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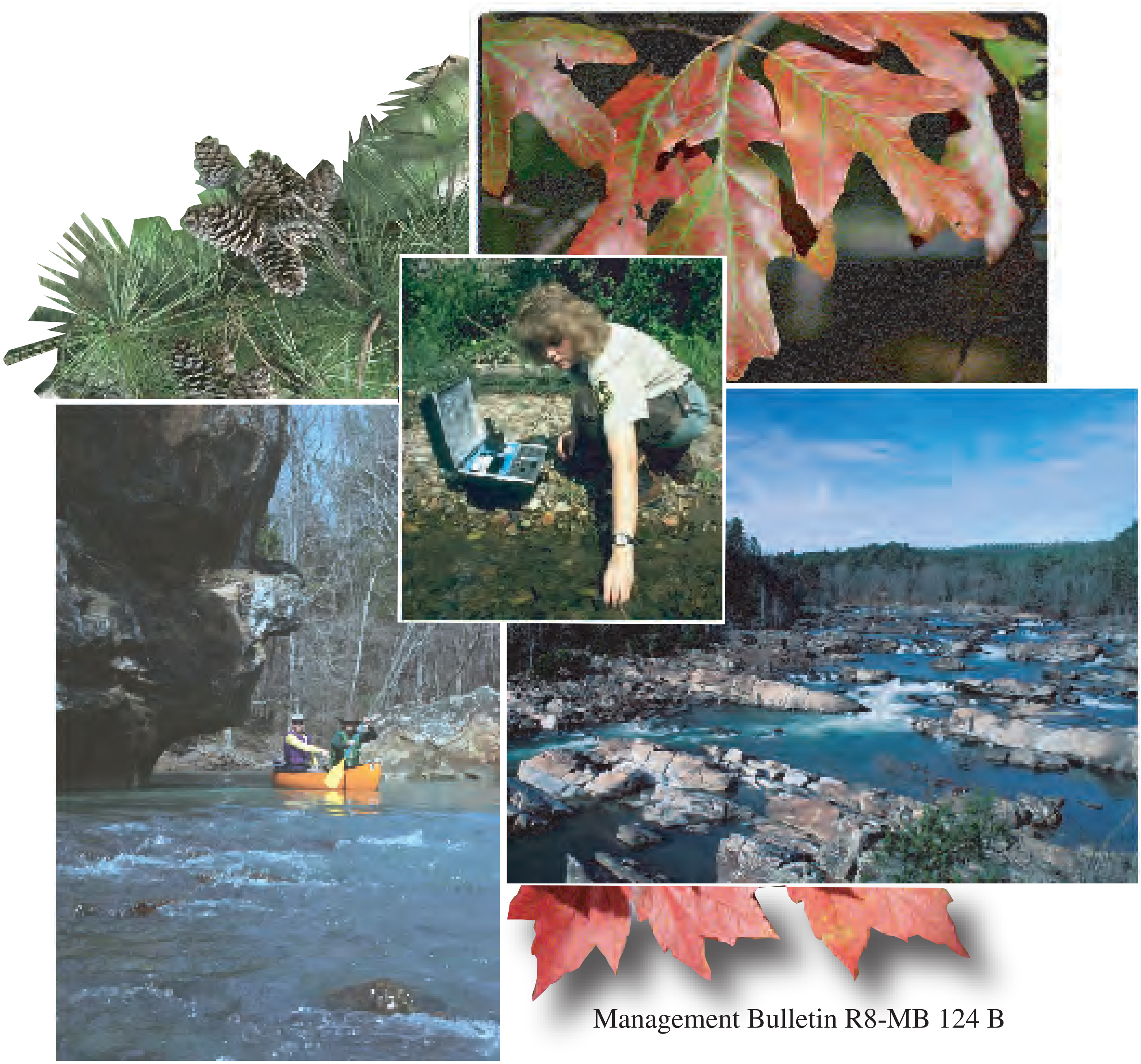
Final Environmental Impact Statement

Revised Land and Resource Management Plan

Ouachita National Forest

Arkansas and Oklahoma



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Final Environmental Impact Statement for the Revised Land and Resource Management Plan

Ouachita National Forest
Arkansas and Oklahoma

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ABSTRACT

The Forest Service has revised the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest. This Final Environmental Impact Statement (FEIS) provides a detailed analysis of the five alternatives considered in revising the Forest Plan. Under the Selected Alternative, the 2005 Revised Forest Plan allocates land to 17 management areas, recommends additions to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness, and identifies lands administratively available for oil and gas leasing and consents to lease (acquired lands) or sets no objection to leasing (Public Domain lands) through the Bureau of Land Management. The Revised Forest Plan re-affirms a recommendation that 16.5 miles of the Glover River in Oklahoma be considered for designation as a Wild and Scenic River. The R.R. Reynolds Research Natural Area (RNA) is established. The Revised Forest Plan contains management direction that cross-country travel by motorized vehicle is unsuitable. The alternatives examined in detail include the 1990 Amended Forest Plan and four alternatives that represent a range of projected vegetation management activities and wilderness recommendations. The Selected Alternative is Alternative E.

Executive Summary

The Forest Service has revised the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest. The purpose of the Forest Plan is to provide long-term, strategic direction for natural resource management on the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental analysis and public involvement.

The 2005 Revised Forest Plan replaces the 1990 Amended Forest Plan for the Ouachita National Forest. The need to revise this Forest Plan was driven by the National Forest Management Act (NFMA) requirement that such plans be revised at least every 15 years and by changing conditions and expectations identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita National Forest.

Public Involvement and Issues

A Notice of Intent (NOI) to prepare an environmental impact statement (EIS) was published in the Federal Register on May 1, 2002, to formally initiate revision. At the same time, the formal public scoping period began. Written public comments were solicited and public meetings were held during the summer of 2002. Additional public meetings were held in the fall of 2003 and again in the spring of 2004. Plan Revision newsletters were periodically published and distributed to the Forest Plan mailing list (consisting of 2,500 individuals, groups, agencies, and organizations at its peak) during the planning process. As a result of this public involvement, the Forest Service was able to refine the issues concerning revision of the Forest Plan and future management of the Ouachita National Forest. Significant issues were grouped into four major issue categories, as follows.

Issue Category 1: Ecosystem Health and Sustainability

What forest management strategies and practices are needed to maintain or improve ecosystem health and sustainability? The four major areas of concern for this issue category are:

- Oak Decline and Mortality
- Viability of Threatened, Endangered, and Other Species of Concern
- Use of Prescribed Fire in Vegetation Management
- Use of Uneven-aged and Irregular Even-aged Silvicultural Systems

Issue Category 2: Land Use Designations

What is the appropriate balance and combination of land use designations? The three areas of concern for this category are:

- Changes needed in definitions and standards for Management Area 9 (water and riparian areas)
- Roadless areas that may be eligible and suitable for wilderness recommendation(s) (36 CFR 219.17)
- Changes needed for suitability determinations, including lands suitable for timber production (36 CFR 219.14(d)) [For the Ouachita National Forest, the required 10-year review of lands not suitable for timber production is being accomplished with this revision.]

Issue Category 3: Public Access and Recreational Activities

How should the Forest provide public access while safeguarding ecosystem health? The four areas of concern for this category are:

- Changes needed in management standards and desired conditions for the transportation system within the Ouachita National Forest, including road densities
- Changes needed to address existing and likely future conflicts among dispersed recreation activities
- The mix of developed and dispersed recreation opportunities on the Forest
- Forest Plan direction concerning the off road use of motorized vehicles

Issue Category 4: Relationship of the National Forest to Communities

What forest management direction should be implemented to support community development needs in and around the Ouachita National Forest? The three areas of concern for this category are:

- Changes in harvest levels and their projected effects on local economies
- Effects of recreation, wildlife-related activities, and tourism on local economies
- Effect of fuels management within the National Forest in relation to communities at risk

Management Areas

Management Areas (MA) for the Ouachita National Forest are geographically defined areas with unique characteristics and different desired conditions accompanied by forest-wide and (normally) MA-specific management standards. In all alternatives except A (No Action Alternative), a slightly revised set of MAs and MA descriptions is used. The MAs for Alternative A are the same as the 1990 Forest Plan. Table ES.1 compares the MAs for the action alternatives to the MAs in the 1990 Forest Plan (Alternative A).

Table ES.1 Management Areas for Alternatives B, C, D, and E compared to 1990 Plan

Management Areas (MAs) for Alternatives B, C, D, and E	***Management Areas (MAs) for Alternative A (1990 Amended Forest Plan)***
MA 1: Wilderness (1a); Poteau Mountain (1b), Recommended Wilderness Addition (1c)	MA 1: Wilderness; MA 1a: Poteau Mountain
MA 2: Special Interest Areas: Scenic Areas (2a); Watchable Wildlife Areas (2b); Rich Mountain and South Fourche Botanical Areas (2c); Rich Mountain Recreation Area (2d)	MA 2: Scenic Areas
MA 3: Developed Recreation Areas	MA 3: Recreation Sites
MA 4: Research Natural Areas and National Natural Landmarks	MA 4: Research Natural Areas and National Natural Landmarks
MA 5: Experimental Forests	MA 5: Alum Creek and Crossett Experimental Forest
MA 6: Rare Upland Communities	MA 6: Threatened, Endangered or Sensitive Species Habitat
MA 7: Ouachita Seed Orchard	MA 7: Ouachita Seed Orchard
MA 8: Administrative Sites/Special Uses	MA 8: Administrative Sites
MA 9: Water and Riparian Communities	MA 9: Water and Riparian Areas
MA 10: Reserved	MA 10: Non-Forest
MA 11: Reserved	MA 11: Not Appropriate for Timber Production
MA 12: Reserved	MA 12: Unproductive
MA 13: Reserved	MA 13: Ouachita Mountains, Unsuitable Lands Based on Other Resource Coordination
MA 14: Ouachita Mountains, Habitat Diversity Emphasis	MA 14: Ouachita Mountains, Lands Suitable for Timber Production
MA 15: West Gulf Coastal Plain, Habitat Diversity Emphasis	MA 15: Coastal Plain
MA 16: Lands Surrounding Lake Ouachita and Broken Bow Lake	MA 16: Lake Ouachita
MA 17: Semi Primitive	MA 17: Semi-Primitive Motorized
MA 18: Reserved (scenery management addressed Forest-wide)	MA 18: Visually Sensitive Foreground Areas, Roads And Trails
MA 19: Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	MA 19: Winding Stair Mountain National Recreation and Wilderness Area (OK) and Rich Mountain Recreation and Black Fork Wilderness Area (AR)
MA 20: Wild and Scenic River Corridors	MA 20: Wild and Scenic River Corridors
MA 21: Old Growth Restoration	MA 21: Old Growth Restoration
MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem And Red-cockaded Woodpecker Habitat
MA 23: Reserved – Broken Bow Lake MA was incorporated with Lake Ouachita MA in MA 16	MA 23: Broken Bow Lake (NF lands above)

Alternatives

The Plan Revision Interdisciplinary (ID) Team developed a broad range of Forest Plan alternatives to address the significant issues. Seven draft alternatives were presented to the Forest Leadership Team (FLT) in January 2004. After review and discussion, the FLT directed the ID Team to carry forward three of the seven draft alternatives for detailed analysis and to merge two others into one. Two of the seven draft alternatives—the minimum level of management and the maximum production potential—were eliminated from detailed consideration and used only for analysis benchmarks.

The FLT determined that four alternatives (plus the present Forest Plan as the No Action Alternative) were sufficient to address the need for change and the significant issues. The range of alternatives considered in detail in this FEIS reflects the relatively modest need for change and the nature of the significant issues identified.

Alternative A (1990 Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the other alternatives are compared.

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed burning, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; and make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction.

Alternative C would place the most emphasis on active management for ecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than the other alternatives. Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternative D would increase emphasis on recreation opportunities, scenery management, and wilderness designation, while focusing ecosystem health activities in support of wildlife based recreation. Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed burning and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. Recommended increases in wilderness designation would total approximately 30,100 acres, including the three additions described in Alternative C and three new areas: Brush Heap, Blue Mountain, and Irons Fork, all located in Arkansas. Alternative D would make cross-country travel by motorized vehicles, including OHVs, unsuitable but would differ from other alternatives by treating OHV-based retrieval of big game as a suitable use.

Alternative E (Selected Alternative) would balance increased emphasis on recreation and ecosystem health with retention of practices that have proven effective over time by combining elements from Alternatives B, C, and D. This would include increased intensive management for native pine-grass, oak woodland, and other fire- and disturbance-dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than in Alternative B and more dispersed than in Alternative D, but less intense than Alternative C. Recommended wilderness additions would be the same as those in Alternative C. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternatives are described in more detail in Chapter 2.

Public Involvement

The public was encouraged to review and submit comments, concerns, and suggestions concerning the Draft EIS and proposed Revised Forest Plan during the formal 90-day comment period, which began February 25, 2005, with the publication of the Notice of Availability (NOA) of the Draft EIS in the Federal Register. The comment period ended May 27, 2005. A detailed description of public involvement activities during forest plan revision is provided in Appendix A of this Final Environmental Impact Statement (FEIS), as are comments received during the 90-day comment period and responses to those comments

Summary Conclusion

The FEIS provides a detailed analysis of alternatives for revising the Land and Resource Management Plan of the Ouachita National Forest. Under the selected alternative, the 2005 Revised Forest Plan allocates land to 17 management areas; recommends increases to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness; and identifies lands administratively available for oil and gas leasing and consents to lease (acquired lands) or sets no objection to leasing (Public Domain lands) through the Bureau of Land Management. The Selected Alternative re-affirms a recommendation that 16.5 miles of the Glover River in Oklahoma be considered for designation as a Wild and Scenic River. The R.R. Reynolds Research Natural Area (RNA) is established. The Selected Alternative contains management direction that cross-country travel by motorized vehicle is unsuitable. The alternatives examined in detail include the 1990 Amended Forest Plan and four alternatives that represent a range of projected vegetation management activities and wilderness recommendations. The Selected Alternative is Alternative E.

Table of Contents

Chapter 1—Purpose and Need

Document Structure

The Forest Service prepared this Final Environmental Impact Statement (FEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant laws and regulations. This FEIS discloses the direct, indirect, and cumulative environmental impacts that would result from implementation of each of the five alternatives documented in detail. The document is organized into five chapters:

Chapter 1. Purpose and Need: This chapter includes information on the history of this Forest Plan revision and the purpose of and need for the revision. This section also details how the Forest Service informed the public about Plan revision and how the public responded.

Chapter 2. Alternatives: This chapter provides a detailed description of the five alternatives that the agency has evaluated for achieving the stated purpose of Plan Revision. These alternatives were developed based on significant issues raised by the public and other agencies and internal management concerns. Chapter 2 provides summary tables that compare the environmental consequences of each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental conditions of the Forest and the environmental effects of implementing each of the five alternatives. This chapter is organized by major environmental components.

Chapter 4. List of Preparers: This chapter provides a list of preparers of this FEIS.

Chapter 5. Distribution List: This FEIS was distributed to the agencies, organizations, and individuals listed in this chapter (as required by NEPA).

Appendices: The appendices provide more detailed information to support the analyses presented in the FEIS.

Additional documentation may be found in the administrative record located at the Forest Supervisor's Office in Hot Springs, Arkansas.

Purpose of and Need for Action

The Forest Service proposed to revise the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest in 2002. This Forest Plan provides long-term, strategic direction for natural resource management on the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental analysis and public involvement.

The Forest Service published the Amended Forest Plan for the Ouachita National Forest in 1990 (replacing the 1986 Forest Plan). The Amended Forest Plan was 15 years old in March 2005. Part of the need to revise the Forest Plan is that the National Forest Management Act (NFMA) calls for such plans to be revised every 10 to 15 years. The need to revise this Forest Plan was also driven by the changing conditions identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita National Forest.

Decision Framework

The Forest Service allocates resources and makes resource management decisions concerning National Forest System lands in two stages. In Stage One, the Forest Plan allocates lands and resources to various uses and desired conditions by establishing forest-wide and Management Area-specific direction. Site-specific project management decisions are made in Stage Two. Forest Plans do not obligate the agency to undertake site-specific projects; rather, they establish desired conditions, objectives, and design criteria for projects. Forest Plans also set limitations on what actions may be authorized and what conditions must be met during project-level decision-making. Authorization of site-specific projects must comply with NEPA procedures.

The primary decisions made in a Forest Plan include:

- Establishment of Forest-wide multiple-use goals (desired conditions) and objectives (36 CFR 219.11(b))
- Establishment of Forest-wide management requirements (36 CFR 219.13 to 219.27)
- Establishment of Management Areas and associated management standards (36 CFR 219.11(c))
- Determination of land that is suitable for the production of timber (16 U.S.C. 1604(k) and 36 CFR 219.14)
- Establishment of an allowable sale quantity (ASQ) for timber within a time frame specified in the Forest Plan (36 CFR 219.16)
- Establishment of monitoring and evaluation requirements (36 CFR 219.11(d))
- Recommendations for potential wilderness areas or wilderness additions (36 CFR 219.17)
- Designation of lands administratively available for oil and gas leasing and consent to the Bureau of Land Management to offer specific lands for leasing (36 CFR 228.102(d) and (e)); authorization of actual site-specific projects must comply with NEPA procedures

The Regional Forester is the Responsible Official who decides which alternative best meets the overall needs of the Ouachita National Forest and the people of the United States

Relevant Planning Documents

The following documents contain environmental analyses and assessments that are not repeated in the FEIS, but provide supporting documentation for the analysis and some Forest Plan decisions:

- *Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle* (USDA Forest Service, Southern Region 1987)
- *Final Environmental Impact Statement for Vegetation Management in the Ozark-Ouachita Mountains* (USDA Forest Service, Southern Region 1990) and its supplement in 2002
- *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and Its Habitat on National Forests in the Southern Region* (USDA Forest Service, Southern Region 1996)
- *Ozark-Ouachita Highlands Assessment* (USDA Forest Service, Southern Region 1999)
- *Southern Resource Assessment* (USDA Forest Service, Southern Region 2002)
- *Final Environmental Impact Statement for an Amendment to the Land and Resource Management Plan—Management Direction for Acquired Lands in Southeastern Oklahoma (Ouachita National Forest)* (USDA Forest Service, Southern Region 2002)

Copies of these documents are available for review at the Forest Supervisor's Office in Hot Springs, Arkansas.

The Planning Process

Forest Plan revision is part of the national forest planning framework. In addition to NFMA, the Government Performance and Results Act of 1993 and the 2004 Revision of the USDA Forest Service Strategic Plan provide broad direction for Forest Plan revision. This FEIS, like the Revised Forest Plan it supports, was developed according to the NFMA implementing regulations at 36 Code of Federal Regulations (CFR) 219 (September 30, 1982, as amended), the National Environmental Policy Act of 1969, and the Council of Environmental Quality regulations at 40 CFR 1500-1508. The FEIS discloses the environmental consequences of each alternative and how each would respond to the significant issues identified.

Planning steps required by NFMA include:

- Identification of significant issues (including concerns and opportunities)
- Development of planning criteria
- Inventory of resources and data collection
- Analysis of the Management Situation
- Formulation of alternatives
- Estimation of effects of alternatives
- Evaluation of alternatives
- Recommendation of the preferred alternative
- Approval and implementation
- Monitoring and evaluation

The Forest Service's 10-step planning process is described in 36 CFR 219.10. The results of Steps 1 through 8 are disclosed in Chapters 1 through 3. The Ouachita National Forest's Plan Revision Team holds responsibility for developing the 2005 Revision. Efforts were made to provide detailed explanations of each step of the revision in the form of process (planning) records. Process records are on file in the Forest Supervisor's Office in Hot Springs, Arkansas. To review these records, contact: Ouachita National Forest Supervisor's Office, P.O. Box 1270, Hot Springs, AR 71902; Telephone: 501-321-5202.

Summary of Public Involvement

The Notice of Intent (NOI) to begin the revision process and the formal public scoping period was published in the Federal Register on May 1, 2002. Written public comments were received and logged in at the Forest Supervisor's Office in Hot Springs, Arkansas, during the formal public scoping period of May 1 through August 2, 2002. Four public meetings were conducted in June 2002 to provide information about the revision process and to solicit public comment.

In September and October 2003, two series of public meetings ("open house" format) were conducted in various locations across the Ouachita Mountains. The first series provided forums for discussion of off-highway vehicle use on the Forest, considered one of the most important issues for Forest Plan revision. The second series of meetings focused on key inventory data for Forest Plan revision, including scenic quality, species viability, roads analysis, and roadless areas. In April 2004, three more public open houses were held to invite feedback and discussion concerning the draft alternatives for the proposed Revised Forest Plan.

Plan Revision newsletters were periodically published and distributed to the Forest Plan mailing list (consisting of 2,500 individuals, groups, agencies, and organizations at its peak) during the planning process. The proposed Revised Forest Plan and accompanying DEIS were made available for review by the public, other agencies, tribal officials, and other elected officials on February 25, 2005; comments regarding the Forest Plan documents were accepted if they were postmarked (or email dated) by May 27, 2005. In addition to distributing hard copies of the draft documents to those who requested them, three public meetings were held to provide information on how to comment. The Forest Supervisor made copies available to all interested parties on the Ouachita National Forest website and on compact discs and widely advertised the availability of all forms of the plan documents to the public, other agencies, Indian tribes, and elected officials. See Appendix A for additional information regarding public involvement in this process. Appendix A also includes a summary of substantive comments received and Forest Service responses to those comments. Comment letters from other federal and state agencies and elected officials are reproduced in their entirety.

Release of the Revised Plan and FEIS

After the comment period for the DEIS ended, all comments received were analyzed, considered, and responded to in the Final Environmental Impact Statement (FEIS).

Significant Issues

After scoping, all elements identified in the Notice of Intent remained important; however, the categories used to organize the issues changed. The issue of Ecosystem Health and Sustainability was unchanged. Silvicultural Practices was included under this category along with other elements that were identified during scoping rather than keeping silvicultural practices a separate issue. The category of Roadless Areas, Recreation, and Motorized Access was separated into two categories, with the Roadless Areas issue moved to a new category called Land Use Designations. Recreation and Motorized Access issues were placed in a category called Public Access. The Relationship of National Forest Management to Local Communities and Economies was renamed Relationship of the National Forest to Communities. The significant issues identified by the Forest Service and examined in this FEIS are further refined as shown below.

Issue Category: Ecosystem Health and Sustainability

What forest management strategies and practices are needed to maintain or improve ecosystem health and sustainability?

Four major areas of concern for this issue category are addressed by the Forest Plan:

- Oak Decline and Mortality
- Viability of Threatened, Endangered, and Other Species of Concern
- The Use of Prescribed Fire in Vegetation Management
- The Use of Uneven-aged and Irregular Even-aged Silviculture

The Forest Plan addresses the following:

- Changes needed in management direction for maintaining or restoring healthy forest ecosystems in the face of new threats from insect outbreaks and diseases (36 CFR 219.27), including oak decline and mortality
- Changes needed in Forest Plan direction for maintaining habitats for viable populations of native plant and animal species (36 CFR 219.19)
- Changes needed in air, soil, and water quality standards
- Changes needed in the standards for implementing different reproduction cutting methods and other silvicultural practices and the predicted levels at which such methods and practices would be implemented on the Ouachita National Forest

Issue Category: Land Use Designations

What constitutes the appropriate balance and combination of land use designations?

Wilderness Recommendations

Six inventoried roadless areas that were initially identified during the 1978 RARE II were reanalyzed for roadless characteristics and the two that still met roadless criteria were evaluated for their wilderness potential. In addition, six other inventoried roadless areas identified were evaluated for wilderness potential per 36 CFR 219.17. Alternatives C and E would recommend additions to Flatside, Upper Kiamichi, and Poteau Mountain Wildernesses. Alternative D would recommend the same three additions, plus creation of three new wilderness areas: Blue Mountain, Brush Heap and Irons Fork.

Riparian Areas

Under the 1990 Amended Forest Plan, water and riparian areas were designated as Management Area (MA) 9. These areas also overlapped or were included within other designated management areas. Amendment 12 (July 22, 1993) moved riparian areas from most management areas into MA 9. Lands and waters within MA 9 include at least 100 feet from both edges of all perennial streams and the shores of bodies of water greater than ½-acre in size and variable distances, but at least 30 feet from both edges of other streams with defined stream channels. Lands in MA 9 are unsuitable for timber production. As direction for this MA has been implemented, needs to clarify the associated management standards have emerged.

The Forest Plan addresses the following:

- Changes needed in definitions and standards for MA 9 (water and riparian)
- Roadless areas that may be eligible and suitable for wilderness recommendation(s) (36 CFR 219.17)
- Changes needed for suitability determinations, including lands suitable for timber production (36 CFR 219.14(d)) [For the Ouachita National Forest, the required 10-year review of lands not suitable for timber production is being accomplished with this revision.]

Issue Category: Public Access and Recreational Activities

How should the Forest provide public access while safeguarding ecosystem health?

Included within this category is public access to the Forest for recreational opportunities, including off-highway vehicle use. The Revised Forest Plan was informed by a forest-wide roads analysis (36 CFR 212.5) and by consideration of the work of the National Off Highway Vehicle (OHV) Policy and Implementation Teams.

Transportation System

Road density (miles of open road per square mile of surface area) varies across the Forest. The Revised Forest Plan provides updated direction for managing a road system suitable for land and resource management activities and public access while limiting impacts to wildlife, soil, and water resources.

Recreation Opportunities

According to Report 4 of the Ozark-Ouachita Highlands Assessment (USDA Forest Service, Southern Research Station 1999), recreation participation in nearly all activities increased on the national forests of the Ozark-Ouachita Highlands from 1986 to 1996, with the most dramatic increases—measured in terms of percent change—occurring in bicycling (most likely mountain biking), horseback riding, and the use of OHV's. In terms of actual participation rates, the five most popular outdoor recreation opportunities on these national forests were sightseeing, camping, hunting, fishing, and hiking. In the South, "participation in most activities is projected to increase significantly more than the Nation as a whole." Primitive camping and hunting are projected to decline somewhat.

Where recreation demands conflict, increased user complaints and environmental impacts are expected. In addition to the kinds of conflicts and problems associated with dispersed recreation activities (those not taking place in highly developed recreation areas), there are concerns about the costs of maintaining developed recreation areas on the Ouachita National Forest. Some of these recreational facilities are deteriorating because of their age and/or heavy use. Lack of sufficient funds to maintain and repair them points to a need to close some areas and strictly limit development of new ones.

Off-Highway Vehicle Use

Cross-country OHV travel is a suitable use over large portions of the Ouachita National Forest under the 1990 Forest Plan. Areas of concentrated use where OHV impacts pose persistent problems include Wolf Pen Gap Trail, Little Missouri River watershed, the Lake Ouachita area, and many utility rights-of-way. User conflicts, such as those experienced when some hunters and hikers encounter OHV riders, are increasing as demands for OHV access increase. The 1990 Forest Plan direction includes guidelines to "provide for Off-Highway vehicle use" and "designate special areas for OHV use." Alternatives B, C, D, and E include management direction that cross-country travel by motorized vehicles is unsuitable with Alternative D including an exception for cross-country travel for game retrieval.

The Forest Plan addresses the following:

- Changes needed in management standards and desired conditions for the transportation system within the Ouachita National Forest
- Changes needed to address existing and likely future conflicts among dispersed recreation activities
- The mix of developed and dispersed recreation opportunities on the Forest
- Forest Plan direction concerning use of motorized vehicles

Issue Category: Relationship of the National Forest to Communities

What forest management direction should be implemented to support community development needs in and around the Ouachita National Forest?

Communities near the Ouachita National Forest are affected by the condition and management of these public lands and the opportunities for recreational and business-enhancing activities they present. Such communities have a special relationship with the National Forest, as implied by the National Forest-Dependent Rural Communities Economic Diversification Act of 1990, which directs the Forest Service to help national forest-dependent communities organize, plan, and implement actions that diversify local economies.

Timber production has important economic impacts in some communities near the Ouachita National Forest. Many also recognize benefits to their economies and quality of life from national forest management of recreation activities, recreation settings, visual quality, tourism, water, range, and wildlife. The Forest Service, partner agencies, and local governments are also concerned about the potential impacts on communities at risk from wildfires spreading from the National Forest. Fuel levels are an important influence on rural communities; therefore, the manner in which the National Forest maintains forest fuels was an important issue. Changes included in alternatives with the potential to affect the National Forest's ability to support long-term community development needs in the vicinity of the Ouachita National Forest included management direction that would make cross-country travel by motorized vehicle unsuitable, an increase in allowable sale quantity, and an increased program of prescribed fire.

Communities expressed a keen interest in management of the Ouachita National Forest, particularly in the areas of allowing timber production and suitability of the Forest for cross-country travel. There are trade-offs between providing benefits to communities from timber production versus providing benefits to communities from recreation and tourism opportunities.

The Forest Plan addresses the following:

- Changes in harvest levels and their projected effects on local economies
- Effects of recreation, wildlife-related activities, and tourism on local economies
- Effect of fuels management within the national forest in relation to communities at risk

Other (Non-Significant) Issues

In addition to the significant issues, the Revised Forest Plan addresses the following issues:

- Management Area definitions and boundaries
- Visual management
- Priorities for land acquisition and disposal
- Preservation of Heritage Resources
- Monitoring of Forest Plan objectives and standards
- Water and riparian management
- Allowable Sale Quantity (ASQ) for timber
- Wild and Scenic River corridor eligibility
- Old growth standards and direction

Chapter 2—Alternatives

Introduction

Chapter 2 describes the No Action Alternative (the 1990 Forest Plan) and four action alternatives. The five alternatives analyzed in detail are summarized briefly as part of this introduction. Chapter 2 displays, in comparative form, the predicted effects of the alternatives on the quality of the environment. Details are discussed in Chapter 3 (Affected Environment and Environmental Consequences). This summary provides a basis for choice among the alternatives. Summary tables showing how alternatives compare are presented near the end of this chapter. Following are brief descriptions of each alternative; more detailed descriptions are presented later in this chapter.

Alternative A (1990 Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through September 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the following alternatives are compared. An updated version of the 1990 Amended Forest Plan, incorporating all amendments, is available at the following website: http://www.fs.fed.us/r8/ouachita.

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed fire, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; and make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction.

Alternative C would place the most emphasis on ecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed fire and thinning would be more intensive than the other alternatives. Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternative D would increase emphasis on recreation opportunities, scenery management, and wilderness designation, while focusing ecosystem health activities in support of wildlife based recreation. Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed fire and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. Recommended increases in wilderness designation would total approximately 30,100 acres, including the three additions described in Alternative C and three new areas: Brush Heap, Blue Mountain, and Irons Fork, all located in Arkansas. Alternative D would make cross-country travel by motorized vehicles, including OHVs, unsuitable but would differ from other alternatives by treating OHV-based retrieval of big game as a suitable use.

Alternative E would balance increased emphasis on recreation and ecosystem health with retention of practices that have proven effective over time by combining elements from Alternatives B, C, and D. This would include increased intensive management for native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed fire and thinning would be more intensive than in Alternative B and more dispersed than in Alternative

D, but less intense than Alternative C. Recommended wilderness additions are the same as those in Alternative C. Cross-country travel by motorized vehicle would be unsuitable.

Alternative Development

Alternatives for the Revised Forest Plan were designed to respond to elements of the USDA Forest Service Strategic Plan for Fiscal Years 2004-2008 (http://www.fs.fed.us/plan). However, these alternatives address only those decisions that Forest Plans appropriately make (36 CFR Part 219), as described in Chapter 1; all other types of decisions are beyond the scope of the Forest Plan.

The Plan Revision Interdisciplinary (ID) Team developed a broad range of Forest Plan alternatives to address the significant issues. Seven draft alternatives were presented to the Forest Leadership Team (FLT) in January 2004. After review and discussion, the FLT directed the ID Team to carry forward three of the seven draft alternatives for detailed analysis and to merge two others into one. Two of the seven draft alternatives—the minimum level of management and the maximum production potential—were eliminated from detailed consideration and used only for analysis benchmarks. Another alternative was proposed by a citizen group, and several elements of the proposed alternative were included as elements within the range of alternatives considered in detail.

The FLT determined that four alternatives (plus the 1990 Forest Plan as the No Action Alternative) were sufficient to address the significant issues. Because the needed changes to the Forest Plan are modest, the complexity of the analysis and the number of alternatives required for this FEIS are less than those accompanying the 1986 Forest Plan and the 1990 Forest Plan. The range of alternatives considered in detail in this FEIS reflects the relatively modest need for change and the nature of the significant issues identified.

Direction Common to All Alternatives

A forest plan, like all National Forest management activity, must conform to established public policy expressed in Federal statutes, regulations, and administrative directives as well as applicable state laws and regulations. These themes are common to each alternative developed for Forest Plan revision. Each alternative considered in detail:

- Strives to strike a balance among the multiple uses that citizens have for their public lands and the many values they represent
- Maintains or enhances the diversity and quality of habitats needed to ensure the viability of all native plant and animal species that reside on or have important breeding habitat within the Ouachita National Forest (including all species listed as Threatened and Endangered that occur on the Forest)
- Provides for meeting or exceeding the guidelines presented by the Arkansas and Oklahoma Best Management Practices (BMPs) manuals for limiting pollution from non-point sources
- Directs that prescribed burns comply with state smoke management plans
- Protects significant heritage resources(historic and pre-historic)
- Identifies 55 to 57 percent of National Forest land as suitable for some form of timber production, said production to be guided by ecosystem management objectives
- Recommends that the Glover River be considered for designation as a Wild and Scenic River
- The four action alternatives also would treat cross-country motorized vehicle travel as unsuitable, with one exception for game retrieval in Alternative D

Management Setting Common to All Alternatives

All alternatives analyzed in detail in Chapter 3 considered ongoing resource management projects, permits, contracts, and other instruments for the use and occupancy as pre-existing actions. These “pre-existing actions” were considered part of the baseline in developing each alternative and were further included in analyzing effects in this FEIS and also as baseline for the Biological Assessment. The projected effects of these actions are part of the cumulative effects analyses documented in the FEIS and Biological Assessment for the Revised Forest Plan. Continued implementation of these pre-existing actions will not foreclose the ability to adopt any of the alternatives analyzed in detail in Chapter 3.

Major resource management projects that included timber harvest activities and may still have harvest activities incomplete are identified by name in Appendix B in Table B.46. Most of those projects also include other resource activities such as wildlife habitat improvements, timber stand improvements, site preparation activities, and prescribed burning which may not be fully implemented before the Revised Forest Plan goes into effect.

Other major resource management projects that contain *completed* timber harvest activities and may still have associated resource activities yet to be implemented. Several non-timber related projects may also have some activities not yet completed. All of these are identified by name in Appendix B in Table B.47, and B.48.

Consistency with the Renewable Resources Planning Act

National Forest Management Act regulations at 36 CFR 219.12(f)(6) direct that forest plans respond to and incorporate national program objectives developed in response to the Renewable Resource Planning Act (RPA). The last RPA Program was developed in 1995. The Government Performance and Results Act (GPRA) replaced the RPA Program. Currently, the Forest Service Strategic Plan (2004 Revision) provides national goals and objectives for the agency as required by the GPRA. The alternatives presented in this FEIS respond to these broad, strategic objectives.

Neither the current RPA Assessment nor the Forest Service Strategic Plan contain recommended output levels applicable to individual national forests. The Assessment does present national and regional analyses of the renewable resource situation, including projections of supply and demand for renewable resources. The Strategic Plan contains goals, objectives, outcomes, performance measures, and strategies that apply to all agency programs, including management of the National Forest System.

Alternatives Considered but Eliminated from Detailed Analysis

Possible alternative themes were outlined in the Notice of Intent published in the Federal Register in May 2002. These themes illustrated the range of alternatives that might be considered. The themes were modified based upon public comments. The current analysis focused on the question, “What components of existing management direction (Alternative A) need to change?” In that context, several possible alternatives, including the “minimum level of management” or “minimum amount of human management/maximum amount of natural forces” were outside the scope of the analysis because such alternatives would not have enabled the Forest Service to meet minimum management requirements for sustaining habitat for all native species and forest health. “Maximum timber production” was not considered an alternative to be analyzed in detail because it would have been inconsistent with the requirements for providing for multiple uses and would not meet the minimum management requirements for sustaining habitat for all native species.

The ID team also considered an alternative presented by the Sierra Club for the revised plans of the Ouachita and Ozark-St. Francis National Forests. The full text of the Sierra Club proposal is included in the administrative record with a more detailed rationale for not considering this alternative in detail. Some elements of the proposal were included in some alternatives; other elements either were beyond the scope of plan revision or were too vague. Brief responses to each point in the nine-point Sierra Club proposal follow:

- Wild and Scenic Rivers—all rivers eligible or already recommended for designation as National Wild and Scenic Rivers would remain so and would be protected within a Wild and Scenic River Corridor Management Area under all alternatives. The Forest Service does not have the authority to formally designate rivers as National Wild and Scenic Rivers, making it impossible to include this element of the Sierra Club alternative.
- Wilderness—RARE II areas and additions to existing wilderness were evaluated for all alternatives; however, merely conducting such an evaluation is not a logical part of a plan alternative.
- Large Conservation Areas (no logging or road construction on areas of up to 500,000 acres)—All alternatives treat more than 40 percent of the National Forest as unsuitable for timber production. Forty-three percent (732,590 acres) of the Ouachita National Forest is treated as unsuitable for timber production in the Selected Alternative. Substantial portions of the “unsuitable” land base occur in large blocks, and many of these areas will have not have roads constructed within them. The Sierra Club proposal itself (“areas of up to 500,000 acres”) is too vague to be considered part of an alternative considered in detail.
- Recreation—“emphasize recreation” is too vague to be considered part of an alternative considered in detail.
- Off-Highway Vehicles—the portion of this proposal having to do with treating cross-country travel by such vehicles as unsuitable has been incorporated in the action alternatives.
- Fire—the FEIS addresses the effects of prescribed fire.
- Natural Biodiversity—all timber and wildlife management activities conducted under the 1990 Forest Plan already “ensure that the native biodiversity of the [Ouachita National Forest] will be maintained and/or reestablished,” and this will not change, regardless of alternative.
- Forest Pests—the term “documented natural biodiversity” is vague, and this element could not be incorporated in any alternative. Provisions to minimize forest pest infestations; however, are included in all alternatives.
- Free Flowing Streams—a provision to discourage impoundments of free-flowing streams on National Forest System lands is included in the action alternatives.

During the 90-day comment period, a timber company owner suggested that the Forest Service develop a new alternative that would “consider the positive environmental health on air, water, soil, wildlife, trails, roads, healthy industries, positive economics and recreation purposes without any constraints placed on budgets, manpower or supervisor’s direction.” This alternative was not examined in detail because it contained too many parameters to incorporate into a reasonable alternative. Furthermore, alternatives unconstrained by budgets or manpower are inherently unreasonable, particularly in an environment where budgets and manpower are steadily declining. However, the parameters noted by the commenter were certainly taken into consideration in making the final selection of an alternative.

Alternatives Analyzed in Detail

Five alternatives were analyzed in detail. See Appendix B for a detailed description of the mathematical model (SPECTRUM) and socio-economic analysis used. Acreage allotted to management area varies little among alternatives. The range of alternatives considered in detail in this FEIS appropriately reflects the relatively modest need for change and the nature of the significant issues identified. Nonetheless, substantial variation exists among alternatives in terms of projected management activities (e.g., prescribed burning, application of uneven-aged management, thinning acres), acres in the high SPB risk category, acres recommended for wilderness designation, acres in Fire Regime Condition Class 1 or 2, projected annual net revenue for the planning period, population response by terrestrial management indicator species, species viability scores, and OHV use direction. Each action alternative allocates lands and waters to the same set of management areas and, in almost every case, allocates the same lands to the same management areas (wilderness recommendations account for any differences). Alternative A (No Action Alternative) represents a continuation of the 1990 Forest Plan, as further amended. Alternative E was identified in the DEIS and is the agency's Selected Alternative for the 2005 Revised Forest Plan.

Management Areas

Management Areas (MA) for the Ouachita National Forest are geographically defined areas with unique characteristics, different desired conditions, and specific standards to guide project planning and implementation that supplement the forest-wide standards. In all alternatives except A (No Action Alternative), a slightly revised set of MAs and descriptions is used. The MAs for Alternative A are the same as the 1990 Forest Plan. Table 2.1 compares the MAs for the 1990 Forest Plan (Alternative A) to those used in the other alternatives.

Table 2.1 Management Areas for 1990 Plan Compared to Other Alternatives

Management Areas (MAs) for Alternatives B, C, D, and E	***Management Areas (MAs) for Alternative A (1990 Forest Plan)***
MA 1: Wilderness (1a); Poteau Mountain (1b), Recommended Wilderness Addition (1c)	MA 1: Wilderness; MA 1a: Poteau Mountain
MA 2: Special Interest Areas: Scenic Areas (2a); Watchable Wildlife Areas (2b); Rich Mountain and South Fourche Botanical Areas (2c); Rich Mountain Recreation Area (2d)	MA 2: Scenic Areas
MA 3: Developed Recreation Areas	MA 3: Recreation Sites
MA 4: Research Natural Areas and National Natural Landmarks	MA 4: Research Natural Areas and National Natural Landmarks
MA 5: Experimental Forests	MA 5: Alum Creek and Crossett Experimental Forest
MA 6: Rare Upland Communities	MA 6: Threatened, Endangered or Sensitive Species Habitat
MA 7: Ouachita Seed Orchard	MA 7: Ouachita Seed Orchard
MA 8: Administrative Sites/Special Uses	MA 8: Administrative Sites
MA 9: Water and Riparian Communities	MA 9: Water and Riparian Areas
MA 10: Reserved	MA 10: Non-Forest
MA 11: Reserved	MA 11: Not Appropriate for Timber Production
MA 12: Reserved	MA 12: Unproductive
MA 13: Reserved	MA 13: Ouachita Mountains, Unsuitable Lands Based on Other Resource Coordination
MA 14: Ouachita Mountains, Habitat Diversity Emphasis	MA 14: Ouachita Mountains, Lands Suitable for Timber Production
MA 15: West Gulf Coastal Plain, Habitat Diversity Emphasis	MA 15: Coastal Plain
MA 16: Lands Surrounding Lake Ouachita and Broken Bow Lake	MA 16: Lake Ouachita
MA 17: Semi Primitive	MA 17: Semi-Primitive Motorized
MA 18: Reserved (scenery management addressed Forest-wide)	MA 18: Visually Sensitive Foreground Areas, Roads And Trails
MA 19: Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	MA 19: Winding Stair Mountain National Recreation and Wilderness Area (OK) and Rich Mountain Recreation and Black Fork Wilderness Area (AR)
MA 20: Wild and Scenic River Corridors	MA 20: Wild and Scenic River Corridors
MA 21: Old Growth Restoration	MA 21: Old Growth Restoration
MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem And Red-cockaded Woodpecker Habitat
MA 23: Reserved – Broken Bow Lake MA was incorporated with Lake Ouachita MA in MA 16	MA 23: Broken Bow Lake (NF lands above)

Alternative A

Alternative A (1990 Amended Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the other alternatives are compared.

Ecosystem Health and Sustainability: Current ecosystem management priorities and emphasis would continue. The present emphasis on pine-oak community health and health in communities susceptible to oak decline and other threats to oak-dominated ecosystems would be maintained. These communities would continue to be susceptible to oak decline and southern pine beetle outbreaks. Prescribed burning would treat an average of 68,000 acres per year.

Land Allocation: Current land allocations to MAs would be maintained. No new wilderness recommendations would be made. Lands classed as suitable for timber production would equal 1,019,694 acres.

Public Access and Recreation: Current standards for public access and recreation opportunities would be retained. The Visual Quality Objective system would be retained for visual resource management.

Relationship to Communities: The Forest would continue to seek to improve economic and other relationships with nearby communities.

Alternative B

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed burning, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction. Compared to the 1990 Forest Plan (Alternative A), this alternative would feature a slightly increased emphasis on ecosystem health and sustainability objectives, including program adjustments to respond to the Healthy Forest Initiative and the 2004 revision of the Agency’s Strategic Plan.

Ecosystem Health and Sustainability: Current ecosystem management priorities would continue, augmented by a small increase in emphasis on ecosystem health in systems susceptible to oak decline or catastrophic wildland fire. Prescribed fire acres would increase from 68,000 average annual acres to approximately 125,000 average annual acres.

Land Allocation: Streamside Management Areas would be maintained, with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,019,694 acres.

Public Access and Recreation: Cross-country travel by motorized vehicles would not be suitable. The Visual Quality Objective system would be retained for visual resource management.

Relationship to Communities: The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including addressing impacts and opportunities represented by the Healthy Forest Initiative.

Alternative C

Alternative C would place the most emphasis on active management forecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than the other alternatives. Compared to the 1990 Amended Forest Plan (Alternative A), this alternative would place greater emphasis on actively managing for improved ecosystem health and sustainability. These objectives would be achieved by aggressively restoring and maintaining native pine-grass, oak woodland, and other fire-adapted ecosystems.

Ecosystem Health and Sustainability: Vegetation management would emphasize restoration and maintenance of lower density, insect outbreak and disease-resistant forest and woodland ecosystems. Tools for improving forest health, particularly areas at risk of disease, pest, and/or invasive species infestation (southern pine beetle, oak decline, non-native invasive plants) would include a mix of silvicultural techniques, prescribed fire, and minimal pesticide use. Activities such as prescribed burning and thinning would be more intensive than the other alternatives especially within pine-oak and some hardwood-dominated communities. Prescribed fire acres would increase from 68,000 average annual acres to approximately 250,000 average annual acres. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 66,000.

Land Allocation: Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Streamside Management Areas would be maintained, with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,017,901 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach than the 1990 Forest Plan to areas that have a high density of non-National Forest System roads. Other access would be as in the 1990 Forest Plan, except that cross-country motorized access would not be suitable, and the Forest would move, within the next four years, to a system of designated routes. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes.

Relationship to Communities: This alternative would produce more timber, reduce fuels in the wildland-urban interface, and produce more smoke related short-term impacts. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including addressing opportunities represented in the Healthy Forest Initiative.

Alternative D

Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed burning and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. More emphasis would be placed on scenery enhancement in vistas along travel corridors and areas adjacent to lakes. Program adjustments would be made to reflect the Healthy Forest Initiative, including addressing fuel levels near communities at risk.

Ecosystem Health and Sustainability: Vegetation management would emphasize attaining minimum levels of habitat needed for species viability. “Watchable wildlife,” including important birding areas, would be promoted. Restoration of native pine-grass and oak woodland ecosystems would be expanded in support of wildlife management objectives in walk-in turkey areas and wildlife management areas to support hunting-based recreation. Prescribed fire acres would increase from 68,000 average annual acres to approximately 100,000 average annual acres. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 90,000.

Land Allocation: New recommended wilderness areas in Arkansas would include Brush Heap, Blue Mountain, and Irons Fork. Additions to Flatside Wilderness, Upper Kiamichi Wilderness, and an addition to the East Unit of Poteau Mountain Wilderness in Arkansas would also be recommended. Streamside Management Areas would be maintained with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 989,567 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach to areas that have a high density of non-National Forest System roads. Cross-country motorized vehicle access would not be suitable, except for cross-country travel for retrieval of big game. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes. Vegetation management would promote “watchable wildlife,” in appropriate areas including important birding areas.

Relationship to Communities: This alternative would produce a slight increase in positive economic impacts related to recreation and tourism and a slight decrease in positive impacts related to timber harvesting. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including opportunities presented by the Healthy Forest Initiative.

Alternative E

Compared to Alternatives A, B, and D, this alternative would place greater emphasis on actively managing for improved ecosystem health and sustainability. These objectives would be achieved by increasing the rate of restoration and maintenance of fire-adapted systems such as native pine-grass and oak woodland communities, but not at the rates or intensity proposed under Alternative C

Ecosystem Health and Sustainability: Prescribed fire acres would increase from 68,000 average annual acres to approximately 180,000 average annual acres. Major ecological systems and rare upland communities would receive increased management to enhance ecosystem health and species viability. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 63,000.

Land Allocation: Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Streamside Management Areas would be maintained with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,016,228 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach to areas that have a high density of non-National Forest System roads. Cross-country access by motorized vehicles would be unsuitable. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes. Management for scenic integrity may affect prescribed fire locations. Other vegetation management would be visually mitigated. Vegetation management would promote “watchable wildlife,” in appropriate areas including important birding areas.

Relationship to Communities: This alternative would produce more timber, reduce fuels in the wildland-urban interface, and produce more smoke related short-term impacts, but less than Alternative C. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including opportunities presented by the Healthy Forest Initiative.

The remaining tables in this chapter provide summary comparisons of alternatives using various measures.

Table 2.2 Summary Comparison of Alternatives

Response Measure	Alternative				
	A No Action	B	C	D	E Selected
Acres in Fire Regime 1, Condition Class 1 or 2, 1st 10-Year Period	266,000	122,000	535,000	283,000	291,000
Acres in southern pine beetle Risk Category 1, 1st 10-Year Period	272,000	275,000	66,000	90,000	63,000
Acres of hardwood forest in high risk categories, 1st 10-Year Period	91,000	91,000	7,000	91,000	84,000
Acres Suitable for Timber Production	1,019,694	1,019,694	1,017,901	989,567	1,016,228
Acres designated/recommended as wilderness	64,469	64,469	66,262	94,596	66,262
Acres in Management Area 9, Water and Riparian	278,284	278,284	278,284	278,284	278,284
Uneven-aged management emphasis (total area in acres)	250,000	110,000	100,000	200,000	125,000
Projected average annual thinning acres, 1st 10-Year Period	26,226	17,400	51,700	27,700	28,500
Prescribed fire (projected total average annual acres)	68,000	125,000	250,000	100,000	180,000
Acres of mast producing hardwood	297.5	297.5	297.5	297.5	297.5
Allowable Sale Quantity (MMCF), Average Annual	26.2	26.2	33.0	25.0	27.0
Employment Average Annual 1st 10-year period	3,894	3,796	3,941	3,842	3,898
Labor Income ($ million)	107.2	103.8	109.4	105.5	107.6
Annual Budget ($ Million)	22.7	22.8	23.7	22.9	23.1
Annual Net Revenue (x 1$ Million) 1st 10-Year Period	6.0	6.5	1.8	5.5	6.8
Long-Term Sustained Yield (MMCF)	50.0	57.8	73.7	63.2	69.3

Table 2.3 Terrestrial Habitat Capability (Animals per Square Mile) for MIS by Alternative after 10 Years and 50 Years of Forest Plan Implementation

		Scarlet Tanager		Prairie Warbler		Pileated Woodpecker		Eastern Wild Turkey		Northern Bobwhite		White-tailed Deer	
		10 yr	*50 yr*	*10 yr*	*50 yr*	*10 yr*	*50 yr*	*10 yr*	*50 yr*	*10 yr*	*50 yr*	*10 yr*	*50 yr*
Alternative	A	24.9	27.1	39.2	49.8	18.6	26.0	3.4	3.7	35.2	56.7	12.8	16.7
	B	25.2	27.5	30.9	51.4	18.7	26.7	2.7	3.1	29.1	54.3	13.2	18.3
	C	24.1	25.7	72.4	99.9	14.3	18.5	5.9	7.0	42.7	77.5	22.7	30.0
	D	24.9	26.8	40.1	65.9	17.8	23.8	3.2	3.4	37.8	69.2	13.4	19.9
	E	25.0	27.3	40.5	59.4	17.8	25.3	3.3	3.9	36.6	70.0	13.7	20.2

Comparison of Alternatives by Issue

Ecosystem health and sustainability is one of the major, broad issues identified for this Revised Forest Plan. Without a healthy and sustainable forest, most other opportunities and resource values that are forest-dependent, such as recreational opportunity, wildlife, timber harvest, and clean water would be jeopardized or in marked decline. Table 2.4 includes indicators used to measure forest health and sustainability by alternative: number of species with viability scores of “good” to “very good”; acres in Fire Regime 1, Condition Class 1 or 2; acres at risk for southern pine beetle outbreaks, and acres of hardwood in high-risk categories. Alternative C has the highest number of species with viability scores of “good” to “very good,” closely followed by Alternative E. Due to its more aggressive treatment regime, Alternative C would have the most acres in Fire Regime 1, Condition Class 1 or 2 and the fewest hardwood acres rated as “high risk.” Alternatives C and E have the fewest acres projected to be susceptible to southern pine beetle infestation. Considering all factors, Alternative C could be considered the “maximum health” alternative.

Table 2.4 Issue Category: Ecosystem Health and Sustainability

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Species Viability (numbers of species in good to very good condition of 80 species forest-wide)	27	42	59	39	53
Acres in Fire Regime 1, Condition Class 1 or 2, 1st 10-Year Period	266,000	122,000	535,000	283,000	291,000
Acres in southern pine beetle Risk Category 1, 1st 10-Year Period	272,000	275,000	66,000	90,000	63,000
Acres of Hardwood Forest in High Risk Categories 1st 10-Year Period	91,000	91,000	7,000	91,000	84,000

Measures used to address land use designation issues and describe the allocations of National Forest System lands are shown in Table 2.5 and include: acres of existing and recommended wilderness, water and riparian areas (MA 9), and acres suitable for timber production. Alternative D recommends the addition of the most acres for wilderness (approximately 30,100 acres). All alternatives maintain nearly equal protections for water and riparian areas and assign the same acreage to Management Area 9. Acres suitable for timber production also remain fairly constant, although the wilderness recommendations cause minor decreases in Alternatives C and E and by reduction of acres suitable for timber production, reflect the larger wilderness recommendation of Alternative D.

Table 2.5 Issue Category: Land Use Designations

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Acres of Wilderness and Recommended Wilderness	64,469	64,469	66,262	94,596	66,262
Acres in Management Area 9, Water and Riparian	278,284	278,284	278,284	278,284	278,284
Acres Suitable for Timber Production	1,019,694	1,019,694	1,017,901	989,567	1,016,228

The issue of public access and recreational activities is addressed in Table 2.6, with measures to reflect changes in the transportation system, OHV use, quality of non-motorized opportunities, and number of deer, turkey, and quail per square mile. Road density is a key factor in measuring disturbance to wildlife. Under Alternatives C, D, and E, road density standards would be imposed that clarify how the Forest would undertake to limit open road density for wildlife purposes. Under Alternatives B, C, D, and E, cross-country travel by motorized vehicles would not be suitable, while under Alternative A, such travel would remain suitable. Under the action alternatives, where OHV and other motorized vehicle use would be projected to move from cross-country travel to designated routes within four years, the quality of non-motorized opportunities should increase, because noise interference by vehicles would be reduced. As hunting is a recreational activity, number of game species is an important measure. Because it is the alternative with the most intensive management, Alternative C, has the highest projected density of game animals (deer, turkey, and Northern bobwhite).

Table 2.6 Issue Category: Public Access and Recreational Activities

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Transportation System	Current	Current	New road density objective	New road density objective	New road density objective
Off Highway Vehicle Use (for cross-country travel)	Suitable	Unsuitable	Unsuitable	Unsuitable (except for large game retrieval)	Unsuitable
Quality of non-motorized opportunities	Current	Higher	Higher	Higher	Higher
Deer per square mile	12.8	13.2	22.7	13.4	13.7
Northern bobwhite per square mile	35.2	29.1	42.7	37.8	36.6
Eastern Wild Turkey per square mile	3.4	2.7	5.9	3.2	3.3

Table 2.7 provides some measures that compare the relationship of the Forest to communities. Measures include the projected timber harvest volume and the economic values associated with timber harvest. All measures are reported for the first ten years of Forest Plan implementation and assume, for comparative purposes, that timber sales equal the allowable sale quantity. Although timber harvest volume would be greatest under Alternative C, when costs are deducted, the alternative with the greatest net revenue would be Alternative E. Average annual employment and labor income from that employment would be greatest under Alternative C, followed closely by Alternatives A, D, and E.

Table 2.7 Issue Category: Relationship of the National Forest to Communities

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Allowable Sale Quantity (MMCF) 1st 10-year Period	261.8	261.8	330.0	250.0	270.0
Annual Net Revenue ($ Million) 1st 10-Year Period	6.0	6.5	1.8	5.5	6.8
Employment Avg. Annual 1st 10-year Period	3,894	3,796	3,941	3,842	3,898
Annual Labor Income ($ Million)	107.2	103.8	109.4	105.5	107.6

Chapter 3—Affected Environment and Environmental Consequences

Introduction

This chapter describes the existing environment of the Ouachita National Forest and provides a more detailed scientific and analytic basis for comparing the alternatives than Chapter 2, which summarizes the differences among alternatives. Each section begins with a brief description of the affected environment and concludes by disclosing the projected direct, indirect, and cumulative effects (the environmental consequences) of implementing the various alternatives. Direct environmental effects are those that occur at the same time and place as the initial action. Indirect effects are those that occur later than the action or are spatially removed from the activity. Cumulative effects are those that result from the incremental effects of actions (or inaction) over time.

Ecological Setting

The Forest Service adopted a "national hierarchical framework of ecological units" in the mid-1990s. Cleland and others (1997) note that the primary purpose for delineating ecological units is "to identify land and water areas at different levels of resolution that have similar capabilities and potentials for management." Ecological units exhibit similar patterns in: (1) natural communities, (2) soils, (3) hydrologic functions, (4) landforms and topography, (5) lithology, (6) climate, and (7) natural processes, including nutrient cycling, productivity, succession, and disturbance regimes associated with flooding, wind, fire, and other natural forces. The Forest Service classification system is summarized in Table 3.1.

Table 3.1 Forest Service National Hierarchy of Ecological Units

Planning and Analysis Scale	Ecological Unit	Purpose, Objective, and General Use	General Size Range
Ecoregion Global Continental Regional	Domain Division Province	Broad application for modeling and sampling strategic planning and assessment	Tens of thousands to millions of square miles
Subregion	Section Subsection	Strategic, multi-forest statewide, and multi-agency analysis and assessment	Thousands to tens of thousands of square miles
Landscape	Landtype Association	Forest area wide planning and watershed analysis	Thousands to tens of thousands of acres
Land Unit	Landtype Landtype Phase	Project and management area planning and analysis	Ten acres or less to hundreds of acres

Source: Cleland and others (1997)

The Ouachita National Forest lies within the Subtropical Division of the Humid Temperate Domain. Most of the Forest is within the Ouachita Mountains Section of the Ouachita Mixed Forest-Meadow Province. Relatively small portions of the Forest to the north and south of the Ouachita Mountains lie within the Southern Mixed Forest Province, which includes small portions of the Middle Coastal Plains Western Section and the Arkansas Valley Section. The Ouachita National Forest occupies portions of seven ecological subsections. At the landscape level, probably the most relevant for forest planning, the Ouachita National Forest has identified 22 Landtype Associations (LTAs) within the seven subsections. These ecological units were differentiated on the basis of landform, geology, soils, and natural vegetation. For maps of the subsections and LTAs, see http://www.fs.fed.us/r8/ouachita. Brief descriptions of the subsections follow this tabulation of the LTAs on the Ouachita National Forest and the subsections within which they occur:

Subsection	Landtype Association (LTA)
Western Arkansas Valley Mountains:	McAlester/Savanna Mtns.
	Poteau River Valley
Fourche Mountains:	Dutch Creek Mtns
	Fourche Valley
	Lower Jackfork Mtns.
	Black Fork/Rich Mtns.
	Johns Valley
	Long Fourche Mtns
	Muddy/Blue Mtns.
	Kiamichi/Ouachita River Valley
Western Ouachita Mountains:	Kiamichi Mtns.
	Hee Mtn.
	Mountain Fork/Glover Valley
Central Ouachita Mountains:	Crystal Mtns.
	Mazarn Valley
	Ordivician Hills
	Novaculite/Chert Mtns
	Broken Bow
Athens Piedmont Plateau:	Cossatot Valley
Southwestern Arkansas:	Little River
	Tiak
Red River Alluvial Plain:	Red River Valley

The Western Arkansas Valley Mountains subsection is in Arkansas and Oklahoma. The McAlester/Savanna Mountains and Poteau River Valley, consisting of low mountains and ridges interspersed with narrow to wide valleys, are the only two LTAs delineated within the Forest boundary. Elevations range from 500 feet above sea level in the valleys to 2,800 feet on some of the highest peaks. The dominant geologic formations are Pennsylvanian, including Upper and Middle Atoka sandstone. The vegetation is predominately shortleaf pine-oak forest and woodland.

The Fourche Mountains subsection is located in Arkansas and Oklahoma. There are eight LTAs within this subsection. Topography ranges from rolling hills to high elevation mountains (relative to the Ouachitas as a whole) aligned in an east-west orientation interspersed with broad valleys.

Elevations range from 400 feet above sea level in the valleys to 2,600 feet on Rich and Black Fork Mountains. Geologic substrates are predominately Mississippian and Pennsylvanian shale and sandstone. The dominant vegetation is pine-oak forest and woodlands. There are several distinct plant communities within the Fourche Mountains subsection including sugar maple-oak-hickory forest, stunted white oak woodlands, and sandstone glades.

The Western Ouachita Mountains subsection, consisting of high to mid-elevation mountains with wide valleys, is located in western Arkansas and eastern Oklahoma. There are three LTAs within this subsection. This area has east-west trending ridges with very steep to moderately steep north-facing slopes and moderately sloping south-facing slopes. The elevation ranges from 400 feet in the valleys to 2,300 feet above sea level in the mountains. Geologic substrates are predominately Jackfork sandstone and Stanley shale. The mountains and hills are dominated by pine-oak forest and woodland, with some prairies in the valleys. Some of the unique plant communities scattered throughout this subsection include mesic oak-hickory forest (with sugar maple, basswood, red oak, white oak, and hickories) on the steep north-facing slopes and seeps and springs in draws.

The Central Ouachita Mountains subsection is characterized by mid-elevation mountains and hills aligned principally in an east-west orientation, interspersed within broad, narrow valley bottoms with elevations ranging from 600 to 1,700 feet above sea level. Five LTAs lie within this subsection. This part of the Ouachita Mountains is the richest in terms of plant community diversity. Natural communities include many seeps and springs, some of the most mesic (moist) forests found on the Ouachita National Forest (highlighted by stands of American beech and umbrella magnolia in coves, on north-facing slopes, and on stream terraces), and novaculite, shale, and sandstone glades and rock outcrops.

A very small portion of the Ouachita National Forest lies within the Athens Piedmont Plateau subsection, and the Cossatot Valley is the only LTA delineated within in the Forest boundary on the Athens Piedmont Plateau subsection. The topography of the Cossatot Valley consists of gently undulating to strongly sloping hills interspersed with long, narrow valleys aligned somewhat in an east-west trending direction. The elevations range from about 500 feet above sea level to about 1,100 feet. The main geologic formation is Mississippian-age Stanley Shale. The vegetation consists of loblolly-shortleaf-oak forest on gentle slopes and shortleaf pine-oak and oak hickory forest on steeper slopes.

Within the Southwestern Arkansas subsection (which includes part of southeastern Oklahoma), the Little River and Tiak are the only LTAs located within the Ouachita National Forest. Most of the land within these LTAs is privately owned. The area within the Forest boundary area is situated on very broad, nearly level to gently undulating upland flats and terraces and low rolling hills. The elevation ranges from 300 to 500 feet above sea level. The predominant geologic formation is the Cretaceous Woodbine formation, made up of quartzose sand, clay, lignites, and some fossil plants. The dominant forest types are loblolly-shortleaf-oak on gentle slope in the uplands, with a few mixed bottomland hardwood forests along floodplains and terraces. The soils are deep and formed mainly from alluvium.

A very small portion of the Red River Alluvial Plain subsection is located on the Tiak Ranger District, and the Red River Valley LTA is the only one delineated within that part of the Forest. The land base within this LTA is mostly privately owned. This LTA is situated on very broad, nearly level upland flats and terraces with localized inclusions of gently to moderately sloping low hills. The geologic substrate consists mainly of Quaternary alluvial surface deposits. The dominant vegetation within the Forest boundary includes loblolly and shortleaf pine mixed with oaks in the uplands and mixed bottomland hardwood forests along floodplains and terraces.

Climate

The climate of the Ouachita National Forest in Arkansas and Oklahoma is temperate due to a central location in the North American continent. Air masses that move across the Forest generally originate from the Eastern Pacific Ocean, Western United States, the Gulf of Mexico, and Canada. The sources of moisture for the region are the Pacific Ocean and the Gulf of Mexico. Because of atmospheric circulation patterns, weather systems generally move from west to east across the Ouachita Mountains (USDA Forest Service 1999a).

Maximum mean monthly temperatures range from 49°F in January to 93°F in July for the northwestern area of the Forest (Fort Smith, AR) and from 51.5°F in January to 93.5°F in July for the southeastern areas of the Forest (Hot Springs, AR). Minimum mean monthly temperatures range from 29.1°F in January to 71.2°F in July for Fort Smith, AR, and from 31°F in January to 70.6°F in July for Hot Springs, AR.

Mean annual precipitation ranges from 39.4 inches per year in Fort Smith, AR, to 55.5 inches per year in Hot Springs, AR. Corresponding surface runoff values range from 14 to 22 inches per year. A comprehensive discussion of monthly maximum, minimum, and extreme temperatures; monthly maximum, minimum, and extreme precipitation events; surface runoff; droughts; and tornados is found in the Ozark-Ouachita Highlands Assessment, Aquatic Conditions report (USDA Forest Service 1999a).

Direct, Indirect, and Cumulative Effects

Many scientists believe that increasing concentrations of atmospheric carbon are producing long-term climate changes. Global climatic change has the potential to influence the resources of the Forest and in turn affect the species dependent upon the Forest for habitat. It is believed that vegetation growth and the associated storage of carbon in living and dead wood fiber associated with forests helps to remove carbon from the atmosphere. Over the long-term, climate changes also affect the duration, frequency, and intensity of forest disturbances such as fire, insects, disease, drought, and storms (USDA Forest Service Strategic Plan for Fiscal Years 2004-2008). Until research to assess the impacts of climate change on the health and productivity of forest ecosystems is complete, impacts on climatic change and variability will remain undetermined.

Air Quality

Federal land management agencies have the unique responsibility to protect the air, land, and water under their respective authorities from degradation associated with air pollution emitted outside the borders of agency lands (Clean Air Act, as amended 1990), as well as from the impacts of air pollutants produced within those borders. These mandates are established through a series of legislative and regulatory requirements (Clean Air Act, as amended 1990; Organic Act 1977, Wilderness Act 1997).

The Clean Air Act (CAA) sets the standards for the air quality in the United States. The CAA has numerous sections, and among these, two are particularly important to National Forest System (NFS) management: National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD). The entire country must comply with the air quality standards set by NAAQS for six criteria pollutants. Primary NAAQS are set based on human health criteria. State air quality regulatory agencies establish State Implementation Plans (SIPs) to ensure that these standards are met in their respective states. If the standards are not met for any criteria pollutant, the area is designated as non-attainment for the pollutant. It is the responsibility of the Ouachita National

Forest to ensure that management activities do not significantly contribute to a violation of the NAAQS.

The Clean Air Act Amendments of 1977 established the Prevention of Significant Deterioration (PSD) program. These amendments designated specific Class 1 areas, and the Forest manages one Class 1 area, Caney Creek Wilderness. There is another Class 1 area in Arkansas, the Upper Buffalo Wilderness, managed by the Ozark-St. Francis National Forests. The PSD regulations require the "affirmative responsibility to protect the air quality related values (including visibility) of any such [wilderness or national park] lands," and to consider "whether a proposed source or modification would have an adverse impact on such values" (40 CFR 51.166 (p)(2)). Because of this responsibility, the status of air quality in and near the Class 1 areas, as well as how current levels of air pollution are impacting Air Quality Related Values (AQRVs), must be considered when making impact determinations about new sources of air pollution.

