

APPENDICES

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Appendix A

NEPA Goals and Criteria

Table A.1 lists the criteria for each of the NEPA goals delineated from the NEPA document and literature reviews. The sources for each of the criteria have been included for reference. The sources are only cited if they contributed something “new” to NEPA’s intent or clarified its intent. Many recent sources simply reiterated what NEPA or earlier sources had discussed, and therefore, they were not cited as sources for those specific criteria. For example, many sources referred to NEPA with regard “to utilize a systematic, interdisciplinary approach . . .” Only sources that added substance or clarification to that NEPA criterion were cited here accordingly.

Table A.1. The NEPA Goals and Criteria.

Goal: To Promote Efforts Which Will Prevent or Eliminate Damage to the Environment

- To promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man (NEPA 1969).
- To facilitate each person's responsibility to contribute to the preservation and enhancement of the environment (NEPA 1969).
- To restore and maintain environmental quality for the overall welfare and development of man (NEPA 1969).
- To fulfill the responsibilities of each generation as trustee of the environment for succeeding generations (NEPA 1969).
- To attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences (NEPA 1969).
- To explore rigorously and to evaluate objectively reasonable alternative actions that might avoid or minimize the adverse environmental effects (CEQ 1971a).
- To identify the extent to which the action curtails the range of beneficial uses of the environment (CEQ 1971a).
- To appraise and improve environmental effects of agency actions (CEQ 1972).
- To use innovative methods for preservation and enhancement of the environment (CEQ 1977).
- To make decisions based on understanding of environmental consequences, and to take actions that protect, restore, and enhance the environment (CEQ 1978a).

Goal: To Enrich Our Understanding of Ecological Systems and Natural Resources

- To enrich the understanding of the ecological systems and natural resources important to the Nation (NEPA 1969).
- To initiate and utilize ecological information in the planning and development of resource-oriented projects (NEPA 1969).
- To recognize the profound impact of man's activities on the interrelationships of all components of the natural environment (NEPA 1969).
- To consider the environment as dynamic; therefore, new situations must be evaluated and new knowledge must be incorporated (CEQ 1972).
- To promote accurate scientific analysis, expert agency comments, and scientific integrity (CEQ 1975, 1978a).
- To ensure that scientific information is not lost, but is published and otherwise referenced and utilized (CEQ 1975).
- To identify gaps in relevant information and to acknowledge scientific uncertainty (CEQ 1978a).
- To institutionalize a continuing systematic, integrated, science-based policy analysis (Bartlett 1986).
- To integrate an interdisciplinary use of the sciences to address complex and interrelated environmental problems (Caldwell 1982).

Table A.1. The NEPA Goals and Criteria (continued).

Goal: To Identify and Estimate the Magnitude and Significance of Relevant Environmental Impacts of Alternative Actions

- To identify the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity (NEPA 1969).
- To include descriptions of both significant primary and secondary consequences (direct and indirect effects) for the environment (CEQ 1971a).
- To recognize that a significant action can adversely affect the quality of the human environment either by directly affecting human beings or by indirectly affecting human beings through adverse effects on the environment (CEQ 1971a).
- To evaluate both the long- and short-term implications of alternative actions in order to avoid, to the fullest extent practicable, undesirable consequences for the environment (CEQ 1971a).
- To assess the action of cumulative and long-term effects from the perspective that each generation is trustee of the environment for succeeding generations (CEQ 1971a).
- To ascertain the range of beneficial uses of the environment that serve the short-term to the disadvantage of long-term environmental goals (CEQ 1971a).

Goal: To Enhance Renewable Resources and to Recycle Depletable Resources

- To identify and address irreversible or irretrievable commitments of resources (NEPA 1969).
- To explore alternative actions that will minimize adverse impacts (CEQ 1971a).
- To discuss the extent the proposed action involves trade-offs between short-term environmental gains at the expense of long-term losses, or vice versa, and to discuss the extent the proposed action forecloses future options (CEQ 1973a).
- To avoid or minimize adverse environmental effects (CEQ 1973a).
- To establish whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why not (CEQ 1978a).

Goal: To Integrate NEPA into Policymaking and the Planning Process

- To study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources (NEPA 1969).
- To incorporate environmental considerations into agency decisionmaking processes—not just for specific projects, but also into policy and program structures (CEQ 1971b).
- To describe alternatives including information and technical data adequate to permit careful assessment of environmental impact by commenting agencies (CEQ 1971a).
- To analyze alternatives and their costs and impacts on the environment in the agency review process in order not to foreclose prematurely options which might have less detrimental effects (CEQ 1971a).
- To consider environmental factors at the earliest possible stage in the planning process (CEQ 1972).
- To build into agency decisionmaking processes an appropriate and careful consideration of environmental aspects of the proposed action (CEQ 1973a).
- To develop alternatives to the proposed action, including those not within existing authority of the responsible agency; or alternatives requiring actions of significantly different nature which would provide similar benefits with different environmental impacts (CEQ 1973a).

Table A.1. The NEPA Goals and Criteria (continued).

Goal: To Integrate NEPA into Policymaking and the Planning Process (continued)

- To include the alternative of taking no action or of postponing action pending further study (CEQ 1973a).
- To use experimental techniques to present environmental facts and values in agency deliberations (Anderson 1974).
- To demonstrate environmental statements are to serve as the means for assessing the environmental impact of proposed agency actions rather than as a justification for decisions already made (CEQ 1973a).
- To develop a range of alternatives between the extremes of no action and an action that fully accomplishes the original goal without any objectionable features (Anderson 1973).
- To integrate the requirements of NEPA with other planning and environmental review procedures (CEQ 1978a).
- To present environmental impacts of the alternatives in a comparative form, thus sharply defining the issues and providing a clear basis for choice by the decisionmaker and the public (CEQ 1978a).
- To incorporate "scoping" to ensure that environmental problems are identified early and are properly studied (CEQ 1978a).

Goal: To Utilize a Systematic, Interdisciplinary Approach in Planning and Decisionmaking

- To utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment (NEPA 1969).
- To continue federal government policy to cooperate with state and local governments, and other concerned public and private organizations (NEPA 1969).
- To improve and coordinate federal plans, functions, programs, and resources (NEPA 1969).
- To consult with and obtain comments of any federal, state, or local agencies which have jurisdiction by law or special expertise with respect to any environmental impact (NEPA 1969).
- To lend appropriate support, where consistent with the foreign policy of the United States, to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment (NEPA 1969).
- To engage in the exchange of data and research results, and cooperation with agencies of other governments to foster the purposes of the Act (Executive Order 11514).
- To consults with other appropriate federal, state, and local agencies with regard to the assessment in detail of potential environmental impacts (CEQ 1971a).
- To develop new governmental initiatives to tackle the Nation's growing environmental problems (CEQ 1972).
- To identify and define the purpose and scope of the action (CEQ 1973a).
- To discuss the relationship of the proposed action to land use plans, policies, and controls for the affected area (CEQ 1973a).
- To require active cooperation among engineers, planners, ecologists, economists, lawyers, and representatives of other disciplines (Anderson 1974).
- To review federal policies to determine the need for across-the-board changes affecting entire federal programs (Hill and Ortolano 1978).
- To promote interdisciplinary learning or mutual exchange of information and viewpoints through the interaction of specialists from the various sciences with agency personnel (Caldwell 1982).

Table A.1. The NEPA Goals and Criteria (continued).

Goal: To Monitor and Evaluate Agency Activities to Protect and Enhance the Quality of the Environment

- To monitor, evaluate, and control agency activities so as to protect and enhance the quality of the environment (Executive Order 11514).
- To ensure that information regarding existing or potential environmental problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to federal agencies, states, counties, municipalities, institutions, and other entities, as appropriate (Executive Order 11514).
- To provide for monitoring to assure that decisions are carried out (CEQ 1978a).
- To develop a monitoring and evaluate program (CEQ 1978a).

Goal: To Mitigate Unavoidable Impacts

- To use the EIS process to identify any adverse environmental effects which cannot be avoided should the proposal be implemented (NEPA 1969).
- To include alternative measures to provide for compensation of fish and wildlife losses, including the acquisition of land, waters, and interests (CEQ 1973a).
- To indicate what other interests and considerations of policy are thought to offset adverse environmental effects (CEQ 1973a).
- To include appropriate mitigation measures not already included in the proposed action or alternatives to avoid or lessen adverse environmental impacts (CEQ 1978a).
- To implement mitigation and other conditions established in the EIS or during its review and committed as part of the decision (ROD) (CEQ 1978a).

Goal: To Provide the Public with Relevant Information

- To make copies of environmental statements and the comments and views of the appropriate federal, state, and local agencies available to the President, the CEQ and to the public (NEPA 1969).
- To make available to states, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment (NEPA 1969).
- To provide the public with relevant information, including information on alternative courses of action (Executive Order 11514; CEQ 1971a).
- To include an appropriate early notice system for informing the public of the decision to prepare a Draft EIS as soon as is practicable (CEQ 1973a).
- To provide for public disclosure of information relevant to analysis of environmental affects and alternative proposals (Anderson 1973; Andrews et al. 1977).
- To respond to the public's right-to-know (Anderson 1974).

Table A.1. The NEPA Goals and Criteria (continued).

Goal: To Encourage and Facilitate Public Involvement in the Decisionmaking Process

- To develop procedures to ensure the fullest practicable provisions of timely public information in order to obtain the views of interested parties (Executive Order 11514; CEQ 1971a).
- To provide, whenever appropriate, provisions for public hearings (Executive Order 11514; CEQ 1971a).
- To discuss the problems and objectives raised by other federal, state, and local agencies and by private organizations and individuals in the review process (CEQ 1971a).
- To issue final EISs that respond clearly to the comments received (CEQ 1973a).
- To consider the comments of agencies and the public in the decisionmaking process (CEQ 1973a).
- To encourage and facilitate public participation or involvement in the impact statement process at the earliest possible time (CEQ 1973a).
- To incorporate, where appropriate, commenting entities recommended modifications to the proposed action and/or new alternatives that will enhance environmental quality and avoid or minimize adverse environmental impacts (CEQ 1973a).
- To encourage agencies to experiment with innovative methods of public participation beyond standard public hearings, document review, and commenting (CEQ 1973a).
- To include more citizen involvement—citizens and agencies working together around conference tables (CEQ 1973b).
- To incorporate an early and open process (“scoping”) for determining the scope of issues and to identify significant issues related to the proposed action (CEQ 1978a).

Goal: To Identify and Develop Methods and Procedures Which Will Ensure Unquantified Environmental Amenities and Values Are Given Appropriate Consideration

- To identify and develop methods and procedures which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations (NEPA 1969).
- To assure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans (NEPA 1969).
- To preserve important historical, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice (NEPA 1969).
- To achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities (NEPA 1969).
- To administer the cultural properties under federal agency control in a spirit of stewardship and trusteeship for future generations (CEQ 1971a).
- To institute procedures to assure that federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance (Executive Order 11593).

Table A.1. The NEPA Goals and Criteria (continued).

Goal: To Elevate Environmental Considerations to Full Partnership with Technical and Economic Factors

- To elevate environmental considerations to full partnership with technical and economic factors in governmental decisionmaking (CEQ 1971b).
- To assess environmental impacts of proposed actions concurrently with initial technical and economic studies (CEQ 1973a).
- To assure a systematic evaluation of reasonable alternative courses of action and their potential social, cultural, economic, and environmental consequences (CEQ 1973a).
- To "balance" environmental and other considerations (e.g., economic justification) in selecting the preferred alternative (Anderson 1973; Andrews et al. 1977).
- To overhaul fundamentally incremental decisionmaking processes in which the pursuit of narrow economic goals has obscured the need to weigh environmental impacts (Andrews et al. 1977).
- To identify environmental effects and values in adequate detail so they can be compared to economic and technical analyses (CEQ 1978a).

Overall Goal: To Encourage the Productive and Enjoyable Harmony Between Humans and the Environment

- To create and maintain conditions under which man and nature can exist in productive harmony (NEPA 1969).
- To enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources (NEPA 1969).
- To recognize the worldwide and long-range character of environmental problems (NEPA 1969).
- To identify any irreversible and irretrievable commitments of resources (NEPA 1969).
- To participate in environmental renewal instead of contributing to environmental degradation (CEQ 1972).
- To explore rigorously and evaluate objectively environmental impacts of all reasonable alternatives, particularly those that may enhance the environment (CEQ 1973a).
- To restore environmental quality previously lost (CEQ 1983a).

Appendix B

Ecosystem Management Goals and Criteria

Table B.1 lists the criteria for each of the ecosystem management goals delineated from the ecosystem management literature review. The sources for each of the criteria have been included for reference.

Table B.1. Ecosystem Management Goals and Criteria.

Goal: Maintain Ecosystem Integrity

- Maintain viable populations of native species in situ (Grumbine 1988, 1994; Salwasser et al. 1995).
- Protect native diversity and the ecological patterns and processes that maintain that diversity (Greater Yellowstone Coordinating Committee 1990; Grumbine 1994; Kaufmann et al. 1994; Maser 1994; U.S. House of Representatives, Committee on Natural Resources 1994; Wood 1994; Salwasser et al. 1995).
- Maintain evolutionary and ecological processes (Grumbine 1994; Salwasser et al. 1995).

Goal: Manage Based on Natural Processes

- Work with nature (Salwasser et al. 1995).
- Manage based on mechanisms of ecosystems or ecological principles (Gordon 1994; Grumbine 1994; Maser 1994; Morrison 1994).
- Include and consider all known components of the system when decisions and management actions are made (Gordon 1994; Maser 1994; Salwasser 1994).
- Maintain natural/ecosystem processes (Goldstein 1992; Kaufmann et al. 1994; U.S. House of Representatives, Committee on Natural Resources 1994).
- Study ecological patterns and diversity in terms of processes and constraints generating them (Bourgeron and Jensen 1994).
- Develop an understanding of the effects that disturbance, succession, and natural selection have on the mechanisms of change within ecosystems (Maser 1994).
- Allow different biological and physical capabilities of ecosystems to define what is possible with regard to management options (Salwasser et al. 1993).

Goal: Sustain Ecosystems for the Long-term

- Sustain ecosystems and ecosystem processes (Goldstein 1992; Bourgeron and Jensen 1994; Gordon 1994; Grumbine 1994; Kaufmann et al. 1994; Salwasser 1994; Wood 1994).
- Minimize degradation of ecosystem processes (Salwasser et al. 1993; Kaufmann et al. 1994; Sample 1994; USDO, BLM 1994; Wood 1994).
- Conserve resources (Quigley and McDonald 1993; Salwasser et al. 1995).
- Restore and maintain ecosystem diversity, health, and productivity (Quigley and McDonald 1993; Golley 1994; Kaufmann et al. 1994; Salwasser 1994; USDO, BLM 1994; Wood 1994).

Table B.1. Ecosystem Management Goals and Criteria (continued).

Goal: Manage Within the Context of an Ecological Hierarchical Organization

- Manage within a hierarchical context; recognize the multiscale nature of ecosystems and use this knowledge to ensure persistence of ecological patterns at all relevant scales (Salwasser et al. 1993; Bourgeron and Jensen 1994; Grumbine 1994).
- Study ecosystem patterns and processes at different geographic and time scales (Salwasser et al. 1993; Bourgeron and Jensen 1994; Maser 1994; Salwasser and Pfister 1994).
- Take into account ecological time frames (Bourgeron and Jensen 1994; U.S. House of Representative, Committee on Natural Resources 1994).
- Recognize that management activities are occurring within a changing landscape (Joyce and Knight 1992; Bourgeron and Jensen 1994; Maser 1994).
- Manage over periods of time long enough to maintain the evolutionary potential of species and ecosystems (Grumbine 1994).
- Define the historic range of natural variability across a range of spatial-temporal scales if patterns and processes are to be maintained at all appropriate scales of organization (Bourgeron and Jensen 1994).
- Define ecological boundaries at appropriate scales (Grumbine 1994; Maser 1994).
- Complete ecosystem-level characterizations, mapping, and analyses (Quigley and McDonald 1993).
- Manage at a scale that is compatible with natural processes (Bourgeron and Jensen 1994; Gordon 1994; Maser 1994; U.S. House of Representatives, Committee on Natural Resources 1994).
- Manage across whole landscapes, watersheds, or regions (Joyce and Knight 1992; Gordon 1994; Sample 1994; U.S. House of Representative, Committee on Natural Resources 1994).
- Place biotic boundaries before political ones (Grumbine 1988).
- Identify and analyze full impact, both cumulative and geographically, of management proposals on existing resource systems (Keiter 1990; Joyce and Knight 1992; Bourgeron and Jensen 1994; Sample 1994).

Goal: Develop and Adopt an Interdisciplinary Approach

- Incorporate a broad, cooperative, and integrated approach to management (Gilbert 1988; USDO, BLM 1994).
- Change the structure of land management agencies and the way they operate (Grumbine 1988, 1994; Quigley and McDonald 1993; Cortner and Mootte 1994).
- Develop interdisciplinary teams of researchers working hand-in-hand with managers, educators, and citizens (Salwasser and Pfister 1994).
- Promote cooperation and use cooperative institutional arrangements (interagency and federal/nonfederal) (Grumbine 1988, 1994; Greater Yellowstone Coordinating Committee 1990; Keiter 1990; Quigley and McDonald 1993; Maser 1994; USDO, BLM 1994; U.S. House of Representatives, Committee on Natural Resources 1994; Wood 1994).
- Develop effective partnerships among private, local, state, tribal, and federal interests (Maser 1994; U.S. House of Representatives, Committee on Natural Resources 1994).
- Coordinate strategies for conservation of shared resources (Greater Yellowstone Coordinating Committee 1990; Salwasser et al. 1995).
- Coordinate goals, plans, and analyses (USDO, BLM 1994, Wood 1994).

Table B.1. Ecosystem Management Goals and Criteria (continued).

Goal: Facilitate Public Involvement

- Involve people in planning and decisionmaking process (Grumbine 1988; USDO, BLM 1994; Salwasser et al. 1995).
- Involve the public through communications and partnerships (Quigley and McDonald 1993).
- Promote meaningful stakeholder and public involvement to facilitate collective decisionmaking (U.S. House of Representatives, Committee on Natural Resources 1994).

Goal: Integrate Scientific Research, Policy, and Management

- Promote stronger teamwork among scientists and managers (Golley 1994; Grumbine 1994).
- Develop a strong scientific basis for management decisions (Quigley and McDonald 1993; Golley 1994; Grumbine 1994; Lucier 1994; Maser 1994; Morrison 1994; Salwasser and Pfister 1994; Wood 1994; Burroughs and Clark 1995).
- Use applicable information and technology to inform management decisions (Golley 1994).
- Place emphasis on goals that are clear, concise, informed and integrated with ecosystem processes (Bourgeron and Jensen 1994; Grossarth and Nygren 1994; Maser 1994).
- Use best available scientific information as the cornerstone for resource allocations and other land management decisions (USDO, BLM 1994).
- Use scientific methods to estimate the effects of management practices on the ecosystem (Grossarth and Nygren 1994).
- Translate ecosystem information into policy (Goldstein 1992; Maser 1994).

Goal: Incorporate Adaptive Management Procedures

- Adapt management over time based on conscious experimentation and routine monitoring (Quigley and McDonald 1993; Grumbine 1994; Maser 1994; Salwasser and Pfister 1994; U.S. House of Representatives, Committee on Natural Resources 1994).
- Develop site-specific monitoring and evaluation schemes (Quigley and McDonald 1993; Grossarth and Nygren 1994; Morrison 1994).
- Integrate monitoring and research with management (Quigley and McDonald 1993).
- Monitor multiple attributes at all appropriate ecological scales to provide a basis to assess ecosystem changes (Joyce and Knight 1992; Bourgeron and Jensen 1994; Grossarth and Nygren 1994; Grumbine 1994; Maser 1994).
- View management activities as experiments in themselves (Joyce and Knight 1992).
- Recognize the uncertainties of science and limits of existing databases (Grumbine 1994; Maser 1994).

Table B.1. Ecosystem Management Goals and Criteria (continued).

