# CHAPTER 5.0 CASE STUDY: FRANCIS MARION NATIONAL FOREST

This chapter focuses on the Francis Marion National Forest. In 1985, a Final Environmental Impact Statement (EIS) and Land and Resource Management Plan (Forest Plan) were approved by the Forest Supervisor for the Francis Marion National Forest. National Forest Management Act (NFMA) regulations require that Forest Plans be revised on a 10- to 15-year cycle or sooner if conditions or the area covered by the Forest Plan change significantly. On September 21, 1989, the Francis Marion National Forest sustained major damage from Hurricane Hugo. The devastation caused by the hurricane drastically changed conditions on the Forest. The actions considered in the 1996 Final EIS were to revise the Forest Plan, to accommodate significantly changed conditions, to incorporate new information, and to address public concerns.

The analytical case study of the Francis Marion National Forest involved a three-step process. First, the 1985 Final EIS and Forest Plan documents were analyzed using the NEPA questions, followed by the ecosystem management questions. Second, the 1996 Final EIS and Forest Plan documents were analyzed using the NEPA and ecosystem management questions. Third, a comparative evaluation was undertaken of the 1985 Final EIS and Forest Plan results to the 1996 Final EIS and Forest Plan results for both the NEPA and ecosystem management question evaluations. The third step is presented here. Appendices E and F contain the output of the first and second steps.

As detailed in Sections 2.4.2 and 3.4.2, the questions were formulated for their ability to contribute to the defined "ideal" sets of NEPA and ecosystem management criteria. The criterion indicators for each question range from satisfying the "ideal" NEPA or ecosystem management criteria to not satisfying the "ideal" NEPA or ecosystem management criteria.

## 5.1 Description of the Francis Marion National Forest

The following description of the Francis Marion National Forest was summarized from the account of the Forest environs found in the 1985 and 1996 Final EIS documents.

The Francis Marion National Forest is located within Berkeley and Charleston counties in southeastern South Carolina. The Forest contains approximately 249,500 acres. The Forest boundary is formed by the Santee River to the north, the Intracoastal Waterway to the east, and Lake Moultrie and Cooper River to the west. Within the Forest boundary, federally owned tracts are distributed in a mosaic of private, county and municipal ownerships; however, federal lands are generally consolidated in the interior (USFS 1996a).

The Francis Marion National Forest forms part of Gulf Atlantic Coastal Flats physiographic region. This region is an extensive lowland that has been alternately above and below mean sea

level. The Forest is comprised of several different landforms: swamps, floodplains, stream terraces, bays, upland flats, side slopes, and ridges (USFS 1985). The Forest is located within the South Atlantic Gulf Water Resource Region and contributes to surface water of the Santee, Cooper, and Wando rivers, Awendaw Creek, and a few small intertidal drainages. There are several groundwater aquifers under the Forest. Portions of the Forest serve as aquifer recharge areas. There are approximately 275 miles of perennial streams on the Forest (USFS 1996a).

Several unique plant communities have been identified and described on the Forest. Hurricane Hugo had little impact on these plant communities. Botanists have found 32 species of orchids, 22 species of ferns, and 12 species of carnivorous plants. The Forest contains 30 different natural communities. Currently there is no detailed Forest-wide inventory of plant communities. Dr. Richard Porcher (The Citadel) completed three inventories of unique natural areas in 1982, 1990, and 1993. The Nature Conservancy and the Forest Service are jointly developing a Southeastern Regional Ecological Community Classification System. In addition to this classification system, a natural vegetation classification is also planned. Because these two classification systems were not available when the 1996 EIS process was undertaken, the Forest Service presented classified plant communities by dominant forest cover types and age-class distributions (USFS 1996a).

The tree species groups on the Forest, in order of relative dominance, are loblolly pine, swamp hardwood, longleaf pine, bottomland hardwood, non-forested land, mixed hardwood and pine, pond pine, and upland hardwood species. Many stands have more loblolly pine now than they did before Hurricane Hugo. This shift has resulted primarily from an abundant loblolly seed crop at the time of the hurricane and the favorable conditions created by the storm for seed germination and growth. Areas that have experienced the greatest increase in loblolly composition include wet sites associated with bottomland hardwoods, and upland sites where loblolly outgrows hardwood sprouts and seedlings. There are also areas where the dominant species was loblolly pine before Hugo that are now predominantly hardwood species. Prior to Hugo, the pine stands averaged 25 percent hardwood. Now hardwoods comprise approximately 40 percent of these stands (USFS 1996a).

Hurricane Hugo removed over 50,000 acres of the pine tree canopy on the Forest. This essentially shifted the age-class distribution to the 0- to 10-year age class for pine stands (from 19 to 57 percent). Before Hugo, 6 percent of Forest acreage was in the 91+ age class, now there is little more than 4 percent. About 3 percent of the pine type was in this age class, and since Hugo, there is only 1 percent of the pine type 91+ years old. Although hardwood stands were significantly damaged by Hugo, much of the canopy remained. Most of the damage was to large-crowned, shallow-rooted trees such as oaks scattered throughout the stands. Since a large portion of the overstory remained, no general shift in the age-class distribution of the hardwoods has occurred (USFS 1996a).

Specific forest type old-growth definitions are currently being developed by the Forest Service and other scientists. Until these definitions are completed, the Regional Forester has directed that forested stands which are greater than 100 years old or withdrawn from timber production be tentatively identified as "potential old growth." In the Francis Marion National Forest, approximately 30,000 acres are classified as unsuitable for timber harvesting and approximately 12,000 acres of suitable stands are greater than 100 years old. Therefore, approximately 42,000 acres, or 17 percent, of the forested lands are considered "potential old growth" (USFS 1996a).

The Forest contains several sensitive plant species and federally endangered plants. Federally endangered species include pondberry, American chaffseed, and Canby's dropwort. At least 18 other plant species have been identified as sensitive species by the Forest Service, and most of those are candidate species for federal listing. Habitats of sensitive species are managed to ensure population levels which will keep these plants from becoming threatened or endangered (USFS 1996a).

Four federally listed endangered animal species, 1 threatened species, and 11 species which are considered sensitive by South Carolina are found on the Francis Marion National Forest. Three sensitive species of amphibians (the flatwoods salamander, eastern tiger salamander, and the gopher frog) and the northern pine snake are found in the Forest. The American alligator is listed as threatened due to similarity of appearance to the American crocodile. Four bird species are federally listed as endangered: red-cockaded woodpecker, Bachman's warbler, bald eagle, and wood stork. The Forest supports one of the largest and fastest growing populations of red-cockaded woodpeckers in the world. Before Hurricane Hugo, the Forest supported 477 clusters. It now supports about 395 clusters and is home to about 333 breeding pairs. Bachman's sparrow, loggerhead shrike, and Henslow's sparrow are Forest sensitive species and are candidates for the federal threatened and endangered species list. Two mammals, the eastern wood rat and the Rafinesque's big-eared bat, are also candidate species. A small population of black bear live on the Forest. The black bear is a species of special concern in the coastal plain of South Carolina and is also included on the Forest's sensitive species list. The only endangered fish species that may inhabit waters adjacent to the Forest is the shortnose sturgeon (USFS 1996a).