In addition to protecting Class 1 wilderness, all federal lands are to be protected from air quality impacts, regardless of whether those impacts are coming from within agency borders or without. The CAA , as amended in 1990 contains numerous sections dealing with these responsibilities, and Section 101(c) states the primary purpose of the Act:

> "A primary goal of this Act is to encourage or otherwise promote reasonable Federal, State, and local governmental actions, consistent with the provisions of this Act, for pollution prevention."

Beyond the CAA, additional legislation recognizes the importance of air quality and the impact it can have on forest resources. The National Forest Management Act states that Land and Resource Management Plans are, in part, specifically based on:

> "…recognition that the National Forests are ecosystems, and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems."

It is within this regulatory framework that resources on NFS lands are to be protected from the detrimental effects of air pollution. Additionally, it is imperative that while federal land managers work to alleviate harmful effects of air pollution from new and existing sources external to Forest boundaries, they must also continue to be good stewards when conducting management activities that contribute to regional air pollution.

Activities such as timber harvesting, oil and gas well drilling and operations, road construction or maintenance, and prescribed fire all produce emissions that may affect air quality in and around the Forest. Although a majority of this area's pollution comes from sources outside the Forest, activities from within the Forest boundaries can also impact air quality in the region. Within the timeframe of this planning period, however, only prescribed fire is expected to change significantly for all alternatives. Particulate matter (PM) and nitrogen oxide (NOx) emissions from prescribed fire activities will contribute to the total pollution load and are the major pollutants of concern in terms of contributions to NAAQS. Therefore, potential emissions of these pollutants will serve as indicators for air quality effects.

Potential emissions of PM from prescribed fire activities will be evaluated in comparison to total PM emissions in counties near the Forest. Analyses for direct and indirect effects of air pollution are limited to pollution *emitted* from within lands administered by the Forest as a result of management activities. Air pollution must be evaluated in both a regional and cumulative context; and it is imperative that an area larger than just NFS lands is used in an air quality evaluation. Because air pollution disperses, levels of pollution emitted from Forest management activities have been evaluated considering regional pollution loads and current air quality monitoring data. An analysis area of 50 kilometers was determined to be adequate to describe the area potentially affected by the mobile and area sources of pollution from Forest management activities on regional air quality. Figure 3.1 shows the air quality assessment analysis area.

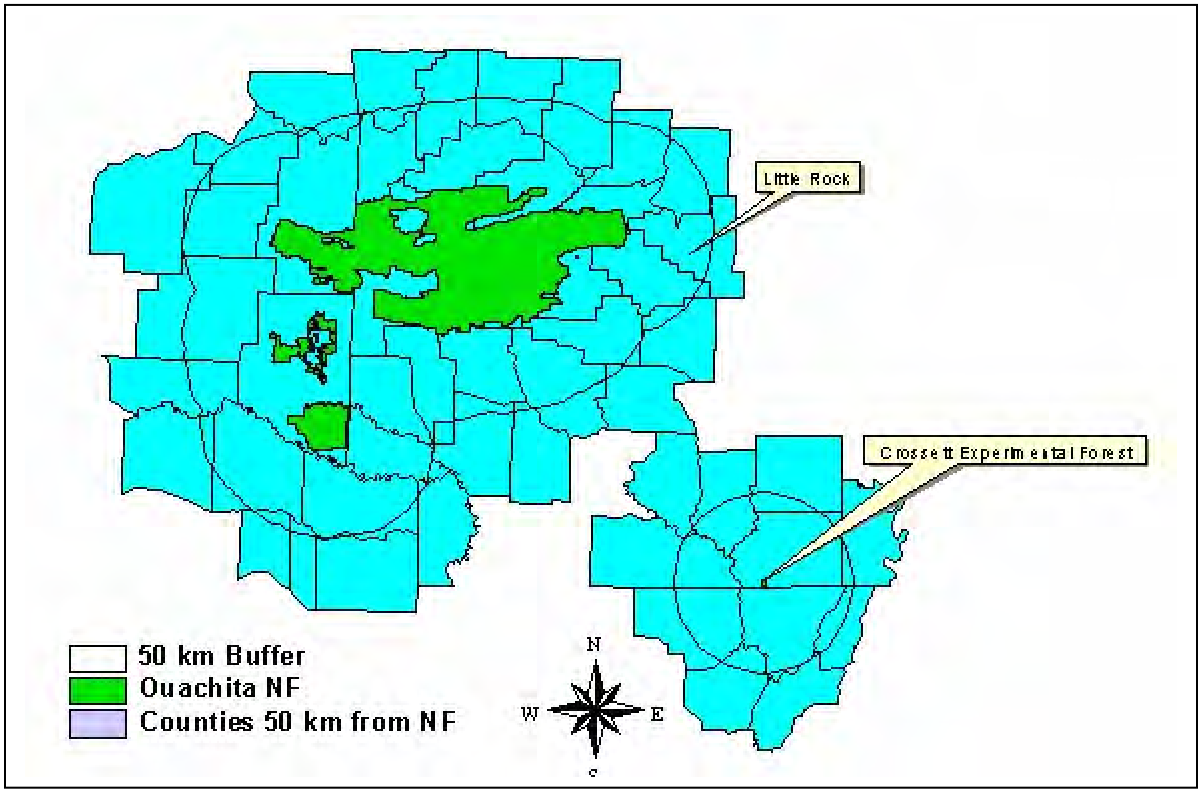

Figure 3.1 Air Quality Assessment Analysis Area

Air pollutants are generally classified as either primary or secondary pollutants. Those emitted directly to the atmosphere as products of combustion are classified as primary pollutants, and those formed when primary pollutants undergo atmospheric chemical reactions are secondary pollutants. Current air pollution impacts occurring on the Ouachita are the cumulative result of numerous sources. Some pollutants are of particular concern because of their impacts to both human health and ecosystems, and those pollutants are described in detail below.

Sulfur Dioxide (SO_2)

About 69 percent of SO_2 released to the air (11.2 million tons in 2000), comes from electric utilities, especially those that burn coal (US EPA, Progress Report 2002). Other sources of SO_2 are industrial facilities that derive their products from raw materials—such as metallic ore, coal, and crude oil—or that burn coal or oil to produce heat. Examples are petroleum refineries, cement manufacturing, and metal processing facilities. Also, locomotives, heavy marine equipment, and some non-road diesel equipment currently burn high sulfur fuel and release SO_2 in large quantities. Once SO_2 is emitted into the atmosphere, it undergoes chemical transformations to form secondary pollutants such as sulfates and sulfites. In the eastern United States, these secondary sulfur pollutants are the major contributors to visibility impairment and acidic deposition. Within 100 kilometers of the Forest, there are 35 coal-fired electric generating units (EGUs). The ten largest point sources of SO_2 located within 200 kilometers of the Forest, listed in Table 3.2, are also among the top 50 highest SO_2 emitting EGUs in the nation (US EPA, 2003 eGRID database, 2002 data).

Some of these facilities may have made reductions since the time the EPA eGRID data were compiled.

Table 3.2 Ten Largest "point" sources of SO_2 emissions within 200 km of the Forest (1999 data)

Tons/Year of SO_2	Source Name	County, State
111,619	Texas Utilities Electric Co.	Rusk, TX
100,122	Texas Utilities Electric Co.	Titus, TX
38,206	White Bluff	Jefferson, AR
37,958	Southwestern Electric Power Co.	Titus, TX
32,019	Entergy Mississippi Inc.	Washington, MS
31,456	Alumnitec Inc.	Garland, AR
29,669	Oklahoma Gas & Electric	Muskogee, OK
28,900	Entergy Mississippi Inc.	Warren, MS
26,839	Doe Run Company	Iron, MO
26,674	Independence	Independence, AR

Sulfur Dioxide (SO_2) and Acid Deposition

Acid deposition occurs when acidic compounds in the atmosphere are deposited on the earth's surface through rain, clouds, snow, fog, or as dry particles. These acidic inputs can contribute to degradation of stream water quality and decrease the amount of available base cations in the soil substrate. An ecosystem's susceptibility to soil nutrient losses and decreases in stream water acid neutralizing capacity (ANC) are influenced by many factors; most notably the bedrock geology/lithology types and the level of acidic inputs. Areas that receive high levels of acidic deposition and have bedrock geology with a naturally low buffering capacity may exhibit nutrient depletion and stream acidification. Stream chemistry data show that streams on the Forest have stable ANC values; however, there currently is some potential that soil nutrient depletion is occurring in sensitive areas. There are four National Atmospheric Deposition Program (NADP) monitoring sites in Arkansas, and the Clark County site is located closest to the Forest. The Fayetteville site located in Washington County, which began monitoring in 1980, has the longest data record of the four sites. The Warren and Buffalo Point sites began monitoring in 1982, and the Caddo Valley site in Clark County began monitoring in 1983.

It is important to note that trend analyses for NADP sites show a general decrease in the levels of sulfate (SO_4) deposition throughout the nation, especially over the last ten years. Of the Arkansas monitoring sites, this observed trend is most prominent in the data from the Fayetteville site. The decline in SO_4 deposition at NADP sites is consistent with the decreases in utility SO_2 emissions brought about by the Acid Rain Program (Title IV) of the 1990 Amendments to the Clean Air Act. The Acid Rain provision mandated significant reductions in SO_2 emissions.

Downward trends in SO_2 emissions and SO_4 deposition are predicted to have a positive effect on aquatic and soil resources on the Forest. Reductions are not great enough to reverse any existing effects, however. Additional emission reductions would be needed to restore any existing degraded streams or to protect streams that have not yet degraded.

Sulfur Dioxide (SO_2) and Regional Haze

During the last four decades, the eastern United States has seen a significant regional reduction in visibility, linked to a corresponding increase in ambient levels of visibility-impairing pollutants often referred to as fine particulates (Malm 1999). The estimated natural background visibility for the eastern United States is 93 ± 28 miles (NAPAP 1990), but average annual visibility at Caney Creek and Upper Buffalo Wildernesses is now only 31 miles (IMPROVE Data 2003). This degradation of visibility, both in terms of how far one can see and the clarity of the view is called regional haze. Although many fine particulate components such as elemental and organic carbon and nitrates contribute to visibility impairment, the major visibility-impairing pollutant in the eastern United States is sulfate; which comprises most of the measured fine particle mass (IMPROVE Data 2003). Further, sulfate particles are considered hygroscopic, which means their effectiveness in impairing visibility is magnified with increasing relative humidity. A humid atmosphere alone does not result in visibility reductions, but sulfate particles grow in size when they attach to atmospheric water molecules; a size that is more effective at scattering the sun's light (Malm 1999). About 60 percent of SO_2 emitted nationally comes from coal-fired power plants (US EPA, National Air Quality, and Emissions Trends Report Data 2003). Organics, released primarily from vegetation as volatile organic compounds (VOCs), are the second most important fine particles measured.

The Inter-agency Monitoring of Protected Visual Environments (IMPROVE), a national network of particulate monitors established for the protection of Class 1 wilderness areas, has monitored the constituents of regional haze for more than two decades. The IMPROVE monitor located on the Forest is at Eagle Mountain near Caney Creek Class 1 area. IMPROVE data from the Caney Creek monitoring site were used in the visibility description that follows.

The clearest days at Caney Creek have the lowest fine particle mass (3.2 $\mu g/m^3$) with estimated visibility at approximately 75 miles (using the annual average relative humidity of 82 percent). Sulfates comprise approximately 43 percent of the total fine particulate mass on these low mass days. On the highest mass (16.9 $\mu g/m^3$) days, the visibility is reduced significantly to approximately 20 miles (IMPROVE Data 2003). Sulfates comprise 69 percent of the total fine particulate mass on these high mass days. The days with the poorest visibility are most likely to occur May through September (Air Resource Specialists 1995), the time of year when the Forest has the greatest visitor use. Throughout the year, people are most likely to see a uniform haze, like a white or gray veil, that obscures the scenery (Air Resource Specialists 1995). Data from the IMPROVE monitoring site at Caney Creek show that for the 20 percent worst visibility days, the extinction values are decreasing and visibility is improving (Figure 3.2). Although there is insufficient data to establish a definite trend, visibility appears to be improving on both the worst and best days (http://vista.cira.colostate.edu/views/) as shown in Figure 3.3.

However, the Regional Haze Rule, a regulation aimed at reducing haze-forming pollutants in federally mandated Class 1 areas, is concerned mainly with improvements on the worst visibility days, and maintaining visibility on the best days. The following trend plots show visibility data measured in inverse megameters; a low measurement constitutes minimal light extinction and thus a good visibility day, a high measurement constitutes high light extinction and thus a poor visibility day. Further reductions in air pollutants impacting visibility will occur under the Regional Haze program and natural background visibility should be achieved by 2064.

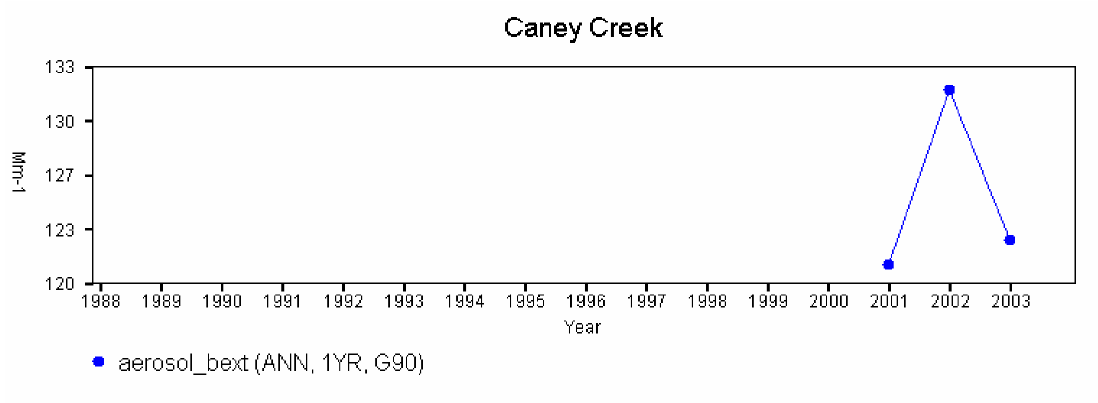

Figure 3.2 Light Extinction Monitored at Caney Creek on the 20% Worst Days - IMPROVE

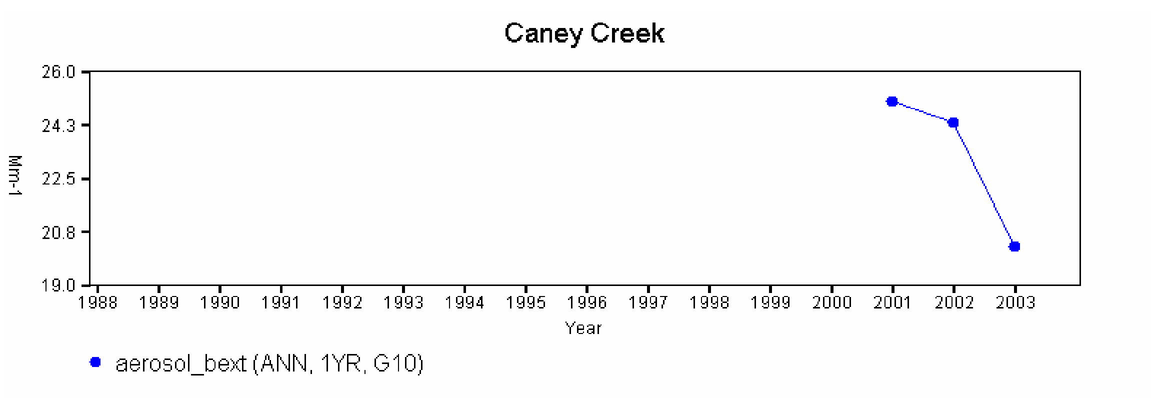

Figure 3.3 Light Extinction Monitored at Caney Creek on the 20% Best Days - IMPROVE

Nitrogen Oxides (NOx)

More than 95 percent of nitrogen oxides (NOx) emissions are in the form of nitric oxide. The transportation sector is the primary source of NOx emissions. Point sources such as coal-burning electric generation facilities also contribute ambient NOx levels. Smoke from wild and prescribed fire is also a contributor to NOx production. Thermal NOx production increases with increases in burn temperature. Relatively low-temperature prescribed burns emit very little NOx as compared to wildfires. When trapped in sufficient quantities, nitrogen dioxide can be seen as a brownish haze. Secondary pollutants formed from nitrogen oxides such as nitrates also reduce visibility and contribute to acid deposition. In the presence of VOCs and sunlight, nitrogen oxides rapidly contribute to the formation of ozone. Available evidence suggests that nitrogen oxides are a controlling factor in the formation of ground-level ozone in rural areas of the Southern United States (Chameides and Cowling 1995).

Ozone (O_3)

Ground level ozone (O_3) is a secondary pollutant, and its production is highly dependent on the presence of nitrogen oxides and VOCs, sunshine, and elevated temperatures. Therefore, high ozone levels will occur only during periods of warm weather, plentiful sunshine, and high levels of ozone-forming pollutants. For this reason, the ozone monitoring season extends from April to October. Ozone occurs in both the stratosphere (upper atmosphere) and the troposphere (ground level). Although the presence of ozone in the upper atmosphere is highly beneficial, in sufficient doses at ground level, ozone is considered a free radical, capable of killing living tissue in plants and in the human lung. Ozone's harmful effects are due to the pollutant's chemical make-up. The compound ozone is less stable than diatomic oxygen (the oxygen our bodies need). This unstable molecule reacts with plant and human lung tissues. In plants, death of the affected tissues sometimes occurs and in the human lung, inflammation and respiratory ailments, and in extreme cases, premature death can occur.

The NAAQS for ozone is set at levels considered protective of human health; however, damage to plants occurs at levels below the NAAQS for ozone. The ozone standard for human health, a new standard established in July of 1997 (CAAA sec 50.10), is set at a three year average of 0.085 parts per million (ppm) for a rolling 8-hour average. Areas that have an EPA Federal Reference Method (FRM) ozone monitoring site must meet these criteria; otherwise, the area is designated non-attainment for ozone. However, areas that do not have a FRM ozone monitoring site are designated as unclassifiable. Therefore, statewide attainment of the NAAQS is sometimes only as certain as the extent of the monitoring network. There are nine FRM ozone monitoring sites in five different counties in Arkansas. Of these five counties, three contain NFS lands and the other two are adjacent to NFS lands. The two monitors that are located adjacent to NFS lands have only shown minimal potential for damage and have not exceeded the ozone standard in the 11 years they have been in operation. In 1998, the 8 hour annual average for ozone was 0.071 ppm, with only 1 hourly occurrence where the level was greater than or equal to 0.100 ppm. This represents a growth loss of 2.1 percent for black cherry, one of the most sensitive species to ozone. In 2001, the 8 hour annual average for ozone was 0.078 ppm with only 2 occurrences where the level was greater than or equal to 0.100 ppm. This represents a growth loss of 3.4 percent for black cherry.

Particulate Matter (PM)

Particulate matter (PM) refers to any suspended atmospheric particle and is comprised of many different elements or compounds. It is defined based on various size classes, i.e., particles with an aerodynamic diameter of 10 microns are referred to as $PM_{10,}$ and particles with an aerodynamic diameter of 2.5 microns are referred to as $PM_{2.5}$. PM can be either a primary or a secondary pollutant, both of which affect Forest resources. Primary particulates tend to be larger in size and are directly emitted from a combination of sources including combustion sources, agriculture, and road construction. Secondary fine particles are formed when combustion gases are chemically transformed into particles. The bulk of regional fine particles within the analysis area are the result of these chemically transformed combustion gases, such as sulfates and nitrates, mainly sulfate particles (transformed SO_2) from coal-fired power plants. These smaller, chemically transformed fine particles are largely responsible for regional haze.

Primary and secondary sources of PM outside of the Forest have a major impact on air quality, and Forest Service activities also can affect air quality. Smoke emitted from forest fires, both prescribed and wild, has the potential to affect air quality. Soot particles from wildland fires are a small but significant part of the total $PM_{2.5}$ load. All alternatives contain standards that would minimize the impacts of smoke from prescribed burning on smoke-sensitive sites.

There are NAAQS for the two size classes of fine particulates (PM_{10} and $PM_{2.5}$). The $PM_{2.5}$ standard is newer (1997) and more stringent and is the standard of concern, because particles with a diameter of 2.5 microns or less have a greater ability to impair visibility and impact human health. The NAAQS for $PM_{2.5}$ is a 24-hour average of no greater than 65 micrograms/m^3, or an annual arithmetic mean of no more than 15 micrograms/m^3. Currently, there are no areas near the Forest designated as non-attainment for fine particulate matter.

Summary of Pollutant Effects

Air quality data are collected for various pollutants in areas around the Forest. Regional sources of air pollution have not been found to have an adverse effect on Forest resources. Visibility in the Eastern U.S., however, has been reduced from a natural background range of 90 to 130 kilometers to an average visual range of 30 to 40 kilometers. Ozone symptoms have been documented on the foliage of ozone-sensitive species, such as black cherry and blackberry, but ozone damage has not been documented. A potential growth loss of 2 or 3 percent on black cherry is minor. Given these impacts currently discussed on the National Forest, air quality in the region can be labeled as good.

Fire Regime and Condition Class Definitions

Emissions estimates from prescribed burning are based, in part, on fire regimes and fire condition classes. Fire Regimes are classified by combinations of fire frequency and severity. Most of the Ouachita National Forest is in Fire Regime 1 and characterized as naturally having frequent (<35 year Mean Fire Interval), periodic fire of low severity and intensity. Mesic sites are mostly Fire Regime 3 characterized by longer fire return intervals (>35 years) and mixed severity. Fire Condition Classes are used to characterize both general wildland fire risk and ecosystem condition. There are three fire condition classes:

> *Condition Class 1* is characterized by: (a) fire regimes within or near an historical range, (b) low risk of losing key ecosystem components, (c) departure from historical frequencies by no more than one return interval, (d) intact and functioning vegetation attributes (species composition and structure) within an historical range.
>
> *Condition Class 2* is characterized by: (a) fire regimes moderately altered from their historical range, (b) moderate risk of losing key ecosystem components, (c) departure (either increased or decreased) from historical frequencies by more than one return interval, (d) moderate alteration from the historical range of vegetation attributes.
>
> *Condition Class 3* is characterized by: (a) fire regimes significantly altered from their historical range, (b) high risk of losing key ecosystem components, (c) departure from historical frequencies by multiple return intervals, (d) significant alteration from the historical range of vegetation attributes.

Fire ecology research has resulted in the classification of ecosystems based on these fire regime and condition classes (FRCC). Prescribed fire is integral in restoring fire-adapted ecological communities and in lowering wildfire risks to people living in the wildland urban interface/intermix areas.

Environmental Consequences for Air Quality

Prescribed fire is the main management activity on the Forest that can affect local and regional air quality; however, the current National Fire Plan and the Healthy Forest Initiative both direct the Forest Service to utilize prescribed fire more frequently. Despite potential air quality effects, prescribed fire can provide important and necessary ecological benefits in forested landscapes. EPA recognized these ecological benefits and developed the Interim Air Quality Policy on Wildland and Prescribed Fires (EPA 1998). This policy provides incentive and guidance to states for developing smoke management programs for dealing with the NAAQS and emissions from prescribed fires, while allowing burning programs to continue. Arkansas and Oklahoma are in the process of finalizing a Smoke Management Program, and the Forest has been involved in this process. In addition to complying with the States' Smoke Management Programs, the Forest will continue to utilize smoke management techniques to protect smoke sensitive areas and public welfare, and to meet the NAAQS. All alternatives would require that the Forest use best available smoke management techniques.

Section 176 (c) of the CAA prohibits Federal agencies from engaging in or supporting any activity that does not conform to a State's Implementation Plan to bring an area back into attainment. As stated previously, there are currently no counties that contain or are adjacent to NFS lands that are in non-attainment status.

Public Health and Environmental Consequences

The EPA and States designate concentration levels for the criteria pollutants to protect public health. Federally designated maximum concentration levels are called National Ambient Air Quality Standards (NAAQS)—the amount of pollutant above which detrimental effects to public health (or welfare) may result (see tabulation below). NAAQS are set at a conservative level with the intent of protecting even the most sensitive members of the public, including children, asthmatics, and people with cardiovascular disease. If an area violates the NAAQS, that area becomes federally designated as a "non-attainment" area. An area that was one time in non-attainment, but has since met the NAAQS and other requirements, is called a maintenance area.

National and State Ambient Air Quality Standards

Pollutant	Time Period Average	Federal
Carbon Monoxide (CO)	1 hour, 8 hour	35 ppm, 9 ppm
Lead (Pb)	Calendar Quarter 90-day	1.5 $\mu g/m^3$
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean Hourly Average	0.053 ppm
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean, 24-hour, 3-hour Hourly Average	0.03 ppm, 0.14 ppm, 0.50 ppm
Ozone (O3)	8-hour, Hourly Average	0.12 ppm, 0.08 ppm
PM_{10}	Annual Arithmetic, Mean 24-hour	50 $\mu g/m^{3,}$, 150 $\mu g/m^3$
$PM_{2.5}$	Annual Arithmetic, Mean 24-hour	15 $\mu g/m^3$, 65 $\mu g/m^3$

ppm=parts per million
$\mu g/m^3$ = micrograms per cubic meter

Criteria pollutants such as sulfur dioxide and nitrogen dioxide have the potential to cause adverse effects on plant life, water quality, aquatic species, and visibility. However, sources of these pollutants are generally associated with urbanization and industrialization rather than with natural resource management activities or wildfire. Wildfire and natural resource management activities such as timber harvest, road construction, site preparation, mining, and fire use can generate ozone, carbon monoxide, and particulate matter. While ozone is a byproduct of fire, potential ozone exposures are infrequent (Sandberg and Dost 1990). Carbon monoxide is rapidly diluted at short distances from a burning area, as fires are generally spatially and temporally dispersed, and pose little or no risk to public health (Sandberg and Dost 1990). The pollutant of most concern to public health and visibility within and downwind of the analysis area is particulate matter. Although particulate matter has no serious effects on ecosystems because fire and smoke are ecological processes (ICBEMP 2000), smoke does affect human health and visibility. Because of its smaller size, $PM_{2.5}$ poses greater health risks than PM_{10}. Large volumes of particulate matter can be produced from fire and, depending on meteorological conditions, may affect large areas for extended periods.

Each day, concentrations of various air pollutants are measured in areas across the States. After the amount of pollution is measured, it is compared to the federal standard. To make it easy to compare all the different pollutants and determine the air quality, the EPA (EPA June 2000) developed the Air Quality Index (AQI) to relate all criteria pollutants to the same scale. Tables 3.3 and 3.4 display the 24-hour AQI breakpoints for $PM_{2.5}$ and PM_{10}. When concentrations reach "Unhealthy for Sensitive Groups," cautionary statements are issued to suggest that people with respiratory conditions or heart disease, the elderly and children, and those who work, exercise, or spend time outdoors, should limit prolonged exertion. EPA developed the health indices based on 24-hour averages.

Table 3.3 EPA's Air Quality Index (AQI) for Particulate Matter 2.5 ($PM_{2.5}$), including the Breakpoints of $PM_{2.5}$ concentrations for the Air Quality Index Rankings

$PM_{2.5}$ 24-hr Avg. Conc. (µg/m^3)	Index Values	Visibility (Miles)	Level of Health Concern	Cautionary Statements
0.0 – 15.4	0-50	> 10	Good	None
15.5 – 40.4	51 – 100**	5.1 – 10.0	Moderate	None
40.5 – 65.4	101 - 150	3.1 – 5.0	Unhealthy for Sensitive Groups	People with respiratory or heart disease, elderly, and children should limit prolonged exertion.
65.5 – 150.4	151 – 200	1.6 – 3.0	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion, everyone else should limit prolonged exertion.
150.5 – 250.4	201 – 300	1.0 – 1.5	Very Unhealthy	People with respiratory or heart disease, elderly, and children should avoid any outdoor activity, everyone else should avoid prolonged exertion.
250.5 +	301 - 500	< 1.0	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.

** An AQI of 100 for $PM_{2.5}$ corresponds to a $PM_{2.5}$ level of 40 micrograms per cubic meter (24-hr avg.)

Table 3.4 Air Quality Index (AQI) and Particulate Matter 10 (PM_{10}) and 2.5 ($PM_{2.5}$) Breakpoints

AQI Value	Health Concern	PM_{10} Breakpoints µg/m^3	$PM_{2.5}$ Breakpoints µg/m^3
0 – 50	Good	0 – 54	0 – 15.4
51 – 100	Moderate	55 – 154	15.5 – 40.4
101 – 150	Unhealthy for Sensitive Groups	155 – 254	40.5 – 65.4
151 – 200	Unhealthy	255 – 354	65.5 – 150.4
201 – 400	Very Unhealthy	355 – 424	150.5 – 250.4
> 400	Hazardous	> 424	> 250.5

µg/m^{3} = micrograms per cubic meter

While the NAAQS evaluate smoke impacts related to public health, smoke often causes public concern at lower levels. One study compared the number of complaints about smoke to the measured PM_{10} concentrations (Acheson and others 2000). Complaints increased when PM_{10} concentrations were as low as 30 micrograms per cubic meter. The 24-hour threshold for the PM_{10} NAAQS is 150 micrograms per cubic meter (Table 3.4). The Air Quality Index for a concentration of 30 micrograms per cubic meter would be rated as “Good,” indicating no health concerns.

Visibility Impairment (Mandatory Class 1 Areas) – Class 1 areas are set aside under the Clean Air Act to receive stringent protection from air quality degradation. Mandatory Class 1 areas are those with certain Federal designations in existence prior to the 1977 amendments to the Clean Air Act. These include 1) international parks, 2) national wilderness areas that exceed 5,000 acres in size, 3) national memorial parks that exceed 5,000 acres in size, and 4) national parks that exceed 6,000 acres in size.

The 1977 amendments established a national goal of “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class 1 Federal areas which impairment results from manmade air pollution.” Fine particles ($PM_{2.5}$) are the primary cause of visibility impairment in Class 1 areas although gases also contribute. Visual range is one indicator of pollution concentrations in the air. Visibility variation occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere. Without pollution effects, an estimated natural visual range is 90 miles in the eastern U.S. and up to 140 miles in the western U.S. (EPA November 2001).

In 1980, EPA’s visibility regulations were developed to protect mandatory Class 1 areas from human-caused impairments reasonably attributable to a single or small group of sources. In contrast, EPA proposed in 1997 a new regulatory program to protect mandatory Class 1 areas from visibility impairment produced by a multitude of sources that emit fine particles and their precursors across a broad geographic area. This Regional Haze Rule (40 CFR, Part 51) addresses impacts from numerous and broad based sources that cannot be easily pinpointed. The rule calls for states to establish goals for improving visibility in mandatory Class 1 areas and to develop long-term strategies for reducing emission of air pollutants that cause visibility impairment. Fire use is one of the sources addressed by the regulations.

Interim Air Quality Policy on Wildland and Prescribed Fires

On May 15, 1998, the EPA issued the *Interim Air Quality Policy on Wildland and Prescribed Fires* (referred to as the *Interim Policy*) to address impacts to public health and welfare. This policy was prepared in response to anticipated increases in fire use that were expected to occur as a result of implementing the *1995 Fire Management and Policy Review*, which outlined a need to restore fire as an ecosystem process in many wildlands. The *Interim Policy* was prepared to integrate the goals of allowing fire to function in its ecological role for maintaining healthy ecosystems while protecting public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility. The policy was developed with the active involvement of stakeholders including the U.S. Department of Agriculture. The *Interim Policy* is Federal policy that reconciles the competing needs to use fire and maintain clean air to protect public health. The *Interim Policy* is interim only because it does not yet address agricultural burning on regional haze (EPA 1998). It is not interim with regard to how States, Tribes, and Federal land managers are expected to address smoke from prescribed fires.

The *Interim Policy* suggests that air quality and visibility impact evaluations of fire activities on Federal lands should consider several different items during planning (EPA 1998). Items discussed in detail in this EIS include a description of applicable regulations, plans, or policies, identification of sensitive areas (receptors), and the potential for smoke intrusions in those sensitive areas. Other important considerations also discussed are applicable smoke management techniques, participation in a basic smoke management program, and potential for emission reductions. Two *Interim Policy* planning items mentioned below in this section will not be explained to the same level of detail as those listed above. These include ambient air quality and visibility monitoring plans, and the cumulative impacts of fires on regional and subregional air quality. In addition to these listed items, issues regarding public (transportation) safety are also discussed.

Smoke Management Program – The *Interim Policy* calls on States (and Tribes) to develop smoke management programs and for federal land managers to participate in them. Basic elements of a smoke management program include 1) a process to authorize burns; 2) a requirement that land managers consider alternatives to burning to reduce air pollutant emissions; 3) a requirement that burn plans include smoke management components such as actions to minimize fire emissions; evaluation of smoke dispersion; actions that will be taken to notify populations and authorities prior to burns to reduce the exposure of people in sensitive areas if smoke intrusions occur; and air quality monitoring especially in sensitive areas; 4) a public education and awareness program; 5) a surveillance and enforcement program; and 6) periodic review of its program for effectiveness. In exchange for States (and Tribes) proactively implementing smoke management programs, EPA intends to exercise its discretion not to re-designate an area as non-attainment if convincing evidence shows that fire use caused or contributed to violation of the daily or annual PM_{10} or $PM_{2.5}$ standards. The State (or Tribe) must certify to EPA that at least a basic program has been adapted and implemented.

Alternatives To Burning And Emission Reductions – Even though the *Interim Policy* acknowledges that fire is a necessary and non-replaceable treatment to meet certain objectives, land management agencies are encouraged to consider whether there are alternatives to burning in order to reduce emissions. In general, mechanical treatments are considered the most viable means of reducing emissions, though in some ecosystems, chemicals may be an option. However, the *Interim Policy* also acknowledges that considering alternatives to burning is not without tradeoffs and limitations. The policy states that mechanical opportunities are normally limited to:

Accessible areas (those with roads, harvest systems, etc)
Terrain that is not excessively rough
Slopes equal to or less than 40 percent
Areas not designated as National Parks or Wilderness
Areas without listed species
Areas without cultural or paleological resources.

In addition to the items listed above, other safeguards, including land allocations, desired conditions, objectives, and standards, would also limit opportunities for mechanical treatments.

Effects Common to All Alternatives

The level of prescribed fire use is expected to increase under Alternatives C and E. However, the level of increase varies between these alternatives. The level of prescribed fire use is expected to remain at or near current levels under Alternatives A (68,000 acres), B (125,000 acres), and D (100,000). In recent decades, the Ouachita National Forest has burned as little as 52,000 acres to as much as 134,000 acres in a single year. These levels fall near the rates of Alternatives A, B, and D, respectively. Despite the varying levels of prescribed fire usage, all wildland fires result in pollutant emissions, which can impact air quality on and off the Forest. Fine particulates are the major pollutants of concern emitted from prescribed fires and are also a criteria pollutant regulated under the CAA. As described previously, fine particulates are a concern in terms of human health and visibility impairment. Prescribed fires also, to a lesser extent, emit nitrogen oxides, which are precursors to ozone formation and are regulated as a surrogate for ozone. Though both VOCs and NOx contribute to ozone formation, NOx is the limiting factor in ozone production. Because of this, NOx emissions from prescribed fires will be assessed in this analysis in addition to PM emissions. Thermal NOx production increases with increased burn temperature, and relatively low-temperature prescribed fires emit very little NOx as compared to wildfires. Prescribed fire provides opportunities to minimize the impacts of smoke on local communities, while a wildfire situation does not typically afford such an opportunity. Ozone is of concern between April through October. During these times, the Forest burns very few acres. There would be no impacts from ozone under any of the alternatives.

Sensitive Areas – Air quality sensitive areas include places that may experience smoke related impacts to health, visibility, and public (transportation) safety. For this EIS, population centers and Impact Zones, non-attainment areas/maintenance areas, Class 1 areas, and major travel routes and airports as sensitive areas appropriate to address for this coarse-scale analysis were considered. All of these types of areas are represented within the 100-kilometer area of consideration. Non-attainment and mandatory Class 1 areas are designated through federal and state processes. Other sensitive areas have been identified through other processes. Evaluation of smoke impacts during project-level analysis may include other types of sensitive areas such as hospitals, airstrips, and campgrounds, but these are too fine-scale to be evaluated for the entire Forest in this EIS.

Public Health – There are no non-attainment/maintenance areas in the area of consideration, which means NAQQS have not been exceeded, and there is no discernible public health risk. There are no public health concerns for any of the alternatives except Alternative C, because Alternative C would contain a proposed burning program of 250,000 acres, on average, annually. Also, wildfires could cause pollutant levels in these areas to increase to levels that cause a public health risk.

Public (Transportation) Safety – Smoke can affect visibility on roads creating hazardous conditions for travelers. Smoke can be especially hazardous in low-lying areas where fog can form, further reducing visibility. Several traffic accidents have occurred on highways the Southeast U.S. from visibility reductions due to smoke. Hazy conditions can also affect aviation operations at airports by reducing visibility. There are several primary travel routes (e.g. highways) and airports throughout the analysis area. Potential impacts of smoke effects on visibility and impacts to transportation safety depend on amount, timing, and location of fire use, and the meteorological conditions that influence dispersion. Potential effects of smoke on specific areas related to transportation safety cannot be evaluated at this scale because of the spatial and temporal nature of this concern and will not be discussed or analyzed further in this document. Mitigations for these areas are considered as part of project-level planning and implementation.

Direct and Indirect Effects by Alternative

Prescribed Fire Emissions

The areas on the Forest that are most suitable for, and in the most need of prescribed fire treatments were identified based on best estimates of the fire regimes for the Forest landscape and current Condition Classes of these fire regimes, given the historic fire activity. Figure 3.4 shows the estimated Condition Classes on the Forest.

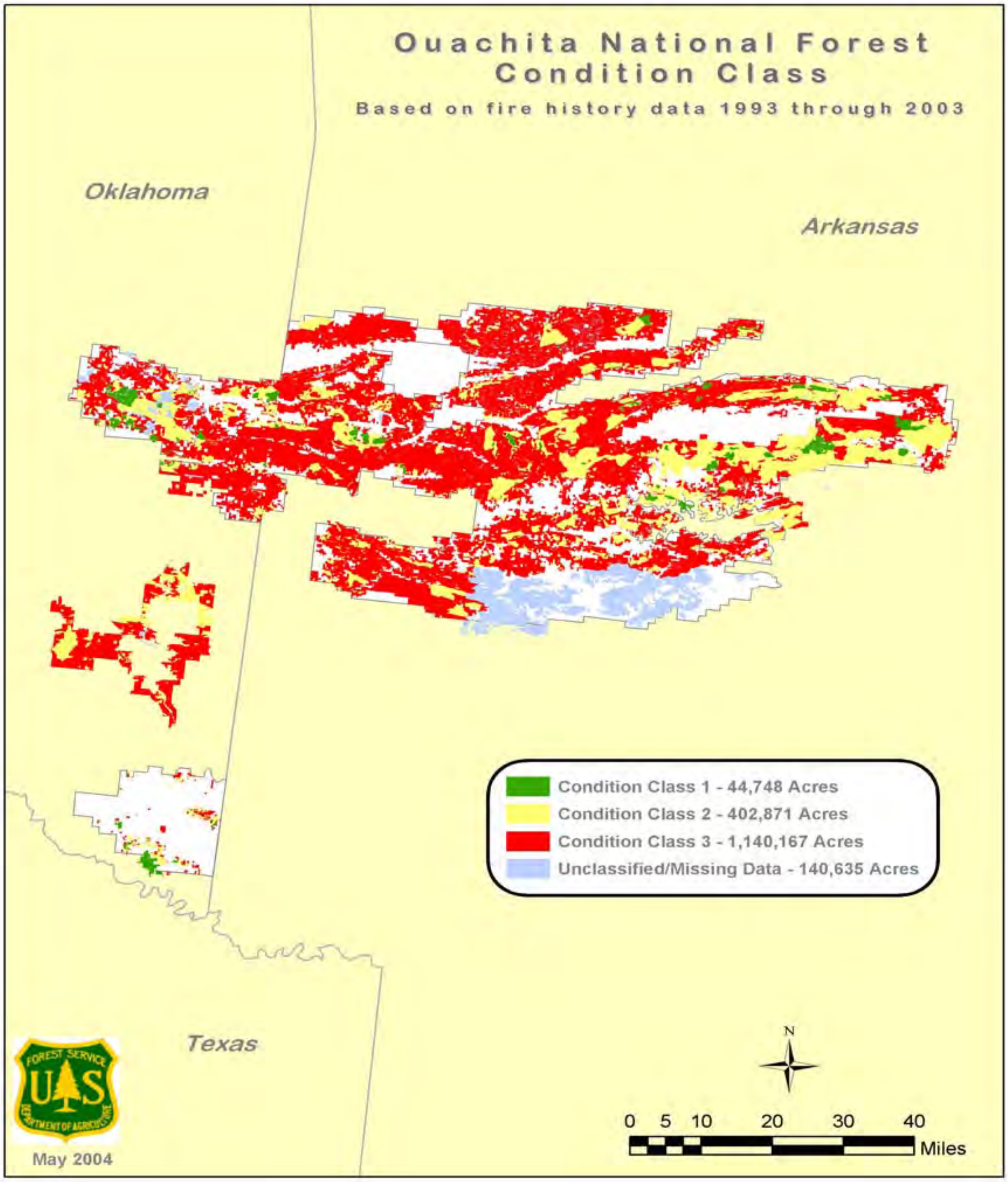

Figure 3.4 Best Estimates of Fire Condition Classes on the Ouachita

Areas in Condition Class 3 are considered to be the furthest from the reference condition for that area, while those in Condition Class 1 are more or less within the natural cycle. Prescribed fire activities will be concentrated in areas that are near Communities at Risk and/or the Wildland Urban Interface and in Red-cockaded Woodpecker (RCW) areas (to maintain Condition Class 1 and meet the requirements of the RCW Recovery Plan).

As more acres are restored to Condition Class 1 in ecological communities adapted to low-intensity periodic fire (Fire Regime 1), the woodland condition would prevail over a larger part of the landscape. In this condition, surface fuels are the primary component contributing to fire behavior. This would represent a change in current fuel profiles where surface fuels, aerial and ladder fuels can all contribute to fire behavior. The woodland types would include a more "grassy" fuel component (Fuel Model 2) compared to the closed canopy forest fuel type (Fuel Model 9). In the woodland condition, total fuel loading would be less than in the forest condition (as much as half the current average fuel loading in tons per acre). There would not be as much of a woody live and/or dead fuels component to contribute to either flaming or smoldering fire behavior. In prescribed burns and wildfires, the grassy component would burn more easily, faster, and produce fewer emissions (both in concentration and duration) as compared to current fuel conditions. Fire intensity would be less in the woodland condition and there would be less likelihood (risk) of stand-replacement burns. Suppression efforts would be less costly while providing a higher degree of safety to both the public and firefighters.

Management prescriptions were assessed in conjunction with the condition class categories to determine the relative number of acres suitable for prescribed burning within each alternative based on its management emphasis. Using this number, an estimate of potentially treatable acres was developed for each alternative.

Emissions estimates per acre burned in each alternative were derived using the First Order Fire Effects Model (FOFEM, Version 5.00; Rocky Mountain Research Station). This emissions estimate was then multiplied by the projected average acres that would be burned each year in each alternative to get an annual emissions estimate. To assess air quality effects, these annual emissions estimates from prescribed fire have been compared to regional annual emissions (all counties within 50 kilometers of the Ouachita National Forest) in tons per year. The number of acres treated with prescribed fire annually is highly dependent on weather and climatic conditions among other local factors. Because there is no way to predict where and when individual prescribed burns will occur, this analysis broadly assumes that the same number of acres will be treated with prescribed fire annually at the maximum level for each alternative. In reality, there would likely be some years with little prescribed fire activity, while others may be much closer to the maximum annual estimate.

Based on fuels inventory and monitoring data taken over the last four years, but not yet published, it appears that FOFEM may be over-estimating by two to four times the actual amount of fuel consumed in pine types when prescribed burning takes place. FOFEM assumes some larger fuels (100 and 1000-hour fuels) are consumed during prescribed burning when, in fact, they often are not. More accurate fuels information will soon be published on the Fire Learning Network.

The regional emissions data were obtained from the most recent and accurate emissions database available. Currently, this is the 2002 VISTAS base case emissions database. It can be assumed that if predicted emissions from the proposed prescribed fire activities contribute a small enough percentage to the total pollution load, they would not impact attainment of the NAAQS. Most counties within 50 kilometers of the Ouachita National Forest are either in attainment or unclassifiable status.

Because site-specific burn units have not been identified within the scope of this programmatic analysis, fuel loading characteristics are unknown at this time. For this reason a range of fuel loading characteristics that were deemed representative of portions of the Forest with potentially treatable acres were used in the emissions analysis. Fuel loading characteristics for more mesic sites with mixed oak and hardwood species were modeled to represent the treatable acres on the north-facing slopes of the Forest, and fuel loading characteristics for dryer mixed oak and chestnut oak sites were modeled to represent the south-facing slopes. The range of potential emissions from the various fuel loading characteristics and their effects on air quality are presented in Table 3.5.

Comparison of Effects by Alternative — Emission estimates per acre burned were derived from the FOFEM model. The number of acres burned varied by alternative, and thus the prescribed fire annual emissions also varied. Under Alternatives A, B, and D maximum prescribed fire usage is expected to remain at current levels, between 52,000 and 134,500 acres a year (data from Forest monitoring reports). Under Alternative C, prescribed fire usage would increase to an average of 250,000 acres annually. Under Alternative E, the prescribed fire acreage would be approximately 180,000 average annual acres. Historical records show that the current level of prescribed burning is not expected to cause non-attainment/maintenance areas because of past prescribed burning (a low of 52,342 acres in 2001 and a high of 134,386 acres in 2004); currently, there are no non-attainment areas. Emission estimates by alternative are presented in Table 3.5.

Table 3.5 $PM_{2.5}$ Estimated Emissions from Prescribed Burning (Percent Increase over 1990 Plan Prescribed Fire Projections)

Category	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Prescribed Burn Acres (projected annual avg.)	68,000	125,000	250,000	100,000	180,000
Tons of $PM_{2.5}$ produced from prescribed burning	From 4,893 to 6,073	From 8,994 to 11,163	From 17,988 to 22,325	From 7,195 to 8,930	From 12,951 to 16,074

The Forest will use the best available smoke management techniques and technology to alleviate nuisance or human health impacts of smoke in local communities and smoke sensitive areas, and avoid impacting attainment status for any criteria pollutant in areas where burns are conducted.

Cumulative Effects

Other than the proposed increases in annual prescribed fire listed in Table 3.5, there are no expected increases (above background) in burning in the analysis area. Table 3.6 compares alternatives using $PM_{2.5}$ and $PM_{10.}$ There are fewer data on $PM_{2.5}$ emissions, because EPA has not been tracking $PM_{2.5}$ emissions for very long. Review of the data indicates that the Forest Service emissions may not have been included in the emissions inventory of $PM_{2.5.}$ The emissions inventory for PM_{10} appears to be more accurate. It is assumed that a more reliable picture of the percentage increase from regional emissions would be obtained by comparing the PM_{10} emissions, because EPA has been tracking this pollutant for almost 15 years. Using PM_{10} as the better measure for comparison, Alternative C would contribute the greatest percentage of PM_{10} (9 percent) when compared to regional emissions, followed by Alternative E with 6 percent. Contribution of these pollutants is tied directly to acres estimated to be burned with prescribed fire.

Table 3.6 Cumulative Emission Estimates for Prescribed Burning on the Forest, by Alternative

Category	Alt A		Alt B		Alt C		Alt D		Alt E	
	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
Emissions (Max. Tons per Year)	6,073	6,650	11,163	13,200	22,325	26,400	8,930	10,560	16,074	19,008
Total Regional Emissions (Tons per year)	81,679	306,244	81,679	306,244	81,679	306,244	81,679	306,244	81,679	306,244
% Rx Fire	7%	2%	14%	4%	27%	9%	11%	3%	20%	6%

Topography and Soils

The Ouachita Mountains are some of the oldest landforms in Arkansas and Oklahoma and have been influenced by many climatic changes. Deposition and weathering of geologic material over time has produced the Forest's topography and landscapes as well as its soil parent material.

Soil is a complex mixture of minerals, organic compounds, living organisms, air, and water. Soils develop slowly from various parent materials and are modified by time, climate, macro- and microorganisms, vegetation, and topography. For the Ouachita National Forest, it is estimated that several hundred years are required to develop one inch of topsoil. Ecological health, diversity, healthy watersheds, and sustained productivity are all dependent on good soil management.

Past land use has affected most of the soils of the Forest. Extensive logging, mining, grazing, and farming have occurred on these lands since the mid to late 1800s, resulting in some areas with thin topsoil over subsoil due to erosion. Soil physical characteristics such as texture, structure, drainage features, depth to bedrock, rock content, moisture content, and physiographic position and location determine their productive potential. This soil information is used to make such management interpretations as erosion hazard and compaction hazard. Soil management interpretations help determine best use and acceptable management activities for maintaining or improving productivity.

The Ouachita National Forest lies within three Physiographic Regions: the Ouachita Mountains, Arkansas Valley, and Western Gulf Coastal Plains. Soils in the Ouachita Mountains developed mainly from tilted and fractured sandstone and shale or from novaculite and chert, which formed during the Pennsylvanian to Ordivician geologic periods (about 300-400 million years ago). Elevations range from about 450 to 2,700 feet above mean sea level in the Ouachita Mountains and about 250-500 feet above mean sea level on the Western Gulf Plain Physiographic Region. The Ouachita Mountains are characterized by east-west trending hills, mountains with narrow ridge tops, and narrow to moderately wide stream terraces and floodplains. The soils on stream terraces and floodplains developed during the Quaternary Period primarily from these same geologic materials. Slope gradients range from zero to over 60 percent. Approximately 20 percent of the Forest contains slopes greater than 35 percent.

The soil resources of the Forest have been classified, and there are 165 different soil mapping units, which represent 77 different soil series. These soil series range from shallow soils (less than 20 inches deep to bedrock) to very deep soils (greater than 60 inches deep). Forest site productivity ranges from about 30 to 85 in the Ouachita Mountains and up to 110 in the Western Gulf Coastal Plain Physiographic Region.

The desired condition of the soil resource is to maintain the productive potential of the land and to support the maintenance of the natural hydrologic functioning of watersheds, the functional integrity of the natural drainage system, and the inherent capacity of watersheds to absorb and retain water. This is accomplished through proper planning and implementation of all soil disturbing activities according to the Design Criteria in the Forest Plan (See Part 3 of the Forest Plan).

Direct and Indirect Effects

Accelerated erosion, soil compaction, and displacement are the primary concerns associated with maintaining long-term soil productivity. Erosion, compaction, and displacement are closely associated with increased runoff and sedimentation. Factors that determine erosion are rainfall intensity, soil erodibility, soil cover conditions, and steepness and length of slope. Approximately 80 percent of the Forest has been rated as having a slight or moderate erosion hazard and 20 percent as having a severe erosion hazard rating. Factors that determine susceptibility to compaction are surface texture, surface rockiness, and soil moisture. About 90 percent of the forest has been rated as having a slight or moderate compaction hazard, while the remaining 10 percent has a high or severe compaction hazard rating. Activities that contribute to erosion, soil compaction, and displacement include construction, maintenance, and use of temporary and permanent roads; vegetation management; recreation, including OHV use; grazing; and minerals management.

Soil Erosion

Soil erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Ground-disturbing activities influence erosion principally because vegetative ground cover is removed, allowing soils to be removed by runoff. A soil's susceptibility to erosion varies by soil type. A moderate or slight erosion hazard indicates that standard erosion control measures, such as installing water bars, plus seeding and fertilizing firelines, ripping on the contour, and not exposing more than 20-30 percent of mineral soil in treatment areas are sufficient to prevent excessive erosion. Soils with severe erosion hazard ratings require more intensive efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity.

Natural erosion rates from undisturbed forest soils are very low, generally around 0.01 to 0.10 tons/acre/year (Scoles and others). In forested watersheds, the most common cause of accelerated erosion is creation and use of forest roads, although timber harvest, site preparation, mineral activities, grazing, trail construction and use, and some recreation uses, such as OHV trails, also have the potential to remove or disturb the surface or cover of soils. Erosion rates tend to remain greater on these areas for many years following their use due to altered soil structure and loss of infiltration. Erosion is most effectively managed by leaving sufficient amounts of the forest floor (slash, and other onsite woody debris material) intact, not overly compacting soils (which would reduce water infiltration rates and result in increased overland flow), and not allowing water to concentrate and channel on roads or trails.

Under all alternatives, erosion control measures will be implemented to reduce the potential effects of proposed project work. To reduce soil loss from roads and improve water quality, erosion control measures will include re-shaping the road prism (where needed), scarifying roads to be closed to provide an effective seedbed, water barring, seeding and fertilizing, and gating roads to be closed to restrict traffic. During reforestation activities and wildlife pond construction, erosion control measures will include proper timing of activities to avoid heavy equipment operation during wet weather, and drainages will be crossed at pre-selected sites and at right angles to the stream. Making cross-country travel by OHVs unsuitable (Alternatives B through D) would lead to better monitoring and management of remaining OHV-related impacts. Use of erosion control measures is specified in plan standards and required for all projects.

The average annual erosion potential of each alternative is shown below for the first and fifth decades. Erosion potential is expressed as a relative value based on the average C-factors (cover factor from the universal soil loss equation) and accumulated for the annual projected vegetation management activities.

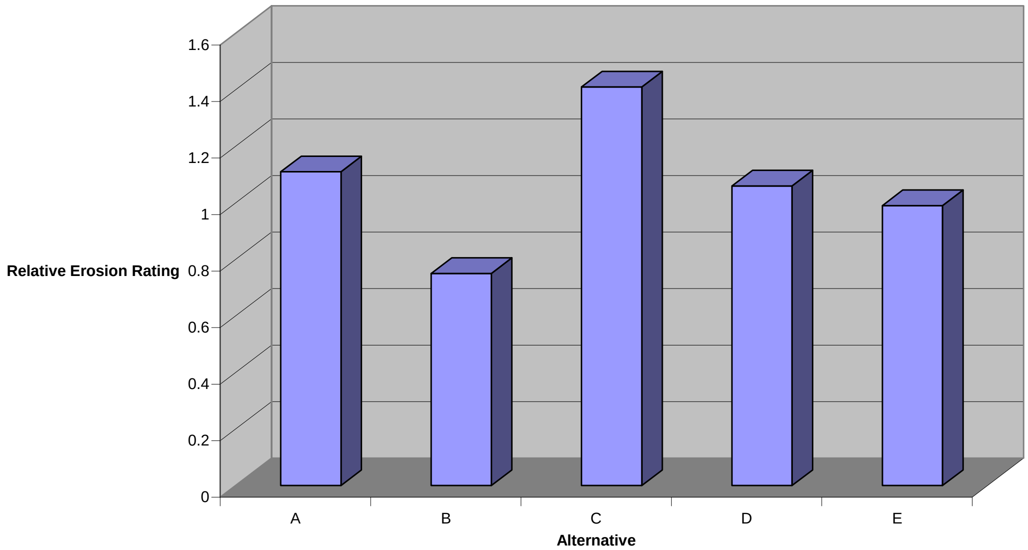

Figure 3.5 Erosion Potential in First Decade

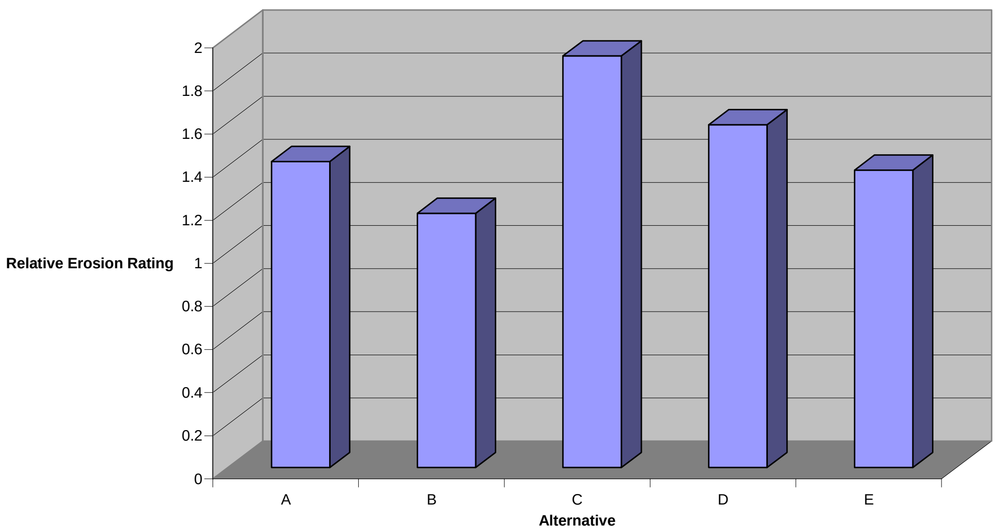

Figure 3.6 Erosion Potential in Fifth Decade

Soil Compaction and Soil Displacement

The use of large machinery in forestry operations has the potential to cause impacts to soils in the form of soil compaction and soil displacement. Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration. Compaction can detrimentally impact both soil productivity and watershed conditions by causing increased overland flow during storm events and reduced plant growth due to reduced amounts of water entering the soil and its reduced availability for plant growth, a restricted root zone, and reduced soil aeration. Heavy equipment operations may also affect soil productivity by soil displacement. Soil displacement is generally the result of topsoil transfer from one site to another caused by tire or track slippage; blading of roads, decks, or firelines; or from intensive skid traffic areas such as main skid trails.

Soils are classified as having a slight, moderate, high, or severe compaction hazard rating. Degree of moisture in the soil greatly affects its hazard to compaction, and December to June is generally considered the period on the Forest when the soil moisture content is greatest. Approximately 90 percent of the soils on the Forest have a slight or moderate compaction hazard rating. The soils on the remaining area have a high or severe compaction hazard rating.

The weight of heavy machinery used for harvesting and road construction can compact soils, decreasing productivity. Compaction monitoring on the Ouachita National Forest has found that compaction can be excessive on heavy traffic areas such as landings, primary skid trails, and temporary roads, particularly when the soils are wet or rock-free, or nearly rock-free, in the surface six inches (USDA-Forest Service, 1990a). Mitigation measures, such as requiring a limited operating season on soils with a high or severe compaction hazard rating (Amendment 27 to the 1990 Forest Plan) and limiting activity when soils are wet are used to limit compaction.

Under all alternatives, measures to minimize compaction and displacement include operating heavy equipment when soils are dry to reduce slippage; operating over intact forest floor and downed woody debris; constructing as few firelines, roads, skid trails, and logging decks as possible; and redistributing topsoil back over areas where it has been removed. In addition, heavy equipment operation will be suspended, or redirected to drier locations when tire or track ruts approach two inches deep or greater off the dedicated transportation system.

Fire Effects on Soil

Prescribed fire has both positive and negative effects on soils. Prescribed fires can potentially result in the same types of impacts on soils as wildfires; however, these burns are generally planned to burn at low to moderate intensities, limiting adverse impacts. Most burning will occur during the cooler winter or early spring months when flame lengths and fire severity should be low to moderate. Only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves, and small twigs should be consumed. This will leave the underlying layer, which consists of more decomposed needles, leaves, and twigs, to protect the mineral soil. This organic layer, along with the trees and other living vegetation on the area, should prevent or minimize any soil movement. These fires are often designed to reduce fuel loadings that diminish the likelihood of detrimental impacts from subsequent wildfires. Negative effects are principally associated with severe burns, which may kill soil biota, alter soil structure, consume organic matter, and remove site nutrients and lead to soil erosion and nutrient leaching during later rainstorms.

High-severity burns, usually wildfires, can adversely affect long-term soil productivity. Excessive nutrient loss from severely burned areas may occur through atmospheric volatilization, deep leaching, and loss of soil organic matter. Even soil structure and infiltration rates can be seriously compromised, leading to accelerated erosion rates. High-severity prescribed burns may unintentionally occur where overstory protection is not required, or during the growing season burns when litter layers are typically drier.

In contrast to high-severity burns, properly managed moderate-severity burns generate acceptable or beneficial effects on soil. The Ouachita-Ozark Vegetation Management EIS (USDA Forest Service 1999a) notes that light to moderate-severity burns will result in little to no detectable change in the amount of organic matter in surface soils. These burns will not change the structure of mineral soils because the elevated temperatures are of brief duration. Light to moderate-severity burns will expose soil on less than 20 percent of the area and recovery usually takes one year or less. Soil biota is reduced but recovers quickly (USDA Forest Service 1990b). In addition, light to moderate severity fires accelerate the recycling process by releasing nutrients in the soil, thereby stimulating nutrient uptake by vegetation. Even though prescribed fires release some nitrogen gases (N_2) mainly from forest floor material, overall nitrogen budgets are not significantly affected. Post-burn, nitrogen is restored by atmospheric input from lightning, rain, and dust and through increased levels of nitrogen fixation by wild legumes and soil bacteria. Prescribed fires may also help in reducing rates of soil acidification (USDA Forest Service 1990b).

Because prescribed fire is planned, there are usually fewer firelines on steep slopes, which have a higher potential to erode. In some cases, such as fuels reduction burns or wildlife enhancement burns, it is necessary to burn on slopes greater than 35 percent. Firelines are stabilized with water bars and seeding after the burn is completed to help prevent erosion, and rehabilitation is required if severe impacts occur.

Recent research and monitoring in the Ouachita Mountains indicate that soil quality and long-term productivity have improved under shortleaf pine-bluestem ecosystem restoration for which restoration treatments include repeated prescribed burning at 3-5 year intervals. Masters (1993) found pH to increase slightly on harvested and burned areas when burned on a 3-4 year cycle. Liechty and others (2005) found that pine-bluestem stands that had been established 20 years earlier on the Poteau Ranger District had increased levels of soil pH, mineralizable nitrogen, total nitrogen and carbon, calcium, and organic matter as compared to the pine-hardwood control stands.

Site preparation burns will be of moderate or less intensity and less than 30 percent mineral soil will be exposed. Other measures that would be implemented to minimize soil erosion and sediment production include burning during the dormant season for fuels reduction or wildlife enhancement burns to assure a light to moderate burn intensity to retain at least ½-inch of forest floor material over at least 70 percent of the treatment area. In addition, all firelines constructed or re-opened by heavy equipment will be water barred, seeded, and fertilized upon completion of the burn, and any firelines planned on slopes greater than 35 percent will be constructed by hand. Alternative A maintains a program for prescribed fires of an average of 68,000 acres annually and Alternative D would have a program for prescribed burning of about 100,000 average annual acres over a ten-year period. Alternative B represents the current prescribed burn program of 125,000 average annual acres. Alternative C represents the greatest potential for effects to soils as the program of average annual burning would be 250,000 acres, and Alternative E has a projected program of 180,000 average annual acres of burning. The impacts of prescribed fire on soils are expected to stay within established limits for all alternatives. All prescribed burns are expected to be of light to moderate severity, with many of them conducted during the dormant season.

Effects of Herbicide Use on Soils

Herbicides do not physically disturb the soil; therefore, treated areas would have intact litter and duff. Herbicides could affect soil productivity through biotic impacts, soil erosion, and nutrient leaching (FEIS Vegetation Management, 1990, IV-95 through IV-96). Depending on the application rate and soil environment, herbicides can stimulate or inhibit soil organisms. Adverse effects can occur when herbicides are applied at higher rates than the label rate. Use of herbicides at the lowest effective rate required by mitigation measures does not reduce activity of soil biota (Fletcher and Friedman 1986). Litter and duff serve to minimize erosion and nutrient loss from leaching. Forest standards have been developed to ensure that herbicides are applied correctly and pose no greater than minimal risk to soils and soils biota and do not accidentally contaminate surface waters. No herbicide will be mixed or used within 100 feet of perennial streams, lakes, or ponds, or within 30 feet of other streams with defined channels. Herbicides, carefully directed and foliar sprayed during late spring to summer at the minimum recommended application rate, should result in no detrimental effects to long-term soil productivity or impact water quality. With plan standards in effect, all alternatives show acceptably low risk with respect to potential herbicide use.

Other Effects on Soils

The 1990 Forest Plan identified about 200 acres of eroding lands in need of restoration and estimated that if watershed improvement work was sustained at a rate of 10 acres per year, then this backlog of lands would be completed by the year 2010. Under current management, the entire 1990 backlog of 200 acres has been accomplished. Nonetheless, abandoned roads and trails and abandoned gravel pits and surface mines continue to contribute to soil displacement, compaction, and erosion. Also, there are additional acres in need of restoration from newly acquired lands, unauthorized OHV trails, as a result of wildfire, and from PL-566 flood control dams, and other special use areas.

On average, the Forest accomplishes 30 to 40 acres/year of watershed restoration (from all the above). This number is not expected to diminish during the next planning period. Rather, more acres may be restored in the future (such as compaction mitigation) if, during project implementation using Forest Plan soil standards, areas are found that exceed the specified tolerances.

Recreational activities, in general, are less disruptive to soils than typical vegetation management activities; however, both horses and motorized vehicles in the Forest have the potential to rut and compact soils. Alternatives B through D would make cross-country travel by motorized vehicles unsuitable and include an objective to “designate and sign a system of roads and trails suitable for public access by motor vehicle, including, where appropriate off-highway vehicles, no later than October 2009.” Allowing OHVs only on designated routes will relocate OHV use to areas better suited for this activity and will allow previously unauthorized user-defined trails to be reclaimed.

About 114,537 acres in Oklahoma and 161,278 acres in Arkansas are considered suitable for livestock grazing under all alternatives; therefore, there are no differences among alternatives in terms of impacts to soil when grazing is considered. Because demand for Forest grazing has been decreasing since 1975, it is expected to continue to decline during the planning period.

Extraction of locatable or leasable minerals directly affects soils by removing vegetation and often the entire soil overlayment. Possible effects include erosion and loss of soil productivity. The Forest requires mineral sites to be restored when use ends.

The most common causes of accelerated erosion are the creation and use of forest roads and the use of heavy equipment associated with timber harvest because construction, maintenance, and use of temporary and permanent roads have the potential to disrupt natural drainage patterns and disturb soils. Continual use of roads leads to soil compaction and, during wet seasons, to rutting. The Forest has a policy of decreasing the open road density where feasible. In comparing alternatives, Alternative C has the highest level of management activity and is therefore considered to be the alternative that would have the greatest impacts to soils. Alternative A, because of fewer management activities, is considered to be the alternative with the least impact to soils. Further comparison of alternatives and information from the Forest Roads Analysis indicates that for Maintenance Level (ML) 3, 4, and 5 roads, only a few miles of new ML 3, 4, or 5 roads or road segments are likely to be constructed over the next 10 to 15 years, and virtually all existing ML 3, 4, 5 roads are likely to remain open, regardless of alternative. Therefore, there are no differences among the alternatives considered in detail for ML 3, 4, and 5 roads. Changes to ML 1 and 2 roads will be addressed by environmental analyses at the project level. Except for relatively minor differences among alternatives in acres managed as wilderness or recommended wilderness, the number of ML 1 and 2 roads and their effects on soil would change only slightly by alternative.

Cumulative Effects

Maintenance or lack of maintenance of roads could contribute to long-term cumulative effects. Road maintenance budgets have been inadequate to keep roads fully maintained. Soil impacts from heavy equipment used during logging operations will continue; however, with proper design of temporary roads and log landings, such use should be properly mitigated.

Cumulatively, environmental consequences to soils from past, present, and foreseeable management, mining, grazing, or recreational activities will be minimized through project level analysis, prescription of appropriate mitigation and adherence to Design Criteria.