Goal: Develop Educational Programs and Provide for Information Exchange

- Develop educational programs for local, state and federal agencies, organizations, and the public (Greater Yellowstone Coordinating Committee 1990; Goldstein 1992; Wood 1994).
- Develop conservation education and interpretation programs (Salwasser et al. 1995).
- Promote public awareness of ecosystem processes (Jensen and Everett 1994).
- Develop methods to facilitate technology transfer, training, and education (Goldstein 1992; Quigley and McDonald 1993; Maser 1994).
- Develop information and an understanding of the nature of ecosystems (Greater Yellowstone Coordinating Committee 1990; Joyce and Knight 1992; Gordon 1994; Grossarth and Nygren 1994; Maser 1994; Wood 1994).
- Integrate data and tools that cut across traditional functional disciplines (Goldstein 1992; Quigley and McDonald 1993).
- Develop an information management scheme (Quigley and McDonald 1993).
- Continually augment existing databases (Grumbine 1994).
- Continually improve applied knowledge of specific processes and interactions responsible for system activities and outcomes (Maser 1994).

Goal: Accommodate Human Use and Occupancy

- Incorporate a strong environmental ethic (Goldstein 1992).
- Accommodate human use and occupancy (Grumbine 1994; Kaufmann et al. 1994; Salwasser 1994; Salwasser and Pfister 1994).
- Recognize that every system definable in biological and physical terms connects to and interacts with human values, uses, institutions, and other social structures (Goldstein 1992; Gordon 1994; Grumbine 1994; Kaufmann et al. 1994; Salwasser 1994).
- Recognize that humans and human values play a dominant role in ecosystem management goals (Grumbine 1994).
- Determine the desires and requirements of people who will be affected by management decisions (Jensen and Everett 1994; Kaufmann et al. 1994; Maser 1994; Salwasser et al. 1994).
- Determine desired future aims based on the integration of ecological, economic, and social considerations (Quigley and McDonald 1993; Grossarth and Nygren 1994; Jensen and Everett 1994; Maser 1994; USDO, BLM 1994).
- Develop an understanding of social and cultural attitudes (Maser 1994).
- Account for aesthetic concerns and amenities (Keiter 1990; Grumbine 1994).
- Recognize that goals are set and evolve via social, cultural and political processes (Maser 1994; Shepard 1994).
- Understand that ecosystems and society are inexorably linked and that the relationship among them is always changing (Maser 1994; Salwasser and Pfister 1994).
- Recognize the importance of social and economic viability within functioning ecosystems (Jensen and Everett 1994; Maser 1994; Sample 1994; U.S. House of Representatives, Committee on Natural Resources 1994).
- Encourage opportunities that are biologically and economically sustainable (Greater Yellowstone Coordinating Committee 1990; Salwasser et al. 1993; Bourgeron and Jensen 1994; U.S. House of Representatives, Committee on Natural Resources 1994).

Appendix C

**NEPA Question Results for the
George Washington National Forest**

Appendix C: NEPA Question Results for the George Washington National Forest

The 1986 George Washington National Forest Final EIS and Forest Plan

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

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

The Draft EIS was distributed for outside agency and public review in November 1984. There was widespread opposition to the Preferred Alternative discussed in the draft statement and proposed plan from both the public and other reviewing agencies. The opposition centered on issues such as excessive timber harvest, clearcutting on slopes greater than 55 percent and with poor and/or shallow soils, soil erosion on steep slopes and in riparian areas, excessive access by offroad vehicles to wilderness and old growth areas, conversion from mixed hardwoods to pines, clearcutting in close proximity to the Appalachian Trail, and timber harvesting in riparian areas. The Forest Service published a Supplement to the Draft EIS in October 1985. The Supplement focused on a new alternative, Alternative 7, that was later selected as the preferred alternative for the final impact statement. According to the Forest Service it was the lack of an uneven-aged timber management system that prompted the Supplement (USFS 1986).

Over 500 letters were received from the public and reviewing agencies that expressed concerns about timber harvesting via clearcutting. Seventy additional letters objected to the level of timber harvest. Another forty-four letters addressed concerns of managing timber on many of the Forest soils of poor productivity and on steep slopes. E.T. Walters (Chairman, Mountain Soil and Water Conservation District, Virginia) wrote of his agency's concern about plans to harvest 239,153 acres of trees on slopes steeper than 55 percent. A. Miller (Regional Environmental Officer, USDO) stated that, "Any management activity which would remove or alter the natural vegetation or alter the stream or river could have a detrimental effect on riparian resource values. We consider the preservation of riparian areas in the George Washington National Forest to be particularly important, considering the rapid disappearance of these ecosystems in the southeastern U.S." (USFS 1986:K-75). J.R. Pomponio (Chief, Environmental Impact and Marine Policy Branch, EPA) was "not sure that the Draft EIS has adequately addressed all possible adverse effects due to insufficient information" (USFS 1986:K-80). Pomponio's criticism was based on the Forest Service's position not integrate geological information into its planning and alternative evaluation process.

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

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

Several significant changes were made from the Draft EIS Preferred Alternative to the Supplemental EIS Preferred Alternative; and several substantive changes were made from the Supplemental EIS to the Final EIS (the Preferred Alternative remained the same). For example,

- Total acres considered suitable for timber harvesting reduced by 64%.
- Designation of 500% more land as special management areas.
- Land for Appalachian Trail buffer zone increased by 1000% (from a 50-foot buffer to a 200-foot buffer).
- Increase in direct habitat and fisheries improvement (other than through harvesting management techniques).
- Total area of clearcutting reduced by 25%.
- 10% of harvesting to use uneven-aged management (100% clearcutting proposed in the Draft EIS).
- Off-road vehicle facilities decreased 200%.
- lower impact to visual resources.

However, harvesting in riparian areas would continue; the preferred alternative would be the least beneficial to the grass/forb community; and 54 percent of steep sloped area (>55 percent) would still be harvested with special equipment (USFS 1986).

Many reviewing agency representatives, in responding to the Supplemental Draft EIS, stated that it was evident that the Forest Service had responded to a number of the suggestions that were made during the Draft EIS review. A number of respondents qualified their comments with such statements as "On the other hand, I still do not feel that you have adequately responded to some of the principal concerns of a great many of those who use the forest" (J. Olin, House of Representatives, Virginia). R.R. Potesta (Director, Department of Natural Resources, Virginia) qualified his response with: "No single alternative considers the best management of all resources and the WVDNR recommends further blending of alternatives to arrive at an acceptable management plan" (USFS 1986:K-85) J. Randolph (Commission of Game and Inland Fisheries, Virginia) wrote that, "Although Alternative 7 recommends a reduction in acreage to be clearcut . . . , it still represents a 40 percent increase over the 'No Action Alternative'" (USFS 1986:K-92).

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

- minimally or not at all.
- **integrated in some areas, but not in others.**
- integrated throughout document and in the alternative selection process.

Management options included the identification, protection or enhancement of various habitat types based on management indicator species selected in response to NFMA regulations. This approach emphasized the management of one species on a selected area with the understanding that a wide variety of game and non-game species would benefit from the habitat manipulation practices. Endangered species received top priority in accordance with the Endangered Species Act (USFS 1986).

While the Draft EIS only provided for minimum viable populations, the Final EIS argued that it came closer to providing habitat for optimum populations of featured species. However, proposed habitat manipulation practices consisted primarily of timber harvest management. The EIS focused on timber harvesting as the means by which other forest management goals were to be achieved.

"Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18). K.J. Buttleman disputed this forestry practice, "these documents seem to focus on timber harvest as the means by which other forest management goals will be achieved . . . other affirmative measures, such as direct habitat improvement, are required . . ." (USFS 1986:K-86). Over 260 letters were received from the public and private organizations that argued that the proposed Plan was purely a timber management plan and other resource values were not considered adequately (USFS 19896).

The document was criticized for not appropriately integrate geological information into its Forest planning and evaluation procedures. J.R. Pomponio (Chief, Environmental Impact and Marine Policy Branch, EPA) offered the opinion that "forest planning and evaluation should be founded upon and integrated with the geological system extant. . . . planning carried out from the bottom up rather than from the forest type or economic needs" (USFS 1986:K-78). In the Draft EIS, the Forest Service proposed timber harvesting on slopes greater than 55 percent with soils of known poor quality and shallow depth. In the Final EIS, despite outside agency and public comments to the contrary, 54 percent of slopes of 55 percent or greater would be harvested with "special equipment" (USFS 1986).

During Draft EIS review, the USDOJ and others advised against allowing timber management in riparian areas because alternations to natural vegetation, streams or rivers could have a detrimental effect on riparian resource values. The Final EIS nevertheless proposed harvesting in riparian areas (USFS 1986).

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

- magnitude and significance of relevant environmental impacts of alternatives not identified.
- **partial identification and estimation of magnitude and significance of relevant impacts of alternatives.**
- thorough identification and estimation of magnitude and significance of relevant impacts of alternatives (including indirect and cumulative effects).

There was no substantive discussion of cumulative impacts in the Final EIS. The only mention of cumulative impacts was in the Executive Summary: "On a project-by-project basis there will be no significant environmental consequences. On a long-term or cumulative basis there are significant consequences in all alternatives" (USFS 1986:ix). The EPA response to the Draft EIS by J. Pomponio cited this quotation (statement also appeared in the draft) and replied, "we are not sure that the Draft EIS has adequately addressed all possible adverse effects due to insufficient information" (USFS 1986:K-77).

The document itself only discussed direct and indirect impacts. The Final EIS acknowledged direct impacts due to the construction of roads resulting in lands taken out of production, soil movement, wildlife and fish disturbance, and visual resource impacts. Indirect impacts due to increased open roads included wildlife disturbance, possible increased fish harvest, and accelerated soil loss through increased maintenance. Sediment yields and ground disturbances were expected to increase during re-entry for shelterwood and uneven-aged cutting. Direct physical impacts from clearcutting were not viewed as significant as BMPs would be followed during tree harvesting. The only acknowledged negative impact from clearcutting was visual impacts.

Impacts from harvesting in riparian areas were not considered detrimental as BMPs would be used to avoid stream bank erosion (USFS 1986). A. Miller (USDOJ) responded that, "Any management activity which would remove or alter the natural vegetation or alter the stream or river could have a detrimental effect on riparian resource values" (USFS 1986:K-75).

Direct and secondary impacts that could not be avoided were associated with development activity, and included: soil movement; wildlife disturbance; localized reduction in air quality; changes in hunter and angler use patterns and harvest; increased noise level; stream sedimentation; and reduction in visual quality (USFS 1986). Reduction in visual quality from clearcutting was considered "a short-term adverse effect" (USFS 1986:II-90).

A. Miller (USDOJ), in her response to the Draft EIS, recommended "including a discussion under each management category evaluating the impact of forest resources of past management practices in the GWNF. This would present a clearer picture of the continuum of George Washington National Forest management, and would assist planners and reviewers in predicting and evaluating the potential resource impacts of the Plan's proposed management practices." This recommendation was ignored in preparation of the Final EIS.

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

- not addressed.
- **marginally; from a narrow perspective.**
- substantially.

The Forest Service identified irreversible and irretrievable commitments of resources. Examples of irreversible commitment of resources included future production of developable minerals and energy required to implement the various alternatives. Measures to protect resources which could be irreversibly affected by other resource uses were incorporated into the Forest-wide Standards and Guidelines.

Irretrievable commitment is resource production or use of a renewable resource that is lost because of allocation decisions. The difference between the output of any resource in an alternative and the maximum production level of that resource is also an irretrievable commitment of a resource. The examples of irretrievable commitments of resources resulted from the Forest Service's philosophy of "fully harvesting the suitable timber" and "to utilize the most productive timber species" (USFS 1986:x). Irretrievable commitment of resources included land removed from productivity because of the construction and reconstruction of local and collector roads; loss of timber production in Wilderness and Wilderness Study areas, Special Management and Special Interest areas; and allocation of roadless areas to uses other than Wilderness (USFS 1986).

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

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

All but 2 of the 37 persons involved in the EIS and Forest Plan process were Forest Service personnel. Outside consultants were used for the Sociology and Economic sections. Various areas of expertise within the Forest Service were represented, e.g., timber management, recreation, range science, wildlife biology, economics, fire management, law enforcement, public affairs, engineering, minerals and geology, landscape architecture, systems analysis, hydrology, fisheries biology, land use planning, and archaeology (USFS 1986).

Personnel were divided into three groups: a management team, an interdisciplinary team, and a support group. The management group consisted of district rangers and two forest supervisors. The interdisciplinary and support teams prepared the EIS. The same person coordinated the preparation and development of the plan and the EIS (USFS 1986).

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.
- **monitoring plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.**
- monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.

A standard Monitoring and Evaluation Plan was included in the Final Land and Resource Management Plan for the George Washington National Forest. "Monitoring and Evaluation" is step 10 in the Forest Service's planning process. Most monitoring programs were to take place at one-year intervals, with reporting at five-year intervals (USFS 1986).

No monitoring or evaluation techniques were developed or outlined in the Revised Forest Plan specific to the George Washington National Forest.

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

- not addressed.
- general mitigation measures discussed, but no detailed mitigation plan developed as part of the Final EIS/ROD.
- **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.

Mitigation measures were provided in the Forest Plan and were to be guided by Forest Service Standards and Guidelines. They were intended to mitigate adverse effects that could not be avoided. Samples of mitigation measures included:

- All activities within riparian areas would be guided by Standards and Guidelines.
- Effects on visual quality would be minimized by Standards and Guidelines.
- All chemicals would be administered by a licensed pesticide applicator.
- Standards and Guidelines for fish, wildlife and plant species have been incorporated (USFS 1986).

No site-specific and detailed mitigation plan was prepared as part of the Final EIS or ROD.

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

- no input sought.
- **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.

Public involvement began in 1979 with an initial screening of public comments received over the past five years from unit plans, environmental statements, the Off-Road Vehicle Plan, RARE II, as well as other correspondence (USFS 1986).

Over 600 individual issues were identified. These were tabulated and ranked in a screening process which resulted in a preliminary listing which was compiled into an Issues and Concerns publication. This publication formed the basis for the initial scoping effort. Three thousand copies were mailed or made available through George Washington National Forest field offices. The Forest Service received 295 responses (a 10 percent response) to the Issues and Concerns booklet. The majority of the comments were from people living in or adjacent to the Forest (USFS 1986).

The Forest Service asked the public to identify the major issues on the Forest. These responses were analyzed and screened to identify the issue content, group similar issues into an overall issue statement, and to decide upon the disposition of the issue statements. Eleven major issues and management concerns were identified (USFS 1986).

Scoping meetings were held in May 1979, with state agencies in Virginia and West Virginia to coordinate George Washington National Forest planning with state activities and neighboring forests. From April 15 to May 8, 1980, the Forest Service consulted with Virginia and West Virginia governors, legislators, state environmental agencies, and federal state park personnel: "(1) to ensure that the planning process was recognized and generally understood by state government; (2) to determine and establish acceptable coordination procedures to be followed in reviewing and commenting on issue and concern package and other steps in the planning process; and (3) to assure that the comment period established for the issue and concern package was understood" (USFS 1986:A-2).

In October 1982, a citizens' workshop was held on National Forest planning (1) to prepare citizens to participate in the new National Forest planning process; (2) to identify and draft specific conservation "alternatives" of forest management; (3) to form task forces to follow forest planning and to see that conservationists "alternatives" are considered and adopted; (4) to discuss proposals for wilderness legislation in Virginia. This workshop was followed by a public briefing in November 1982, to update interested persons as to status of development of the Forest Plan (USFS 1986).

The Draft EIS was made available for agency and public review on October 5, 1984. Comments were received until January 18, 1985. The Forest Service also held a briefing session and a series of seven "open house" events. A slide/tape program for group meetings was prepared to help explain the George Washington National Forest Draft EIS and Forest Plan to the public (USFS 1986).

Several respondents said the management of the National Forests should be left to the trained professionals who have the experience to make the right decisions. The agency commented that "The management of National Forests are governed by a number of legal constraints. The National Environmental Policy Act (NEPA), requires that public input be part of the decisionmaking process. Within this decisionmaking process, professional expertise from a number of land managers and resource specialists is obtained to form a complete determination" (USFS 1986:K-69).

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.
- acknowledged comments/concerns; no or minimal changes made to the project.
- **project moderately changed; but not to the level of concerns/comments.**
- project changed during Scoping or after Draft EIS review to reflect the extent of comments/concerns.

As a result of the comments received on the Draft EIS, a Supplement to the Draft EIS and Forest Plan was prepared. This Supplement presented one additional alternative addressing two major issues highlighted by agency and public review of the Draft EIS (the document does not identify the "two major issues").

Several significant changes were made from Draft EIS Preferred Alternative to the Supplemental EIS Preferred Alternative; and several substantive changes were made from the Supplemental EIS to the Final EIS (the Preferred Alternative remained the same). For example,

- Total acres considered suitable for timber harvesting reduced by 64%.
- Designation of 500% more land as special management areas.
- Land for Appalachian Trail buffer zone increased by 1000%.
- Increase in direct habitat and fisheries improvement (other than through harvesting management techniques).
- Total area of clearcutting reduced by 25%.
- 10% of harvesting to use uneven-aged management (100% clearcutting proposed in the Draft EIS).
- Off-road vehicles facilities decreased 200%.
- Lower impact to visual resources (USFS 1986).

Ninety percent of harvesting would still be by clearcutting; harvesting would continue on 54 percent of slopes greater than 55 percent with poor soils; harvesting would continue in riparian areas; species management would continue to feature only game species and threatened/endangered species as management indicator species.

Several agencies responded that it was evident in the Supplement that the Forest Service responded to a number of suggestions offered in response to the Draft EIS and Forest Plan. J. Olin (Virginia House of Representatives) wrote that "The supplement contains additional definition of lands not suitable for timbering The addition of the concept of cutting small areas to achieve uneven-aged growth is a useful addition to management alternatives. Further, you have considerably reduced the amount of annual timbering and road-building. On the other hand, I still do not feel that you have adequately responded to some of the principle concerns of a great many of those who use the forest" (USFS 1986:K-73). K.J. Buttleman and C.H. Ellis (both representing the Virginia Council on the Environment), among others, believed that Alternative 7, as described in the

Supplement, presented a more sustainable approach to management of the Forest than did the Preferred Alternative described in the Draft EIS (USFS 1986).

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

Several significant changes were made from Draft EIS Preferred Alternative to the Supplemental EIS Preferred Alternative; and several substantive changes were also made from the Supplemental EIS to the Final EIS (the Preferred Alternative remained the same). However, it is evident from the Forest Service's treatment of these changes that the changes were made in response to reviewing agency and public comments rather than from an understanding of ecosystem processes or the integration of environmental considerations into the planning and decisionmaking processes. For example, the Final EIS states that "The emphasis on uneven-aged management in Alternative 7 [the Final EIS Preferred Alternative] would affect the timber resource on the forest in ways significantly different from any of the even-aged situations. . . . The trend in terms of tree species would be to replace those of high commercial value with those of a lower value" (USFS 1986:IV-13). The Final EIS also states that "Alternatives having the highest timber harvest levels generally provide the greatest opportunities for providing habitat improvements," and "Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18). "Uneven-aged management poorly fits the biological requirements of most timber tree species found in the Forest" (USFS 1986:K-52).

It was the agency and public comments that provided insight into ecosystem processes or the integration of environmental considerations into the planning and decisionmaking processes. J.R. Pomponio (EPA) commented that "It appears to us that too little attention was paid to the geological system underlying the area covered by the Forest. . . . we believe the Draft EIS is deficient in this area. The welfare of the Forest and the planning process for the resource as a whole is vitally dependent upon a thorough understanding of its geological foundations" (USFS 1986:K-78). A. Miller (USDOJ) recommended "including a discussion under each management category evaluating the impact of forest resources of past management practices in the George Washington National Forest. This would present a clearer picture of the continuum of George Washington National Forest management, and would assist planners and reviewers in predicting and evaluating the potential resource impacts of the Plan's proposed management practices" (USFS 1986:K-75). Miller also opined that any management activity which removed or altered natural vegetation could affect streams or rivers, and therefore, could have a detrimental effect on riparian resource values. The EPA reviewers concurred: ". . . a canopy change in streams similar to Simpson's Creek and Bratton's Run will raise upstream temperatures and send sediment loads downstream. These kinds of changes will completely change the ecosystem of such streams" (USFS 1986:K-80). In response to the Forest Service's proposed conversion of hardwood stands to pine stands in the Draft EIS, E.T. Walters (Mountain Soil and Water Conservation District) responded that "Since it is the hardwood deciduous forests of these Appalachian Mountains that are singularly distinctive (and so beneficial for wildlife), there were questions raised about any plans to convert some of these woodlands on federal land to pine plantations. Private landowners are already busy

converting their forest holdings to the conifers in search of a quicker economic return. The National Forest, it is believed, can and should take a longer range approach" USFS 1986:K-111).