A conservative estimate of the number of invertebrate species on the Forest is between 4000 and 5000. The mosquito family alone includes several hundred species. Approximately 43 species of amphibians and 58 species of reptiles inhabit the Forest. This list includes approximately 24 frogs and toads, 19 species of salamanders, 36 types of snakes, 10 species of turtles, and 11 kinds of lizards. The Forest provides habitat for approximately 249 species of birds. Species of neotropical migratory birds are included in this list. Approximately 26 species of neotropical migrants use the interior portions of the Forest and 12 species use the habitat associated with

edges or openings and early successional habitat. Commonly hunted game birds include wood duck, wild turkey, mourning dove, bobwhite quail, and woodcock. The Forest contains 48 species of mammals. Of these, white-tailed deer is the most popular game animal. Small game animals commonly hunted include fox, raccoon, opossum, and squirrel. Ten species of fur-bearers inhabit the Forest: red fox, mink, muskrat, beaver, and skunk are uncommon; bobcat and otter occur at moderate levels; and gray fox, raccoon, and opossum are common. Other mammals include nine species of mice and rats, eight species of moles, voles and shrews, and larger mammals such as black bear. The Forest is included in the historic range of the eastern cougar. About 114 species of fish are found within the boundaries of the Forest, most of which are associated with freshwater (USFS 1996a).

The Forest averages 86 wildfires each year that burn approximately 575 acres. The arrangement (or continuity) of fuels, both horizontally and vertically, plays a key role in assessing the risk of fires spreading or spotting to adjacent areas. Over 40,000 acres of damaged trees have been salvaged since Hurricane Hugo. An average of 27,000 acres were control burned annually from 1991 to 1994. These treatments, along with others such as road clearing, fire lane construction, and site preparation, have broken much of the large contiguous blocks of fuel that resulted from Hugo. However, there still exists relatively large areas of continuous fuel, primarily in hardwood areas of the Forest (USFS 1996a).

The openings created by Hurricane Hugo are quickly closing with brushy vegetation. Although the removal of the canopy by the hurricane initially stimulated browse, the quality and quantity has been slowly decreasing since the storm. Canopy closure results in a loss of grass and grass/shrub habitat due to shading. As the canopy continues to close in these storm damaged areas, nesting sites, brood habitat, and year-round feeding areas for turkey will be quickly lost. Currently browse is relatively plentiful; however, the bulk is of poor quality and low preference to deer. The amount of food high in nutrients available in the winter and early spring has declined since Hugo. The Forest maintains approximately 410 wildlife openings comprising over 700 acres which are planted with plant species that benefit all types of wildlife. Hard and soft mast contribute to the available wildlife forage. Following Hugo, many mast producing hardwoods were damaged, resulting in a decline in both the quantity and quality of hard mast (USFS 1996a). Southern pine beetle populations reached outbreak status by the spring of 1990 after Hurricane Hugo and lasted through the summer. Longleaf pine, which is normally not a preferred host, was stressed by Hugo and subsequently brought to the point that beetle attack was often fatal. As the pine has recovered from the stress, the number of southern pine beetle infestations has declined (USFS 1996a).

Since 1977, approximately 102,000 acres, or 41 percent of the total Forest area, have been inventoried for cultural resources, and more than 1100 sites have been located and recorded. Human occupation of lower coastal South Carolina dates back at least 15,000 years as prehistoric

people arrived in the area during the last major ice age. Abundant archaeological information exists. The historic era began in the early 1500s when European voyages of exploration began along the southeastern coast. With the founding of Charles Town (Charleston) in 1670, the area that is now part of the Francis Marion National Forest was granted to the early colonists, and there are numerous historic sites related to early colonization. Evidence of early naval stores industry, plantations, subsistence farming, and early industrial sites are found throughout the Forest (USFS 1996a).

Four wilderness areas were established by Congress on the Francis Marion National Forest in 1980. There are two roadless areas on the Forest; one is 890 acres and the other is 530 acres. A study is underway to determine whether the Santee River from the Atlantic Ocean to Wilson Dam on Lake Moultrie should be recommended for inclusion into the National Wild and Scenic Rivers System (USFS 1996a).

The Francis Marion National Forest is located along the tourist-oriented coast of South Carolina. Nearly half of all camping within the State occurs at public facilities along the coast, including the Francis Marion National Forest. The Forest offers a variety of developed and dispersed recreation activities. Only 2 percent of the developed campsites in the area are located on the Forest, however, 100 percent of the public off-highway vehicle (OHV) trails and horse trails and 94 percent of public hunting are located on the Forest. Recreational opportunities include camping, horse riding, canoeing, hiking, boating, mountain biking, hunting, fishing, bird watching, and all-terrain vehicle and OHV use (USFS 1996a).

There are nine incorporated towns within or next to the Forest. Between 1980 and 1990, the area experienced a substantial population growth, with Berkeley County increasing by 35.9 percent and Charleston County increasing by 6.7 percent. Social and economic forces are altering the pattern of living in the small communities. First, many people are commuting to the four main employment markets in the area; consequently, these people are no longer economically dependent on the small communities. Second, communities on the periphery of the Forest are experiencing an influx of new residents from the Charleston area; these new residents are part of an urban culture. Consequently, a more urban population is now using the Forest (USFS 1996a).

Hurricane Hugo severely reduced the supply of pine wood products on the Forest. The Forest's pine inventory of softwood growing stock was reduced by 57 percent. Hugo drastically reduced the supply of the pine growing stock by 53 percent and hardwood growing stock by 18 percent in the 23 county-wide area affected by the hurricane. Surveys show that the primary effects of the reduced supply are being felt more by solid wood products industries than by paper companies. A quantifiable future demand level for wood products on the Francis Marion National Forest cannot be made in light of the numerous unknown conditions brought about by the hurricane. However, short-term demand has increased due to the greatly reduced supply, and

long-term demand is expected to increase based on national and regional demand trends (USFS 1996a).

## 5.2 Evaluation Results for the Francis Marion National Forest

This section presents the NEPA and ecosystem management question results used to evaluate the Francis Marion National Forest 1985 Final EIS and Forest Plan and the 1996 Final EIS and Forest Plan.

### 5.2.1 NEPA Evaluation

This section presents the 13 NEPA questions and the resulting Forest Service responses gleaned from a thorough review of the 1985 and 1996 Final EIS and Forest Plan documents for the Francis Marion National Forest. Table 5.1 provides a visual comparison of the NEPA question evaluations for the 1985 and 1996 Final EIS and Forest Plan documents. The NEPA question responses determined to represent most appropriately Forest Service actions and plans are highlighted. Following each question and range of responses, are statements summarizing information taken from the Final EIS and Forest Plan documents that support the selected question response. Appendix E provides more detailed statements and direct quotations taken from the 1985 and 1996 Final EIS and Forest Plan documents.