Research indicates that soil productivity is sustained through nitrogen and carbon fixation, mineral release from weathering parent material, decaying organic matter, and translocation of nutrients. Erosion, compaction, and displacement can affect long-term and short-term soil productivity. Loss of soil nutrients can occur directly from soil erosion and soil displacement, or indirectly by biomass removal from harvesting timber or from fire. Biomass removal in the form of timber harvest can result in nutrient deficits. Nutrient depletion; however, is generally only a concern where soils are initially nutrient poor, where whole-tree harvest (total biomass removal) is used, or where stand rotations are short, i.e., on the order of 20-35 years (Jorgenson and Wells 1986).

Monitoring and research studies on the Ouachita National Forest have not detected differences in soil nutrient status in stands managed under different intensities, suggesting that cumulative effects on nutrient levels are not substantial even under the most intensive management regimes (Ku and Lawson 1993). Beasley and others (1987) studying soil nutrient levels of undisturbed and managed timber stands on the Ouachita National Forest, found that nutrient losses on disturbed soils quickly returned to control levels, generally by the second year after treatment. They concluded that any net loss of nutrients from forest management actions was soon replaced through atmospheric deposition of nutrients, which equaled or exceeded any losses. Additionally, general field observation and expert opinion do not support the notion that typical management actions, such as those that would be implemented under each alternative, negatively affect soil productivity on the Ouachita National Forest (Wheeler and Eichman 1991).

Aquatic Habitat and Species

Aquatic Resources

The following sections describe the physical environment of the aquatic resources found in and around the Ouachita National Forest. Additional detailed descriptions of the water environment including physical, chemical, and biological information may be found in the Ozark-Ouachita Highlands Assessment, Aquatic Report (1999).

Hydrologic Unit Codes

A watershed is a region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water. For purposes of planning, the forest uses areas defined by Hydrologic Unit Codes (HUC) as watersheds.

Watersheds are delineated within a hierarchical framework. For example, each of the major river basins or regions (1st level) is subdivided into smaller and smaller basins called, in descending order, sub-regions (2nd level), accounting units (3rd level), cataloging units (4th level) and then watersheds (5th level). To help readers locate 5th level watersheds and avoid the confusion of 10-digit codes, the 5th level watersheds have been named. Whenever possible, the name was taken from a local stream or lake feature. See Appendix C for a list of hydrologic units and an explanation of how HUCs are numbered. Across the Forest, there are thirteen 4th level cataloging units. Figure 3.7 displays the 4th level cataloging units and Ouachita National Forest surface ownership.

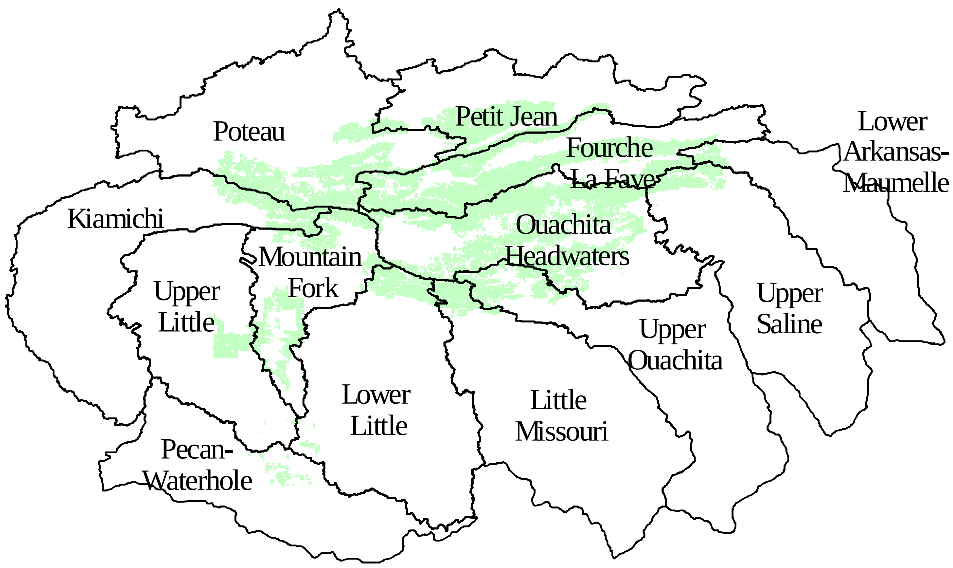

Figure 3.7 Fourth level cataloging units and lands managed by the Ouachita National Forest.

Figure 3.8 shows the 5th level watersheds (subdivisions of 4th level cataloging units) that contain lands managed by the Ouachita National Forest. There are 50 5th level watersheds that are potentially affected by management of the Forest.

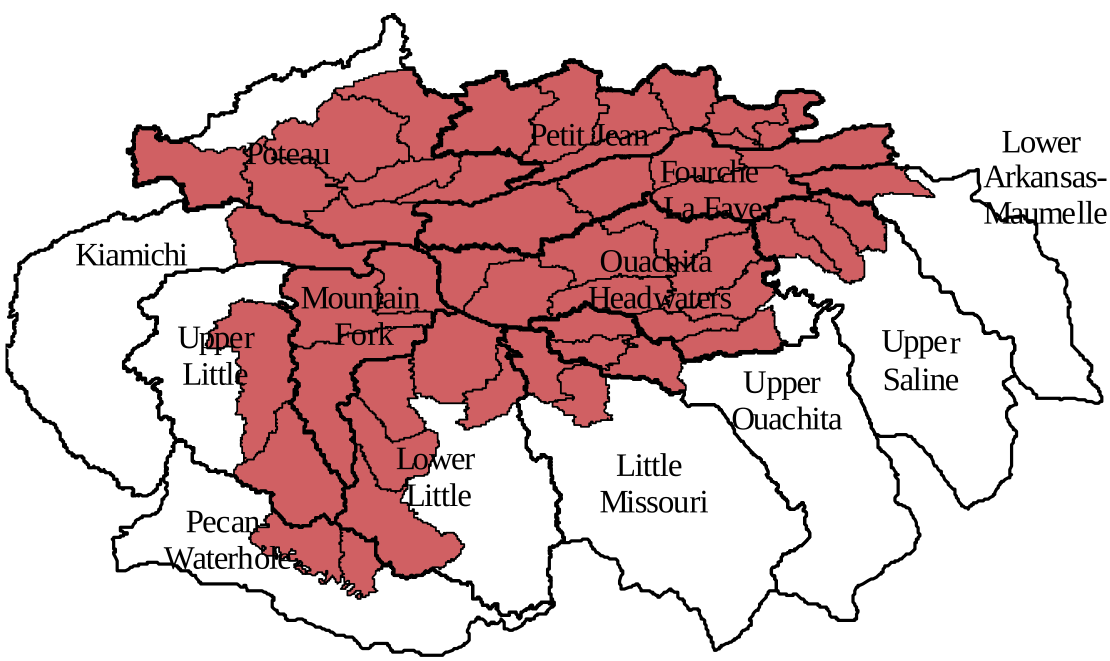

Figure 3.8 Fifth level watersheds within 4th level cataloging units

Rivers

Ten major rivers originate (totally or in part) from the Ouachita Mountains. From the southern portion of the Ouachita Mountains, the Ouachita, Caddo, and Little Missouri Rivers contribute to the Red River. From the northern side, the Poteau, Petit Jean, and Fourche La Fave Rivers flow into the Arkansas River. The western headwaters of the Ouachita Mountains contribute to the Glover, Kiamichi, Mountain Fork, and Cossatot Rivers. According to the National Hydrography Data (1:24,000), over 22,546 miles of perennial streams occur within watersheds and over 5,675 miles flow within lands managed by the Ouachita National Forest.

Lakes

National Hydrography Data show that about 25,000 lakes and ponds covering 110,682 acres are found within the 5th level watersheds that include the Ouachita National Forest. Within the Forest itself, there are 409 lakes covering about 60,000 water surface acres, the largest lakes and ponds within the 5th level watersheds are shown (water surface acres) in the following tabulation:

Lake Ouachita, AR	38,182
Broken Bow Lake, OK	14,217
Lake Maumelle, AR	8,960
Lake Greeson, AR	7,054
Lake Hamilton, AR	6,663
Wister Reservoir, OK	3,908
Blue Mountain Lake, AR	2,972
Nimrod Lake, AR	2,841
Spur Lake, AR	2,829
Harris Brake Lake, AR	1,260
Lake Winona, AR	1,170
Lake Hinkle, AR	969
Ward Lake, OK	374

(acres calculated from GIS coverages)

Watershed Condition and Vulnerability

Watershed condition and vulnerability were determined through a forest-wide watershed assessment (US Forest Service 2004). Fifteen factors (eight condition and seven vulnerability factors) affecting watershed condition or watershed vulnerability were addressed and ranked on 5th level watersheds across the Forest. Lake Hamilton watershed has the lowest overall score, based on road crossings, point sources, population, road density, and drinking water sources. Riddle Creek, Irons Fork Middle Fork, Headwaters of the Poteau, Lower Little River, and Little Mazarn also have low overall watershed values.

Figure 3.9 displays overall condition plotted against overall vulnerability. Lower values are indicative of greater vulnerability or poorer condition while higher values have lower vulnerability or better condition. Watersheds above the dark line are watersheds with lower vulnerabilities and better condition when compared to watersheds between the lines. Watersheds below the lighter line are in poorer condition and have higher vulnerabilities when compared to watersheds between the lines.

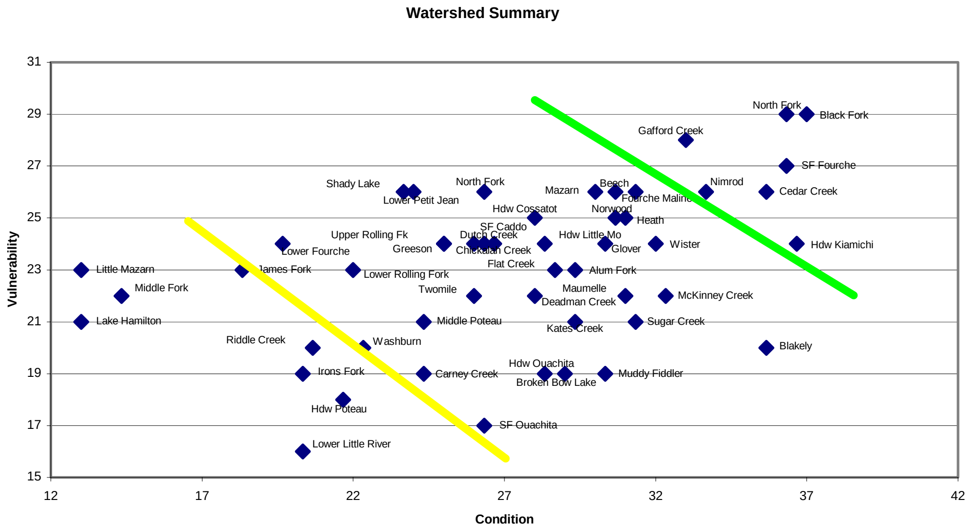

Figure 3.9 Watershed summary using vulnerability and condition

The principal objective of the forest-wide watershed analysis was to provide an assessment of watershed health for the forest plan. Summary conclusions drawn from the analysis include:

- Scores represent a comparative ranking and are limited to the 50 watersheds studied. A lower score does not mean that the watershed is impaired, only that compared to the other 50 that include National Forest System lands, it has a lower comparative ranking
- Watersheds with lower condition and vulnerability scores tend to have a lower percentage of lands managed as part of the National Forest
- Higher road density, which is a vulnerability factor, tends to occur in more populated areas; however, higher road densities within riparian areas are found in less populated areas with a greater National Forest influence. This is likely due to a tendency in decades past to locate roads within riparian areas
- The watersheds with a high percentage of lands managed as part of the National Forest serve as a refuge for many aquatic species of concern

Water Uses

Water on the Ouachita National Forest is needed for recreation (primary contact such as swimming and secondary contact such as fishing and boating), wildlife, fisheries, public and domestic uses, livestock watering, and administrative use. Additionally, instream flow quantities and timing are necessary to maintain the capacity of the channels to transport water and sediment and for fisheries, recreation, and visual quality.

Surface Water

For planning purposes, consumptive and non-consumptive water uses were determined for counties associated with 5th level watersheds. Since the 1999 Ozark-Ouachita Highlands Assessment, additional data have become available. Tables 3.7 and 3.8 display the consumptive and non-consumptive surface withdrawals by county for 1995 and 2000, respectively. Thermoelectric and public water supplies comprise 85 percent and 11 percent, respectively, of the surface-water use. Overall, surface water use increased by approximately 11 percent from 1995 to 2000, with most of the demand in thermoelectric use.

Table 3.7 Surface-water Use (Million Gallons per Day), 1995

County	State	Public Supply	Commercial	Domestic	Industrial	Thermo-electric	Mining	Livestock	Irrigation	Total
Clark	AR	2.83	0.00	0.00	0.00	0.00	0.00	0.20	0.96	3.99
Conway	AR	1.32	0.04	0.00	20.54	0.00	0.00	1.29	3.88	27.07
Faulkner	AR	7.16	0.00	0.00	0.00	0.00	0.00	0.56	0.28	8.00
Franklin	AR	2.97	0.07	0.00	0.00	8.03	0.00	0.53	0.01	11.61
Garland	AR	14.53	0.00	0.00	2.41	247.15	0.00	0.66	0.01	264.76
Hot Spring	AR	3.19	0.05	0.00	0.44	0.00	0.00	0.18	3.67	7.53
Howard	AR	3.44	0.00	0.00	1.14	0.00	0.00	00.5	0.00	5.08
Little River	AR	0.00	0.00	0.00	0.00	0.00	0.00	0.35	2.81	3.16
Logan	AR	2.75	0.00	0.00	0.00	0.00	0.00	0.64	0.00	3.39
Montgomery	AR	0.67	0.00	0.00	0.02	0.00	0.00	0.25	0.04	0.98
Perry	AR	0.61	0.00	0.00	0.00	0.00	0.00	0.22	2.98	3.81
Pike	AR	0.71	0.00	0.00	0.00	0.00	0.00	0.30	0.00	1.01
Polk	AR	3.18	0.00	0.00	0.00	0.00	0.00	0.41	0.23	3.82
Pope	AR	8.95	0.22	0.00	0.00	967.12	0.00	0.55	0.13	976.97
Pulaski	AR	57.73	0.00	0.00	0.00	0.00	0.00	0.14	9.85	67.72
Saline	AR	4.77	0.00	0.00	0.60	0.00	0.12	0.17	0.07	5.73
Scott	AR	1.34	0.00	0.00	0.00	0.00	0.00	0.42	0.00	1.76
Sebastian	AR	31.52	0.00	0.00	0.00	0.00	0.00	0.31	0.11	31.94
Sevier	AR	2.5	0.00	0.00	0.00	0.00	0.00	0.55	0.00	3.05
Yell	AR	2.29	2.68	0.00	0.00	0.00	0.00	0.61	1.83	7.41
Latimer	OK	1.13	0.00	0.00	0.00	0.00	0.00	0.80	0.17	2.10
LeFlore	OK	8.81	0.00	0.00	0.00	0.00	0.00	2.47	0.66	11.94
McCurtain	OK	7.21	0.00	0.00	0.00	0.00	0.00	2.55	0.07	9.83
Pushmataha	OK	0.76	0.14	0.00	0.00	0.00	0.00	1.09	0.22	2.21
Total		170.37	3.20	0.00	25.15	1,222.30	0.12	15.75	27.98	1,464.87

Table 3.8 Surface-water Use (Million Gallons per Day), 2000[1]

County	State	Public Supply	Domestic	Industrial	Thermo-electric	Mining	Livestock[2]	Irrigation	Total
Clark	AR	2.56	0.00	0.01	0.00	0.00	0.00	0.60	3.17
Conway	AR	1.74	0.00	7.82	0.00	0.00	0.00	4.71	14.27
Faulkner	AR	8.45	0.00	0.00	0.00	0.02	0.00	2.99	11.46
Franklin	AR	2.71	0.00	0.00	0.00	0.00	0.00	0.01	2.72
Garland	AR	13.40	0.00	2.28	0.00	0.00	0.00	0.60	16.28
Hot Spring	AR	2.19	0.00	0.02	408.73	0.02	0.00	3.38	414.34
Howard	AR	4.94	0.00	1.00	0.00	0.47	0.00	0.00	6.41
Little River	AR	0.82	0.00	1.31	0.00	0.00	0.03	0.62	2.78
Logan	AR	3.33	0.00	0.00	0.00	0.00	0.00	0.11	3.44
Montgomery	AR	0.34	0.00	0.00	0.00	0.00	0.00	0.05	0.39
Perry	AR	0.72	0.00	0.00	0.00	0.00	0.00	4.76	5.48
Pike	AR	1.64	0.00	0.00	0.00	0.03	0.00	0.01	1.68
Polk	AR	1.71	0.00	0.00	0.00	0.00	0.00	0.25	1.96
Pope	AR	12.21	0.00	0.00	984.60	0.00	0.00	0.15	996.96
Pulaski	AR	68.20	0.00	0.00	0.00	0.13	0.00	12.23	80.56
Saline	AR	9.39	0.00	0.52	0.00	0.00	0.00	0.61	10.52
Scott	AR	1.74	0.00	0.00	0.00	0.00	0.00	0.00	1.74
Sebastian	AR	29.90	0.00	0.00	0.00	0.00	0.00	0.19	30.09
Sevier	AR	2.63	0.00	0.03	0.00	0.00	0.00	0.00	2.66
Yell	AR	2.91	0.00	0.00	0.00	0.00	0.00	0.81	3.72
Latimer	OK	1.14	0.00	0.00	0.00	0.00	0.92	0.04	2.10
LeFlore	OK	10.39	0.00	0.00	0.00	0.00	3.01	2.81	16.21
McCurtain	OK	5.49	0.00	0.94	0.00	0.00	2.68	0.56	9.67
Pushmataha	OK	1.36	0.00	0.00	0.00	0.00	0.91	0.39	2.66
Total		**189.91**	**0.00**	**13.93**	**1,393.33**	**0.67**	**7.55**	**35.88**	**1,641.27**
Difference 2000-1995		**19.54**	**0.00**	**-11.22**	**171.03**	**0.55**	**-8.20**	**7.90**	**176.40**

[1] commercial use was not identified in 2000 data
[2] includes aquaculture

Groundwater

Groundwater in the Ouachita Mountains is localized in relatively small reservoirs rather than in widespread aquifers. Primarily, it occurs in secondary openings such as joints, fractures, and separations along bedding planes. Wells drilled into bedrock have a fair chance of producing 5 to 10 gallons per minute (gpm), with a small percentage of such wells producing water that is not potable because of high iron content. Determining locations of wells capable of producing in excess of 10 gpm is seldom feasible. If a need exists for 50 gpm or more, treated surface water would probably have to be used. In the area south of the Ouachita River, springs are important in sustaining base flow in streams during the typical June–October period of water deficit. North of the Ouachita River, a few small springs are fed from side seepage, and most do not flow during periods of water deficit.

The Cretaceous age formations on the coastal plain portions of the Forest around Idabel, Oklahoma, are low productivity aquifers. Groundwater from these formations is generally of poor quality, and yields are usually only sufficient for farmstead and stock supply. The alluvia of the Red River are the most productive ground water reservoirs. The water, although “hard,” is suitable for industrial, municipal, and irrigation uses. A yield of several hundred gallons per minute may be expected. Springs in the coastal plain portions of the forest in this area of Oklahoma do not maintain low flow conditions during the June-October period.

Consumptive and non-consumptive water uses were determined for counties associated with 5th level watersheds. Since the 1999 Ozark-Ouachita Highlands Assessment, additional data became available for 2000. Tables 3.9 and 3.10 display the consumptive and non-consumptive ground water withdraws by county for 1995 and 2000, respectively. Irrigation, followed by water supply for public and domestic purposes, comprises 49 percent and 47 percent, respectively, of the groundwater use. Overall, groundwater use decreased by approximately 6 percent from 1995 to 2000, with most of the decrease in demand in domestic and livestock use.

Table 3.9 Groundwater Use (Million Gallons per Day), 1995

County	State	Public Supply	Commercial	Domestic	Industrial	Thermo-electric	Mining	Saline mining	Livestock	Irrigation	Total
Clark	AR	0.21	0.00	0.29	0.54	0.00	0.00	0.00	0.13	0.00	1.17
Conway	AR	0.24	0.00	0.23	0.00	0.00	0.00	0.00	0.33	0.00	1.47
Faulkner	AR	1.30	0.00	1.88	0.00	0.00	0.00	0.00	0.37	0.00	3.90
Franklin	AR	0.00	0.00	0.32	0.00	0.20	0.00	0.00	0.36	0.00	0.95
Garland	AR	0.00	0.01	1.28	0.00	0.00	0.00	0.00	0.10	0.00	1.52
Hot Spring	AR	0.00	0.01	0.30	0.14	0.00	0.00	0.00	0.12	0.00	0.57
Howard	AR	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.34	0.00	0.77
Little River	AR	1.05	0.00	0.60	0.00	0.00	0.00	0.00	0.23	0.00	1.88
Logan	AR	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.43	0.37	1.53
Montgomery	AR	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.17	0.00	0.68
Perry	AR	0.09	0.00	0.33	0.00	0.00	0.00	0.00	0.15	0.00	0.57
Pike	AR	0.10	0.00	0.55	0.00	0.00	0.00	0.00	0.20	0.00	0.86
Polk	AR	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.28	0.00	1.04
Pope	AR	0.00	0.00	1.77	0.00	0.00	0.00	0.00	0.37	1.09	3.33
Pulaski	AR	3.74	0.00	0.71	0.00	0.00	0.00	0.00	0.57	13.52	18.54
Saline	AR	1.62	0.00	2.26	0.00	0.00	0.00	0.00	0.08	0.00	3.96
Scott	AR	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.28	0.00	0.98
Sebastian	AR	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.21	0.00	0.43
Sevier	AR	0.25	0.00	0.70	0.00	0.00	0.00	0.00	0.37	0.00	1.32
Yell	AR	1.47	0.00	0.41	0.00	0.00	0.00	0.00	0.41	0.00	2.29
Latimer	OK	0.00	0.00	0.02	0.00	0.00	0.00	0.15	0.09	0.00	0.26
LeFlore	OK	0.00	0.00	1.07	0.00	0.00	0.00	0.01	0.28	0.79	2.31
McCurtain	OK	0.00	0.00	1.15	0.00	0.00	0.00	0.00	0.28	0.00	1.47
Pushmataha	OK	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.12	0.00	0.44
Total		**10.60**	**0.13**	**17.34**	**0.68**	**0.20**	**0.00**	**0.16**	**6.27**	**16.86**	**52.24**

Table 3.10 Groundwater Use (Million Gallons per Day), 2000[1]

County	State	Public Supply	Domestic	Industrial	Thermo-electric	Mining	Saline mining	Livestock[2]	Irrigation	Total
Clark	AR	0.06	0.11	0.23	0.00	0.00	0.00	0.00	0.00	0.40
Conway	AR	0.00	0.50	0.00	0.00	0.02	0.00	0.00	1.30	1.82
Faulkner	AR	0.16	0.48	0.00	0.00	0.00	0.00	0.00	0.73	1.37
Franklin	AR	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.04
Garland	AR	0.19	0.78	0.03	0.00	0.00	0.00	0.00	0.00	1.00
Hot Spring	AR	0.00	0.52	0.01	0.00	0.00	0.00	0.00	0.00	0.53
Howard	AR	0.13	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.35
Little River	AR	0.65	0.53	0.24	0.00	0.00	0.00	0.01	0.00	1.43
Logan	AR	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.23	1.01
Montgomery	AR	0.30	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.72
Perry	AR	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.58
Pike	AR	0.05	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.45
Polk	AR	0.01	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.67
Pope	AR	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.87	2.07
Pulaski	AR	4.97	0.98	0.00	0.00	0.00	0.00	0.17	20.43	26.55
Saline	AR	1.65	1.59	0.00	0.00	0.00	0.00	0.00	0.03	3.27
Scott	AR	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Sebastian	AR	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
Sevier	AR	1.30	0.60	0.00	0.00	0.00	0.00	0.00	0.01	1.91
Yell	AR	0.20	0.52	0.02	0.00	0.00	0.00	0.00	0.00	0.74
Latimer	OK	0.00	0.00	0.00	0.00	0.00	0.09	0.10	0.00	0.19
LeFlore	OK	0.17	0.68	0.00	0.00	0.00	0.03	0.35	0.66	1.89
McCurtain	OK	0.00	0.84	0.05	0.00	0.00	0.00	0.30	0.00	1.19
Pushmataha	OK	0.02	0.18	0.00	0.00	0.00	0.00	0.09	0.00	0.29
Total		**9.86**	**13.26**	**0.58**	**0.04**	**0.02**	**0.12**	**1.02**	**24.26**	**49.16**
Difference 2000-1995		**-0.74**	**-4.08**	**-0.10**	**-0.16**	**0.02**	**-0.04**	**-5.25**	**7.40**	**-3.08**

[1] commercial use was not identified in 2000 data
[2] includes aquaculture

Future Demands

The Ozark-Ouachita Highlands Assessment Aquatic Report (1999) found the following conclusions for future uses within the Ozark-Ouachita Highlands Assessment Area:

- Domestic and public withdrawals are projected to increase from 143 gallons per person per day in 1995 to 156 gallons per person per day in 2040. Total domestic and public withdrawals are thus projected to increase from 538 million gallons per day (mgd) in 1995 to 675 mgd in 2040.
- Total industrial and commercial withdrawals are projected to drop from 339 mgd in 1995 to 214 mgd in 2040.
- Total annual energy production at thermoelectric plants in the Assessment Area is projected to increase from 75 billion kilowatt hours (kWh) in 1995 to 107 billion kWh in 2040.
- Total withdrawals for thermoelectric plants are projected to drop from 4.2 billion gallons per day (mmgd) in 1995 to 3.8 mmgd in 2040.
- Acres of crops irrigated are expected to increase from 798 thousand in 1995 to 1,226 thousand in 2040. Total irrigation withdrawals are projected to increase from 1.3 mmgd in 1995 to 2.0 in 2040.
- Total withdrawals are projected to increase until 2020 and remain rather stable after that, staying within 5 percent of 1995 withdrawals. Essentially the increases in withdrawals for domestic and public use and for irrigation are largely balanced by the decreases in withdrawals for industrial, commercial, and thermoelectric uses.

Instream Flows

Arkansas is a “Riparian Doctrine” State. Water rights are acquired when the riparian land is acquired unless the instrument of conveyance limits or restricts the riparian rights. Riparian doctrine assures right to increase flow requirements and not instream flows themselves, since flows are dependent upon climate, geology, vegetation, and management of the land. Oklahoma is an “Appropriated Right” State, meaning water rights and ground water permits are issued by the State.

Instream flow needs for recreation, fish habitat, and other uses have not been quantified and remain to be determined. Nothing indicates that on-Forest demand for water would increase significantly under any alternative. The primary impact will be the construction of waterholes for range and wildlife use. Use of instream flows by wildlife and grazing animals should not increase significantly. Instream flow requirements for fisheries and for fire and suppression will require determination.

Source Waters

As part of the 1998 Clean Water Action Plan, each state identified source waters that are the contributing areas above municipal or public water sources. These areas are generally separated into ground waters and surface waters. Forty-seven surface sources that intersect National Forest System lands are found in Arkansas, and one is found in Oklahoma. Sixty-two Arkansas wells and springs and six Oklahoma wells fall within the influence of lands managed by the Ouachita National Forest. Figure 3.10 identifies the approximate locations of source waters on or near the Ouachita National Forest.

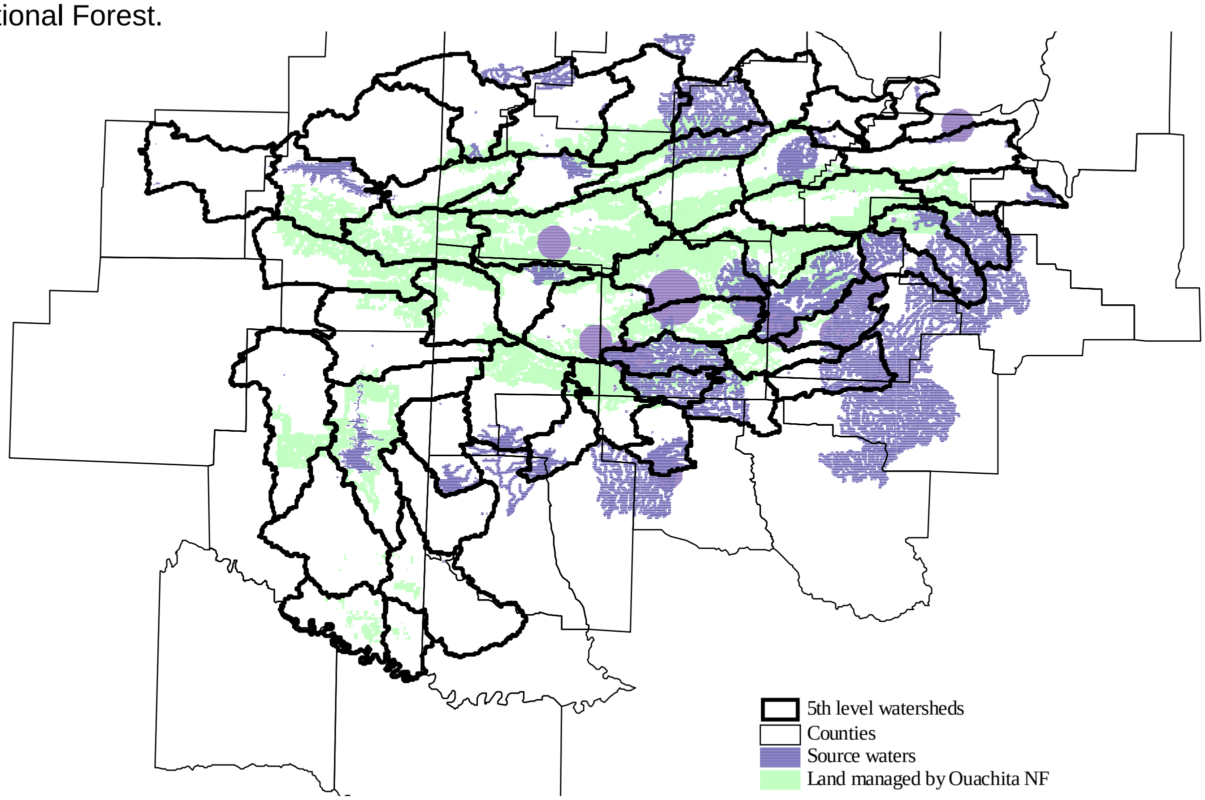

Figure 3.10 Approximate Locations of Source Waters on or near the Ouachita National Forest

Water Quality

Impaired Waters

Section 303(d) of the Clean Water Act requires states to prepare a list of impaired surface waters and to develop a priority ranking for the determination of total maximum daily loads (TMDLs).

In the 5th level watersheds that have National Forest System lands in Oklahoma, over 205 miles of lake shoreline and 247 miles of stream were listed as impaired in the 2002 Section 303(d) report. Of those impairments, 2 miles of lake shoreline and 28 miles of stream occur on National Forest System lands.

In the 5th level watersheds that have National Forest System lands in Arkansas, 28 miles of stream were listed as impaired in the 2002 303(d) report. Of those impairments, 0.2 miles of stream occur on National Forest System lands.

Table 3.11 lists impaired waters on lands managed by the National Forest, the beneficial use impacted, factors leading to listing, and cause.

Table 3.11 Impaired Waters

Stream or Lake	State	Beneficial Use Impacted	Factors Leading to Listing	Cause
Cedar Lake	OK	Warm water aquatic communities	Dissolved oxygen, pH	Unknown
Little River	OK	Cool water aquatic communities	Dissolved oxygen, turbidity, and zinc	Unknown
Little River, Mountain Fork, below Broken Bow Lake	OK	Trout, primary recreation contact	Lead and pathogens	Unknown
Little River, Mountain Fork	OK	Cool water aquatic communities	Lead, pH, and turbidity	Unknown
Glover River	OK	Cool water aquatic communities, primary recreation contact	Lead, dissolved oxygen, and pathogens	Unknown
Kiamichi River	OK	Warm water aquatic communities	Lead and pH	Unknown
Fourche La Fave River	AR	Fish Consumption	Mercury	Mercury

Extraordinary Waters

Outstanding Resource Waters (ORWs) serve as “baselines” against which other waters within the same ecoregion may be compared. These waters include extraordinary (state determined), ecologically sensitive (state determined), and legislatively designated (state or federally designated) streams and lakes. Extraordinary waters are those recognized by the state as having exceptional combinations of physical, chemical, and biological characteristics that sustain healthy aquatic habitats. Ecologically sensitive waters provide habitat for threatened, endangered, or endemic aquatic or semi-aquatic species. Legislatively designated waters in the Assessment Area include the National Wild and Scenic River System and state scenic river systems.

Within the framework of the Clean Water Act (CWA), each State designates its own ORWs and develops an antidegradation policy that stipulates that designated uses of a water body (e.g., public water supply and recreation) cannot be impaired to allow greater discharge of pollutants into that water body. The CWA prohibits any lowering of existing water quality in ORWs.

Approximately 901 miles of Extraordinary Streams or shoreline occur within the 5th level watersheds surrounding the National Forest, and 110 miles occur on the Forest. Figure 3.11 shows the locations of Extraordinary Waters.

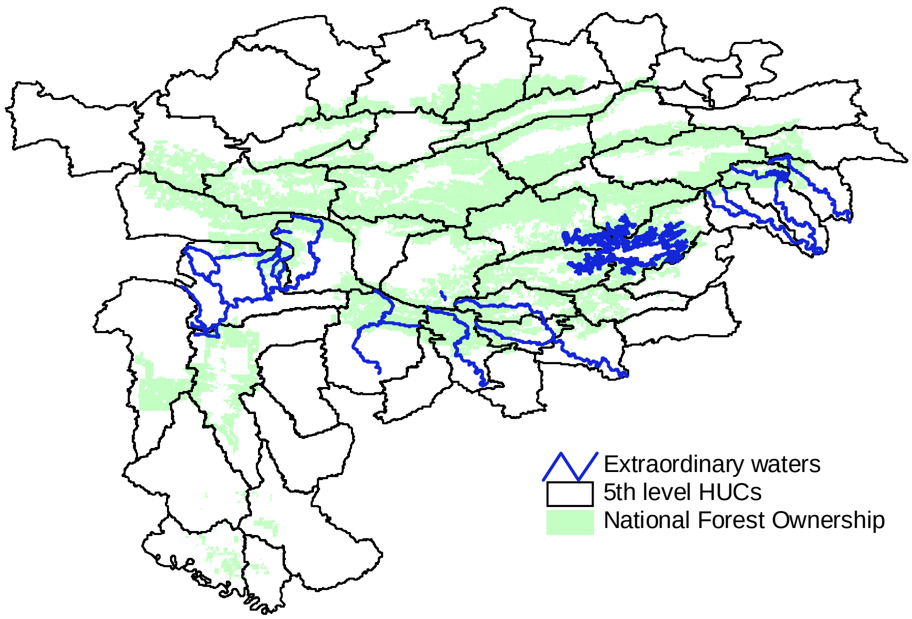

Figure 3.11 Extraordinary Waters

Non-point Source Pollution Management

The 1987 Amendments to the Clean Water Act (PL100-4) and the National Forest Management Act set forth goals for managing water quality. EPA developed Non-point Source Controls and Water Quality Standards Guidance (August 19, 1987), which provides guidance for state non-point source management programs. The Forest Service developed a non-point source strategy, which incorporates provisions of the Clean Water Act, the National Forest Management Act, and EPA guidance. Appendix C explains how these Acts and guidance are to be implemented under this Forest Plan.

Environmental Consequences for Water Quality and Associated Beneficial Uses

Management activities have the potential to affect water quality. These effects can be categorized as direct, indirect, or cumulative effects. Any activity that disturbs the land surface, decreases cover, or alters vegetation can affect water quality. The primary Forest Service management activities that could affect water quality are:

- Road construction, reconstruction,and maintenance
- Timber and wildlife management
- Fuel reduction burns
- Fireline construction and reconstruction
- Recreational OHV use

Direct and Indirect Effects

Changes in water quality as a result of road type, location, surface, maintenance, and use are well documented in the Ouachita Mountains (Miller, Beasley and Covert 1985; Swift 1985; Vowell 1985). Forest standards (Best Management Practices) and Forest Service Manual and Handbook guidance are designed to minimize the effects of road construction, maintenance and use on water quality. Forest effectiveness monitoring has demonstrated that road and temporary road crossings, (Clingenpeel, 1990, Neihardt 1994,and Vestal, 2000) do not have significant adverse effects on water quality parameters or channel substrates.

Forest monitoring has shown that unrestricted OHV use has adverse effects on water quality and associated beneficial uses. Unrestricted use in the late 1990s resulted in many user-defined trails and high use levels that caused decreases in pool depth and pool volume and increased percent fines and embeddedness. Trail closure and aggressive restoration resulted in watershed recovery in 2002 (Clingenpeel 2002).

Forest monitoring has also demonstrated that harvesting and stand improvement activities (with stream buffers maintained) did not have significant effects on water quality (Clingenpeel 1989).

Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed fire lines accounted for the majority of sediment from all watersheds.

The introduction of herbicides into the water is treated as an indirect effect because standards do not permit direct application. Herbicide monitoring across the Forest has detected only trace amounts of herbicide in streams (Ouachita National Forest 1993).

The effect of nutrients released to streams as a result of management activities is an indirect effect. Beasley, Miller, and Lawson (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium, and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there is no significant impact to water quality from the primary management activities listed previously.

While it is not possible to eliminate all soil from entering a stream, it is possible to limit and prevent soil from directly entering streams through the design and implementation of Best Management Practices (BMPs). Within the Forest Plan, standards serve as Forest BMPs. Based on the results of research and monitoring and the consistent implementation of BMPs, an adverse direct or indirect effect resulting from proposed management actions is unlikely, regardless of alternative.

Cumulative Effects

In 1990, the Forest began a long-term monitoring effort to determine cumulative effects from silvicultural activities using paired watersheds and Basin Area Stream Survey methods (Clingenpeel and Cochran 1992). Based on an examination of all physical, chemical, and biological characteristics, no single factor was indicative of adverse cumulative effects from management activities (Ouachita National Forest 1994).

In addition, the Forest has developed a process to estimate sediment yields and analyze the cumulative effects of proposed management actions on water quality. The process provides an objective method to systematically evaluate water quality conditions for watersheds within the planning area. The process also provides data that can aid in aquatic viability analysis at the community scale (Clingenpeel and Leftwich 2004).

The process builds upon the East-Wide Watershed Assessment Process and provides for modifications based on local information. Interpretation of analysis results strives to describe objectives rather than “constraints” and provides the Forest an opportunity to identify and focus on the highest priorities for watershed improvement.

Sediment is an appropriate measure to determine the effects of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller 1981). Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen 1986), degrade drinking water, and affect recreational values.

There may be other factors such as increases in water yield or nutrient loading that could be used in the cumulative effects analysis. However, water yield models do not characterize impacts of management activities such as road construction. Changes in nutrients within streams as a result of management activities are minor (Beasley, Miller, and Lawson 1987) and therefore, not appropriate at the forest level cumulative effects analysis.

Miller, Beasley, and Lawson (1986) identified that peak flows and increases in water yield were not significant for large storm events as a result of vegetation management. Increases in summer base flows were identified for one to three years after harvest.

Changes in land use and disturbance have been modeled with respect to estimated increases in sediment, and predicted impacts are summarized by alternative. The significance of predicted impacts is related to criteria designed to determine levels of watershed health, as described later.

A valid cumulative effects analysis must be bounded in space and time. For the purposes of this exercise, 5th level watersheds that include lands of the Ouachita National Forest are the appropriate spatial bounds and were used to assess cumulative effects. The implementation period for a forest plan is 5 to 15 years; however, the appropriate time period for the sediment model is five decades (50 years). This allows for a discussion of past, present, and future activities for public and private lands by watershed for a time period of 50 years.

The summary table of the sediment model calculates the baseline, current, and predicted sediment values for each watershed by alternative and period. To determine the potential cumulative effects of water quality and associated beneficial uses these sediment values are expressed as a percent increase over the baseline. The baseline assumes an undisturbed forest floor with no roads.

Watershed Condition Rank (WCR)

Watershed condition is expressed in three categories of risk: high, moderate, and low. These ranks do not necessarily translate into excellent or poor watershed conditions, but rather categorize the watersheds based on their relative risk in terms of predicted sediment production and aquatic viability. The following section details the outcome of the WCR with respect to the effects of forest management on aquatic biota:

> Where a watershed risk level is ***low***, the probability (or potential) is **low** for adverse effects on aquatic species. If the effects of forest alternatives remain within this range, there should be no adverse effect on water quality with respect to beneficial uses (fish communities). National Forest objectives would be to maintain or improve aquatic health through the implementation of standards.

Where a watershed risk level is ***moderate,*** the potential to adversely affect beneficial uses is **moderate**. Additional project-level conservation measures would be considered. Examples of these additional measures could include conducting watershed assessments during project planning to identify the source of the problem and monitoring prior to project implementation to establish actual health of the biota.

Where a watershed risk level is ***high***, the potential to adversely affect beneficial uses is **high**. In addition to measures listed above, project level analysis and implementation would seek to maintain or restore watershed health and aquatic systems. An example would be to design project-level activities to have no net increase in sediment yields.

Risk levels and sediment increase by ecoregions is presented in the following tabulation.

Risk Level	Arkansas River Valley	Coastal Plain	Ouachita Mountains
	- - - - - - - - - - - - - - - -Percent Increase- - -- - - - - - - - - - -		
Low	0 to 311	0 to 3746	0 to 1347
Moderate	311 to 623	3746 to 7492	1347 to 2693
High	> 623	> 7492	> 2693

Table 3.12 presents the current and estimated sediment increases for each watershed at the end of the first 10 years of plan implementation. The baseline assumes an undisturbed forest floor with no roads. Similar estimates resulted from analyses of sediment increases in subsequent decades. Of the 50 watersheds modeled, none had changes in risk level as a result of projected management activities included in each alternative. Overall, 35 watersheds have a low risk of cumulative effects, seven have a moderate risk, and eight have a high risk of an adverse cumulative effect on aquatic resources.

Table 3.12 Current and Predicted Risk Levels for All Alternatives in the First Decade.

00 Region (1st level) 0000 Sub-Region (2nd level) 000000 Accounting unit (3rd level) 00000000 Cataloging unit (4th level) 0000000000 Watershed (5th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		- - - - - - - - - - - -Risk Level - - - - - - - - - - -				
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040101 Ouachita Headwaters						
0804010101 Irons Fork	650.72	L	L	L	L	L
0804010102 Kates Creek	397.71	L	L	L	L	L
0804010103 Muddy Fiddler	456.45	L	L	L	L	L
0804010104 S. Fork of the Ouachita	500.03	L	L	L	L	L
0804010105 North Fork	601.47	L	L	L	L	L
0804010106 Blakely	321.42	L	L	L	L	L
0804010107 Lake Hamilton	659.38	L	L	L	L	L
0804010108 Mazarn	413.55	L	L	L	L	L
0804010109 Little Mazarn	1,242.76	L	L	L	L	L

00 Region (1st level) 0000 Sub-Region (2nd level) 000000 Accounting unit (3rd level) 00000000 Cataloging unit (4th level) 0000000000 Watershed (5th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		- - - - - - - - - - - -Risk Level - - - - - - - - - - -				
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040102 Upper Ouachita						
0804010205 Headwaters of the Caddo	237.06	L	L	L	L	L
0804010206 Carney Creek	718.11	L	L	L	L	L
0804010207 South Fork of the Caddo	201.23	L	L	L	L	L
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040103 Little Missouri						
0804010301 Hdw of the Little Mo	201.39	L	L	L	L	L
0804010302 Greeson	636.69	L	L	L	L	L
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080402 Lower Ouachita						
08040203 Upper Saline						
0804020301 Alum Fork	673.99	L	L	L	L	L
0804020302 North Fork	487.34	L	L	L	L	L
0804020303 Middle Fork	821.72	L	L	L	L	L
11 Arkansas-White-Red Region						
1111 Lower Arkansas						
111101 Robert S. Kerr Reservoir						
11110105 Poteau						
1111010501 Hdw of the Poteau	1,466.33	M	M	M	M	M
1111010502 Black Fork	299.90	L	L	L	L	L
1111010503 Middle Poteau	563.07	L	L	L	L	L
1111010504 Fourche Maline	599.46	L	L	L	L	L
1111010505 Wister	603.36	L	L	L	L	L
1111010506 Riddle Creek	923.49	H	H	H	H	H
1111010508 James Fork	1,104.86	H	H	H	H	H
11 Arkansas-White-Red Region						
1111 -- Lower Arkansas						
111102 - Lower Arkansas-Fourche La Fave						
11110204 Petit Jean						
1111020401 Washburn	807.40	H	H	H	H	H
1111020402 Sugar Creek	431.69	M	M	M	M	M
1111020403 Deadman Creek	677.9	H	H	H	H	H
1111020404 Chickalah Creek	619.93	M	M	M	M	M
1111020405 Dutch Creek	349.64	L	L	L	L	L
1111020406 Heath	1,451.71	H	H	H	H	H
1111020407 Lower Petit Jean	1,431.72	H	H	H	H	H
11 Arkansas-White-Red Region						
1111 -- Lower Arkansas						
111102 - Lower Arkansas-Fourche La Fave						
11110206 Fourche La Fave						
1111020601 Cedar Creek	456.03	L	L	L	L	L
1111020602 Gafford Creek	542.32	L	L	L	L	L

00 Region (1st level) 0000 Sub-Region (2nd level) 000000 Accounting unit (3rd level) 00000000 Cataloging unit (4th level) 0000000000 Watershed (5th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		- - - - - - - - - - - -Risk Level - - - - - - - - - - -				
1111020603 Nimrod	827.69	L	L	L	L	L
1111020604 Lower Fourche	2,128.08	M	M	M	M	M
1111020605 S. Fork of the Fourche	525.04	L	L	L	L	L
11 Arkansas-White-Red Region						
1111 Lower Arkansas						
111102 Lower Arkansas-Fourche La Fave						
11110207 Lower Arkansas-Maumelle						
1111020702 Maumelle	478.71	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140105 Kiamichi						
1114010501 Hdw of the Kiamichi	273.52	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140106 Pecan-Waterhole						
1114010604 Norwood	22,714.37	H	H	H	H	H
1114010605 McKinney Creek	16,141.89	H	H	H	H	H
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140107 Upper Little						
1114010704 Glover	1,058.96	L	L	L	L	L
1114010705 Lower Little River	5,858.30	M	M	M	M	M
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140108 Mountain Fork						
1114010801 Twomile	431.97	L	L	L	L	L
1114010804 Beech	484.14	L	L	L	L	L
1114010805 Broken Bow Lake	506.58	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140109 Lower Little						
1114010901 Flat Creek	6,492.93	M	M	M	M	M
1114010902 Upper Rolling Fork	929.18	L	L	L	L	L
1114010903 Lower Rolling Fork	2,641.61	M	M	M	M	M
1114010904 Hdw of the Cossatot	318.54	L	L	L	L	L
1114010907 Shady Lake	663.97	L	L	L	L	L

L = low, M = moderate, H = high
Hdw = Headwaters

Aquatic Communities

The 1982 implementing regulations for the National Forest Management Act of 1976 (36 CFR 219.19) require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area. USDA Departmental Regulation Number 9500-004 (1983) requires that habitat on National Forest System lands be managed to support viable populations of native and desired non-native plants, fish, and wildlife. These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations involves ensuring that habitats are distributed in patterns and available in amounts that can support interacting populations at levels that result in persistence of the species over time. The 1982 planning regulations also require that Forest planning “provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area” (36 CFR 219.26).

Aquatic communities and habitat elements include Conservation Targets such as rivers and streams, ponds, lakes, wildlife waterholes, and seeps with minimal woody vegetation as opposed to forested seeps described in the aquatic-associated terrestrial systems. This section describes the current conditions of the aquatic communities on the Forest, the relationship of these conditions to species of viability concern and management indicator species (MIS), and the biological effects of implementing each of the five alternatives. The analysis draws upon the most current available data concerning existing natural communities; current watershed conditions; and the distribution, abundance, and habitat relationships of species of viability concern and MIS. Central to the analysis is the comprehensive Ouachita National Forest Species Viability Evaluation (2004).

Habitat condition needs for species of viability concern and MIS are based on the most current science, literature, and expert opinion. Complete literature citations (not presented here) are contained within the Species Viability Evaluation (SVE) itself, available online at www.aokforests.com or upon request. For the Ouachita National Forest SVE, each aquatic community was weighted by how important that community is to the species (on a descending scale of “obligate,” “optimal,” “suitable,” or “marginal”). Alternatives were compared on the basis of condition scores for each Conservation Target (natural aquatic community). Table 3.13 contains the viability condition scores for aquatic communities.

Table 3.13 Species Viability Condition Scores for Aquatic Communities and Habitat Elements

Range of Condition Score	Condition Classification	Definition of SVE Score Applied to Communities and Habitat Elements
3.51 – 4.0	Very Good	Community or Habitat Element conditions are optimal; associated species’ populations should remain robust and potentially even expand
2.51– 3.50	Good	Community or Habitat Element conditions are acceptable; associated species’ populations should remain stable
1.51 – 2.50	Fair	Community or Habitat Element conditions are slightly inadequate; although associated species’ populations may persist for some time, they may be subject to gradual decline
1.0 – 1.50	Poor	Community or Habitat Element conditions are severely inadequate. Associated species’ populations are expected to severely decline; localized extirpations are occurring or are imminent

Ouachita Ponds, Lakes, and Waterholes

Ponds, lakes, and waterholes consist of all lentic (impounded, or otherwise non-flowing) aquatic systems on the forest. These systems provide a water source for a wide-range of plants and animals, including nongame aquatic and sport fishing species. In addition, these waterbodies provide critical reproductive habitat for amphibians and critical foraging habitat for bald eagles. The desired conditions are protection and maintenance of water quality, site productivity, associated riparian vegetation, and habitat for dependent species.

Ponds and Lakes

Ponds and lakes generally are managed with an emphasis on recreational sport fishing. Largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*) and redear sunfish (*Lepomis microlophus)* are designated as demand management indicator species (MIS) to track the health of lake and pond communities, particularly as they relate to their ability to support a recreational fishery.

According to the FY 2004 Ouachita National Forest Annual Monitoring Report and a Summary and Analysis of Data Pertaining to Management Indicator Species (2003), the fisheries in ponds and lakes that are primarily managed by the Forest are in very good condition and the MIS populations are stable. Condition was also based on the designation and maintenance of protective buffer zones around the perimeter of these water bodies.

No species of viability concern are associated with ponds and lakes. Recreational fishing ponds and lakes do provide habitat for three Management Indicator/Demand species (MIS/Demand), as listed in the following tabulation:

Species	Importance of Ponds and Lakes
Largemouth bass (*Micropterus salmoides*) MIS/Demand Bluegill sunfish (*Lepomis macrochirus*) MIS/Demand Redear sunfish (*Lepomis microlophus*) MIS/Demand	Obligate

Wildlife Water Holes

Wildlife water holes (ponds one-quarter to one-half acre in size) are an important component of habitat for many species of terrestrial and semi-aquatic species, especially where lack of free water (seeps, streams, rivers, large impoundments) can be a critical limiting factor in full utilization of otherwise usable habitat. Ponds are used by a variety of demand wildlife species, such as deer, turkey, bear, and mourning doves that require access to water on a daily basis. Other species of wildlife, particularly amphibians (frogs, toads, and some species of salamanders), use ponds that lack fish as annual breeding sites, using ponds much as they would normally use temporary pools. For this reason, wildlife waterholes constructed in the general forest area, less than one-half acre or less in size, have not been stocked with fish or managed as part of the Forest fisheries program except occasionally at recreation or administrative sites.

The annual biomass produced by naturally reproducing populations of amphibians is a critical component of the terrestrial food chain, far exceeding the biomass available to terrestrial predator species from a small pond fishery. Wildlife waterhole sites also provide some of the same benefits that are obtained through wildlife openings, i.e., edge effects and an alternative food and cover source. Where adequate free water is not available, wildlife waterholes are constructed at the rate of one per 160 acres to ensure adequate spatial distribution and availability to all species.

Due to the management practice of prohibiting fish stocking in wildlife waterholes, this habitat element was determined to be in very good condition to provide for amphibian reproduction sites. Condition was also based on the designation of a protective buffer zone around the perimeter of these water bodies.

Wildlife water holes provide obligate habitat for two species and optimal habitat for six species considered in the SVE.

Species	**Importance of Wildlife Waterholes**
Ringed Salamander (*Ambystoma annulatum*) Mole Salamander (*Ambystoma talpoideum*)	Obligate
Bird-voiced Tree Frog (*Hyla avivoca*) Strecker's Chorus Frog (*Pseudacris streckeri streckeri*) Northern Crawfish Frog (*Rana areolata circulosa*) Southeastern Myotis (*Myotis austroriparius*) Eastern Small-Footed Bat (*Myotis leibii*) Indiana Bat (*Myotis sodalis*)	Optimal

Seeps with Minimal Woody Vegetation

Seeps with minimal woody vegetation differ from Ouachita forested seeps, in that they are devoid of trees or shrubs. Burrowing crayfish species, as obligates of this habitat, actually burrow into the substrate, maintaining residence at the surface and/or subsurface water level as it fluctuates according to rainfall conditions. Amphibian species use these permanent and/or ephemeral water sources for reproduction. Additionally, certain species of birds, mammals, and reptiles also utilize seeps as water sources.

Seeps with minimal woody vegetation provide obligate habitat for three species and optimal habitat for five species considered in the Species Viability Evaluation.

Species	**Importance of Seeps with Minimal Woody Vegetation**
A Crayfish (*Fallicambarus jeanae*) A Crayfish (*Fallicambarus strawni*) A Crayfish (*Fallicambarus harpi*)	Obligate
Ringed Salamander (*Ambystoma annulatum*) Mole Salamander (*Ambystoma talpoideum*) Bird-voiced Tree Frog (*Hyla avivoca*) Strecker's Chorus Frog (*Pseudacris streckeri streckeri*) Northern Crawfish Frog (*Rana areolata circulosa*)	Optimal

Direct, Indirect, and Cumulative Effects

Currently, concerns for maintaining or enhancing the water quality and aquatic habitats associated with ponds and lakes (including Management Indicator Species), wildlife waterholes, forested seeps/springs, and seeps with minimal vegetation on the Forest include indirect detrimental effects from:

- Road construction, reconstruction, and maintenance
- Timber and wildlife habitat management activities
- Fireline construction/reconstruction associated with prescribed burning
- Indiscriminate recreational off-road-vehicle use
- Non-native invasive species

The previously named activities, particularly ground-disturbing activities, have the most potential for direct, indirect, and cumulative detrimental effects on individuals, as well as water quality and aquatic habitats. Direct effects could be mortality or displacement of individuals. Indirect and cumulative effects could be alteration of aquatic habitat and/or sedimentation. Under all alternatives, ponds, lakes, waterholes, seeps and springs all have Streamside Management Areas assigned as protective buffers from ground-disturbing activities within the riparian area, so cumulatively these communities would maintain a "good" or "very good" condition. Tables 3.14 and 3.15 display the viability ranks of aquatic communities after 10 and 50 years and compare that rank to the current condition. There are no changes by alternative at the 10 or 50 year periods.

Table 3.14 Viability Rank of Aquatic Communities Forest-wide after 10 Years by Alternative in Comparison to Current Condition.

Aquatic Communities	Current Condition	Alternatives				
		A	B	C	D	E
Ouachita Ponds and Lakes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Wildlife Waterholes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Seeps with Minimal Vegetation	Good	Good	Good	Good	Good	Good

Table 3.15 Viability Rank of Aquatic Communities Forest-wide after 50 Years by Alternative in Comparison to Current Condition.

Aquatic Communities	Current Condition	Alternatives				
		A	B	C	D	E
Ouachita Ponds and Lakes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Wildlife Waterholes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Seeps with Minimal Vegetation	Good	Good	Good	Good	Good	Good

Ouachita Rivers and Streams

Affected Environment

Rivers and streams comprise the flowing-water systems on the Forest. These systems provide critical habitat for fish, mussels and other invertebrates, reptiles, and amphibians. Bird, reptile and mammal species also depend on rivers and streams for water sources, as well as foraging habitat. The desired conditions are protection and maintenance of water quality, site productivity, channel stability, riparian vegetation, and habitat for riparian-dependent species.

Smallmouth bass (*Micropterus dolomieu*) is retained as a demand MIS to track the health of river and stream communities, particularly as it relates to supporting sport fisheries. Smallmouth bass are known to be sensitive to habitat degradation and are not found to occur in less than high quality habitat. Watersheds with a high percentage of National Forest land reflect low risk to aquatic species viability across all alternatives, and smallmouth bass are considered to be secure Forest-wide in their preferred habitat of medium-sized and small upland rivers.

Ouachita Rivers and Streams provide obligate habitat for 61 species and optimal habitat for 7 aquatic, semi-aquatic, and/or terrestrial species considered in the Species Viability Evaluation (SVE) or as Management Indicator Species (MIS), including Demand species (Demand). Species with no designation are SVE only, and not MIS/Demand species. The following tabulation lists the species of concern that fit these various categories:

Species	**Importance of Ouachita Rivers and Streams**
A Crayfish (*Orconectes saxatilis*) A Crayfish (*Orconectes menae*) A Crayfish (*Procambarus reimeri*) A Crayfish (*Procambarus tenuis*) Ouachita Madtom (*Noturus lachneri*) Caddo Madtom (*Noturus taylori*) Peppered Shiner (*Notropis perpallidus*) Leopard Darter (*Percina pantherina*) Paleback Darter (*Etheostoma pallididorsum*) Crystal Darter (*Crystallaria asprella*) Ouachita Darter (*Percina* sp. *nov*.) Redspot Chub (*Nocomis asper*) Kiamichi Shiner (*Notropis ortenburgeri*) Goldstripe Darter (*Etheostoma parvipinne*) Longnose Darter (*Percina nasuta*) Ouachita Shiner (*Lythrurus snelsoni*) Monkeyface (*Quadrula metanevra*) Ebonyshell (*Fusconaia ebena*) Spike (*Elliptio dilatata*) Butterfly (*Ellipsaria lineolata*) Western Fanshell (*Cyprogenia aberti*) Spectaclecase Pearlymussel (*Cumberlandia monodonta*) Flat Floater (*Anodonta suborbiculata*) Pink Mucket (*Lampsilis abrupta*) Winged Mapleleaf (*Quadrula fragosa*) Arkansas Fatmucket (*Lampsilis powellii*) Elktoe (*Alasmidonta marginata*)	Obligate

Species	Importance of Ouachita Rivers and Streams
Rainbow (*Villosa iris*) Ouachita Rock Pocketbook (*Arkansia wheeleri*) Flutedshell (*Lasmigona costata*) Rabbitsfoot (*Quadrula cylindrica cylindrica*) Ouachita Kidneyshell (*Ptychobranchus occidentalis*) Pyramid Pigtoe (*Pleurobema rubrum*) Ohio Pigtoe (*Pleurobema cordatum*) Southern Hickorynut (*Obovaria jacksoniana*) Louisiana Fatmucket (*Lampsilis hydiana*) Scaleshell (*Leptodea leptodon*) Fatmucket (*Lampsilis siliquoidea*) Sandbank Pocketbook (*Lampsilis satura*) Purple Liliput (*Toxolasma lividus*) Ouachita Creekshell (*Villosa arkansasensis*) Southern Pocketbook (*Lampsilis ornata*) Black Sandshell (*Ligumia recta*) Harperella (*Ptilimnium nodosum*) A Sandgrass (*Calamovilfa arcuata*) Narrowleaf Ironweed (*Vernonia lettermannii*) Sand Grape (*Vitis rupestris*) Razorback Musk Turtle (*Sternotherus carinatus*) Smallmouth bass (*Micropterus dolomieu*) MIS/Demand Yellow bullhead (*Ameiurus natalis*) MIS Pirate perch (*Aphredoderus sayanus*) MIS Central stoneroller (*Campostoma anomalum*) MIS Green sunfish (*Lepomis cyanellus*) MIS Longear sunfish (*Lepomis megalotis*) MIS Yellow bullhead (*Ameiurus natalis*) MIS Creek chubsucker (*Erimyzon oblongus*) MIS Johnny darter (*Etheostoma nigrum*) MIS Orangebelly darter (*Etheostoma radiosum*) MIS Redfin darter (*Etheostoma whipplei*) MIS Northern studfish (*Fundulus catenatus*) MIS Northern hog sucker (*Hypentilium nigricans*) MIS Striped shiner (*Luxilus chrysocephalus*) MIS Channel darter (*Percina copelandi*) MIS	Obligate
Ouachita Dusky Salamander (*Desmognathus brimeylorum*) Many-ribbed Salamander (*Eurycea multiplicata multiplicata*) Bird-voiced Tree Frog (*Hyla avivoca*) Bald Eagle (*Haliaeetus leucocephalus*) Southeastern Myotis (*Myotis austroriparius*) Eastern Small-Footed Bat (*Myotis leibii*) Indiana Bat (*Myotis sodalis*)	Optimal

Aquatic Endangered, Threatened, or Other Species of Viability Concern and Management Indicator Species (MIS)

Table 3.16 provides the federal, state, and global rankings of all aquatic species considered in the SVE. This list includes those species found both on the Forest and downstream of it (within the 5th level HUC) in the following categories:

- Species listed as Proposed, Threatened, or Endangered under the federal Endangered Species Act
- Species listed on the Region 8 Sensitive Species list
- Species identified as locally rare and of special concern by species experts

The Ouachita National Forest harbors a rich diversity of aquatic species, including 47 species of viability concern:

- 1 federally endangered plant
- 7 endemic crayfish
- 12 fish species (including 1 federally threatened and 9 endemic)
- 27 mussel species (including 4 federally endangered, 1 federally threatened, and1 endemic)

Table 3.16 Ouachita National Forest Aquatic Species of Viability Concern

Common Name	Scientific Name	Viability Concern Classification	Endemic	State Rank (AR/OK)	Global Rank
Plant Species					
Harperella	*Ptilimnium nodosum*	Endangered	No	S2/-	G2
Crayfish Species					
A Crayfish	*Fallicambarus jeanae*	Local viability concern	Yes	S2/-	G2
A Crayfish	*Orconectes saxatilis*	Local viability concern	Yes	-/S1	G1
A Crayfish	*Fallicambarus strawni*	RF Sensitive	Yes	S1?/-	G1G2
A Crayfish	*Orconectes menae*	RF Sensitive	Yes	-/-	G3
A Crayfish	*Procambarus reimeri*	RF Sensitive	Yes	-/-	G1
A Crayfish	*Procambarus tenuis*	RF Sensitive	Yes	-/-	G3
A Crayfish	*Fallicambarus harpi*	Local viability concern	Yes	-/-	G1
Fish Species					
Ouachita Madtom	*Noturus lachneri*	RF Sensitive	Yes	S2/-	G2
Caddo Madtom	*Noturus taylori*	RF Sensitive	Yes	-/-	G1
Peppered Shiner	*Notropis perpallidus*	RF Sensitive	Yes	S2/S2S3	G3
Leopard Darter	*Percina pantherina*	Threatened	Yes	S1/S1	G1
Paleback Darter	*Etheostoma pallididorsum*	RF Sensitive	Yes	S2/-	G2
Crystal Darter	*Crystallaria asprella*	RF Sensitive	No	-/S1	G3
Ouachita Darter	*Percina* sp. nov.	Local viability concern	Yes	-/-	G2
Redspot Chub	*Nocomis asper*	Local viability concern	No	S2/-	G4
Kiamichi Shiner	*Notropis ortenburgeri*	RF Sensitive	Yes	S2/S3	G3
Goldstripe Darter	*Etheostoma parvipinne*	Local viability concern	No	-/S2	G4G5

Common Name	Scientific Name	Viability Concern Classification	Endemic	State Rank (AR/OK)	Global Rank
Longnose Darter	*Percina nasuta*	RF Sensitive	Yes	S2/S1	G3
Ouachita Shiner	*Lythrurus snelsoni*	RF Sensitive	Yes	-/S2	G3
Mussel Species					
Monkeyface	*Quadrula metanevra*	RF Sensitive	No	S3/S4, S1	G4
Ebonyshell	*Fusconaia ebena*	Local viability concern	No	-/-	G4G5
Spike	*Elliptio dilatata*	Local viability concern	No	S4/S1	G5
Butterfly	*Ellipsaria lineolata*	Local viability concern	No	S /S2	G4
Western Fanshell	*Cyprogenia aberti*	Local viability concern	No	S2/-	G2
Spectaclecase Pearlymussel	*Cumberlandia monodonta*	Local viability concern	No	S1/-	G2G3
Flat Floater	*Anodonta suborbiculata*	Local viability concern	No	S1/-	G5
Pink Mucket	*Lampsilis abrupta*	Endangered	No	S2/-	G2
Winged Mapleleaf	*Quadrula fragosa*	Endangered	No	-/-	G1
Arkansas Fatmucket	*Lampsilis powellii*	Threatened	Yes	S2/-	G1G2
Elktoe	*Alasmidonta marginata*	Local viability concern	No	S3/S1	G4
Rainbow	*Villosa iris*	Local viability concern	No	-/S1	G5
Ouachita Rock Pocketbook	*Arkansia wheeleri*	Endangered	No	S1/S1	G1
Flutedshell	*Lasmigona costata*	Local viability concern	No	S3/S1	G5
Rabbitsfoot	*Quadrula cylindrica cylindrica*	RF Sensitive	No	S2/S1	G3
Ouachita Kidneyshell	*Ptychobranchus occidentalis*	Local viability concern	No	S/S2	G3G4
Pyramid Pigtoe	*Pleurobema rubrum*	RF Sensitive	No	S2/-	G2
Ohio Pigtoe	*Pleurobema cordatum*	RF Sensitive	No	S1/S2	G3
Southern Hickorynut	*Obovaria jacksoniana*	Local viability concern	No	S2/S2	G1G2
Louisiana Fatmucket	*Lampsilis hydiana*	Local viability concern	No	S1/-	G4
Scaleshell	*Leptodea leptodon*	Endangered	No	S1/S1	G1
Fatmucket	*Lampsilis siliquoidea*	Local viability concern	No	S3/-	G5
Sandbank Pocketbook	*Lampsilis satura*	RF Sensitive	No	S2/-	G2
Purple Liliput	*Toxolasma lividus*	RF Sensitive	No	S2/-	G2
Ouachita Creekshell	*Villosa arkansasensis*	RF Sensitive	No	S2/S1S2	G2
Southern Pocketbook	*Lampsilis ornata*	Local viability concern	No	S1/-	G5
Black Sandshell	*Ligumia recta*	Local viability concern	No	S2/S1	G5

RF Sensitive = Regional Forester’s Sensitive Species List

Currently, concerns for maintaining or enhancing water quality and aquatic habitats on the Forest include potential detrimental effects from:

- Road construction, reconstruction, and maintenance
- Timber and wildlife habitat management activities
- Fireline construction/reconstruction and associated prescribed burning
- Indiscriminate recreational off-road-vehicle use
- Non-native invasive species
- Dams and other barriers to passage by fish and other aquatic organisms

These activities have the most potential for detrimental effects on water quality and aquatic habitats, particularly in the Streamside Management Areas. Their effects on water quality and, by association, aquatic communities, are discussed in the Watershed Section of this document. Provisions for fish passage accommodation have been included within all alternatives.

Habitat quality within these freshwater ecosystems is directly related to activities within the watershed. Therefore, the influence of these activities upon habitats, or water bodies, can be described to determine the condition of the habitat.

To determine if there is adequate quality habitat for these aquatic species, the condition of individual watersheds was determined from the physical and anthropogenic interactions within the watershed. Ideally, watershed condition would be determined from stream surveys. However, the extent and detail required to address all watersheds, including private land, with stream surveys was not available or reasonable to obtain for this analysis. To address habitat condition at the watershed level, it was necessary to determine values from geographic data. These values were compared among the watersheds, and a condition or set of conditions was determined.