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

- 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.

Development of alternatives began with the construction of "benchmarks." The benchmarks were essentially maximization of the potential the Forest has to produce single resources within legal constraints. Upper and lower bounds formed the "decision space" in which alternatives were formulated. Benchmarks were established to determine the supply potential for six resources: timber, water, developed recreation, dispersed recreation, wildlife, and wilderness. Alternatives that do not reach the upper level of timber production were developed to provide a range of management options (USFS 1986).

Examination of the interrelationships between model constraints and resources produced the basis for formulating model constraints to respond to the issues and concerns raised during scoping. Qualitative, non-priced benefits include items such as threatened and endangered species maintenance or enhancement, natural or scenic values, cultural resource values, visual quality, and increased plant and animal diversity. "Willingness to pay" values is an example of dollar value being attributed to selected resource amenities, e.g., visual quality. Other unquantifiable environmental values were entered into the models as constraints. For example, to guarantee maintenance of habitat for minimum viable wildlife populations, constraints were placed into the alternative selection model. All other resource protection management requirements were considered outside the model and were handled through the use of Standards and Guides (USFS 1986).

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

- **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.

The preferred alternative is identified in the Abstract and throughout the document in the appropriate sections. However, there is no statement of why the preferred alternative was selected over the other alternatives. Perhaps an explanation would have appeared in the ROD had one been prepared [a ROD was never produced due to the filing of 18 appeals after publication of the Final EIS (USFS 1993a)].

The Summary chapter of the Final EIS contains an alternative comparison table titled "Present Value Analysis of Alternatives--Contributions to Costs and Benefits." Columns, defined in terms of dollars, included "net value," "costs," "benefits," "timber," "road construction/maintenance," "developed recreation," "dispersed recreation," and "facility construction." A second table compares

economic efficiency based on a 4 percent discount rate. A third table presents economic values and selected indicators of responsiveness. Indicators include: "present net value," "special management areas," "primitive campsites," "off-road vehicle routes," "wildlife habitat improvement," "fuelwood volume," "timber harvest," etc. Some indicators are given in terms of dollars, while others list number of acres, number of miles, number of camp sites, etc. The final comparison table (Table 4) is a summary of alternatives and responses to issues and concerns (USFS 1986).

The body of the EIS contains a more detailed breakdown of each of these tables and presents sources of the information provided in the tables. Table II-14 is a summary of significant environmental effects for "soil and water," "minerals and geology," "vegetation," "wildlife and fish," "visual," "recreation," "wilderness," "special areas," "costs," and "energy." Information in the summary table was presented in the format of: "Diversity would be best in Alternatives 1 and 6 and poorest in Alternatives RPA, 4, and 'no action'" (USFS 1986:II-90). Chapter 4, Environmental Consequences, includes a discussion and comparison of the physical, biological, economic and social effects of implementing each alternative. A discussion of direct and indirect effects was grouped according to the component of the human environment affected (USFS 1986).

No conclusions were reached or inferred in discussions accompanying any of the tables. The Forest Service made no attempt in the Final EIS to develop a decisionmaking framework for effectively evaluating all the environmental effects of the alternatives (USFS 1993a).

The 1993 George Washington National Forest Final EIS and Forest Plan

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

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

The Forest Service received and analyzed 4268 letters offering comment from individuals, businesses, organizations, and local, state and federal agencies on the Draft EIS and Draft Revised Forest Plan (USFS 1993a).

Comments were grouped by topic and then by sub-topic. Topics included biodiversity, below-cost timber sales, forest access, all-terrain vehicle (ATV) use, roadless area management, special management areas, aesthetics, vegetation management, resource sustainability, minerals, gypsy moth and other pests, adequacy of the revision, the mix of goods and services, cultural resources, lands, and other comments (USFS 1993a).

Alternatives were refined as a result of letters of comment on the Draft EIS and Draft Revised Plan. In response to public comments, a new Alternative (8A) was formulated; small adjustments were made to all 13 alternatives considered in detail; and substantial changes were made to six alternatives. Alternative 8A (the preferred alternative) reflected many of the suggestions and comments made on the Draft EIS and many components identified in other alternatives (USFS 1993a).

Specific agency and public comments recommended that to address biodiversity concerns better and to contribute to the Neotropical Bird Conservation Program, additional large tracts of contiguous forest lands should be afforded protection through wilderness designation or other long-term mechanisms. Corridors were suggested to serve as mitigation for the effects of fragmentation. Other commentators were concerned that the Forest Plan did not take a broad ecosystem view of both short- and long-term environmental changes. Also of concern to some writers was the protection of riparian areas. Numerous letters suggested no timber cutting in riparian areas at all (60 letters), while 346 letters wanted a minimum of 100-ft buffers where no timber cutting would be allowed (USFS 1993a).

D. Esher (Chief, EPA) recommended “that all disruptive activities (e.g., timber harvesting, road building, construction of facilities, oil and gas leasing and development) be carefully considered within the context of the regional and forest landscape. The need for additional timber, access roads, etc. should be balanced against the potential for degradation/alteration of healthy ecosystems” (USFS 1993a:I-349).

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

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

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

The critical impacts identified during Draft EIS review were addressed in the Final EIS. Some impacts were avoided through management decisions and/or design changes. For other critical impacts, strategies to mitigate impacts were identified. The Forest Service also argued that some impacts would be smaller than alleged by some agency and public reviewers. Examples include, impacts of salvage logging following gypsy moth infestation, and/or other pests, and the level of protection needed in riparian areas (USFS 1993a).

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

- minimally or not at all.
- integrated in some areas, but not in others.
- **integrated throughout document and in the alternative selection process.**

There were many public comments concerned with biodiversity. The Final EIS addressed biological diversity by concentrating on eight components: the natural values of the Forest, forest type conversion, old growth, forest fragmentation, late successional habitat, riparian and wetland areas, management indicator species, and special biological areas (USFS 1993a).

The Revised Plan:

- Provided large, unfragmented blocks (composed mostly of late successional vegetation).
- Provided early successional habitat.
- Identified approximately 180,000 (17% of the Forest) in 10 old growth forest types with a "high probability of now containing old growth characteristics."
- Provided guidance on managing stands with a "high probability of now containing old growth characteristics" until a Regional policy is completed.
- Prohibited any stand type conversion. Permitted planting naturally or historically occurring pine and hardwood species.
- Maintained a mixed species (pine or hardwood) mixture in the regenerated stand.
- Established the goal of restoration, maintenance, and enhancement of riparian areas and their dependent resources.
- Identified riparian areas on physical and biological characteristics rather than arbitrary distances from perennial streams.
- Established policy for managing riparian areas through timber harvesting methods.
- Applied streamside management zones to both perennial and intermittent streams.
- Provided habitat for the continued existence of all populations of threatened, endangered, and sensitive plant and animal species in the Forest through timber harvesting methods.
- Required coordination of management of threatened, endangered, and sensitive species with the USDI Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia.
- When needed, required site-specific surveys to be conducted for undiscovered habitats of, and populations of, threatened, endangered and sensitive species prior to a decision to implement any project.
- Established 38 Biological Special Interest Areas, 2 Geological Special Interest Areas, and a Special Interest Area along the Shenandoah Mountain Crest for the recovery of the endemic Cow Knob salamander.

- Recommended six Biological Special Interest Areas for study for designation as Research Natural Areas (USFS 1993a:ROD-21).

D. Henne (Regional Environmental Officer, USDOl) commended the Forest Service for its foresight in establishing 38 Special Biological Areas to protect state- and federally-listed endangered, threatened, and sensitive plant and animal species. A letter from J.W. Clarke contended “that the eastern national forests should be managed for two purposes, to maintain and preserve biological diversity and as places for low density recreation. The Forest Service's proposed Alternative 8 is a small step in that direction” (USFS 1993a:I-738).

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

- **magnitude and significance of relevant environmental impacts of alternatives not identified.**
- partial identification and estimation of magnitude and significance of relevant environmental impacts of alternatives.
- thorough identification and estimation of magnitude and significance of relevant environmental impacts of alternatives (including indirect and cumulative effects).

Direct, indirect, and cumulative effects were briefly defined on p. 3-1 of the Final EIS. For the most part, effects were generally described. For example, “The cutting practices and site preparation impact suitable land only. Prescribed burning impacts vegetation on both suitable and unsuitable land. There will be short-term effects on vegetation and long-term indirect effects as species compete to occupy space made available in the understory or overstory” (USFS 1993a:3-126). Again, for water quality— “In all alternatives, the Forest complies with the Clean Water Act and protects beneficial uses through the use of Virginia and West Virginia BMPs and other standards and guidelines that provide additional protection of water quality” (USFS 1993a:3-148). There was no mention of indirect or cumulative effects because all effects would be mitigated through the proposed management plan.

Under “The Affected Environment—Timber,” there is no discussion of impacts of various types of timber harvesting methods (USFS 1993a:3-114). Under “The Affected Environment—Wildlife,” there is no discussion of adverse impacts to wildlife from harvesting or other management decisions (USFS 1993a:3-159). Under “The Affected Environment—Soils,” soil erosion, soil compaction, and nutrient loss/cycling were briefly discussed. For “soil erosion,” anticipated accelerated soil erosion is mentioned. The overall effect, however, was reduced erosion, since many system roads would be closed and timber harvesting and other soil-disturbing activities would be eliminated or greatly restricted. No indirect or cumulative effects from soil erosion were given (USFS 1993a:3-111).

All management decisions were presented in a positive light—all management decisions would increase biodiversity, improve habitat, etc. (USFS 1993a). So in that sense, direct and indirect effects were discussed.

D. Esher (EPA) wrote that, “Although EPA believes that the range of alternatives is sufficient, the potential for adverse environmental impacts to aquatic and terrestrial resources remains a concern to us. We are concerned by the lack of sufficient information regarding direct, indirect, and cumulative impacts to surface waters, riparian habitat and overall biodiversity” (USFS 1993a:I-414). Letter 3685 identified the EIS’s failure to discuss the indirect effects of the alternatives. Letter 3933 noted that the ecological effects on waterways from developed recreation sites were not

addressed. Letter 3981 pointed out that “Cumulative impacts of the management activities of the various alternatives are ignored. The lands of the George Washington National Forest are treated as an isolated island (except when it comes to economic issues). The environmental context of the George Washington National Forest must be addressed, its affects [sic] on lands outside its boundaries and the affects [sic] of these lands upon it” (USFS 1993a:I-419). The Forest Service responded that “Such analysis is outside the scope of the revision. Moreover, there is no data for any but the most general assessment” (USFS 1993a:I-419).

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

- **not addressed.**
- marginally; from a narrow perspective.
- substantially.

The Final EIS stated that “Irreversible and irretrievable commitments of resources are normally not made at the programmatic level of a Forest Plan. . . . Irreversible and irretrievable commitments are not specifically identified as such in discussions contained in this chapter [The Affected Environment]” (USFS 1993a:3-2).

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

- project completed using in-house personnel from same disciplinary background.
- **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 onset of this planning effort.
- ongoing interdisciplinary committee, composed of Forest Service and non-Forest Service members, involved in policymaking and planning processes.

The preparers of the Draft and Final EISs and the Revised Forest Plan were all Forest Service personnel. The in-house, “Interdisciplinary Team” was composed of a plant pathologist, a planning analyst, two hydrologists, two wildlife biologists, an assistant recreation staff officer, two foresters, two botanist/ecologists, two fisheries biologists, an engineer, an entomologist, two geologists, two landscape architects, a lands/fire/minerals staff officer, and a research forester. The Forest Service stated that the EIS team worked with various individuals, organizations, and agencies to formulate the 14 alternatives that provided a wide response to the 13 issues (the identify of the individuals, organizations, or agencies was not provided) (USFS 1993a). How this was accomplished was not outlined other than during the scoping process which consisted of public meetings and meetings with individuals and groups to identify major issues of concern.

Under a mandate of the Endangered Species Act, the Forest Service was required to coordinate with the U.S. Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia for the management of threatened, endangered, and sensitive species (USFS 1993a).

7. What provisions were made for monitoring and evaluation?

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

- monitoring and evaluation plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.
- **monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.**

The monitoring process recognized the critical roles of new scientific information and public participation in maintaining a viable, dynamic Forest Plan. Monitoring would also determine whether or not the Forest Service was producing desired resource values, uses and products in ways that sustain the diversity and productivity of ecosystems. Evaluation of the monitoring information would provide useful and valid indicators to the public and Forest Service decisionmakers of whether the Plan remained sufficient to sustain a diverse, healthy and productive Forest (USFS 1993a).

The monitoring and evaluation program would help keep the commitments made in the Forest Plan. These commitments included assessing whether or not:

- Projects were implemented in compliance with the project design, Forest Plan direction, and/or the NEPA decision document.
- Forest-wide and Management Area standards were followed.
- Plan standards were effective.
- Plan goals and objectives were met.
- Emerging public issues were being addressed.
- Research needed to ensure practices do not impair land productivity was identified.
- New information, including laws, regulations, and Forest Service directives, was assessed quickly on how it affects the Plan.
- Plan implementation was moving toward the desired future condition.
- Assumptions, relationships, and decisions were, and continue to be valid in light of new information or changing conditions (USFS 1993a:P5-1).

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

- none.
- general mitigation measures discussed, but no mitigation plan developed as part of the Final EIS/ROD.
- 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.**

Mitigation measures were an essential part of the selected alternatives. Mitigation measures were contained in the Revised Plan as standards that would apply to the entire Forest as well as standards specific to individual management areas. “These mitigation measures were designed to protect or enhance, as appropriate, aesthetic, soil, water, wildlife, fisheries, vegetation, dispersed and developed recreation, and other important resource values” (USFS 1993a:ROD-45). The monitoring and evaluation program would evaluate the effectiveness of the mitigation measures and would identify any needed changes (USFS 1993a).

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

- no input sought.
- **input through informational meetings, open houses, letters, and public hearings.**
- representatives of the general public, local, state and other federal agencies, and organizations involved in ongoing Forest Service planning committees.

According to the Forest Service, "The public was very involved in the revision of the Forest Plan" (USFS 1993a:S-3). The Forest held 13 public meetings with as many as 100 attendees per meeting. The attendees participated in the identification, clarification, and exploration of possible responses to public issues. The public continued to participate as the possible responses were formulated into 14 alternatives that offered a wide range of management plans for the Forest. Forest officials also met with individuals and groups throughout the process to provide information and explanations of the revision. Finally, the Forest received and analyzed 4,300 letters of comment on the Draft EIS and Draft Revised Forest Plan (USFS 1993a).

The comments and responses were part of a continuing dialogue with the public. "Extensive public participation has been extremely valuable in revising the 1986 Plan" (USFS 1993a:S-3). Thirteen issues were developed based on public comments expressed in letters and appeals, the Chief's directives, and concerns of other Forest Service professionals. These issues helped define the management direction of the Revised Plan. Once public issues had been identified, it became clear that in order to address them, some changes were needed in the existing Forest Plan. These included: updating the current Plan's management direction, developing and displaying more detailed management areas, reassessing the amount of suitable lands for timber, and reassessing the amount of timber to make available ((USFS 1993a).

E.N. Haskell (Office of the Governor, Virginia) wrote that the Forest Service is ". . . to be commended for the extent to which you involved the public in identifying the issues and concerns you dealt with in developing the range of alternatives set forth in the EIS" (USFS 1993a:I-744). Letter 3921 said that "You have made progress in establishing dialogue with your constituents. Selection of Alternative 8 as the preferred alternative reflects commitment to those publics which have committed time and energy to build a plan with you" (USFS 1993a:I-460).

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.
- acknowledged comments/concerns; no or minimal changes made to the project.
- project moderately changed; but not to the level of comments/concerns.
- **project changed during Scoping or after Draft EIS review to reflect the extent of comments/concerns.**

The alternatives were products of often intense interaction among the public, state, federal and local agencies, and the Forest Service. "Although the Forest Service seeks public input in formulating the alternatives, that input may or may not be reflected in the Revised Plan. Regardless, comments from the public followed a definite path through the planning process and often created new approaches for the Forest Service—new analyses, fresh alternatives" (USFS 1993a:S-5).

Alternatives were refined as a result of letters of comment on the Draft EIS and Draft Revised Plan. In response to public comments, a new Alternative (8A) was formulated; small adjustments were made to all the alternatives; and substantial changes were made to six alternatives. Alternative 8A (the preferred alternative) reflected many of the suggestions and comments made on the Draft

EIS and positive components identified in other alternatives (USFS 1993a). "In helping the Forest Service formulate the alternatives ..., the public exercised its right to be heard and to have its concerns addressed. In choosing the alternative that became the Revised Forest Plan, the Forest Service exercised its mission to listen to the public, to seek its input, and to combine, when possible, public desires with professionally-sound forest management" (USFS 1993a:S-5).

The Revised Plan:

- Provided large, unfragmented blocks (composed mostly of late successional vegetation).
- Provided early successional habitat.
- Identified approximately 180,000 (17% of the Forest) in 10 old growth forest types with a "high probability of now containing old growth characteristics."
- Provided guidance on managing stands with a "high probability of now containing old growth characteristics" until a Regional policy is completed.
- Prohibited any stand type conversion. Permitted planting naturally or historically occurring pine and hardwood species.
- Maintained a mixed species (pine or hardwood) mixture in the regenerated stand.
- Established the goal of restoration, maintenance, and enhancement of riparian areas and their dependent resources.
- Identified riparian areas on physical and biological characteristics rather than arbitrary distances from perennial streams.
- Established policy for managing riparian areas through timber harvesting.
- Applied streamside management zones to both perennial and intermittent streams.
- Provided habitat for the continued existence of all populations of threatened, endangered, and sensitive plant and animal species in the Forest through timber harvesting.
- Required coordination of management of threatened, endangered, and sensitive species with the USDI Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia.
- When needed, requires site-specific surveys to be conducted for undiscovered habitats of, and populations of, threatened, endangered and sensitive species prior to a decision to implement any project.
- Established 38 Biological Special Interest Areas, 2 Geological Special Interest Areas, and a Special Interest Area along the Shenandoah Mountain Crest for the recovery of the endemic Cow Knob salamander.
- Recommended six Biological Special Interest Areas for study for designation as Research Natural Areas (USFS 1993a:ROD-21).

All of these project decision changes or amendments reflected the comments and concerns of citizens, local, state and federal agencies, and environmental groups.

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

Land and resource management planning requires that processes formerly used to make individual resource decisions be combined into integrated management decisions. The 10-step process defined in NFMA regulations was followed (USFS 1993a:B-1).

Critical factors relevant to the Regional Forester's decision to select Alternative 8A were (USFS 1993a:ROD-3):

- Biological diversity of the Forest.
- The productive capacity of the Forest to provide a variety of goods and services.
- The health of the Forest affected by the continued presence and potential damage to natural resources from the gypsy moth as well as other insects and diseases.
- The natural beauty of the Forest associated with its historical and cultural value to the mid-Appalachian region.
- Concerns about changes in socioeconomic conditions in the area affected by the Forest.
- National and regional issues such as below-cost timber sales, ecosystem management, and old growth which require new approaches to traditional management.
- Sensitivity to striking a balance.

All of the management decisions for the Revised Forest Plan indicate how the environmental information influenced the selection of the final plan of action as evidenced in the Final EIS and ROD. There was, however, criticism by reviewing agencies and the public of the Forest Service's "non-use" of environmental information for addressing landscape level analyses: [e.g., D. Esher (EPA)] "We believe that as a programmatic document, the Plan and the accompanying Draft EIS, are well suited for landscape level analyses and with the advent of GIS, the ease at which spatial and temporal cumulative impacts can be assessed, is generally enhanced. We encourage the Forest Service to utilize these tools so that activities which occur on the Forest can be evaluated within the context of the landscape and thus, decrease the potential for long-term, cumulative impacts to terrestrial and aquatic resources, as well as biodiversity" (USFS 1993a:I-414). The Forest Service responded that this type of analysis was not suitable for a programmatic EIS, such as this EIS and Forest Plan.