**1. <u>When and by whom were critical environmental impacts identified in the EIS</u>?**

**85** other federal agencies, local and state government agencies, citizens, and/or environmental groups identified critical environmental impacts during Draft EIS review.

**96** other federal agencies, local and state government agencies, citizens, and/or environmental groups identified critical environmental impacts during Scoping.

- critical environmental impacts were identified during interdisciplinary planning and decisionmaking sessions or in programmatic EIS.

From an ideal NEPA perspective, most critical environmental impacts would be identified during interdisciplinary planning and decisionmaking sessions along with economic and technical considerations—long before the actual EIS document process is initiated—or at the very least during the formal scoping process. In the 1985 Final EIS and Forest Plan, other federal, state and local agencies, citizens, and organizations identified critical environmental impacts during Draft EIS review. Identified critical environmental impacts included: harvesting hardwood forests and replanting with pines; harvesting in wet loblolly forest habitat, which is the habitat of the

**Table 5.1. Comparison of NEPA Evaluations for the Francis Marion National Forest 1985 and 1996 Final EISs and Forest Plans.**

1. When and by whom were critical environmental impacts identified in the EIS?

**85** other federal agencies, local and state government agencies, citizens, and/or environmental groups identified critical environmental impacts during Draft EIS review.

**96** other federal agencies, local and state government agencies, citizens, and/or environmental groups identified critical environmental impacts during Scoping.

· critical environmental impacts were identified during interdisciplinary planning and decisionmaking sessions or in programmatic EIS.

2. How were identified critical environmental impacts dealt with in the EIS?

· identified critical impacts not fully discussed; no critical impacts avoided, mitigated.

**85** some identified critical impacts discussed; some critical impacts avoided, mitigated, etc.

**96** all identified critical impacts discussed; all identified critical impacts avoided, mitigated, etc.

3. How was ecological information integrated into the document and into the alternative selection process?

**85** minimally or not at all.

· integrated in some areas, but not in others.

**96** integrated throughout document and in the alternative selection process.

4. How were the magnitude and significance of relevant impacts of alternatives identified and estimated (including indirect and cumulative effects)?

**85** magnitude and significance of relevant environmental impacts of alternatives not identified.

· partial identification and estimation of magnitude and significance of relevant impacts of alternatives.

**96** thorough identification and estimation of magnitude and significance of relevant impacts of alternatives (including indirect and cumulative effects).

5. How were identified irreversible or irretrievable commitments of resources addressed?

**96** not addressed.

**85** marginally; from a narrow perspective.

· substantially.

6. To what extent was an integrated, systematic, interdisciplinary approach used?

· project completed entirely using in-house personnel from same disciplinary background.

**85/96** project completed using in-house personnel from numerous disciplinary backgrounds; other agencies or specialists consulted on a needs basis (e.g., permit required).

· interdisciplinary committee, composed of Forest Service and non-Forest Service members, formed at outset of this planning effort.

· ongoing interdisciplinary committee, composed of Forest Service and non-Forest Service members, involved in policymaking and planning processes.

7. What provisions were made for monitoring and evaluation?

· none.

· importance of monitoring and evaluation discussed; no monitoring or evaluation plan delineated in the EIS/ROD.

**85** monitoring plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.

**96** monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.

**Table 5.1. Comparison of NEPA Evaluations for the Francis Marion National Forest 1985 and 1996 Final EISs and Forest Plans (continued).**

8. How did the Final EIS/ROD address the mitigation of unavoidable impacts?

· not addressed.

**85** general mitigation measures discussed, but no detailed mitigation plan developed as part of the Final EIS/ROD.

**96** mitigation plan developed as part of Final EIS/ROD; only general mitigation measures proposed (Guidelines or Standards).

· mitigation plan developed as part of Final EIS/ROD; site-specific and detailed mitigation measures delineated.

9. How was input sought from citizens, local and state government agencies, and environmental groups?

· no input sought.

**85/96** input through informational meetings, open houses, letters, public hearings.

· representatives of the general public, local, state, and other federal agencies, and organizations involved in ongoing Forest Service planning committees.

10. Was the project changed to reflect comments/concerns of citizens, local and state government agencies, environmental groups? How were the comments/concerns addressed?

· not at all; no reason given or comments ignored.

**85** acknowledged comments/concerns; no or minimal changes made to the project.

· project moderately changed; but not to the level of concerns/comments.

**96** project changed during Scoping or after Draft EIS review to reflect comments/concerns.

11. How has the environmental information influenced the selection of the final plan of action as evidenced in the Final EIS/ROD?

· not at all.

**85** minimal evidence of influence of environmental information.

· environmental information integrated in some parts of planning and decisionmaking more than others, as evidenced in the selection of the final plan of action.

**96** environmental information integrated throughout the planning and decisionmaking process as evidenced through the selection of the final plan of action.

12. Were unquantifiable environmental values given appropriate consideration in decisionmaking along with economic and technical considerations?

· not at all.

**85/96** unquantifiable environmental values were quantified (e.g., willingness to pay) and entered into a model as constraints.

· unquantifiable environmental values were not quantified, as such, and were given appropriate consideration.

13. Did the EIS provide a decisionmaking framework for consideration of all effects of alternatives, including environmental, economic and social effects?

**85/96** no decisionmaking framework provided.

· decisionmaking framework provided for effects that were quantified.

· decisionmaking framework provided for consideration of all effects of alternatives, including environmental, economic and social effects.

endangered swallow-tailed kite; harvesting in wetland and riparian areas; the lack of a management program for sensitive species; effects on water quality and soils from road building; increased timber harvesting; clearcutting; forest fragmentation; and loss of old growth stands and their accompanying late successional animal species.

In the 1996 EIS process, very few environmental impacts were identified by the public and reviewing agencies during the Draft EIS review process. This was because of the Forest Service's extensive scoping effort—over 400 responses were received containing 3000 plus individual comments. As a result of this scoping effort, two additional alternatives were developed and existing alternatives were modified before publication of the draft document.

**2. <u>How were identified critical environmental impacts dealt with in the EIS?</u>**

- identified critical impacts were not fully discussed; no critical impacts were avoided; mitigated, etc.

**85** some identified critical impacts were discussed; some critical impacts were avoided, mitigated, etc.

**96** all identified critical impacts were discussed; all identified critical impacts were avoided, mitigated, etc.

NEPA specifies that all identified critical impacts are to be discussed in the Final EIS. Further, the Record of Decision (ROD) must state whether all practicable means have been adopted to avoid or minimize environmental harm from the selected alternative, and if not, why they were not. Most of the concerns and comments expressed during Draft EIS review were not specifically addressed in the body of the 1985 Final EIS as the original list of issues raised during scoping was carried over. No new issues were added to the list. Only minor adjustments were made from the Draft EIS to the final document in response to the identified critical environmental impacts. Clearcutting, or even-aged management, would remain the silvicultural system, harvesting would continue in riparian and wetland areas that fell within the general forest area, forest fragmentation would increase, and diversity of habitat would be reduced.