The condition of each watershed containing any National Forest System land was assessed using the following criteria:

1. Sedimentation was assessed by determining the percent increase above the baseline sediment levels by watershed as assessed with the Watershed Condition Ranking. This process is described in detail in the Fish Assemblage – Sediment Profile and Sediment Yield sections.
2. Point Source Pollutants (density of point sources).
3. Riparian Habitat (road density in the riparian area, and percent forest in the riparian area).
4. Altered stream flow (density of dams, road density in the riparian, and average density of strip-mines).

Threats to aquatic species viability are not limited to these four variables; however, GIS coverages are not available for channelization and introduced species. For forest-level planning, it is assumed that these four condition categories are adequate when identified by watershed land disturbance activities in the planning area.

The watershed analysis for current condition determined that there was low risk of detrimental effects to water quality and aquatic habitat from predicted increases in sediment in all watersheds where species of viability concern are known to occur except those listed in Table 3.17 that have moderate or high risk of detrimental effects.

Table 3.17 Watersheds with Moderate or High Risk of Detrimental Effects from Predicted Increases in Sediment where Species of Viability Concern are Known to Occur

5th Level Hydrologic Unit Code Name (HUC)	Percent of HUC in NFS Ownership	Point Source Ranking	Riparian Health Ranking	Hydrological Modification Ranking	Sediment Ranking	Current Risk to Viability from Predicted Increased Sediment
1111010501 Poteau Headwaters	36.24	Good	Fair	Poor	Good	Moderate
1111010506 Riddle Creek	2.76	Good	Fair	Fair	Poor	High
1111020403 Deadman Creek	25.09	Very Good	Very Good	Good	Poor	High
1114010604 Norwood	10.96	Very Good	Good	Good	Poor	High
1114010605 McKinney Creek	3.73	Very Good	Very Good	Very Good	Poor	High
1114010705 Lower Little River	1.91	Good	Good	Fair	Good	Moderate
1114010901 Flat Creek	2.56	Good	Very Good	Good	Good	Moderate
1114010903 Lower Rolling Fork	1.12	Good	Very Good	Good	Good	Moderate

For each watershed and species, sensitivity to condition categories was assigned based on the species viability evaluation database, published literature, and personal communications. Species sensitivity to the four condition categories was compared with the condition of their respective watersheds to assess the threats to their persistence in the planning area.

Specific information is not available to determine the relationship between individual species and point source, riparian habitat, or altered flows; however, the establishment of groups identified by Jenk's optimization process illustrates the relative magnitude of each stressor within the range of current conditions. The relationship between fish community structure and sediment increase is definable and is discussed further in the Fish Assemblage–Sediment Profile section. As a result, sediment increase is the primary metric used for assessing the risk of maintaining the current viability of aquatic species populations. It is important to keep in mind, however, that the effect of any of the remaining stressors may increase the risk to aquatic fauna in a watershed.

Each aquatic species of concern was evaluated by risk (high, moderate, low) to the species' viability from detrimental influences from predicted increases in sediment within each watershed where it is known to occur. The importance of each watershed to the overall viability of the species (critical, high, moderate, low) was also taken into consideration. Overall forest-wide risk to viability per species was considered low unless the species occurred in a watershed of moderate or high risk to species viability. For those species, viability was evaluated and discussed by watershed as follows. To evaluate the 10-year and 50-year effects of the alternatives, the historical rate of change for each of these risk criteria values was determined and applied accordingly.

Viability determinations incorporate elements of species distribution, abundance, and sensitivities to environmental factors; watershed condition relative to the species' environmental sensitivities; and the national forest role in the watershed. Viability determinations are:

Outcome 1. Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Outcome 2. Species viability is potentially at risk in the watershed; however, the extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate.

Outcome 3. Species viability is potentially at risk within the watershed; however, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Outcome 4. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate to low.

Outcome 5. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Aquatic Federally Endangered and Threatened Species List

There are five federally endangered species and two federally threatened aquatic species listed as occurring or potentially occurring within the Forest. These include five mussel species, one fish species, and one plant species. The following tabulation lists the federally Threatened or Endangered aquatic species:

Common Name (Scientific Name)	Federal listing
Winged mapleleaf mussel (*Quadrula fragosa*)	Endangered
Ouachita rock-pocketbook (*Arkansia wheeleri*)	Endangered
Scaleshell mussel (*Leptodea leptodon*)	Endangered
Pink Mucket (*Lampsilis abrupta*)	Endangered
Arkansas fatmucket mussel (*Lampsilis powellii*)	Threatened
Leopard darter (*Percina pantherina*)	Threatened
Harperella (Ptilimnium nodosum)	Endangered

Appendix D contains the Biological Assessment on these and the other federally Threatened or Endangered species that occur on the Forest.

Winged Mapleleaf (*Quadrula fragosa*)

The winged mapleleaf freshwater mussel is not known to occur, but is believed to be within the Ouachita National Forest in both Oklahoma and Arkansas. Chemical and organic pollution, alteration and inundation of river channels, and siltation continue to have a severe negative impact on this species elsewhere in its range. Commercial harvest of shells may also be a threat. The winged mapleleaf is considered to be sensitive to pollution, siltation, habitat perturbation, and loss of glochidial host.

Direct, Indirect, and Cumulative Effects

Since there are no element occurrence records for this species on the Forest, the winged mapleleaf freshwater mussel was analyzed in relation to its rangewide status and distribution. Populations were discovered approximately 50 miles downstream from the Forest in the Ouachita River and approximately 100 miles downstream from the Forest in the Saline River, so recently (2000-2004) that it is difficult to determine trends, but the low numbers of individuals and limited distribution indicate that the populations are in a precarious position.

Forest-wide resource management standards, common to all alternatives and listed in the Revised Forest Plan under “Soil and Water Resources” and “Management Area 9 (Water and Riparian Communities)” concerning the conservation of soil productivity, water quality and other aquatic resources provide for the conservation of any potential winged mapleleaf habitat and for the quality of the water flowing downstream from the Forest. Because there are no individuals known to occur on the Ouachita National Forest, there would be no direct, indirect, or discernable negative cumulative effects to this species under any alternative.

Ouachita Rock-Pocketbook (*Arkansia wheeleri*)

Populations of this freshwater mussel are known to occur in the Kiamichi and Glover Rivers in Oklahoma and the Little River system in Oklahoma and Arkansas. Although it is not found within the Forest boundary, the Ouachita rock-pocketbook is known to occur within close proximity. The potential for occurrence along with the federally Endangered status of this species makes this a species of viability concern for the Forest.

Direct, Indirect, and Cumulative Effects

The Ouachita rock-pocketbook is known to occur downstream of Forest ownership in the Kiamichi, Lower Little River, and Flat Creek 5th level watershed (HUC) streams. The streams within these watersheds are considered of moderate value to the viability of the Ouachita rock-pocketbook mussel range-wide under all alternatives. The Kiamichi Headwaters watershed is in very good condition with low risk of detrimental influences to species viability (Outcome 1 - see Watershed Section).

The species is so rare within the Lower Little River and Flat Creek watersheds (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within these watersheds (Outcome 5). Therefore, the likelihood of maintaining current viability is low under all alternatives.

Table 3.18 displays the known occurrences of Ouachita rock-pocketbook mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.18 Watershed Occurrences and Importance of National Forest System lands for the Ouachita Rock-Pocketbook Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ouachita Rock-Pocketbook (*Arkansia wheeleri*)	Kiamichi Headwaters	Moderate	49.83	Low	Outcome 1
	Lower Little River	Moderate	1.91	Moderate	Outcome 5
	Flat Creek	Moderate	2.56	Moderate	Outcome 5

Scaleshell Mussel (*Leptodea leptodon*)

The scaleshell mussel is poorly known, difficult to detect, and extremely rare. It is known to have occurred within the Forest, but distribution and densities are not well understood. The scaleshell mussel is found with increasing difficulty and so rarely that they do not appear to be members of viable populations (no evidence of recent reproduction).

Direct, Indirect, and Cumulative Effects

The scaleshell mussel was historically found to occur in the South Fork Fourche and Beech 5th level watershed (HUC) streams. These streams are considered of moderate value to the viability of the scaleshell mussel range-wide under all alternatives.

The species is so rare within the South Fork Fourche watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is moderate to low under all alternatives.

The species is so rare within the Beech watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is low under all alternatives

Table 3.19 displays the known occurrences of scaleshell mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.19 Watershed Occurrences and Importance of National Forest System lands for the Scaleshell Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Scaleshell (*Leptodea leptodon*)	South Fork Fourche	Moderate	54.26	Low	Outcome 4
	Beech	Moderate	15.31	Low	Outcome 3

Pink Mucket (*Lampsilis abrupta*)

The federally Endangered pink mucket mussel was historically known from 25 rivers and tributaries; in 1990, it was known from only 16 rivers and tributaries. This species has never been collected in large numbers from any one site or drainage, and most surveys only find one to five individuals. There are taxonomic concerns that Louisiana, Arkansas, and Missouri populations may represent another undescribed species. If populations west of the Mississippi River prove to be a different species, the rank will need to be reevaluated.

Records indicate occurrences in the upper Ouachita watershed below Remmel Dam, which is the third major impoundment on the Ouachita River downstream from the Forest. The species is very rare in Arkansas, and while it is likely that the species historically tended to occur in low numbers, the lack of recruitment and the difficulty with which it is found indicate that the species continues to decline in the state.

Direct, Indirect, and Cumulative Effects

The pink mucket has rarely been found to occur in the Poteau Headwaters and Flat Creek 5th level watershed (HUC) streams. These streams are considered of high value to the viability of this mussel on the Forest, but of moderate-to-low viability value range-wide under all alternatives.

The species is so rare within the Poteau Headwaters watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is moderate to low under all alternatives.

The species is so rare within the Flat Creek watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low under all alternatives.

Table 3.20 displays the known occurrences of pink mucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.20 Watershed Occurrences and Importance of National Forest System lands for the Pink Mucket Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Pink Mucket (*Lampsilis abrupta*)	Poteau Headwaters	High	36.26	Moderate	Outcome 4
	Flat Creek	High	2.56	Moderate	Outcome 5

Arkansas Fatmucket (*Lampsilis powellii*)

Arkansas fatmucket mussels live only in Arkansas and are endemic to the Saline, Caddo, and upper Ouachita Rivers. Historically, this mussel species was found to be relatively common in preferred habitat; however, its frequency of detection and its population sizes have been consistently decreasing.

Direct, Indirect, and Cumulative Effects

The Arkansas fatmucket is known to occur in the Irons Fork, Kates Creek, Muddy Fiddler, South Fork Ouachita, Blakely, Caddo Headwaters, Carney Creek, Alum Fork, North Fork Saline, and Middle Fork Saline 5th level watershed (HUC) streams. Alum Fork and Kates Creek are considered of high value to the viability of the Arkansas fatmucket. Irons Fork, Muddy Fiddler, Caddo Headwaters, Carney Creek, North Fork Saline, and Middle Fork Saline watersheds are considered of moderate value to the viability of this mussel range-wide, and Blakely is considered of low value to this species viability. All ten of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is moderate to low under all alternatives.

However, this species is so rare and appears to be in decline in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.21 displays the known occurrences of Arkansas fatmucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.21 Watershed Occurrences and Importance of National Forest System lands for the Arkansas Fatmucket Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Arkansas Fatmucket (*Lampsilis powellii*)	Kates Creek	High	44.79	Low	Outcome 5
	South Fork Ouachita	High	66.43	Low	Outcome 4
	Alum Fork	High	30.03	Low	Outcome 5
	Irons Fork	Moderate	37.90	Low	Outcome 5
	Muddy Fiddler	Moderate	72.54	Low	Outcome 5
	Caddo Headwaters	Moderate	64.12	Low	Outcome 5
	Carney Creek	Moderate	14.79	Low	Outcome 5
	North Fork Saline	Moderate	23.07	Low	Outcome 5
	Middle Fork Saline	Moderate	12.17	Low	Outcome 5
	Blakely	Low	48.49	Low	Outcome 5

Leopard Darter (*Percina pantherina*)

The federally Threatened leopard darter is endemic to the Little River system in Arkansas and Oklahoma. While often quite abundant in its preferred habitats, the leopard darter habitat is usually restricted to small areas and can be quite disjunct. The leopard darter is generally found to occur in small to moderate-sized clear upland streams and rivers of moderate gradient. During non-spawning periods, it is usually found in pools of creeks and rivers favoring the cobble, small boulder habitat in the shallow areas of pools near the end of riffles. They are known to seek out the deep, cool pools during the hottest summer months.

The leopard darter has historically had very limited distribution, and is known to occur only in portions of five small, swift streams: the Cossatot River and Robinson Fork (the Rolling Fork River) in Arkansas; Glover and Little Rivers in Oklahoma; and the Mountain Fork River in both states. This restricted range was further reduced by impoundments of three rivers, forming Lakes Gillham, Broken Bow, and Pine Creek. Leopard darter habitat below the dams was decimated by reservoir releases.

The U.S. Fish and Wildlife Service designated Critical Habitat in the Little River system for the leopard darter (USFWS 1984). Those segments occurring within the Ouachita NF are: a 16.5-mile segment of the Glover River, the last free-flowing river in Oklahoma, and almost two miles of the Mountain Fork River upstream from Broken Bow Lake. Both of these Critical Habitat segments occur within Management Area 20—Wild and Scenic River Corridors. Limited vegetation management activities are planned for these corridors, as these areas are unsuitable in their entirety for timber production. The corresponding watersheds were analyzed as part of the Watershed Analysis process, and found to be in good condition with low vulnerability to detrimental influences from Forest Service management activities.

Direct, Indirect, and Cumulative Effects

The leopard darter is known to occur in the Glover, Two-mile, Beech, Broken Bow Lake, Upper Rolling Fork, and Cossatot Headwaters 5th level watershed (HUC) streams. The first four watersheds are considered of critical value to the viability of the leopard darter, and the last two of moderate value. All six of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is low under all alternatives.

However, this species is fairly rare in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low under all alternatives.

Table 3.22 displays the known occurrences of leopard darter by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual eggs, larva, and/or adults could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on leopard darter habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.22 Watershed Occurrences and Forest Ownership Importance for the Leopard Darter

Species	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Leopard Darter (*Percina pantherina*)	Glover	Critical	16.82	Low	Outcome 5
	Two-mile	Critical	40.16	Low	Outcome 4
	Beech	Critical	15.31	Low	Outcome 5
	Broken Bow Lake	Critical	29.32	Low	Outcome 5
	Upper Rolling Fork	Moderate	0.14	Low	Outcome 5
	Cossatot Headwaters	Moderate	31.46	Low	Outcome 5

Harperella (*Ptilimnium nodosum*)

Populations of harperella (*Ptilimnium nodosum*) on the Forest are limited to stream/river channels. This federally listed Endangered vascular plant was first discovered on the Forest in September 1990. It is currently known from 11 locations on Forest lands on the Oden, Cold Springs, and Fourche Ranger Districts in Garland, Montgomery, Scott, and Yell Counties, as well as three privately owned sites.

It typically grows on rocky shoals, within crevices in exposed bedrock, and occasionally along sheltered muddy banks. It seems to exhibit a preference for the downstream margins of small pools or other spots of deposition of fine alluvium. In most harperella sites, there seems to be significant deposition of fine silts. It may occur in mostly sunny to mostly shaded sites. On the Forest, harperella occurs in perennial to near-perennial streams either on or among boulders or large cobbles or on course sediment bars.

Where harperella exists on the Forest and elsewhere throughout its range, population numbers often fluctuate from year-to-year in response to factors such as rainfall levels, and winter conditions affecting seedlings and drought. There is significant dynamism in the persistence of individual stands with population levels documented to have fluctuated as much as 30 percent in four years (USDI-FWS 1991a). A status report by Hardcastle and Williams (2001) used repeatable methods to estimate populations in the Ouachita National Forest. Potential and existing habitat conditions for this species frequently change with flood events and are not readily quantifiable. The assumption has been made that this species may occur wherever suitable habitat exists within perennial stream channels.

Direct, Indirect, and Cumulative Effects

Harperella is known to occur in the Cedar Creek, North Fork Ouachita, and South Fork Fourche, Muddy Fiddler 5th level watershed (HUC) streams. These four watersheds are considered of critical value to the viability of harperella. All four of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is low under all alternatives.

South Fork Fourche watershed reflects minimal impairment, but the known harperella occurrences are located on lands in private individual ownership. Species viability is potentially at risk in the watershed; however, the extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate under all alternatives.

Cedar Creek, North Fork Ouachita, and Muddy Fiddler also reflect minimal impairment; the harperella localities are located on lands in Forest ownership, where likelihood of maintaining viability is high under all alternatives.

Table 3.23 displays the known occurrences of harperella by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual plants could be directly harmed by vehicles crossing streams. Indirect effects could include excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on harperella habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.23 Watershed Occurrences and Importance of National Forest System (NFS) lands for Harperella

Common Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Harperella (*Ptilimnium nodosum*)	Cedar Creek	Critical	80.50	Low	Outcome 1
	South Fork Fourche	Critical	54.26	Low	Outcome 3
	Muddy Fiddler	Critical	72.54	Low	Outcome 1
	North Fork Ouachita	Critical	71.41	Low	Outcome 1

Other Aquatic Species of Viability Concern

Other aquatic species of viability concern were analyzed separately from the aquatic Threatened and Endangered species. This list was derived based on recommendations from local aquatic experts and from the most current Region 8 Regional Forester's Sensitive species list. Species are categorized as being Sensitive due to their endemic or restricted ranges, and/or current or predicted downward trends in population numbers and/or available habitat, which raises concern about long-term viability. Table 3.24 contains the current risk from predicted increases in sediment to other aquatic species of viability concern. For species occurrence and viability outcome for aquatic species of concern, see Appendix E-Biological Resources.

Table 3.24 Current Risk to Species Viability from Predicted Increases in Sediment where Other Aquatic Species of Viability Concern are Known to Occur

Other Aquatic Species of Viability Concern Common Name (*Scientific Name*)	Watershed Occurrences by Risk Level			Risk to Species Viability from Predicted Increased Sediment
	High	Moderate	Low	
Crayfish Species				
Crayfish (*Fallicambarus harpi*)			3	Low
Crayfish (*Fallicambarus jeanae*)			3	Low
Crayfish (*Fallicambarus strawni*)			3	Low
Crayfish (*Orconectes menae*)			3	Low
Crayfish (*Orconectes saxatilis*)			1	Low
Crayfish (*Procambarus tenuis*)			2	Low
Crayfish (*Procambarus reimeri*)			1	Low
Fish Species				
Crystal Darter (*Crystallaria asprella*)		2		Moderate
Paleback Darter (*Etheostoma pallididorsum*)			6	Low
Goldstripe Darter (*Etheostoma parvipinne*)	2	3	1	Moderate
Ouachita Shiner (*Lythrurus snelsoni*)			3	Low
Redspot Chub (*Nocomis asper*)		1	1	Low
Kiamichi Shiner (*Notropis ortenburgeri*)	1	4	10	Low
Peppered Shiner (*Notropis perpallidus*)		2	6	Low
Ouachita Madtom (*Noturus lachneri*)			4	Low
Caddo Madtom (*Noturus taylori*)			8	Low
Longnose Darter (*Percina nasuta*)	1		1	Moderate
Ouachita Darter (*Percina* sp. nov)			3	Low
Mussels Species				
Elktoe (*Alasmidonta marginata*)			4	Low
Flat Floater (*Anodonta suborbiculata*)		1	3	Low
Spectacle Case (*Cumberlandia monodonta*)			1	Low
Western Fanshell (*Cyprogenia aberti*)			4	Low
Butterfly (*Ellipsaria lineolata*)	1	2	3	Moderate
Spike (*Elliptio dilatata*)	1		11	Low
Ebony Shell (*Fusconaia ebena*)	1	1	1	Moderate
Louisiana Fatmucket (*Lampsilis hydiana*)		3	15	Low
Southern Pocketbook (*Lampsilis ornata*)			4	Low
Sandbank Pocketbook (*Lampsilis satura*)		1	8	Low
Fatmucket (*Lampsilis siliquoidea*)		2	6	Low
Fluted Shell (*Lasmigona costata*)		2	13	Low
Black Sandshell (*Ligumia recta*)	1		9	Low
Southern Hickorynut (*Obovaria jacksoniana*)		2	8	Low
Ohio Pigtoe (*Pleurobema cordatum*)		1	1	Moderate
Pyramid Pigtoe (*Pleurobema rubrum*)		1	1	Moderate
Ouachita Kidneyshell (*Ptychobranchus occidentalis*)		2	17	Low
Rabbitsfoot (*Quadrula cylindrica cylindrica*)			1	Low
Monkeyface (*Quadrula metanevra*)		1	5	Low
Purple Lilliput (*Toxolasma lividus*)		1	5	Low
Ouachita Creekshell (*Villosa arkansasensis*)		1	16	Low
Rainbow (*Villosa iris*)		1	5	Low

All 7 crayfish species, 8 of the fish species, and 19 of the mussel species of viability concern are known to occur primarily in watersheds that are in good condition with low risks to species viability from detrimental influences from predicted increases in sediment relative to all watersheds within the Forest; therefore, likelihood of adversely affecting current viability from Forest management activities is low. Three fish species and four mussel species occur in watersheds where the risk to species viability from Forest management activities is moderate-low or moderate-high; these species are discussed below.

Crystal Darter

Direct, Indirect, and Cumulative Effects

The crystal darter is known to occur in two watersheds, Lower Little River and Flat Creek. Under all alternatives, both of these watersheds were rated as critical to species viability and of moderate risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream.

Therefore, these two watersheds were assigned to Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.25 displays the known occurrences of crystal darter by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.25 Watershed Occurrences and Importance of National Forest System lands for Crystal Darter

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Crystal Darter (*Crystallaria asprella*)	1114010705 Lower Little River	Critical	1.91	Moderate	Outcome 3
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3

Goldstripe Darter

This fish species is restricted to Upper West Gulf Coastal Plain–OK, on the Forest with little National Forest ownership within watersheds of known occurrences.

Direct, Indirect, and Cumulative Effects

The goldstripe darter is known to occur in six watersheds. Under all alternatives, these watersheds were assigned to Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within the watersheds. Therefore, likelihood of maintaining viability is low.

Table 3.26 displays the known occurrences of goldstripe darter by watershed the importance of the 5^{th} level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.26 Watershed Occurrences and Importance of National Forest System lands for Goldstripe Darter

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Goldstripe Darter (*Etheostoma parvipinne*)	1114010604 Norwood	Critical	10.96	High	Outcome 3
	1114010605 McKinney Creek	Critical	3.73	High	Outcome 3
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3
	1114010903 Lower Rolling Fork	Critical	1.12	Moderate	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Outcome 3
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Outcome 3

Kiamichi Shiner

The Kiamichi shiner is an endemic restricted to the Ouachita Mountains and West Gulf Coastal Plains in Arkansas and Oklahoma. It is generally found to be locally abundant.

Direct, Indirect, and Cumulative Effects

The Kiamichi shiner is known to occur in the watersheds listed in Table 3.27. Under all alternatives, four of the 14 watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those four watersheds were assigned to the Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low. The remaining 10 watersheds were rated as of low risk to species viability and were assigned to Viability Outcome 1: species occur within the watershed with minimal impairment; likelihood of maintaining viability is high.

Table 3.27 displays the known occurrences of Kiamichi shiner by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.27 Watershed Occurrences and Importance of National Forest System lands for Kiamichi Shiner

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Kiamichi Shiner (*Notropis ortenburgeri*)	1114010605 McKinney Creek	Critical	3.73	High	Outcome 3
	1111010501 Poteau Headwaters	Critical	36.24	Moderate	Outcome 3
	1111010502 Black Fork	Critical	73.55	Low	Outcome 1
	1111010503 Middle Poteau	Critical	41.22	Low	Outcome 1
	1111010505 Wister	Critical	33.44	Low	Outcome 1
	1111020601 Cedar Creek	Critical	80.42	Low	Outcome 1
	1114010501 Kiamichi Headwaters	Critical	49.83	Low	Outcome 1

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
	1114010705 Lower Little River	Critical	1.91	Moderate	Outcome 3
	1114010805 Broken Bow Lake	Critical	29.32	Low	Outcome 1
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3
	1114010902 Upper Rolling Fork	Critical	0.14	Low	Outcome 1
	1114010903 Lower Rolling Fork	Critical	1.12	Moderate	Outcome 3
	804010101 Irons Fork	Critical	37.90	Low	Outcome 1
	1114010704 Glover	High	16.82	Low	Outcome 1
	804020301 Alum Fork	High	30.03	Low	Outcome 1

Butterfly Mussel

The Butterfly mussel is found in medium to large rivers with gravel and gravel-sand substrate and good current. It is not considered to be widespread or abundant. It is found to sparsely occur in the Caddo, Cossatot, Little Missouri, Little, Ouachita, Saline, and St. Francis Rivers. The status of this species in Arkansas and Oklahoma is relatively uncertain.

Direct, Indirect, and Cumulative Effects

The butterfly freshwater mussel is known to occur in the watersheds as listed in Table 3.28. Under all alternatives, three of the six watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those three watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed; however, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

The remaining three watersheds were rated as of low risk to species viability and were assigned to Viability Outcome 1: Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Table 3.28 displays the known occurrences of butterfly freshwater mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to fish host eggs, juvenile and/or adult individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.28 Watershed Occurrences and Importance of National Forest System lands for Butterfly Freshwater Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Butterfly Mussel (*Ellipsaria lineolata*)	1111020403 Deadman Creek	Moderate	25.11	High	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Outcome 3
	1114010901 Flat Creek	High	2.56	Moderate	Outcome 3
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Outcome 1
	1114010704 Glover	Moderate	16.82	Low	Outcome 1
	804010206 Carney Creek	Moderate	14.79	Low	Outcome 1

Ebony Shell Freshwater Mussel

This species occurs in a number of watersheds across Arkansas in relatively high numbers; however, the population status of this species in the state is uncertain.

Direct, Indirect, and Cumulative Effects

The ebony freshwater mussel is known to occur in the watersheds as listed in Table 3.29. Under all alternatives, two of the three watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

The remaining watershed was rated as of low risk to species viability and was assigned to Viability Outcome 1: Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Table 3.29 displays the known occurrences of ebony shell freshwater mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile, or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.29 Watershed Occurrences and Importance of National Forest System lands for Ebony Shell Freshwater Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ebony Shell Freshwater Mussel (*Fusconaia ebena*)	1111020403 Deadman Creek	Moderate	25.10	High	Outcome 3
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Outcome 1
	1114010901 Flat Creek	Moderate	2.56	Moderate	Outcome 3

Ohio Pigtoe Mussel

The Ouachita form of the Ohio pigtoe may actually be multiple species. The true Ohio Pigtoe is a large river obligate. Occurrences on the Forest most likely represent specimens of Round Pigtoe (*P. sintoxia*). The taxonomic investigation is ongoing.

Direct, Indirect, and Cumulative Effects

The Ohio pigtoe freshwater mussel is known to occur in the two watersheds as listed in Table 3.30. Under all alternatives, these two watersheds were rated as of moderate and low risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.30 displays the known occurrences of the Ohio pigtoe mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.30 Watershed Occurrences and Importance of National Forest System lands for Ohio Pigtoe Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ohio Pigtoe Mussel (*Pleurobema cordatum*)	1114010705 Lower Little River	High	1.91	Moderate	Outcome 5
	804010103 Muddy Fiddler	Moderate	72.54	Low	Outcome 2

Pyramid Pigtoe Mussel

This mussel species is extremely abundant in the lower Ouachita River and lower Saline River downstream from the Ouachita NF. The upper Ouachita and upper Saline Rivers' populations are peripheral to its range.

Direct, Indirect, and Cumulative Effects

The pyramid pigtoe freshwater mussel is known to occur in the two watersheds as listed in Table 3.31. These two watersheds were rated as of moderate and high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.31 displays the known occurrences of pyramid pigtoe mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile, or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.31 Watershed Occurrences and Importance of National Forest System lands for Pyramid Pigtoe Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Pyramid Pigtoe Mussel (*Pleurobema rubrum*)	1111020403 Deadman Creek	High	25.09	High	Outcome 3
	1114010901 Flat Creek	Moderate	2.56	Moderate	Outcome 1

Stream Management Indicator Species

Following passage of the National Forest Management Act (NFMA) in 1976, the Secretary of Agriculture, on the advice of the Committee of Scientists, promulgated regulations to guide the development of plans for the National Forest System (36 CFR 219). For fish and wildlife resources, among other things, these regulations at 219.19(a)(1) state:

> *"In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities. In the selection of management indicator species, the following categories shall be represented where appropriate:*
>
> *Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; Species with special habitat needs that may be influenced significantly by planned management programs; Species commonly hunted, fished or trapped; Non-game species of special interest; and Additional plant or animal species selected because their populations changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality."*

Section 219.19(a) (6) requires that:

Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with State fish and wildlife agencies to the extent practicable.

The Management Indicator Species Revised Forest Plan Selection Process Paper (August 2005) reviewed the Ouachita National Forest list of Management Indicator Species, and concluded 14 stream fishes were adequate to represent streams and rivers. The Process Paper summarizes monitoring information for these species and assesses their status and conservation needs after more than a decade of Forest Plan implementation experience. The lake/pond and terrestrial MIS are addressed in the lake/pond and terrestrial species sections, respectively, of the EIS.

The initial MIS listed species by Ecoregions (ADPC&E 1986) and the Forest fell into three general zones: Arkansas River Valley, Ouachita Mountain, and Gulf Coastal Plain. Table 3.32 lists the stream MIS species and the primary reason(s) for their selection.

Table 3.32 Selected Stream and River Management Indicator Species

Common Name	Scientific Name	Primary reason(s) for selection
Arkansas River Valley Ecoregion		
Yellow bullhead	*Ameiurus natalis*	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Arkansas River Valley Ecoregion
Central stoneroller	*Campostoma anomalum*	
Redfin darter	*Etheostoma whipplei*	
Green sunfish	*Lepomis cyanellus*	
Longear sunfish	*Lepomis megalotis*	
Ouachita Mountain Ecoregion		
Central stoneroller	*Campostoma anomalum*	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion
Johnny darter (within leopard darter range only)	*Etheostoma nigrum*	
Orangebelly darter	*Etheostoma radiosum*	
Redfin darter	*Etheostoma whipplei*	
Northern studfish	*Fundulus catenatus*	
Northern hog sucker	*Hypentilium nigricans*	
Green sunfish	*Lepomis cyanellus*	
Longear sunfish	*Lepomis megalotis*	
Striped shiner	*Luxilus chrysocephalus*	
Smallmouth bass	*Micropterus dolomieu*	
Channel darter (within leopard darter range only)	*Percina copelandi*	
Gulf Coastal Plain		
Pirate perch	*Aphredoderus sayanus*	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Gulf Coastal Plain
Central stoneroller	*Campostoma anomalum*	
Creek chubsucker	*Erimzon oblongus*	
Green sunfish	*Lepomis cyanellus*	
Longear sunfish	*Lepomis megalotis*	
Forest-wide		
Smallmouth bass	*Micropterus dolomieu*	To help indicate effects of management activities on meeting public fishing demand in streams

According to the Management Indicator Species Report (October 2003), sampling data pertaining to the stream MIS species indicate that there are fluctuations in numbers of individuals from sample to sample and/or from year to year. However, all species are maintaining stable patterns within the natural range of variability and show no indication that management activities are detrimentally affecting the water quality, aquatic habitat or aquatic biological communities.

Direct, Indirect, and Cumulative Effects

The primary threats from Forest management activities to the persistence of aquatic species in stream/riverine habitats involve the manipulation of water flow and water quality. Water quality degradation through sedimentation may be caused by road and/or fireline construction, recreational activities, and silvicultural activities. Other threats to potential habitat loss and/or degradation are pesticides, channel alterations during road construction and maintenance, in-stream gravel mining, residential development, agricultural activities, and improperly treated municipal waste.

Alternative A provides the lowest level of management activities that would create any potential threats to water quality and aquatic habitat. Alternatives B and D would provide similar levels of management activities, and Alternatives C and E would provide the highest levels of management activities that could potentially threaten the aquatic environment. The watershed assessment revealed that, although there were differences among alternatives and the current condition, there were no differences of risk to species viability from predicted increases in sediment among or between alternatives. This is a reflection of water quality and aquatic habitat protection design criteria/standards that would be applicable under all alternatives to all ground-disturbing management activities.

Direct effects include a slight possibility that individuals could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to aquatic passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on aquatic habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for all aquatic species under all alternatives.

Terrestrial Communities

This section describes the current terrestrial conditions of the Forest, the relationship of these conditions to species of viability concern and management indicator species (MIS), and the biological effects of implementing each of the five alternatives. The analysis draws upon the most current available data concerning existing natural terrestrial communities and the role of fire within those communities; the distribution, abundance, and habitat relationships of species of viability concern and MIS; landtype associations; and watershed conditions. Central to the analysis is the comprehensive Ouachita National Forest Species Viability Evaluation (2004).

Habitat condition needs for species of viability concern and MIS are based on the most current science, literature, and expert opinion. Literature citations used for the SVE are in the SVE documentation available at www.aokforests.com or upon request. The species viability scores represent the average of the weighted “condition scores” (see Table 3.33) of the natural communities and habitat elements associated with a particular species of concern or MIS. For the Ouachita National Forest SVE, each community and habitat element was weighted by how important that community or habitat element is to the species (on a descending scale of “obligate,” “optimal,” “suitable,” or “marginal”). Alternatives were compared on the basis of condition scores for each Conservation Target (natural community, habitat element, or species of viability concern).

Table 3.33 Species Viability Condition Scores for Terrestrial Communities

Range of Condition Score	Condition Classification	Definition of SVE Score Applied to Communities and Habitat Elements
3.51 – 4.00	Very Good	Community or Habitat Element conditions are optimal; associated species’ populations should remain robust and potentially even expand
2.51 – 3.50	Good	Community or Habitat Element conditions are acceptable; associated species’ populations should remain stable
1.51 – 2.50	Fair	Community or Habitat Element conditions are slightly inadequate; although associated species’ populations may persist for some time, they may be subject to gradual decline
1.00 – 1.50	Poor	Community or Habitat Element conditions are severely inadequate. Associated species’ populations are expected to severely decline; localized extirpations are occurring or are imminent

Terrestrial communities include all non-aquatic Ouachita Mountain and West Gulf Coastal Plain Ecological Community Systems listed by NatureServe (2003). Other terrestrial habitat elements include caves and mines, snags, dens, early seral vertical structure, mature trees/old growth, and large trees near water. Table 3.34 lists the terrestrial community types and their areal extent on the Forest.

Table 3.34 NatureServe Communities occurring within the Ouachita National Forest

NatureServe Communities	Percent of Forest
Ouachita Shortleaf Pine-Oak Forest and Woodland CES202.313 (Sub-Communities)	
1) Ouachita Shortleaf Pine-Oak Forest	44.7
2) Ouachita Pine-Oak Woodland	13.6
3) Ouachita Shortleaf Pine – Bluestem	11.4
West Gulf Coastal Plain Pine-Hardwood Flatwoods CES203.378	<0.1
Ouachita Dry-Mesic Hardwood Forest CES202.708	12.4
Ouachita Mesic Hardwood Forest CES202.043	1.8
Ouachita Montane Oak Forest CES202.306	0.6
Ouachita Dry Oak Woodlands CES202707	0.3
Ouachita Novaculite Glade and Woodland CES202.314	<0.1
Central Interior Acidic Cliff and Talus CES202.689	0.3
Central Interior Highlands Dry Acidic Glade and Barrens CES202.692	0.2
Southern Arkansas/Oklahoma Calcareous Prairie CES203.377	<0.1
Ouachita Riparian CES202.703	13.2
Ouachita Mountain Forested Seeps CES202.321	<0.1
South-Central Interior Large Floodplain CES202.705	<0.1
West Gulf Coastal Plain Small Stream and River Forest CES203.487	0.3
West Gulf Coastal Plain Wet Hardwood Flatwoods CES203.548 (Red Slough WMA)	0.2

The scoring benchmarks for community conditions are derived for areal extent, canopy closure, vertical structure, fire regime, and remoteness/road density. The associated indicators are weighted as to the importance of the condition (high–3, medium–2, low–1). If no weight is designated, then the scoring system defaults to medium–2.

The areal extent of communities is the percent of the Forest each vegetation system represents. Canopy closure is a combination of stem density, basal area, and extent of canopy cover. Canopy closure is used primarily to distinguish a closed-canopy forested condition from an open to intermittent-canopy woodland condition. Vertical structure within each vegetation community is represented by age or diameter classes:

- Early seral includes the 0-5 year-old grass/forb stage plus the 6-10 year-old shrub stage (in woodland communities, “percent herbaceous ground cover” includes early seral stage plus 40% of the late seral stage to include the woodland herbaceous layer); the importance of the early seral indicator was weighted as high (3).

- Mid-seral structure includes all age-classes and diameters in the immature forest and woodland condition class; the importance of this indicator was weighted as low (1).

- Late seral includes mature forest and woodland trees with diameters at breast height of greater than 9.5 inches for pine and 12 inches for hardwood; the importance of this indicator was weighted as medium (2).

Fire regime includes how frequently fires occur and the season in which the burn occurs (dormant or growing). The cool or dormant season is considered to be October through February, and the growing season is March through September. The frequency of the burns is weighted more heavily (3 to 1) than the season of the burn. Most of the natural communities of the Ouachita National Forest are slightly, moderately, or highly dependent on certain fire regimes to restore and maintain “good” conditions. Remoteness refers to the mean density of roads within each community type across the Forest.

The fire regime condition class reference conditions describing the role of fire in ecological communities (Masters and Guyette 2004) and other fire effects related research (Spetich 2004; Jurney and others 2001; Masters and others 1995; Foti and Guldin 1994; Foti and Glenn 1991) associated with fire-adapted ecosystems in the Interior Highlands of Arkansas, Missouri, and Oklahoma were compared to NatureServe community descriptions to better define the seasonality and frequency of fire by community type. Another source used extensively in researching the role of fire in ecological communities and for individual species found in the Ouachitas was the Fire Effects Information System online at http://www.fs.fed.us/database/feis/index.html.

Ouachita Shortleaf Pine-Oak Forest and Woodland

Ouachita Shortleaf Pine-Oak Forest Subsystem
Ouachita Shortleaf Pine-Oak Woodland Subsystem
Ouachita Shortleaf Pine-Bluestem Woodland (including Red-cockaded Woodpecker Habitat) Subsystem

This system represents forests and woodlands of the Ouachita Mountain region of Arkansas and adjacent Oklahoma in which shortleaf pine is an important or dominant component. Shortleaf pine was ubiquitous in the forests of the Ouachitas prior to major European settlement and timber exploitation (Sargent 1884; Mattoon 1915; Smith 1986; Foti and Glenn 1991), and it remains so today. Shortleaf pine often occurs with a mixture of hardwood species but also occurs naturally in nearly pure stands. In some examples of this system, the aggregate importance of hardwoods may be greater than pine, especially on subxeric and mesic sites, in which case, the community is often referred to as an oak-pine forest or woodland. The shortleaf pine-oak forest and woodland system comprises approximately 70 percent of the Forest. This system has been divided into three subsystems (pine-oak forest, pine-oak woodlands, and pine-bluestem woodlands).

Ouachita Shortleaf Pine-Oak Forest

Ouachita shortleaf pine-oak forest represents the most densely wooded, generally closed-canopy component of the pine-oak system. Currently, the pine-oak forest subsystem makes up approximately 71 percent of the pine-oak system and occupies about 50 percent of the Forest. These percentages reflect decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes. With a fire regime closer to the historic range of variability, the pine-oak forest subsystem would probably occupy 45-65 percent of the pine-oak system. Table 3.35 presents key factors for the Ouachita pine-oak forest current condition.

Table 3.35 Ouachita Pine-Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Score
Areal Extent	Percent of pine-oak systems in forested condition	<40 or >75	40-44 or 66-75	45-49 or 61-65	50-60	71.00	Fair
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	93.00	Very Good
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	17.40	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<20	20-40	41-70	>70	42.40	Good
Remoteness	Road Density in miles/mile²	>2	1-2	0.5-1	<0.5	2.33	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	8-12	2.48 (24,765 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<5 or >45	5-10 or 40-45	10-15 or 30-40	15-30	28.60 (285,597 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	68.92 (688,229 acres)	Good
Composite SVE Score is 2.06 - Fair							

The overall SVE condition score for the pine-oak forest community is 2.06 (“Fair”). The vertical structure needed to sustain “good/very good” conditions in pine-oak forest is 6-14 percent in grass/forb/shrub condition and 60-90 percent in mature forest condition. Current vertical structure condition is 2.48 percent in grass/forb/shrub stages, and 68.9 percent in the mature forest condition. A substantial portion of the current acreage in the grass/forb/shrub stages consists of 10+ year-old pine plantations and heavily thinned pine and pine-oak stands acquired in land exchanges and land purchases in the mid-1990s. Such areas will soon be more appropriately characterized as mid-seral stands.

The fire regime needed to sustain good/very good conditions is one in which at least 50 percent of the pine-oak forest community burns at least once every 5-7 years and has an occasional growing season burn. Figure 3.12 shows vertical structure and fire regime current condition for this system. The current fire history reflects that 17.4 percent of the pine-oak forest community is burned every 5-7 years, and that 42.4 percent of the burned area receives an occasional growing season burn.

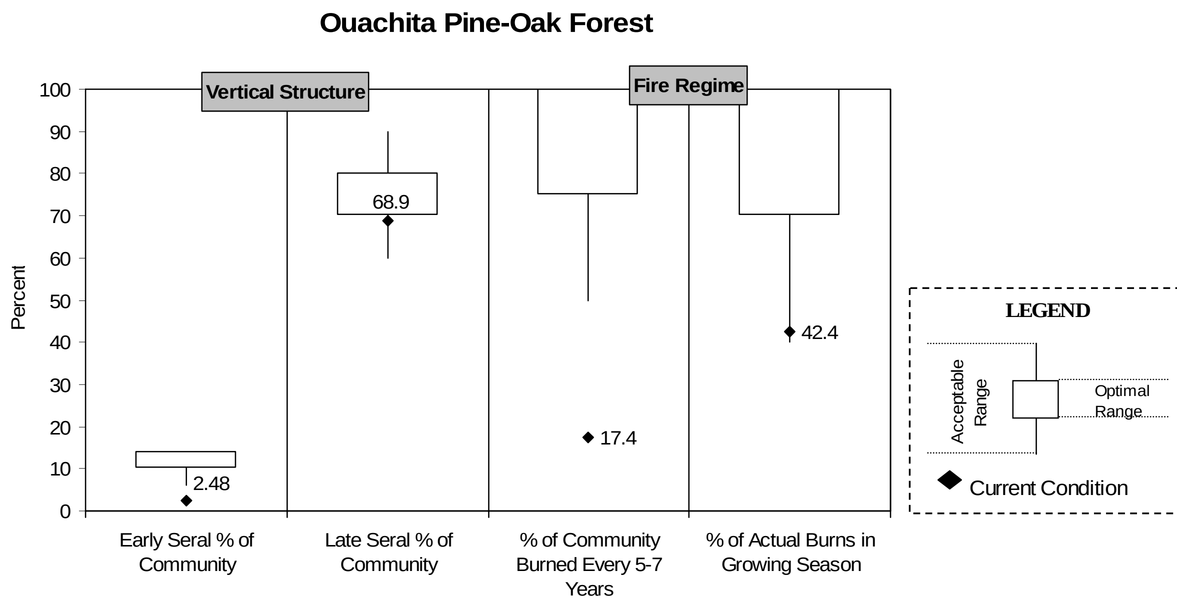

Figure 3.12 Vertical Structure and Fire Regime, Ouachita Pine-Oak Forest

The grass/forb/shrub, immature and/or mature structure of pine-oak forests provides optimal habitat for seven species, suitable habitat for 24 species, and marginal habitat for two species included in the SVE. One of the SVE species for which this subsystem provides optimal conditions is also an MIS, and one of the SVE species for which this subsystem provides suitable conditions is also an MIS. In addition, one MIS not considered in the SVE analysis finds “optimal” habitat here, and three more MIS find suitable habitat in this subsystem. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled “SVE/MIS”):

Species	Importance of Pine-Oak Forest
Prairie Warbler *(Dendroica discolor)* SVE/MIS Pileated Woodpecker *(Dryocopus pileatus)* MIS Red-headed Woodpecker *(Melanerpes erythrocephalus)* Brown-headed Nuthatch *(Sitta pusilla)* Bewick's Wren *(Thryomanes bewickii)* American Burying Beetle *(Nicrophorus americanus)* Diana Fritillary *(Speyeria diana)*	Optimal

Species	Importance of Pine-Oak Forest
Mole Salamander *(Ambystoma talpoideum)* Caddo Mountain Salamander *(Plethodon caddoensis)* Fourche Mountain Salamander *(Plethodon fourchensis)* Kiamichi Mountain Salamander *(Plethodon kiamichi)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* Southern Redback Salamander *(Plethodon serratus)* Bachman's Sparrow *(Aimophila aestivalis)* Chuck-will's-widow *(Caprimulgus carolinensis)* Whip-poor-will *(Caprimulgus vociferus)* Northern Bobwhite *(Colinus virginianus)* SVE/MIS American Kestrel *(Falco sparverius)* Bald Eagle *(Haliaeetus leucocephalus)* Worm-eating Warbler *(Helmitheros vermivorus)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS Kentucky Warbler *(Oporornis formosus)* Scarlet Tanager *(Piranga olivacea)* MIS White-eyed Vireo *(Vireo griseus)* Hooded Warbler *(Wilsonia citrina)* White-tailed Deer *(Odocoileus virginianus)* MIS Plains Spotted Skunk *(Spilogale putorius interrupta)* Waterfall's Sedge *(Carex latebracteata)* Ozark Chinquapin *(Castanea pumila var ozarkensis)* Shinners' Sunflower *(Helianthus occidentalis* ssp *plantagineus)* Timber Rattlesnake *(Crotalus horridus)*	Suitable
Ouachita Leadplant *(Amorpha ouachitensis)* Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Marginal

Ouachita Shortleaf Pine-Oak Woodland

Ouachita shortleaf pine-oak woodland is an open canopied, fire-dependent subsystems with abundant herbaceous ground cover. Based on an analysis of landtype associations, 20-45 percent of the pine-oak system could be in pine-oak woodland conditions, given an appropriate combination of thinning and burning. Currently, this woodland subsystem makes up about 23 percent of the shortleaf pine-oak communities and 16 percent of the Forest. These figures reflect decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes. Table 3.36 presents key factors for the Ouachita pine-oak woodland current condition.

Table 3.36 Ouachita Pine-Oak Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Areal Extent	Percent of pine-oak systems in or dedicated to restored pine-oak woodland condition	<15 or >50	15-19 or 46-50	20-25 or 41-45	25-40	23.4	Good
Canopy Closure	Percent of the areal extent with 40-80% canopy closure	>90 or <30	81-90 or 30-40	71-80 or 41-50	51-70	67.3	Good
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	3.2	Poor

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<20	20-40	41-70	>70	23.8	Fair
Remoteness	Road Density in miles/mile²	>2	1-2	0.5-1	<0.5	1.89	Fair
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	8-12	0 (0 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Woodland)	<5 or >45	5-10 or 40-45	10-15 or 30-40	15-30	18.3 (46,674 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Woodland)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	81.7 (208,628 acres)	Good
Percent herbaceous ground coverage	Percent of pine-oak woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	32.68 (83,451 acres)	Fair
Composite SVE Score is 2.11 - Fair							

Overall SVE condition score for the pine-oak woodlands is 2.11 (“Fair”). A defining characteristic of this pine-oak woodland subsystem is canopy closure condition of less than 70 percent; current canopy closure is 89 percent. Based on the SVE, the vertical structure needed to support good/very good conditions is 6-14 percent in grass/forb/shrub and 60-90 percent in the mature forest condition. Current vertical structure condition is 0 percent in grass/forb/shrub, and 81.7 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the pine-oak woodland community is burned every 3-5 years, with occasional growing season burns included. The current fire history reflects that less than 4 percent of the pine-oak woodland community is burned every 3-5 years, and less than 24 percent of the burned areas receive an occasional growing season burn. Figure 3.13 shows vertical structure and fire regime current condition for this system.

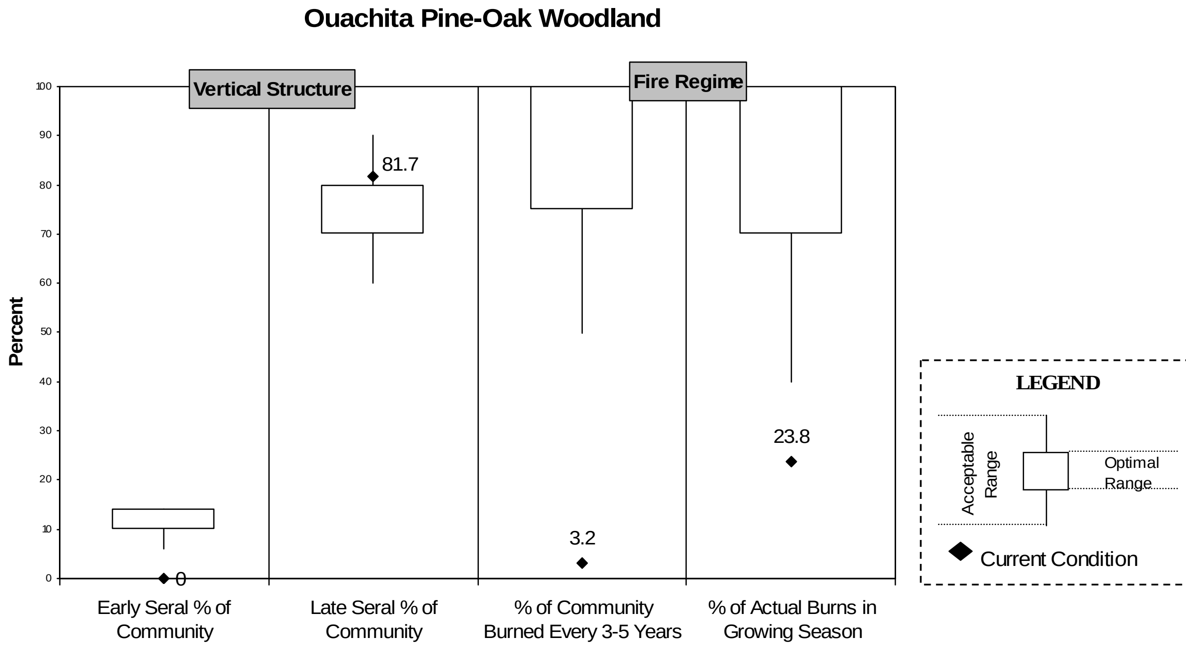

Figure 3.13 Vertical Structure and Fire Regime Condition, Ouachita Pine-Oak Woodland

The grass/forb/shrub, immature and/or mature structure of shortleaf pine-oak woodlands provides optimal habitat for eight species and suitable habitat for three species considered in the SVE. Of those species that find optimal habitat in this subsystem, two are also MIS; four additional MIS also find optimal habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled "SVE/MIS:"

Species	Importance of Pine-Oak Woodland
Red-cockaded Woodpecker *(Picoides borealis)* SVE/MIS Prairie Warbler *(Dendroica discolor) SVE/MIS* Bachman's Sparrow *(Aimophila aestivalis)* Pileated Woodpecker *(Dryocopus pileatus) MIS* Eastern Wild Turkey *(Meleagris gallopavo) MIS* Northern Bobwhite *(Colinus virginianus)* SVE/MIS Scarlet Tanager *(Piranga olivacea)* MIS White-tailed Deer *(Odocoileus virginianus)* MIS Timber Rattlesnake *(Crotalus horridus)*	Optimal
Western Diamondback Rattlesnake *(Crotalus atrox)* Great Plains Skink *(Eumeces obsoletus)* Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Suitable

Ouachita Shortleaf Pine-Bluestem Woodland (includes Red-cockaded Woodpecker Habitat)

Ouachita shortleaf pine-bluestem woodland represents the most open-canopy, pine-dominated, fire-dependent component of pine-oak systems on the Forest. Currently, this subsystem constitutes approximately 14.3 percent of the shortleaf pine-oak dominated communities and 4 percent of the Forest. Based on landtype associations, the shortleaf pine-bluestem woodland subsystem could occupy 10-30 percent of all known pine-oak dominated systems. This community represents the most intensely managed system towards restoration of this historically predominant condition. This woodland condition with frequent fires has undergone a great deal of conversion to a forested condition due to a decrease in vegetation management and suppression of the natural fire regime. Table 3.37 lists the key factors for Ouachita shortleaf pine-bluestem woodland current condition.

Table 3.37 Ouachita Shortleaf Pine-Bluestem Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Areal Extent	Percent of pine-oak systems in shortleaf pine-bluestem condition	<5 or >30	5-9 or 25-30	10-15 or 26-30	16-25	14.3	Good
Canopy Closure	Percent of the areal extent with 40-80% canopy closure	>90 or <30	81-90 or 30-40	71-80 or 41-50	51-70	31	Fair
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	83.9	Very Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<20	20-40	41-70	>70	77.7	Very Good
Remoteness	Road Density in miles/mile²	>2	1-2	0.5-1	<0.5	2.06	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >12	2-3 or 9-12	3-4 or 8-9	5-7	2.0 (1,144 acres)	Fair
Vertical Structure	Percent Mid-Seral (Immature Woodland)	>30	21-30	10-20	<10	32 (18,308 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Woodland)	<30 or >95	31-60 or 91-95	60-65 or 75-90	65-75	66 (37,761 acres)	Very Good
Percent Herbaceous Ground Coverage	Percent of pine-bluestem woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	28.4 (16,248 acres)	Fair
Composite SVE Score is 2.61 - Good							

Overall SVE condition score for the pine-bluestem woodlands is 2.61 ("Good"). The defining characteristics of this subsystem are canopy closure of 40-70 percent, sparse to absent midstory, abundant herbaceous groundcover, and a minimal oak component among the dominant canopy trees. The current SVE reflects a canopy closure of 31 percent, taking into account the recent intense efforts to restore the pine-bluestem condition through thinnings and frequent prescribed burns.

Based on the SVE, the vertical structure needed to support good/very good conditions is 3-8.3 percent in grass/forb/shrub, and 60-90 percent in the mature forest condition. Current vertical structure condition is 2.0 percent in grass/forb/shrub, and 66 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the pine-bluestem woodland community is burned every 3-5 years, with an occasional growing season burn included. The SVE fire history reflects that 83.9 percent of the pine-bluestem woodland community is burned every 3-5 years, and 78 percent of the burned area receives an occasional growing season burn. Figure 3.14 shows vertical structure and fire regime current condition for this system.

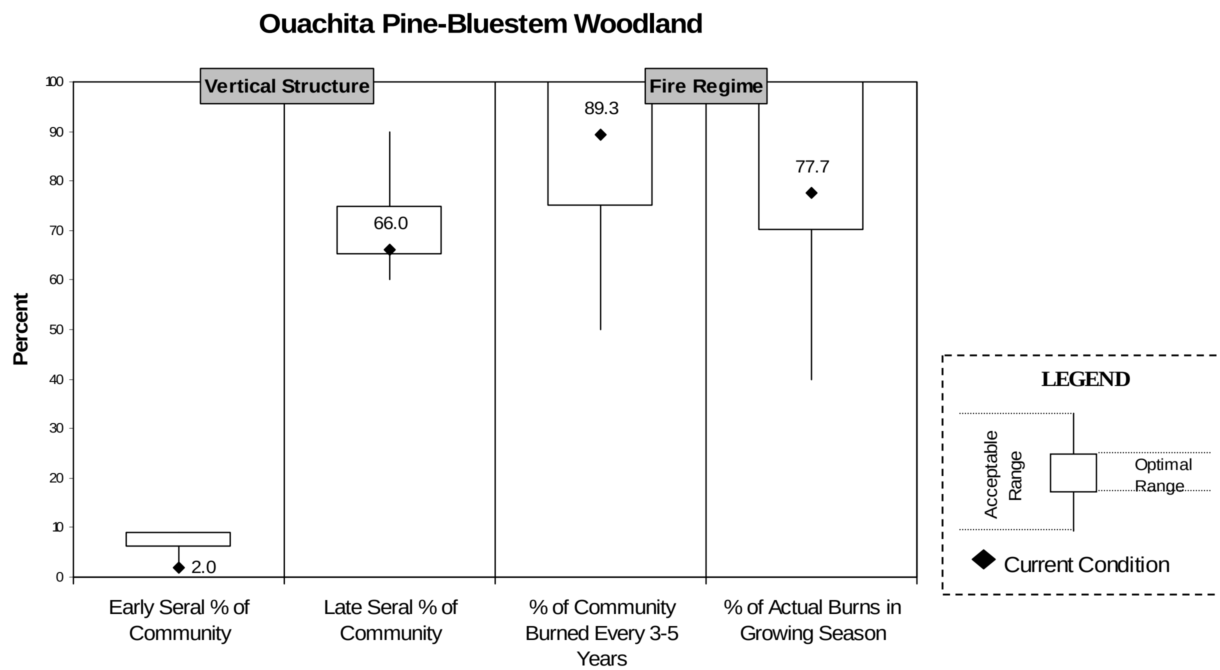

Figure 3.14 Vertical Structure and Fire Regime Condition, Ouachita Pine-Bluestem Woodland

Ouachita shortleaf pine-bluestem woodlands' grass/forb/ shrub, immature and/or mature structure provides obligate habitat for one species, optimal habitat for eight species, and suitable habitat for four species considered in the SVE. One of the species for which this subsystem provides obligate conditions is also an MIS; two species in the "optimal" category are also MIS; and a fourth MIS not considered in the SVE finds optimal conditions here as well. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Pine-Bluestem Woodland
Brown-headed Nuthatch *(Sitta pusilla)*	Obligate
Red-cockaded Woodpecker *(Picoides borealis)* SVE/MIS Red-headed Woodpecker *(Melanerpes erythrocephalus)* Bachman's Sparrow *(Aimophila aestivalis)* Prairie Warbler *(Dendroica discolor)* SVE/MIS American Kestrel *(Falco sparverius)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS/Demand Northern Bobwhite *(Colinus virginianus)* SVE/MIS/Demand Diana Fritillary *(Speyeria diana)* White-tailed Deer *(Odocoileus virginianus)* MIS/Demand	Optimal
Pileated Woodpecker (Dryocopus pileatus) MIS Western Diamondback Rattlesnake (Crotalus atrox) Great Plains Skink (Eumeces obsoletus) Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Suitable

West Gulf Coastal Plain Pine-Hardwood Forest

This West Gulf Coastal Plain (WGCP) ecological system represents less than one percent of the Forest and consists of forests and woodlands dominated by shortleaf pine and loblolly pine in combination with a variety of dry to dry-mesic hardwood species. In southeastern Oklahoma, this type was historically present on nearly all WGCP uplands except on the most edaphically limited sites (droughty sands, calcareous clays, and shallow soil barrens or rock outcrops). These relatively upland sites are underlain by loamy to fine-textured soils of varying depths along low ridges and side slopes, with moderate fertility and moisture retention. Table 3.38 lists the key factors for West Gulf Coastal Plain pine-hardwood forest current condition.

Table 3.38 West Gulf Coastal Plain Pine-Hardwood Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	93	Very Good
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	6.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	53.2	Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	2.39	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	10-12	1.7 (136 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<5 or >45	5-10 or 40-45	11-15 or 30-40	16-30	23.6 (1,899 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	74.7 (6,015 acres)	Very Good
Composite SVE Score is 1.92 - Fair							

The overall SVE condition score for the WGCP pine-hardwood forest is 1.92 (“Fair”). Based on the SVE, the vertical structure needed to support good/very good conditions is 6-14 percent in grass/forb/shrub, and 60-90 percent in the mature, fire-maintained forest condition. Current vertical structure condition is 1.7 percent in grass/forb/shrub, and 74.7 percent in the mature forest condition.

Based on the SVE, the fire regime needed to support good/very good conditions is one in which at least 50 percent of the WGCP pine-hardwood forest community is burned every 3-5 years, with an occasional growing season burn included. The current fire history reflects that 6.3 percent is burned every 3-5 years, and that 53.2 percent of the burned area receives an occasional growing season burn. Figure 3.15 shows vertical structure and fire regime current condition for this system.

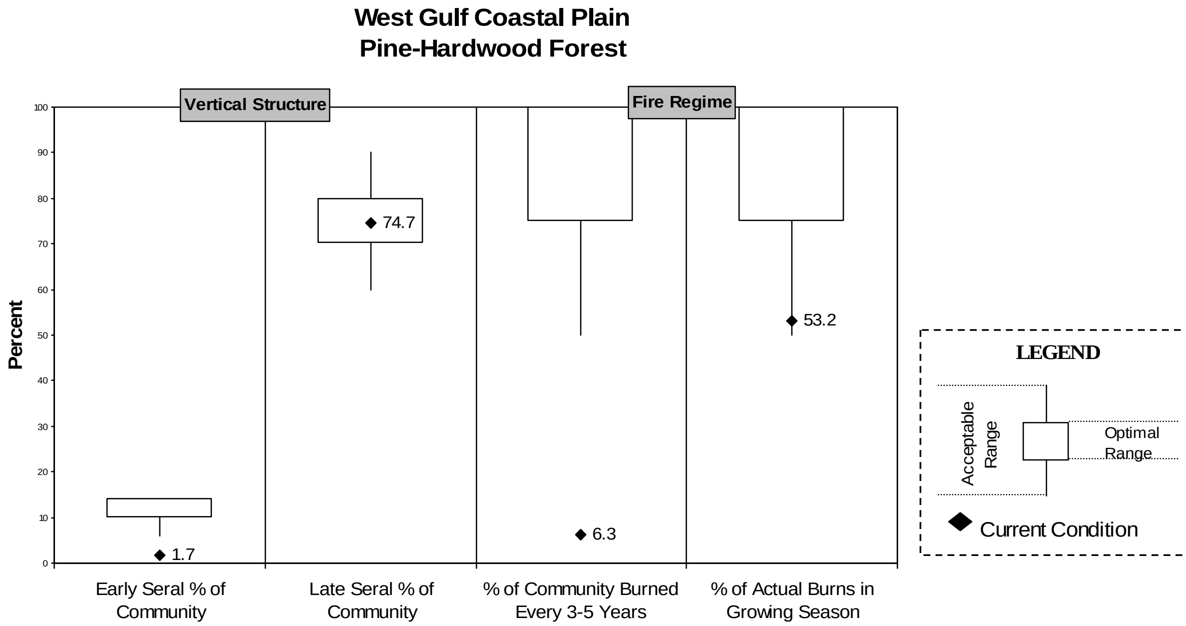

Figure 3.15 Vertical Structure and Fire Regime Condition, WGCP Pine-Hardwood Forest

As shown in the following tabulation, WGCP pine-hardwood forests provide optimal habitat for one MIS and suitable habitat for two MIS:

Species	Importance of WGCP Pine-Hardwood Forest
Pileated Woodpecker *(Dryocopus pileatus)* MIS	Optimal
Eastern Wild Turkey *(Meleagris gallopavo)* MIS White-tailed Deer *(Odocoileus virginianus)* MIS	Suitable

Ouachita Dry-Mesic Oak Forest

This system, which is found throughout the Ozark and Ouachita Highlands, constitutes approximately 12 percent of the Forest. It occurs on dry to mesic, gentle to moderately steep slopes. Typically, soils are moderately to well drained and more fertile than those associated with drier, more open oak woodlands. A closed canopy of oak and hickory typifies this system. Maples, gums, and other hardwoods may also appear in the canopy. Wind, drought, occasional fires, and infrequent ice storms influence this system. Table 3.39 lists the key factors for Ouachita dry-mesic oak forest current condition.

Table 3.39 Ouachita Dry-Mesic Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	99.2	Very Good
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	11.9	Poor
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	34.8	Fair
Remoteness	Road Density in miles/mile^2	>2	1-2	0.5-1	<0.5	1.07	Fair
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >14	2-4 or 10-14	7-10	4-6	0.79 (1,828 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<10 or >45	0 -15 or 35-45	15-20 or 30-35	20-30	52.1 (120,583 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	47.1 (109,035 acres)	Poor
Composite SVE Score is 1.64 - Fair							

Overall SVE condition score for the dry-mesic oak forest is 1.64 (“Fair”). Based on the SVE, the vertical structure needed to support good/very good conditions is 4-10 percent in grass/forb/shrub, and 60-90 percent in mature, fire-maintained forest condition. Current vertical structure is 0.79 percent in grass/forb/shrub, and 47.1 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the dry-mesic oak forest community is burned every 5-7 years, with an occasional growing season burn included. The current fire history reflects that 11.9 percent of this community is burned every 5-7 years, and 34.8 percent of the burned area receives an occasional growing season burn. Figure 3.16 shows vertical structure and fire regime current condition for this system.

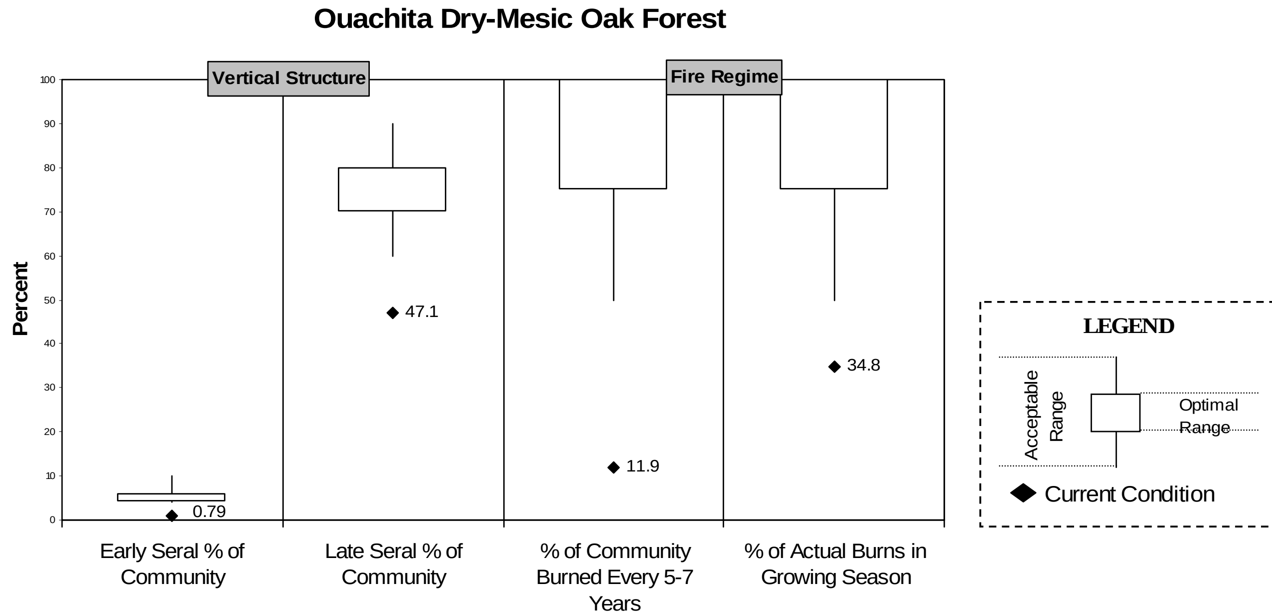

Figure 3.16 Vertical Structure and Fire Regime Condition, Ouachita Dry-Mesic Oak Forest

Ouachita dry-mesic oak forests' grass/forb/shrub, immature and/or mature structure provides optimal habitat for two species considered in the SVE and three MIS, plus suitable habitat for 22 SVE species; this subsystem also provides suitable habitat for an additional MIS. The MIS are labeled in the following tabulation:

Species	Importance of Ouachita Dry-Mesic Oak Forest
Southern Redback Salamander *(Plethodon serratus)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Scarlet Tanager *(Piranga olivacea)* MIS American Burying Beetle *(Nicrophorus americanus)* White-tailed Deer *(Odocoileus virginianus)* MIS	Optimal
Mole Salamander *(Ambystoma talpoideum)* Caddo Mountain Salamander *(Plethodon caddoensis)* Fourche Mountain Salamander *(Plethodon fourchensis)* Kiamichi Mountain Salamander *(Plethodon kiamichi)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* Chuck-will's-widow *(Caprimulgus carolinensis)* Whip-poor-will *(Caprimulgus vociferus)* Worm-eating Warbler *(Helmitheros vermivorus)* Wood Thrush *(Hylocichla mustelina)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS Kentucky Warbler *(Oporornis formosus)* White-eyed Vireo *(Vireo griseus)* Hooded Warbler *(Wilsonia citrina)* Diana Fritillary *(Speyeria diana)* Indiana Bat *(Myotis sodalis)* Plains Spotted Skunk *(Spilogale putorius interrupta)* Ozark Chinquapin *(Castanea pumila var ozarkensis)* A Goldenrod *(Solidago ouachitensis)* A Twistflower *(Streptanthus squamiformis)* Ozark Least Trillium *(Trillium pusillum var ozarkanum)* Timber Rattlesnake *(Crotalus horridus)* Great Plains Skink *(Eumeces obsoletus)* Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Suitable

Vertical Structure

The diversity of vertical structure, representing vegetation successional or seral stages (early seral-grass/forb/shrub, mid seral-immature forest and woodland, late seral-mature forest and woodland), is frequently the determining factor for the presence, distribution, and abundance of wildlife and plant species. Species are often obligate or dependent on certain vegetation structural conditions regardless of the community composition. To some species, the grass/forb shrub condition or early seral stage is critical; for others, the immature and/or mature condition is most important. Of particular importance are those forest conditions at the early and mature stages of the successional continuum (grass/forb shrub or early seral, and mature trees or late seral).