All management decisions were expressed as though there were no uncertainties or gaps in knowledge because all contingencies had been accounted for. For example, the ROD states that the Revised Forest Plan (USFS 1993a:ROD-30):

- Requires an ecological approach to achieving multiple use management.
- Stresses the need for a high quality environment while producing needed goods and services.
- Contains standards which ensure that management practices are implemented in a manner that maintains or improves the long-term productivity of the site.
- Details general and site-specific mitigation measures.
- Maintains or improves water quality.
- Requires that vegetation management, including timber harvesting, be accomplished in a manner that maintains the diversity, productivity, and long-term sustainability of ecosystems.
- Limits the use of herbicides.
- Requires that wildfire be suppressed.

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

- 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.**

Formulation of alternatives: A reasonable range of alternatives was formulated to assist in identifying an alternative that came nearest to maximizing net public benefits; the alternatives also provided for the resolution of identified significant issues and concerns (USFS 1993a:B-1).

Estimated effects of alternatives: The physical, biological, economic and social effects of implementing each alternative were considered in detail to respond to the issues and need for change; The FORPLAN model estimated many, but not all, of the economic and physical effects. Other effects examined outside the model included ecological and social considerations. Specifically, the analysis determined: (1) direct effects, (2) indirect effects, (3) conflict with other federal, state, and local land use plans, (4) other environmental effects, (5) socioeconomic effects within the Forest influence zone, (6) tradeoffs associated with various resource production levels and land allocations, and (7) mitigation measures (standards) for resource protection (USFS 1993a:B-2). The Forest Service used 1985 socioeconomic data for employment percentage, employment type, total income, etc., rather than data from the 1990 census.

Evaluation of alternatives: Significant physical, biological, economic and social effects of implementing alternatives were used to evaluate each alternative and to compare them with one another; each alternative was judged on how it addressed the significant issues, concerns and opportunities identified (USFS 1993a:B-3).

Preferred alternative: The Forest Supervisor reviewed the alternative evaluations and the public issues and concerns (USFS 1993a:B-3).

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

- no decisionmaking framework provided.
- decisionmaking framework provided for effects that were quantifiable.
- **decisionmaking framework provided for consideration of all effects of alternatives, including environmental, economic and social effects.**

A summary of the major environmental, economic and physical differences among the Preferred Alternative (8A) and other alternatives, including the Environmental Alternative (3), was provided in tabular form in the Final EIS and ROD. Measurable attributes for comparing alternatives included:

- Potential old growth (percent).
- Relatively unfragmented/fragmented habitat (M acres).
- Riparian areas suitable for timber production (percent).
- Carrying capacity for various species (M animals).
- Projected net revenue from timber sales (M dollars).
- Special interest areas (M acres).
- Allowable sale quantity (MMBF).
- Supply of timber products/demand (percent).

- Change in employment (jobs).
- Ave. annual road construction (miles).
- Routes for off highway vehicles (miles).
- Roadless areas (number/acres).
- Wilderness study areas (number/acres).
- Management areas with recreational/scenic values (M acres).
- Adopted visual quality objectives (M acres).
- Estimated amount of regeneration harvest methods (M acres).
- Prescribed burning (M acres).
- Ave. annual sediment (M tons).
- Ave. annual erosion (M tons).
- Lands available for leasable energy (M acres).
- Lands available for non-energy leasable minerals (M acres).
- Lands available for salable minerals (M acres).
- Lands considered for insecticide treatment (M acres).
- Adopted recreation opportunity spectrum class (M acres) (USFS 1993a).

Although Alternative 8A had greater effects on the environment than Alternative 3, it was selected as the Revised Forest Plan because it generated more net public benefits. Some of the benefits included:

- It more fully resolved issues.
- It provided flexibility to manage damage from gypsy moth adequately.
- Goods and services were provided in a way that best responded to overall public desires and environmental protection needs.
- Flexibility was provided to manage habitats for a variety of wildlife species.
- It provided a projected 80 new jobs vs. a loss of 566 jobs.
- Substantial areas were allocated to unfragmented habitat and remoteness (USFS 1993a).

The Preferred Alternative (8A) was also similarly compared to alternatives with greater present net values (PNVs). PNVs only include goods and services that can be priced. The PNV measures provide a partial net public benefits estimation framework for comparing alternatives and discussing other benefits that were not given a monetary value. Six alternatives had higher PNVs than Alternative 8A, while two alternatives had lower PNVs than Alternative 8A.

Appendix D

**Ecosystem Management Question Results
for the George Washington National Forest**

Appendix D: Ecosystem Management Question Results for the George Washington National Forest

The 1986 George Washington National Forest Final EIS and Forest Plan

1. Did the agency propose management procedures to maintain viable populations of native species in situ? If so, how?
 - no procedures proposed.
 - **management procedures primarily focused on game species such as deer, bear, wild turkey, and endangered species.**
 - agency proposed management procedures to maintain viable populations of native species in situ through preservation and enhancement of multiple habitat types and sizes.

Areas known to contain endangered and threatened species habitats were preserved or enhanced regardless of other resource values or the harvest cutting method. Protection for unusual plants not on the threatened and endangered list was provided in the designation of Special Interest Areas (USFS 1986).

While the Draft EIS only provided for minimum viable habitats, the Final EIS stated that it comes closer to provide habitat for optimum populations of the featured species. Minimum viable population figures were interpreted to mean minimum “hunnable populations.” Minimum population figures for non-game species were based on the suggestion by Soule and Wilcox (1980) of a minimum effective size of a population over the long term (USFS 1986).

NFMA regulations [Sec. 6 (219.19)] require the identification of management indicator species and the reason for their selection. Featured species were selected for which population and/or trend data were and/or would be available and that met at least two of the NFMA criteria. Featured species in the Draft EIS included white-tailed deer, black bear, eastern wild turkey, gray squirrel, and ruffed grouse. Featured species in the Final EIS included white-tailed deer, black bear, eastern wild turkey, pileated woodpecker, and common flicker. White-tailed deer and eastern wild turkey were selected because of hunting pressures and recreational benefits. Black bear was included because State wildlife agencies in Virginia and West Virginia place a high priority on black bear management. Pileated woodpecker and common flicker were selected because their population levels directly reflect habitat conditions and trends (USFS 1986).

2. Was it evident that the agency acknowledged ecological patterns and diversity in terms of the processes and constraints generating them?
 - **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.
 - agency demonstrated understanding of ecological patterns and diversity in terms of the processes and constraints generating them; management decisions reflected this understanding.

It was not evident that the agency acknowledged ecological patterns and diversity in terms of the processes and constraints generating them. For example, the development of alternatives began

with the construction of “benchmarks.” The benchmarks were essentially maximization of the potential the Forest has to produce single resources within legal constraints. The yields formed the upper bounds of production potential which could be achieved. The lower limits or minimum bounds were also identified. Upper and lower bounds formed the “decision space” in which alternatives could be formulated (USFS 1986).

From the type of response received to the Draft EIS, it was evident that other agencies and the public were more aware of ecological patterns and diversity issues than were the Forest Service personnel who prepared the Draft EIS. Some of the opposition to the Preferred Alternative discussed in the draft statement and proposed plan centered on issues such as excessive timber harvesting, clearcutting on slopes greater than 55 percent with poor and shallow soils, excessive access by offroad vehicles to wilderness and old growth areas, clearcutting in close proximity to the Appalachian Trail, harvesting in riparian areas, and conversion of hardwood forests to pine plantations (USFS 1986).

Several significant changes were made from the Draft EIS Preferred Alternative to the Supplemental EIS Preferred Alternative; and several substantive changes were made from the Supplemental EIS to the Final EIS. However, the changes appear to have been made primarily based on agency and public opposition rather than from a developed understanding of ecological patterns and diversity.

The EIS focused on timber harvesting as the means by which other forest management goals were to be achieved. For example, the Final EIS stated that "Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18).

A. Miller (Regional Environmental Officer, USDO) recommended "including a discussion under each management category evaluating the impact of forest resources of past management practices in the George Washington National Forest. This would present a clearer picture of the continuum of George Washington National Forest management, and would assist planners and reviewers in predicting and evaluating the potential resource impacts of the Plan's proposed management practices" (USFS 1986:75). A letter from J.R. Pomponio (Chief, Environmental Impact and Marine Policy Branch, EPA) stated that "It is the opinion of the reviewers that Forest planning and evaluation should be founded upon and integrated with the geological system extant. What this means, essentially, is planning carried out from the bottom up rather from the forest type or economic needs. . . . Establishing the resource limits from this perspective may cause a drastic change in the ultimate plan . . ." (USFS 1986:K-80).

3. What level of measures were proposed to sustain ecosystem diversity, health, and productivity?
- **minimal or very narrowly focused measures proposed.**
 - importance of sustainability discussed, but no management measures were proposed.
 - specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticides, etc.

The Final EIS stated that all alternatives would provide sufficient diversity to maintain viable populations of all native vertebrate and plant species. The document also stated that National Forest land and resource management planning is designed to provide resources, goods and services within the constraint of maintaining the sustained yield of recreation, water, timber and wildlife, without impairing the long-term productivity of the land (USFS 1986).

Measures proposed to sustain ecosystem diversity, health, and productivity included: (1) protection of unusual flora through the establishment of Special Interest Areas and (2) provision of buffers around all caves capable of harboring bats. Other than these specific measures, ecosystem diversity, health and productivity would be sustained through harvesting, which reflects the George Washington National Forest's 1986 philosophical approach to ecosystem management: "Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18). Again, "Alternatives having the highest timber harvest levels generally provide the greatest opportunities for providing habitat improvements" (USFS 1986:IV-18).

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

- **management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries.**
- acknowledged ecosystem patterns and processes at different geographic and time 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 patterns and processes were not studied at different geographic and time scales. There was some discussion of the Forest's ecological history before it became part of the U.S. Forest System. There was no discussion of Forest Service management activities over time or how those management activities have affected the ecosystem patterns and processes of the Forest.

Forest Plans are to cover 10- to 15-year time frames and to predict expected future demands of Forest resources for the next 50 years for developed recreation, dispersed recreation, wilderness, wildlife and fish, range, timber, fuelwood, water, and minerals. Again, there is not discussion of how these demands will affect future ecosystem patterns and processes, other than to state that, "National Forest land and resource management planning is designed to provide resources, goods and services within the constraint of maintaining the sustained yield of recreation, water, timber and wildlife, without impairing the long-term productivity of the land" (USFS 1986:26).

A letter from A. Miller (USDOJ) recommended "... including a discussion under each management category evaluating the impact of forest resources of past management practices in George Washington National Forest. This would present a clearer picture of the continuum of George Washington National Forest management, and would assist planners and reviewers in predicting and evaluating the potential resource impacts of the Plan's proposed management practices" (USFS 1986:K-75). The Forest Service evidently did not see the value of this recommendation because there was no discussion of past Forest management practices in either the Supplemental or Final EIS. While J.R. Pomponio (EPA) wrote that, "A complete picture and evaluation of the geological provinces is lacking. . . . a stratigraphic representation of them would be helpful to the planning process as well as to the reviewers" (USFS 1986:K-80). E.T. Walters (Mountain Soil and Water Conservation District) expressed his agency's concern over the conversion of hardwood forests to pine plantations: "Since it is the hardwood deciduous forests of these Appalachian Mountains that are singularly distinctive . . . , there were questions raised about any plans to convert some of these woodlands on federal land to pine plantations. Private landowners are already busy converting their forest holdings to the conifers in search of a quicker economic return. The National Forest, ... , can and should take a longer range approach" (USFS 1986:K-111).

5. How were management boundaries delineated?

- **only used political boundaries; no or limited discussion of what occurs beyond political boundaries.**
- 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.

The Forest Plan only covers the 954,000 acres of National Forest land that lie within the George Washington National Forest. The only discussion outside the Forest's boundaries in the EIS concerns possible impacts of forest management activities on the local economy and the availability of recreation, fuelwood, and hunting opportunities for local residents (USFS 1986).

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

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

All but 2 of the 37 persons involved in EIS and Forest Plan process were Forest Service personnel. Outside consultants were used for the Sociology and Economic sections. Personnel were divided into three groups: a management team, an interdisciplinary team, and a support group. The management group consisted of district rangers and two forest supervisors. The interdisciplinary and support teams prepared the EIS. The same person coordinated the preparation and development of the plan and the EIS (USFS 1986).

The interdisciplinary team who prepared the EIS and Forest Plan represented the varied expertise within the Forest Service, e.g., timber management, recreation, range science, wildlife biology, economics, fire management, law enforcement, public affairs, engineering, minerals and geology, landscape architecture, systems analysis, hydrology, fisheries biology, land use planning, and archaeology (USFS 1986).

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

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

Informational meetings were held. Formalized input was sought and received in response to a scoping letter. There was also formalized decisionmaking through citizen workshop, task forces, and consultations with state governments, state environmental personnel, and representatives of the forest industry (USFS 1986).

Public involvement began in 1979 with an initial screening of public comments received over the previous 5 years from unit plans, environmental statements, the Off-Road Vehicle Plan, RARE II, as well as other correspondence. Over 600 individual issues were identified. These were tabulated and ranked in a screening process which resulted in a preliminary listing, which was then compiled into an Issues and Concerns publication. This publication formed the basis for the initial scoping effort. Three thousand copies were mailed or made available through George Washington National Forest field offices. Two hundred and ninety-five responses to the Issues and Concerns booklet were received. The majority of the comments received were from people living in or adjacent to the forest (USFS 1986). Therefore, scoping consisted of letter/survey responses to Issues and Concerns publication—which is the minimum NEPA scoping requirement. These scoping responses were analyzed and screened to identify the issue content, group similar issues into an overall issue statement, and decide upon the disposition of the issue statements. There were 11 major issues and management concerns identified (USFS 1986).

In October 1982, a citizen's workshop was held on national forest planning (1) to prepare citizens to participate in the new National Forest planning process; (2) to identify and draft specific conservation "alternatives" of forest management; (3) to form task forces to follow forest planning and to see that conservationists "alternatives" are considered and adopted; (4) to discuss proposals for wilderness legislation in Virginia. In November 1982, a public briefing was held to update interested public as to status of development of the Forest Land and Resource Management Plan (USFS 1986).

Several respondents said the management of the National Forests should be left to the trained professionals who have the experience to make the right decisions. The agency commented that "The management of National Forests are governed by a number of legal constraints. The National Environmental Policy Act (NEPA), requires that public input be part of the decisionmaking process. Within this decisionmaking process, professional expertise from a number of land managers and resource specialists is obtained to form a complete determination" (USFS 1986:K-69).

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

- **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.
- 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.

The final outcome of management decisions was primarily based on reviewing agency and public comments, that in large part supported the integration of ecology-based research and technology. Whereas, the Forest Service's research and technology dictated clearcutting and even-aged harvesting as its only forest management policy. "Alternatives having the highest timber harvest levels generally provide the greatest opportunities for providing habitat improvements" (USFS 1986:IV-18). "Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18).

The Draft EIS proposed 100 percent clearcutting; in the Final EIS the Forest Service reduced this percentage to 85 percent in response to agency and public comments. Harvesting would continue on 54 percent of slopes steeper than 55 percent, with poor and shallow soils in spite of a plethora of public and agency comments to the contrary. Harvesting would also continue in riparian areas, disregarding numerous agency and public comments (USFS 1986).

J. Olin (Virginia House of Representatives) wrote that, "I have been informed that about 23 percent of the slopes in the Forest have an incline of 55 percent or more. In addition, another 17 percent of the forest has physical and soil characteristics which would make these areas highly vulnerable to serious erosion problems" (USFS 1986:K-85). A. Miller (USDOJ) expressed opposition to harvesting in riparian areas, "... allowing timber management in these areas will detrimental to the goal of riparian area preservation and enhancement. Any management activity which would remove or alter the natural vegetation or alter the stream or river could have a detrimental effect on riparian resource values. We consider the preservation of riparian areas in the George Washington National Forest to be particularly important, considering the rapid disappearance of these ecosystems in the southeastern U.S." (USFS 1986:K-75). K.J. Buttleman (Administrator, Council on the Environment, Virginia) wrote "... these documents seem to focus on timber harvest as the means by which other forest management goals will be achieved" (USFS 1986:K-86).

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

- not at all.
- **followed standardized monitoring and evaluation procedures.**
- 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 Monitoring and Evaluation Plan, based on regional Standards and Guidelines, was included in the Final Land and Resource Management Plan. "Monitoring and Evaluation" are step 10 in the Forest Service's planning process (USFS 1986).

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

- **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.

In October 1982, a citizen's workshop was held on national forest planning (1) to prepare citizens to participate in the new National Forest planning process; (2) to identify and draft specific conservation "alternatives" of forest management; (3) to form task forces to follow forest planning and to see that conservationist "alternatives" are considered and adopted; and (4) to discuss proposals for wilderness legislation in Virginia (USFS 1986). The Final EIS did not describe the outcome(s) of this workshop. There was no mention of the task forces that were to be formed for following the forest planning process. If the task forces were in deed formed, the impact they had on this planning process is not known.

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

In the Draft EIS, the Forest Service proposed harvesting 803,000 acres; in the Final EIS the acreage was reduced to 600,930 acres. This reduction was in response to public and agency comments of harvesting on slopes greater than 55 percent and with poor soils. The agency's response was that cable logging results in very little impact to soils, but the number of acres harvested on steep slopes would be reduced regardless. The Draft EIS proposed 100 percent clearcutting; in the Final EIS the Forest Service reduced this percentage to 85 percent in response to agency and public comments. Prior to the development of the management plan, the Forest Service's policy toward off-road vehicle (ORV) use was "open to ORV use except where posted 'closed.'" In the scoping responses, the public requested that this policy be changed to "closed to ORV use except where posted 'open,'" primarily because of erosion problems and noise disturbing wildlife (USFS 1986).

The Forest Service did set its priorities based on social demands. Moreover, it was the public and reviewing agency comments that advised the Forest Service to reevaluate its management plan to operate within the constraints of ecosystem patterns and processes (as they were understood at that time).

The final outcome of management decisions was largely influenced by reviewing agency and public comments, that likewise supported the integration of ecology-based research and technology. However, Forest Service research and technology dictated clearcutting and even-aged harvesting as its forest management policy. "Alternatives having the highest timber harvest levels generally provide the greatest opportunities for providing habitat improvements" (USFS 1986:IV-18). "Better overall habitat diversity will generally be provided by those alternatives which provide for the most timber harvesting activity" (USFS 1986:IV-18).

The 1993 George Washington National Forest Final EIS and Forest Plan

1. Did the agency propose management procedures to maintain viable populations of native species in situ? If so, how?
 - no procedures proposed.
 - management procedures primarily focused on game species such as deer, bear, wild turkey, and endangered species.
 - **agency proposed management procedures to maintain viable populations of native species in situ through preservation and enhancement of multiple habitat types and sizes.**

The Final EIS addressed biological diversity by concentrating on eight components of biological diversity: the natural values of the Forest, forest type conversion, old growth, forest fragmentation, late successional habitat, riparian and wetland areas, management indicator species, and special biological areas (USFS 1993a).

The Revised Forest Plan:

- Provided large, unfragmented blocks (composed mostly of late successional vegetation).
- Provided early successional habitat.
- Identifies approximately 180,000 (17% of the Forest) in 10 old growth forest types with a "high probability of now containing old growth characteristics."
- Provided guidance on managing stands with a "high probability of now containing old growth characteristics" until a Regional policy is completed.
- Prohibited any stand type conversion. Permitted planting naturally or historically occurring pine and hardwood species.
- Maintained a mixed species (pine or hardwood) mixture in the regenerated stand.
- Established the goal of restoration, maintenance, and enhancement of riparian areas and their dependent resources.
- Identified riparian areas on physical and biological characteristics rather than arbitrary distances from perennial streams.
- Established policy for managing riparian areas.
- Applied streamside management zones to both perennial and intermittent streams.
- Provided habitat for the continued existence of all populations of threatened, endangered, and sensitive plant and animal species in the Forest.
- Required coordination of management of threatened, endangered, and sensitive species with the U.S. Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia.
- When needed, required site-specific surveys to be conducted for undiscovered habitats of, and populations of, threatened, endangered and sensitive species prior to a decision to implement any project.
- Established 38 Biological Special Interest Areas, 2 Geological Special Interest Areas, and a Special Interest Area along the Shenandoah Mountain Crest for the recovery of the endemic Cow Knob salamander.
- Recommended six Biological Special Interest Areas for study for designation as Research Natural Areas (USFS 1993a:ROD-21).