In the 1996 EIS process, most of the critical impacts identified during scoping and Draft EIS review were addressed in the Final EIS. However, the Forest Service did not agree with every identified environmental impact as being "critical." For example, timber harvesting in wetlands would continue as the Forest Service believed that there were available technology and adequate safeguards in place to ensure that wetland functions remained unimpaired.

**3. How was ecological information integrated into the document and into the alternative selection process?**

**85** minimally or not at all.

· integrated in some areas, but not in others.

**96** integrated throughout the document and in the alternative selection process.

NEPA requires the integration of ecological information throughout the document and in the alternative selection process. There was minimal evidence of any discussion of the integration of ecological information in the 1985 Final EIS document or in the alternative selection process. The Forest Service professed that without even-aged management techniques, optimum benefits to wildlife species would be difficult and that diversity of habitat would be reduced. A letter from the South Carolina Nature Conservancy stated that management provisions focused entirely on species needs within isolated populations and did not take into account habitat considerations or management of plant/natural communities in which the populations are found.

The 1996 EIS process meets the NEPA criterion as it integrated ecological information throughout the documents and used this ecological information in the alternative selection process and for selecting the preferred alternative. This EIS process was based on the principles of ecosystem management as interpreted by the Forest Service. The preferred alternative emphasized expanding the longleaf pine ecosystem, promoted mast-producing hardwoods and mixed pine/hardwood stands; managed for red-cockaded woodpecker habitat on two thirds of the forest; enhanced game and non-game species habitat; increased the number of wildlife openings; created travel corridors for wildlife; and reduced forest fragmentation.

**4. How were the magnitude and significance of relevant impacts of alternatives identified and estimated (including indirect and cumulative effects)?**

**85** magnitude and significance of relevant environmental impacts of alternatives not identified.

· partial identification and estimation of magnitude and significance of relevant impacts of alternatives.

**96** thorough identification and estimation of magnitude and significance of relevant impacts of alternatives (including indirect and cumulative effects).

To meet the NEPA criterion, the EIS process must include a thorough identification and estimation of the magnitude and significance of relevant impacts of the alternatives (including indirect and cumulative effects). The 1985 Final EIS did not adequately identify the magnitude and significance of relevant impacts. General, and often vague, direct and indirect effects were given for the alternatives. There was no discussion of cumulative impacts in the Final EIS.

In the 1996 Final EIS, the Forest Service met the NEPA criterion. The Final EIS discussed probable direct, secondary and cumulative effects of the proposed management activities. The magnitude and significance of relevant impacts were discussed in general terms as this was considered a programmatic EIS process.

**5. How were identified irreversible or irretrievable commitments of resources addressed?**

**96** not addressed.

**85** marginally; from a narrow perspective.

· substantially.

NEPA requires EISs to include a discussion of any irreversible and irretrievable commitments of resources which would be involved in the proposed action. The 1985 Final EIS dealt with irreversible and irretrievable commitments of resources from a narrow perspective. The EIS stated that measures to protect resources that could be irreversibly affected by other resource uses had been incorporated into the Forest-wide standards and guidelines and that none of the alternatives would, therefore, have irreversible commitments of resources. Wilderness Areas, Special Biological Study Areas, etc. were considered irretrievable commitments of resources.

The 1996 EIS process did not address irreversible or irretrievable commitments of resources because this EIS process was considered programmatic. Irreversible or irretrievable commitments of resources were to be addressed at the project level.

**6. To what extent was an integrated, systematic, interdisciplinary approach used?**

· project completed entirely using in-house personnel from same disciplinary background.

**85/96** project completed using in-house personnel from numerous disciplinary backgrounds; other agencies or specialists consulted on a needs basis (e.g., permit required).

· interdisciplinary committee, composed of Forest Service and non-Forest Service members, formed at outset of this planning effort.

· ongoing interdisciplinary committee, composed of Forest Service and non-Forest Service members, involved in policymaking and planning processes.

An integrated, systematic, interdisciplinary approach as envisioned by NEPA would have involved an ongoing interdisciplinary committee, composed of Forest Service and non-Forest Service members, in policymaking and planning processes. The 1985 EIS effort was prepared by Forest Service personnel of varied backgrounds and expertise. Other agencies were only consulted on a needs basis (e.g., permit requirements). There was no indication in the EIS documents as to how the Forest Service's multidisciplinary personnel developed the alternatives

or selected the preferred alternative—i.e., did the Forest Service multidisciplinary personnel make decisions as a committee or did individuals with specific expertise contribute sections to the EIS documents with planning and management decisions made by a manager or management team?

The 1996 EIS effort was also prepared in-house by Forest Service personnel of varied backgrounds and expertise with other agencies consulted on an as needed basis (e.g., permit requirements). Likewise, there was no indication in the EIS documents if or how the Forest Service's multidisciplinary personnel developed the alternatives or selected the preferred alternative.

**7. <u>What provisions were made for monitoring and evaluation</u>?**

- none.
- importance of monitoring and evaluation discussed; no monitoring or evaluation plan delineated in the EIS/ROD.

**85** monitoring plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.

**96** monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.

CEQ regulations require that provisions be made for monitoring and evaluation. The most effective procedure for assuring effective monitoring and evaluation is the development of a forest-wide and site-specific monitoring and evaluation plan as part of the Final EIS and ROD. The 1985 Forest Plan outlined a standard Monitoring and Evaluation Plan. The Final EIS stated that the monitoring plan for wildlife would continue to be developed and the agency would also continue to develop monitoring methods and procedures. Neither the Final EIS nor Forest Plan discussed evaluation methods and procedures.

In the 1996 EIS process, the needs identified through past monitoring and evaluation efforts and through Analysis of Management Situation drove the alternative development process. Monitoring and evaluation received major emphasis in the revision of the Forest Plan, which would provide the Forest Service with information on future progress achieved in obtaining management goals and objectives. Three types of monitoring were to be conducted: implementation, effectiveness, and validation.

**8. How did the Final EIS/ROD address the mitigation of unavoidable impacts?**

- not addressed.

**85** general mitigation measures discussed, but no detailed mitigation plan developed as part of the Final EIS/ROD.

**96** mitigation plan developed as part of Final EIS/ROD; only general mitigation measures proposed (Guidelines or Standards).

- mitigation plan developed as part of Final EIS/ROD; site-specific and detailed mitigation measures delineated.

NEPA intended that unavoidable impacts be mitigated as much as feasible. Any mitigation measure proposed in the EIS must be explained and committed to in the ROD. Site-specific and detailed mitigation measures are to be delineated. The 1985 Final EIS discussed generic mitigation measures designed to mitigate the adverse effects that could not be avoided, but did not develop a mitigation plan as such.