The early seral vertical structure condition is highly productive in terms of diversity and abundance of nesting and escape cover and forage production, including insects, small mammals, reptiles, seeds, and soft mast. Some plant species may need a certain amount of direct sunlight, while others may require shaded conditions. The early seral condition has an ephemeral lifespan of only up to 10 years, and is often in short and/or declining supply.

Early seral vertical structure conditions provide obligate habitat for two species, optimal habitat for seven species, and suitable habitat for four species considered in the SVE. Several MIS also find optimal or suitable habitat in the early seral structural condition, as shown in the following tabulation (MIS that were evaluated within the SVE are labeled “SVE/MIS”).

Species	Importance of Grass-Forb/Seedling-Sapling
Prairie Warbler *(Dendroica discolor)* SVE/MIS A Twistflower *(Streptanthus squamiformis)*	Obligate
American Kestrel *(Falco sparverius)* White-eyed Vireo *(Vireo griseus)* Orchard Oriole *(Icterus spurius)* Painted Bunting *(Passerina ciris)* Northern Bobwhite *(Colinus virginianus)* SVE/MIS Eastern Wild Turkey *(Meleagris gallopavo)* MIS Diana Fritillary *(Speyeria diana)* American Burying Beetle *(Nicrophorus americanus)* Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Optimal
Bewick's Wren *(Thryomanes bewickii)* White-tailed Deer *(Odocoileus virginianus)* MIS Western Diamondback Rattlesnake *(Crotalus atrox)* Timber Rattlesnake *(Crotalus horridus)* Great Plains Skink *(Eumeces obsoletus)*	Suitable

Vegetation communities that, through naturally limiting factors such as elevation, rainfall, aspect, slope, and thin soils, maintain primarily an early seral condition include acidic cliff and talus, acidic glades and barrens, and novaculite glade and woodland. Montane oak naturally provides a high elevation shrub condition. Herbaceous groundcover and shrubby vegetation cover the calcareous prairie and are interspersed throughout dry oak and pine-oak and pine-bluestem woodlands. A frequent to occasional fire treatment is essential to discourage the woody encroachment and to maintain the early seral condition within these systems. Overall current SVE condition score for the early seral habitat is 2.50 (“Fair”).

Direct and Indirect Effects

The most prominent communities within the Ouachita National Forest—pine-oak forests, pine-oak woodlands, shortleaf pine-bluestem woodlands, WGCP pine-hardwood forests and dry-mesic oak forests—are slated for the most active management regimes. Vegetation management activities will include even-aged (modified seedtree and shelterwood) and uneven-aged regeneration harvest, thinning, and prescribed fire. Communities will be managed to provide for diversity of vertical structure as well as consideration of the value of contiguous communities, which means that some woodland conditions may revert to forest condition, while some forest will be restored to woodland conditions to allow for a more contiguous habitat. Figures 3.17 and 3.18 compare early seral habitat by alternative by community at the 10th and 50th year, respectively, of Plan implementation.

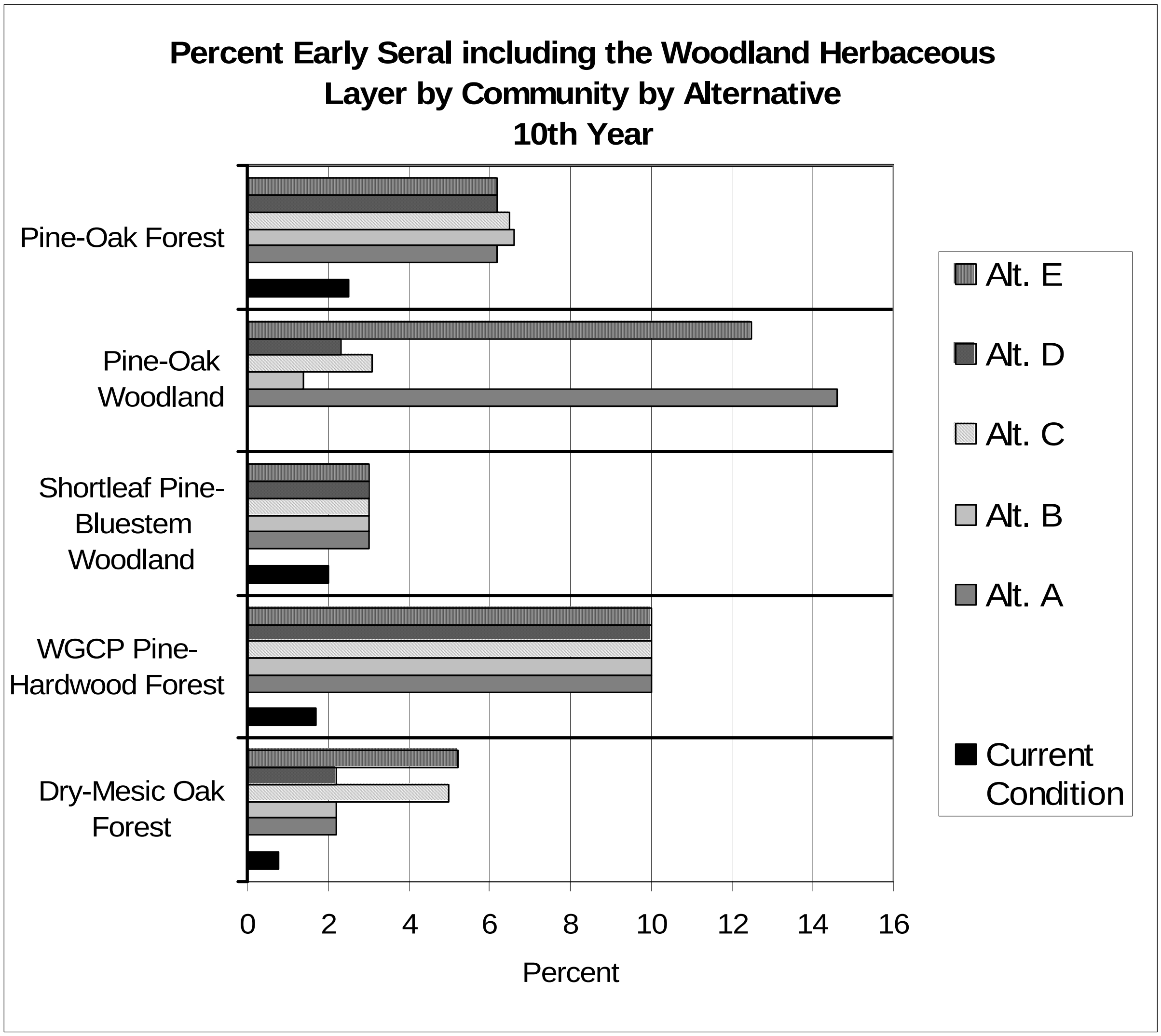

Figure 3.17 Early Seral Habitat by Alternative by Community at the 10th Year

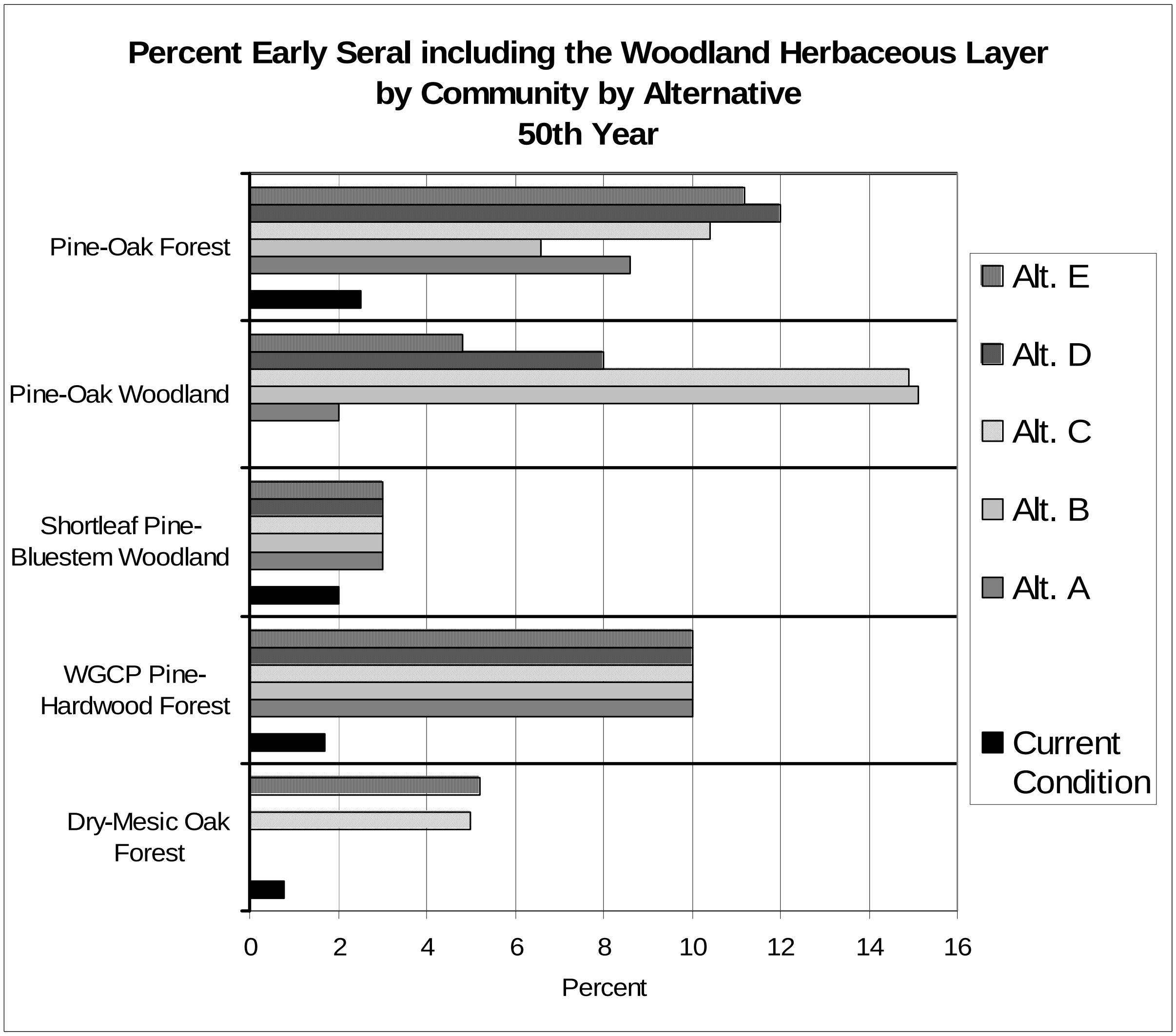

Figure 3.18 Early Seral Habitat by Alternative by Community at the 50th Year

The mid-seral vertical structure condition is perhaps the least beneficial to wildlife species. The closed canopy prevents sunlight from reaching the forest floor, limiting the development of herbaceous groundcover and shrubby understory. This condition does provide some foraging and cover for some species. For the majority of wildlife, this vertical structure condition provides lower quality habitat than early or late seral stages, although a few species do prefer mid-seral conditions, such as hooded warbler and worm-eating warbler.

The late seral vertical structure condition provides habitat for a suite of habitat specialists as well as habitat generalists. According to the September 2003 Continuous Inventory of Stand Conditions database used for this analysis, approximately 62 percent of the Forest is in the mature vertical structure condition. This condition provides important habitat for high canopy nesting and roosting, suitable structure for cavity development and excavation, and relatively large volumes of seed and hard mast. Components of this condition include snags, large and small diameter hollow trees as den trees, downed woody debris, and large trees near water that provide critical habitat for many wildlife species. Figures 3.19 and 3.20 compare late seral habitat by alternative by community at the 10th and 50th year, respectively.

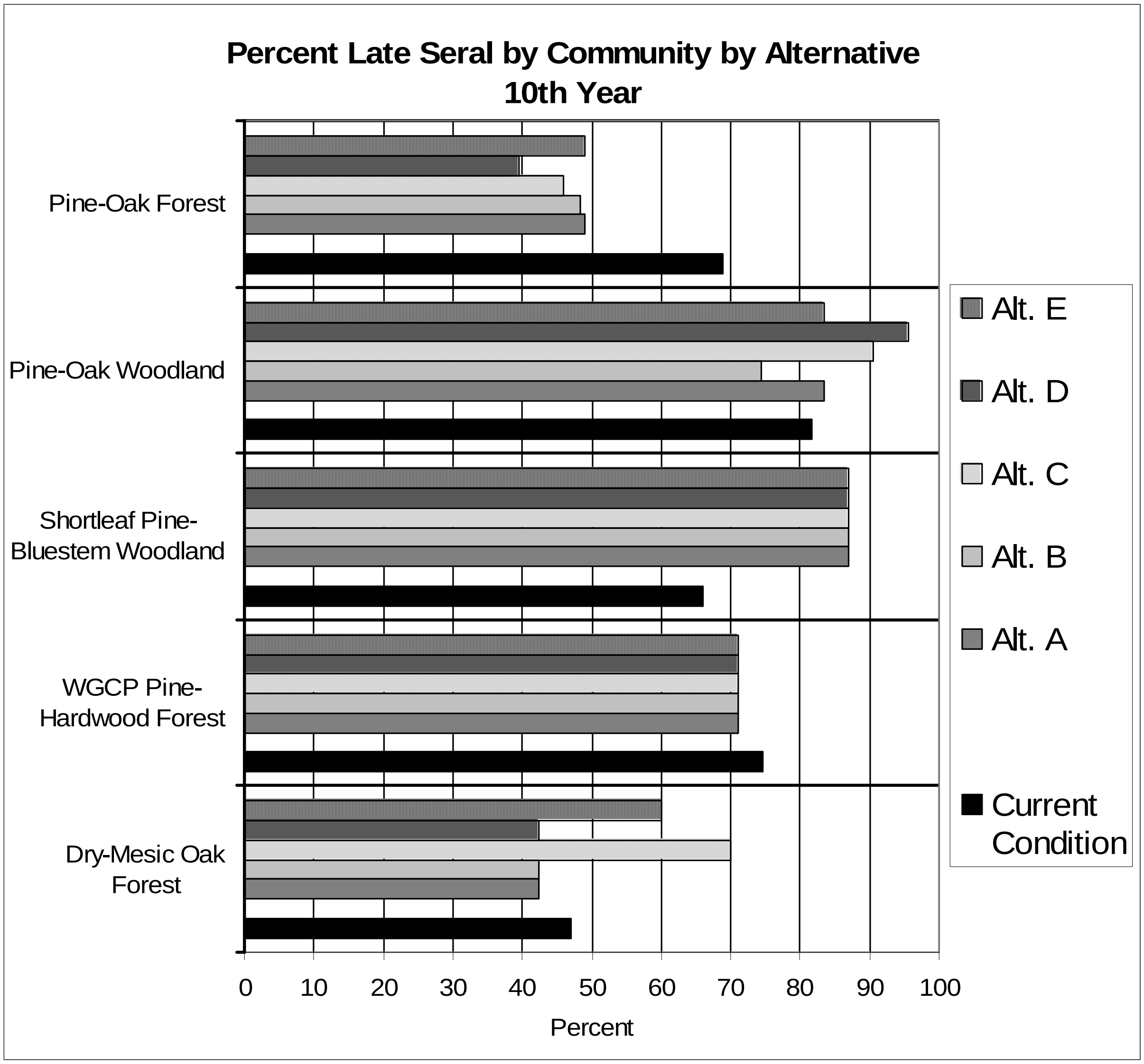

Figure 3.19 Late Seral Habitat by Alternative by Community at the 10th Year

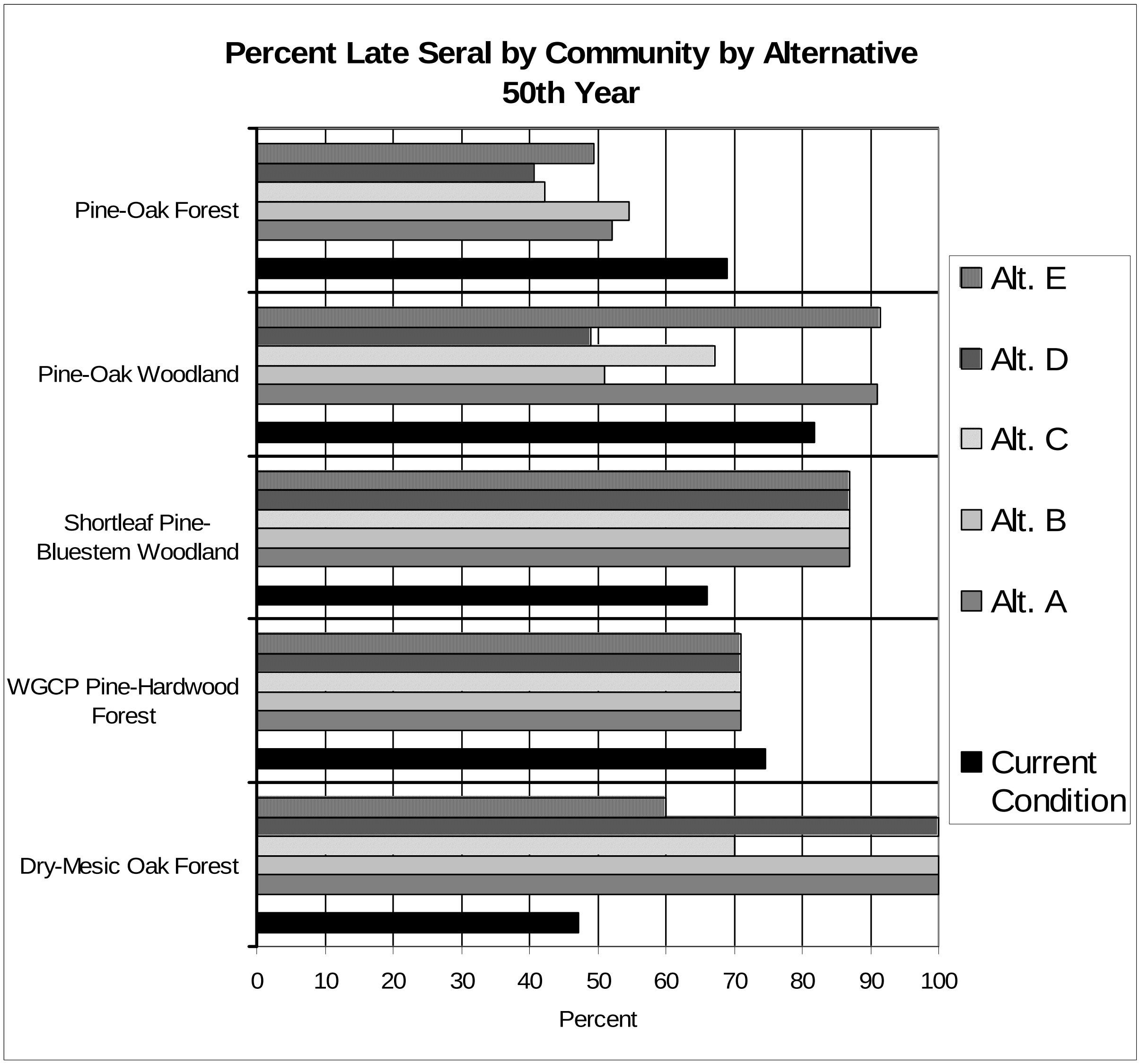

Figure 3.20 Late Seral Habitat by Alternative by Community at the 50th Year

The Ouachita pine-oak forests, pine-oak woodlands, pine-bluestem woodlands, WGCP pine-hardwood forests, and Ouachita dry-mesic oak forests are identified under all alternatives to be managed, restored, and maintained as habitat diversity emphasis communities. The future distribution of these communities on the Forest will vary among alternatives in relation to management intensity as in the number of acres treated annually. Pine-bluestem restoration efforts will be accomplished as a priority, restoring the pine-bluestem community to those appropriate areas that have converted to pine-oak forest. A wealth of research data has been compiled and published (see http://www.fs.fed.us/r8/ouachita/natural-resources/pine_lit_review.shtml for a listing) concerning the shortleaf pine-bluestem grass ecosystem, especially regarding the responses of native plants and animals to the thinning and prescribed burning necessary to restore and maintain this fire-adapted system.

The ability to use prescribed burning as a tool will play a critical role in restoring natural species assemblages and forest or woodland structure within the pine-oak communities and the dry-mesic hardwood forests. Table 3.40 presents estimated annual average acres of prescribed fire by alternative. Future age-class distributions and vertical structure will vary among alternatives due to differences in management intensity and emphasis. Longer rotation ages along with frequent prescribed fire will enhance certain habitat attributes, such as the herbaceous ground cover and standing snags that are important to many species of viability concern, as well as demand and management indicator species.

Table 3.40 Estimated Annual Average Acres of Prescribed Fire, by Community, by Alternative

Community Name	A	B	C	D	E
Ouachita Pine-Oak Forest	36,420	66,578	117,228	50,000	87,234
Ouachita Pine-Oak Woodland	8,568	18,000	61,698	25,000	39,123
Shortleaf Pine/Bluestem Woodland	5,945	22,000	25,000	10,500	23,500
WGCP Pine-Hardwood Forest	1,003	1,500	1,945	80	1,744
Ouachita Dry – Mesic Oak Forest	7,812	12,800	35,545	11,000	21,412
Mesic Hardwood	13	75	1,051	500	928
Montane Oak	378	755	937	350	802
Dry Oak Woodlands	189	375	803	400	710
Novaculite Glade & Woodlands	6	30	503	250	359
Acidic Cliff & Talus	189	216	870	400	850
Acidic Glades & Barrens	126	201	525	250	525
Calcareous Prairie	35	70	71	70	63
Riparian Systems MA9	2,316	2,400	3,824	1,200	2,750
Total Acres	68,000	125,000	250,000	100,000	180,000

Some mortality of individual associated plants and animals could occur as a result of restoration and/or maintenance activities. The benefits to those species by managing and/or restoring the habitat will far outweigh those few casualties. Short-term negative effects to individual plants and animals are expected to be minimal and discountable compared to the long-term positive effects of habitat restoration.

Age-class distribution (vertical structure) varies some by community age-rotation criteria, with thinned stands managed towards long rotations with frequent fire intervals. As restoration, management and maintenance activities proceed within these communities, the importance of these habitats to species of regional as well as local viability concern will increase. Cumulatively, the effects of restoration, management and maintenance in the natural communities previously described, are expected to be critical to the sustainability of these habitats and the viability of the associated species. Figures 3.21 and 3.22 compare viability scores for common natural communities by alternative at the 10th and 50th year, respectively.

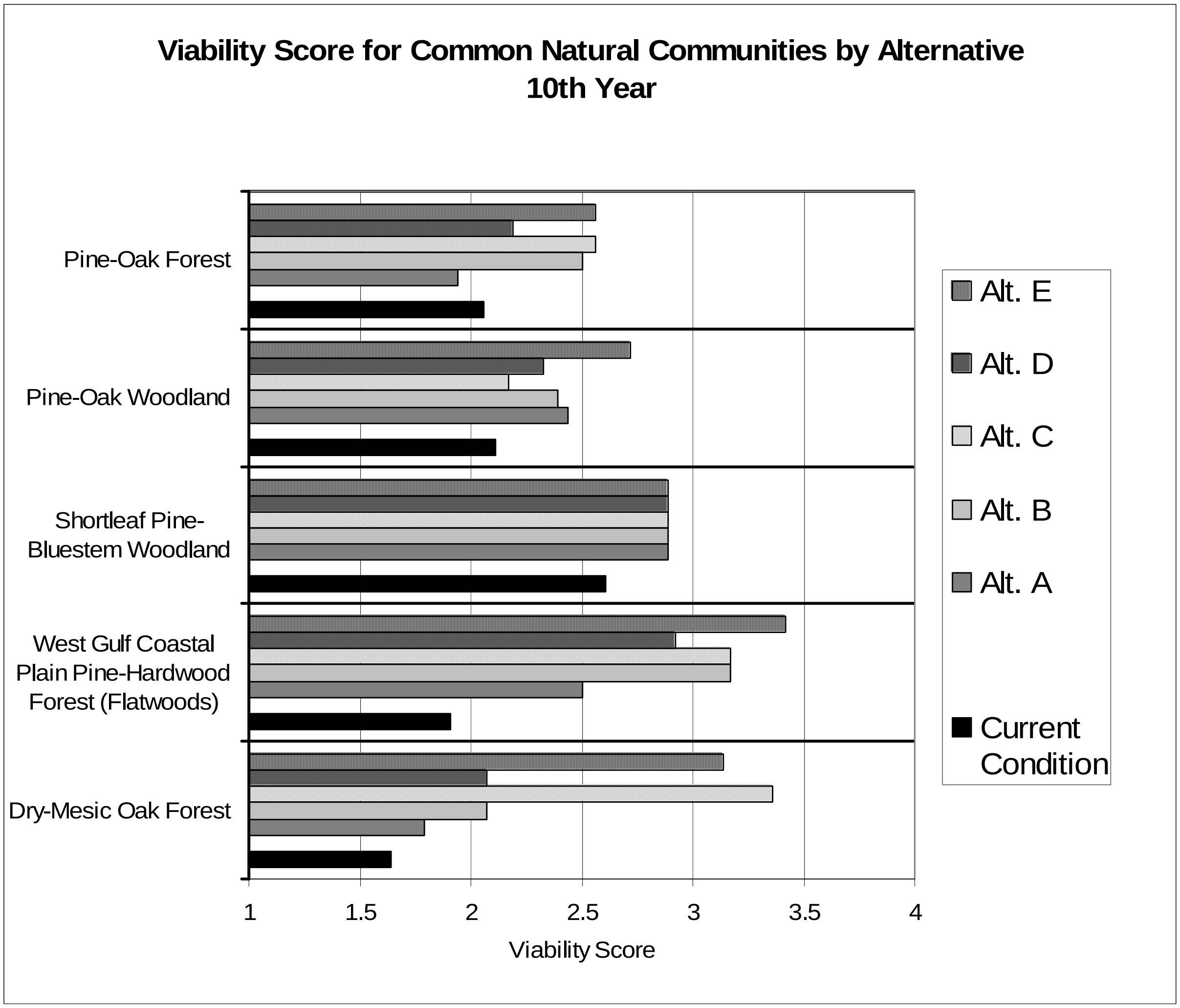

Figure 3.21 Viability Scores for Common Natural Communities by Alternative at the 10th Year

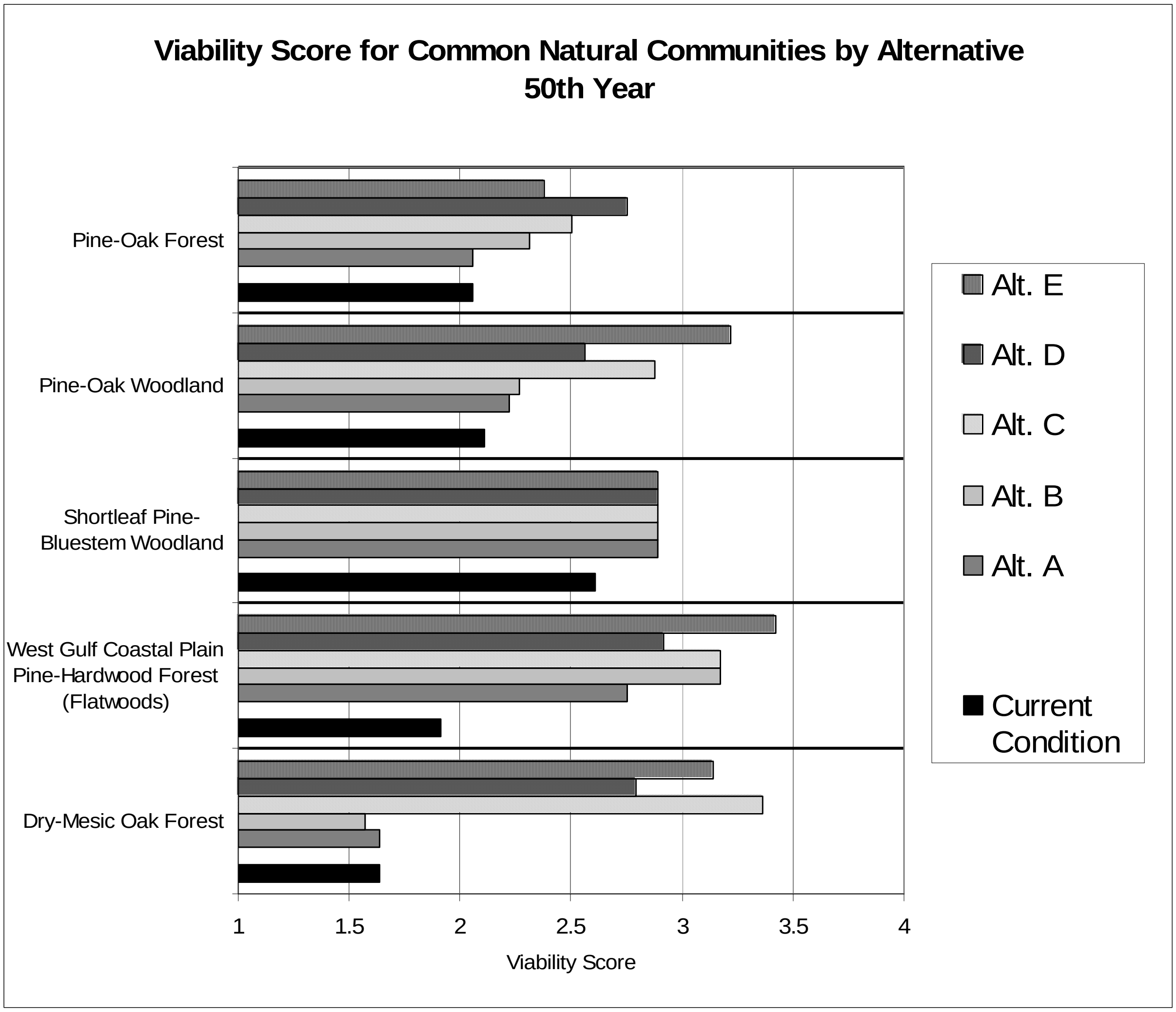

Figure 3.22 Viability Scores for Common Natural Communities by Alternative at the 50th Year

Vegetation management activities within the pine-oak forest and woodland, and dry-mesic oak forest vary in intensity among the alternatives. Vegetation management activities within the shortleaf pine-bluestem woodland system are directly responsive to the needs of the federally Endangered Red-cockaded Woodpecker and will be consistent across all alternatives.

There is high value in the large areas of continuous habitat, which means that some woodland will be allowed to revert to forested conditions, while some forest will be restored to woodland conditions. As pine, pine-oak, and dry-mesic oak forests and/or woodlands are prevalent on the Forest, management opportunities should ensure the continued persistence of these communities with a management focus on maintenance and restoration of native communities and species assemblages.

Cumulative Effects

Through time, Alternatives A and B would result in the least benefit to the pine-oak forest and woodlands and the dry-mesic oak forest. Alternative D would result in the greatest benefit to the pine-oak forest, but lower benefits for the pine-oak woodland and dry-mesic oak forest. Alternative C would result in a lower emphasis on the pine-dominated systems, but a slightly greater improvement within the dry-mesic oak forest. Alternative E would result in the best health prescription for the pine-dominated systems and considerable improvement of the dry-mesic oak forest.

Rare Upland Communities

Together, the relatively rare upland communities described in this section comprise approximately 3.3 percent of the total Forest area. These systems are generally small, isolated, and/or disjunct and are generally "embedded" in a larger landscape matrix. These communities are maintained primarily through naturally occurring circumstances such as elevation, soil moisture conditions, and soil productivity. Historically, wildfire was a major influence in all but the mesic hardwood forest; decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes have altered all of the other rare upland communities.

Ouachita Mesic Hardwood Forest

This system is found on toeslopes and in valley bottoms, as well as on north-facing and other protected slopes and ravines. Here, American beech may be the dominant tree species with codominants of red oak, sweetgum, American basswood, cucumbertree, or other mesic tree species. In some situations, sugar maple is dominant. Table 3.41 lists the key factors for Ouachita mesic hardwood forest current condition.

Table 3.41 Ouachita Mesic Hardwood Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	98	Very Good
Fire Frequency	Percent burned every 25-35 years	<25	25-50	51-75	>75	0.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	57.3	Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	0.8	Good
Composite SVE Score is 2.50—Fair							

Overall SVE condition score for the mesic hardwood forests is 2.50 (Fair). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the mesic hardwood forest community is burned every 25-35 years, with an occasional growing season burn included. The most recent fire history indicates that only 0.3 percent of this system is burned every 25-35 years, but 57.3 percent of the burned area received a growing season burn.

The grass/forb/shrub, immature and/or mature structure of the species-rich Ouachita mesic hardwood forests provides obligate habitat for one species, optimal habitat for 22 species, suitable habitat for 12 species, and marginal habitat for four species considered in the SVE; one of the “suitable” species is also an MIS. In addition to species considered in the SVE, two MIS find optimal habitat in this system (for at least part of their needs), and two MIS find suitable habitat here. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled “SVE/MIS”):

Species	Importance of Ouachita Mesic Hardwood Forest
Ouachita Slitmouth Snail *(Stenotrema unciferum)*	Obligate
Mole Salamander *(Ambystoma talpoideum)* Ringed Salamander *(Ambystoma annulatum)* Four-toed Salamander *(Hemidactylium scutatum)* Southern Redback Salamander *(Plethodon serratus)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* Rich Mountain Salamander *(Plethodon ouachitae)* Kiamichi Mountain Salamander *(Plethodon kiamichi)* Fourche Mountain Salamander *(Plethodon fourchensis)* Caddo Mountain Salamander *(Plethodon caddoensis)* Hooded Warbler *(Wilsonia citrina)* White-eyed Vireo *(Vireo griseus)* Whip-poor-will *(Caprimulgus vociferus)* Scarlet Tanager *(Piranga olivacea)* MIS Kentucky Warbler *(Oporornis formosus)* Wood Thrush *(Hylocichla mustelina)* Worm-eating Warbler *(Helmitheros vermivorus)* Acadian Flycatcher *(Empidonax virescens)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Cerulean Warbler *(Dendroica cerulea)* American Burying Beetle *(Nicrophorus americanus)* Moore's Larkspur *(Delphinium newtonianum)* Ozark Least Trillium *(Trillium pusillum var ozarkanum)* Ozark Spiderwort *(Tradescantia ozarkana)* A Goldenrod *(Solidago ouachitensis)*	Optimal
Yellow-throated Vireo *(Vireo flavifrons)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS Swainson's Warbler *(Limnothlypis swainsonii)* Prairie Warbler *(Dendroica discolor)* SVE/MIS Chimney Swift *(Chaetura pelagica)* Chuck-will's-widow *(Caprimulgus carolinensis)* Diana Fritillary *(Speyeria diana)* Indiana Bat *(Myotis sodalis)* Eastern Small-Footed Bat *(Myotis leibii)* White-tailed Deer *(Odocoileus virginianus)* MIS Butternut *(Juglans cinerea)* Browne's Waterleaf *(Hydrophyllum brownei)* Ouachita Bluet *(Houstonia ouachitana)* Ozark Chinquapin *(Castanea pumila var ozarkensis)* Waterfall's Sedge *(Carex latebracteata)*	Suitable
Plains Spotted Skunk *(Spilogale putorius interrupta)* Rayless Crown-Beard *(Verbesina walteri)* A Corn-Salad *(Valerianella palmeri)* Ouachita Leadplant *(Amorpha ouachitensis)*	Marginal

Ouachita Dry Oak Woodland

This system occurs in the Ozark and Ouachita Highlands and far western portions of the Interior Low Plateau regions along gentle to steep slopes and over bluff escarpments with southerly to westerly aspects. Parent material can range from calcareous to acidic. Soils are very shallow and mostly well-drained to excessively well-drained; some soils have a fragipan that causes wide fluctuations in moisture conditions. This system was historically woodland in structure, composition, and process but now includes areas of more closed canopy forests due to fire suppression. Oak species dominate this system with a herbaceous ground cover component. Drought stress and associated landscape fire are the major natural influences on this system. Table 3.42 lists the key factors for Ouachita dry oak woodland current condition.

Table 3.42 Ouachita Dry Oak Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Score and Rating
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	22.9	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<20	20-40	41-70	>70	65.6	Good
Remoteness	Road density in miles/mile²	>2	1-2	0.5-1	<0.5	2.02	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >14	2-4 or 10-14	7-10	4-6	1.8 (85 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Woodland)	<10 or >45	10-15 or 35-45	15-20 or 30-35	20-30	76.3 (3,630 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Woodland)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	22 (1,045 acres)	Poor
Percent herbaceous ground coverage	Percent of dry oak woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	23.8 (503 acres)	Poor
Composite SVE Score is 1.17 - Poor							

Overall SVE condition score for Ouachita Dry Oak Woodland is 1.17 (“Poor”). The defining characteristic of this subsystem is that the canopy closure should be less than 70 percent; it is currently near 90 percent. Based on the SVE, the vertical structure needed to support good/very good conditions is 4-10 percent in grass/forb seral stage and 60-90 percent in the mature woodland condition. Current condition is 1.8 percent in grass/forb seral stage and 22 percent in the mature woodland condition. Recent oak decline has influenced the vertical structure of this system to a great extent.

Based on the SVE, the fire regime needed to support good/very good conditions is one in which at least 50 percent of the dry oak woodland community is burned every 5-7 years, with an occasional growing season burn included. The current fire history reflects that 22.9 percent of the dry oak woodlands system is burned every 5-7 years, and 65.6 percent of the burned area receives an occasional growing season burn. Figure 3.23 presents vertical structure and fire regime condition for the Ouachita dry oak woodland community.

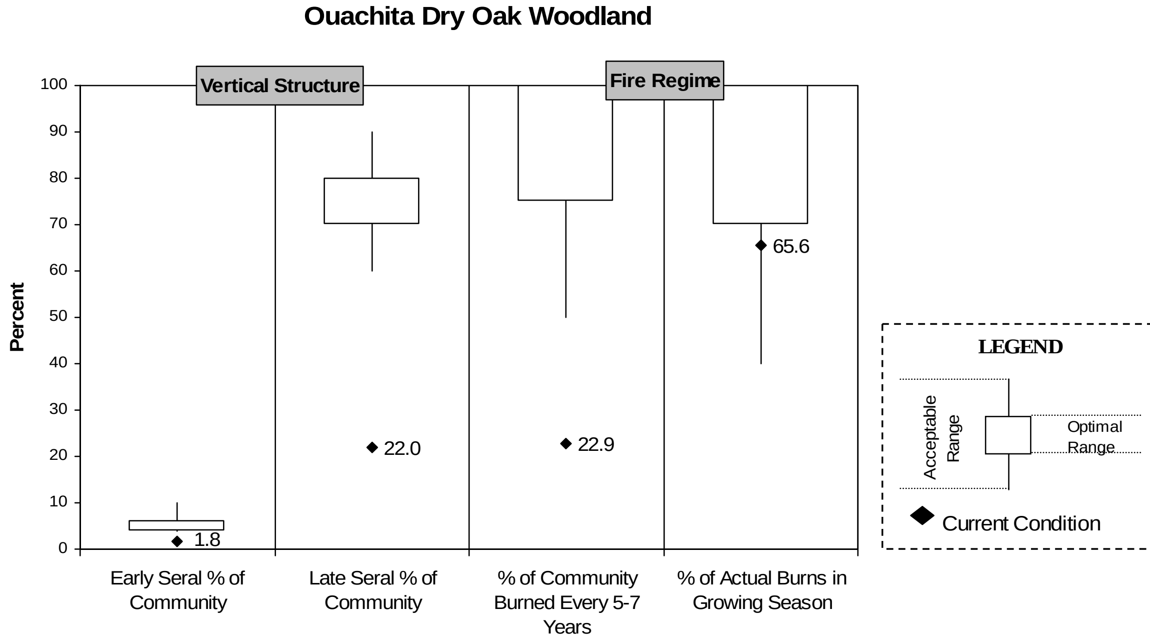

Figure 3.23 Vertical Structure and Fire Regime Condition, Ouachita Dry Oak Woodland

The grass/forb/shrub, immature and/or mature structure of Ouachita Dry Oak Woodland provides optimal habitat for five species, suitable habitat for 12 species, and marginal habitat for two species considered in the SVE. One "optimal" category species and one "suitable" category species are also MIS. Additional (non-SVE) management indicator species studied include three for which Ouachita Dry Oak Woodland is optimal habitat and one for which it is suitable habitat. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Ouachita Dry Oak Woodland
Prairie Warbler *(Dendroica discolor)* SVE/MIS Eastern Wild Turkey *(Meleagris gallopavo)* MIS Scarlet Tanager *(Piranga olivacea)* MIS Bewick's Wren *(Thryomanes bewickii)* American Burying Beetle *(Nicrophorus americanus)* Indiana Bat *(Myotis sodalis)* White-tailed Deer *(Odocoileus virginianus)* MIS Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)*	Optimal
Bachman's Sparrow *(Aimophila aestivalis)* Chuck-will's-widow *(Caprimulgus carolinensis)* Whip-poor-will *(Caprimulgus vociferus)* Northern Bobwhite *(Colinus virginianus)* SVE/MIS Pileated Woodpecker *(Dryocopus pileatus)* MIS American Kestrel *(Falco sparverius)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Eastern Small-Footed Bat *(Myotis leibii)* Plains Spotted Skunk *(Spilogale putorius interrupta)* Bush's Poppymallow *(Callirhoe bushii)* Ozark Chinquapin *(Castanea pumila var ozarkensis)* Timber Rattlesnake *(Crotalus horridus)* Great Plains Skink *(Eumeces obsoletus)*	Suitable
Ozark Least Trillium *(Trillium pusillum var ozarkanum)* Western Diamondback Rattlesnake *(Crotalus atrox)*	Marginal

Ouachita Montane Oak Forest

This system represents oak-dominated forests of the highest elevations in the Ouachita Mountains. Canopy trees are often stunted due to the effects of ice, wind and cold conditions, in combination with shallow, rocky soils, fog, occasional fire, and periodic severe drought. Some stands form almost impenetrable thickets ("elfin forests"). The current vertical structure condition is a self-maintaining scrubby or stunted, oak-dominated system maintained by naturally occurring processes and, when needed, prescribed fire. Table 3.43 lists the key factors for Ouachita montane oak forest current condition.

Table 3.43 Ouachita Montane Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 10 years	<25	25-50	51-75	>75	1.67	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	67.7	Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	0.75	Good
Composite SVE Score is 2.0 - Fair							

Overall SVE condition score for Ouachita Montane Oak Forest is 2.0 ("Fair"). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the montane oak forest community is burned every 10 years, with an occasional growing season burn included. The current fire history reflects that less than 2 percent of the montane oak forest community is burned every 10 years, and 67.7 percent of the burned area receives an occasional growing season burn.

Montane oak forests provide suitable habitat for two species considered in the SVE and two MIS; they provide optimal habitat (at least for some needs) for two MIS. MIS are labeled as such in the following tabulation:

Species	Importance of Ouachita Montane Oak Forest
Scarlet Tanager *(Piranga olivacea)* MIS White-tailed Deer *(Odocoileus virginianus)* MIS	Optimal
Pileated Woodpecker *(Dryocopus pileatus)* MIS Eastern Wild Turkey *(Meleagris gallopavo)* MIS Western Diamondback Rattlesnake *(Crotalus atrox)* Timber Rattlesnake *(Crotalus horridus)*	Suitable

Ouachita Novaculite Glade and Woodland

This system represents a mosaic of glades and woodlands found on novaculite substrates in the central Ouachita Mountains of western Arkansas. Novaculite is a weakly metamorphosed rock of sedimentary origin that is primarily composed of microcrystalline quartz and chalcedony. This system generally occupies ridgetops at 1,400 to 2,100 feet elevation in a mosaic of small woodlands along ridges and upper slopes, with rock outcrops and patches of talus scattered throughout. Some glade/woodland patches may appear as nearly linear strips interspersed with grassy openings. Wooded patches have a variable, often patchy structure, with some areas of dense canopy interspersed with more open canopies and open grassy areas. In general, the grassy openings occur on shallow soils with exposed bedrock, while the woodlands occur on somewhat deeper soils. In all cases, these are extremely limiting growing conditions. The structure of this system is controlled by a combination of periodic fire and severe drought. Based on the SVE, naturally limiting factors and prescribed fire are necessary to maintain the open glade/woodland vertical structure in good/very good conditions. Table 3.44 lists the key factors for Ouachita novaculite glade and woodland current condition.

Table 3.44 Ouachita Novaculite Glade and Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	0.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	82.8	Very Good
Remoteness	Road density in miles/mile²	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 2.5 - Fair							

Overall SVE condition score for Ouachita Novaculite Glade and Woodland is 2.5 (“Fair”). The most recent fire history revealed that only 0.3 percent of the community has been burned every 3-5 years, which indicates that the community is actually in “poor” overall condition. Of the burned area, 82.8 percent did receive the occasional growing season burn. Figure 3.24 presents fire regime condition for the Ouachita novaculite glade and woodland community.

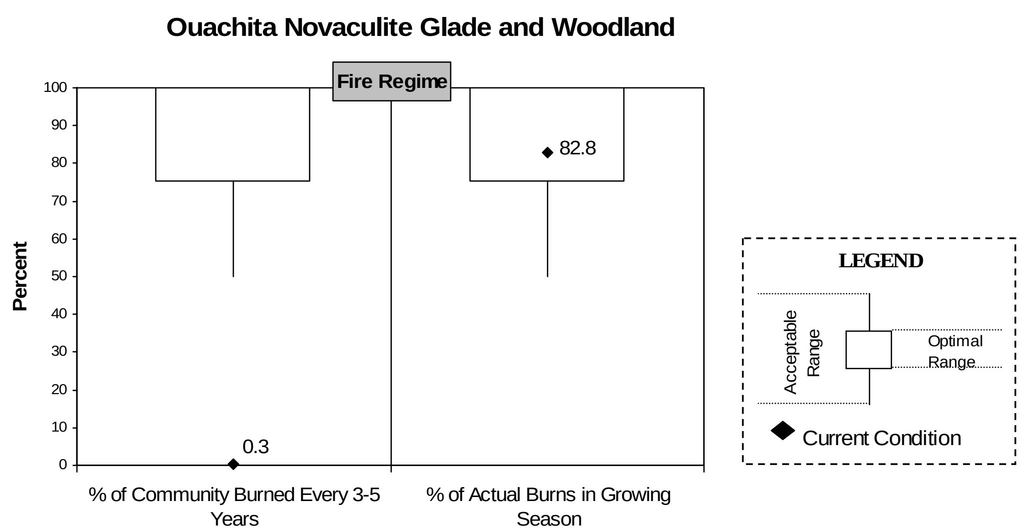

Figure 3.24 Vertical Structure and Fire Regime Condition, Ouachita Novaculite Glade and Woodland

Ouachita Novaculite Glade and Woodland provide obligate habitat for one species, optimal habitat for two species, and suitable habitat for three species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. MIS are labeled in the following tabulation:

Species	Importance of Ouachita Novaculite Glade
Heartleaf Leafcup *(Polymnia cossatotensis)*	Obligate
Waterfall's Sedge *(Carex latebracteata)* A Twistflower *(Streptanthus squamiformis)*	Optimal
Eastern Wild Turkey *(Meleagris gallopavo)* MIS Diana Fritillary *(Speyeria diana)* White-tailed Deer *(Odocoileus virginianus)* MIS Western Diamondback Rattlesnake *(Crotalus atrox)* Timber Rattlesnake *(Crotalus horridus)*	Suitable

Central Interior Highlands Dry Acidic Glades and Barrens

This system is found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, occurring along moderate to steep slopes or valley walls of rivers along most aspects. Parent material includes chert, igneous and/or sandstone bedrock with well-drained to excessively well-drained, shallow soils interspersed with rock and boulders. These soils are typically dry during the summer and autumn, but are often saturated during the spring and winter. Grasses dominate this system, with stunted oak species and shrub species occurring on variable depth soils. This system is influenced by drought and infrequent to occasional fires. Based on the SVE, prescribed fire is needed to support the open glade vertical structure in good/very good conditions. Table 3.45 lists the key factors for the Central Interior Highlands dry acidic glades and barrens current condition.

Table 3.45 Central Interior Highlands Dry Acidic Glades and Barrens Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 5-10 years	<25	25-50	51-75	>75	23.8	Poor
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<30 or >90	30-50 or 86-90	51-70 or 81-85	71-80	57.3	Good
Remoteness	Road density in miles/mile²	>2	1-2	0.5-1	<0.5	2.51	Poor
Composite SVE Score is 1.33 - Poor							

Overall SVE condition score for Central Interior Highlands Dry Acidic Glades and Barrens is 1.33 (“Poor”). The fire regime needed to support good/very good conditions is one in which 50-85 percent of the dry acidic glades and barrens system and a 100-meter buffer are burned every 5-10 years, with an occasional growing season burn included. The most recent fire history indicates that only 23.8 percent of this system is burned every 5-10 years, and 57.3 percent of the burned areas receive an occasional growing season burn. This system is frequently embedded within large-area prescribed burns. Figure 3.25 presents fire regime condition for the central interior highlands dry acidic glades and barrens.

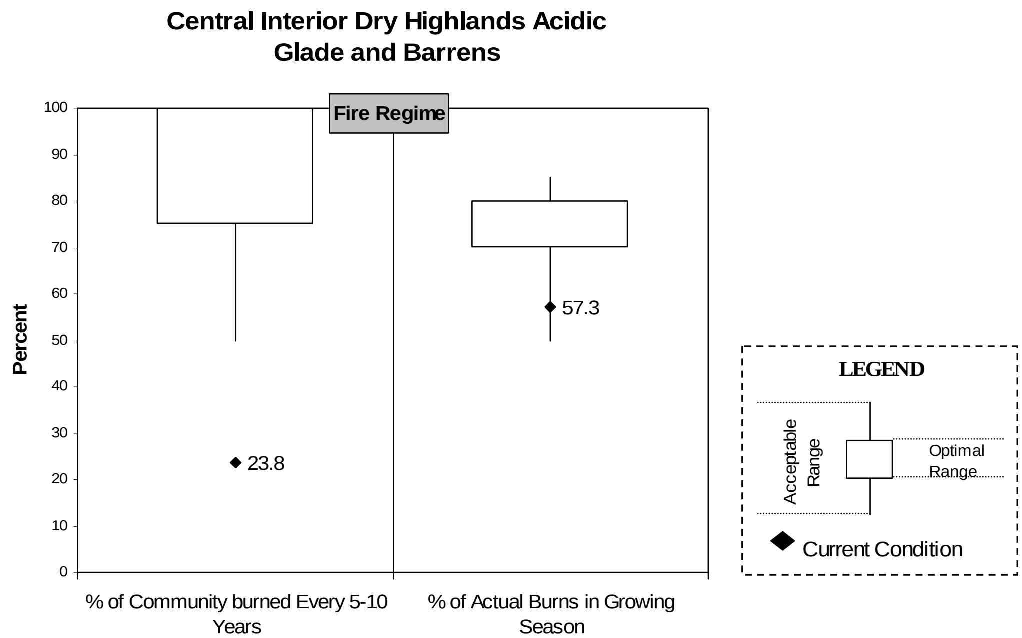

Figure 3.25 Fire Regime Condition, Central Interior Highlands Dry Acidic Glades and Barrens

Central interior highlands dry acidic glades and barrens provide obligate habitat for four species, optimal habitat for two species, and suitable habitat for nine species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. The MIS are labeled as such in the following tabulation:

Species	Importance of Central Interior Highlands Dry Acidic Glades and Barrens
Open-ground Whitlow-grass *(Draba aprica)* Wolf Spikerush *(Eleocharis wolfii)* Small-headed Pipewort *(Eriocaulon kornickianum)* Nuttall's Corn-Salad *(Valerianella nuttallii)*	Obligate
A Corn-Salad *(Valerianella palmeri)* Collared Lizard *(Crotaphytus collaris)*	Optimal
Eastern Wild Turkey *(Meleagris gallopavo)* MIS White-eyed Vireo *(Vireo griseus)* Diana Fritillary *(Speyeria diana)* White-tailed Deer *(Odocoileus virginianus)* MIS Waterfall's Sedge *(Carex latebracteata)* Shinners' Sunflower *(Helianthus occidentalis* ssp *plantagineus)* Maple-leaved Oak *(Quercus acerifolia)* Western Diamondback Rattlesnake *(Crotalus atrox)* Great Plains Skink *(Eumeces obsoletus)*	Suitable

Central Interior Highlands Acidic Cliff and Talus

This system is found primarily in the Interior (Ozark-Ouachita) Highlands and Interior Low Plateau ecoregions. Sandstone outcrops and talus ranging from moist to dry typify this system, which is usually sparsely vegetated; however, on moister sites with more soil development, several fern species and sedges may become established. Wind, fire, and water erosion are the major forces influencing this system. Based on the SVE, an open, fire-maintained, herbaceous-dominated system with sparse woody vegetation is needed to support good/very good vertical structure conditions. Table 3.46 lists the key factors for Central Interior Highlands acidic cliff and talus current condition.

Table 3.46 Central Interior Highlands Acidic Cliff and Talus Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	3.6	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<30 or >90	30-50 or 86-90	51-70 or 81-85	71-80	52.7	Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	0.91	Good
Composite SVE Score is 2.00 - Fair							

The overall SVE condition score for Central Interior Highlands Acidic Cliffs and Talus is 2.00 ("Fair"). The fire regime needed to support good/very good conditions is one in which 50-85 percent of the acidic cliff and talus system and a 100-meter buffer are burned every 5-7 years, with an occasional late growing season burn included. The most recent fire history indicates that only 3.6 percent of this system is burned every 5-7 years, and 52.7 percent of the prescribed burned area receives an occasional growing season burn. This system is frequently embedded within large area prescribed burns.

Central Interior Highlands Acidic Cliff and Talus provide obligate habitat for one species and suitable habitat for four species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. MIS are labeled as such in the following tabulation:

Species	Importance of Central Interior Acidic Cliff and Talus
Rich Mountain Slitmouth Snail *(Stenotrema pilsbryi)*	Obligate
Eastern Wild Turkey *(Meleagris gallopavo)* MIS White-eyed Vireo *(Vireo griseus)* Diana Fritillary *(Speyeria diana)* White-tailed Deer *(Odocoileus virginianus)* MIS	Suitable

Calcareous Prairie

This system includes natural grassland vegetation and associated woody vegetation in a relatively small natural region of the Upper West Gulf Coastal Plain of Oklahoma. Although other calcareous prairies are found west of the Mississippi River, this system represents some of the largest known and highest quality remaining examples. Plant communities in this system occur over relatively deep soils with circumneutral surface soil pH, which is unusual given the predominance of acidic, generally forested soils in the region. In most cases, individual prairie openings are small and isolated today but were probably more extensive prior to European settlement, forming a mosaic of grassland and woodlands influenced by frequent fire. The flora has much in common with other Mississippi Embayment prairie systems as well as the classic midwestern prairies. Based on the SVE, an open, fire-maintained grassland system with sparse to absent woody vegetation is needed to support good/very good vertical structure conditions. Table 3.47 lists the key factors for calcareous prairie current condition.

Table 3.47 Calcareous Prairie Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	55	Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	60	Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 3.33 - Good							

Overall SVE condition score for Calcareous Prairie is 3.33 (“Good”). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the calcareous prairie system and a 100-meter buffer are burned every 3-5 years, with an occasional growing season burn included. The most recent fire history reports that at least 55 percent of this system has been treated with prescribed fire twice in the last 10 years, and 60 percent of the burns were in the growing season.

Calcareous prairie provides obligate habitat for two species, optimal habitat for four species, and suitable habitat for three species considered in the SVE; of these, one of the “optimal” species is also an MIS. Two additional MIS find suitable (albeit, relatively minor) habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled “SVE/MIS.” Figures 3.27 and 3.28 present viability scores for rare upland communities by alternative at the 10th year and 50th year, respectively.

Species	Importance of Calcareous Prairie
Golden Glade Cress *(Leavenworthia aurea)* Arkansas Meadow-Rue *(Thalictrum arkansanum)*	Obligate
Prairie Warbler *(Dendroica discolor)* SVE/MIS American Kestrel *(Falco sparverius)* Painted Bunting *(Passerina ciris)* Threadleaf Bladderpod *(Lesquerella angustifolia)*	Optimal
Bachman's Sparrow *(Aimophila aestivalis)* Northern Bobwhite *(Colinus virginianus)* SVE/MIS White-tailed Deer *(Odocoileus virginianus)* MIS	Suitable

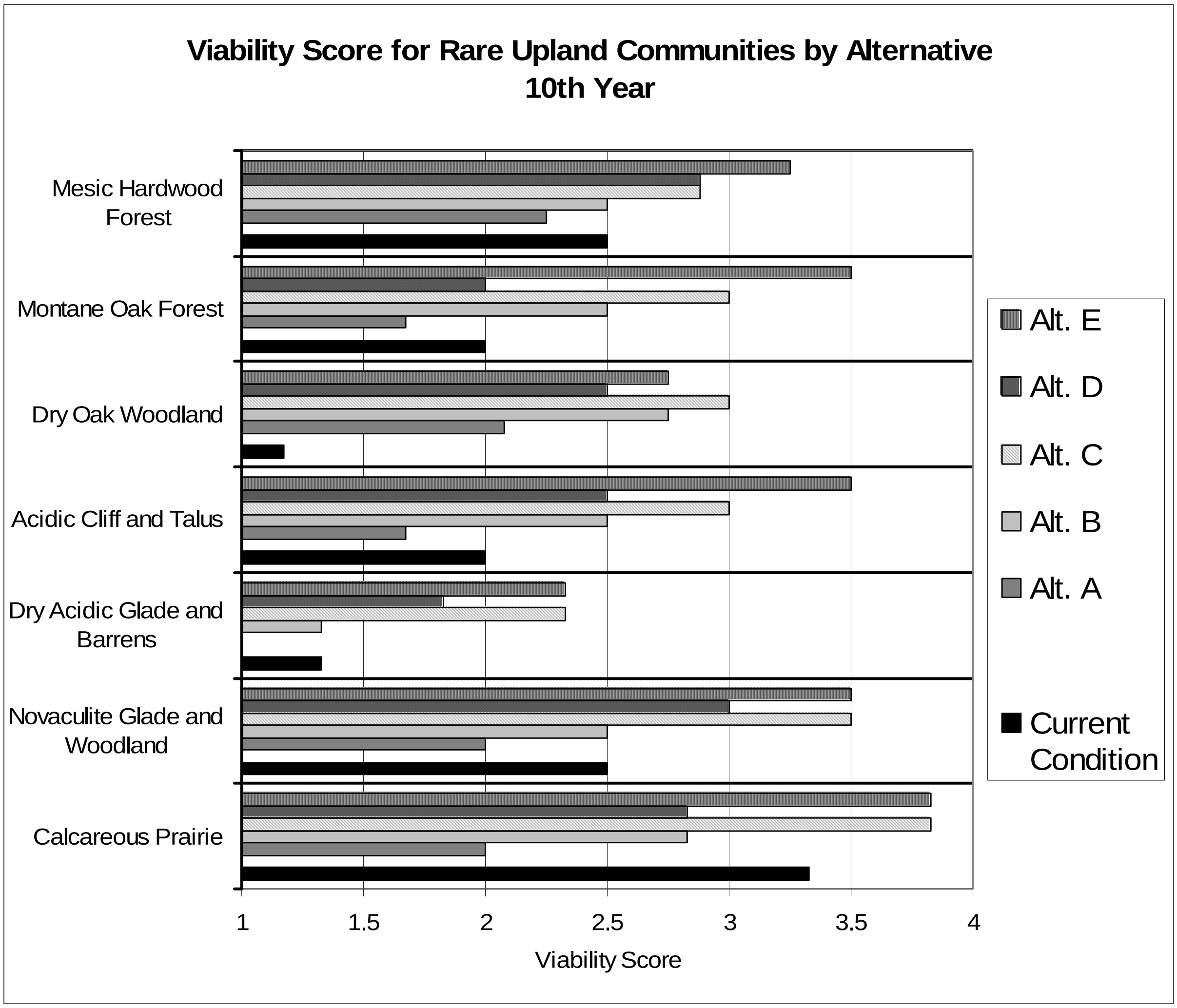

Figure 3.27 Viability Score for Rare Upland Communities by Alternative, 10th Year

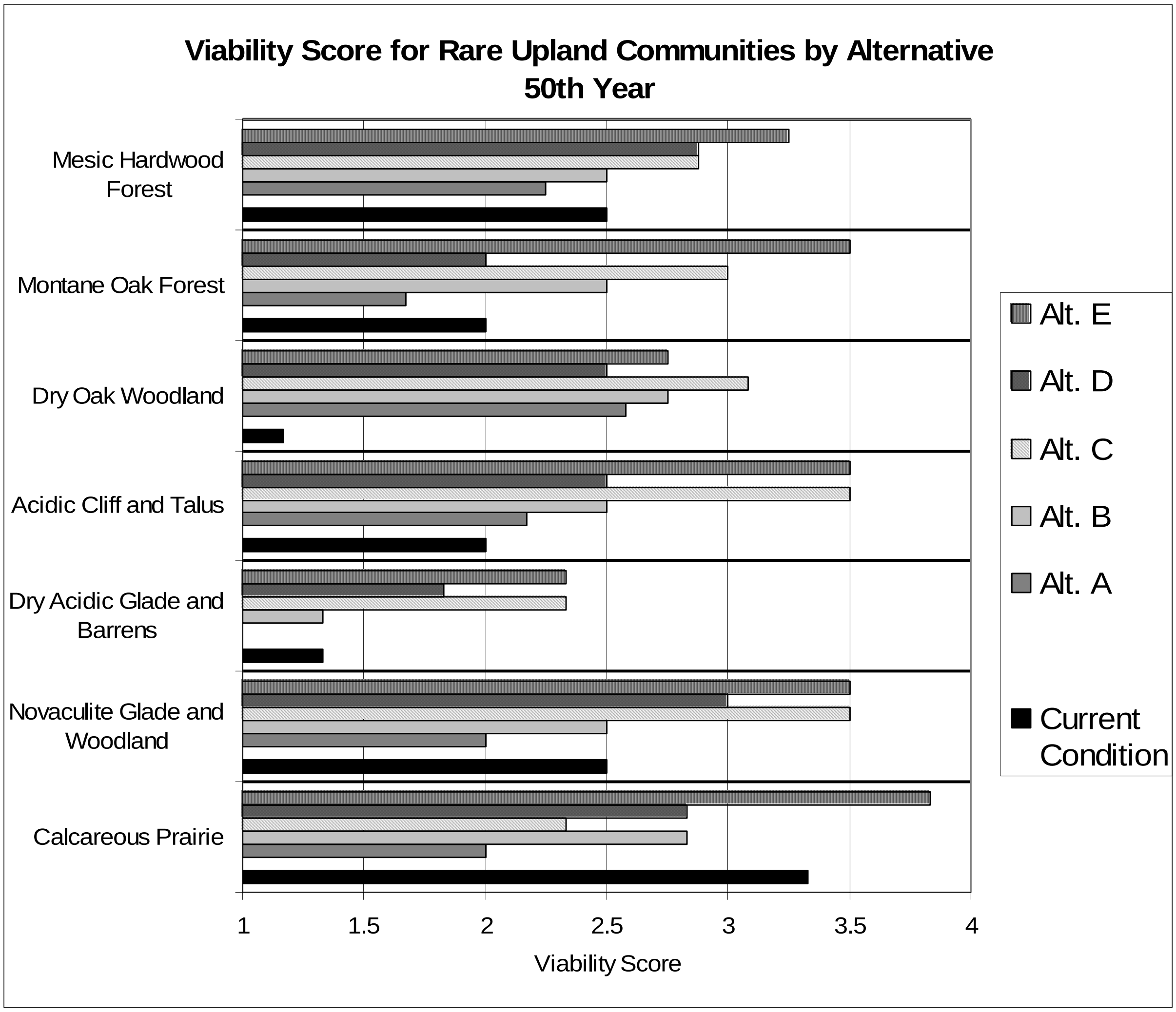

Figure 3.28 Viability Score for Rare Upland Communities by Alternative, 50th Year

Direct and Indirect Effects

As a result of past fire suppression efforts, most rare upland communities have some level of need for restoration of an appropriate fire regime. Some mortality of individual associated plants and animals could occur as a result of restoration, as well as maintenance activities. The benefits to those species by restoring the habitat will far outweigh those few casualties. Short-term negative effects to individual plants and animals are expected to be minimal compared to the long-term positive effects of habitat restoration.

As the Ouachita Mountains encompass a large part of the uplands, and these communities are dispersed and embedded within the uplands, appropriate management of these rare upland communities across the landscape is critical to the sustainability of these habitats.

Alternative A would result in the least benefit to all of the rare upland communities, with the exception of Alternative D, which is least beneficial to the dry oak woodland community. Alternative C would result in the greatest benefit to the dry oak woodland but lower benefits for the calcareous prairie. Alternative E would result in the greatest benefit to the most communities.

Cumulative Effects

Cumulative effects on the areas and distribution of these generally small, embedded habitats are predicted by considering opportunities to inventory and restore these communities across all alternatives. Management to restore, maintain, and protect these communities is limited by inadequate inventories regarding their occurrence and distribution on the landscape, but the action alternatives include provisions to improve these inventories. These communities are classified as unsuitable for timber production and are managed to restore or maintain ecosystem health.

Riparian and Aquatic-Associated Terrestrial Communities

Riparian and aquatic-associated terrestrial ecosystems comprise approximately 14 percent of the Forest, and are managed within designated Streamside Management Areas (SMAs) to protect and maintain water quality, productivity, channel stability, and habitat for riparian-dependent species. The desired condition is that watercourses are in proper functioning condition and support healthy populations of native species. Due to the similarity in the characteristics and the conservation management of these communities, they are grouped together for the analysis of potential management effects. Brief descriptions and desired conditions for individual riparian and aquatic associated terrestrial ecosystems are provided in the following paragraphs.