Management indicator species for the Forest were selected in accordance with Sec. 219.19(a) of NFMA regulations and include: (1) endangered, threatened, sensitive species; (2) species whose habitats may be influenced by management; (3) species commonly hunted; (4) non-game species of

special interest; and (5) species whose population changes are believed to indicate the effects of management activities on other species or selected major biological communities. Management indicator species included: black bear, wild turkey, white-tailed deer, common flicker, pileated woodpecker, brown-headed cowbird, ovenbird, worm-eating warbler, cave dwelling bats, cow knob salamander, tiger salamander, yellow pines, old growth forest types, brook trout and sunfish, and all species federally listed as threatened or endangered and known to occur on the Forest (northeastern bulrush, swamp pink, smooth rockcress, James spiny mussel, peregrine falcon, bald eagle, Virginia northern flying squirrel, Indiana bat) (USFS 1993a:3-169).

D. Henne (Regional Environmental Officer, USDO) commented that “The Department commends the Forest Service for their foresight in establishing the 48 Special Biological Areas to protect State- and Federally-listed endangered, threatened, and sensitive plant and animal species. We believe the preservation of these unique habitat areas is an effective method for maintaining biodiversity within the George Washington National Forest” (USFS 1993a:I-738). A letter from J.W. Clarke expressed similar views: “I have long felt that the eastern national forests should be managed for two purposes, to maintain and preserve biological diversity and as places for low density recreation. The Forest Service's proposed Alternative 8 is a small step in that direction . . .” (USFS 1993a:I-742).

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

- minimal or no evidence.
- agency demonstrated some understanding of ecological patterns and diversity; however, this understanding did not effect the management decisionmaking process.
- agency demonstrated some understanding of ecological patterns and diversity; this limited understanding was reflected in the decisionmaking process.
- **agency demonstrated understanding of ecological patterns and diversity in terms of the processes and constraints generating them; management decisions reflected this understanding.**

The Biological Diversity section in Section 3, Affected Environment, discussed genetic variation, distinct species, native species, biological associations or communities, and the geographic scale of regional landscapes. Section 3 also contained a thorough discussion of fragmentation, patch size, edges, matrices, and early and late successional habitats. This section also stated that “In examining the threats to the biodiversity of the George Washington National Forest planning area, the best science and resource management will have minor lasting effects if social and political systems do not come to grips with human population growth, poverty, and pollution” (USFS 1993a:3-163).

The Revised Forest Plan:

- Provided large, unfragmented blocks (composed mostly of late successional vegetation).
- Provided early successional habitat.
- Identifies approximately 180,000 (17% of the Forest) in 10 old growth forest types with a "high probability of now containing old growth characteristics."
- Provided guidance on managing stands with a "high probability of now containing old growth characteristics" until a Regional policy is completed.
- Prohibited any stand type conversion. Permitted planting naturally or historically occurring pine and hardwood species.

- Maintained a mixed species (pine or hardwood) mixture in the regenerated stand.
- Established the goal of restoration, maintenance, and enhancement of riparian areas and their dependent resources.
- Identified riparian areas on physical and biological characteristics rather than arbitrary distances from perennial streams.
- Established policy for managing riparian areas.
- Applied streamside management zones to both perennial and intermittent streams.
- Provided habitat for the continued existence of all populations of threatened, endangered, and sensitive plant and animal species in the Forest.
- Required coordination of management of threatened, endangered, and sensitive species with the U.S. Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia.
- When needed, required site-specific surveys to be conducted for undiscovered habitats of, and populations of, threatened, endangered and sensitive species prior to a decision to implement any project.
- Established 38 Biological Special Interest Areas, 2 Geological Special Interest Areas, and a Special Interest Area along the Shenandoah Mountain Crest for the recovery of the endemic Cow Knob salamander.
- Recommended six Biological Special Interest Areas for study for designation as Research Natural Areas (USFS 1993a:ROD-21).

D. Esher (Chief, EPA) recommended that “all disruptive activities (e.g., timber harvesting, road building, construction of facilities, oil and gas leasing and development) be carefully considered within the context of the regional and forest landscape. The need for additional timber, access roads, etc. should be balanced against the potential for degradation/alternation of healthy ecosystems” (USFS 1993a:I-349). The EPA was further “concerned by the lack of sufficient information regarding direct, indirect, and cumulative impacts to surface waters, riparian habitat and overall biodiversity. We believe that as a programmatic document, the Plan and the accompanying Draft EIS, are well suited for landscape level analyses and with the advent of GIS, the ease at which spatial and temporal cumulative impacts can be assessed, is generally enhanced. We encourage the Forest Service to utilize these tools so that activities which occur on the Forest can be evaluated within the context of the landscape and thus, decrease the potential for long-term, cumulative impacts to terrestrial and aquatic resources, as well as biodiversity” (USFS 1993a:I-414).

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

- minimal or very narrowly focused measures proposed.
- importance of sustainability discussed, but no management measures were proposed.
- **specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticide use, etc.**

The Revised Forest Plan:

- Provided large, unfragmented blocks (composed mostly of late successional vegetation).
- Provided early successional habitat.
- Identifies approximately 180,000 (17% of the Forest) in 10 old growth forest types with a "high probability of now containing old growth characteristics."
- Provided guidance on managing stands with a "high probability of now containing old growth characteristics" until a Regional policy is completed.

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- Recommended six Biological Special Interest Areas for study for designation as Research Natural Areas (USFS 1993a:ROD-21).

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

- no acknowledgment of ecosystem patterns and processes; management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries.
- **acknowledged ecosystem patterns and processes at different geographic and time 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.

The documents acknowledged ecosystem patterns and processes at different geographic and time scales, but management decisions only affected prescribed time-frames within defined forest system boundaries. The EIS stated that "At the geographic scale of regional landscapes, diversity includes a variety in the kinds of biological communities and a biogeographic (patterns, sizes, shapes, juxtapositions and interconnectedness) that provides for free, natural interchange of individuals throughout the area. Many species, especially those with specialized habitat affinities or that are migratory or wide-ranging, can only be sustained in viable numbers and distributions in very large wildland areas, bioregions" (USFS 1993a:3-163).

"The Forest Service recognizes the need for regional landscape planning as it relates to biodiversity and will cooperate to the fullest extent possible with agencies, groups, and managers of adjacent state and federal lands. As the Forest Service implements ecosystem management we are inventorying, classifying, and mapping ecosystems. This information will assist in regional planning and cooperation" (USFS 1993a:I-76). However, this EIS and Revised Forest Plan only dealt with the ecosystems within the Forest boundaries.

D. Esher (EPA) recognized “that as a programmatic document, the Plan and the accompanying Draft EIS, are well suited for landscape level analyses and with the advent of GIS, the ease at which spatial and temporal cumulative impacts can be assessed, is generally enhanced. We encourage the Forest Service to utilize these tools so that activities which occur on the Forest can be evaluated within the context of the landscape and thus, decrease the potential for long-term, cumulative impacts to terrestrial and aquatic resources, as well as biodiversity” (USFS 1993a:I-414). Several letters criticized the documents for not taking a broad ecosystem view of both short- and long-term environmental changes. Letter 3977 wrote that the Forest Service should “Begin to consider long-term contingency planning for influences beyond Forest boundaries, such as changing regional land patterns and the possible effect of climate change” (USFS 1993a:I-76).

5. How were management boundaries delineated?

- only used political boundaries; no or limited discussion of what occurs beyond political boundaries.
- **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.

Even though discussions on biodiversity, fragmentation, etc. dealt with ecosystems of different scales, the Final EIS and Revised plan were focused within the Forest boundaries. The Revised Forest Plan covered the 1.1 million acres of National Forest land in 14 counties of Virginia and 5 counties of West Virginia (USFS 1993a).

The Final EIS stated that, "The Forest Service recognizes the need for regional landscape planning as it relates to biodiversity and will cooperate to the fullest extent possible with agencies, groups, and managers of adjacent state and federal lands. As the Forest Service implements ecosystem management we are inventorying, classifying, and mapping ecosystems. This information will assist in regional planning and cooperation" (USFS 1993a:I-76).

The Final EIS did discuss employment and social opportunities and constraints of Forest activities on neighboring communities and the region.

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

- project completed using in-house personnel from the same disciplinary background.
- **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 the onset of project planning.
- involved ongoing interdisciplinary committee that included representatives of other federal agencies, state and local agencies, and the public in policymaking and planning processes.

The preparers of the Draft and Final EISs and the Revised Forest Plan were all Forest Service personnel. The in-house, interdisciplinary team was composed of a plant pathologist, a planning analyst, two hydrologists, a wildlife biologist, an assistant recreation staff officer, two foresters, two botanist/ecologist, two fisheries biologists, a wildlife biologist, an engineer, an entomologist, two geologists, two landscape architects, a lands/fire/minerals staff officer, and a research forester. The

interdisciplinary team, however, worked with various individuals, organizations and agencies to formulate the 14 alternatives that provided a wide response to the 13 issues (USFS 1993a).

The Forest Service was required to coordinate with the U.S. Fish & Wildlife Service and appropriate agencies in Virginia and West Virginia for the management of threatened, endangered, and sensitive species.

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

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

As stated in the Final EIS, "The public was very involved in the revision of the Forest Plan" (USFS 1993a:S-3). The Forest held 13 public meetings with as many as 100 attendees. The attendees participated in the identification, clarification, and exploration of possible responses to public issues. The public continued to participate as the possible responses were formulated into 14 alternatives that offered a wide range of management plans for the Forest. Forest officials also met with individuals and groups throughout the process to provide information and explanations of the revision. Finally, the Forest received and analyzed 4300 letters of comment on the Draft EIS and Draft Revised Forest Plan (USFS 1993a).

The comments and responses were part of a continuing dialogue with the public. Extensive public participation was extremely valuable in revising the 1986 Plan. Thirteen issues were developed based on public comments expressed in letters and appeals, the Chief's directives, and concerns of other Forest Service professionals. These issues helped define the management direction that was needed in the Revised Plan (USFS 1993a).

Once the public issues were identified, it became clear that in order to address the issues, some changes were needed to the existing GWNF Plan. These changes included: updating the current Plan's management direction, developing and displaying more detailed management areas, reassessing the amount of suitable lands for timber, and reassessing the amount of timber to make available (USFS 1993a).

The alternatives were products of often intense interaction among the public, state, federal and private agencies, and the Forest Service. The Final EIS stated that "Although the Forest Service seeks public input in formulating the alternatives, that input may or may not be reflected in the Revised Plan. Regardless, comments from the public followed a definite path through the planning process and often created new approaches for the Forest Service—new analyses, fresh alternatives" (USFS 1993a:S-5).

Alternatives were refined as a result of letters of comment on the Draft EIS and Draft Revised Plan. In response to public comments, a new Alternative (8A) was formulated; small adjustments were made to all the alternatives; and substantial changes were made to six alternatives. "Alternative 8A (the preferred alternative) reflected many of the suggestions and comments made on the Draft EIS and positive components identified in other alternatives" (USFS 1993a:S-7). In helping the Forest Service formulate the alternatives ..., the public exercised its right to be heard and to have its concerns addressed. In choosing the alternative that became the Revised Forest Plan, the Forest

Service exercised its mission to listen to the public, to seek its input, and to combine, when possible, public desires with professionally-sound forest management” (USFS 1993a:S-5).

A letter from E.N. Haskell (Office of the Governor, Virginia) commended the Forest Service “for the extent to which you involved the public in identifying the issues and concerns you dealt with in developing the range of alternatives set forth in the EIS” (USFS 1993a:I-744). Letter 3921 also praised the agency for its progress in establishing dialogue with its constituents, “Selection of Alternative 8 as the preferred alternative reflects commitment to those publics which have committed time and energy to build a plan with you” (USFS 1993a:I-460).

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

- had no influence on final outcome.
- recent scientific research and technology considered in decisionmaking, but many "trade-offs" were made to accomplish economic and technological goals that were contrary to scientific information.
- **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.

The Final EIS stated that "The purpose of the Revised Plan is to provide for multiple use and sustained yield of goods and services in a way that maximizes net public benefits in an environmentally sound manner. Ecosystem management will be the guiding principle in achieving this objectives" (USFS 1993a:S-1). The Final EIS and Revised Plan emphasized providing uses, values, services and environmental conditions consistent with the 1990 RPA Assessment “in a manner that maintains biological diversity and sustainable ecosystems” (USFS 1993a:S-7).

The Final EIS documented numerous scientific studies to support its findings. The 1986 Final EIS contained an "Analysis of Planned Type Conversion" that supported increasing the percentage of white pine in the Forest by 20 percent. The financial analysis revealed prepared for the 1993 Final EIS concluded that clearcutting with conversion to white pine was financially less attractive than regenerating such lands to upland oak by natural regeneration. The Management Indicator Species (MIS) selected for the 1986 Final EIS were black bear, wild turkey, white-tailed deer, common flicker, and pileated woodpecker. The 1993 Final EIS Revised Plan added cave dwelling bats, brown-headed cowbird, ovenbird, worm-eating warbler, cow knob salamander, tiger salamander, yellow pine community, and old growth forest type. Additional selections were warranted to meet better the intent of Sec. 219.19 of the NFMA. A Biological Assessment was done as part of a site-specific environmental analysis to determine how a project affects federally listed and proposed species. A Biological Evaluation was done as part of a site specific environmental analysis to determine if and how a project affects those species designated as sensitive by the Regional Forester (USFS 1993a).

D. Esher (EPA) wrote that the EPA was “concerned by the lack of sufficient information regarding direct, indirect, and cumulative impacts to surface waters, riparian habitat and overall biodiversity. We believe that as a programmatic document, the Plan and the accompanying Draft EIS, are well suited for landscape level analyses and with the advent of GIS, the ease at which spatial and temporal cumulative impacts can be assessed, is generally enhanced. We encourage the Forest

Service to utilize these tools so that activities which occur on the Forest can be evaluated within the context of the landscape and thus, decrease the potential for long-term, cumulative impacts to terrestrial and aquatic resources, as well as biodiversity” (USFS 1993a:I-414). Letter 1292 stated that “The GWNF should be managed according to the latest findings of unbiased science, in accordance with the principles of conservation biology and island biogeography” (USFS 1993a:I-343).

The 1986 Forest Plan defined management areas under a different concept than was used in the 1993 Forest Plan. Generally, the 1986 Forest Plan defined a number of small and specific management areas, but relegated most of the Forest to general management areas. Within these general areas, it was difficult to determine where different emphasis was applied. Management areas in the 1993 Forest Plan operated under a “zone” concept. The zone concept gives area-specific direction for the entire Forest. Management area allocations were governed by the goals of each proposed alternative. Twenty-two management prescriptions were developed based on public views that centered on four resources: recreation, wildlife, water, and timber. The 22 prescriptions were: visual quality objectives, even/uneven-aged silvicultural systems, featured/management indicator species, clearcut size, hardwood to pine conversion, motorized vs. nonmotorized access, recreation opportunity spectrum, non-timber practices allowed, open vs. closed roads, ORV/ATV use, timber harvest methods, and rotation lengths. The management area prescriptions were ten analyzed within the FORPLAN model. In the FORPLAN model, management areas consisted of: (1) a management emphasis, (2) a management intensity, (3) an option on when to implement or timing choice, (4) predicted resource yields, (5) the value of the resource yields, and (6) the cost of implementing the management prescription (USFS 1993a).

9. Were adaptive management techniques (e.g., monitoring, evaluation) integrated into planning and management?
- not at all.
 - followed standardized monitoring and evaluation procedures.
 - **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.**

The monitoring process discussed in the Final EIS recognized the critical roles of new scientific information and public participation in maintaining a viable, dynamic Forest Plan. Monitoring would also determine whether or not the Forest Service was producing desired resource values, uses and products in ways that sustain the diversity and productivity of ecosystems. Evaluation of the monitoring information would provide useful and valid indicators to the public and Forest Service decisionmakers of whether the Plan remained sufficient to sustain a diverse, healthy and productive Forest (USFS 1993a).

The monitoring and evaluation program would help keep the commitments made in the Forest Plan. These commitments included assessing whether or not:

- Projects were implemented in compliance with the project design, Forest Plan direction, and/or the NEPA decision document.
- Forest-wide and Management Area standards were followed.
- Plan standards were effective.
- Plan goals and objectives were met.
- Emerging public issues were being addressed.
- Research needed to ensure practices do not impair land productivity was identified.

- New information, including laws, regulations, and Forest Service directives, was assessed quickly on how it affects the Plan.
- Plan implementation is moving toward the desired future condition.
- Assumptions, relationships, and decisions were, and would continue to be valid in light of new information or changing conditions (USFS 1993a:P5-1).

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

- **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 for agency personnel, representatives from other federal agencies, state and local agencies, and the public.

The Final EIS does not refer to any educational programs or short courses held for the benefit of in-house agency personnel. Although public, state and local, and other agency support and input was strongly encouraged, the Final EIS does not reference any educational workshops or short courses that were held to educate state and local agency personnel or the public with regard to the NEPA process, the Forest Service management and planning process, or ecosystem management.

A professional interpretation program was proposed as part of the Revised Forest Plan. "Interpretation is a dynamic means of communicating to the public about the valuable resources found in their Forest, and the management activities which are occurring to protect these resources" (USFS 1993a:Plan-C-1). The products of the professional interpretative program included:

1. Increased public awareness and sensitivity to the fragile nature of many of our natural and cultural resources and the need to protect them.
2. Cultivation in our youth of knowledge and respect for the natural environment.
3. Education of the public about the role of the Forest Service as the agency responsible for managing the GWNF.
4. Promotion of the Forest as a place with a multitude of opportunities for visitors to enjoy.
5. Further development of good relations between the Forest Service and the public.
6. Promotion of partnerships.
7. Reduction of litter and vandalism (USFS 1993a:Plan-C-1).

Over the past several years, most of the interpretation on the Forest has been done by volunteers. The establishment of professional interpreters on the Forest would help ensure that high quality interpretation will be planned and implemented (USFS 1993a).

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; ecological patterns and processes were disregarded.
- 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.
- **agency evaluated and set priorities based on societal demands within the constraints of ecosystem patterns and processes.**

Critical factors relevant to the Regional Forester's decision to Select Alternative 8A were:

- Biological diversity of the Forest.
- The productive capacity of the Forest to produce a variety of goods and services.
- The health of the Forest affected by the continued presence and potential damage to natural resources from the gypsy moth as well as other insects and diseases.
- The natural beauty of the Forest associated with its historical and cultural value to the mid-Appalachian region.
- Concerns about changes in socioeconomic conditions in the area affected by the Forest.
- National and regional issues such as below-cost timber sales, ecosystem management, and old growth which require new approaches to traditional management.
- Sensitivity to striking a balance (USFS 1993a:ROD-3).

The Forest Service's Preferred Alternative (8A) emphasizes late successional and remote wildlife habitat, watershed protection, and non-motorized recreation opportunities to a greater degree than in the past. This emphasis was accomplished, however, in a multiple use context where other uses, values, products and conditions were also provided. Alternative 8A also recognized that besides the traditional multiple uses of timber, wildlife and motorized recreation, the Forest Service needs to provide amenity values, such as aesthetics and remote, non-motorized recreation, as well as environmental conditions that promote healthy, diverse lands and water (USFS 1993a).

The Environmental Alternative (3) was formulated to address issues and concerns about biodiversity, ecosystem management, conservation biology and landscape ecology. It was predicated on the assumption that the primary role of the George Washington National Forest should be to provide ecosystems not available on private land. According to the agency personnel who prepared this EIS, this assumption would require changing existing Forest Service policies, which the regional Forester does not have the authority to change (USFS 1993a).

The Final EIS asserted that the Forest Service would use ecosystem management as the means to meet goals specified in the Revised Forest Plan. "Ecosystem management is the means to an end. It is not the end itself. The Forest Service does not manage ecosystems just for the sake of managing them or for some notion of intrinsic ecosystem values. They are managed for specific purposes such as producing, restoring, or sustaining certain ecological conditions, desired resource uses and products, vital environmental services, and aesthetic cultural or spiritual values. For the Forest Service, ecosystem management means to produce desired resource values, uses, products or services in ways that also sustain the diversity and productivity of ecosystems" (USFS 1993a:I-72).