The 1996 Final EIS developed a mitigation plan as part of the Final EIS and Forest Plan; however, only general mitigation measures were proposed because this EIS process was considered programmatic. The Forest Service would implement additional and site-specific mitigation measures at the project level.

**9. How was input sought from citizens, local and state government agencies, and environmental groups?**

- no input sought.

**85/96** input through informational meetings, open houses, letters, public hearings.

- representatives of the general public, local, state, and other federal agencies, and organizations involved in ongoing Forest Service planning committees.

To meet NEPA's intent, representatives of the public, organizations, local, state and other federal agencies should be involved in ongoing Forest Service planning and policy committees. The NEPA process should also reflect additional comments and concerns raised during formal scoping or Draft EIS review. Input from the public, organizations, and local and state agencies during the 1985 EIS process was obtained through meetings with local civic and community organizations, advertising, letters, brochures, a scoping work group, public meetings, and open houses.

Input from the public, organizations, and local and state agencies during the 1996 EIS process was obtained through letters, newsletters, informal contacts. It was not evident from the documents in either case study that representatives of the public, local, state and other federal agencies, and organizations were involved in ongoing Forest Service planning committees.

**10. <u>Was the project changed to reflect comments/concerns of citizens, local and state government agencies, environmental groups</u>? <u>How were the comments/concerns addressed</u>?**

- not at all; no reason given or comments ignored.

**85** acknowledged comments/concerns; no or minimal changes made to the project.

- project moderately changed; but not to the level of concerns/comments.

**96** project changed during Scoping or after Draft EIS review to reflect comments/concerns.

The project scope should reflect the comments and concerns raised during formal scoping and Draft EIS review. The publics, however, were not directly involved in the 1985 Forest Service decisionmaking process. Some issues and concerns raised by the publics were reflected in the selection of the preferred alternative in the Final EIS. However, many identified critical environmental and social impacts were not addressed in the Final EIS or in the preferred alternative selection process, such as no adjustment to the intensive level of even-aged timber management; no changes made in the width of vegetated buffer along perennial streams; no adjustments to harvesting in riparian and wetland areas; minimal changes to decreasing hunting opportunities for wild turkey, gray squirrel, etc.; no increase in recreational areas vs. demand; and minimal response to decreasing late successional and old growth habitats.

In the 1996 EIS process, the publics were not directly involved in the Forest Service's decisionmaking process. However, public input greatly influenced the outcome of this EIS process particularly during scoping. Most of the changes or amendments raised during scoping and review of the Draft EIS were reflected in the Final EIS. Efforts were made to ensure that the selected alternative considered the goals of other public agencies as they related to national forest management.

**11. <u>How has the environmental information influenced the selection of the final plan of action as evidenced in the Final EIS/ROD</u>?**

- not at all.

**85** minimal evidence of influence of environmental information.

- environmental information integrated in some parts of planning and decisionmaking more than others as evidenced through the selection of the final plan of action.

**96** environmental information integrated throughout the planning and decisionmaking process as evidenced through the selection of the final plan of action.

In keeping with NEPA's intent, environmental information should be integrated throughout the planning and decisionmaking process as evidenced through the selection of the final plan of

action. In reviewing the 1985 Final EIS, it became evident that the Forest Service made changes to the EIS in direct response to the environmental concerns raised in reviewing federal agency and public comments rather than from an understanding of ecosystem processes or the need to integrate environmental considerations into planning and decisionmaking. It was the federal agency and public comments that provided insight into ecosystem processes. Therefore, environmental information per se had little influence on the selection of the final plan of action as presented by the Forest Service in the Final EIS.

The selection of the final plan of action in the 1996 Final EIS showed evidence of the integration of environmental information throughout the planning and decisionmaking process. Scientific studies, some conducted by the Forest Service and others by various agencies and researchers, were referenced throughout the document. Some studies were conducted specifically for this EIS process. The Forest Service completed an ecological classification and mapping framework of the Francis Marion National Forest to identify land allocation options for the alternatives. Landtype associations were used to define management areas in some alternatives. The Landtype data were entered into a GIS. The preferred alternative emphasized expanding the longleaf pine ecosystem; promoted mast-producing hardwoods and mixed pine/hardwood stands; managed for red-cockaded woodpecker habitat on two thirds of the forest; enhanced game and non-game species habitat; increased the number of wildlife openings; created travel corridors for wildlife; and reduced forest fragmentation.

**12. <u>Were unquantifiable environmental values given appropriate consideration in decisionmaking along with economic and technical considerations</u>?**

**85/96**

- not at all.
- unquantifiable environmental values were quantified (e.g., willingness to pay) and entered into a model as constraints.
- unquantifiable environmental values were not quantified, as such, and were given appropriate consideration.

NEPA states that unquantifiable environmental values be given appropriate consideration in the decisionmaking process along with economic and technical considerations. The 1985 Final EIS "quantified" (e.g., willingness to pay) many unquantifiable environmental issues for inclusion in the FORPLAN model. Other qualitative values were treated as "constraints" in the model. Constraints for each resource were quantified by translating broad direction statements for each alternative into specific estimates of the maximum or minimum level of goods and services to be produced. Additionally, Forest Service personnel validated projected yields and feasibility of assigning management prescriptions to individual capability areas based on their knowledge of on-the-ground conditions.

The 1996 Final EIS "quantified" unquantifiable environmental values (e.g., willingness to pay) and entered the quantified values into the model directly or as constraints. The ROD stated that the FORPLAN model was used as a simulator of different management scenarios that achieved different alternative objectives. The outputs of the model were used primarily for effects analysis in the Draft EIS.

**13. <u>Did the EIS provide a decisionmaking framework for consideration of all effects of alternatives, including environmental, economic and social effects</u>?**

**85/96** no decisionmaking framework provided.

- decisionmaking framework provided for effects that were quantified.
- decisionmaking framework provided for consideration of all effects of alternatives, including environmental, economic and social effects.

CEQ regulations specify that a decisionmaking framework for consideration of all effects of the alternatives, including environmental, economic and social effects, be included in the EIS so that reviewers can easily understand and can thereby effectively evaluate the merits and faults of the alternatives. The 1985 EIS process did not provide such a decisionmaking framework. The Final EIS contained various tables: a comparison of the different mixtures of yields for certain resources; a comparison of social and economic benefits; a description of the biological effects on various resources; and a comparison of net value analysis. Chapter IV, Environmental Consequences, included a discussion and comparison of the physical and biological effects as well as the economic and social effects of implementing each alternative. No conclusions were reached or inferred in discussions accompanying any of the tables. The ROD only contained a summary table of those effects that were quantified. The Forest Service did not evaluate the effects per se, nor did the agency provide a framework suitable for the reviewer to evaluate all the environmental effects of the proposed alternatives.