Ouachita Mountain Forested Seeps

Forested seeps occur throughout the Ouachita Mountains of Arkansas and Oklahoma, along the lower slopes of smaller valleys where rock fractures allow water to seep out of the mountainsides and into the riparian zones of larger creeks, sometimes extending upslope along small ephemeral drainages. The soil remains saturated to moist throughout the year. The vegetation typically is in a forested condition but is highly variable in canopy composition. Red maple, black tupelo, sweetgum, and white oak are common and typical; American beech and/or umbrella magnolia may also be present. Canopy coverage may be moderately dense to quite open. The subcanopy is often well-developed and characteristically includes American holly, umbrella magnolia, and ironwood. Table 3.48 lists the key factors for Ouachita forested seeps current condition.

Table 3.48 Ouachita Forested Seeps Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Remoteness	Road Density in miles/mile^2	>2	1-2	0.5-1	<0.5	4.05	Poor
No-Activity Protection Zone	Areal Extent of Buffer in Feet from seep perimeter	<50	51-99	100	100	100	Very Good
Composite SVE Score is 2.5—Fair							

Overall SVE condition score for forested seeps is 2.50 (Fair). These systems are small, isolated, and/or disjunct and are "embedded" in a larger habitat matrix. The conditions needed to support good/very good conditions in this system are a largely unroaded, undisturbed, mature forested system with a protective buffer of at least 100 feet beyond the seep boundaries. Current road density within this system is particularly high, and may be partially attributable to the ponding effect that frequently results from road construction.

Canopy closure and vertical structure are primarily naturally occurring, mature forest conditions, with wind storms and/or occasional pest infestations creating small patch openings that allow for a sparse early seral stage component. The fire regime needed to support good/very good conditions is one in which fire is allowed to burn into forested seeps, but no concentrated effort to force them to burn is used.

Forested seeps provide obligate habitat for two species, optimal habitat for five species, and suitable habitat for five species considered in the SVE as shown in the following tabulation:

Species	Importance of Forested Seeps
Four-toed Salamander *(Hemidactylium scutatum)* Large-leaved Grass-of-Parnassus *(Parnassia grandifolia)*	Obligate
Ouachita Dusky Salamander *(Desmognathus brimeylorum)* Rich Mountain Salamander *(Plethodon ouachitae)* An Isopod *(Lirceus bicuspidatus)* Southern Lady's-Slipper *(Cypripedium kentuckiense)* Dryopteris *(Dryopteris x australis)*	Optimal
Ringed Salamander *(Ambystoma annulatum)* Mole Salamander *(Ambystoma talpoideum)* Many-ribbed Salamander *(Eurycea multiplicata multiplicata)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* A Corn-Salad *(Valerianella palmeri)*	Suitable

Ouachita Riparian

This forested system is found along streams and small rivers within the Ouachita Mountains. In contrast to larger floodplains, this system has much less floodplain development and often contains cobble bars and steep banks. Ouachita riparian systems are typically of high gradient and experience periodic, strong flooding. This system is often characterized by cobble bars with directly adjacent forest. Canopy cover can vary, but typical trees include sweetgum, sycamore, river birch, maple species, and oak species. The richness of the herbaceous layer varies from species-rich to species-poor. Likewise, the shrub layer can vary considerably, and small seeps can often be found within this system, especially at the headwaters and terraces of streams. These areas are often dominated by wetland-obligate species of sedges, ferns, and other herbaceous species. Flooding and scouring strongly influence this system and prevent the floodplain development found on larger rivers. Table 3.49 lists the key factors for Ouachita riparian current condition.

Table 3.49 Ouachita Riparian Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Riparian Protection Buffer	Percent of Riparian Buffered	<100	<100	100	100	100	Very Good
Remoteness	Road Density in miles/mile²	>2	1-2	0.5-1	<0.5	2.57	Poor
Composite SVE Score is 2.67—Good							

The overall SVE condition score for Ouachita Riparian is 2.67 (“Good”). Ouachita riparian systems are linear along the streams and rivers, and embedded throughout the dominant forest type. The defining characteristic of this system is canopy closure greater than 80 percent. Canopy closure is currently very near 100 percent. Protective management buffers are very good, but road density is excessively high.

The condition needed to sustain this system is a largely unroaded, undisturbed, mature forested system with a protective buffer of minimal management on perennial streams, and streams with defined channels. Vertical structure is primarily naturally occurring mature forest condition with wind storms and/or occasional pest infestations creating small patch openings that allow for a sparse early seral stage component.

These systems rely heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the forested riparian areas, but no concentrated effort to force them to burn is apparent.

Ouachita riparian areas provide optimal habitat for 16 species, suitable habitat for 19 species, and marginal habitat for two species considered in the SVE. In addition, one MIS finds optimal habitat in Ouachita Riparian communities, and two MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of Ouachita Riparian
Kiamichi Mountain Salamander *(Plethodon kiamichi)* Rich Mountain Salamander *(Plethodon ouachitae)* Cerulean Warbler *(Dendroica cerulea)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Acadian Flycatcher *(Empidonax virescens)* Worm-eating Warbler *(Helmitheros vermivorus)* Wood Thrush *(Hylocichla mustelina)* Kentucky Warbler *(Oporornis formosus)* Yellow-throated Vireo *(Vireo flavifrons)* Hooded Warbler *(Wilsonia citrina)* Ouachita Leadplant *(Amorpha ouachitensis)* Southern Lady's-Slipper *(Cypripedium kentuckiense)* Moore's Larkspur *(Delphinium newtonianum)* Browne's Waterleaf *(Hydrophyllum brownei)* Ozark Spiderwort *(Tradescantia ozarkana)* Ozark Least Trillium *(Trillium pusillum var ozarkanum)* A Corn-Salad *(Valerianella palmeri)*	Optimal
Ringed Salamander *(Ambystoma annulatum)* Mole Salamander *(Ambystoma talpoideum)* Caddo Mountain Salamander *(Plethodon caddoensis)* Fourche Mountain Salamander *(Plethodon fourchensis)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* Southern Redback Salamander *(Plethodon serratus)* Strecker's Chorus Frog *(Pseudacris streckeri streckeri)* Chuck-will's-widow *(Caprimulgus carolinensis)* Chimney Swift *(Chaetura pelagica)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS Painted Bunting *(Passerina ciris)* Southeastern Myotis *(Myotis austroriparius)* Indiana Bat *(Myotis sodalis)* White-tailed Deer *(Odocoileus virginianus)* MIS Dryopteris *(Dryopteris x australis)* Ouachita Bluet *(Houstonia ouachitana)* Butternut *(Juglans cinerea)* Timber Rattlesnake *(Crotalus horridus)*	Suitable
Northern Crawfish Frog *(Rana areolata circulosa)* Waterfall's Sedge *(Carex latebracteata)*	Marginal

West Gulf Coastal Plain Small Stream and River Forest

This is a predominately forested system in the West Gulf Coastal Plain (WGCP) that is associated with small rivers and streams. In contrast to WGCP Large River Floodplain Forest, examples of this system have fewer major geomorphic floodplain features. Those features that are present tend to be smaller and more closely intermixed with one another, resulting in less obvious vegetational zonation. Bottomland hardwood species are typically important and diagnostic, although mesic hardwood species also occur in areas with less inundation, such as upper terraces. As a whole, flooding occurs annually, but the water table usually is well below the soil surface throughout most of the growing season. Areas are frequently to occasionally impacted by beaver impoundments. Table 3.50 lists the key factors for West Gulf Coastal Plain small stream and river forest current condition.

Table 3.50 West Gulf Coastal Plain Small Stream and River Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Remoteness	Road density in miles/mile^2	>2	1-2	0.5-1	<0.5	1.12	Fair
Composite SVE Score is 3.00—Good							

The overall SVE condition score for the WGCP small stream and river forests is 3.00 (Good). The WGCP small stream and river forest systems are linear along the streams and small rivers, and embedded throughout the bottomland hardwood forest type. The defining characteristic of this system is canopy closure greater than 80 percent. Canopy closure is currently very near 100 percent. The appropriate conditions needed to sustain this system are a largely mature, closed-canopy forest shaped by intact hydrologic functions and processes with a protective buffer of minimal management on perennial streams and rivers.

These systems rely heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the small stream and river forest, but no concentrated effort to force them to burn is apparent.

The WGCP small stream and river forest provides optimal habitat for 14 species and suitable habitat for four species considered in the SVE. In addition, one MIS finds optimal habitat in WGCP Small Stream and River Forest communities, and two MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of West Gulf Coastal Plain
Bird-voiced Tree Frog *(Hyla avivoca)* Chimney Swift *(Chaetura pelagica)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Acadian Flycatcher *(Empidonax virescens)* Bald Eagle *(Haliaeetus leucocephalus)* Wood Thrush *(Hylocichla mustelina)* Swainson's Warbler *(Limnothlypis swainsonii)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Kentucky Warbler *(Oporornis formosus)* Painted Bunting *(Passerina ciris)* Prothonotary Warbler *(Protonotaria citrea)* Yellow-throated Vireo *(Vireo flavifrons)* Hooded Warbler *(Wilsonia citrina)* Mississippi Green Water Snake *(Nerodia cyclopion cyclopion)*	Optimal

Species	Importance of West Gulf Coastal Plain
Chuck-will's-widow *(Caprimulgus carolinensis)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS White-tailed Deer *(Odocoileus virginianus)* MIS Timber Rattlesnake *(Crotalus horridus)*	Suitable

South-Central Interior Large Floodplain

This system occurs along large rivers where topography and alluvial processes have resulted in a well-developed floodplain. A single occurrence may extend from river's edge across the outermost extent of the floodplain or to where it meets a wet meadow or upland system. These systems generally contain well-drained levees, terraces and stabilized bars, and some include herbaceous sloughs and shrub wetlands resulting, in part, from beaver activity. A variety of soil types may be found within the floodplain, from very well-drained sandy substrates to very dense clays. It is this variety of substrates in combination with different flooding regimes that creates the mix of vegetation. Most areas are inundated at some point each spring; microtopography determines how long the various habitats are inundated.

Although vegetation is quite variable in this broadly defined system, silver maple, sycamore, sweetgum, and oak species are common. Understory species are mixed, but include shrubs and sedges. This system likely floods at least once annually and can be altered by occasional severe floods. Impoundments and conversion to agriculture can also impact this system. Table 3.51 lists the key factors for South-Central interior large floodplain current condition.

Table 3.51 South-Central Interior Large Floodplain Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Remoteness	Road Density in miles/mile^2	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 4.00—Very Good							

The overall SVE condition score for the large floodplain habitat is 4.00 (Very Good). The defining characteristic of this interior large floodplain system is canopy closure greater than 80 percent. Canopy closure is currently very near 90 percent. The appropriate conditions needed to sustain this system are a largely mature, closed-canopy forest shaped by intact hydrologic functions and processes.

This system relies heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the interior large floodplain, but no concentrated effort to force them to burn is apparent.

The south-central interior large floodplain forest provides optimal habitat for 10 species and suitable habitat for six species considered in the SVE. In addition, one MIS finds optimal habitat in South-Central Interior Large Floodplain, and three MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of South Central Interior Large Floodplain
Chimney Swift *(Chaetura pelagica)* Cerulean Warbler *(Dendroica cerulea)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Acadian Flycatcher *(Empidonax virescens)* Bald Eagle *(Haliaeetus leucocephalus)* Wood Thrush *(Hylocichla mustelina)* Swainson's Warbler *(Limnothlypis swainsonii)* Painted Bunting *(Passerina ciris)* Prothonotary Warbler *(Protonotaria citrea)* Yellow-throated Vireo *(Vireo flavifrons)* Hooded Warbler *(Wilsonia citrina)*	Optimal
Chuck-will's-widow *(Caprimulgus carolinensis)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Eastern Wild Turkey *(Meleagris gallopavo)* MIS Scarlet Tanager *(Piranga olivacea)* MIS Southeastern Myotis *(Myotis austroriparius)* White-tailed Deer *(Odocoileus virginianus)* MIS	Suitable

West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough Wildlife Management Area-WMA)

This unique wetland resource known today as the Red Slough Wildlife Management Area (WMA) was formerly one of the largest wetland complexes found in Oklahoma. Most of this area was lost or drastically altered by conversion to agricultural lands over the course of the last century. Historically, bottomland hardwoods dominated the area, accounting for 75 percent of the Red Slough area. Scrub/shrub, aquatic emergent vegetation, and prairie habitats accounted for the remaining 25 percent.

The Red Slough WMA is currently a 5,974-acre wetland project designed to restore hydrology and reestablish bottomland hardwoods. It is cooperatively managed by the USDA Forest Service, USDA Natural Resources Conservation Service, and Oklahoma Department of Wildlife Conservation to maintain the annually flooded marsh condition, with some reestablishment of a bottomland-hardwood dominated forest shaped by restored hydrological functions and processes. The current primary objective for this area is to provide recreation opportunities, particularly watchable wildlife and waterfowl hunting, while maximizing native biodiversity potential.

The Red Slough WMA consists of approximately 3,700 acres of moist soil management units, 1,875 acres of bottomland hardwood reforestation fields, and 397 acres of reservoirs. Habitat types consist of mudflats, emergent marshes, shallow water impoundments, deep-water reservoirs, riparian zones, bottomland hardwoods, wet prairies, and scrub/shrub. Table 3.52 lists the key factors for West Gulf Coastal Plain wet hardwood flatwoods (Red Slough Area) current condition.

Table 3.52 West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough Area) Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 25-35 years	<25	25-50	51-75	>75	65	Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	55	Good
Remoteness	Road Density in miles/mile	>2	1-2	0.5-1	<0.5	0.69	Good
Composite SVE Score is 3.00—Good							

The overall SVE condition score for the WGCP wet hardwood flatwoods is 3.00 (“Good”). Forest-wide direction for desired road density (miles/square mile) within the Red Slough WMA is less than one mile per square mile. The current road density is approximately 0.7 miles per square mile. The fire regime should reflect that at least 50 percent of the Red Slough WMA is prescribed burned within every 25-35 years with an occasional growing season burn included. The most recent fire history indicates that this is occurring.

The Red Slough provides optimal habitat for nine species and suitable habitat for seven species considered in the SVE; of these, one species for which Red Slough provides optimal conditions is also an MIS. One additional MIS finds marginal habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled “SVE/MIS:”

Species	Importance of Red Slough WMA
Prairie Warbler *(Dendroica discolor)* SVE/MIS Acadian Flycatcher *(Empidonax virescens)* Wood Thrush *(Hylocichla mustelina)* Swainson's Warbler *(Limnothlypis swainsonii)* Kentucky Warbler *(Oporornis formosus)* Painted Bunting *(Passerina ciris)* Prothonotary Warbler *(Protonotaria citrea)* Yellow-throated Vireo *(Vireo flavifrons)* White-eyed Vireo *(Vireo griseus)*	Optimal
Chuck-will's-widow *(Caprimulgus carolinensis)* Chimney Swift *(Chaetura pelagica)* American Kestrel *(Falco sparverius)* Bald Eagle *(Haliaeetus leucocephalus)* Orchard Oriole *(Icterus spurius)* Hooded Warbler *(Wilsonia citrina)* Timber Rattlesnake *(Crotalus horridus)*	Suitable
Eastern Wild Turkey *(Meleagris gallopavo)* MIS	Marginal

Direct and Indirect Effects

The riparian and aquatic-associated communities comprise approximately 14 percent of the total Forest area, and due to the fairly similar application in all alternatives of the Streamside Management Area (SMA) protection designation, they are grouped together for the analysis of potential management effects. Under all alternatives, these communities are managed under SMA standards that define these riparian corridors (minimum of 100 feet on both sides of perennial streams and minimum of 30 feet on either side of other defined stream channels). These communities are classified as unsuitable for timber production and are managed for improved or maintained health.

The management goal for riparian vegetation systems is to maintain or enhance the structural and functional integrity of the riparian areas and those associated aquatic and upland systems. Riparian corridor characteristics important to the structural and functional integrity for terrestrial species include habitat connectivity (travel corridors); vegetation diversity (including age, species composition, canopy closure, and vertical structure), abundance of snags and woody debris, and a protection buffer width that is adequate to retain riparian habitat functions.

Riparian corridors or SMAs also function as protection and management towards water quality and important stream functions, as well as bridging the functional aspects with the upland communities. Therefore, they present an opportunity to manage riparian habitat as a comprehensive system in which streams or rivers and upland communities mutually influence each other. Figures 3.29 and 3.30 present viability scores for riparian communities by alternative at the 10th year and 50th year, respectively.

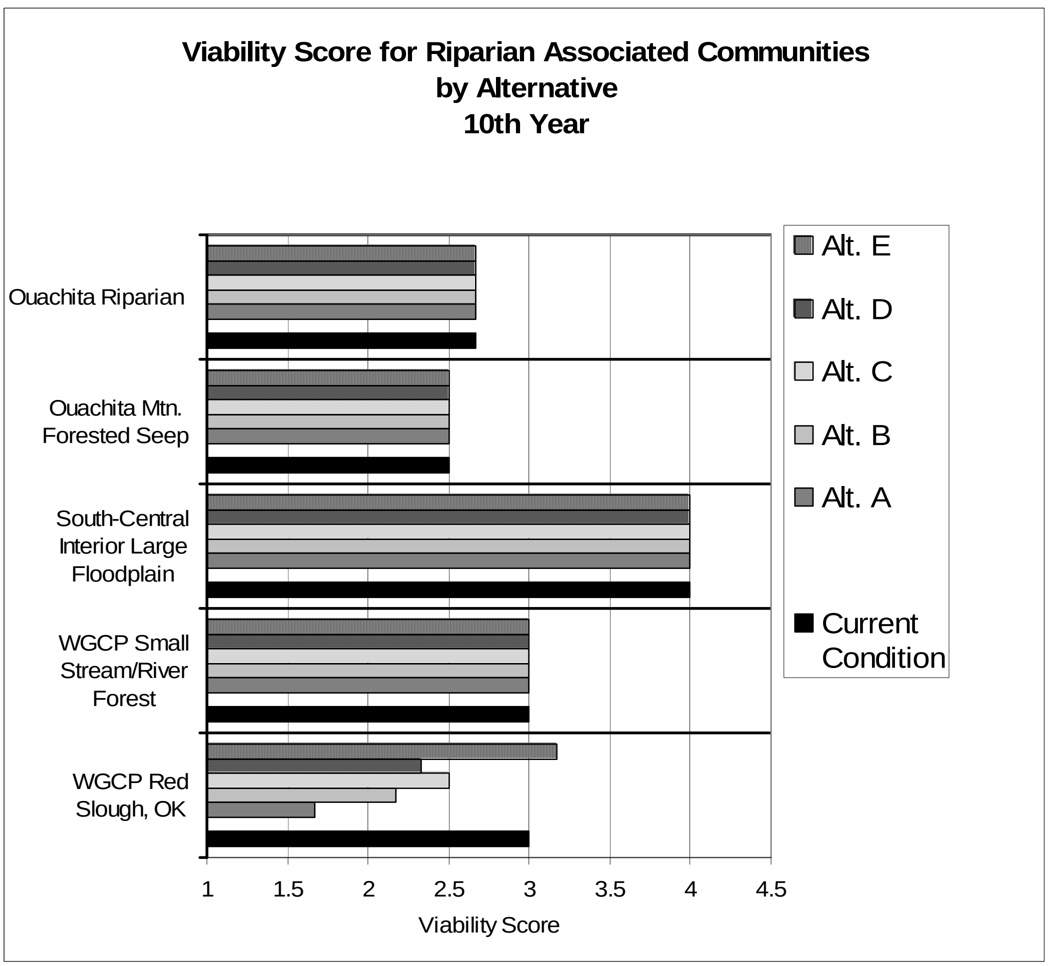

Figure 3.29 Viability Score for Riparian Associated Communities by Alternative, 10th Year

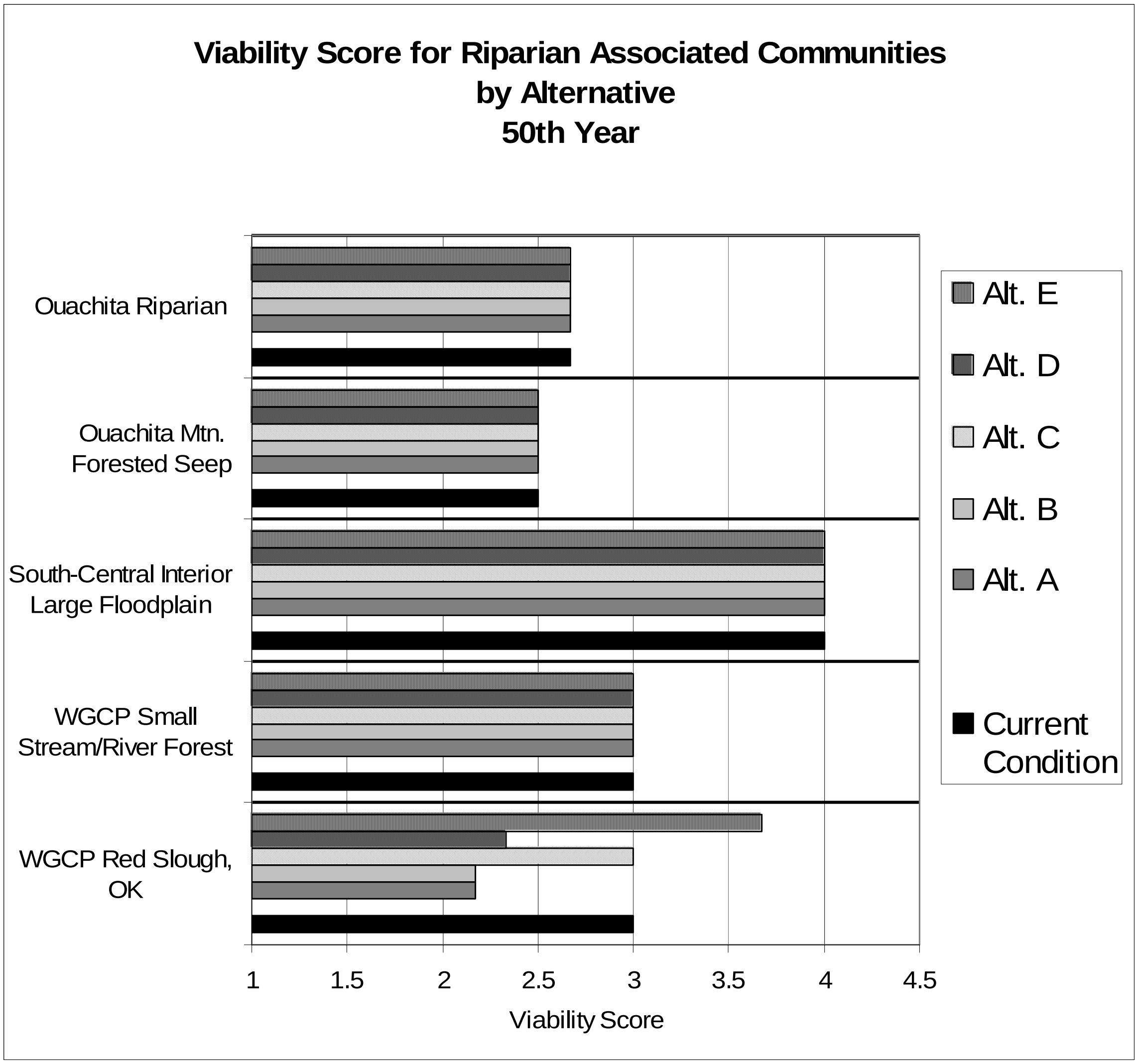

Figure 3.30 Viability Score for Riparian Associated Communities by Alternative, 50th Year

Activities not permitted in SMAs under any alternative would include mechanical site preparation or ripping; log loading areas; livestock feeding or distribution areas or convenience structures (salting and dusting facilities, corrals, etc.); or wheeled or crawler vehicles except at designated crossings or for wildfire suppression, stream habitat enhancement, and prescribed burning. Activities permitted in SMAs under all alternatives would include felling of individual trees for safety; prescribed fire; construction and maintenance of non-motorized trails; trails for OHVs; boat and fishing docks, launching ramps/areas and swimming beaches; road construction, reconstruction, and maintenance; and temporary roads and skid trails to designated crossings.

The following activities would not be permitted within SMAs under Alternatives A and B, but would be permitted under certain circumstances within Alternatives C, D, and E: felling of individual trees and brush removal to enhance visual quality; use of aquatic approved pesticides for treatment of invasive non-native and nuisance species; felling of individual trees or creating snags for habitat enhancement for riparian-dependent or PETS species (habitat enhancement for Red-cockaded Woodpeckers would still be permitted within SMAs under Alternatives A and B); control of Southern Pine and/or Ips Beetle infestations and cable skidding within primary buffers if necessary for infestation control; thinning in offsite loblolly pine plantations to reduce vulnerability to Southern

Pine and/or Ips Beetle and/or restore native vegetation; and thinning to reduce vulnerability to insect and diseases and/or restore native vegetation.

Cumulative Effects

Cumulatively, implementation of the current SMA standards under Alternatives A and B is expected to continue to increase the proportion of late successional forest towards old growth conditions within these riparian associated communities. The abundance of snags, den trees and downed wood would continue, providing important habitat for many riparian-dependent species. This management regime also results in abundant and well-distributed habitats characterized by closed canopy or shaded, low-disturbance, moist-soil micro-habitats that are preferred by a large number of riparian associated plant and animal species.

Cumulatively, implementation of the SMA standards under Alternatives C, D, and E would provide most all of the previously stated benefits of Alternatives A and B. Alternatives C and E may also provide an increase in sedimentation entering the waterways from construction of firelines, as well as disturbances from entering the SMAs for pest and non-native invasive species infestations. Access to the SMAs to treat for pests, diseases, and off-site and non-native invasive species should cumulatively contribute to the conservation of healthy and native SMA vegetation.

Special Terrestrial Habitats and Habitat Elements

Cave and Mine Habitat

This habitat element encompasses subterranean habitat types within the influence of National Forest management activities. Caves refer to naturally occurring underground cavities, chambers, or series of chambers, especially ones with an opening in the side of a hill or mountain. A crevice cave in Oklahoma is the only known cave within the Ouachita National Forest. Mines refer to man-made underground cavities, chambers, or series of chambers, especially ones with an opening in the side of a hill or mountain. All known caves and mines that are susceptible to wildlife use and/or habitat disturbances. They are gated for the protection and conservation of the habitat and associated species, as well as public safety. Cave and mine habitat provides obligate habitat for three species considered in the SVE as listed in the following tabulation:

Species	Importance of Caves/Mines
Southeastern Myotis *(Myotis austroriparius)* Eastern Small-Footed Bat *(Myotis leibii)* Indiana Bat *(Myotis sodalis)*	Obligate

Direct, Indirect, and Cumulative Effects

Under all alternatives, cave and mine habitat is gated for human safety with-bat friendly gates that allow passage for bat roosting habitat, as well as passage for other small animals that utilize this habitat. Cave and mine habitat would continue to be protected by maintaining gates to prevent species and habitat disturbance. The direct, indirect, and cumulative effects to cave and mine habitat under all alternatives would protect and maintain the integrity of the subterranean habitat.

Large Trees Near Water

Current direction provides for the conservation of SMAs as unsuitable for timber management. Large trees near water have therefore been retained within the riparian and floodplain areas forest-wide with the exception of removing hazard trees for safety.

Large trees near water provide obligate habitat for one species and optimal habitat for five species considered in the SVE, plus optimal habitat for one MIS, as listed in the following tabulation:

Species	Importance of Large Trees Near Water
Bald Eagle *(Haliaeetus leucocephalus)*	Obligate
Cerulean Warbler *(Dendroica cerulea)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Southeastern Myotis *(Myotis austroriparius)* Eastern Small-Footed Bat *(Myotis leibii)* Indiana Bat *(Myotis sodalis)*	Optimal

Direct, Indirect, and Cumulative Effects

Under all alternatives, large trees near water are maintained within Streamside Management Areas (SMAs) for the duration of their natural lifespan unless there is a safety risk, off-site loblolly is present, or a southern pine beetle or Ips beetle infestation occurs. The direct, indirect and cumulative effects to the “large trees near water” habitat under all alternatives would protect, maintain, and/or enhance the integrity of the primarily SMA structural habitat.

Snags, Cavity/Den Trees, Down Logs/Woody Debris

Snags, cavity (den) trees, and down woody debris on the forest floor are important natural, structural habitat components. The dependency of cavity-nesting wildlife species on an adequate and continuous supply of snags and cavity trees is well documented. Primary excavators (e.g., most woodpeckers) require snags of certain size and hardness to create nesting and roosting cavities. Secondary cavity-nesting species are in turn dependent on the cavities created by the primary excavators. Most cavity-nesting birds are insectivorous and play an important role in forest ecology and in the control of insect pests.

Cavity tree structure needs can usually be met in filter strips, key areas, wildlife inclusions, or in adjacent lands not suited for timber production. The objective is to provide for den trees and clumps of den trees well distributed over the Forest to ensure their availability for dependent cavity dwelling species.

Some 38 species of Arkansas and Oklahoma birds excavate nesting holes, use cavities resulting from decay, or use holes created by other species in dead or deteriorating trees. Fifty-eight species of amphibians, reptiles, and mammals are known to use snags or the resulting dead and down material. Snags also provide perches for birds of prey and foraging substrate for a wide variety of wildlife.

The 1990 Forest Plan provided for conservation of snag and den trees in that all snags and den trees were retained during timber harvesting, site preparation, and wildlife habitat improvements. In areas where less than two snags per acre of 16 inches diameter at breast height occurred and fire is unlikely to create more, snags should be developed by girdling trees of sufficient size and density.

Snag structure provides obligate habitat for five species and optimal habitat for two species considered in the SVE; snags also provide optimal habitat for one MIS, as shown in the following tabulation:

Species	**Importance of Snags**
American Kestrel *(Falco sparverius)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Prothonotary Warbler *(Protonotaria citrea)* Brown-headed Nuthatch *(Sitta pusilla)* Indiana Bat *(Myotis sodalis)*	Obligate
Pileated Woodpecker *(Dryocopus pileatus)* MIS Southeastern Myotis *(Myotis austroriparius)*	Optimal

Large and small diameter den trees provide obligate habitat for two and optimal habitat for four species considered in the SVE; this habitat element also provides optimal habitat for one MIS, as shown in the following tabulation:

Species	**Importance of Den Trees**
Chimney Swift *(Chaetura pelagica)* Prothonotary Warbler *(Protonotaria citrea)*	Obligate
Pileated Woodpecker *(Dryocopus pileatus)* MIS Red-headed Woodpecker *(Melanerpes erythrocephalus)* Southeastern Myotis *(Myotis austroriparius)* Indiana Bat *(Myotis sodalis)*	Optimal

Riparian associated communities and the rare upland communities (mesic hardwoods, in particular) provide down woody debris in areas close to water and in the water, as well as in the drier upland areas. At least 58 species of amphibians, reptiles, and mammals on the Forest are known to use snags or the resulting dead and down material as snags decay and fall to the forest floor. Many salamander species and the Ouachita slitmouth snail use logs and down woody debris for cover as well as forage. Several bird species as well as mammals such as skunks, mice, and black bear utilize this structure, particularly for foraging.

All alternatives provide for downed logs and woody debris, and require the following, “Where available, retain or develop 50 linear feet of pine logs (12 inch or greater diameter) and 50 linear feet of hardwood logs (12 inch diameter or greater) per acre as wood debris on the forest floor within harvest areas. Felled logs will be oriented along contours.”

Downed logs and woody debris on the forest floor provide optimal habitat for 17 species and suitable habitat for four species considered in the SVE; one MIS finds optimal foraging habitat in downed woody debris, as shown in the following tabulation:

Species	Importance of Down Woody Material
Kiamichi Mountain Salamander *(Plethodon kiamichi)* Rich Mountain Salamander *(Plethodon ouachitae)* Ringed Salamander *(Ambystoma annulatum)* Mole Salamander *(Ambystoma talpoideum)* Caddo Mountain Salamander *(Plethodon caddoensis)* Fourche Mountain Salamander *(Plethodon fourchensis)* Sequoyah Slimy Salamander *(Plethodon sequoyah)* Southern Redback Salamander *(Plethodon serratus)* Four-toed Salamander *(Hemidactylium scutatum)* Ouachita Dusky Salamander *(Desmognathus brimleyorum)* Many-ribbed Salamander *(Eurycea multiplicata multiplicata)* Rich Mountain Slitmouth Snail *(Stenotrema pilsbryi)* Ouachita Slitmouth Snail *(Stenotrema unciferum)* Red-headed Woodpecker *(Melanerpes erythrocephalus)* Pileated Woodpecker *(Dryocopus pileatus)* MIS Plains Spotted Skunk *(Spilogale putorius interrupta)* Timber Rattlesnake *(Crotalus horridus)*	Optimal
Bewick's Wren *(Thyromanes bewickii)* Southern Prairie Skink *(Eumeces septentrionalis obtusirostris)* Western Diamondback Rattlesnake *(Crotalus atrox)* Great Plains Skink *(Eumeces obsoletus)*	Suitable

Direct, Indirect, and Cumulative Effects

Under all alternatives, snags, cavity (den) trees, and down woody debris on the forest floor are created, protected, maintained, or enhanced, particularly within Streamside Management Areas (SMAs) and Rare Upland Communities for the duration of their natural lifespan unless there is a human safety or forest health (disease or pest) risk. The direct, indirect and cumulative effects to “snags, cavity (den) trees, and down woody debris on the forest floor” habitat under all alternatives would create, protect, maintain and/or enhance these important forest habitat components.

Mast Production

Although no mast-dependent species of viability concern were identified during the SVE, hard mast (acorns and hickory nuts) is an important habitat element for several wildlife species in demand for sport hunting, including white-tailed deer, eastern wild turkey, squirrel, and black bear. Mid to late-successional oak, hickory, and pine-hardwood forests provide an important source of hard mast on the Forest. The availability of acorns has been demonstrated to strongly influence population dynamics of demand species and non-game animals such as white-footed mice.

Annual hard mast production on the Forest is highly variable, with production levels varying as much as 33 percent within the same areas in consecutive years. Published studies have shown variability in acorn production from tree to tree, species to species, and year to year; they also show that abundant acorn crops are generally produced at intervals shorter than five years. Rarely is there a complete failure. Although small in quantity at times, some mast is usually produced every year. Many factors influence the size of an acorn crop and its availability for wildlife. Each tree has certain inherent capabilities for acorn production, and the extent to which these capabilities are realized is likely the result of environmental influences, such as competition, nutrient reserve, rainfall, and late frosts.

The importance of a variety of oak species within pine and hardwood stands cannot be overemphasized, because no single species of oak can be relied upon to produce acorns year after year. Diversity of oak species composition lends itself to greater consistency of production, which may be the most important factor relating to wildlife. Wildlife utilization of alternative food sources in years of poor mast crops is well documented. Although available literature concerning hickory nut production on the Ouachita suggests only poor to fair production levels, the hickory nut's contribution to overall abundance and diversity of available hard mast should not be minimized.

Of the forest vertebrates requiring the structure of mature hardwood and hardwood/pine types, the needs of the pileated woodpecker, a management indicator species (MIS), are perhaps the most exacting. Where habitat requirements for this species are provided, conditions will be suitable for those associated species occurring in these habitats. Where habitat adequate to meet the needs of the pileated woodpecker is met, the hardwood structure habitat needs of associated mast-dependent species are assumed to be sufficiently provided.

All alternatives provide for retention or development of the hardwood and hardwood-pine forest types, age 50 and older that are mast producers. Management direction would be for approximately 20 percent of each project area to be designated for mast producing species. Other direction common to all alternatives includes the following:

- Retain clumps of deciduous trees at a rate of one ½-acre clump per 20 acres of regeneration cutting by even aged methods to create den trees. Where possible, locate clumps around existing den trees. In addition, existing den trees will not be felled unless necessary for insect or disease control, or to provide for public and employee safety.

- Retain or develop mature growth pine habitats (80 years old or greater) and mature growth hardwood habitats (100 years old or greater) within each project area at a rate of five percent each.

- Retain or develop a 10-30% hardwood component within managed pine stands.

Current condition score for mast production on the Ouachita National Forest is 2.38 (“Fair”). The mast production SVE score is a composite average of the scores of all communities with mast producing capability including:

- Ouachita Dry Oak Woodland
- Ouachita Dry-Mesic Oak Forest
- Ouachita Mesic Hardwood Forest
- Ouachita Montane Oak Forest
- Ouachita Mountain Forested Seep
- Ouachita Novaculite Glade and Woodland
- Ouachita Pine/Bluestem Woodland
- Ouachita Pine-Oak Forest
- Ouachita Pine-Oak Woodland
- Ouachita Riparian
- South-Central Interior Large Floodplain
- West Gulf Coastal Plain Pine-Hardwood Forest (Flatwoods)
- West Gulf Coastal Plain Small Stream/River Forest

Direct, Indirect and Cumulative Effects

Mast production capability will be managed consistently across all alternatives; current condition would be enhanced across all alternatives. Table 3.53 compares composite mean SVE scores for mast producing capability by alternative.

Table 3.53 Composite Mean SVE Score of Communities with Mast Producing Capability by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Baseline	2.38 Fair	2.38 Fair	2.38 Fair	2.38 Fair	2.38 Fair
10 Year	2.44 Fair	2.73 Good	2.99 Good	2.69 Good	3.07 Good
50 Year	2.49 Fair	2.70 Good	3.05 Good	2.71 Good	3.18 Good

Alternatives B, C, D, and E provide slightly-to-considerably improved conditions for increasing mast production, as reflected in the mean community SVE scores in the preceding table. Alternatives B and D concentrate vegetation management activities within pine-dominated communities and provide the least emphasis on the rare upland hardwood-dominated communities. Alternatives C and E emphasize management activities that meet the needs of all communities for healthy forest conditions, including the mast producing hardwood-dominated communities. Cumulatively, mast production capability would remain consistent or improve slightly-to-considerably in Alternatives C and E, as community health restoration efforts in the dry-mesic hardwoods and rare upland communities are implemented.

Old Growth Habitat

Although many plants and animals thrive in mature forests, there are no plant or animal species in the planning area known to require true old growth conditions (stands of trees at least a century in age, with downed logs and standing snags and an intact natural disturbance regime or comparable managed disturbance regime); that is, there are no “old growth obligate species” on the Ouachita National Forest. Some species, including the pileated woodpecker, would thrive under old growth conditions; however, they also find optimal habitat in younger forest stages that have abundant snags and down woody material. Therefore, the amount and distribution of old growth communities should not be a limiting factor for any species of viability concern on the Forest.

Old growth conditions are of interest and importance primarily because so little old growth remains within the planning area. In 1915, Wilbur Mattoon could observe that “[m]ature shortleaf [pine] occurs over a large region centering in western Arkansas and northern Louisiana. This is the last extensive region of virgin shortleaf forest left” (Mattoon 1915). Mattoon also provided tables showing shortleaf pine density in stands that ranged up to 200 years of age for Arkansas stands that were at various “stocking” levels and maximum, minimum, and average diameter at breast height for stands in western Arkansas that ranged up to 200 years of age. By the mid-1940s (Smith 1986), very little of anything resembling virgin or old growth forest dominated by shortleaf pine remained.

Most stands of old growth oak and other hardwoods were soon cut, too. Some forms of old growth oak forests and woodlands, including the relatively well known stunted oak forests of Rich Mountain, Black Fork Mountain, and other “high” ridges persisted at higher elevations. These mostly stunted forests and woodlands were and remain of little economic importance and therefore were little disturbed by the saw.

Planning for restoration and maintenance of old growth makes it more likely that this ecological gap will be filled in future decades, and that the natural communities that make up the Ouachita National Forest will be represented by a full range of ecological conditions. Disturbances, such as periodic fires, blow downs, ice storms and insect outbreaks, play key roles in natural old-growth forests and woodlands; in ecosystems where fire has been suppressed for decades, reintroduction of a prescribed fire regime may be necessary to restore some of the ecological conditions that once typified old growth in the Ouachita Mountains and Arkansas Valley.

The 1990 Forest Plan (No Action Alternative) addresses old growth in two ways: active management to restore fire-maintained (primarily pine-dominated) old growth forests and woodlands (MA 21) and essentially custodial management to allow natural restoration of old growth conditions (both hardwood-dominated and pine-dominated community types) in research natural areas (MA 4), riparian areas (MA 9), wilderness (MA 1), portions of semi-primitive areas (MA 17), and other parts of the National Forest outside the primary block of "lands suitable for timber production" (MA 14 in the 1990 Forest Plan). The action alternatives maintain this dual approach to old growth management and restoration (active management and custodial management) and differ primarily in terms of the degree of thinning and prescribed burning projected to take place in portions of the dry-mesic oak community.

Seven of the old growth types listed in the white paper prepared by Gaines and others (1997) for the Southern Region of the Forest Service occur on the Forest (Table 3.54). Pine and pine-oak forests and woodlands cover 69 percent of the area, and dry to dry-mesic oak forest and woodland cover nearly 21 percent.

Table 3.54 Existing Forest Cover for Seven Potential Old-Growth Cover Types

Cover type	Percent
Mixed and western mesophytic	0.13
River flood plain hardwood	0.30
Dry-mesic oak	20.60
Dry and xeric oak	0.69
Dry to xeric pine and pine-oak	69.34
Dry and dry-mesic oak-pine	8.43
Seasonally wet oak-hardwood	0.52
Total (rounded)	100.00

Source: USDA Forest Service, Southern Research Station (1999a)

Direct, Indirect, and Cumulative Effects

Under all alternatives, occurrences of the mixed and western mesophytic forest type (Ouachita Mesic Hardwood Forest) on the Ouachita National Forest would be managed to allow old growth conditions to develop (and regenerate naturally). Early to mid-seral conditions in this community are created primarily by natural disturbances. Most, if not all, occurrences of this type are represented by relatively small patches (less than 100 acres)—reflecting their "relict" status in the Ouachita Mountains and the limited distribution of moist coves and other suitable, relatively rare habitats—and the emphasis in all alternatives is on maintaining these patches, not trying to create larger ones artificially.

Similarly, occurrences of river floodplain hardwood (South Central Interior Large Floodplain, Ouachita Riparian) and seasonally wet oak-hardwood (West Gulf Coastal Plain Small Stream and River Forest, West Gulf Coastal Plain Wet Hardwood Flatwoods) would be managed under all alternatives within MA 9 to perpetuate natural vegetation cover and be allowed to age or regenerate naturally. However, the nature of natural disturbance regimes in these systems tends to inhibit the development of centuries-old forests, and patch size is naturally constrained by their linear occurrence in the landscape, regardless of alternative.

Dry-mesic oak forests and woodlands (Ouachita Dry-Mesic Oak Forest and Ouachita Montane Oak Forest) occur in a wide variety of patch sizes across the Forest, and most would be managed under all alternatives in ways that allow the development of or actively restore old growth conditions in a significant proportion of these patches. Occurrences in wilderness, botanical areas, wild and scenic corridors, research natural areas, special interest areas, and riparian areas would, for the most part, be under custodial management under all alternatives (the minor exceptions may include thinning to control occasional southern pine outbreaks in riparian areas and prescribed burning in some special interest areas to maintain or restore more open conditions). Elsewhere on the Forest, occurrences of dry-mesic oak forests and woodlands would likely be subject to at least occasional prescribed burns under all alternatives. In Alternative C, many of these patches would also be thinned and burned to restore reference conditions (more open, frequently burned stands with episodic oak reproduction); fire would be more frequent. Lesser amounts of thinning and prescribed burning would also take place in these communities than in Alternative E.

A small amount of regeneration (group selection and/or irregular shelterwood or seedtree management), 200 acres per year or less, is projected to take place in dry-mesic oak forest or woodland communities in Alternative E (on suitable lands), and a somewhat greater amount (1,000 acres or less per year) is projected to take place in Alternative C. None of the other alternatives include projected acres of regeneration cutting in this community. Regenerating one-tenth (Alternative E) to five-tenths (Alternative C) of one percent per year of a natural community type that covers approximately 200,000 acres would have very little effect on future old growth dry-mesic oak forest and woodland. In all alternatives, the vast majority of occurrences of dry-mesic oak forest and woodland—which are well distributed across the Forest and exist in the full range of patch sizes—would be managed to allow old growth conditions to develop (and regenerate naturally).

Dry and xeric oak woodlands (Ouachita Dry Oak Woodland) are mostly high elevation communities maintained by edaphic conditions and periodic fire. Occurring naturally in relatively small patches, this community would be managed under all alternatives to perpetuate natural vegetation cover and would be allowed to age or regenerate naturally. Some patches may be thinned to restore historically lower tree densities.

The dry to xeric pine and pine-oak forests and woodlands (Ouachita Shortleaf Pine-Oak Forest and Woodland) that occupy much of the Ouachita National Forest are represented by a broad range of patch sizes. Currently, and in all action alternatives, approximately 79,000 acres of the Forest would be managed with an emphasis on restoration of fire-maintained pine-grass and pine-oak-grass old growth conditions. Thirty-five separate units of between 600 and nearly 6,000 acres (all assigned to MA 21, Pine-Old Growth Restoration), well distributed across the Forest, are managed for such conditions. Although each unit also has hardwood stands, in the aggregate, the units provide for “medium” (100 to 2,499 acres) and “large” (2,500 acres or more) patches of this cover type in all alternatives. In addition, all alternatives include provisions for restoring and maintaining elements of older (100 to 120 year-old), thinned and fire maintained pine-grass patches in MA 22 (Shortleaf Pine-Bluestem-Red-cockaded Woodpecker), which encompasses more than 205,000 acres, 70 percent of which is Ouachita Shortleaf Pine-Oak Forest and Woodland. Conservatively, at least 24,000 acres would consist of patches 100 to 120 years of age at any given time, once the management area reaches the desired condition. Other small to medium patches of this cover type are represented in the scenic areas Blowout Mountain (526 acres), Dutch Creek (624 acres), and Crystal Mountain (100 acres), each of which has “old growth” as part of its desired condition.

Many small, medium, and large patches of Ouachita Shortleaf Pine-Oak Forest and Woodland are under custodial management in Research Natural Areas (MA 4), Riparian Areas (MA 9), Wilderness (MA 1), and portions of Semi-Primitive Areas (MA 17). This circumstance would not change under any alternative. Summaries of the working inventory of “possible old growth” (stands of various communty/system types meeting minimum age criteria) and minimum areas within the Forest in which restoration of old growth characteristics would be featured under all alternatives are provided in Appendix D of the 2005 Revised Forest Plan.

Under Alternatives B-E, all of the relatively small patches of Ouachita Mountain Forested Seep would be managed to perpetuate natural vegetation cover and be allowed to age naturally. Old growth conditions are likely to develop in many of these communities.

Terrestrial Endangered, Threatened, Other Species of Viability Concern and Management Indicator Species (MIS)

The comprehensive list of "species of viability concern" for the Forest was compiled from all species that may occur or are known to occur on the Ouachita National Forest from current lists of Proposed, Endangered, Threatened, or Sensitive species for Region 8. Other species of viability concern were identified on the basis of Partners in Flight data, Birds of Conservation Concern identified by the US Fish and Wildlife Service, local expert opinions,and all known endemic and/or locally rare species. Table 3.55 lists the terrestrial plant and animal species considered in the Species Viability Evaluation for the Ouachita National Forest, including Forest, state and global rankings.

Table 3.55 Ouachita National Forest Terrestrial Plant and Animal Species Considered in the Species Viability Evaluation (RF: Sensitive-Regional Forester's Sensitive Species List; BCC: Bird of Conservation Concern: MIS: Management Indictor Species; D: Demand; E: Endemic)

Common Name (*Scientific Name*)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Amphibians							
Southern Redback Salamander (*Plethodon serratus*)	Local viability concern	No	No	No	No	S4/-	G5
Northern Crawfish Frog (*Rana areolata circulosa*)	Local viability concern	No	No	No	No	S3/-	G4T4
Rich Mountain Salamander (*Plethodon ouachitae*)	RF Sensitive	No	No	No	Yes	S2/S2	G2G3
Sequoyah Slimy Salamander (*Plethodon sequoyah*)	RF Sensitive	No	No	No	Yes	-/S2	G2Q
Kiamichi Mountain Salamander (*Plethodon kiamichi*)	RF Sensitive	No	No	No	Yes	-/S2	G2Q
Fourche Mountain Salamander (*Plethodon fourchensis*)	RF Sensitive	No	No	No	Yes	S2/-	G2Q
Caddo Mountain Salamander (*Plethodon caddoensis*)	RF Sensitive	No	No	No	Yes	S2/-	G2
Bird-voiced Tree Frog (*Hyla avivoca*)	Local viability concern	No	No	No	No	S2/-	G5
Four-toed Salamander (*Hemidactylium scutatum*)	Local viability concern	No	No	No	No	S2/-	G5

Common Name (*Scientific Name*)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Many-ribbed Salamander (*Eurycea multiplicata multiplicata*)	Local viability concern	No	No	No	Yes	S4/-	G4T4
Ouachita Dusky Salamander (*Desmognathus brimeylorum*)	RF Sensitive	No	No	No	Yes	S4/S3	G3/G4
Mole Salamander (*Ambystoma talpoideum*)	Local viability concern	No	No	No	No	S3/-	G5
Ringed Salamander (*Ambystoma annulatum*)	Local viability concern	No	No	No	No	S4/-	G4
Strecker's Chorus Frog (*Pseudacris streckeri streckeri*)	Local viability concern	No	No	No	No	S2/-	G5T5
Bird							
Wood Thrush (*Hylocichla mustelina*)	Local viability concern	Yes	No	No	No	-/-	G5
Bewick's Wren (*Thyromanes bewickii*)	Local viability concern	Yes	No	No	No	S2/S4	G5
Brown-headed Nuthatch (*Sitta pusilla*)	Local viability concern	Yes	No	No	No	S4/-	G5
Yellow-throated Vireo (*Vireo flavifrons*)	Local viability concern	Yes	No	No	No	-/-	G5
Prairie Warbler (*Dendroica discolor*)	Local viability concern	Yes	Yes	No	No	-/-	G5
Acadian Flycatcher (*Empidonax virescens*)	Local viability concern	Yes	No	No	No	S4B/-	G5
Kentucky Warbler (*Oporornis formosus*)	Local viability concern	Yes	No	No	No	S4B/-	G5
Red-cockaded Woodpecker (*Picoides borealis*)	Federally Endangered	Yes	No	No	No	S2/S1	G3
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Local viability concern	Yes	No	No	No	-/-	G5
White-eyed Vireo (*Vireo griseus*)	Local viability concern	Yes	No	No	No	S4B, S4N/-	G5
Cerulean Warbler (*Dendroica cerulea*)	Local viability concern	Yes	No	No	No	S2/S2B	G4
Prothonotary Warbler (*Protonotaria citrea*)	Local viability concern	Yes	No	No	No	S4B/-	G5

Common Name (*Scientific Name*)	**Viability Concern**	**BCC**	**MIS**	**D**	**E**	**State Rank (AR/OK)**	**Global Rank**
Swainson's Warbler (*Limnothlypis swainsonii*)	Local viability concern	Yes	No	No	No	S3/S1	G4
Northern Bobwhite (*Colinus virginianus*)	Local viability concern	Yes	Yes	Yes	No	S5/-	G5
Hooded Warbler (*Wilsonia citrina*)	Local viability concern	Yes	No	No	No	S4B/S2B	G5
Bachman's Sparrow (*Aimophila aestivalis*)	RF Sensitive	Yes	No	No	No	S3/S2?	G3
Painted Bunting (*Passerina ciris*)	Local viability concern	Yes	No	No	No	-/-	G5
Piping Plover (*Charadrius melodus*)	Federally Endangered	Yes	No	No	No	-/-	G3
Migrant Loggerhead Shrike (*Lanius ludovicianus migrans*)	RF Sensitive	Yes	No	No	No	-/-	G4T3Q
Orchard Oriole (*Icterus spurius*)	Local viability concern	Yes	No	No	No	S4B/-	G5
Worm-eating Warbler (*Helmitheros vermivorus*)	Local viability concern	Yes	Yes	No	No	S4B/-	G5
Pileated Woodpecker (*Dryocopus pileatus*)	MIS	No	Yes	No	No	-/-	G5
Chuck-will's-widow (*Caprimulgus carolinensis*)	Local viability concern	Yes	No	No	No	S4B/-	G5
American Kestrel (*Falco sparverius*)	Local viability concern	Yes	No	No	No	-/-	G5
Bald Eagle (*Haliaeetus leucocephalus*)	Federally Threatened	Yes	No	No	No	S2B, S4N/-	G4
Interior Least Tern (*Sterna antillarum athalassos*)	Federally Endangered	Yes	No	No	No	S2B/-	G4T2Q
Eastern Wild Turkey (*Meleagris gallopavo*)	MIS	No	Yes	Yes	No	-/-	G5
Whip-poor-will (*Caprimulgus vociferus*)	Local viability concern	Yes	No	No	No	S4B/-	G5
Chimney Swift (*Chaetura pelagica*)	Local viability concern	Yes	No	No	No	-/-	G5
Scarlet Tanager (*Piranga olivacea*)	MIS	No	Yes	No	No	-/-	G5

Common Name (*Scientific Name*)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Invertebrates							
Rich Mountain Slitmouth (*Stenotrema pilsbryi*)	RF Sensitive	No	No	No	Yes	S2/-	G2
Ouachita Slitmouth (*Stenotrema unciferum*)	Local viability concern	No	No	No	Yes	S?/-	G2
An Isopod (*Lirceus bicuspidatus*)	RF Sensitive	No	No	No	Yes	S3/-	G3Q
Diana (*Speyeria diana*)	RF Sensitive	No	No	No	No	S2S3	G3
American Burying Beetle (*Nicrophorus americanus*)	Federally Endangered	No	No	No	No	S1/S1	G2G3
Mammals							
Indiana Bat (*Myotis sodalis*)	Federally Endangered	No	No	No	No	S2/S1	G2
Rafinesque's Big-Eared Bat (*Corynorhinus rafinesquii*)	RF Sensitive	No	No	No	No	S2/-	G3G4
Eastern Small-Footed Bat (*Myotis leibii*)	RF Sensitive	No	No	No	No	S1/-	G3
Plains Spotted Skunk (*Spilogale putorius interrupta*)	Local viability concern	No	No	No	No	S?/-	G5T4
White-tailed Deer (*Odocoileus virginianus*)	MIS	No	Yes	Yes	No	-/-	G5
Mountain Lion (*Puma concolor*)	Local viability concern	No	No	No	No	SH/-	G5
Southeastern Myotis (*Myotis austroriparius*)	RF Sensitive	No	No	No	No	S2?/S2?	G3G4
Plants							
Scott's Spleenwort (*Asplenium* x *ebenoides*)	RF Sensitive	No	No	No	No	S1S2/-	HYB
Nuttall's Corn-Salad (*Valerianella nuttallii*)	RF Sensitive	No	No	No	No	S1/-	G1G2
Large-leaved Grass-of-Parnassus (*Parnassia grandifolia*)	Local viability concern	No	No	No	No	S3/-	G3
Ozark Chinquapin (*Castanea pumila* var *ozarkensis*)	RF Sensitive	No	No	No	No	S3S4/S2	G5T3
Rayless Crown-Beard (*Verbesina walteri*)	RF Sensitive	No	No	No	No	S1/S1	G3?
Wolf Spikerush (*Eleocharis wolfii*)	Local viability concern	No	No	No	No	S2/-	G3?
Dryopteris (*Dryopteris* x *australis*)	RF Sensitive	No	No	No	No	S1/-	HYB

Common Name (*Scientific Name*)	**Viability Concern**	**BCC**	**MIS**	**D**	**E**	**State Rank (AR/OK)**	**Global Rank**
Open-ground Whitlow-grass (*Draba aprica*)	RF Sensitive	No	No	No	No	S2/S1	G3
Trelease's Larkspur (*Delphinium treleasei*)	RF Sensitive	No	No	No	No	S3/-	G3
Shinners' Sunflower (*Helianthus occidentalis* ssp. *plantagineus*)	RF Sensitive	No	No	No	No	S1/-	G5T2T3Q
Southern Lady's-Slipper (*Cypripedium kentuckiense*)	RF Sensitive	No	Yes	No	No	S3/S1	G3
Ouachita Bluet (*Houstonia ouachitana*)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Waterfall's Sedge (*Carex latebracteata*)	RF Sensitive	No	No	No	Yes	S3/S2	G3
Bush's Poppymallow (*Callirhoe bushii*)	RF Sensitive	No	No	No	No	S3/-	G3
A Sandgrass (*Calamovilfa arcuata*)	RF Sensitive	No	No	No	No	S1/S2	G2
Grave's Spleenwort (*Asplenium* x *gravesii*)	RF Sensitive	No	No	No	No	S1/-	HYB
Ouachita Leadplant (*Amorpha ouachitensis*)	RF Sensitive	No	No	No	Yes	S3/S2	G3Q
Panicled False Indigo (*Amorpha paniculata*)	RF Sensitive	No	No	No	No	S1/-	G2G3
Moore's Larkspur (*Delphinium newtonianum*)	RF Sensitive	No	No	No	Yes	S3/-	G3
Maple-leaved Oak (*Quercus acerifolia*)	RF Sensitive	No	No	No	No	S1/-	G1
A Corn-Salad (*Valerianella palmeri*)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Sand Grape (*Vitis rupestris*)	RF Sensitive	No	No	No	No	SR/-	G3
Ozark Least Trillium (*Trillium pusillum* var *ozarkanum*)	RF Sensitive	No	No	No	No	S3/S1	G3T3
Ozark Spiderwort (*Tradescantia ozarkana*)	RF Sensitive	No	No	No	No	S3/S1S2	G3
Arkansas Meadow-Rue (*Thalictrum arkansanum*)	RF Sensitive	No	No	No	No	-/S1	G2Q
Small-headed Pipewort (*Eriocaulon kornickianum*)	RF Sensitive	No	No	No	No	S2/-	G2
A Goldenrod (*Solidago ouachitensis*)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Narrowleaf Ironweed (*Vernonia lettermannii*)	RF Sensitive	No	No	No	Yes	S3/S?	G3
Heartleaf Leafcup (*Polymnia cossatotensis*)	RF Sensitive	No	No	No	Yes	S1/-	G1
Threadleaf Bladderpod (*Lesquerella angustifolia*)	RF Sensitive	No	No	No	No	-/S3	G3

Common Name (*Scientific Name*)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Golden Glade Cress (*Leavenworthia aurea*)	RF Sensitive	No	No	No	No	-/S2	G2
Butternut (*Juglans cinerea*)	RF Sensitive	No	No	No	No	S3/-	G3G4
Browne's Waterleaf (*Hydrophyllum brownei*)	RF Sensitive	No	No	No	Yes	S1/-	G1
A Twistflower (*Streptanthus squamiformis*)	RF Sensitive	No	No	No	Yes	S2/S1	G2
Reptiles							
Western Diamondback Rattlesnake (*Crotalus atrox*)	Local viability concern	No	No	No	No	-/-	G5
Collared Lizard (*Crotaphytus collaris*)	Local viability concern	No	No	No	No	-/-	G5
American Alligator (*Alligator mississippiensis*)	Federally Threatened	No	No	No	No	S4/-	G5
Southern Prairie Skink (*Eumeces septentrionalis obtusirostris*)	Local viability concern	No	No	No	No	S3/-	G5T5
Great Plains Skink (*Eumeces obsoletus*)	Local viability concern	No	No	No	No	-/-	G5
Razorback Musk Turtle (*Sternotherus carinatus*)	Local viability concern	No	No	No	No	S3/-	G5
Timber Rattlesnake (*Crotalus horridus*)	Local viability concern	No	No	No	No	-/-	G4
Mississippi Green Water Snake (*Nerodia cyclopion cyclopion*)	Local viability concern	No	No	No	No	S4/-	G5

Terrestrial Species Methodology

Species viability and habitat condition benchmarks (scoring) were derived using the most current science, literature and expert opinion best reflecting natural processes at work within the natural diversity of native plant and animal communities and best supporting the viability of associated species and their habitat needs. Complete literature citations (not presented here) are contained within the SVE itself, available online at www.aokforests.com or upon request; brief citations (author, year) are included in Appendix E. The effects of alternatives were analyzed in terms of how well the alternative approached the “good” or “very good” viable condition of the Conservation Targets. Ranges and definitions of terrestrial species SVE scores are shown in Table 3.56. Species viability scores were determined as a reflection of the condition scores of the combined associated Conservation Targets or habitat condition, as well as weighted by how important the habitat is to that species (obligate, optimal, marginal, suitable). For a complete list of Conservation Targets and associated species, see Appendix E.

Table 3.56 Ranges of Condition Score, Condition Classification, and Definitions of SVE Scores

Ranges of Condition Score	Condition Classification	Definitions of Terrestrial Species SVE Score
3.51-4.0	Very Good	(VIABLE) Habitat and/or population conditions are optimal. Species should remain robust and potentially even expand within suitable habitat.
2.51 - 3.50	Good	(VIABLE) Habitat and/or population conditions are acceptable. Species should remain stable.
1.51 – 2.50	Fair	(NON-VIABLE) Habitat and/or population conditions are slightly inadequate. Although species may persist for some time, they may be subject to gradual declines.
1.0 - 1.50	Poor	(NON-VIABLE) Habitat and/or population conditions are severely inadequate. Species are expected to decline rapidly and localized extirpations are occurring or are imminent.

Terrestrial and Aquatic-Associated Terrestrial Federally Proposed, Endangered, and Threatened Species List

There are five federally Endangered and two federally Threatened terrestrial species listed as occurring or potentially occurring within the Forest. At present, no species known to occur on the Forest are proposed for federal listing. The four listed birds, one mammal, one insect, and one reptile species are shown in the following tabulation:

Common Name and Scientific Name	Federal Listing
Least Tern (*Sterna antillarum*)	Endangered
Piping Plover (*Charadrius melodus*)	Endangered
American Alligator (*Alligator mississippiensis*)	Threatened by similarity of appearance (to other listed crocodilians)
Indiana Bat (*Myotis sodalis*)	Endangered
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened
American Burying Beetle (*Nicrophorus americanus*)	Endangered
Red-cockaded Woodpecker (*Picoides borealis*)	Endangered

Least tern (*Sterna antillarum*) and Piping plover (*Charadrius melodus*)

Affected Environment

Most least terns and piping plovers that occur on the Ouachita National Forest in Arkansas and Oklahoma are passing migrants, but from May through September, a few nest in small colonies on exposed sandbars in the Arkansas, Mississippi, White, and Red Rivers and are regularly seen foraging within the Red Slough WMA. Arkansas nesting habitat is threatened by manipulation of river flows. Reduced flows allow encroachment of woody vegetation, eliminating some bare sandbars. High flows during nesting wash away eggs and drown chicks. Nests are also lost to dredging operations, trampling by cattle, all-terrain vehicle use, storms, and predation.

Direct, Indirect, and Cumulative Effects

The least tern and piping plover nest on sandbars of large rivers and may seasonally occur as possible migrants, but are not known to occur as reproducing populations on the Forest (James and Neal 1986; Peterson 1980). There is no known or potential large river sandbar habitat on the Forest; therefore, there should be no direct, indirect, or cumulative effects from Forest management activities on these species. There are no known element occurrences on the Forest; therefore, these species were not included in the SVE analysis.

American Alligator (*Alligator mississippiensis*)

Affected Environment

The American alligator ranges across southeastern North America. With enforcement of protective legislation, populations have shown rapid recovery from habitat loss and over hunting and are stable or increasing in most of its range. Even though the American alligator is no longer biologically endangered or threatened, it is still listed by the USFWS as Threatened throughout its entire range due to the similarity of appearance to other endangered or threatened crocodilians. It now seems secure from extinction and was pronounced fully recovered in 1987.

Alligators play a vital role in wetland wildlife communities. Their deep water holes are important for other wildlife, especially during drought. They help control populations of many nuisance animals and are also valuable for biomedical studies. The only suitable or potential habitat for this species occurring on the Forest is within the West Gulf Coastal Plain Wet Hardwood Flatwoods of the Red Slough Wildlife Management Area (WMA) of southeastern Oklahoma, where it has been observed in streams and ditches that run through the WMA. At least one alligator has also been observed in Broken Bow Lake in Oklahoma, but there is little, if any suitable habitat for this species on nearby National Forest System land. This species is not been known to reproduce on the Forest; therefore, this species was not included in the SVE analysis.

Direct, Indirect, and Cumulative Effects

The primary threat to the American alligator on the Forest is loss of habitat and/or habitat degradation within the Red Slough WMA. Since the Red Slough WMA is slated for continued and enhanced maintenance as a wildlife emphasis area under all alternatives, there would be no negative direct, indirect, or cumulative effects on this species in any of the alternatives.

Indiana Bat (*Myotis sodalis*)

Affected Environment

All current habitat use and distribution data for the Indiana bat, in combination with extensive District, Forest and regional surveys, a recent Anabat (acoustic detection) survey conducted during the maternity period, and captures during the 2003 and 2005 Ouachita Mountain Bat Blitzes have failed to locate this species in the Arkansas portion of the Forest or adjacent lands. Gardner and Cook (2002) published data from the Indiana bat Recovery Team and other sources in the scientific literature that show there are no records of this species reproducing in Arkansas or Oklahoma, and that Indiana bats typically travel north from winter hibernacula (located in the Ozarks and in southeastern Oklahoma), not south into the Ouachita Mountains.

Indiana bats occasionally hibernate in small numbers (no more than ten bats) in Bear Den Caves on the Forest in eastern Oklahoma, but have not been detected there during the breeding season. Bear Den Caves represent the only natural cave habitat occurring on the Forest, and are within the Winding Stair National Recreation Area. Very little active management activity occurs near the caves other than protection of the cave habitat by gating. Based on the SVE, the Indiana bat habitat on the Forest scores “Good” (2.86).

Direct, Indirect, and Cumulative Effects

Direct effects to the Indiana bat would be disturbance and habitat degradation from human intrusions at Bear Den Caves, the only suitable hibernation site known to occur on the Forest. Because Bear Den Caves are in the Winding Stair National Recreation Area, vegetation management activities are minimal. Bear Den Caves are slated for continued protection from disturbance under all alternatives, the effects on this hibernation site from all of the alternatives would be protection of the desired habitat.

Indirect effects in the general forest area would be enhancement or development of potential summer roost and foraging habitat. Although Indiana bats are not known to occur on the Ouachita National Forest during maternity periods, potential roost and foraging habitat could benefit from properly implemented prescribed fires including improvement of foraging habitat conditions and creation of additional roosts. The flame lengths of prescribed fires are not likely to have a direct effect on roost trees. Indiana bats would normally be absent from the general forest area during all dormant season fires. Alternative A actually degrades the current condition of potential roosting and foraging habitat; Alternatives B and D maintain the current condition. Implementation of Alternatives C and E could result in the highest levels of vegetation management and possible effects to potential roost trees at the landscape scale.

For Alternative A, potential summer roosting and foraging habitat would be degraded, but for Alternatives B, C, D and E, the determination of effect is not likely to adversely affect Indiana bat. Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species. Additional site-specific analysis would be conducted on all projects with the potential for affecting this species.

Bald Eagle (*Haliaeetus leucocephalus*)

Affected Environment

The bald eagle is a fairly common local migrant and winter resident around lakes and large rivers in Arkansas. Numbers have grown since the bald eagle was listed as Endangered, and the federal listing has now been changed to Threatened. Eagles often perch on exposed limbs of tall trees near water. They feed on fish, water birds, small mammals, and carrion. The breeding territory for most of the local population is in the northern United States and Canada. Bald eagles are known to regularly use three bald eagle nests around Lake Ouachita on the Womble Ranger District (RD), Jessieville RD, and on the Poteau RD, where bald eagles have nested since 2000 near Lake Hinkle. Bald eagles utilize large trees near water as nest sites, as well as roosting sites in winter. This habitat element (large trees near water) scored 2.75 (Good) in the SVE process.