Appendix E

**NEPA Question Results for the
Francis Marion National Forest**

Appendix E: NEPA Question Results for the Francis Marion National Forest

The 1985 Francis Marion National Forest Final EIS and Forest Plan

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

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

Many critical environmental impacts were identified during Draft EIS review by other federal agencies, local and state government agencies, citizens, and organizations. Only 28 responses were received—8 from federal agencies, 6 from state/county government, 6 from cooperators, 5 from organizations, and 3 from individuals. Identified critical environmental impacts included: harvesting hardwood forests and replanting with pines; harvesting in wet loblolly forest habitat which is the habitat of the 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 succession animal species.

Most of the concerns and comments expressed during Draft EIS review were not specifically addressed in the body of the Final EIS as the original list of issues raised during scoping was carried over. No new issues were added to the list. Some incremental changes were made from the Draft EIS to the final document. Changes made to the Final EIS included: the conversion of approximately 6000 acres of loblolly pine to longleaf pine, which represented 2 percent of the Forest; the Forest Service agreed to defer cutting portions of the wet loblolly forest types until the swallow-tailed kite's habitat requirements were determined; and a hardwood component would be retained in pine stands and a pine component would be retained in hardwood stands in response to criticism that the Francis Marion National Forest was becoming a "monoculture" or "tree farm." The Final EIS did not contain a summary of how it differed from the Draft EIS.

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

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

In direct response to federal agency and private organizational criticisms, the Final EIS preferred alternative converted some pine forest type to hardwood forest type, resulting in more hardwood forest type acreage in the older age classes by the end of the 150-year planning horizon. Old growth hardwood stands (averaging 20 acres in size) were to be distributed throughout the Forest at the

rate of 20 acres of old growth per 400 acres of forested land. Likewise, pine stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of pine per 400 acres of hardwood forest type. No rationale was given for how this distribution scheme was determined (USFS 1985).

Riparian areas and wetlands that fell within the “general forest area” would continue to be managed under existing standards and guidelines. These guidelines would provide mitigation measures to decrease the impact of any management practice in wetlands. Vegetative buffer strips of 50 feet would be retained along perennial streams, however, “operable pines” would be removed within these buffer strips. The silvicultural system would remain even-aged management (i.e., “clearcutting,” although the term is never specifically used in the document except in response to public comments). “Without even-aged management techniques, manipulation of forest cover to give optimum benefits to wildlife species would be difficult. Diversity of habitat would be reduced, consequently reducing the opportunity for some species of plants and animals” (USFS 1985:X-201).

Most of the concerns and comments expressed during Draft EIS review were not specifically addressed in the body of the Final EIS as the original list of issues raised during scoping was carried over. No new issues were added to the list. Some incremental changes were made from the Draft EIS to the final document. Changes made to the Final EIS included: the conversion of approximately 6000 acres of loblolly pine to longleaf pine; the Forest Service agreed to defer cutting portions of the wet loblolly forest types until the swallow-tailed kite’s habitat requirements were determined; and a hardwood component would be retained in pine stands and a pine component would be retained in hardwood stands in response to criticism that the Francis Marion National Forest was becoming a “monoculture” or “tree farm.” The Final EIS did not contain a summary of how it differed from the Draft EIS.

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

- **minimally or not at all.**
- integrated in some areas, but not in others.
- integrated throughout document and in the alternative selection process.

The Forest Service in its summary and introduction to the Final EIS described the Francis Marion National Forest as being part of the Southern Floodplain Forest Ecosystem and Southeastern Mixed Forest Ecoregion. The document also gave a brief account of the Forest’s ecological history since pre-settlement times (USFS 1985). The Final EIS did not describe current Forest conditions from an ecological perspective nor did it use ecological information in the alternative selection process.

In direct response to federal agency and private organizational criticisms, the Final EIS preferred alternative converted some pine forest type to hardwood forest type, resulting in more hardwood forest type acreage in the older age classes by the end of the 150-year planning horizon. Old growth hardwood stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of old growth per 400 acres of forested land. Likewise, pine stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of pine per 400 acres of hardwood forest type. No rationale was given for how this distribution scheme was determined (USFS 1985).

Riparian areas and wetlands that fell within the “general forest area” would still be managed under existing standards and guidelines. Buffer strips of 50 feet would be retained along perennial

streams, however, operable pines could be removed within the buffer strips (USFS 1985). The silvicultural system would remain even-aged management. The Forest Service stated that, “Without even-aged management techniques, manipulation of forest cover to give optimum benefits to wildlife species would be difficult. Diversity of habitat would be reduced, consequently reducing the opportunity for some species of plants and animals” (USFS 1985:X-201).

A letter from R.L. Jones (Land Programs Coordinator, South Carolina Nature Conservancy) stated that, “Unfortunately, management provisions appear to focus entirely on species needs within isolated populations. Recommendations do not take into account the larger question of habitat considerations or management of plant/natural communities in which the populations are found. The proposed recommendations for the most part suggest a small buffer around identified populations as being adequate to protect the sensitive plants” (USFS 1985:X-266).

4. How were the magnitude and significance of relevant impacts of alternatives identified and estimated (including indirect and cumulative effects)?
 - **magnitude and significance of relevant environmental impacts of alternatives not identified.**
 - partial identification and estimation of magnitude and significance of relevant impacts of alternatives.
 - thorough identification and estimation of magnitude and significance of relevant impacts of alternatives (including indirect and cumulative effects).

General, and often vague, direct and indirect effects were given for all alternatives and then those that were specific to each alternative. For example, an indirect effect to diversity for Alternative A was given as, “This alternative indirectly affects the diversity of plant habitat through management activities” (USFS 1985:IV-11). There was, however, no discussion of what the actual indirect effects might be. A second example, “In the short term [the 50-year planning horizon], diversity would be improved for plant and animal species inhabiting the early successional vegetative stages. The decrease in acreage of the older age classes would decrease those plant and animal species requiring late successional vegetative stages” (USFS 1985:IV-14).

There was no discussion of cumulative impacts in the Final EIS.

5. How were identified irreversible or irretrievable commitments of resources addressed?
 - not addressed.
 - **marginally; from a narrow perspective.**
 - substantially.

With regard to irreversible commitment of resources, the Final EIS stated, “The alternatives were formulated with the understanding that maintenance of future options was an important consideration. Measures to protect resources that could be irreversibly affected by other resource uses were incorporated into the Forest-wide standards and guidelines. None of the alternatives would have significant irreversible commitments of resources” (USFS 1985:IV-63).

With regard to irretrievable commitment of resources, the Final EIS stated, “This represents opportunities for the period of time that the resource cannot be used. Timber mortality not salvaged within ‘special areas’ is an example of an irretrievable commitment of a resource” (USFS 1985:IV-63). “Special areas” were Wilderness Areas, Special Biological Study Areas, etc.

6. To what extent was an integrated, systematic, interdisciplinary approach used?
- project completed entirely using in-house personnel from same disciplinary background.
 - **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.

The EIS documents and Forest Plan were prepared entirely in-house by a management team, an interdisciplinary team, and a support group of Forest Service personnel. Various expertise within the Forest Service was represented, e.g., forestry, forest planning, hydrology, soil science, forest archaeology, civil engineering, landscape architecture, wildlife biology, materials engineering, wildlife, research analysis, planning, and silviculture (USFS 1985).

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.
 - **monitoring plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.**
 - monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.

The Forest Plan outlined a monitoring and evaluation plan for implementation of the selected alternative. This plan was amended from the Draft Forest Plan in response to federal agency comments to show that the Forest Service had the responsibility for monitoring (NFMA requires monitoring as an essential part of any National Forest and resource management plan) (USFS 1985). The Final EIS stated that the monitoring plan for wildlife would continue to be developed (at the time of the Final EIS, the Forest Service only had baseline data on game animals) and it would also continue to develop monitoring methods and procedures (USFS 1985). The Forest Plan did not discuss evaluation methods and procedures.

8. How did the Final EIS/ROD address the mitigation of unavoidable impacts?
- not addressed.
 - **general mitigation measures discussed, but no detailed mitigation plan developed as part of the Final EIS/ROD.**
 - 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.

Unavoidable adverse impacts were identified for each alternative. Several of the alternatives contained significant adverse effects on the physical, biological, social and economic aspects of the environment. Many of these effects would result from management practices, yields, standards and

guidelines, and policies associated with those alternatives. The Forest Service selected the preferred alternative because it minimized the adverse effects. Unavoidable impacts for the preferred alternative included:

- Short-term adverse effects on visual quality from timber harvesting.
- Foregone timber volumes from the designation of 3412 acres of "special areas."
- Short-term adverse effects on air and visual quality from prescribed burning.
- Localized adverse effects from the use of pesticides.
- Short-term adverse effects on soil and water quality from localized soil movement during road construction/reconstruction.
- Localized lowering of site productivity on skid trails, temporary roads and new roads.
- Short-term adverse effects on riparian areas from timber harvesting and other management practices.
- Alteration of normal surface drainage patterns from timber management practices (USFS 1985).

The Final EIS discussed generic mitigation measures designed to mitigate the adverse effects that could not be avoided. Forest-wide standards and guidelines were outlined. Additionally, at some later date, very specific mitigation measures were to be developed for the use of pesticides (USFS 1985).

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

- no input sought.
- **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.

The Francis Marion National Forest EIS team developed a 10-step process for selecting public issues and management concerns to be addressed in the EIS and Forest Plan. Step 3 outlined the pre-scoping procedures: identified public issues; published notice in newspapers; sent a news release to local newspapers and radio and TV stations; placed "Help Plan the Future Management of the Francis Marion National Forest" posters; met with local civic and community organizations; made individual contacts with local and other interested citizens; and mailed a letter and "question and answer" brochure to approximately 385 individuals, organizations, and government agencies. The team received 65 responses in the form of letters and/or verbal comments. Step 7 outlined the scoping of issue topics: one work group was formed, composed of eight citizens representing a cross section of interests (only general issue topics were scoped); the work group was asked to rate each issue topic using "high," "medium," or "low"; the group was also asked to identify the 10 most important issue topics from the list of 13. Step 9 outlined the public review of the tentative major issues: a list of the nine tentative major issues along with the four "other" topics were mailed to approximately 385 individuals, organizations, and other governmental agencies; a 38-day review and comment period was provided; 10 responses were received (USFS 1985).

The Draft EIS public review process consisted of: notice of availability, distribution of published documents, news releases, paid advertisements, slide/tape programs for organizations, cooperators, and Forest Service personnel, public meeting (18 attended), two open-house sessions (no one attended either open house). A total of 28 written or oral responses were received from 3

individuals, 6 state and county governments, 8 federal agencies, 6 cooperators, and 5 organizations (USFS 1985).

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.
- **acknowledged comments/concerns; no or minimal changes made to the project.**
- project moderately changed; but not to the level of comments/concerns.
- project changed during Scoping or after Draft EIS review to reflect the extent of comments/concerns.

Federal and state agencies and organizations were critical of the timber harvest quotas as they were well above Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) figures with no justification given for the increase. The Final EIS slightly lowered the harvest quota. The Forest Service was also criticized for the intensive level of even-aged timber management; no change in harvesting methods occurred in the final document as a result of this criticism. Also, no changes were made in the width of the vegetated buffer along perennial streams; suitable pines would continue to be harvested within the 50-foot buffer and harvesting would continue in wetland areas. In response to agency and public criticism, the Forest Service adjusted the Forest Plan to include hardwood stands within pine forests and vice versa, and to convert 6000 acres of loblolly pine to longleaf pine (USFS 1985).

Employment opportunities, availability of fuelwood, hunting, fishing, and recreational opportunities had been identified in the focus issues and in the social and economic impact analysis as key concerns of the public. However, the Final EIS hunting opportunities for wild turkey, and other late successional species, and gray squirrel, and other game species requiring dens and old growth, would decrease, fishing opportunities would decrease, and fuelwood availability would decrease—which could potentially have serious effects on low income families. There would also be a decrease in developed recreational areas vs. demand. On the other hand, employment opportunities would increase, particularly for minorities, there would be an increase in dispersed recreational areas, and hunting opportunities for early successional species would increase (USFS 1985).

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

In direct response to federal agency and private organizational criticisms, the Final EIS preferred alternative converted some pine forest type to hardwood forest type, resulting in more hardwood forest type acreage in the older age classes by the end of the 150-year planning horizon. Old growth hardwood stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of old growth per 400 acres of forested land. However, there was not discussion of the ecological reasons for taking such steps. For instance, no scientific rationale was given for determining how old growth stands were to be distributed, or how 20 acres of old growth per 400

acres of forest land was determined. The Forest Service acknowledged that vegetative management practices would cause a transitional change in the age and size classes of plants, but, there was no discussion of these effects on ecosystems or on wildlife species dependent on affected vegetative habitat (USFS 1985).

Riparian areas and wetlands that fell within the “general forest area” would still be managed under existing standards and guidelines. For example, vegetative buffer strips, 50 feet wide, would be used along perennial streams, however, operable pines would be removed within the buffer strips. The silvicultural system would remain even-aged management (clearcutting). The Forest Service stated that, “Without even-aged management techniques, manipulations of forest cover to given optimum benefits to wildlife species would be difficult. Diversity of habitat would be reduced, consequently reducing the opportunity for some species of plants and animals” (USFS 1985:X-201).

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

- 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.

The following summarizes the process used on the Francis Marion National Forest to formulate alternatives:

- Major public issues were identified through public involvement efforts; management concerns were added to these.
- Public issues and management concerns were consolidated into a set of general planning questions.
- Multiple use management prescriptions, representing sets of compatible management practices, were developed to answer the questions.
- Individual resource inventories were completed to identify site-specific areas having common environmental characteristics.
- Appropriate locations for applying possible management prescriptions were identified.
- Resource yields and their associated costs and values were developed for each prescription based on physical and biological factors.
- Supply potentials for each resource were determined with the FORPLAN model.
- Potential demand was estimated for the various resource activities.
- Alternative direction statements were established to provide a broad range of options for the future management of the Forest.
- 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.
- A linear program model (FORPLAN) was used to estimate goods and services produced by each alternative, to test the original constraints, and to ensure maximum economic efficiency of the alternative.
- Forest personnel validated projected yields and feasibility of assigning management prescriptions to individual capability areas based on their knowledge of on-the-ground conditions (USFS 1985).

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

- **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.

The Summary chapter of the Final EIS contained an alternative comparison table titled, "Resource Yields and Activities with Significant Differences Between Alternatives." The alternatives produced different mixtures of yields for certain resources: timber acres regenerated, fuelwood harvested, wildlife use, maximum expected wildlife use, water yield, and soil enhancement. A second table compared social and economic benefits through selected social and economic indicators for comparison of alternatives based on dollars returned to the U.S. government and South Carolina, employment, and total income. A third table, "Significant Biological Effects," presents in descriptive form, the biological effects on various resources by alternative: timber, wildlife, threatened and endangered species, soil and water, riparian areas, minerals, utility corridors, air quality, land purchase, cultural resources, visual quality, recreation use, and "Special Areas." Table 6 listed the present net value analysis in dollars, while Table 7 listed economic values and selected non-priced benefits in dollars, acres, number of animals, and jobs (USFS 1985).

The body of the EIS contains a more detailed breakdown of each of these tables and gives source of the information presented in the tables. Chapter IV, Environmental Consequences, included a discussion and comparison of the physical and biological effects and the economic and social effects of implementing each alternative. A discussion of direct and indirect effects was grouped according to the component of the environment affected (USFS 1985).

No conclusions were reached or inferred in discussions accompanying any of the tables.

The 1996 Francis Marion National Forest Final EIS and Forest Plan

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

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

There were very few environmental impacts identified during the Draft EIS review by the public or reviewing agencies. During alternative development, the Forest Service mailed out a newsletter describing its four proposed alternatives. Over 400 written responses were received containing over 3000 individual comments. As the result of the comments, two additional alternatives were developed and existing alternatives were modified to address public concerns. Some issues were changed as follows:

- Corridors connecting wilderness areas—added based on meetings with agency officials, interest groups, and individuals.
- Disposal of treated sewage—not addressed as an issue; decided to handle on a case-by-case basis.
- Public information and education—not addressed as an issue; however, agreed that current level of public information and education was not adequate.
- Clearcutting—no longer addressed as a separate issue; addressed under harvest methods (USFS 1996a).

W.B. Conrad Jr. (South Carolina Department of Natural Resources) wrote that it was his agency's position "that the Forest Service adequately identified key issues, developed appropriate alternatives, clearly analyzed the effects of these alternatives, selected the best alternative and developed a highly appropriate plan based on the preferred alternative" (USFS 1996a:I-41). C. McConnell (Wildlife Management Institute) stated that "The Draft EIS adequately describes the analysis of the five alternatives for managing the land and resources it supports. Likewise, the affected environment is adequately described and there is proper disclosure of the significant environmental effects of the alternatives considered" (USFS 1996a:I-16). Although the impetus for the new EIS and Forest Plan was Hurricane Hugo, Letter 407 pointed out that the possibility of future hurricanes had not been included in the revised Forest Plan (USFS 1996a).

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

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

The critical impacts identified during scoping and Draft EIS review were addressed in the Final EIS. Some impacts were avoided through management decisions and/or design changes. Other critical

impacts were to be mitigated. Several identified impacts were not viewed as critical by the Forest Service. For example,

- In the ROD, “I have revised the MIS [management indicator species] list in the Final EIS and Forest Plan, and have added a Forest-wide objective concerning under-represented plant communities” (USFS 1996a:ROD-12).
- “In response to public comments on the Draft EIS, a hardwood component to the Allowable Sale Quantity has been added to the Forest Plan. This Forest Plan produces the highest allowable sale quantity in the first period” (USFS 1996a:ROD-20).
- A section was added to discuss neotropical migratory birds. Neotropical bird species were added to the MIS list (USFS 1996a:B-53).
- “Timber harvesting in wetlands will continue. The Forest Service believes that there is available technology and there are adequate safeguards in place to ensure that the wetland functions will remain unimpaired” (USFS 1996a:ROD-15).

In response to the Forest Service’s intent to continue timber harvesting in wetlands, A. Mager Jr. (USDOC, NOAA) wrote that, “A major problem we encountered in our review was that of identifying wetlands that are contiguous with, or otherwise hydrologically linked to waters that are tidally influenced. This is of concern because, in the absence of such a determination, it is not possible for us to ascertain which activities and alternatives are capable of affecting, either positively or negatively, our trust resources” (USFS 1996a:I-31).

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

- minimally or not at all.
- integrated in some areas, but not in others.
- **integrated throughout document and in the alternative selection process.**

A consideration in the development of alternatives was the principle of ecosystem management. On June 4, 1992, the Chief of the Forest Service announced the agency's new policy, principles and guidelines for ecosystem management. Under this policy, ecosystem management means using an ecological approach to achieve the multiple use management of National Forests by blending the needs of people and environmental values so that national Forests present diverse, healthy, productive and sustainable ecosystems. The policy would reduce clearcutting as a standard optimum regeneration method (USFS 1996a).

The preferred alternative emphasized expanding the longleaf pine ecosystem, promoting mast-producing hardwoods and mixed pine/hardwood stands, and establishing areas for semi-primitive motorized recreational opportunities. Red-cockaded woodpecker (RCW) management would be emphasized on approximately two thirds of the forest. Wildlife emphasis would enhance habitat for game and non-game species, increase the number of wildlife openings, and create and maintain travel corridors for wildlife. Forest fragmentation would be reduced by having two thirds of the Forest in the RCA habitat management area, by establishing corridors between the wilderness areas, and by closing some roads (USFS 1996a).

The Forest Service completed an ecological classification and mapping framework for the Francis Marion National Forest to identify land allocation options for the alternatives. The classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on

the goals and objectives of the alternative (USFS 1996a). The ecological classification system was not extended beyond the boundaries of the Forest.

The ROD stated that the Final EIS and Forest Plan balance economic and resource values and recognize the equal importance of all natural resources as well as the continued availability of goods and services the public expects from the Forest (USFS 1996a).