The 1996 EIS process did not provide a decisionmaking framework. The Final EIS contained many charts, bar graphs, pie charts, and tables depicting various scenarios for different management options based on the issues developed during scoping. The Final EIS or ROD did not evaluate these graphics and tables nor did the Forest Service use them to prepare a decisionmaking framework from which reviewers could evaluate all the environmental effects of the proposed alternatives. The rationale for the alternative selection as presented in the ROD was that the Forest Plan should maximize net public benefits and best respond to the issues.

### 5.2.2 Ecosystem Management Evaluation

This section presents the 11 ecosystem management questions and the resulting Forest Service responses gleaned from a thorough review of the 1985 and 1996 Final EIS and Forest Plan documents for the Francis Marion National Forest. Table 5.2 provides a visual comparison of

**Table 5.2. Comparison of Ecosystem Management Question Analyses of the Francis Marion National Forest 1985 and 1996 Final EISs and Forest Plans.**

1. Did the agency propose management procedures to maintain viable populations of native species in situ? If so, how?

· no procedures proposed.

**85** management procedures primarily focused on game species such as deer, bear, wild turkey, and endangered species.

**96** agency proposed management procedures to maintain viable populations of native species in situ through preservation/enhancement of multiple habitat types and sizes.

2. Was it evident that the agency acknowledged ecological patterns and diversity in terms of the processes and constraints generating them?

**85** minimal or no evidence.

· agency demonstrated some understanding of ecological patterns and diversity; however, this understanding did not affect the management decisionmaking process.

· agency demonstrated some understanding of ecological patterns and diversity; this limited understanding was reflected in the decisionmaking process.

**96** agency demonstrated understanding of ecological patterns and diversity in terms of the processes and constraints generating them; this was reflected in management decisions.

3. What level of measures were proposed to sustain ecosystem diversity, health, and productivity?

**85** minimal or very narrowly focused measures proposed.

· importance of sustainability discussed, but no management measures were proposed.

**96** specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticides, etc.

4. Were ecosystem patterns and processes studied at different geographic and time scales?

**85** management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries**.**

**96** acknowledged ecosystem patterns and processes at different scales, but management decisions only affected prescribed time-frame within defined forest system boundaries.

· the historic range of ecosystem patterns and processes were defined across a range of spatial and temporal scales; the agency developed effective partnerships with other federal agencies, state and local agencies, and private landowners.

5. How were management boundaries delineated?

**85** only used political boundaries; no or limited discussion beyond political boundaries.

**96** acknowledged ecosystem concepts, but only looked at selected parts of ecosystems.

· defined ecological boundaries at appropriate scales; managed within and across whole landscapes, watersheds, regions, etc.

6. To what extent was a broad, integrative, interdisciplinary approach used?

· project complete entirely using in-house personnel from same disciplinary background.

**85/96** project completed using an in-house interdisciplinary team; other agencies or specialists consulted only on a needs basis (e.g., permit required).

· interdisciplinary committee, composed of representatives of other federal agencies, state and local agencies, and the public, was formed at onset of this planning effort.

· involved ongoing interdisciplinary committee that included other federal agencies, state and local agencies, and the public in policymaking and planning processes.

**Table 5.2. Comparison of Ecosystem Management Question Analyses of the Francis Marion National Forest 1985 and 1996 Final EISs and Forest Plans (continued).**

7. How was the public involved in the planning and decisionmaking process?

· not at all; framing goals were left to the "experts."

**85/96** input through informal meetings, open-houses, letters, and/or public hearings.

· meaningful stakeholder and public involvement generated to facilitate collective decisionmaking.

8. How were results of recent scientific research and technology integrated into management and policy decisionmaking?

**85** had no influence on final outcome.

· recent scientific research and technology considered in decisionmaking, but many "trade-offs" were made to accomplish social and economic goals that were contrary to scientific information.

**96** recent scientific research and technology considered in decisionmaking; some "trade-offs" were made to accomplish social and economic goals; the "trade-offs" were determined not to be contrary to the precepts of ecosystem management.

· best available scientific information was cornerstone for resource allocations and management decisions; scientific database increased as a result of this planning process.

9. Were adaptive management techniques (e.g., monitoring, evaluation) integrated into planning and management?

· not at all.

**85** followed standardized monitoring and evaluation procedures.

**96** used adaptive management by monitoring and evaluating multiple attributes at all appropriate ecological scales; monitoring and evaluation outcomes to influence future planning and management decisions.

10. How were educational programs integrated into the decisionmaking process?

**85/96** no or minimal educational programs developed.

· in-house educational workshops or short courses held for agency personnel to prepare them for the decisionmaking process.

· educational workshops or short courses held that include representatives from other federal agencies, state and local agencies, and the public.

11. Did the agency evaluate and set priorities based on societal demands within the constraints of ecosystem patterns and processes?

· agency did not evaluate or set priorities based on societal demands; ecosystem patterns and processes were disregarded.

**85** agency evaluated and set priorities based on societal demands; ecosystem patterns and processes were generally disregarded.

· agency evaluated and set priorities based on societal demands; ecosystem patterns and processes were given some consideration.

**96** agency evaluated and set priorities based on societal demands within the constraints of ecosystem patterns and processes.

the ecosystem management question results for the 1985 and 1996 Final EIS and Forest Plan documents. The ecosystem management question responses determined to represent most appropriately Forest Service actions and plans are highlighted. Following each question and range of responses, are statements summarizing information taken from the Final EIS and Forest Plan documents that support the selected question response. Appendix F provides more detailed statements and direct quotations taken from the 1985 and 1996 Final EIS and Forest Plan documents.

**1. <u>Did the agency propose management procedures to maintain viable populations of native species in situ</u>? <u>If so, how</u>?**

- no procedures proposed.

**85** management procedures primarily focused on game species such as deer, bear, wild turkey, and endangered species.

**96** agency proposed management procedures to maintain viable populations of native species in situ through preservation/enhancement of multiple habitat types and sizes.

Ideal ecosystem management procedures would maintain viable populations of all native species in situ through the preservation and enhancement of multiple habitat types and sizes. In the 1985 Final EIS, proposed management procedures focused primarily on game species. Indicator species included white-tailed deer, eastern wild turkey, eastern gray squirrel, northern bobwhite quail, and red-cockaded woodpecker (all but the red-cockaded woodpecker are game species). Viable population constraints were used to ensure that populations were managed and maintained through harvesting rotations. The minimum management requirements were designed to maintain and, if possible, to increase populations of threatened and endangered species.

The 1996 Final EIS met this ecosystem management criterion. The alternatives were compared by analyzing the effects on management indicator species. Indicator species were listed by successional stage and vegetative type: grass-forb, shrub/seedling, sapling/pole, and mature. Indicator species included game species, species representing each successional stage and vegetative type, as well as endangered species. The Forest Service's goal was to maintain viable populations while preserving and enhancing the diversity of plant and animal communities within the planning area.