Direct, Indirect, and Cumulative Effects

Direct effects to bald eagles, in the form of fatalities to individual birds, are not likely to occur through normal management actions and activities occurring on the Ouachita National Forest.

Indirect effects to bald eagles and their habitat could occur. Negative indirect effects include disturbance that would result in breeding or nesting failure, and alteration of occupied habitats. Timber harvesting or road building activities have the potential to impact the bald eagle or its habitat, should it occur near streams, lakes, or other wetlands. Human disturbance from roads, trails, and campgrounds can also adversely affect the use of an area for nesting or roosting by eagles. Beneficial indirect effects could result through the protective emphases in Streamside Management Areas (SMAs). The primary threat to the bald eagle on the Forest is habitat degradation from loss of large trees near water. The SMAs of streams, rivers, and lakes are unsuitable for timber production under all alternatives. Management activities within these SMAs are limited to forest health issues; therefore, large trees near water are likely to benefit under all alternatives.

Cumulative effects to bald eagle populations are expected to be negligible under all alternatives. Rrecovery plan direction would be used for establishing protection zones around bald eagle nests and communal roost sites under all alternatives. Management Area 9-Water and Riparian Communities emphasizes low levels of disturbance and maintenance of mature forest. Thus, the effects on bald eagle habitat from all of the alternatives except Alternative A would be maintenance or enhancement of the desired habitat.

Because this management direction addresses critical needs for habitat and protection of roosts and nests from human disturbance, Alternatives B, C, D and E are not likely to adversely affect the bald eagle, and should provide conditions beneficial to this species. Additional site-specific analysis would be conducted on all projects with the potential for affecting this species.

American Burying Beetle (*Nicrophorus americanus*)

Affected Environment

The American burying beetle (ABB) is a large, black-and-orange carrion beetle once found in 32 states and Canada but now known only in Arkansas, Oklahoma, Nebraska and Rhode Island. Specimens have been documented in nine Arkansas counties, with the largest numbers in Fort Chaffee and on the Ouachita National Forest. Surveys have been conducted for the American burying beetle (ABB) across the Forest, but more intensively in Ranger Districts (RDs) and counties having known occurrences—the Poteau and Cold Springs RD in Arkansas and the Tiak, Choctaw, and Kiamichi RDs in Oklahoma. In Oklahoma, ABBs have been documented on the Forest in LeFlore and McCurtain Counties.

Reasons for the decline of this species are not well understood, but habitat fragmentation and pesticides are possible contributing factors. This insect feeds primarily on carrion from bodies of small vertebrates that it buries and later uses for food for hatching larvae. Like other carrion beetles, burying beetles play an important role in ecosystems, serving as scavengers responsible for recycling dead or decaying materials. Predators and scavengers such as American crow, raccoon, fox, opossum, and skunk compete with ABB for carrion. Competition for carrion within the genus *Nicrophorus* and within the species *N. americanus* is documented. There are no known incidences of mammalian or bird predation on the beetles.

American burying beetles are known to particularly utilize the grass/forb/shrub seral stages of pine-oak or oak-pine dominated open and closed canopy forests, mesic hardwood forests, dry-mesic oak forests, and dry oak woodland habitat on the Forest. The combined associated habitat for the ABB on the Forest scored 2.50 (Fair) in the Species Viability Evaluation.

Direct, Indirect, and Cumulative Effects

The ABB's decline throughout the range has been attributed to a variety of factors, including decreasing populations of the small mammals and birds necessary for successful rearing of its larvae, and competition with vertebrate scavengers for small carrion. Contrary to the earlier belief that the ABBs were associated with eastern deciduous woodlands, it is now apparent that carrion availability (appropriate in size as well as numbers) is more important than the type of vegetation or soil structure.

Since 1992, the Forest has conducted numerous and comprehensive surveys on National Forest System lands for the American burying beetle, in accordance with USFWS protocol. These surveys have confirmed continued existence of occurrence in the known historic counties of Arkansas (Scott, Logan, Sebastian), as well as Oklahoma (LeFlore and McCurtain). However, ABB have not been found to occur in any other counties within the Ouachita NF, even after well over 12,000 trap night surveys.

The counties of confirmed historical and existing ABB occurrence as previously listed, are designated as the American Burying Beetle Area (ABBA) and are evaluated separately from the rest of the Ouachita NF. Any given NF project will then either be within the ABBA or outside of the ABBA.

As there are no known occurrences of American burying beetles outside of the ABBA in those counties with NF lands, all alternatives will have no effect in these areas. Periodic surveys will continue to be conducted on the NF lands outside of the ABBA, in accordance with US Fish and Wildlife Service monitoring protocols. If any American burying beetles are found to occur outside of the historic counties, then that county will be added to the American Burying Beetle Area, and management activities will be planned and implemented in accordance with the most current Forest Plan and USFWS direction.

Direct effects from all alternatives would include ground disturbing activities that may result in harm to ABB individuals, as buried carrion is the substrate of choice for depositing their eggs. Ground disturbing activities that could potentially harm ABB individuals include some forest harvesting and regeneration site preparation activities, and construction, reconstruction, maintenance or decommissioning of roads, firelines, trails, and facilities. Direct effects to individual ABBs would be reduced or minimized by following the US Fish and Wildlife Service bait-away or trap-and-relocate protocols prior to implementation of "ground-disturbing" management activities in project areas.

Generally, the indirect effects of forest management activities will be beneficial to American burying beetle habitat in all of the alternatives. Increased establishment and maintenance of early seral habitat will provide enhanced habitat for the ABB prey base of small vertebrate carrion production. Indirect beneficial effects on ABB habitat would primarily involve maintenance and/or enhancement of the grass/forb/shrub vegetation condition that harbors small mammal and other potential carrion populations. The cumulative effects of forest management activities in the Selected Alternative on ABB habitat would be continued enhancement of grass/forb habitat, providing conditions beneficial to this species, but ground-disturbing activities may harm individuals.

For all alternatives, a determination of "likely to adversely affect" is made for the American burying beetle within the Ouachita NF American Burying Beetle Area because ground disturbing activities may harm individuals and, even when Baiting Away or Trapping and Relocating protocols are implemented, not all ABBs would be removed.

Red-cockaded Woodpecker *(Picoides borealis)*

Affected Environment

In the mid-1800s, John J. Audubon described the Red-cockaded Woodpecker (RCW) as abundant in Southern pine forests. Today, 10,000 to 14,000 individuals remain, living in a fragmented range in the southeastern United States. Unlike other woodpeckers, the Red-cockaded Woodpecker roosts in cavities in live pines requiring 80 to 120-year-old pines for its cavities, and extensive pine and pine-hardwood forests to meet its foraging needs. Much of the Southeast has been cleared for agriculture. Many remaining pine forests are unsuitable for the Red-cockaded Woodpecker. Because of the drastic loss and continued decline of habitat through out the range, the bird is Endangered.

Historically, RCWs occurred in pine forests of numerous species, ranging in the eastern United States from New Jersey south through Florida, and west from Missouri through Oklahoma and Texas. By the time RCWs were listed as Endangered, suitable habitat had shrunk to 1 percent or less of its historic levels, with predictable declines in the numbers of birds. Surveys in Arkansas in the 1970s and 1980s revealed a population of at most a few hundred birds confined to public lands and scattered holdings of timber companies.

Basic biological and population data about RCWs have appeared in many technical publications. Included are data for the Ouachita NF and the Ouachita Mountains in Oklahoma (McCurtain County Wilderness Area). Currently, the only active RCW clusters on the Forest are limited to restored shortleaf pine-bluestem communities within Management Area 22 in Arkansas. There are also three active RCW clusters on the Crossett Experimental Forest in Crossett, Arkansas, that are considered stable.

Within the MA 22 area in Arkansas, there has been a steady increase in the number of active RCW clusters, from 10 to 35 clusters from 1990 to 2004. The current SVE score for RCWs within MA 22 on the Forest is 2.50 (Fair), in association with the current pine-bluestem ecosystem restoration.

Direct, Indirect, and Cumulative Effects

Direct effects to Red-cockaded Woodpeckers could include mortality of individuals during capture, handling, translocation, or prescribed fire. Prescribed fire, even when employed within prescription and Revised Recovery Plan guidelines, could result in the loss of individuals if nest trees are burned during nesting season. However, for the period of 1998-2002, RCW habitats managed with prescribed fire included 6,195 active clusters with no losses of nests (Costa 2003). The Revised Recovery Plan increases the protection standard (area raked around each roost tree) above those used during the compilation of the data cited above. Therefore, the potential for mortality to Red-cockaded Woodpeckers during nesting season due to prescribed fire is deemed insignificant and discountable, with standard mitigations given in the Recovery Plan. Losses of individual cavity trees to fire can be compensated by installation of artificial cavities. Avoidance of prescribed fires during the nesting season is not recommended, since nesting season coincides with timing favorable for other important ecological fire effects.

Indirect effects to Red-cockaded Woodpeckers occur at the landscape level and at the population level. There will be beneficial effects of the habitat management actions to Red-cockaded Woodpecker habitats and populations. Detrimental habitat isolation and fragmentation effects will be reduced as suitable habitat areas are enlarged and joined across the Habitat Management

Areas. Population expansion will be fostered by: restoration of off-site pine stands with native pine species; regeneration of limited mature pine stands with retention of potential roost trees; thinning of mid-successional and mature pine and pine-hardwood stands; prescribed fire to remove encroaching woody vegetation and restore herbaceous groundcovers; chemical and mechanical treatment of encroaching midstory where fire is not a viable management tool; installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding and monitoring of individual birds to facilitate monitoring of the population; and translocation of birds as necessary to optimize annual reproduction.

Cumulative effects to Red-cockaded Woodpecker populations over the long-term (all alternatives) are expected to be population growth at rates prescribed in the Revised Recovery Plan, Recovery Plan population objective attainment, and ultimately, recovery of the species. Management of Red-cockaded Woodpecker populations on the Forest in Arkansas and Oklahoma, will be according to the RCW EIS Record of Decision and the Revised Recovery Plan, as required by the Endangered Species Act, and will not vary by alternative. Habitat Management Areas for Red-cockaded Woodpeckers have been established through direction in the EIS Record of Decision and Revised Recovery Plan for Red-cockaded Woodpeckers. Management direction has been incorporated into all alternatives, including the Selected Alternative, Alternative E, through the continued allocation of acres to Management Area 22, and through forest-wide protection of Endangered species.

Beneficial management actions required to implement the Revised Recovery Plan include: harvesting of timber, including thinning and regeneration; use of mechanical and chemical methods and prescribed fire for control of midstory and hardwood encroachment; the installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding, and monitoring of individual birds; translocation of birds from donor populations to recipient populations; and intra-population translocations, as necessary to optimize annual reproduction.

Mitigation actions required under the Revised Recovery Plan for habitat management include: protection of active and inactive cavity trees within burn units; utilization of two-aged regeneration methods rather than clear-cutting; rotation ages not less than 120 years for shortleaf pine; limitation of regeneration area size; and limitation of operable season to avoid nesting and brood-rearing periods in active clusters. Implementation of any alternative is not likely to adversely affect the Red-cockaded Woodpecker, as residual potential risks to individuals after full implementation of protective measures are insignificant and discountable. Additional site-specific analysis would be conducted on all projects with the potential to affect this species.

Summary of Viability Outcomes for Federally Listed Terrestrial Species

Figures 3.31 and 3.32 summarize the viability scores, by alternative, for federally listed terrestrial species that were included in the SVE. All alternatives are predicted to improve the viability score of the Red-cockaded Woodpecker, and Alternatives B, C, and E are predicted to improve the viability score for the American burying beetle by the 5th decade.

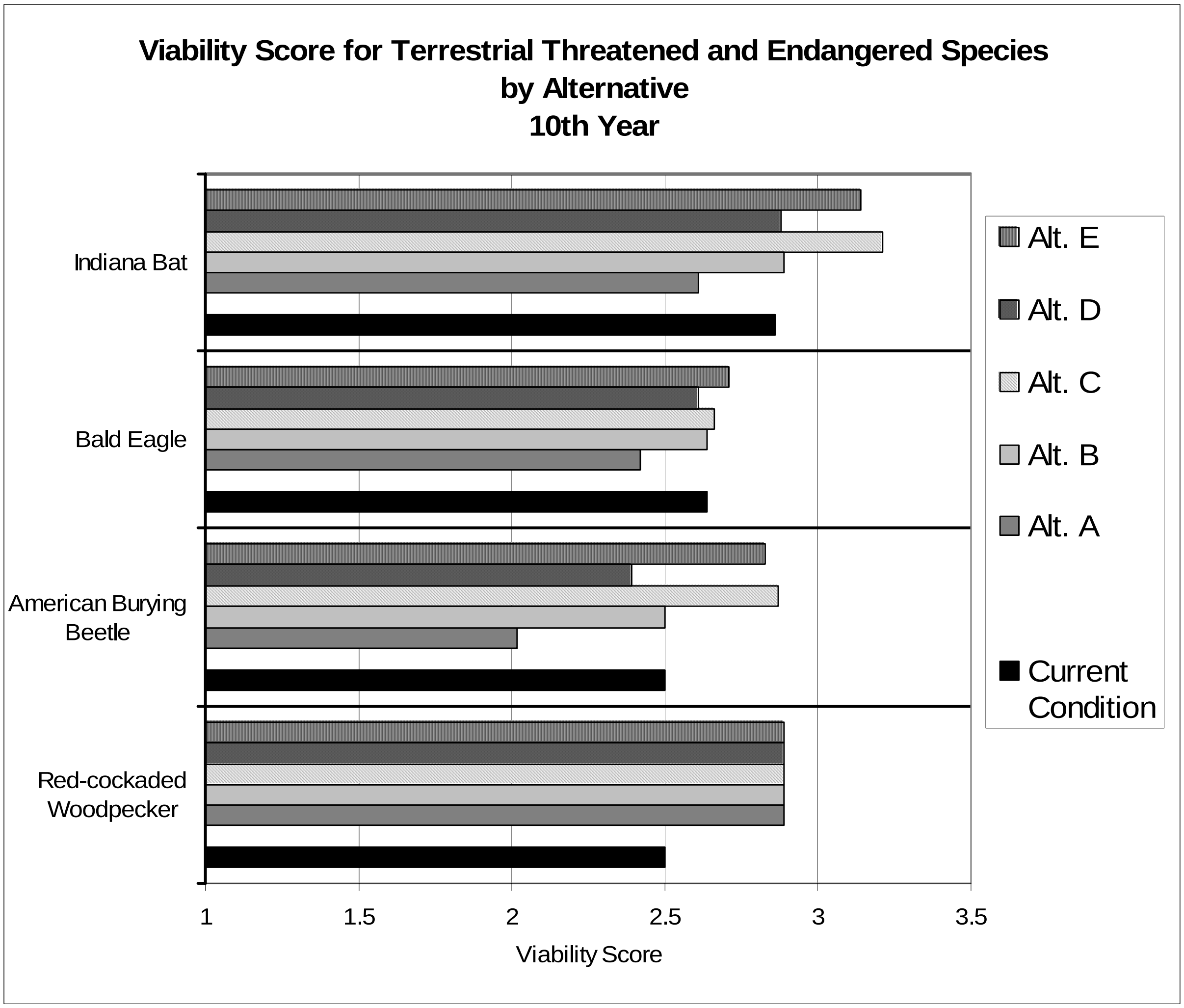

Figure 3.31 Viability Score for Terrestrial Threatened and Endangered Species by Alternative, 10th Year

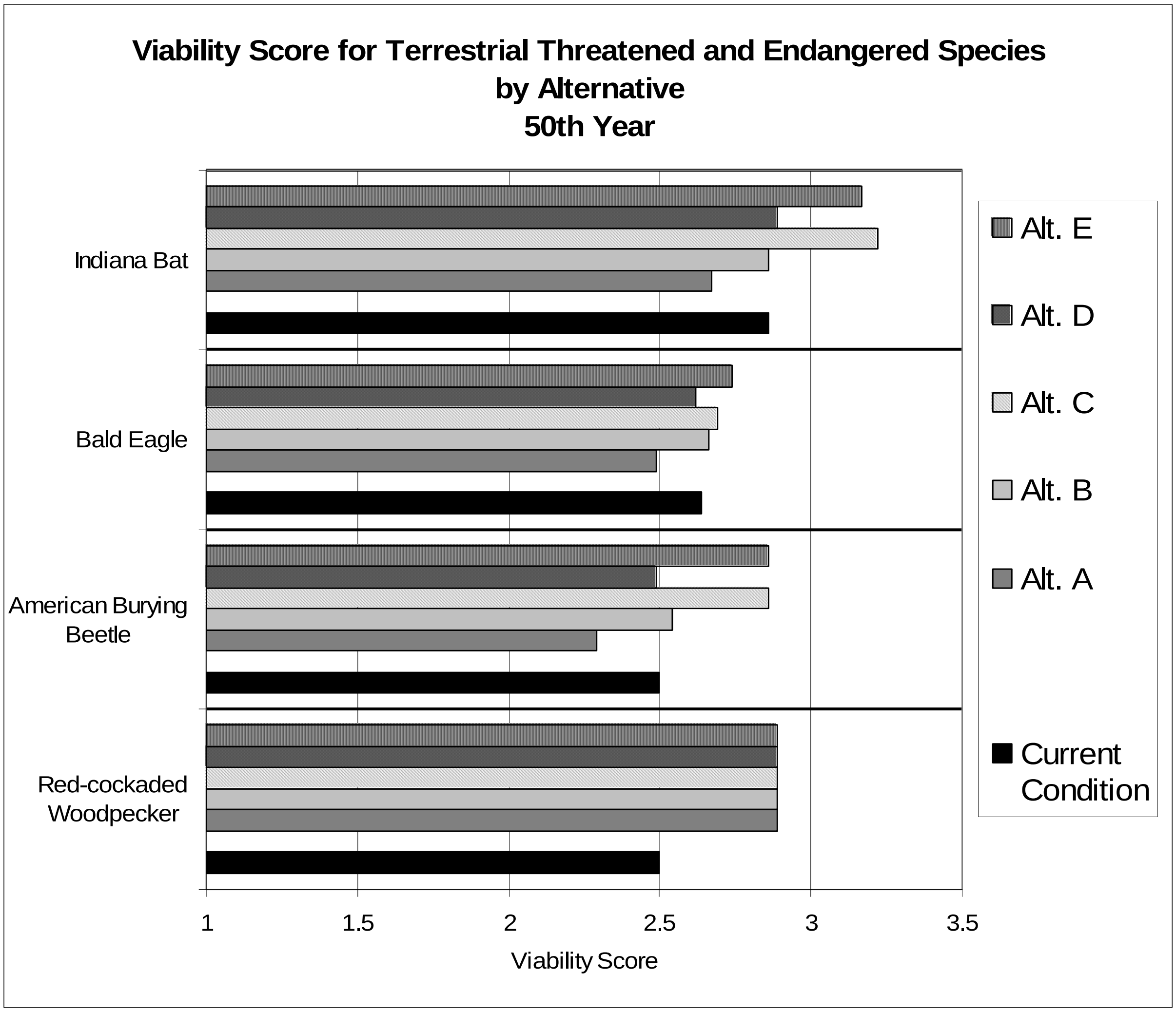

Figure 3.32 Viability Score for Terrestrial Threatened and Endangered Species by Alternative, 50th Year

Other Sensitive Terrestrial Species of Viability Concern

Other species of viability concern (Table 3.57) were analyzed separately from the Threatened and Endangered species. This list was derived based on recommendations from local flora and/or fauna experts, from the most current Partners In Flight and/or Birds of Conservation Concern lists, and from the Region 8 Sensitive Species List. Species are categorized as being Sensitive due to their endemic or restricted ranges, and/or current or predicted downward trends in population numbers and/or available habitat, which raises concern about long-term viability. For specific communities and/or habitat elements by species, see Appendix E.

Table 3.57 Other Terrestrial Species of Viability Concern and Current SVE Scores and Ratings for those species known to occur on the Forest

Common Name	Scientific Name	Weighted Viability Score	Rating
Mammals			
Southeastern Myotis	*Myotis austroriparius*	3.36	Good
Eastern Small-Footed Bat	*Myotis leibii*	3.31	Good
Plains Spotted Skunk	*Spilogale putorius interrupta*	2.86	Good
Birds			
Prothonotary Warbler	*Protonotaria citrea*	2.88	Good
Red-headed Woodpecker	*Melanerpes erythrocephalus*	2.82	Good
American Kestrel	*Falco sparverius*	2.75	Good
Chimney Swift	*Chaetura pelagica*	2.71	Good
Worm-eating Warbler	*Helmitheros vermivorus*	2.59	Good
Bachman's Sparrow	*Aimophila aestivalis*	2.59	Good
Swainson's Warbler	*Limnothlypis swainsonii*	2.56	Good
Yellow-throated Vireo	*Vireo flavifrons*	2.56	Good
Painted Bunting	*Passerina ciris*	2.56	Good
Acadian Flycatcher	*Empidonax virescens*	2.50	Fair
Chuck-will's-widow	*Caprimulgus carolinensis*	2.50	Fair
Cerulean Warbler	*Dendroica cerulea*	2.50	Fair
Orchard Oriole	*Icterus spurius*	2.50	Fair
Brown-headed Nuthatch	*Sitta pusilla*	2.50	Fair
Bewick's Wren	*Thryomanes bewickii*	2.50	Fair
White-eyed Vireo	*Vireo griseus*	2.50	Fair
Wood Thrush	*Hylocichla mustelina*	2.50	Fair
Kentucky Warbler	*Oporornis formosus*	2.50	Fair
Northern Bobwhite	*Colinus virginianus*	2.50	Fair
Prairie Warbler	*Dendroica discolor*	2.50	Fair
Hooded Warbler	*Wilsonia citrina*	2.50	Fair
Whip-poor-will	*Caprimulgus vociferus*	2.48	Fair
Amphibians and Reptiles			
Razorback Musk Turtle	*Sternotherus carinatus*	3.50	Good
Northern Crawfish Frog	*Rana areolata circulosa*	3.48	Good
Strecker's Chorus Frog	*Pseudacris streckeri streckeri*	3.42	Good
Many-ribbed Salamander	*Eurycea multiplicata multiplicata*	3.10	Good
Mississippi Green Water Snake	*Nerodia cyclopion cyclopion*	3.00	Good
Ringed Salamander	*Ambystoma annulatum*	2.94	Good
Mole Salamander	*Ambystoma talpoideum*	2.86	Good
Ouachita Dusky Salamander	*Desmognathus brimeylorum*	2.67	Good
Rich Mountain Salamander	*Plethodon ouachitae*	2.67	Good
Caddo Mountain Salamander	*Plethodon caddoensis*	2.59	Good
Fourche Mountain Salamander	*Plethodon fourchensis*	2.59	Good
Sequoyah Slimy Salamander	*Plethodon sequoyah*	2.59	Good
Kiamichi Mountain Salamander	*Plethodon kiamichi*	2.59	Good
Four-toed Salamander	*Hemidactylium scutatum*	2.59	Good
Southern Prairie Skink	*Eumeces septentrionalis obtusirostris*	2.50	Fair

Common Name	Scientific Name	Weighted Viability Score	Rating
Southern Redback Salamander	*Plethodon serratus*	2.50	Fair
Bird-voiced Tree Frog	*Hyla avivoca*	2.50	Fair
Timber Rattlesnake	*Crotalus horridus*	2.50	Fair
Great Plains Skink	*Eumeces obsoletus*	2.50	Fair
Western Diamondback Rattlesnake	*Crotalus atrox*	2.40	Fair
Collared Lizard	*Crotaphytus collaris*	2.00	Fair
Invertebrates			
Ouachita Slitmouth	*Stenotrema unciferum*	2.93	Good
An Isopod	*Lirceus bicuspidatus*	2.90	Good
Diana Fritillary	*Speyeria diana*	2.50	Fair
Rich Mountain Slitmouth	*Stenotrema pilsbryi*	2.00	Fair
Plants			
Arkansas Meadow-Rue	*Thalictrum arkansanum*	3.50	Good
Threadleaf Bladderpod	*Lesquerella angustifolia*	3.50	Good
Golden Glade Cress	*Leavenworthia aurea*	3.50	Good
Narrowleaf Ironweed	*Vernonia lettermannii*	3.50	Good
A Sandgrass	*Calamovilfa arcuata*	3.50	Good
Sand Grape	*Vitis rupestris*	3.50	Good
Moore's Larkspur	*Delphinium newtonianum*	3.08	Good
Ouachita Bluet	*Houstonia ouachitana*	2.67	Good
Bush's Poppymallow	*Callirhoe bushii*	2.67	Good
Wolf Spikerush	*Eleocharis wolfii*	2.67	Good
Butternut	*Juglans cinerea*	2.67	Good
Rayless Crown-Beard	*Verbesina walteri*	2.67	Good
Ozark Spiderwort	*Tradescantia ozarkana*	2.67	Good
Small-headed Pipewort	*Eriocaulon kornickianum*	2.67	Good
A Corn-Salad	*Valerianella palmeri*	2.63	Good
Browne's Waterleaf	*Hydrophyllum brownei*	2.58	Good
A Goldenrod	*Solidago ouachitensis*	2.53	Good
Large-leaved Grass-of-Parnassus	*Parnassia grandifolia*	2.50	Fair
Ouachita Leadplant	*Amorpha ouachitensis*	2.50	Fair
Ozark Chinquapin	*Castanea pumila var ozarkensis*	2.50	Fair
Southern Lady's-Slipper	*Cypripedium kentuckiense*	2.50	Fair
Waterfall's Sedge	*Carex latebracteata*	2.50	Fair
Heartleaf Leafcup	*Polymnia cossatotensis*	2.50	Fair
Dryopteris	*Dryopteris x australis*	2.50	Fair
Ozark Least Trillium	*Trillium pusillum var ozarkanum*	2.47	Fair
A Twistflower	*Streptanthus squamiformis*	2.46	Fair
Shinners' Sunflower	*Helianthus occidentalis ssp plantagineus*	2.44	Fair
Nuttall's Corn-Salad	*Valerianella nuttallii*	2.00	Fair
Maple-leaved Oak	*Quercus acerifolia*	2.00	Fair
Open-ground Whitlow-grass	*Draba aprica*	2.00	Fair

The current SVE scores reflect that 45 species scored “good;” and 35 species scored “fair.” Of the 35 species that scored fair, 25 scored 2.50 which is the highest score within the fair ranking. Five of the remaining fair species scored above 2.40, and the remaining fair species scored 2.00. There were no species that scored lower than 2.00, and no species scored “Poor.” Figures 3.33 and 3.34 shows the number of other terrestrial species of viability concern per condition class by alternative for the 10th year and 50th year.

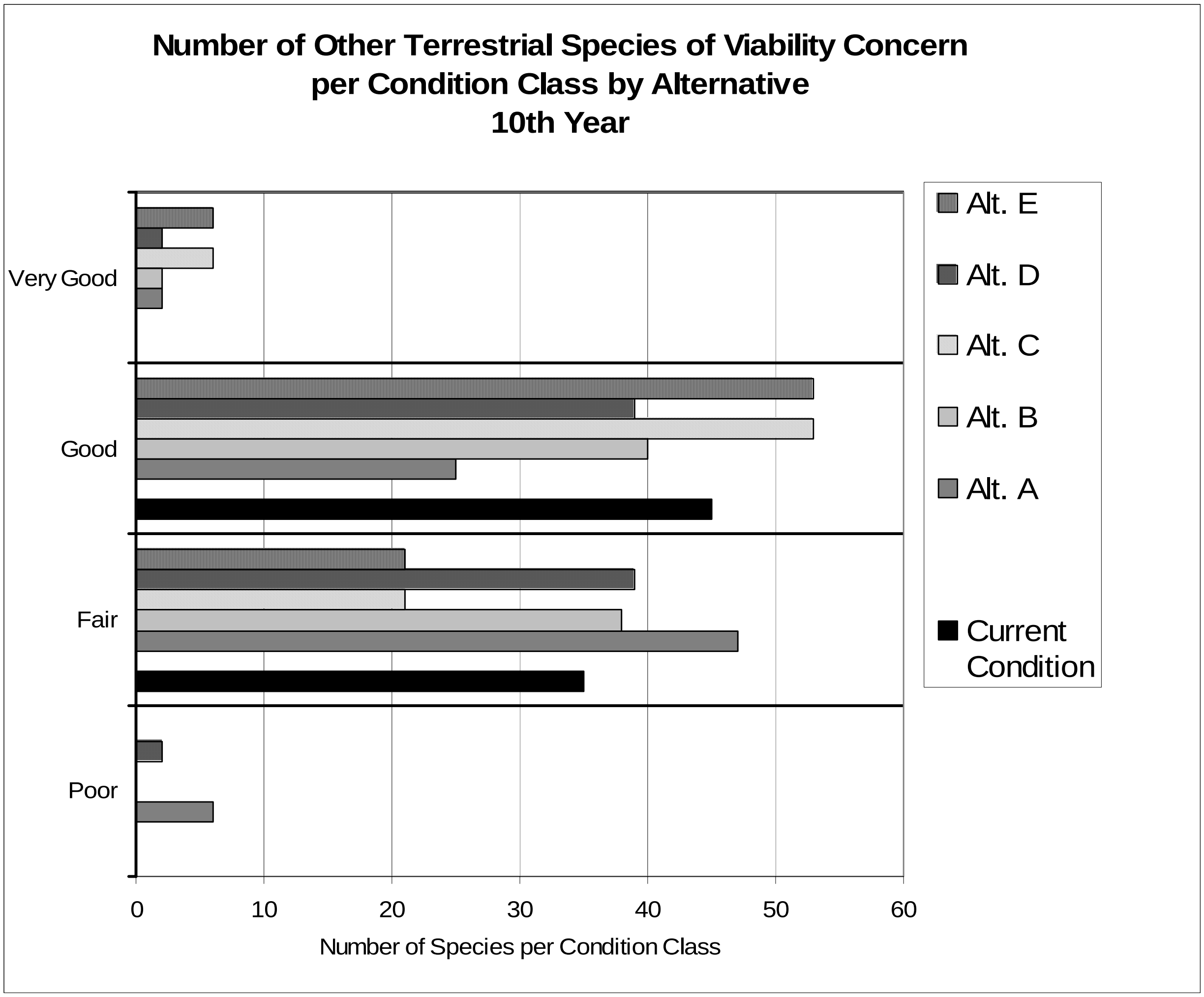

Figure 3.33 Number of Other Terrestrial Species of Viability Concern per Condition Class by Alternative, 10th Year

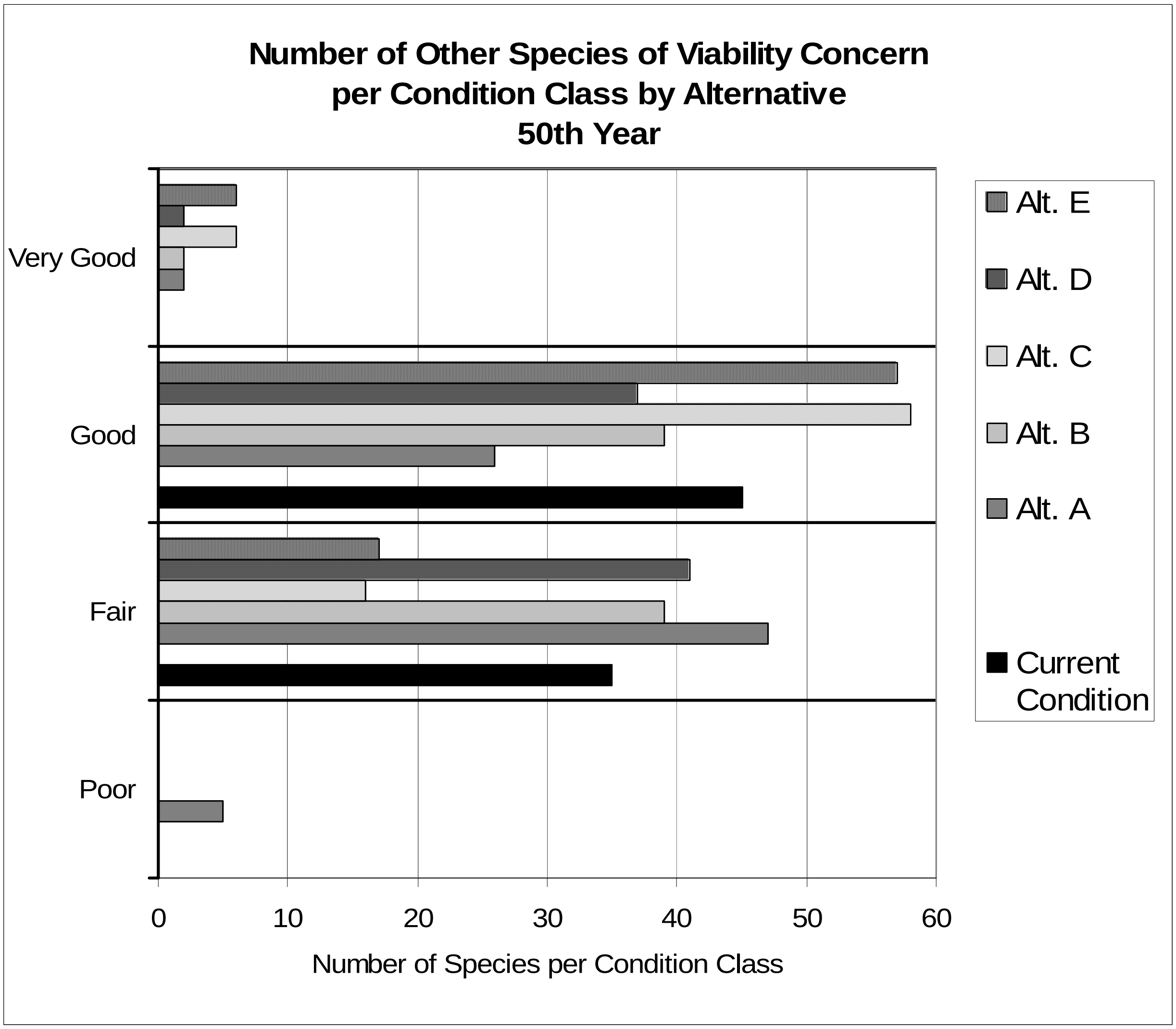

Figure 3.34 Number of Other Terrestrial Species of Viability Concern per Condition Class by Alternative, 50th Year

Management Indicator Species

Management indicator species (MIS) are analyzed separately from the Threatened, Endangered, and Sensitive Species. Northern bobwhite and Red-cockaded Woodpecker were included in the SVE and and as MIS. Red-cockaded Woodpecker was previously discussed in the terrestrial endangered species section. National Forest Management Act regulations, adopted in 1982, require selection of management indicator species (MIS) during development of forest plans (36 CFR 219.19(a)). Reasons for their selection must be stated. The “Management Indicator Species Selection Process Paper” describes the process and rationale used to select MIS for this cycle of Plan revision.

Management indicator species (MIS) are to be selected “because their population changes are believed to indicate the effects of management activities” (36 CFR 219 (a)(1)). They are to be used during planning to help compare effects of alternatives (36 CFR 219.19(a)(2)), and as a focus for monitoring (36 CFR 219.19(a)(6)). Where appropriate, MIS shall represent the following groups of species (36 CFR 219 (a)(1)):

- Threatened and Endangered species on State and Federal lists
- Species with special habitat needs
- Species commonly hunted, fished, or trapped
- Non-game species of special interest
- Species selected to indicate effects on other species of selected major biological communities

Since adoption of these regulations, the management indicator species concept has been reviewed and critiqued by the scientific community. These reviews identify proper uses and limitations of the indicator species concept. They generally caution against overreaching in the use of indicator species, especially when making inferences about ecological conditions or status of other species within a community. Caution is needed because many different factors may affect populations of each species within a community, and each species' ecological niche within a community is unique. Table 3.58 shows the Terrestrial Management Indicator Species selected for use in the Ouachita National Forest and the primary reasons for their selection.

Table 3.58 Terrestrial Management Indicator Species selected for use and primary reason(s) for their selection, Ouachita National Forest.

Common Name	Scientific Name	Primary reason(s) for selection
Northern bobwhite	*Colinus virginianus*	To help indicate effects of management on meeting public hunting demand, and to help indicate effects of management on the pine-oak woodland community
White-tailed deer	*Odocoileus virginianus*	To help indicate effects of management on meeting public hunting demand
Eastern wild turkey	*Meleagris gallapavo*	To help indicate effects of management on meeting public hunting demand
Red-cockaded Woodpecker	*Picoides borealis*	To indicate effects of management on recovery of this Endangered species, and to help indicate effects of management on shortleaf pine-bluestem woodland community
Pileated woodpecker	*Dryocopus pileatus*	To help indicate effects of management on snags and snag-dependent species
Scarlet tanager	*Piranga olivacea*	To help indicate effects of management on mature forest communities
Prairie warbler	*Dendroica discolor*	To help indicate effects of management on the early successional component of forest communities

Table 3.59 presents terrestrial habitat capability for terrestrial Management Indicator Species by alternative. For the scarlet tanager, habitat capability changes little over the first 10-year period (some decline in Alternative C, modest increases in Alternatives B and E); after 50 years, all alternatives show increased habitat capability for this species when compared to the 1st decade figure for Alternative A (1990 Forest Plan), with Alternatives A, B, and E showing the greatest relatives increases. For the praire warbler, eastern wild turkey, and Northern bobwhite, Alternative C clearly would provide the greatest habitat capability (at 10 and 50 years); Alternatives B and E, though, still provide greater habitat capability for these species than do Alternatives A or B. Habitat capability for the pileated woodpecker, on the other hand, is lowest under Alternative C (at 10 and 50 years) and highest under A and B, with values for Alternatives D and E not far behind.

Table 3.59 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative after 10 Years and 50 Years

Species		Scarlet Tanager		Prairie Warbler		Pileated Woodpecker		Eastern Wild Turkey		Northern Bobwhite		White-tailed Deer	
Years		10	50	10	50	10	50	10	50	10	50	10	50
Alternatives	A	24.9	27.1	39.2	49.8	18.6	26.0	3.4	3.7	35.2	56.7	12.8	16.7
	B	25.2	27.5	30.9	51.4	18.7	26.7	2.7	3.1	29.1	54.3	13.2	18.3
	C	24.1	25.7	72.4	99.9	14.3	18.5	5.9	7.0	42.7	77.5	22.7	30.0
	D	24.9	26.8	40.1	65.9	17.8	23.8	3.2	3.4	37.8	69.2	13.4	19.9
	E	25.0	27.3	40.5	59.4	17.8	25.3	3.3	3.9	36.6	70.0	13.7	20.2

Figures 3.35 and 3.36 graphically illustrate the terrestrial habitat capability for Management Indicator Species by alternative.

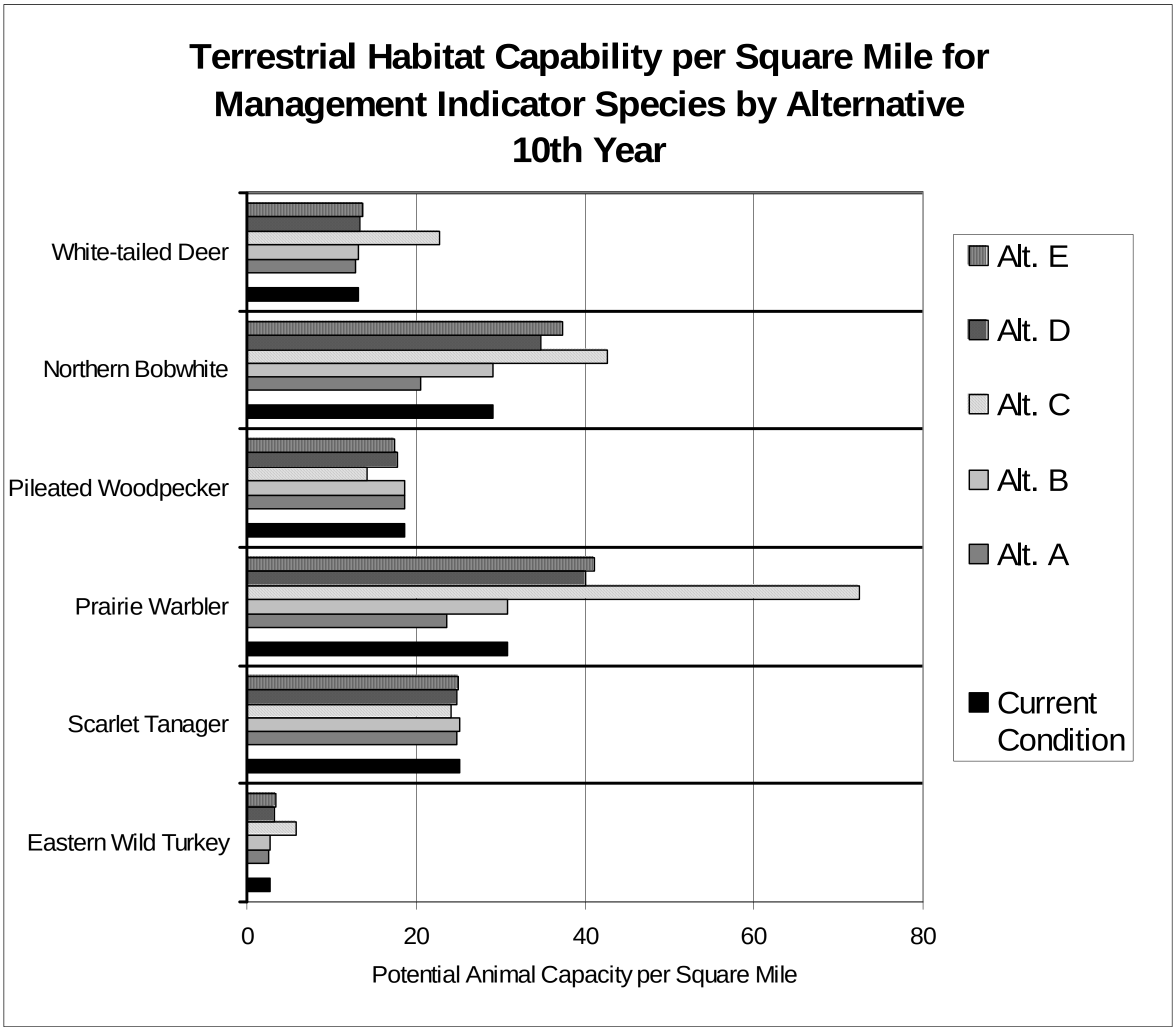

Figure 3.35 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative, 10th Year

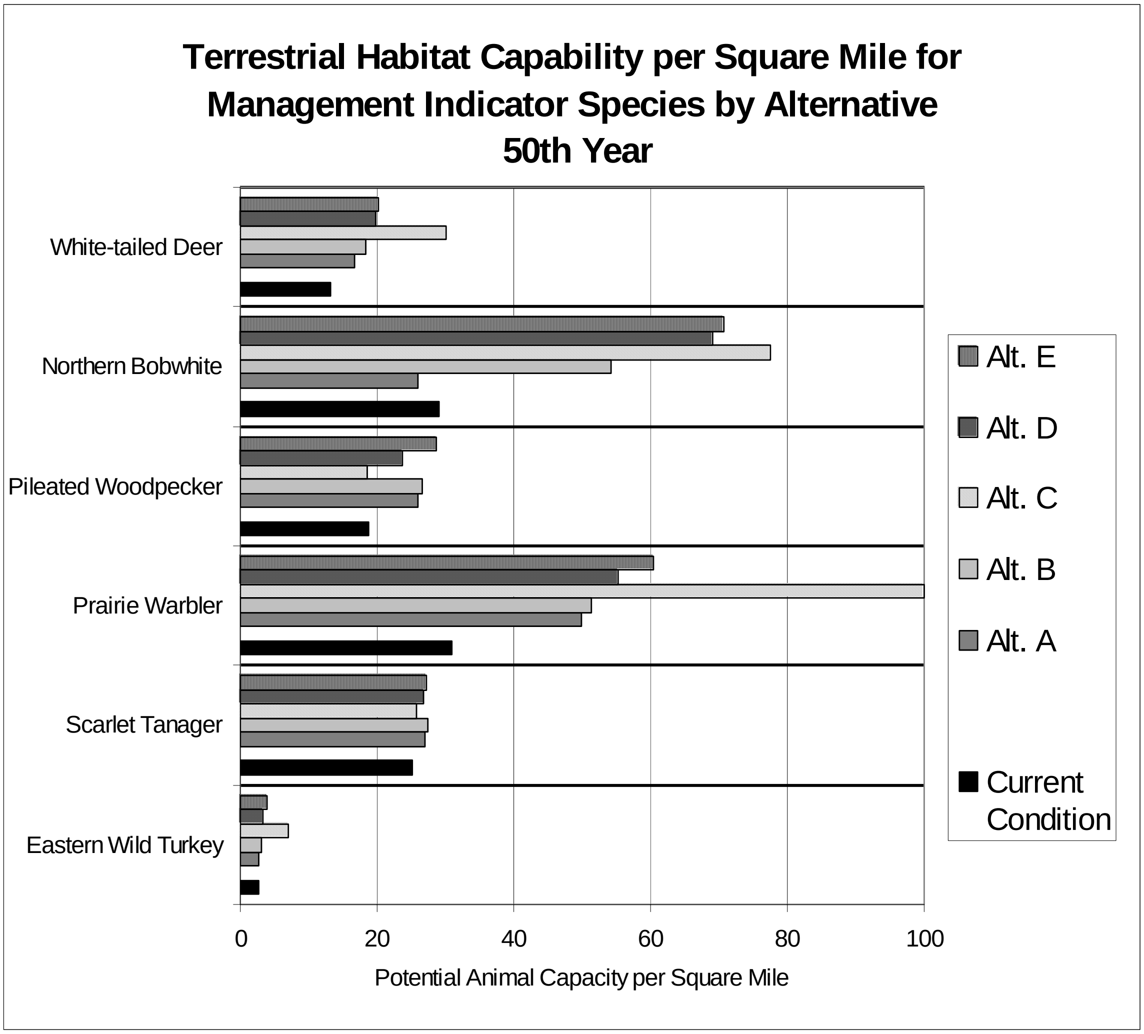

Figure 3.36 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative, 50th Year

Direct, Indirect, and Cumulative Effects (for Other Sensitive Terrestrial Species of Viability Concern, and Management Indicator Species)

Under all alternatives, some individuals within a project area may be harmed directly by certain management activities; however, typically habitat enhancement benefits built into all projects are of greater importance to the population viability and persistence within the landscape. The indirect and cumulative effects on these species are indicated through the SVE scores for Other Sensitive Terrestrial Species of Viability Concern and Management Indicator Species and are directly related to the condition of the habitat. Therefore, the indirect and cumulative effects by alternatives to the community conditions and all species evaluated in this analysis are discussed here together. From the current condition, each of the alternatives would provide distinct differences in effects. Alternatives will be described according to their patterns of influence to the following:

- Community health conditions
- Creation and maintenance of appropriate ratios of seral stages
- Threatened, Endangered and other species of viability concern SVE scores
- Habitat capability for management indicator species

These varying patterns of influence are reflections of the different intensity levels of management activities by alternative.

From current levels of vegetation management and emphasis, Alternative A would yield lower levels of forest health treatments, timber management activities, prescribed fire, and overall community health emphasis than the other alternatives. Management activities would emphasize the pine-dominated communities and provide few activities for maintenance and/or restoration of rare upland communities or the species that require those habitats. Cumulatively, Alternative A would produce lower health conditions for the communities, create and maintain less appropriate ratios of seral habitat, yield lower current SVE scores for most species of viability concern and lower habitat capability values for Prairie warbler and White-tailed deer in comparison to the other alternatives. However, habitat capability values for Scarlet tanager, Pileated woodpecker, and Eastern wild turkey are roughly comparable to those for Alternatives B, D, and E

Alternative B would be most similar to the current levels of vegetation management and community emphasis. This alternative would maintain current levels of forest health treatments, timber management, prescribed fire (averaging 100,000 to 125,000 acres per year), and overall community health emphasis. Management activities would primarily emphasize the pine-dominated communities, and provide some activities for maintenance and/or restoration of rare upland communities and the species that require those habitats. Cumulatively, Alternative B would maintain or degrade health conditions for various communities, create and maintain current ratios of seral habitat, maintain or lower current SVE scores for most species of viability concern, and maintain or lower current habitat capability values for MIS. Alternative B would produce the highest Scarlet tanager habitat capability of all alternatives after 50 years but the lowest capability for Northern bobwhite.

Alternative C would provide the highest levels of forest health treatments, timber management activities, prescribed fire (averaging 250,000 acres annually), and overall community health emphasis. Management activities would emphasize the health of all communities and provide activities for maintenance and/or restoration of rare upland communities and the species that require those habitats. Cumulatively, Alternative C would improve health conditions for the most communities; create and maintain appropriate ratios of seral habitat; and improve current SVE scores for the most species of viability concern of all the alternatives. Among terrestrial MIS, the Pileated woodpecker and Scarlet tanager would have the lowest habitat capabilities and the Prairie warbler, Eastern wild turkey, Northern bobwhite, and White-tailed deer would have the highest habitat capabilities under Alternative C.

Alternative D would provide higher levels of active vegetation management than Alternatives A and B, but lower levels than Alternatives C and E. Management activities would emphasize the pine-dominated communities and provide few opportunities for maintenance and/or restoration of rare upland communities or the species that require those habitats. Alternative D would maintain or enhance the current health conditions for pine/oak dominated communities and lower current health conditions for the rare upland communities, create and maintain less appropriate ratios of seral habitat, lower current SVE scores for species of viability concern associated with rare upland communities, but mostly improve habitat capability values for MIS. Alternative D would have the highest habitat capability for Pileated woodpecker after 50 years of Plan implementation and the second highest capability for Prairie warbler.

Compared to Alternatives A and B, Alternative E would provide high levels of forest health treatments, timber management activities, prescribed fire, and overall community health emphasis. Management activities would emphasize the health of all communities and provide activities for maintenance and/or restoration of rare upland communities and the species that require those habitats, as well as the pine/oak dominated communities. The pattern of influence for Alternative E would improve current health conditions for all Ouachita Mountain communities, create and maintain appropriate ratios of seral habitat, improve current SVE scores for more species of viability concern than Alternatives A, B, or D, and maintain or improve habitat capability values for MIS. Among the terrestrial MIS, Alternative E would have the second highest habitat capability for Scarlet tanager and White-tailed deer and intermediate values (compared to the other alternatives) for the other terrestrial MIS.

Forest Health

Insect and Disease Concerns

In this section, biological threats to forest health are addressed, including outbreaks of insects and diseases, and intrusions by invasive, non-native species. Additional detailed descriptions of biological threats to forest resources are included in the Ozark-Ouachita Highlands Assessment, Terrestrial Report (USDA 1999e).

Native Insects and Diseases

Insects and diseases naturally occur in plant communities and are essential to maintaining a healthy forest system. Concerns about insects and diseases arise when they bring about or threaten to bring about radical changes in forest composition and/or structure. Examples of such radical changes include the extensive outbreaks of gypsy moths and dogwood anthracnose disease in Eastern forests and periodic outbreaks of southern pine beetles in many Southern states. Forest management seeks to address detrimental effects of insects and diseases without interfering with their long-term beneficial effects. Potential for damage to forest communities depends upon community type and age, species composition, location on the landscape, current and past management practices, past disturbances, stress factors, and weather conditions.

Southern pine beetles (SPBs) periodically pose threats to forest resources. SPB generally attack older, densely populated stands that are stressed by drought conditions, poor soil conditions, absence of natural enemies, or other factors. About 68 percent of the forested acres within the Ouachita National Forest are pine-dominated, and epidemic outbreaks of SPB pose a serious threat to this resource.

Ips beetles are another genus of pine bark beetles that are native to the Forest. These beetles are highly destructive and second only to SPB in their capability to kill pine trees. Ips beetles usually attack pines that are recently dead, damaged, dying, or recently felled trees, and fresh logging debris. Frequently, three types of bark beetles will infest the same tree—the Ips beetle, the SPB, and the black turpentine beetle.

The black turpentine beetle, another native insect, also has the potential usually in conjunction with other bark beetles to cause extensive losses to pine forests. The black turpentine beetle seldom persists at a high population level, but when the beetle’s population is increasing dramatically, it is capable of attacking healthy trees. Rarely do black turpentine beetle populations increase at rates high enough to be considered an outbreak.

Oak decline and oak wilt are two native tree diseases affecting the Forest. Oak decline is a complex, slow-acting disease syndrome involving the interaction of predisposing factors such as climatic trends, poor soil or site quality, tree age, or tree genetics; inciting factors such as short-term drought, frost, or insect defoliation; and contributing factors such as root disease, bark beetles, or canker or decay fungi (USDA).

Oak decline cannot be attributed to a single cause, and most reports mention one or more factors. In addition to drought or frost, combinations of the two-lined chestnut borer and Armillaria root disease are common factors (USDA). When mature oaks growing on average or poor sites experience drought or spring defoliation, they become weak and vulnerable to attack by secondary, opportunistic organisms.

Beginning in 2000 after extreme drought conditions, an oak decline related red oak borer epidemic began. The red oak borer (*Enaphalodes rufulus*) and white oak borer (*Goes tigrinus*) are native borer species that are typically found at healthy population levels within natural oak ecosystems. At healthy population levels, these borers rarely kill the tree they inhabit. However, in this instance, the availability of highly vulnerable oak stands in conjunction with record drought levels and excessive stand densities led to a borer epidemic. Two summers of average precipitation levels and subsequent increases in sap flow have shown a decline in oak borer population levels. However, the majority of the hardwood acres on the Forest remain vulnerable due to high stand density levels and older, more susceptible trees.

Oak wilt is a vascular wilt disease of oaks that currently is found only in North America. Oak wilt results when a fungus invades the vascular tissues of oaks, causing trees to wilt rapidly and die. A wide variety of oaks are susceptible, but species in the red oak group (northern red oak, scarlet oak, and black oak) are most readily killed. Oaks in the white oak group (white oak, post oak, and chestnut oak) are infected, but mortality occurs much less frequently and more slowly.

Dogwood is an important understory and midstory species in many forest communities and is valuable for fruit production, which benefits a wide variety of wildlife, and for their ornamental display of white “flowers” (technically bracts) and red berries (USDA). Dogwood anthracnose is a relatively new fungal disease of the native flowering dogwood. Both infection and spread of the disease are favored by moist, cool weather, which tends to occur at higher elevations, sheltered coves, and north-facing slopes. Shade increases the risk of infection and mortality due to slower drying conditions. Also, southern or western aspects tend to have less severe infection, possibly because of drier conditions and more sunlight. Detection surveys in Arkansas have not found anthracnose (USDA). Similarly, no reports are known for Oklahoma.

Since 1930, the American elm tree has been devastated by one of the most well-known diseases in the world, Dutch elm disease (USDA). The fungus that causes the disease is an exotic pest, introduced to America from Europe around 1930, but the native American elm bark beetle also spreads the fungus. In forests, elm losses have been spotty.

Chestnut blight fungus virtually destroyed the American chestnut as an overstory forest tree. The American chestnut does not occur in the Ozark-Ouachita Highlands, but chestnut blight also affects the Allegheny and Ozark chinquapins, which do occur on the Forest, and these species are related to American chestnut (USDA). The effects of the chestnut blight are similar in chinquapins, reducing infected individual trees to a clump of sprouts. More common within the Ozark-Ouachita Highlands Assessment area and more susceptible to the blight is the Ozark chinquapin. Ozark chinquapin is rarely used for wood products, but the nuts are valuable wildlife food and historically have been consumed by humans (Halls 1977b).

The Southern Region of the Forest Service has listed Ozark chinquapin as a Sensitive plant because of damage from the blight. The U.S. Fish and Wildlife Service considered placing it on the list of Threatened and Endangered plants, but has not listed it yet. Both the Arkansas Natural Heritage Commission and the Oklahoma Biological Survey maintain inventory records for this species.

The management guide proposed to fully protect Ozark chinquapins with stems 8 inches or greater in diameter at breast height (dbh). In addition, the guide allows impacts to smaller stump sprouts during normal forest management activities (e.g., prescribed fire or timber cutting). Although never officially adopted, the guide serves as a resource for management activities on the Forest at the District level.

Non-Native, Invasive Species

Animal and plant species not normally found in an area with an extraordinary capacity for multiplication and spread at the expense of native species are called non-native, invasive species. Because these species are introduced to areas where they are not native, they have few or no natural enemies, and they are able to reproduce and spread with little interference. Invasive species, particularly insects, pathogens, plants, and aquatic pests, pose a long-term risk to the health of the Nation's forests by interfering with natural and managed ecosystems, degrading wildlife habitat, reducing the sustainable production of natural resource-based goods and services, and increasing the susceptibility of ecosystems to other disturbances such as fire and flood (USDA Forest Service Strategic Plan for Fiscal Years 2004-2008).

A nonnative insect that poses a threat to forest health in many Eastern states is the European gypsy moth. These insects feed on numerous plants but prefer oak species. Gypsy moths spread when carried by wind or human activities. When gypsy moths reach the epidemic stage, they are capable of defoliating trees.

Another non-native species, the red imported fire ant, is omnivorous and preys on insects and small vertebrates (USDA). When foraging, they may gnaw holes in roots and buds, and in the spring, they seek sap from trees. More aggressive than native ants, fire ants have been implicated in declines of ground-nesting birds such as quail and turkey by attacking newly-hatched young. Other adverse effects are that fire ants may compete with native scavengers that feed on dead animals and fallen fruit, and disturbance of their mounds may cause mechanical problems for agricultural machinery (USDA). Currently, the fire ant population in Arkansas is moderate. It is probable that the ant will spread accidentally through transport by potted plants, trees, sod, and cattle, although fire ants are intolerant of cold temperatures.

Non-Native, Invasive Plants

In 2001, a Regional Forester's Invasive Exotic Plant Species List was developed. In 2004, the USDA Forest Service Southern Regional Strategy for Non-Native Invasive Species noted that a species is considered a "non-native invasive" if: it is not native (alien) to the ecosystem under consideration, and its introduction causes, or is likely to cause, harm to human health or economic or environmental harm. Many non-native invasive plants affect forest health, primarily by replacing native species and reducing native biodiversity. Appendix E includes species from the Regional Forester's Invasive Exotic Plant Species List that are known or are likely to occur on the Forest. As more data are collected, there is a potential for additional species to be added to the list. The Regional Forester's Invasive Exotic Plant Species List is divided into 2 categories.

Category 1 Species are non-native plant species that are known to be invasive and persistent throughout all or most of their range within the Southern Region. They can spread into and persist in native plant communities and displace native plant species; thereby posing a threat to the integrity of the natural plant communities in the Region. Use of Category 1 Species for re-vegetating or rehabilitating sites is prohibited on National Forest System land. Cooperators and partners may not establish or encourage Category 1 species for any reason in projects that receive Forest Service funding except as addressed by Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA) that were already in effect on the date of issuance of the Regional Forester's

Invasive Exotic Plant Species List, or as required for scientific studies designed to further knowledge about invasive species. Efforts to control Category 1 species are encouraged where practicable. Proposals for non-native invasive plant species control will receive the highest funding priority when they include Category 1 species, particularly where native plant communities are threatened.

Category 2 Species are non-native plant species that are suspected to be invasive or are known to be invasive in limited areas of the Southern Region. Category 2 species will typically persist in the environment for long periods once established, and may become invasive under favorable conditions. Plant species in Category 2 pose a significant risk to the integrity of natural plant communities, and the establishment or encouragement of Category 2 species is prohibited in areas where ecological conditions would favor invasiveness and is discouraged elsewhere. Projects that use Category 2 species should document why no other (non-invasive, non-native, or native) species will serve the purpose and need. Cooperators and Partners are also discouraged from using Category 2 species. The Forest botanist, plant ecologist, or Forest noxious weed coordinator (or Regional specialists) should be consulted for alternative native or non-invasive non-native species that would serve the purpose and need of the project. Control efforts for Category 2 species may or may not be necessary to achieve the management objectives of the planning area.

Direct and Indirect Effects

Both native insects and diseases and non-native invasive species pose a long-term risk to the health of the Forest by interfering with natural and managed ecosystems, degrading wildlife habitat, reducing the sustainable production of natural resource-based goods and services, and increasing the susceptibility of ecosystems to other disturbances such as fire and flood. Under the right conditions, epidemic outbreaks may pose a serious threat to Forest resources and ecosystem health. Such threats are usually periodic, not constant (with the exception of invasive species), and are dependent upon a wide range of natural and man-made conditions.

Risk from native insects and diseases and non-native invasive species is a function of complex interactions of many factors, most that forest management cannot affect. Disturbances such as lightning, ice storms, tornadoes, wildfires, and droughts create conditions conducive to damage from insects, diseases and invasive species but are not within the control of management activities. Predisposing factors such as climatic trends, poor soil or site quality, tree age, vegetation density, tree genetics; inciting factors such as short-term drought, frost, fire or insect infestation; and contributing factors such as root disease, bark beetles or canker or decay fungi are all factors that may interact to create risk (USDA). Since many factors interact to create the risk condition, it is very difficult to predict effects of forest management. Factors directly attributable to man include mechanized logging that wounds trees, harvesting operations that compact soils and prescribed fires that lead to pine or hardwood mortality. The alternatives under consideration include measures that are useful in controlling the risk from such threats.

The Southern Research Station provided information on the acres at risk from southern pine beetle and acres at risk for oak decline. Table 3.60 displays the acres at risk from southern pine beetle and the acres at risk for oak decline by alternative in the first ten year period. As the threat from turpentine beetle is often linked with infestations of southern pine and Ips beetles, these three pests are considered together. In this comparison, Alternative E (because of focused treatments to maintain forest health in the Pine Oak Community) had the fewest acres, 63,000, at risk from SPB, while Alternative C with an aggressive forest health treatment strategy focused across all Communities has nearly as few acres, 66,000, at risk from SPB. Alternative C has, by far, the fewest acres, 7,000, at risk for oak decline when compared to the other alternatives; with Alternatives A, B, and D having the greatest number of acres at risk 91,000.

Table 3.60 Acres (x 1,000) at Risk for SPB and Oak Decline 1st 10 Year Period

Measure	Alternative				
	A	B	C	D	E
SPB Hazard	272	275	66	90	63
Oak Decline Risk	91	91	7	91	84

Age is a contributing factor to risk of disease infection or insect infestation. Older trees may have suffered damage from one or more sources, may be less vigorous, and do not tolerate stressors well. Seral stages (vertical structure) are surrogates for the age of the forest. Early seral describes the grass-forb/herbaceous condition, including the seedling and shrub condition, mid-seral describes sapling through poletimber conditions, and late seral describes immature and mature sawtimber conditions. Comparatively, Alternative B maintains the Forest in an older condition, and Alternatives C and D perform about the same in terms of forest age. Alternative C maintains the Forest in a condition that contains more acres in the early seral condition. Table 3.61 compares the alternatives by seral stages for Decade 1 and Decade 5.

Table 3.61 Seral Stages (acres x 1,000) by Decade, by Alternative

Seral Stage	Alternative									
	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Early Seral (0-20 age class)	205	338	238	354	319	556	283	445	279	388
Mid-Seral (poletimber)	657	364	573	230	584	220	637	314	564	239
Late Seral (immature and mature saw timber)	887	1,047	938	1,165	845	973	828	990	906	1,122

Treatments that are most beneficial to maintaining a healthy forest and reducing risk from insects and disease are thinning to reduce density which impairs the ability of the insects and/or diseases to spread; regeneration harvest to reduce stand age which increases vegetation vigor; uneven-aged management to reduce older, more vulnerable vegetation which induces regeneration; and prescribed fire to reduce stem density which maintains the Forest in a more open condition and maintains or enhances seed production in the nutrient rich grass/forb herbaceous vegetation layer.

Table 3.62 compares the alternatives by acres treated with prescribed fires (health prescription only), uneven-aged management, thinning, and even-aged regeneration.

Table 3.62 Treatments by Decade (Acres x 1,000) by Alternative

Treatment	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Prescribed Fire for Health[1]	504	504	312	312	795	795	415	415	425	425
Uneven Aged Harvest	250	250	110	110	100	100	200	200	125	125
Thinning	262	408	174	366	517	690	277	461	285	407
Even-Aged Regen Harvest	57	81	60	95	60	124	57	129	57	118

[1] Acres treated with the health prescription and does not include prescribed fire for fuel reduction or wildlife enhancement.

It is possible to maintain the Forest in a reasonably healthy condition, although active management or control of insects, disease, and invasive species is impractical due to high costs on a forest-wide scale. When insects, disease or invasive species are detected, the Forest observes the progression and effects of the potential outbreak and may institute control measures. All alternatives include monitoring. Forest monitoring and a reactive strategy when risk factors indicate an impending episode of infection, infestation or invasion are sufficient to sustain the Forest. Occasional outbreaks, though not always predictable, are natural and will continue to occur under all alternatives.

There are few ways to reduce the impact of diseases. The following summary describes the most likely effects and outcomes of diseases identified as threats to Forest resources. Because of the lack of predictability and the complexity of interaction of naturally occurring factors, there are few activities with the potential to affect the spread or control of diseases. In comparing alternatives, there is little difference found among alternatives.

Oak Wilt: Because of the relatively low threat and high treatment costs, none of the alternatives include treatments for oak wilt.

Dogwood anthracnose: Treatment of dogwood anthracnose generally requires application of fungicides; however, such treatment is too expensive to be used in the Forest. Current research on prevention and treatment of dogwood anthracnose is focusing on genetic resistance. All alternatives would react to dogwood anthracnose in a similar manner.

Dutch elm disease: Elms will gradually become less frequent in the Forest, but extermination of the species is not likely. Active management or control of the disease is impractical; therefore, all alternatives should be considered equal in reacting to Dutch elm disease.

Chestnut blight fungus: Continued blighting and withering of sprouts will slowly reduce the prevalence of chinquapin and debilitate rootstocks. Extermination of the species is not likely.

The two non-native invasive species of insects identified as a threat to the Forest, gypsy moth and fire ant, are troublesome, but unless an epidemic of gypsy moth were to coincide with other infections or infestations, neither invasive species is considered a lethal threat to Forest resources.

As the range for European gypsy moth expands, the frequency of introduction of gypsy moth on the Forest will likely increase. Activities, including tourism and commerce, may transport both the moth and the fire ant into previously uninfected areas. Control of gypsy moth to protect oak species may lead to the use of insecticides to locally eradicate the moth and prevent it from becoming established on the Forest. It is expected that occasional outbreaks of both insects will occur on the Forest.

To protect native forest communities from the threat posed by non-native invasive plant species, the Southern Region adopted a policy that prohibits use of certain persistent and highly invasive species for revegetation or rehabilitation. Many variables influence the introduction and spread of non-native, invasive plant species–so many variables that it is very difficult to predict the effects of Forest management in controlling non-native, invasive species. Introduction may be natural or human-caused and may be intentional or non-intentional. Increases in the number of people visiting the National Forest and increases in the number of residences in proximity to the National Forest increase the chance of invasive species introductions; however, the probability of establishment for most of the currently recognized species is amplified when introduction coincides with disturbance that provides receptive conditions, such as bare soil and strong sunlight. Alternative C includes the most active management and most numerous ground disturbing activities. Therefore, it includes the most opportunity for introduction and consequent spread of non-native invasive species. This may be balanced by Alternative C projecting the most active program of prescribed fire, which is likely to hinder the spread of some invasive species.

Cumulative Effects

Long-term, despite the Forest's best control efforts, the number of invasive plant species can be expected to increase due to natural spread and inadvertent introduction by human causes such as ground disturbance or transport of goods.