4. How were the magnitude and significance of relevant impacts of alternatives identified and estimated (including indirect and cumulative effects)?
 - magnitude and significance of relevant environmental impacts of alternatives not identified.
 - partial identification and estimation of magnitude and significance of relevant environmental impacts of alternatives.
 - **thorough identification and estimation of magnitude and significance of relevant environmental impacts of alternatives (including indirect and cumulative effects).**

Chapter 3 of the Final EIS (The Affected Environment and Environmental Consequences) discussed probable direct, secondary and cumulative effects of the proposed management activities. The impacts are not always identified as “direct” or “secondary,” but all levels of probable effects were outlined and discussed. The magnitude and significance of relevant impacts were discussed in general terms as this was considered a programmatic EIS. Before implementing any of the activities of the Forest Plan, a site-specific environmental analysis of effects would be conducted on a project-by-project basis (USFS 1996a).

5. How were identified irreversible or irretrievable commitments of resources addressed?
 - **not addressed.**
 - marginally; from a narrow perspective.
 - substantially.

Irreversible and irretrievable commitments of resources were not identified or discussed as this EIS process was considered “programmatic.” The actual commitment to develop, use or affect non-renewable resources would be made at the project level (USFS 1996a).

6. To what extent was an integrated, systematic, interdisciplinary approach used?
 - project completed using in-house personnel from same disciplinary background.
 - **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 onset of this planning effort.
 - ongoing interdisciplinary committee, composed of Forest Service and non-Forest Service members, involved in policymaking and planning processes.

An in-house interdisciplinary team prepared the EIS documents and Forest Plan. The team consisted of a resource conservationist, a lands forester, landscape architects, a public affairs specialist, a fire management officer, a soil scientist, a civil engineer, a planning analyst, and a

silviculturist. The team was assisted by the management team and other Forest Service contributors (USFS 1996a).

7. What provisions were made for monitoring and evaluation?

- none.
- importance of monitoring and evaluation discussed, but no monitoring or evaluation plan delineated in the EIS/ROD.
- monitoring and evaluation plan outlined as part of the Final EIS/ROD; no specific monitoring or evaluation techniques given.
- **monitoring and evaluation plan developed as part of the Final EIS/ROD; forest-wide and site-specific standards delineated.**

In the Revised Forest Plan, the needs identified through past monitoring and evaluation efforts and through the Analysis of Management Situation drove the alternative development process. The monitoring and evaluation program functions as the quality control system for the Forest Plan. Monitoring and evaluation received major emphasis in this revision and would provide the Forest Service with information on the future progress it achieved in obtaining management goals and objectives. "Thorough evaluation of monitoring results is directly linked to the decisionmaker's ability to respond to changing conditions, emerging trends, public concerns, and new information and technology" (USFS 1996a:ROD-33).

The Final EIS recognized that improvements should be made in the methods used to monitor Plan implementation. "Many monitoring items are stated in the form of Standard Management Attainment Report activities. In many cases, this is a poor measure of Plan implementation" (USFS 1996a:B-14).

Three types of monitoring would be conducted in the Forest: implementation, effectiveness, and validation.

1. Implementation monitoring—answers the question, "did we do what we said we would do?"
2. Effectiveness monitoring—answers the question, "by implementing projects in accordance with plan direction, are we effectively accomplishing our objectives and moving toward our desired condition?"
3. Validation monitoring—answers the question, "are initial Forest plan data, assumptions, coefficients, prescriptions and standards used in the development of the Plan still valid?" (USFS 1996a:P5-2).

A list of monitoring questions and methods to answer those questions was prepared for each Plan objective (USFS 1996a).

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

- none.
- general mitigation measures discussed, but no mitigation plan developed as part of the Final EIS/ROD.
- **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.

The Forest Service considers mitigation measures to be an integral part of its Forest-wide standards and guidelines. The Final EIS and Forest Plan only outlined general mitigation measures; however, as the Forest Plan was implemented, additional and site-specific mitigation measures would be developed and implemented at the project level (USFS 1996a).

Mitigation measures would be monitored as an integral part of the Forest Plan monitoring and evaluation program. Results of the mitigation measures would be evaluated and the mitigation measures, or standards and guidelines, would then be changed if monitoring results indicated a need (USFS 1996a).

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

- no input sought.
- **input through informational meetings, open houses, letters, and public hearings.**
- representatives of the general public, local, state and other federal agencies, and organizations involved in ongoing Forest Service planning committees.

Public involvement was considered a key part of this land management planning process.

Scoping:

- Notice of Intent published.
- 200 letters and response forms mailed to individuals, organizations, businesses, and county, state and federal agencies. 622 written responses received. About 2500 individual comments were identified within the written responses.
- 200 letters were mailed. The letter invited the recipients to share their ideas for the future management of the Forest at public meetings to be held in five locations (a total of 100 persons attended) (USFS 1996a).

Issue development:

- 17 issues were published in planning Newsletter #1; 700 copies were mailed; only 12 postcards were returned with comments.
- The draft issues were published in planning Newsletter #2; about 800 copies were mailed.

Alternative development:

- Planning Newsletter #3 including the four alternatives was published; 1050 copies were distributed.
- Over 400 written responses were received containing over 3000 individual comments.
- As a result of the comments, two additional alternatives were developed; existing alternatives were modified to address public concerns and to improve clarity in alternative descriptions.
- Planning Newsletter #4 including the six draft alternatives was published and mailed.

During the development of the Draft EIS, numerous informal contacts were made with the public, and some issues were changed. In August of 1994, the Draft EIS and Proposed Revised Forest Plan were published. Based on the 400 responses received, the Forest Service modified the alternatives, corrected technical and computational errors, and further clarified portions of the text in both documents. No new alternatives were developed (USFS 1996a).

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.
- acknowledged comments/concerns; no or minimal changes made to the project.
- project moderately changed; but not to the level of comments/concerns.
- **project changed during Scoping or after Draft EIS review to reflect the extent of comments/concerns.**

Most of the critical impacts and comments/concerns identified during scoping, alternative selection, and Draft EIS review were addressed in the Final EIS. For example:

- In the ROD, "I have revised the MIS list in the Final EIS and Forest Plan, and have added a Forest-wide objective concerning under-represented plant communities" (USFS 1996a:ROD-12).
- "In response to public comments on the Draft EIS, a hardwood component to the Allowable Sale Quantity has been added to the Forest Plan. This Forest Plan produces the highest allowable sale quantity in the first period" (USFS 1996a:ROD-20).
- A section was added to discuss neotropical migratory birds. Neotropical bird species were added to the MIS list (USFS 1996a).
- Timber harvesting in wetlands would continue. "The Forest Service believes that there is available technology and there are adequate safeguards in place to ensure that the wetland functions will remain unimpaired" (USFS 1996a:ROD-15).

The Final EIS and Forest Plan addressed a broad range of public issues and management concerns; supplied a mixture of public uses and products; responded to environmental values and conditions desired by the public; and were sensitive to ecological principles by emphasizing the maintenance of healthy, diverse and sustainable forest ecosystems. The Final EIS and Forest Plan balanced economic and resource values and recognized the equal importance of all natural resources as well as the continued availability of goods and services the public expects from the Forest (USFS 1996a).

The Forest Plan was developed with public participation and the involvement, coordination, and comments from federal, state and local agencies. Numerous efforts were made to ensure that the selected alternative considered the goals of other public agencies as they related to national forest management (USFS 1996a).

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

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 classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on the goals and objectives of the alternative. The Landtype data were entered into a GIS (USFS 1996a). The ecological classification system did not extend beyond the boundaries of the Forest.

The preferred alternative emphasized expanding the longleaf pine ecosystem, promoting mast-producing hardwoods and mixed pine/hardwood stands, and establishing areas for semi-primitive motorized recreational opportunities. Red-cockaded woodpecker (RCW) management would be emphasized on approximately two-thirds of the forest. Wildlife emphasis would enhance habitat for game and non-game species, increase the number of wildlife openings, and create and maintain travel corridors for wildlife. Forest fragmentation would be reduced by having two thirds of the Forest in the RCA habitat management area, by establishing corridors between the wilderness areas, and by closing some roads (USFS 1996a).

The ROD stated that the Final EIS and Forest Plan balance economic and resource values and recognize the equal importance of all natural resources as well as the continued availability of goods and services the public expects from the Forest (USFS 1996a).

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

- 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.

The ROD stated that the FORPLAN model was used as a simulator of different management scenarios which achieved different alternative objectives. It was also used to provide an estimate of some of the probable activities and outputs. These estimates were then used primarily for effects analysis in the Draft EIS (USFS 1996a).

Present Net Value (PNV) of the alternatives was estimated using discounted costs and revenues over a 90-year planning period. Benefits included estimated timber sale receipts, wildlife and fish user day values, and recreational visitor day values. Estimated costs included the necessary budget to implement the alternatives fully. The ROD stated that the Forest Plan maximized net public benefits while responding to the issues. It balanced adequate protection of the environment with production of both monetary and non-monetary resource outputs (USFS 1996a).

Identified issues developed during alternative selection and carried forward to the Final EIS included: recreational facilities; trail system; scenery along travelways; off-highway vehicle travel; roads; habitat for game and non-game wildlife; protection of threatened, endangered and sensitive plants and animals; timber management strategy; corridors connecting wilderness areas; herbicides; prescribed burning; distribution and mix of tree species; wetlands; and revenue and jobs. Chapter 3 (The Affected Environment and Environmental Consequences) under the sub-heading, Economical/Social Environment, discussed more qualitative issues, such as communities, groups and life-styles; special uses; wilderness; roadless areas; wild and scenic rivers; land ownership and

use; health, safety, and energy; Heritage Management Program; and visual quality (USFS 1996a). These issues were quantified (e.g., willingness to pay, etc.) and entered directly into the FORPLAN model or were classified as “constraints” and then input into the model (USFS 1996a).

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

- **no decisionmaking framework provided.**
- decisionmaking framework provided for effects that were quantifiable.
- decisionmaking framework provided for consideration of all effects of alternatives, including environmental, economic and social effects.

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. For example, the number of proposed recreational facilities for each of the alternatives in discussed and presented in a bar graph for comparison purposes (USFS 1996a). No information is provided to inform the reader as to the need for new recreational sites (other than it was raised as an issue during scoping), or to the appropriate number and types of sites necessary to meet this need. Therefore, there is no way to evaluate whether one or nine additional sites are appropriate.

The Final EIS or ROD did not present a decisionmaking framework for consideration of all effects of the alternatives. The Rationale for alternative selection in the ROD was that the Forest Plan should maximize net public benefits and best respond to the issues. It balances adequate protection of the environment with production of both monetary and nonmonetary resource outputs. The Regional Forester approached his decision by looking at the issues and the public comments on them and then comparing the consequences of various alternatives on the issues (USFS 1996a).

Appendix F

**Ecosystem Management Question Results
for the Francis Marion National Forest**

Appendix F: Ecosystem Management Question Results for the Francis Marion National Forest

The 1985 Francis Marion National Forest Final EIS and Forest Plan

1. Did the agency propose management procedures to maintain viable populations of native species in situ? If so, how?
 - no procedures proposed.
 - **management procedures primarily focused on game species such as deer, bear, and wild turkey, and endangered species.**
 - agency proposed management procedures to maintain viable populations of native species in situ through preservation and enhancement of multiple habitat types and sizes.

Indicator species were selected to represent habitat requirements for different animal species. Viable population constraints were used to ensure that viable populations were managed for and maintained through harvesting rotations. Indicator species included white-tailed deer, eastern wild turkey, eastern gray squirrel, northern bobwhite quail, and red cockaded woodpecker. All but the endangered red cockaded woodpecker are game species. A “no effect” situation was applied to threatened, endangered and sensitive species. The minimum management requirements were designed to maintain and, if possible, increase populations of threatened and endangered species (USFS 1985).

The Draft EIS proposed to harvest 6717 acres of wet loblolly pine, or 83 percent of this community type. Wet loblolly pine is the habitat of the South Carolina listed endangered swallow-tailed kite. The South Carolina Wildlife and Marine Resource Department, therefore, criticized this proposed action. The Final EIS was amended to defer cutting portions of the wet loblolly forest types to allow time for the Wildlife and Marine Resource Department to determine the bird's habitat requirements (USFS 1985).

A letter from J.H. Lee (Regional Environmental Officer, USDOJ) questioned the Forest Plan's ability to improve or maintain viable populations of indicator species: “We are unclear as to how this improvement will be accomplished, when habitat conditions for wild turkey and squirrel are predicted to decline through the first 50 years and deer populations reach a high in the first 5- year period only to decline from the 5th through the 15th periods” (USFS 1985:X-244). D.S. Carter Jr. (Director, National Wildlife Federation) wrote: “It is our general assessment that the preferred alternative will result in a less diverse forest, reduced populations of some important game and non-game species . . . the Forest Service has an affirmative obligation to conserve endangered and threatened species, not just to insure that their actions do not jeopardize the continued existence of a threatened or endangered species” (USFS 1985:X-263).

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

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

The Forest Service in its summary and introduction to the Final EIS described the Francis Marion National Forest as being part of the Southern Floodplain Forest Ecosystem and Southeastern Mixed Forest Ecoregion. The document also gave a brief account of the Forest's ecological history since pre-settlement times (USFS 1985). The Final EIS did not describe current Forest conditions from an ecological perspective nor did it use ecological information in the alternative selection process.

In direct response to federal agency and private organizational criticisms, the Final EIS preferred alternative converted some pine forest type to hardwood forest type, resulting in more hardwood forest type acreage in the older age classes by the end of the 150-year planning horizon. Old growth hardwood stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of old growth per 400 acres of forested land. Likewise, pine stands (averaging 20 acres in size) were to be distributed throughout the Forest at the rate of 20 acres of pine per 400 acres of hardwood forest type. No rationale was given for how this distribution scheme was determined (USFS 1985).

Riparian areas and wetlands that fell within the "general forest area" would still be managed under existing standards and guidelines. Buffer strips of 50 feet would be retained along perennial streams, however, operable pines could be removed within the buffer strips (USFS 1985). The silvicultural system would remain even-aged management. The Forest Service stated that, "Without even-aged management techniques, manipulation of forest cover to give optimum benefits to wildlife species would be difficult. Diversity of habitat would be reduced, consequently reducing the opportunity for some species of plants and animals" (USFS 1985:X-201).

A letter from R.L. Jones (Land Programs Coordinator, South Carolina Nature Conservancy) stated that, "Unfortunately, management provisions appear to focus entirely on species needs within isolated populations. Recommendations do not take into account the larger question of habitat considerations or management of plant/natural communities in which the populations are found. The proposed recommendations for the most part suggest a small buffer around identified populations as being adequate to protect the sensitive plants" (USFS 1985:X-266).

3. What level of measures were proposed to sustain ecosystem diversity, health, and productivity?
 - **minimal or very narrowly focused measures proposed.**
 - importance of sustainability discussed, but no management measures were proposed.
 - specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticides, etc.

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 occurring in the Francis Marion National Forest. Beyond that, the Forest Service would maintain viable populations of native vertebrate and plant species. "The minimal management requirements contained constraints designed to protect the long-term productivity of soils, wildlife [actually different vegetative habitat types], threatened and endangered species, and the long-term sustained yield capacity of timber" (USFS 1985:IV-61).

The silvicultural system would remain even-aged management (clearcutting) despite numerous agency and organizational comments to the contrary. “Without even-aged management techniques, manipulation of forest cover to give optimum benefits to wildlife species would be difficult. Diversity of habitat would be reduced, consequently reducing the opportunity for some species of plants and animals” (USFS 1985:X-201). Sustainability was discussed in terms of the “long-term yield capacity” of the Forest (USFS 1985:II-24).

Forest management goals of the Final EIS included retaining a hardwood component in pine stands and a pine component in hardwood stands. However, there was no discussion of the ecological reasons for taking such actions. Further, no ecological rationale was given for distributing 20 acres of hardwood, old growth forests per 400 acres of pine stands.

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

- **management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries.**
- acknowledged ecosystem patterns and processes at different geographic and time 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.

The Forest Service in its summary and introduction to the Final EIS described the Francis Marion National Forest as being part of the Southern Floodplain Forest Ecosystem and Southeastern Mixed Forest Ecoregion (USFS 1985). This was the only reference to ecosystem boundaries within or outside the Forest’s political boundaries. The Final EIS stated that most of the management activities and resource yields for the preferred alternative were short-term uses (less than 50 years). In committing the Forest to the production of these resource yields, however, long-term productivity could be affected (USFS 1985). How long-term productivity could be affected was not discussed.

One of the goals for the “environmental alternative” was “to prevent environmental damage to lands or resources of adjoining lands or other ownerships or downstream areas” (USFS 1985:vii). However, this goal was not included in the preferred alternative in the Final EIS.

5. How were management boundaries delineated?

- **only used political boundaries; no or limited discussion of what occurs beyond political boundaries.**
- acknowledged ecosystem concept, but only looked at selected parts of ecosystems.
- defined ecological boundaries at appropriate scales; managed within and across whole landscapes, watersheds, regions, etc.

The Forest Service in its summary and introduction to the Final EIS described the Francis Marion National Forest as being part of the Southern Floodplain Forest Ecosystem and Southeastern Mixed Forest Ecoregion (USFS 1985). This was the only reference to ecosystem boundaries within or outside the Forest’s political boundaries.

Management options discussed in the Final EIS and Forest Plan predominantly focused within the boundaries of the Francis Marion National Forest. The only real discussion outside of the Forest

boundaries concerned the possible impacts of forest management activities on the local economy and the availability of recreation, fuelwood and hunting opportunities for local communities (USFS 1985).

Several agency and organizational comments urged the Forest Service to take a broader perspective in managing the Forest. For example, a letter from D.A. Poole (President, Wildlife Management Institute) stated that, “. . . private and corporate lands produce large populations of early successional species. These same lands produce an abundance of pulp wood. The focus of the Francis Marion National Forest should be on those forest resources that are not readily available on private and corporate lands” (USFS 1985:X-300).

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

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

The EIS documents and Forest Plan were prepared entirely in-house by a management team, an interdisciplinary team, and a support group of Forest Service personnel. The preparers represented varied backgrounds and expertise, including forest planning, hydrology, soil science, forest archaeology, civil engineering, landscape architecture, wildlife biology, materials engineering, operational research analysis, and silviculture (USFS 1985).

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

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

The Francis Marion National Forest interdisciplinary team developed a 10-step process for selecting public issues and management concerns to be addressed in the EIS and Forest Plan. Step 3 outlined the pre-scoping procedures: identified public issues; published notice in newspapers; sent a news release to local newspapers and radio and TV stations; placed "Help Plan the Future Management of the Francis Marion National Forest" posters; met with local civic and community organizations; made individual contacts with local and other interested citizens; and mailed a letter and "question and answer" brochure to approximately 385 individuals, organizations, and government agencies. The team received 65 responses in the form of letters and/or verbal comments. Step 7 outlined the scoping of issue topics: one work group was formed, composed of eight citizens representing a cross section of interests (only general issue topics were scoped); the work group was asked to rate each issue topic using "high," "medium," or "low"; the group was also asked to identify the 10 most important issue topics from the list of 13. Step 9 outlined the public review of the tentative major issues: a list of the nine tentative major issues along with the four "other" topics was mailed to approximately 385 individuals, organizations, and other governmental agencies; a 38-day review and comment period was provided; 10 responses were received (USFS 1985).

The Draft EIS public review process consisted of: notice of availability, distribution of published documents, news releases, paid advertisements, slide/tape programs for organizations, cooperators, and Forest Service personnel, public meeting (18 attended), two open-house sessions (no one attended either open house). A total of 28 written or oral responses were received from 3 individuals, 6 state and county governments, 8 federal agencies, 6 cooperators, and 5 organizations (USFS 1985).

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

- **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.
- 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.

The Final EIS did state that the Forest Service was interested in any inventory or data which might have been collected by other federal, state and local agencies. The Forest Service, at the time of completing the EIS and Forest Plan, only had data on game species. The South Carolina Wildlife and Marine Resource Department was doing research on the endangered swallow-tailed kite. In response to agency and organizational comments with regard to the kite, the Forest Service was to develop an action plan to manage kite habitat as more data became available from the South Carolina Wildlife and Marine Resource Department. The Final EIS was amended to defer cutting portions of wet loblolly forest types until the data were available (USFS 1985).

Under the preferred alternative:

- numbers of white-tailed deer and other early successional species increase (due to increased timber harvesting and harvesting techniques which favor edge species).
- numbers of wild turkey and other late successional species decrease (due to increased timber harvesting, harvesting techniques, and increased edge).
- numbers of gray squirrel and other species requiring dens and old growth decrease (due to increased harvesting and harvesting techniques).
- fish stocks decrease (due to timber harvesting techniques in riparian areas).
- song bird populations decrease (due to increased timber harvesting, harvesting techniques, and increased edge) (USFS 1985).