**2. <u>Was it evident that the agency acknowledged ecological patterns and diversity in terms of the processes and constraints generating them</u>?**

**85** minimal or no evidence.

- agency demonstrated some understanding of ecological patterns and diversity; however, this understanding did not affect the management decisionmaking process.
- agency demonstrated some understanding of ecological patterns and diversity; this limited understanding was reflected in the decisionmaking process.

**96** agency demonstrated understanding of ecological patterns and diversity in terms of the processes and constraints generating them; this was reflected in management decisions.

Ecosystem management specifies that agencies demonstrate an understanding of ecological patterns and diversity in terms of the processes and constraints generating them and that management decisions reflect this understanding. In the 1985 EIS process, it was not evident that the Forest Service acknowledged ecological patterns and diversity in terms of the processes and constraints generating them. From the responses received to the Draft EIS, it was evident that other federal agencies and the public were more aware of ecological patterns and diversity issues than were the Forest Service personnel who prepared the Draft EIS. Several changes were made from the Draft to the Final EIS. However, these appear to have been made primarily because of agency and public comments rather than from an acquired understanding of ecological patterns and diversity. Also, the EIS focused on even-aged management as the only means by which other forest management goals were to be achieved.

In the 1996 EIS process, the Forest Service met the ecosystem criterion. The agency acknowledged the equal importance of all natural resources as well as the continued availability of goods and services. The principles of ecosystem management were considered in the development of alternatives. The Forest Service developed an ecological classification system to look at the Forest at a different scale and for working within the ecological potential of the landscape. However, no classification was done for areas outside the boundaries of the Forest.

**3. <u>What level of measures were proposed to sustain ecosystem diversity, health, and productivity</u>?**

**85** minimal or very narrowly focused measures proposed.

- importance of sustainability discussed, but no management measures were proposed.

**96** specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticides, etc.

To meet ecosystem management criteria, specific measures should be proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticides, etc. For the 1985 EIS process, minimal measures were proposed. The EIS stated that the Forest Service was mandated by the Endangered Species Act to protect viable populations of the red-cockaded woodpecker and other endangered and threatened species. Beyond that, the Forest Service would maintain viable populations of native vertebrate and plant species. All of the selected indicator species were game species, except for the endangered red-cockaded woodpecker. The Forest Service believed that even-aged management was necessary to give optimum benefits to wildlife species; it was the only management option proposed to sustain ecosystem diversity, health, and productivity.

The 1996 EIS process meets the ecosystem management criterion as it considered ecosystem management in the development of the alternatives to sustain ecosystem diversity, health, and productivity of the Forest. Ecosystem management guidelines included: consideration of feasibility and the health, productivity, and resilience of the land over time; protection of special areas, endangered species, rare plant populations, and cultural resources; working within the ecological potential of sites and landscapes; and monitor, research, and adapt.

**4. <u>Were ecosystem patterns and processes studied at different geographic and time scales</u>?**

**85** management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries**.**

**96** acknowledged ecosystem patterns and processes at different scales, but management decisions only affected prescribed time-frame within defined forest system boundaries.

· the historic range of ecosystem patterns and processes were defined across a range of spatial and temporal scales; the agency developed effective partnerships with other federal agencies, state and local agencies, and private landowners.

Ecosystem management prescribes that the historic range of ecosystem patterns and processes be defined across a range of spatial and temporal scales and that the management agency develop effective partnerships with other agencies and private landowners. For the 1985 EIS process, management decisions were only concerned with prescribed management time-frames, e.g., 5 to 15-year time frames, within defined forest system boundaries. There was no discussion of Forest Service management activities over the long term or how past management activities affected ecosystem patterns and processes of the Forest. There was also no discussion of how past, current and future demands would affect future ecosystem patterns and processes.

For the 1996 EIS process, ecosystem patterns and processes were acknowledged at different geographic and time scales, but management decisions only affected the primary Forest Service planning horizon of 50 years and were confined to forest system boundaries. The Forest Service completed an ecological classification and mapping framework for the Francis Marion National Forest to identify land type associations. Several reviewers were critical of the Forest Service for confining its management decisions to within Forest boundaries.

**5. <u>How were management boundaries delineated</u>?**

**85** only used political boundaries; no or limited discussion beyond political boundaries.

**96** acknowledged ecosystem concepts, but only looked at selected parts of ecosystems.

- defined ecological boundaries at appropriate scales; managed within and across whole landscapes, watersheds, regions, etc.

Ecosystem management defines ecological boundaries at appropriate scales and manages within and across whole landscapes, watersheds, regions, etc. as deemed appropriate. The 1985 Forest Plan only covered lands that lay within the boundaries of the Francis Marion National Forest. The only discussion outside Forest boundaries concerned possible impacts of forest management activities on the local economy and the availability of recreation, fuelwood and hunting opportunities for local communities.

In the 1996 Final EIS, discussions were presented on biodiversity, fragmentation, and ecosystems of different scales; however, the discussions focused only on areas within Forest boundaries. The only discussions of land outside of the Forest concerned the possible impacts of management activities on the local economy and the availability of recreation and hunting opportunities for communities.

**6. <u>To what extent was a broad, integrative, interdisciplinary approach used</u>?**

- project complete entirely using in-house personnel from same disciplinary background.

**85/96** project completed using an in-house interdisciplinary team; other agencies or specialists consulted only on a needs basis (e.g., permit required).

- interdisciplinary committee, composed of representatives of other federal agencies, state and local agencies, and the public, was formed at onset of this planning effort.
- involved ongoing interdisciplinary committee that included other federal agencies, state and local agencies, and the public in policymaking and planning processes.

Ecosystem management requires that a broad, integrative, interdisciplinary approach be used in decisionmaking. Ideally, this would involve developing an ongoing interdisciplinary committee that would include other federal agencies, state and local agencies, and the general public in policymaking and planning processes. The 1985 EIS effort was prepared in-house by Forest Service personnel of varied backgrounds and expertise. Other agencies were only consulted on a needs basis (e.g., permit requirements). There was no indication in the EIS documents as to how the Forest Service's multidisciplinary personnel developed the alternatives or selected the preferred alternative—i.e., did the Forest Service multidisciplinary personnel make decisions as a committee or did individuals with specific expertise contribute sections to the EIS documents with planning and management decisions made by a manager or management team?

The 1996 EIS effort was also prepared in-house by Forest Service personnel of varied backgrounds and expertise. Likewise, there was no indication in the EIS documents if or how the Forest Service's multidisciplinary personnel developed the alternatives or selected the preferred alternative.

**7. <u>How was the public involved in the planning and decisionmaking process</u>?**

**85/96**

- not at all; framing goals were left to the "experts."
- input through informal meetings, open-houses, letters, and/or public hearings.
- meaningful stakeholder and public involvement generated to facilitate collective decisionmaking.

