for vegetation? (B-46 new)**

*Information*

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

**39. Do an Integrated Resource Review (IRR).**

*Results*

An IRR was conducted on the Francis Marion National Forest on July 13 – 15, 2004. Issues related to early successional habitat, growing season fires, hardwood management, conversion of loblolly to longleaf pine, first thinnings, management of acquired lands, and the Planning/NEPA process were discussed and recommendations made for resolution. A report entitled “Final Report of the Integrated Resource Review Francis Marion National Forest” is available for review.

*Findings*

This monitoring item needs to be added to the Forest Plan.

## Chapter 3. FY 2005 and FY 2006 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 mollusk.

**Responsibility:** Districts and SO.

**Date:** FY 2005 and FY 2006

**Status:** Crayfish and mussels were collected in conjunction with the fish community monitoring in FY 2003.

**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 Management Indicator Species (MIS) including northern bobwhite, eastern wild turkey, painted bunting, and American swallow-tailed kite, prairie warbler, northern parula.

**Responsibility:** SO staff

**Date:** FY 2005 and FY 2006

**Status:** In the process of compiling and analyzing this information.

**c) Action:** The forest needs to begin doing even-aged regeneration harvesting to meet Objective 12 and begin providing additional habitat for maintaining viable populations of early successional native species.

**Responsibility:** District staff

**Date:** FY 2005 and FY 2006

**Status:** Presently no acres have been accomplished.

**d) Action:** Increase the active management (i.e., prescribed burning, mid-story removal) in the Wando area to recover the flatwoods salamander and to prevent listing of the Carolina Gopher frog.

**Responsibility:** District staff

**Date:** FY 2005 and FY 2006

**Status:** Prescribed fire was conducted in habitat for flatwoods salamander in FY 2004.

**e) Action:** 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.

**Responsibility:** SO and District staff

**Date:** FY 2005 and FY 2006

**Status:** The most serious damage occurred on sites that are being eroded by maintenance and use of Atlantic Intracoastal Waterway.

**f) Action:** The forest needs to develop Heritage Preservation Plans 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.

**Responsibility:** SO and District staff

**Date:** FY 2005 and FY 2006

**Status:** There are two historic buildings and two fire lookout towers that need repair, restoration or documentation.

**g) Action:** The use of PAOT is not a good measure of the success of the recreation program on the Francis Marion. We should drop the use of PAOT for other measures related to NUVM analysis.

**Responsibility:** SO

**Date:** FY 2005 and FY 2006

**Status:** Presently using PAOT to measure accomplishment for recreation capacity.

**h) Action:** The district needs to update the CISC database (treatment layer) to better reflect its prescribed burning program.

**Responsibility:** District

**Date:** FY 2005 and FY 2006

**Status:** Presently the CISC database (treatment layer) only reflects about 1/2 of the acres presently burned.

**i) Action:** Delete monitoring tasks B-19, B-36, B-41 and B-42. These are either no longer necessary and/or addressed under another task sheet.

**Responsibility:** SO

**Date:** FY 2005 and FY 2006

**Status:** Presently defined as monitoring tasks in the Forest Plan as amended.

**j) Action:** Add monitoring tasks B-44, B-45 and B-46. These are items we have reported in past monitoring reports but not included in the Forest Plan.

**Responsibility:** SO

**Date:** FY 2005 and FY 2006

**Status:** Not part of Appendix B in the Forest Plan.

## **Actions That Require Forest Plan Amendment or Revision**

**a) Action:** Prepare a Forest Plan amendment, as necessary, to modify the boundary of MA-26 or eliminate standard MA-26-2 regarding the frequency of prescribed burning, which is constrained at urban interfaces within this management area.

**Responsibility:** SO planning and resource staffs

**Date:** FY 2006

**Date:** FY 2006

**b) Action:** Prepare a Forest Plan amendment, as necessary, to modify FW-83 or Appendix A regarding items which are inconsistent with the new Recovery Plan for RCW.

**Responsibility:** SO planning and resource staffs

**Date:** FY 2006

**c) Action:** Prepare a Forest Plan amendment, as necessary, to modify FW-84 regarding the ground-application of herbicide within 60 feet of any threatened, endangered, proposed or sensitive plant.

**Responsibility:** SO planning and resource staffs



## Appendix A - List of Preparers

The following individuals contributed to this report:

Jim Bates	Forest Archaeologist
Bill Hansen	Hydrologist
Ed Hedgecock	Forest Engineer
John Cleeves	Forest Planner
Dennis Law	Soil Scientist
Robert Morgan	Archaeologist
Gary Peters	Wildlife Program Manager
Robin Mackie	Ecologist/Botanist
Oscar Stewart	Resource Staff Officer
Tony White	Planning, Engineering, Recreation, and Heritage Resources Staff Officer
Gail White	Public Affairs Specialist
Joe Robles	Recreation Specialist
Robbin Cooper	Landscape Architect
Jay Purnell	Forest Silviculturist
Charlie Kerr	Fire/Aviation Management Officer
Eric Schmeckpeper	GIS
Bill Jackson	Air Specialist
Jeanne Riley	Fisheries 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 BE 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 of project effects analysis.

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 aquatic species.

- What is the distribution of American eel across the forest? What habitat does the eel utilize? What is the population status?
- What species of crayfish occur on the forest and what is the distribution of crayfish across the forest? What is the population status?
- What species of mollusks occur on the forest and what is the distribution of mollusks across the forest? What is the population status?
- What ecological factors are affecting the health of the federally endangered pondberry at Honey Hill? How can this population best be managed?
- What ecological factors are affecting the health of the federally threatened flatwoods salamander on the forest? How can this population best be managed?

## Appendix D – References

Dolloff, C. A., D. G. Hankin, and G. H. Reeves. 1993. Basinwide estimation of habitat and fish populations in streams. General Technical Report SE-83. Asheville, North Carolina: U.S. Department of Agriculture, Southeastern Forest Experimental Station.

Hansbarger, J., and J. M. Dean. 1994. Fish communities of headwater coastal streams in the Francis Marion National Forest. Technical Report BI-94-01. Belle W. Baruch Institute for Marine Biology and Coastal Research.

Eversole, A. G. and Jones, D.R. 2004 Key to the crayfish of South Carolina. Clemson University, Clemson, SC 43 pp.



**FRANCIS MARION NATIONAL FOREST  
FISCAL YEAR 2004 MONITORING AND EVALUATION ANNUAL  
REPORT**

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