A letter from D.S. Carter Jr. (National Wildlife Federation) stated that "... the red-cockaded woodpecker ... the existing biological opinion on the handbook chapter is inadequate. It is not based on the best available scientific information. . . . The U.S. Fish and Wildlife Service should issue a biological opinion based on the best available scientific information to insure that Forest Service actions do not jeopardize the continued existence of the red-cockaded woodpecker" (USFS 1985:X-257).

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

- not at all.
- **followed standardized monitoring and evaluation procedures.**
- 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.

The Final Forest Plan contained a standardized monitoring and evaluation plan for implementing the selected alternative. Due to federal agency comments, the Final Forest Plan was rewritten to show that the Forest Service has the responsibility for monitoring as NFMA requires monitoring as an essential part of any National Forest land and resource management plan (USFS 1985).

The monitoring plan for wildlife would continue to be developed. There were baseline population and habitat data for some wildlife species (mostly game animals). There were unfortunately no baseline data for other species. The Forest Service would also continue to develop monitoring methods and procedures (USFS 1985). The Forest Plan did not discuss evaluation methods and procedures.

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

- **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.

Slide and/or tape programs were prepared and shown to organizations, cooperators, the public, and Forest Service personnel that (1) explained the Forest Service planning process and (2) presented the Forest Service's proposed alternatives during DRAFT EIS review. However, no representatives of the public attended the open houses where the slide/tape program was presented. The Forest Service also distributed published documents explaining the Forest Service Planning process to the public, federal, local and state agencies, and organizations (USFS 1985). If in-house educational workshops were held, there is no mention of them in the Final EIS.

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

Employment opportunities, availability of fuelwood, hunting, fishing, and recreational opportunities were identified in the focus issues and in the social and economic impact analysis as key concerns of

the public (USFS 1985). However, the Final EIS did not reflect many of the identified issues and concerns. Under the preferred alternative:

- timber harvesting quota was above RPA figures by 21 million board feet (special interest concern).
- intensive, even-aged timber management to continue (special interest concern).
- employment opportunities increased, particularly for minorities (special interest concern).
- hunting opportunities increased for white-tailed deer and other early successional species (side effect of special interest concerns).
- hunting opportunities decreased for wild turkey and other late successional species (conflict with special interest concerns; could have a serious effect on low income families).
- hunting opportunities decreased for gray squirrel and other game species requiring dens and old growth (conflict with special interest concerns; diversity impacts; could have a serious effect on low income families).
- fishing opportunities decreased (conflict with special interest concerns; diversity impacts; could have a serious effect on low income families).
- fuelwood availability decreased (conflict with special interest concerns; could have a serious effect on low income families).
- opportunities for song bird viewing decreased (conflict with special interest concerns; aesthetic and diversity impacts).
- decreased developed recreational areas vs. demand (conflict with special interest concerns; recreational opportunities impact).
- increased dispersed recreational areas (no conflict with special interest concerns).
- no additional wilderness allocated (conflict with special interest concerns; recreational, aesthetic, old growth, and diversity impacts) (USFS 1985).

Ecosystem patterns and processes were generally disregarded. A letter from D.S. Carter Jr. (National Wildlife Federation) stated that, "It appears that in the initial planning phases, wildlife and fisheries and hunting and fishing opportunities were a high priority in the issue identification process. We do not believe that timber management and production and the maintenance of wildlife populations and enhancement of hunting and fishing opportunities are as mutually exclusive goals as the alternatives indicate" (USFS 1985:X-257). Similarly a letter from J.A. Timmerman Jr. (Director, South Carolina Wildlife and Marine Resources Department) stated that, "During the planning process for the Draft EIS and Forest Plan, wildlife was the first and foremost public concern and considerable public comment was directed toward increased outputs for fish and wildlife, yet such outputs are not reflected in the Plan" (USFS 1985:X-269).

The 1996 Francis Marion National Forest Final EIS and Forest Plan

1. Did the agency propose management procedures to maintain viable populations of native species in situ? If so, how?
 - no procedures proposed.
 - management procedures primarily focused on game species such as deer, bear, wild turkey, and endangered species.
 - **agency proposed management procedures to maintain viable populations of native species in situ through preservation and enhancement of multiple habitat types and sizes.**

Before Hurricane Hugo, populations of proposed, endangered, threatened, and sensitive species were stable to increasing based on population monitoring done from 1986 to 1989. The hurricane affected all plants and animals to some extent and much of the habitat for many wildlife indicator species, but the most significant change was in the red-cockaded woodpecker populations (USFS 1996a).

The Forest Service compared the alternatives by analyzing the effects of each alternative on management indicator species. The process employed in the development of indicator species for the 1985 Forest Plan was determined to be valid for the Forest Plan revisions. Indicator species were listed by successional stage and vegetative type: grass-forb, shrub/seedling, sapling/pole, and mature. Indicator species included white-tailed deer, eastern wild turkey, eastern woodrat, eastern fox squirrel, northern bobwhite quail, yellow-breasted chat, Bachman's sparrow, eastern bluebird, wood thrush, great-crested flycatcher, pileated woodpecker, red-cockaded woodpecker, black-throated green warbler, green-crested flycatcher, hooded warbler, northern parula, painted bunting, prairie warbler, Swanson's warbler, swallow-tailed kite, yellow-throated warbler, prothonotary warbler, white-eyed vireo, largemouth bass, redbreast sunfish, speckled madtom, Mabee's salamander, southern chorus frog, pinewoods treefrog, pondberry, awed meadowbeauty, wild coco, pondspice, spoonflower, and American chaffseed (USFS 1996a).

In response to criticisms received to the Draft EIS, the management indicator species list was revised to add a forest-wide objective concerning under-represented plant communities. The Forest Service believed that by revision of this list and making the associated changes in its monitoring strategy, the agency would be better able "to meet its mandate to maintain viable populations while preserving and enhancing the diversity of plant and animal communities within the planning area" (USFS 1996a:ROD-12).

2. Was it evident that the agency acknowledged ecological patterns and diversity in terms of the processes and constraints generating them?
 - minimal or no evidence.
 - agency demonstrated some understanding of ecological patterns and diversity; however, this understanding did not effect the management decisionmaking process.
 - agency demonstrated some understanding of ecological patterns and diversity; this limited understanding was reflected in the decisionmaking process.
 - **agency demonstrated understanding of ecological patterns and diversity in terms of the processes and constraints generating them; management decisions reflected this understanding.**

The Forest Service demonstrated adequate understanding of ecological patterns and diversity and this understanding was generally reflected in the decisionmaking process. “The Forest Plan balances economic and resource values and recognizes the equal importance of all natural resources as well as the continued availability of goods and services the public expects from the Forest” (USFS 1996a:ROD-7).

A consideration in the development of alternatives was the principle of ecosystem management. Under this policy, ecosystem management means using an ecological approach to achieve the multiple use management of National Forests by blending the needs of people and environmental values so that national Forests present diverse, healthy, productive and sustainable ecosystems. Ecosystem management was the means used to meet the goals specified in laws, regulations, RPA programs, Forest Plans, and project decision documents (USFS 1996a).

The Final EIS discussed habitat alterations in general and those that resulted from Hurricane Hugo in particular. The document states that, “If new construction of wildlife openings follow the current criteria such as small size (usually 2 acres or less) and the typical location (usually in upland pine areas adjacent to previous disturbances or naturally occurring openings), wildlife openings will not significantly contribute to an increase in forest fragmentation” (USFS 1996a:III-52).

The preferred alternative emphasized expanding the longleaf pine ecosystem; promoting mast-producing hardwoods and mixed pine/hardwood stands; establishing areas for semi-primitive motorized recreational opportunities; establishing red-cockaded woodpecker (RCW) management on approximately two-thirds of the forest; and enhancing wildlife habitat for game and non-game species by increasing the number of wildlife openings and creating and maintaining travel corridors for wildlife. Forest fragmentation would be reduced by having two thirds of the Forest in the RCW habitat management area, by establishing corridors between the wilderness areas, and by closing some roads (USFS 1996a).

As a first step in looking at the Francis Marion National Forest at a different scale and working within the ecological potential of the landscape, the Forest Service developed an ecological classification and mapping system. The agency used the ecological classification framework for the Forest to identify land allocation options for the alternatives. The classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on the goals and objectives of the alternative (USFS 1996a). However, no classification was done for areas outside the boundaries of the Forest. Nor was there a discussion of what physically or biologically happens outside Forest boundaries.

3. What level of measures were proposed to sustain ecosystem diversity, health, and productivity?
 - minimal or very narrowly focused measures proposed.
 - importance of sustainability discussed, but no management measures were proposed.
 - **specific measures were proposed to sustain ecosystem diversity, health, and productivity, e.g., mandated BMPs, environmental restrictions on pesticide use, etc.**

A consideration in the development of alternatives was the principle of ecosystem management. Ecosystem management guidelines included:

- consider economic feasibility and the health, productivity and resilience of the land over time.
- think about the effects of proposed actions at several geographic scales and through time.
- Protect special areas, endangered species, rare plant populations, and cultural resources.
- work within the ecological potential of sites and landscapes.
- involve interested and affected people in the full process of making decisions about common resources.
- monitor, research, interpret, and adapt.
- integrate everything, but not necessarily everything on every acre, at all times (USFS 1996a:II-2).

Indicator species were selected to represent successional stage and vegetative type: grass-forb, shrub/seedling, sapling/pole, and mature. The indicator species placed constraints on development options and management that would occur within these different habitat types (USFS 1996a).

The preferred alternative emphasized expanding the longleaf pine ecosystem; promoting mast-producing hardwoods and mixed pine/hardwood stands; establishing areas for semi-primitive motorized recreational opportunities; establishing red-cockaded woodpecker (RCW) management on approximately two-thirds of the forest; and enhancing wildlife habitat for game and non-game species by increasing the number of wildlife openings and creating and maintaining travel corridors for wildlife. Forest fragmentation would be reduced by having two thirds of the Forest in the RCW habitat management area, by establishing corridors between the wilderness areas, and by closing some roads (USFS 1996a).

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

- no acknowledgment of ecosystem patterns and processes; management decisions were only concerned with the prescribed management time-frame within defined forest system boundaries.
- **acknowledged ecosystem patterns and processes at different geographic and time scales, but management decisions only affected the 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.

As a first step in looking at the Francis Marion National Forest at a different scale and working within the ecological potential of the landscape, the Forest Service developed an ecological classification and mapping system. The agency used the ecological classification framework for the Forest to identify land allocation options for the alternatives. The classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on the goals and objectives of the alternative (USFS 1996a). However, no classification was done for areas outside the boundaries of the Forest. Nor was there a discussion of what physically or biologically happens outside Forest boundaries.

C. McConnell (Wildlife Management Institute) opined that, “The balance offered in Alternative F [the preferred alternative] is preferable only when viewing the Francis Marion National Forest in a vacuum. When viewing the Forest, and other national forests on a regional scale, one may develop a different perspective” (USFS 1996a:I-17). L. Brennan et al. (Tall Timbers Research, Inc.)

criticized the Draft EIS because there was no indication of what pre-settlement vegetation was on various parts of the Forest; further, there was no evaluation of soils or what vegetation they were expected to support. Letter 407 pointed out that hurricanes, being a natural occurrence and inevitable in the area, were not reflected in the overall Forest Plan (USFS 1996a).

The Final EIS did discuss pre-Hurricane forest conditions and the changes that occurred due to the passage of the hurricane. The Final EIS also described the desired future condition of the Forest for each alternative for the 50-year planning horizon (USFS 1996a).

5. How were management boundaries delineated?

- only used political boundaries; no or limited discussion of what occurs beyond political boundaries.
- **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.

As a first step in looking at the Francis Marion National Forest at a different scale and working within the ecological potential of the landscape, the Forest Service developed an ecological classification and mapping system. The agency used the ecological classification framework for the Forest to identify land allocation options for the alternatives. The classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on the goals and objectives of the alternative (USFS 1996a). However, no classification was done for areas outside the boundaries of the Forest. Nor was there a discussion of what physically or biologically happens outside Forest boundaries.

Management options discussed in the Final EIS and Forest Plan predominantly focused within the boundaries of the Francis Marion National Forest. The only discussions concerning areas outside of the Forest treated the possible impacts of Forest management activities on the local economy and the availability of recreation and hunting opportunities for local communities within the region (USFS 1996a).

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

- project completed using in-house personnel from the same disciplinary background.
- **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 the onset of project planning.
- involved ongoing interdisciplinary committee that included representatives of other federal agencies, state and local agencies, and the public in policymaking and planning processes.

An in-house interdisciplinary team prepared the EIS documents and Forest Plan. The team consisted of a resource conservationist, a land forester, landscape architects, a public affairs specialist, a fire management officer, a soil scientist, a civil engineer, a planning analyst, and a silviculturist. The team was assisted by the management team and other Forest Service contributors (USFS 1996a).

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

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

Public involvement was considered a key part of this land management planning process.

Scoping:

- Notice of Intent published.
- 200 letters and response forms mailed to individuals, organizations, businesses, and county, state and federal agencies. 622 written responses received. About 2500 individual comments were identified within the written responses.
- 200 letters were mailed. The letter invited the recipients to share their ideas for the future management of the Forest at public meetings to be held in five locations (a total of 100 persons attended) (USFS 1996a).

Issue development:

- 17 issues were published in planning Newsletter #1; 700 copies were mailed; only 12 postcards were returned with comments.
- The draft issues were published in planning Newsletter #2; about 800 copies were mailed.

Alternative development:

- Planning Newsletter #3 including the four alternatives was published; 1050 copies were distributed.
- Over 400 written responses were received containing over 3000 individual comments.
- As a result of the comments, two additional alternatives were developed; existing alternatives were modified to address public concerns and to improve clarity in alternative descriptions.
- Planning Newsletter #4 including the six draft alternatives was published and mailed.

During the development of the Draft EIS, numerous informal contacts were made with the public, and some issues were changed. In August of 1994, the Draft EIS and Proposed Revised Forest Plan were published. Based on the 400 responses received, the Forest Service modified the alternatives, corrected technical and computational errors, and further clarified portions of the text in both documents. No new alternatives were developed (USFS 1996a).

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

- had no influence on final outcome.
- recent scientific research and technology considered in decisionmaking, but many "trade-offs" were made to accomplish economic and technological goals that were contrary to scientific information.
- **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.

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 classification process used existing inventories of soil, geological, vegetative and hydrological information. Landtype associations were used to define management areas in some alternatives depending on the goals and objectives of the alternative. The Landtype data were entered into a GIS (USFS 1996a).

A consideration in the development of alternatives was the principle of ecosystem management. Under this policy, ecosystem management means using an ecological approach to achieve the multiple use management of National Forests by blending the needs of people and environmental values so that national Forests present diverse, healthy, productive and sustainable ecosystems.

The preferred alternative emphasizes expanding the longleaf pine ecosystem, promoting mast-producing hardwoods, and mixed pine/hardwood stands and establishing areas for semi-primitive motorized recreational opportunities. Red-cockaded woodpecker (RCW) management would be emphasized on approximately two-thirds of the forest. Wildlife emphasis would enhance habitat for game and non-game species, increase the number of wildlife openings, and create and maintain travel corridors for wildlife. Forest fragmentation would be reduced by having two thirds of the Forest in the RCA habitat management area, by establishing corridors between the wilderness areas, and by closing some roads (USFS 1996a).

The 1985 Final EIS and Alternative C of the 1996 Final EIS classified the Forest by management areas based on use: test areas, wilderness areas, recreational areas, non-forest area, water areas, work centers, unique areas, red-cockaded woodpecker areas, general timber production areas (which comprise the largest segment of the Forest), dispersed recreation areas, special wildlife areas, and replacement recruitment stands for red-cockaded woodpecker. Whereas the remaining alternatives proposed in the 1993 Final EIS process, used a different approach to management areas. 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. For example, Management Area 26 included the sandy ridges/side slopes ecological unit, and Management Area 27 included the river/creek bottoms, loamy ridges/flats and swampy flat ecological units. Recreational areas, administrative sites,, roads, trails, clearings, rights-of-way, water, and red-cockaded woodpecker clusters and recruitment stands were not classified as separate management areas. These sites were distributed across the Forest and were incorporated into the ecologically zoned management areas (USFS 1996a).

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

- not at all.
- followed standardized monitoring and evaluation procedures.
- **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.**

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 Plan implementation. "Many monitoring items are stated in the form of standard Management Attainment Report activities. In many cases, this is a poor measure of Plan implementation" (USFS 1996a:B-14). The Final EIS further stated that the ultimate determination of whether the minimum management requirements were met would depend upon the systematic and frequent monitoring of the Forest (USFS 1996a).

Three types of monitoring would be conducted in the Forest: implementation, effectiveness, and validation.

1. Implementation monitoring—answers the question, "did we do what we said we would do?"
2. Effectiveness monitoring—answers the question, "by implementing projects in accordance with plan direction, are we effectively accomplishing our objectives and moving toward our desired condition?"
3. Validation monitoring—answers the question, "are initial Forest plan data, assumptions, coefficients, prescriptions and standards used in the development of the Plan still valid?" (USFS 1996a:P5-2).

A list of monitoring questions and methods to answer those questions was prepared for each Forest Plan objective (USFS 1996a).

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

- **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 for agency personnel, representatives from other federal agencies, state and local agencies, and the public.

The Forest Service agreed that the current level of public information and education was not adequate. Rather than treat these items as separate issues, the agency decided that public information and education should be addressed in the Forest Plan (USFS 1996a). However, the Forest Plan did not discuss either issue.

Letter 34 commented on the lack of educational programs: "I would like to see particular emphasis on management and/or facilities that facilitate or encourage public education, e.g., land-use history, fire ecology, site-specific plant communities, production issues, etc. Interpretive or educational opportunities could be integrated with recreational and/or research areas at minimal cost but with large 'returns'" (USFS 1996a:I-22). The Forest Service responded that it was constructing the Sewee Visitor and Environmental Education Center along with the U.S. Fish and Wildlife Service. This center would provide a diversity of educational offerings (USFS 1996a).

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; ecological patterns and processes were disregarded.
- 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.
- **agency evaluated and set priorities based on societal demands within the constraints of ecosystem patterns and processes.**

The purpose and need for the Forest Plan was to provide a Forest-wide, programmatic, integrated framework for analyzing and approving future site-specific projects and programs. “Overall, the strategic Forest Plan decisions set the framework for attaining net public benefits Forest wide” (USFS 1996a:I-1).

Desired Future Condition:

- The upland landscape contains predominantly even-aged pine stands of different sizes, ages and densities of trees.
- Some uneven-aged stands are found on drier sites.
- Loblolly pine is the dominant species. However, the acreage of longleaf has increased and is common on the well-drained upland sites.
- Mast-producing hardwoods are common in areas protected from fire.
- Mixed pine and hardwood stands are fairly common, often found in transition areas between predominantly pine types and predominantly hardwood types.
- Evidence of timber harvest is seen throughout the Forest in the pine types.
- Roads are found throughout most of the Forest, but many are closed to motorized vehicles.
- Prescribed burning during in the dormant season as well as during the growing season.
- Both game and non-game wildlife species are common.
- Off-highway vehicle travel is not permitted except on designated trails.
- Most of the Forest exhibits different degrees of human disturbance; however, a portion of the Forest has minimal human disturbance (USFS 1996a:S-4).

The Regional Forester wrote in the ROD,

My decision to approve the Forest Plan is based on the potential to maximize net public benefits consistent with the principles of multiple use and sustained yield of forest resources. The Forest Plan addresses a broad range of public issues and management concerns; supplies a mixture of public uses and products, responds to environmental values and conditions desired by the public; and is sensitive to ecological principles by emphasizing the maintenance of healthy, diverse and sustainable forest ecosystems. (USFS 1996a:ROD-7)

No where in the ROD is the term "ecosystem management" mentioned.

The Forest Plan sought to balance economic and resource values and recognized the equal importance of all natural resources as well as the continued availability of goods and services that the public expects from the Forest. The ROD further stated that “The Forest Plan strikes a balance among competing interests in order to achieve the maximum net public benefits from forest resources” (USFS 1996a:ROD-7).