Meaningful stakeholder and public involvement generation to facilitate collective decisionmaking is important to comply fully with ecosystem management criteria. Input from the public during the 1985 EIS process was obtained through meetings with local civic and community organizations, letters, brochures, a scoping work group, public meetings, and open houses. The public, however, was not directly involved in the Forest Service's management decisions as there was no collective decisionmaking process in place. Some issues and concerns raised by the public were reflected in the selection of the preferred alternative in the Final EIS. However, many identified critical environmental and social impacts were not addressed in the Final EIS or in the preferred alternative selection process. For example, clearcutting, or even-aged management, would remain the silvicultural system, harvesting would continue in riparian and wetland areas that fell within the general forest area, forest fragmentation would increase, and diversity of habitat would be reduced.

The 1996 EIS process acquired public input through letters, newsletters, and public meetings. Although the publics were not directly involved in this EIS policy and decisionmaking process, their input greatly influenced its outcome. The project decision changes or amendments to alternative development and the Draft EIS reflected the comments and concerns of citizens, organizations, and local, state and other federal agencies. The Forest Service ecosystem

management guidelines said that the agency would involve interested and affected people in the full process of making decisions about common resources. How this involvement was to occur and to what level was not outlined or discussed in the Final EIS.

**8. <u>How were results of recent scientific research and technology integrated into management and policy decisionmaking</u>?**

**85** had no influence on final outcome.

- recent scientific research and technology considered in decisionmaking, but many "trade-offs" were made to accomplish social and economic goals that were contrary to scientific information.

**96** recent scientific research and technology considered in decisionmaking; some "trade-offs" were made to accomplish social and economic goals; the "trade-offs" were determined not to be contrary to the precepts of ecosystem management.

- best available scientific information was cornerstone for resource allocations and management decisions; scientific database increased as a result of this planning process.

Ecosystem management requires that the best available scientific information form the cornerstone for resource allocations and management decisions. The scientific database should increase as a result of this planning process. The final outcome of management decisions in the 1985 EIS was to a large extent influenced by reviewing agency and public comments, who substantially supported the integration of ecology-based research and technology for making resource management decisions. The Forest Service's resource management decisions were based on older scientific studies that supported even-aged harvesting practices. Hence, even though changes in the Final EIS were in response to public and agency comments, the changes did not reflect an acquired understanding of ecosystem processes by Forest Service personnel or the incorporation of the best available scientific information.

In reviewing the 1996 EIS documents, it was clear that the results of recent scientific research and technology were considered in the decisionmaking process, however, some trade-offs were made to accomplish social and economic goals. The trade-offs were determined not to be contrary to the precepts of ecosystem management. Scientific studies, some conducted by the Forest Service and others by various agencies and researchers, were referenced throughout the Final EIS. Some studies were conducted specifically for this EIS process. The Forest Service completed an ecological classification and mapping framework of the Francis Marion National Forest to identify land allocation options for the alternatives. The Landtype data were entered into a GIS. The principles of ecosystem management were considered in the development of the alternatives. The delineation of management areas was driven by the emphasis of each alternative and the ecological units and zones needed to fulfill the goals and objectives of the alternative.

**9. <u>Were adaptive management techniques (e.g., monitoring, evaluation) integrated into planning and management</u>?**

- not at all.

**85** followed standardized monitoring and evaluation procedures.

**96** used adaptive management by monitoring and evaluating multiple attributes at all appropriate ecological scales; monitoring and evaluation outcomes to influence future planning and management decisions.

A critical ecosystem management criterion is that adaptive management techniques (e.g., monitoring, evaluation) be integrated into planning and management. Adaptive management incorporates the monitoring and evaluation of multiple attributes at all appropriate ecological scales. The 1985 Final EIS and Forest Plan used standardized monitoring and evaluation procedures based on regional Standards and Guidelines. No site-specific monitoring or evaluation procedures were developed based on ecological scales or ecosystem attributes.

The 1996 Final EIS and Forest Plan meets this ideal ecosystem management criterion. In this EIS process and Forest Plan revision, the needs identified through monitoring and evaluation and through the Analysis of Management Situation drove the alternative development process. The Final EIS recognized that improvements should be made in the methods used to monitor Forest Plan implementation. The ultimate determination of whether the minimum management requirements were met would be dependent upon the systematic and frequent monitoring of the Forest. Three types of monitoring were to be conducted in the Forest: implementation, effectiveness, and validation.

**10. <u>How were educational programs integrated into the decisionmaking process</u>?**

**85/96** no or minimal educational programs developed.

- in-house educational workshops or short courses held for agency personnel to prepare them for the decisionmaking process.
- educational workshops or short courses held that include representatives from other federal agencies, state and local agencies, and the public.

Another ecosystem management criterion calls for the integration of educational programs into the decisionmaking process. The 1985 EIS process developed minimal educational programs. The Forest Service prepared a slide and tape program that was shown to organizations, cooperators, the public, and Forest Service personnel that explained the Forest Service planning process. However, no representatives of the public attended the open houses where the slide and tape program was shown.

The 1996 EIS process did not involve any educational programs. In response to a comment during Draft EIS review, the Final EIS agreed that the current level of public information and education was not adequate. Rather than treat these items as issues in the Final EIS, the agency decided that public information and education should be addressed in the Forest Plan. However, the Forest Plan did not discuss either issue.

**11. <u>Did the agency evaluate and set priorities based on societal demands within the constraints of ecosystem patterns and processes</u>?**

- agency did not evaluate or set priorities based on societal demands; ecosystem patterns and processes were disregarded.

**85** agency evaluated and set priorities based on societal demands; ecosystem patterns and processes were generally disregarded.

- agency evaluated and set priorities based on societal demands; ecosystem patterns and processes were given some consideration.

**96** agency evaluated and set priorities based on societal demands within the constraints of ecosystem patterns and processes.

Ecosystem management requires that agencies evaluate and set priorities based on societal demands within the constraints of ecosystem patterns and processes. In the 1985 Final EIS, the Forest Service evaluated and set priorities based on some societal demands (many other societal demands were disregarded), while ecosystem patterns and processes were generally ignored. Due to timber industry demands, timber harvesting quotas were above RPA figures and intensive, even-aged management would continue. Hunting opportunities would increase for white-tailed deer and other early successional species, while hunting opportunities would decrease for wild turkey, gray squirrel, and other late successional or old growth species. Fuelwood availability would decrease, which would affect low income families. From an ecosystem patterns and processes perspective, only even-aged management would be employed to manage wildlife habitat; tables in the Final EIS indicate that old growth and late successional habitats would decrease due to increased harvesting quotas and game fishery levels would decrease because of continued timber harvesting within riparian and wetland areas.

In the 1996 EIS process, the Forest Service meets the ecosystem management criterion. The Final EIS stated that the purpose and need for the Forest Plan was to provide a Forest-wide, programmatic framework for analyzing and approving future site-specific projects and programs. The Forest Plan would balance economic and resource values and recognize the equal importance of all natural resources as well as the continued availability of goods and services.