Fire

A concern for forest health and its relationship to the risks of catastrophic fire has resulted in a number of government-wide initiatives, including the National Fire Plan (NFP), the Healthy Forest Initiative (HFI), and Healthy Forest Restoration Act (HFRA). These initiatives recognize the natural role of fire in ecosystems and the problems that decades of fire exclusion in these ecosystems have created as it relates to hazardous fuel build-ups and the risk of catastrophic fire. As a result of fire ecology research, ecosystems have been classified based on fire regime and condition classes (FRCC), and assessments of FRCC can help managers determine where fuels mitigation activities and ecosystem management work is most needed.

Wildland and Prescribed Fire

Fire Management on the Ouachita National Forest encompasses a wide variety of activities including wildfire prevention efforts, wildfire suppression, hazardous fuel reduction (prescribed fire and mechanical treatments), ecosystem management including restoration, maintenance and enhancement of fire-adapted ecological communities, firefighter training, community assistance in dealing with wildfires, and the dispatching of firefighting resources to both fire and non-fire (or "all-risk") incidents.

Prescribed Fire

The rationale for prescribed fire varies and can include ecological restoration, fuels management, silvicultural or wildlife habitat improvement, control of non-native invasive species, or other objectives. A prescribed fire often meets multiple objectives. Prescribed fires are also conducted on the National Forest to help meet specific wildlife habitat objectives, to facilitate silvicultural operations, and to aid in the control of non-native, invasive species.

All prescribed fires require the completion and approval of a prescribed fire plan. These plans clearly state the objective(s) of the fire, document compliance with regional weather parameters and identify prescribed conditions needed to accomplish objectives (e.g. fuel moisture, wind direction, speed, relative humidity, mixing heights, transport winds, drought index). Screening is done to identify potential smoke sensitive targets up to 100 miles from planned fires. An emission model, fire behavior model, and smoke dispersion model are run prior to fire ignition to ensure compliance with state and federal standards and to predict fire intensity in response to specific burn objectives. A complexity analysis is done for fires where special integration/coordination is required. Specific mitigation (public notification, need for smoke warning signs, or other needed coordination) is documented. Weather is monitored periodically throughout the day of the burn. Other monitoring is conducted before, during, and after burns for implementation, effectiveness, and validation monitoring. Table 3.63 displays the five-year average of acres treated with prescribed fire 1999 – 2003.

Table 3.63 Prescribed Fire Statistics, 1993-2003

Ouachita National Forest Prescribed Fire Acres						
Fiscal Year	1999	2000	2001[1]	2002	2003	5 Year Average
Acreage	106,110	99,931	52,342	80,285	128,319	93,397

[1]Acreage reflects effects of ice storm.

Current Conditions on the Forest in the Regional Assessment of Fire Regime and Condition Class (FRCC)

The Assessment was based on analysis of the Continuous Inventory of Stand Conditions (CISC) database as of FY 2000. Table 3.64 summarizes acres by Condition Class for the Ouachita National Forest.

Table 3.64 Fire Regime Condition Class

Condition Class	Acres
1	44,747.84
2	402,870.92
3	1,140,167.37
Acres Not Assigned[1]	192,315

[1] Acres not recorded in CISC or appropriate for FRCC (such as water).

Based on the Region 8 Mid-scale Assessment, a minimum of 1,140,167 acres of the Ouachita National Forest is in the worst possible of Condition Classes (Condition Class 3). Approximately 402,871 acres are in Condition Class 2, and only about 44,748 acres are estimated to be in Condition Class 1.

Direct and Indirect Effects

While suppression strategies and resources needed to combat wildland fires will not vary by alternative, the level of prescribed fire for hazardous fuel mitigation and ecosystem management will vary.

Alternative C, because of the projected level of prescribed fires (250,000 acres annually), will provide the highest level of hazardous fuels reduction and ecological restoration and maintenance in fire-adapted ecosystems. A variety of other vegetation management tools (mechanical, herbicide, etc.) will likely also be used to restore rare ecological communities that are fire-dependent (e.g, glades and prairies). As needed, fire will be used to help control non-native, invasive vegetation whenever and wherever it is practical to do so.

Alternative E, at an average annual prescribed fire program of 180,000 acres, will likewise contribute significantly to fuels mitigation and ecological restoration, but will likely relegate some restoration of rare ecological communities and control of non-native invasive plant species to occurrences embedded in larger landscape burns.

The level of prescribed fire in Alternative B will be similar to that which has occurred over the last 5-10 years, about 100,000 to 125,000 acres annually. Priorities will be established based on the need for burning for Threatened and Endangered Species habitat areas (Red-cockaded Woodpecker, primarily), burning around communities at risk, and in the wildland urban interface and additional emphasis in fire-adapted old growth communities.

Alternative A projects about 68,000 acres, and Alternative D projects 100,000 acres of average annual prescribed fire. This level of burning will be needed to lower Condition Class in the wildland-urban interface/intermix (WUI) and to maintain minimum levels of critical habitat for RCW. Either of these alternatives can change or reverse viability trends for a number of flora and fauna, and hamper any effort to maintain fire-adapted old growth. Only 10 to 20 percent (roughly 250,000 acres) of the landscape will likely become, and be maintained, as Condition Class 1. Table 3.65 presents, by alternative, acres projected to be in fire regime condition classes 1–3.

Table 3.65 Fire Regime Condition Class (FRCC)

	Alternative				
	A	B	C	D	E
FRCC 1	265,834	84,402	356,480	140,101	291,555
FRCC 2	0	37,124	178,487	142,407	5,306
FRFC 3	1,464,656	1,608,964	1,195,523	1,447,982	1,433,628

Cumulative Effects

As more acres are restored to condition class 1 in ecological communities adapted to low-intensity periodic fire (Fire Regime 1), the woodland condition would prevail over a larger part of the landscape. In this condition, surface fuels are the primary component contributing to fire behavior. This would represent a change in current fuel profiles where surface fuels, aerial and ladder fuels can all contribute to fire behavior. The woodland types would include a more “grassy” fuel component (Fuel Model 2) as compared to the closed canopy forest fuel type (Fuel Model 9). In the woodland condition, total fuel loading would be less than in the forest condition (as much as half the current average fuel loading in tons per acre). There would not be as much of a woody live and/or dead fuels component to contribute to either flaming or smoldering fire behavior. In prescribed fires and wildfires, the grassy component would burn more easily, faster, and produce fewer smoke emissions (both in concentration and duration) as compared to current fuel conditions. Fire intensity would be less in the woodland condition and there would be less likelihood (risk) of stand-replacement burns. Suppression efforts would be less costly while providing a higher degree of safety to both the public and firefighters. Although the role of fire in fire-adapted ecosystems has been studied in recent years, it is not possible to precisely know the exact role that fire has played over time. Also, the role of fire may appear different depending on which years or time periods are compared. Given these uncertainties, the cumulative effect of prescribed fire will likely not restore the role of fire to the level it would have been in all fire-adapted ecosystems. None of the alternatives is likely to lead to much more than half of the fire-adapted ecosystems being restored to their natural mean fire interval. Of the alternatives being considered, Alternatives C and E place the most emphasis on ecological restoration and maintenance, while Alternatives A and D place the least emphasis in ecosystem management. Alternative B is intermediate by comparison.

Wildland Fire Suppression

Each year, Arkansas and Oklahoma experience hundreds of wildfires. Many of these fires threaten rural homes and other structures. Federal, state, and local rural fire departments are primarily responsible for controlling these wildfires.

Firefighting forces suppress most wildfires in the Forest while they are small. These fires often occur at times of the year and under conditions so that fire intensities are low or moderate resulting in little damage. Without prompt suppression, many of these fires would grow in size and eventually threaten homes and property. Some fires occur on “high fire danger” days, where low relative humidity and wind result in larger, more potentially destructive wildfires. These are most often springtime events. When summer and fall droughts occur, wildfires in Arkansas and Oklahoma can be very destructive, though infrequent. Table 3.66 displays fire occurrence statistics for the years 1980 – 2003.

Table 3.66 Ouachita Fire Occurrence Statistics by Calendar Year 1980 – 2003

	1980-1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Lightning	296	11	19	8	25	20	22	31	8	15	455
Equipment	55	6	4	2	7	5	13	3	5	4	104
Smoking	80	5	2	2	1	1	2	0	1	0	94
Campfire	55	3	2	4	5	6	1	3	3	4	86
Burning Debris	135	14	21	4	7	17	13	5	3	9	228
Rail Road	22	7	4	17	7	4	9	2	1	2	75
Arson	1,029	86	123	49	51	57	96	37	37	48	1,613
Children	7	1	0	0	1	0	1	0	0	0	10
Miscellaneous	188	11	11	8	10	14	12	12	9	12	287
Total # Fires	1,867	144	186	94	114	124	169	93	67	93	2,951
Total Acres	25,596	3,279	2,363	1,066	3,543	2,153	1,928	1,173	1,231	3,276	45,608

During the period from 1980 to 2003, about 15 percent of the wildfires on the Ouachita National Forest were lightning-caused, while 75 percent were human caused. Of the human caused fires, 55 percent were arson.

Wildland Fire Suppression – Fire Management Plan

The Fire Management Plan (FMP) documents program elements and direction in wildland fire suppression and management. It serves as a “desk guide” for implementing the fire management program as discussed in the Forest Plan resource objectives. This document identifies the objectives and constraints that regulate wildland fire suppression and use across the Forest.

A full range of suppression strategies may be utilized. Direct attack is most often the costliest, and is used whenever safety is a concern or to minimize acreage burned and resource values lost. Indirect attack often allows the fire to become larger by allowing it to spread out to pre-existing barriers in exchange for lesser costs. The option of simply monitoring the fire, both its behavior and effects, may be the most cost efficient strategy in those areas where the effects of the fire are desirable and the risk to safety or resource values is manageable. Firefighter and public safety is always the primary consideration for all suppression actions. Strategies and tactics for the fire should secondarily be commensurate with resource values at risk.

Direct and Indirect Effects

While the firefighting resources would remain stable regardless of alternative, the effects of wildfire (wildfire intensity, duration, and resistance to control) would change over time based on alternative. Alternatives C and E would lead to conditions with lower fuel loading occurring on a significant portion of the forested landscape. All WUI areas would be maintained as Condition Class 1. Snags would likely be less of a problem in treated stands and firefighter safety would be better addressed. Fire suppression costs would likely go down in Alternatives C and E over time as fire fuels are reduced. Alternative B would be intermediate in response to fuels mitigation and firefighter/public safety by comparison. Alternatives A and D would provide the least responsiveness to these concerns (fuels mitigation, suppression costs, and firefighter and public safety).

Cumulative Effects

The effects of prescribed fires are usually short-lived and cumulative impacts are generally ascribed to benefits to soil and potential for smoke accumulation. The impacts of prescribed fire on soils are expected to stay within established limits for all alternatives. Due to the proximity of the Ouachita National Forest with the Ozark-St. Francis National Forests, which also have burn programs, there is potential, depending on wind speed and direction, for cumulative effects from smoke produced from the prescribed fires to accumulate in areas more than if just one Forest was implementing a burn program. See the Air Quality effects section for additional information.

Wildland Urban Interface/Intermix

As the populations increase and private lands within the forest boundaries become populated with single structures, small farms, poultry operations, and other developments, the wildland-urban interface/intermix (WUI) is becoming more of an issue. Many rural residents typically like to live in wooded surroundings and desire to maintain a natural vegetative setting around structures, which blends property into the adjacent forested environment. While being aesthetically pleasing, an unmanaged forest setting on private land or on federal land adjacent to private structures can become a hazardous fuel issue in the event of a wildfire. Nationally, the direction is to increase hazardous fuel treatment either with prescribed fire or mechanical treatments in WUI areas. These areas pose the greatest threat to public and firefighter safety as well as being the most complex and expensive areas to suppress wildland fires. A variety of methodologies were assessed to provide an estimate of WUI on the Forest.

Communities at Risk

State and federal land managers for the states of Arkansas and Oklahoma developed a list of communities at risk. This list was published in the Federal Register (Federal Register 66:751, 2001); over 500 communities were listed. A GIS analysis was used to help identify how many communities are at risk. Such communities within one-half mile of National Forest System land are listed in Table 3.67.

Table 3.67 Communities at Risk on or Near the Ouachita National Forest

Arkansas	Oklahoma
Alamo	Big Cedar
Avant	Black Fork
Big Fork	Haw Creek
Bonnerdale	Lenox
Cedar Creek	Page
Harvey	Pleasant Hill
Mountain Pine	Stapp/Zoe
Norman	Tom
Oden	
Onyx	
Sims	
Story	
Waltreak	

Of the communities at risk near the Ouachita National Forest, there are about 2,583 acres of federal land within the half-mile boundary. The breakdown of Condition Class on federal land in relation to communities at risk is shown in Table 3.68.

Table 3.68 Acreage by Condition Class of Land within 0.5 Mile of Communities at Risk

Category	Acres
Condition Class 3	2,043
Condition Class 2	511
Condition Class 1	29
Private Land	11,723
Total Acres in 0.5 mile radius	14,306

In addition to the lands in Table 3.68, there are approximately 80,393 acres of private and National Forest System lands in the wildland urban interface/intermix, as determined via a Geographic Information System analysis of a study conducted by the University of Wisconsin found online at http://silvis.forest.wisc.edu/projects/WUI_Main.asp.

Direct and Indirect Effects

All the alternatives focus attention on fuels mitigation projects in the WUI and near communities at risk. All the alternatives call for enough prescribed fire to accomplish the task of lowering Condition Class in the immediate vicinity of these areas. Alternatives calling for 125,000 acres or more of prescribed fire (Alternatives B, C, and E) provide the best potential benefit of treating even larger landscapes intersecting the WUI and treating fuels surrounding communities at risk.

Cumulative Effects

Over time, fuels reduction due to prescribed fire will reduce the fire hazard in the WUI leading to less damage to private properties than fires with heavy fuel loads. Also, reduction in fuels will, over time, benefit fire control by reducing resistance to control. Overall, risk to communities should be significantly reduced as a result of fuel reduction in the WUI.

Social and Economic Environment (Local Community Effects)

Social analysis coupled with economic and demographic information forms the human dimension of ecosystem management. This section characterizes demographic (social) changes; economy trends; values, attitudes, and beliefs; effects of national forest management on the local economy; and the efficiency of national forest programs to the tax paying public.

Social attitudes, values, and beliefs are elements used to describe and understand the human dimensions of resource management. This information is used to predict possible effects on local communities. These effects may include acceptance of or resistance to the decisions made. This information is used with the biological and physical analysis to best understand potential effects on the land as well as the human environment.

Demographic Changes

One characteristic of an area used to determine how dynamic and subject to change it may be is the growth of population and its various racial and ethnic components within the counties that comprise a national forest. A static population would imply few possible issues affecting change. Conversely, a dynamic, growing population may produce many conflicting issues for land managers to consider. Certain areas of the Forest and surrounding lands that are attractive to urban dwellers for recreation, second homes, or retirement may have the greatest potential for generating conflicts with traditional residents of the area dependent upon the resources of the Forest for their livelihoods and with national forest management.

Demographic changes are given for the Forest; then a contrast is made with the states in which the Forest exists (Arkansas and Oklahoma). When data are available, contrasting data are usually made for the Census decades of 1980, 1990, and 2000. Other data from non-Census sources may present years that differ from these decadal periods. Tables in Appendix B present all counties within the Forest proclamation boundaries. At times, the narrative will point out unusual characteristics of individual counties; the reader will be referred to the Appendix B for further contrasts with the remaining Forest counties.

Appendix B, Table B.13 shows total population and rates of change for each county within the Forest proclamation boundary. Saline County showed the most growth, with over 20 and 30 percent growth for the 1980 and 1990 decades, respectively. Several counties showed negative growth during the 1980s, but most counties in the Forest area showed strong growth during the 1990s. Total percent growth of the Forest counties exceeded the percent growth of Arkansas as a whole. Thus, little growth was evident in both the Forest and the states during the 1980s, but growth picked up substantially in the 1990s for all three.

Appendix B, Table B.14 contains population characteristics (especially minority) for all counties. Population increased by 4.0 percent from 1980 to 1990 in Forest boundary counties, compared with 2.8 percent for Arkansas and 4.0 percent for Oklahoma. More currently, the change from 1990 to 2000 was 13.7 percent for Arkansas, 9.7 percent for Oklahoma, and 15.8 percent for the Forest area. Meanwhile, minority share of the population was 17.3 percent for Arkansas, 14.1 percent for Oklahoma, and 9.5 percent for the Forest area for 1980, and 20.0 percent for Arkansas, 27.2 percent for Oklahoma, and 14.0 percent for the Forest area for 2000. In Oklahoma, Howard, LeFlore, and McCurtain Counties had over 20 percent shares of their population represented by minorities (see Appendix B, Table B.14). All areas have increased their share of minority residents over the last 20 years.

Table 3.69 illustrates significant population variable changes from 1980 to 1990 and 1990 to 2000 on all counties within the Forest boundary.

Table 3.69 Minority Population

	1980 Minority	1990 Minority	2000 Minority	Pop. Change ’80-‘90	Pop. Change ’90-‘00
Forest Counties	9.5%	10.6%	14.0%	4.0%	15.8%
Arkansas	17.3%	17.3%	20.0%	2.8%	13.7%
Oklahoma	14.1%	18.5%	27.2%	4.0%	9.7%

Source: U.S. Census Bureau from USDA NRIS HD Model

Table 3.70 displays population density for Forest boundary counties and for the States of Arkansas and Oklahoma.

Table 3.70 Population Density (Persons per Square Mile)

	1990	2000
Forest Boundary Counties	80.3	96.9
Arkansas	45.1	51.3
Oklahoma	45.8	50.3

Source: U.S. Census Bureau from USDA NRIS HD Model

Population density was 45.1 people per square mile in Arkansas in 1990, while the population density for the Forest was almost twice this rate, 80.3 people per square mile. Population density in 2000 increased marginally to 51.3 persons per square mile in the state, a 14 percent increase, while the Forest counties increased to 96.9—a 21 percent increase. Population density is especially high in Sebastian County (214.6 persons/square mile) and Saline County (115.5 persons/square mile) in 2000. Other counties within the Forest boundaries had densities below 50 in 2000 (see Appendix B, Table B.15).

The significance of these population changes is that the Forest boundary population grew at a faster rate for the 1980 to 1990 decade and for the 1990 to 2000 decade than that of Arkansas. Oklahoma grew at a similar rate to that of the Forest in the 1980’s decade, but slower in the 1990’s decade.

Minority population share of the total still lags behind that of the States of Arkansas and Oklahoma. This is to be expected because of the larger urban populations found elsewhere in the States. Minority population grew at a 76 percent rate compared to a 35 percent rate for Arkansas and a 92 percent rate for Oklahoma from 1980 to 2000.

The rural nature of the area is contrasted with the states in Table 3.71. For a breakout of all counties within the Forest boundaries, see Appendix B, Table B.16.

Table 3.71 Percentage of Population in Rural Areas

	1980	1990	2000
Forest Boundary Counties	52.7	51.7	52.5
Arkansas	48.4	46.5	47.6
Oklahoma	32.7	32.3	34.7

Source: U.S. Census Bureau from USDA NRIS HD Model

Although there was loss of rural share in the Forest area during the 1980's, the rural characteristic of the Forest analysis area has changed only slightly in the 1980-2000 period. The percentage of persons living in rural areas for the aggregated counties making up this area decreased slightly from 52.7 percent in 1980 to 52.5 percent in 2000. This compares with the less rural character of Arkansas, which decreased from 48.4 to 47.6 and Oklahoma, which increased from 32.7 to 34.7 percent from 1980 to 2000.

Appendix B, Table B.18 indicates that Montgomery, Perry, and Pike Counties in Arkansas were 100 percent rural in 2000. All Arkansas cunties except Garland and Saline became slightly more rural from 1980 to 2000. In Oklahoma, LeFore and McCurtain Counties both became more rural from 1980 to 2000. LeFlore increased from 62 percent in 1980 to 69 percent in 2000.

There appears to be a significant rise in population growth in the Forest analysis area in the 1990 decade—a characteristic that was absent during the 1980s. This rural characteristic of the area, however, remained about the same from 1980-2000.

Per capita income is a relative measure of the wealth of an area. t constitutes the personal income from all sources divided by the population of that area. For the Forest analysis area, the per capita income average was $9,647 and $15,737 in 1990 and 2000, respectively. Per capita income for Arkansas was $10,520 and $16,904 in 1990 and 2000, respectively. Per capita income for Oklahoma was $11,893 and $17,646 in 1990 and 2000, respectively. These statistics are presented in Table 3.72. Per capita income is slightly more than $1,000 less in the Forest area than in Arkansas and slightly less than $2,000 in Oklahoma when 1990 dollars are adjusted to 2000 dollars (see Appendix B, Table B.19).

Table 3.72 Per Capita Income

	1990	1990 Adjusted to 2000 $'s	2000	Real Avg. Annual Change*
Forest Boundary Counties	$9,647	$12,559	$15,737	2.3
Arkansas	$10,520	$13,886	$16,904	2.0
Oklahoma	$11,893	$15,699	$17,646	1.2

Source: U.S. Census Bureau from USDA NRIS HD Model
*Real rates of increase were determined by inflating 1990 housing prices to 2000 with the Consumer Price Index Deflator

The real average change in Forest area income between 1990 and 2000 was 2.3 percent per year, which contrasts with that of 2.0 percent per year for Arkansas and 1.2 percent per year for Oklahoma. Perry County was the fastest growing county for per capita income (3.3 percent per year on a real basis) over the 1990 decade.

Income for the Forest area grew faster than income for Arkansas and Oklahoma on a real basis (inflation adjusted) during the 1990's. Thus, the financial well being of the population increased at a greater rate in the Forest area than that of Arkansas and Oklahoma for the 1990's decade.

Another indicator of relative economic prosperity is the percent of the workforce out of work. Unemployment rates change dramatically over time, depending in large part on the national economy. Some areas have protracted unemployment problems because of low educational attainment and lack of skills.

In 2001, the Forest had a similar unemployment rate (5.2 percent) to that of Arkansas, but the rate was much higher than the rate for Oklahoma (3.8 percent) as shown in Table 3.73. The Forest unemployment rate was calculated as a weighted average (unemployment rate and number of unemployed) of all counties in the area (see Appendix B, Table B.20).

Table 3.73 Unemployment Rate (Percent)

	1995	1998	2001
Forest Boundary Counties	5.5	5.9	5.1
Arkansas	4.9	5.5	5.1
Oklahoma	4.7	4.5	3.8

Source: U.S. Bureau of Labor Statistics from USDA NRIS HD Model

During the period of 1995 to 2001 the unemployment rate for the Forest area decreased by 0.4 percent. The rate for Arkansas increased marginally by 0.2 percent and the rate for Oklahoma decreased by almost one percentage point. Ashley, Hot Spring, and Perry Counties in Arkansas, and McCurtain County in Oklahoma had unemployment rates that were significantly higher than the Forest average for 2001. Unemployment on average in the analysis area was about on par with that of Arkansas but much higher than Oklahoma in 2001.

Poverty is represented in Table 3.74 (more specific Forest information can be identified in Appendix B, Table B.21):

Table 3.74 Poverty Rate (percent)

	1980	1990	2000
Forest Boundary Counties	17.0	17.5	14.8
Arkansas	19.0	19.0	16.0
Oklahoma	13.4	16.7	14.7

Source: U.S. Census Bureau from USDA NRIS HD Model

Five counties in the Forest area had poverty rates in 2000 greater than the weighted average for the analysis area. McCurtain County, Oklahoma, had a 2000 poverty rate of 24.7 percent, the highest of all counties in the Forest area. At 7.2 percent, Saline County had the lowest poverty rate in 2000. Generally, all counties experienced declining poverty rates from 1980. Only Sebastian and McCurtain Counties had slight increases over this time. The average was lower for the Forest (14.8 percent) than Arkansas (16.0 percent). Since 1980, the poverty rate has declined by 2.2 percent for the Forest area, 3 percent for Arkansas, but it has increased by 1.3 percent in Oklahoma.

Transfer payments from the federal government to the states and their citizens are another indicator of relative poverty in an area. Transfer payments are payments to persons for which they do not render services in the current period. As a component of personal income, they are payments by government and business to individuals and nonprofit institutions. Although most of transfer payments are made in cash, they also include Medicare, Medicaid, and food stamps. At the state level, approximately 90 percent of total transfer payments are estimated on the basis of directly reported data. The remaining 10 percent are estimated on the basis of indirect, but generally reliable, data.

Table 3.75 illustrates the analysis area average versus the state receipts of these payments from the federal government. The growth rate in federal transfer payments for the Forest analysis area is similar to that of Arkansas, but faster than the growth rate for Oklahoma from 1970 to 2000. Appendix B indicates that Saline County had a 7 percent growth rate of payments over this period. For McCurtain and LeFlore Counties, OK, payments grew only 2.4 percent and 3.1 percent per year, respectively.

Table 3.75 Federal Transfer Payments to Individuals

	1970 (000 $'s)	1990 (000 $'s)	2000 (000 $'s)	Real Rate of Avg. Annual Change '70-'00*
Forest Boundary Counties	$641,877	$1,616,605	$2,220,034	4.2%
Arkansas	$3,022,006	$7,598,406	$10,382,800	4.2 %
Oklahoma	$4,356,595	$9,399,962	$12,770,090	3.6 %

Source: U.S. Bureau of Economic Analysis
*Real rates of increase were determined by inflating 1970 dollars to 2000 with the Consumer Price Index Deflator

Another factor indicating relative poverty and social disparity for an area is the percent of households headed by a female member. The greater this percentage is, the more likely that these households may be on some form of government assistance. Table 3.76 contrasts the experience for the two areas of comparison:

Table 3.76 Female Head of Households

	1990 Female Head of Households (percent)	2000 Female Head of Households (percent)
Forest Boundary Counties	5.5	6.4
Arkansas	6.3	7.4
Oklahoma	6.1	7.0

Source: U.S. Census Bureau from USDA NRIS HD Model

For 1990 and 2000, female-headed households were slightly less in the Forest analysis area than for Arkansas and for Oklahoma. A lower percentage of female-headed household for the Forest may indicate greater social cohesion from the extended family. For the Forest, from 1990 the share of female-headed households with children present has increased by almost one percent. This may be indicative of a higher divorce rate in the 1990s than before.

A few counties such as Ashley, Howard, and McCurtain had female household percentages larger than that of the state of Oklahoma and Arkansas in 2000. These same counties plus LeFlore, Oklahoma had household sizes larger than that of both states in 1990 (see Appendix B, Table B.26). This may indicate less social cohesion and more economic adversity than counties with much lower percentages.

The number of persons per household also indicates economic status in a region. The greater the average number of persons per household, the less prosperous an area tends to be. Density of households is shown in Table 3.77. More specific information about individual Forest county information on households can be found in Appendix B.

Table 3.77 Density of Households

	1990 Persons Per Household	2000 Persons Per Household
Forest Boundary Counties	2.7	2.5
Arkansas	2.6	2.5
Oklahoma	2.6	2.5

Source: U.S. Census Bureau from USDA NRIS HD Model

The change in household size from 1990 to 2000 decreased slightly for the Forest and both states. Most of the counties in the Forest analysis area had household sizes that approximated the average for the Forest and the state. Very large households do not seem to be a characteristic of the Forest analysis area.

Table 3.78 shows that the decade of the 1990s appears to be a decade of moderate growth. Housing unit growth from 1990 to 2000 was 17.7 percent for the Forest area, while Arkansas showed a similar growth rate of 17.2 percent. Oklahoma's growth was less than half of Arkansas' and the Forest's. Such a contrast is explained by the slower population growth in this decade than either Arkansas or the Forest. Housing unit growth in Saline County showed the greatest growth (37.5 percent) of the analysis area counties. Ashley and Scott Counties showed the least growth, with 8.1 and 9.8 percent, respectively (see Appendix B, Table B.27).

Housing vacancy rates have decreased marginally in the last 10 years. The Forest analysis area had rates about one and one-half percent more than that of Arkansas in 1990. In 2000, the rate differential between the Forest and Arkansas was only 0.6 percent. Meanwhile, Oklahoma's vacancies decreased from 14 to 11 percent from 1990 to 2000. Thus, housing over-supply has diminished in all three areas. For 2000, housing vacancy was especially high in Garland, Montgomery, and Pike Counties, with rates of 16, 25, and 19 percent, respectively. All of these counties except Pike had rates in 2000 that were lower rates than 1990 (see Appendix B, Table B.27).

Table 3.78 Housing Units

	Housing Unit Percent Change 1990-2000	Percent Vacant Units 1990	Percent Vacant Units 2000
Forest Boundary Counties	17.7	12.4	11.7
Arkansas	17.2	10.9	11.1
Oklahoma	7.7	14.0	11.0

Source: U.S. Census Bureau from USDA NRIS HD Model

Median housing value is contrasted in Table 3.79. Housing values within the Ouachita analysis area tend to be substantially below that of Arkansas and Oklahoma. Housing values are determined principally by the extent of demand. Higher prices are a result of greater demand. Population and job increases play a factor in the extent of demand for housing. Population has only begun to increase at a significant rate in the 1990s. The prior decade population grew at a small pace. Housing stock increased at a significant rate in the decade of the 1990's. However, value is still low compared with both states which have the influence of urban areas and can support higher priced housing. At any rate, it appears that the Ouachita analysis area is fairly dynamic as far as new home additions, slightly exceeding the growth rate of the States. Population and wage and salary growth will have to increase significantly to warrant significant increases in housing values.

Table 3.79 Housing Value

	1990 Median Value	2000 Median Value	Real Avg. Rate of Change 1990 - 2000*
Forest Boundary Counties	$38,440	$60,360	1.75%
Arkansas	$46,000	$72,800	1.83 %
Oklahoma	$47,600	$70,700	1.19%

Source: U.S. Census Bureau from USDA NRIS HD Model
*Real rates of increase were determined by inflating 1990 housing prices to 2000 with the Consumer Price Index Deflator

Appendix B, Table B.28 shows the median housing values of all counties in the Forest analysis area. Forest boundary counties housing values are significantly below those of both states. However, Garland, Saline, and Sebastian Counties have median values that significantly exceed those of the analysis area and the states.

Trends in the Economy

Analyzing the major sectors of an economy allows insight into how diverse it is and what industries may be driving its growth. Appendix B shows the entire economy broken out by important industry sub-sectors for wood products. There is also an estimate of wild land recreation developed in a Forest Service publication (Technical Advice Bulletin TAB-05032004) that provides an estimate of labor income from recreation activities for both federal and non-federal sources in each county.

Table 3.80 shows the Manufacturing sector, the sub-sectors for wood based industries, and an estimate of the wild land recreation for a percentage share of labor income for 1990 and 2000. Employment share is given for all categories except wildland recreation. Recreation is not a sector of an economy but comprises several of the services and retail industries.

Table 3.80 Economic Diversity

Sub-Sector	1990 Employment % of Total Economy	2000 Employment % of Total Economy	% Average Annual Change '90-'00	1990 Labor Income % of Total Economy	2000 Labor Income % of Total Economy	% Real Average Annual Change '90-'00
Manufacturing	23.9	21.1	1.1	31.1	26.9	1.1
Lumber & Wood Products	3.5	3.1	1.2	4.4	4.0	1.6
Wood Furn. & Fixtures	1.1	0.9	0.0	1.0	0.9	0.0
Paper & Pulp Products	2.0	1.3	-1.7	4.4	3.0	-1.2
Total Wood Products	6.6	5.3	0.3	9.8	7.9	0.4
Wild land Rec.	NA	NA	NA	2.5	2.0	-2.1
Total Economy*	$223,037	$282,909	2.4	$5,696.7	$7,325.9	2.5

Source: IMPLAN 1990 and 2000 Data
*Real rates of change were determined by inflating 1990 to 2000 with the Gross National Product Price Index Deflator

It is evident that the Forest area economy is becoming slightly less reliant on the manufacturing sector (it is becoming more diverse). Its importance declined by more than 4 percent of the share of labor income from 1990 to 2000. Still, manufacturing is a relatively large proportion of the local economy's labor income, representing almost 27 percent of the economy in 2000.

Of the wood manufacturing sector, total wood products maintain a 7.9 percent share of the local economy's labor income in 2000. This is a relatively large decrease from the 9.8 percent share it had in 1990. Employment's share diminished from a 6.6 percent share in 1990 to 5.3 percent share in 2000.

Wild land recreation, which includes federal and state recreation areas, decreased in share from 1990 by 0.5 percent share to 2.0 percent of the local economy, as measured by labor income. There are no estimates of employment for recreation.

Tables B.29 – B.38 in Appendix B compare the Forest analysis area's economy for 1990 and 2000 for all nine major sectors of the economy.

The overall composition of the analysis area economy has not changed greatly from 1990. The only sector besides manufacturing that has changed significantly is Services, which increased from 21.6 to 25.1 percent in 2000 as measured by employment change. Other sectors changed less than one percent. The entire economy's labor income grew at an average annual rate of 2.5 percent over the 1990 decade (based in constant 2000 dollars).

The estimate for wild land recreation's labor income decreased from 2.5 in 1990 to a 2.0 percent share of the 2000 economy, indicating the overall economy has grown faster than recreation activity. Thus, the local economy has changed little in the last 10 years. The economy's main drivers are Manufacturing and Services. Table 3.81 shows the average annual growth rate in employment and labor income over the 1990s.

Table 3.81 Economy Dynamics

	Employment Average Annual Change 1990-2000	Labor Income Average Annual Change 1990-2000
Forest Boundary Counties	2.4 percent	2.5 percent

Source: IMPLAN 1990 and 2000 Data

Both employment and constant 2000 dollar labor income have grown at nearly the same average annual rate (2.4 percent versus 2.5 percent, respectively).

Another way to indicate diversity of an economy is with the Shannon-Weaver Entropy Indexes of diversity. This process generates a relative measure of how diverse a county is with a single number. The entropy method measures diversity of a region against a uniform distribution of employment, where the norm is equi-proportional employment in all industries. All indices range between 0 (no diversity) and 1.0 (perfect diversity). These two extremes would occur when there is only one industry in the economy (no diversity) and when all industries contribute equally to the region's employment (perfect diversity). In most cases, diversity would be registered somewhere between 0 and 1.0. Another factor affecting the magnitude of the index is the number of industries in a local economy; the greater the number, the larger the index.

Table 3.82 contrasts the change in diversity from 1990 to 2000 at the four digit SIC or individual industry level. For a point of reference, Arkansas serves as comparison. Appendix B, Table B.38 illustrates the indexes for all counties in the Ouachita analysis area.

Table 3.82 Shannon-Weaver Entropy Indexes

	1990 Index	2000 Index	Percent Change
Forest Boundary Counties*	0.63224	0.64220	1.6
Arkansas	0.74039	0.73581	-0.6
Oklahoma	0.70993	0.71233	0.3

*Weighted Average Estimate of Aggregated Counties. Weighted by full-time and part-time employment in their respective years.
Source: USDA Forest Service, Information Monitoring Institute

The indexes measuring diversity show a slight increase in diversity in the Forest analysis area between 1990 and 2000, a slight decrease in Arkansas, and a slight increase in Oklahoma. The Forest area became 1.6 percent more diverse while Arkansas became 0.6 percent less diverse. Oklahoma percent gain in diversity was 0.3 percent over the 1990s. Yell County had the greatest increase in diversity during 1990s, about a 9 percent change. Meanwhile, Logan County, at minus 1.6 percent, had the greatest decrease during the decade.

As indicated by the analysis above of the Ouachita economy, the overall change over the 1990 decade was marginal. This is substantiated by these diversity indexes, which changed very little.

A principle way an economy grows is by export of goods and services. Most typically, manufacturing activity is thought of as providing most of this export related activity. However, services and retail trade can be considered “export” industries if significant visitors come in from outside in travel related activities to bring in new dollars. A manufacturing industry can be a net importer if it imports more of a commodity that it exports.

Table 3.83 compares the exporting characteristics of the Forest’s analysis area for 1990 and 2000.

Table 3.83 Exports by Selected Industries

	1990 Net Exports*	2000 Net Exports
Lumber & Wood Products	$462	$763
Wood Furniture & Fixtures	$90	$112
Paper & Pulp Products	$727	$772
Total Manufacturing	$1,391	$1,962
Total of All Sectors	-$227	-$3,188

*1990 Dollars Converted to 2000 Dollars via GDP Price Deflator
Source: IMPLAN 1990 and 2000 Data in millions of dollars

The chart shows that this Forest’s local economy went from a net importing economy in 1990 to an even greater net importing economy in 2000. The 1990 decade saw the total economy’s reliance on imports increase by 14 fold over 1990, thereby becoming more reliant on other areas for its goods and services production. Wood Products, meanwhile, showed large changes in the three wood products sectors whereby those industries actually gained in their net exporting status. Total manufacturing also gained in net exporting by 41 percent in the 1990 decade. Wholesale and Retail Trade; Finance, Insurance, and Real Estate; and Services were sectors that showed the greatest change in net imports over the 1990 decade. The only positive exporting sectors were Manufacturing and Construction (see Appendix B, Table B.40).

In summary, the Forest area economy is less diverse than the regional Arkansas and Oklahoma economies. Both states and the Forest analysis area became slightly more diversified over the 1990 decade. Most of the individual counties in the analysis area showed small increases over the decade as indicated by the Shannon-Weaver indices.

Annual Payments to Counties with National Forest System (National Forest System) Lands

Under the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393), counties with National Forest System lands periodically elect one of the following options for annual payments from the U.S. Treasury (compensating them for the absence of property taxes on these lands):

- An annual "25-percent payment"
- A "full payment amount"

The traditional 25-percent annual payment is based on the gross revenues from timber sales and other revenue-generating activities on a national forest in a given fiscal year. Under this method, payments to states vary from year to year according to the actual revenues generated. States then apportion these payments among counties based on their national forest acreage. Among Ouachita National Forest counties, Ashley, Hot Spring, Howard, and Pike Counties (all in Arkansas) elected 25-percent payments and, under the current law, will remain under that payment system until at least October 2006. (For Ashley, Hot Spring, and Howard Counties, the 25-percent payments averaged $4,300 or less from 1986 through 1999; Pike County averaged only $10,600 per year. Three of these counties have less than 1,700 acres of National Forest System land; Pike County has 10,341 National Forest System acres.)

Counties selecting the "full payment amount," on the other hand, receive payments based on an average of the three highest 25-percent payments to the state from fiscal year 1986 through fiscal year 1999. Full payment amounts, which typically are apportioned among counties based on their proportion of a national forest's acreage, increase or decrease only in response to changes in the consumer price index for rural areas (published by the Bureau of Labor Statistics). Currently, among Ouachita National Forest counties, Garland, Logan, Perry, Polk, Montgomery, Saline, Scott, Sebastian, and Yell Counties in Arkansas and McCurtain and LeFlore Counties in Oklahoma have selected this payment method through fiscal year 2007.

Payments in Lieu of Taxes (PILT) are funds that the federal government transfers to counties with federal lands to help offset the non-tax status of those lands within their boundaries. For counties with National Forest System lands, PILT covers shortfalls from other payments (25 percent payments or "full payments," as previously explained); in recent years, if the other payments compensated counties at a rate of less than about $1.75 per acre, PILT made up the shortfall.

Direct, Indirect, and Cumulative Effects

Because the full payment amount is not based on current-year or future-year national forest revenues, none of the alternatives would have any direct, indirect, or cumulative effect on payments to counties selecting the "full payment amount," as long as the Secure Rural Schools and Community Self-Determination Act, which is up for reauthorization in 2006, remains in force. If counties revert to or remain (in four cases) on 25 percent payments, their annual payments very likely will be highly variable, because they will be tied to fluctuating revenues from timber sales and minerals exploration and leasing operations. (Recreation revenues play little or no role in payments to counties, because most fees for camping and day use are reinvested in the developed recreation sites areas where fees are charged.) PILT would help dampen some of the variation in total compensation paid to counties under 25 percent payments. Because the alternatives differ little in terms of projected gross revenues from timber sales and even less in terms of annual minerals activity, none of the alternatives will likely generate more timber- and minerals-associated revenues than the others; thus, even under the 25 percent payments system, the alternatives should not differ in terms of their direct, indirect, or cumulative effects on payments to counties.

Summary of Demographic and Economy Changes

Population and economic dynamics are changing at a moderate rate within the Forest analysis area. While population grew very slowly from 1980 to 1990, growth has seemed to increase substantially during the 1990s. The rate of increase was 15.8 percent over this period, about two percentage points ahead the growth rate of the comparison area Arkansas, but substantially over the 9.7 percent growth rate in Oklahoma. Increased population suggests the area may have new residents from outside the area, which will present non-traditional ideas from those of long-standing residents, possibly those that are non-commodity based.

Minority population's share has changed significantly within the analysis area from 1980 to 2000. Minority share has increased about five percent from 9.5 percent to 14 percent over this time, indicating significant growth. These numbers are less than the share found in the Arkansas and Oklahoma in 2000 (20 and 27.2 percent, respectively). This growth in minority population provides increased opportunities for minority participation in local recreation endeavors.

The analysis area's rural-urban characteristic has not changed significantly since 1980. Rural share was about 53 percent in both 1980 and 2000. The lack of large cities in the analysis area tended to keep the rural share even.

The area's economic health as measured by per capita income grew at a robust rate during the 1990s, 0.3 percent per year, greater than that of Arkansas's rate. Still, per capita income in 2000 was about $1,200 less than that of the Arkansas and about $2,000 less than Oklahoma.

The area's unemployment rate has decreased by 0.4 percent from 1995 to 2001. The rate in 2001 was equal to the rate of Arkansas, 5.1 percent, but much higher than that of Oklahoma, 3.8 percent. Income growth rate in this area has progressed steadily, indicating that the area is relatively economically strong. People with strong incomes and jobs are more likely to have free time and need an outlet for recreation.

The area's poverty rate has declined by over two percent from 1980 to 2000, 2.2 percent to 14.8 percent. Meanwhile, Arkansas's rate has decreased by 3 percent over the same time period to 16 percent and Oklahoma's rose by almost a percent and one half to 14.7 percent. Saline County's 7.2 percent poverty rate and a large population component in 2000 played a part in the favorable Forest county poverty rate versus that of the state.

Transfer payment in the Forest analysis area showed the same average annual real rate of growth from 1970 as that of the Arkansas (4.2 percent). Meanwhile Oklahoma's transfer payments grew from 1970 to 2000 by an average real rate of 3.6 percent. In constant 2000 dollars, payments increased by $0.64 billion to $2.2 billion in 2000. Therefore, the rate of government assistance for the analysis area is on par with that of the Arkansas, but ahead of that of Oklahoma.

Percentage of female head of households was lower than both state's percentage. Persons per household was slightly larger than both states' average, another good sign of an area lacking protracted economic problems.

Housing unit growth was slightly greater than that for Arkansas and more than twice as great as Oklahoma's growth rate for the 1990s, a sign of relative prosperity. Median housing value in 2000, however, is still about $12,500 less than the Arkansas's average of $72,800, and about $10,500 lower than Oklahoma's median housing value, a condition which can be expected with a larger urban component which tends to be associated with more demand for housing and thus higher prices.

The Forest analysis area's economy has become less reliant on the manufacturing sector. As measured by labor income, manufacturing produces about 27 percent of the salaries and wages in this economy during 2000. During the 1990s, the economy did not change drastically. Other than Manufacturing's change from a 31 percent to a 27 percent share of labor income, there was no other sector that had dramatic shifts in share other than government, which changed from 9 to 14 percent during the 1990 to 2000 period. Wood products manufacturing in 2000 held about an 8 percent share of the labor income share of the total Ouachita economy in 2000, down from about 10 percent in 1990. Wild land recreation, meanwhile, decreased marginally from 2.5 to 2.0 percent over the decade.

The Shannon-Weaver Entropy indexes show that the Ouachita analysis area has grown slightly more diversified overall since 1990. This would be expected in an expanding economy.

Since 1990, the area has changed from a marginally net importing regional economy with $0.23 billion (in 2000 dollars) in imports to a significant importing area with $3.2 billion in net imports in 2000. Because an economy grows with industries that produce for export, the Ouachita area must send its dollars outside the area to purchase goods and services for its economic consumption. Preferably an economy would rather attract new money via exports so that money may remain in the area to turn over in additional economic transactions before it leaks out. Economies that export more than they import are able to grow faster than those that are net importers.

Wood based industries have increased their exports over the decade from $1.3 billion to $1.6 billion in 2000. Other than Manufacturing, the only other major sector in this economy to be a net importer is Construction.

Thus, the economy and demography of this area appears to be healthy for a rural area. Population grew steadily in the 1990s; poverty is at a relatively low level. Housing construction is vigorous. The economy's composition has changed only marginally in the last decade. It has become more reliant on importation of goods and services, rather than production of its own goods and services for export. A fairly diverse economy has resilient characteristics that allow it to weather downturns in the economy. Most of the economic and demographic variables looked at in this overview were comparable with those of Arkansas and Oklahoma; therefore, most social and economic characteristics seem to be on par with both states.

Values, Attitudes, and Beliefs of Populations within the Forest Commuting Area

Public interest and desires are integral to the implementation of programs and activities related to forest management. In determining public preferences, the Ouachita National Forest developed and implemented programs of public information about plan revision and solicited the public's comments on topics likely to change or become controversial in the revision of the 1990 Forest Plan. Beginning in June 2002 and continuing throughout the course of plan revision, the Plan Revision Team visited with the public at 19 meetings and open houses. Citizens visited with Forest Service personnel and discussed issues such as off highway vehicle (OHV) use, inventories compiled to inform the plan, and proposed management alternatives. The Forest also provided periodic newsletters to keep citizens informed on plan issues and progress.

Meetings and open houses were scheduled at dates, times, and places thought to be convenient for the public. Care was taken to have meetings in both Oklahoma and in Arkansas. The OHV meetings were well attended, and a variety of comments were received in regard to this one issue; however, the meetings to determine issues, inventory meetings, and plan alternative meetings were less attended and resulted in fewer comments in regard to plan content and direction than the OHV specific meetings. In order to obtain a more representative sample of public interest and to assure that the significant time and funds invested in developing the draft plan were well spent, the Forest commissioned a telephone survey within a 150-mile radius of the center of the Ozark-St. Francis National Forests and Ouachita National Forest (50-miles for the St. Francis National Forest) to determine the public's desires in regard to National Forest management. Appendix B contains the complete survey results, and results are tabulated in the analysis that follows.

Table 3.84 shows the percentage of respondents who indicated "yes" in response to questions regarding participation in specific recreational activities; subtracting the numbers shown from 100 percent yields the percent who responded "no."

Table 3.84 Public Participation in Recreational Activities

Activity	Percent Responding "Yes"
Mountain Biking	17
Horseback Riding on Trails	14
Day Hiking	27
Backpacking	7
Developed Camping	25
Visiting Wilderness	39
Gathering Mushrooms, Berries	32
Nature Viewing/Photography	56
Big Game Hunting	14
Small Game or Waterfowl Hunting	14
Driving for Pleasure	70
Off-Road Vehicle Driving	27
Freshwater Fishing	37
Canoeing or Kayaking	12
Rafting	19
Rock Climbing	05

Quite clearly, most people participate in the outdoors in their vehicle through driving-for-pleasure; nature viewing was second most predominant, and visiting a wilderness area was third.

Table 3.85 indicates which values respondents thought should receive most emphasis in national forest management. The ratings "Extremely Important" and "Important" need no explanation. Other responses, including "Not at all Important" and "Refused" combined with neutral responses represent the difference between 100 percent and the sum of "Extremely Important" and "Important."

Maintaining stream quality, providing healthy forests and providing habitat for fish and wildlife were highest in importance to the survey respondents.

Table 3.85 Survey Responses (Expressed as Rounded Percentages) to Different Values that could be Emphasized in National Forest Management

Forest Management Activity	Extremely Important	Important	Other Responses
	- - - - - - - - - - - *Percent*	- - - - - - - - - -	
Maintaining Stream Quality	86	06	08
Providing Outdoor Recreation	46	24	30
Providing Habitat for Fish and Wildlife	71	14	15
Providing Quiet Places for Renewal	53	19	28
Leave Forest in Natural Appearance	63	18	19
Emphasizing Planting Trees for Timber	59	18	23
Provide Access to Raw Materials	30	22	48
Protect Endangered Plants and Animals	62	16	22
Emphasize Managing Trees for Healthy Forests	70	16	14

Next, the survey asked respondents to rate the importance of various options for national forest management. Protecting older or continuous forest areas, important wildlife habitats, and sources of water and reducing the threat of wildfires were highest in importance to the survey respondents (Table 3.86). The ratings "Extremely Important" and "Important" need no explanation. Other responses, including "Not at all Important" and "Refused" combined with neutral responses represent the difference between 100 percent and the total of "Extremely Important" and "Important."

Table 3.86 Survey Responses (Expressed as Rounded Percentages) Concerning Different Options Available for National Forest Management

Management Activity	Very Important	Important	Other Responses
	- - - - - - - - - - - - - *Percent*	- - - - - - - - - -	
Restrict access for motorized OHV	33	20	47
Develop & maintain trail system for non-motorized use	34	29	37
Provide challenging motorized trails	20	16	64
Develop new paved roads to improve access	20	12	68
Designate primitive backcountry areas	41	22	37
Use control fires in wilderness to restore natural conditions	36	27	37
Protect areas that are sources of water	80	10	10
Manage forests for historical ecosystems	46	22	32
Manage forests to maintain today's conditions	58	24	18
Protect important wildlife habitats	67	17	16
Restrict harvesting & mining	24	19	57
Expand commercial recreation services	21	17	62
Introduce recreation fees for facility maintenance	35	27	38
Introduce a rec. fee for ORV use to maintain and improve ORV trails	30	18	52
Increase law enforcement	50	16	34
Create open areas in the National Forest	43	26	31
Manage Forests to increase wildlife populations for hunting	36	19	55
Protect older or continuous forest areas	63	20	17
Limit number of people on rivers at one time to avoid crowding	28	18	54
Use controlled fires to reduce threat of wildfires	52	22	26

Next, the survey focused on environmental attitudes of the public in the context of environmental issues affecting the "Ozarks and Ouachita Highlands." The highest levels of agreement were tabulated for strengthening the Environmental Species Act, leaving management of public lands to trained professionals, and adding more controls on tourism and second home development. The highest levels of disagreement were for the assertions that "relying on wood products from other countries is preferable to relying on wood products from our National Forests" and "there is no justifiable reason for cutting trees on National Forest System lands." Some environmental attitude responses are shown in Table 3.87 below.

Table 3.87 Environmental Attitudes

Attitude	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Endangered Species Act should be strengthened	30	31	10	7
More important to protect streams for recreational fishing than other species or aquatic life	22	28	21	15
More controls needed on tourism and 2nd home development	34	33	13	6
Preferable to import wood products than rely on wood products from national forests	13	25	20	26
No justifiable reason for cutting trees on National Forest System lands	31	17	24	21
Management of public lands should be left to trained professionals	48	30	8	5

This survey indicates that people have a relatively strong preference for environmental conservation. However, respondents were almost evenly divided in response to questions about the desirability of importing wood products rather than relying on wood products from national forests and whether there are "justifiable reasons" for cutting trees on National Forest System land. There was strong agreement with the idea that management of public lands should be left to trained professionals.

Effects on the Local Economy

Economic Effects

Economic impacts of each alternative are presented in the tables below. As shown, Alternatives B through E do not significantly change from the No Action Alternative (Alternative A). This is because the analysis realistically examined only what needed to change within the scope of current budgets and activity levels. This approach focuses more on the emphasis of activities than their relative magnitude. Using this approach, Alternative C demonstrates the most difference.

The tables either display estimates of employment shown as numbers of jobs, or Labor Income expressed in millions of dollars. With an indicated change of about 0.3 percent or less for employment and 1 percent or less for Labor Income, the differences among alternatives are not significant.

Table 3.88 shows how the alternatives compare in terms of jobs. Due to substitution effects from competing non-government sources (such as similar volume of timber harvesting which may occur on private lands if national forest timber is not offered to the market), these jobs are characterized as being associated with local economic activity initiated by Forest Service programs and activities, rather than caused by these activities.

Table 3.88 Employment by Program by Alternative (Average Annual, Decade 1)

Resource	Total Number of Jobs Contributed				
	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	1,234	1,234	1,234	1,234	1,234
Wildlife and Fish	359	359	359	359	359
Grazing	3	3	3	3	3
Timber	1,577	1,485	1,610	1,526	1,578
Minerals	17	17	17	17	17
Payments to States/Counties	127	120	130	123	127
Forest Service Expenditures	584	585	593	586	587
Total Forest Management	3,901	3,802	3,947	3,848	3,905
Percent Change from Current	0.0%	-2.5%	1.2%	-1.3%	0.1%

Table 3.89 shows how the alternatives compare in terms of labor income. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table as Forest Service expenditures and is reflected as a Percent Change from Current.

Table 3.89 Labor Income by Program by Alternative (Average Annual, Decade 1; $1,000,000, shown in 2005 $'s)

Millions of dollars					
Resource	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	$20.5	$20.5	$20.5	$20.5	$20.5
Wildlife and Fish	$6.0	$6.0	$6.0	$6.0	$6.0
Grazing	$0.02	$0.02	$0.02	$0.02	$0.02
Timber	$55.5	$52.2	$56.6	$53.7	$55.5
Minerals	$0.6	$0.6	$0.6	$0.6	$0.6
Payments to States/Counties	$4.4	$4.2	$4.5	$4.3	$4.4
Forest Service Expenditures	$20.5	$20.6	$21.4	$20.7	$20.8
Total Forest Management	$107.5	$104.1	$109.7	$105.7	$107.8
Percent Change from Current	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.90 shows how the alternatives compare in terms of employment by industry. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are spread across the economic sectors based upon regional economic multipliers.

Table 3.90 Employment by Major Industry by Alternative (Average Annual, Decade 1)

Total Number of Jobs Contributed					
Sector	**Alt. A-NA**	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Agriculture	960	906	906	929	960
Mining	17	17	17	17	17
Construction	42	40	43	41	42
Manufacturing	461	436	469	448	461
Transportation & Warehousing	46	44	47	45	46
Wholesale trade	40	39	41	39	40
Retail trade	75	73	77	74	75
Information	44	44	45	44	44
Finance, Insurance, & Real Estate	68	67	69	67	68
Services	1,657	1,649	1,665	1,653	1,659
Government (Federal, State, & Local)	485	480	488	482	485
Utilities	6	6	6	6	6
Total Forest Management	3,901	3,802	3,947	3,848	3,905
Percent Change from Current	0.0%	-2.5%	1.2%	-1.3%	0.1%

Table 3.91 shows how the alternatives compare in terms of labor income by major industrial sector. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are spread across the economic sectors based upon regional economic multipliers.

Table 3.91 Labor Income by Major Industry by Alternative (Average Annual, Decade 1; $1,000,000; 2005 $'s)

Millions of Dollars					
Sector	**Alt. A-NA**	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Agriculture	$29.7	$28.0	$30.3	$28.7	$29.7
Mining	$0.7	$0.7	$0.7	$0.7	$0.7
Construction	$1.2	$1.1	$1.2	$1.1	$1.2
Manufacturing	$19.7	$18.6	$20.1	$19.2	$19.7
Transportation & Warehousing	$1.9	$1.9	$2.0	$1.9	$1.9
Wholesale trade	$1.6	$1.5	$1.6	$1.6	$1.6
Retail trade	$1.6	$1.6	$1.6	$1.6	$1.6
Information	$1.9	$1.9	$1.9	$1.9	$1.9
Finance, Insurance, & Real Estate	$1.8	$1.8	$1.9	$1.8	$1.8
Services	$28.7	$28.4	$29.0	$29.5	$28.8
Government (Federal, State, & Local)	$18.3	$18.2	$19.0	$18.3	$18.5
Utilities	$0.4	$0.4	$0.4	$0.4	$0.4
Total Forest Management	$107.5	$104.1	$109.7	$105.7	$107.8
Percent Change from Current	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.92 shows how the alternatives compare in terms of Forest Service Revenues and Payments to Counties. While the difference between alternatives is insignificant, the slight difference in levels of management activity and timber product values is reflected in the table as a change in Timber and in Total Revenues.

Table 3.92 Forest Service Revenues and Payments to Counties (Annual Avg, 1st Decade; $1,000,000; 2005 $'s)

Forest Service Program	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	$0.0	$0.0	$0.0	$0.0	$0.0
Wildlife and Fish	$0.0	$0.0	$0.0	$0.0	$0.0
Grazing	$0.0	$0.0	$0.0	$0.0	$0.0
Timber	$24.3	$22.9	$24.8	$23.5	$24.3
Minerals	$1.9	$1.9	$1.9	$1.9	$1.9
Soil, Water & Air	$0.0	$0.0	$0.0	$0.0	$0.0
Protection	$0.1	$0.1	$0.1	$0.1	$0.1
Total Revenues	$26.3	$24.9	$26.8	$25.5	$26.3
Payment to States/Counties	$6.3	$6.3	$6.3	$6.3	$6.3

Table 3.93 shows how the alternatives compare in terms of Cumulative Economic Impacts. While the difference among alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are a reflection of the application of regional economic multipliers.

Table 3.93 Cumulative Economic Impacts in 2018

	2003		2018					
	Area	Forest	Area	Forest Portion				
Economic Indicator	Totals	Portion	Totals	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Employment								
Total (jobs)	215,994	3,894	291,719	3,894	3,796	3,941	3,842	3,898
% of Area Totals	100%	1.8%	100%	1.3%	1.3%	1.4%	1.3%	1.3%
% Change from No Action	---	---	---	0.0%	-2.5%	1.2%	-1.4%	0.1%
Labor Income								
Total ($ million)	$5,606.0	$107.2	$8,451.0	$107.2	$103.8	$109.4	$105.5	$107.6
% of Area Totals	100%	1.9%	100%	1.3%	1.2%	1.3%	1.2%	1.3%
% Change from No Action	---	---	---	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.94 shows the current Role of Forest Service-Related Contributions to the Area Economy. This table provides good indicators as to why so little impact is shown by alternative. The total economic contribution related to Forest Service activities is less than two percent of the total. When measured against the Area economy, each alternative will not have any significant economic impact due to the relative size of the economy. The opportunities for significant economic contribution occur more at the local community level and are better examined during project implementation.

Table 3.94 Current Role of Forest Service-Related Contributions to the Area Economy

Industry	Employment (Jobs)		Labor Income ($ million)	
	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	14,793	960	$239.7	$29.7
Mining	2,358	11	$123.0	$0.5
Construction	16,943	42	$445.9	$1.2
Manufacturing	51,466	461	$1,917.4	$19.7
Transportation & Warehousing	6,345	46	$254.8	$1.9
Wholesale trade	5,988	40	$227.2	$1.6
Retail trade	30,470	74	$657.6	$1.6
Information	2,830	44	$132.8	$1.9
Finance, Insurance, & Real Estate	12,487	68	$316.8	$1.8
Services	84,834	1,657	$2,213.5	$28.6
Government (Federal, State, & Local)	27,595	485	$1,023.5	$18.3
Utilities	1,002	6	$60.1	$0.4
Total	257,108	3,894	$7,612.4	$107.2
Percent of Total	100.0%	1.5%	100.0%	1.4%

Social Impacts

In this section, a discussion of the social effects of each alternative is presented including the "No Action" alternative (1990 Forest Plan).

Data from the attitudes, values, and beliefs identified by the survey as well as the information gathered at the meetings were used to develop a range of alternatives for forest management. The display below represents a continuum with alternatives featuring a greater range of management activities displayed on the left and those with fewer management activities on the right. Following the array is a discussion of each alternative and its potential social and economic impacts.

Greater Management Activities **Fewer Management Activities**

C → E → D → B → A

Alternative A. This alternative is the "baseline" or no-action alternative to which the four action alternatives are compared. Under this alternative, forest management would be maintained, and no changes to address identified issues would be proposed. Outbreaks of southern pine beetle would continue to be treated as they occur; however, no increased emphasis for treatment of systems susceptible to oak decline or other treatments to oak-dominated ecosystems would be implemented. Alternative A would maintain current practices, though it should be recognized that changes in management practices could be mandated as the Forest responds to the requirements of the Healthy Forest Initiative. The existing base of suitable acres for timber (1,019,694 acres) remains intact. Likewise, no areas would be recommended for removal from mineral entry, and no changes to existing activities in other, non-timber forest products would be planned. This alternative continues the current relationship with adjacent forest communities, and no changes are expected in Forest product related income or jobs under this alternative.

The Forest's existing Visual Management System would remain in effect. Recreation opportunities of all types would remain as currently managed. Recreation opportunity would remain at current levels for each class. No new wilderness or semi-primitive recreational opportunities would be proposed. User conflicts–such as hunters versus hikers, horses versus bicycles, or motorized users versus solitude-seekers–would continue and would likely increase as the level of use increases over time. Cross-country travel by foot or vehicle would result in more user-created trails and travel ways as users seek new experiences or settings.

Alternative B. This alternative would differ from Alternative A by a modest increase in emphasis on ecosystem health and sustainability. Suitable timber production acres would be approximately 1,019,694. There would be no new recommendations for wilderness study areas or other national designations for land under this alternative that would reduce the suitable timber acres. The Forest would address impacts and opportunities to local communities as a result of implementation of the Healthy Forest Initiative and would alter intensity and location of forest health activities as required by conditions.

The forest visual resources and recreation opportunity would continue to be managed under existing inventories and systems, similar to Alternative A. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Alternative C. This alternative would have a slightly reduced suitable timber base, 1,017,901acres, as the result of three small areas that would be proposed as additions to Flatside Wilderness (620 acres), the East Unit of Poteau Mountain Wilderness (77 acres) and to Upper Kiamichi Wilderness (1,096 acres). These areas would be managed to retain their wilderness character until Congress decides their ultimate disposition. However, little, if any, change in actual timber management activity would occur as a result of these recommendations.

Alternative C provides more emphasis than the 1990 Forest Plan on ecosystem health and sustainability, including increased active management to restore and maintain native pine-grass and oak woodlands. A greater intensity of thinning and the largest allocation of all alternatives (250,000 acres) in prescribed fires within pine-oak and some hardwood-dominated communities would be accomplished. Limited streamside vegetative management would be allowed to meet ecosystem health objectives.

The Scenery Management System would replace the existing Visual Management System as the inventory and management system for visual resource management. To meet established road miles per square mile objectives, areas of the Forest with a high density of non-National Forest System Roads (private, local, state and Federal roads and highways) would be recalculated and open road density figures for those areas would be adjusted by excluding non-National Forest

System Roads from the calculation. Cross-country travel by motorized vehicles would be considered unsuitable and a system of designated routes would need to be developed with appropriate public input.

This alternative would increase the potential for reduction of fuels in the wildland-urban interface and increases potential for short-term impacts from prescribed fire smoke. Vegetation management under Alternative C would address the most acres of any of the alternatives with treatment of 677,000 acres in the first ten-year period.

Alternative D. This alternative would emphasize recreation opportunities, scenery management, “watchable wildlife,” and wilderness resources. Three areas would be recommended for wilderness study, Brush Heap, Blue Mountain, and Irons Fork Mountain, containing a total of 28,334 acres. These three areas, plus additions to Flatside Wilderness (620 acres), the East Unit of Poteau Mountain Wilderness (77 acres), and Upper Kiamichi Wilderness (1,096 acres) would be recommended for wilderness designation. The existing suitable timber base under this alternative would be reduced by the recommended wilderness acres to 989,567acres. This alternative would slightly increase economic impacts associated with tourism and recreation and would slightly decrease economic potential as a result of reduced timber harvest potential.

The 1990 Forest Plan projections for prescribed fire and other forms of forest management would be maintained; however, the emphasis of this activity would be redirected to Old Growth and shortleaf pine bluestem grass ecosystems, walk-in turkey areas, and wildlife management areas. Alternative D would have fewer acres in uneven-aged management than Alternative A, but more than Alternatives B, C, or E. Streamside Management Areas would be maintained; however, some timber harvest and vegetation management would take place to meet ecosystem health objectives.

This alternative would replace the Visual Management System with the Scenery Management System, and would place the greatest emphasis on scenery management of any alternative. Increased scenery management would be most apparent along higher traffic road corridors (two of which are Forest Scenic Byways and two of which are State of Oklahoma Scenic Drives) and in the viewing area of forest lakes.

Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input. An exception for retrieval of big game would be allowed.

Alternative E. Forest management practices would be similar to Alternative C, but contain some elements of Alternatives B and D as well. Management practices would focus on ecological conditions for diversity and forest health in a portion of the forest and recreation and scenic values in other parts of the forest.

As in Alternative C, three small wilderness additions (Flatside, Poteau Mountain, and Upper Kiamichi) would be recommended, removing 1,793 acres from the suitable timber base of the Forest. Suitable acres for timber production would be 1,016,228 acres.

Management in semi-primitive areas, the Winding Stair National Recreation Area and near-lake areas would be driven by scenery management needs with increased emphasis along high traffic roads, trails, and lake areas. All vegetation management would promote “watchable wildlife,” including important birding areas.

To meet established road miles per square mile objectives, areas of the Forest with a high density of non-National Forest System Roads (private, local, state, and Federal roads and highways) would be recalculated, and open road density figures for those areas adjusted by excluding non-National

Forest System Roads from the calculation. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Economic Efficiency

Table 3.95 evaluates economic efficiency by listing estimated benefits, costs, net benefits, and cumulative present net value (PNV) by alternative. All figures are in 2005 dollars. The benefits in Table 3.95 include market values and non-market assigned values. Market values include those values where the Forest Service receives money such as for timber, minerals, range, or special uses. Non-market values are assigned values for amenities such as wildlife and recreation.

Table 3.95 Cumulative Present Values of Costs and Benefits in Thousands of Dollars

	Alt A	Alt B	Alt C	Alt D	Alt E
Cumulative Total Present Net Value	$1,017,153	$1,160,993	$1,327,225	$1,212,226	$836,911
Present Value benefits by Program:					
Range:	$78	$78	$78	$78	$78
Timber:	$1,122,320	$1,276,685	$1,468,583	$1,330,721	$948,560
Minerals:	$37,081	$37,081	$37,081	$37,081	$37,081
Recreation	$232,986	$232,986	$232,986	$232,986	$232,986
Wildlife:	$282,178	$282,178	$282,178	$282,178	$282,178
PV of Benefits	$1,674,642	$1,829,008	$2,020,906	$1,883,044	$1,500,883
Present Value costs by Program:					
Range:	$3,905	$3,905	$3,905	$3,905	$3,905
Timber:	$223,941	$230,562	$237,261	$230,799	$220,550
Roads/ Engineering	$167,328	$167,328	$167,328	$167,328	$167,328
Minerals:	$5,606	$5,606	$5,606	$5,606	$5,606
Recreation	$56,114	$56,114	$56,114	$56,114	$56,114
Wildlife:	$56,975	$56,975	$56,975	$56,975	$56,975
Soil, Water, Air	$17,656	$17,656	$17,656	$17,656	$17,656
Protection/ Forest Health	$125,963	$129,868	$148,836	$132,435	$135,838
PV Costs	$657,489	$668,015	$693,681	$670,818	$663,972

Since all alternatives presumed no change in the Range and Minerals program and that wildlife and recreation amenities would satisfy estimated demand levels, timber values are the only benefit values that change by alternative. This change in timber values reflects a combination of differing levels of total harvest and harvesting of products with different market values.

All alternatives presumed no change in budget levels for any programs other than Timber and Protection/Forest Health; therefore, these are the only costs that change by alternative. The changes in Timber costs reflect a combination of different harvest levels and product mixes. The change in Protection/Forest Health costs reflect different levels of Forest Health related prescribed fire. While the Timber costs are associated with similar changes in timber benefits, Forest Health costs are related to ecological changes that are not measured in dollars. This partially accounts for the range of differences in Present Net Value, Present Value of Benefits, and Present Value of Costs by Alternative.

Alternative A. This alternative would have the fourth highest PNV with a combination of the fourth highest Benefits and the lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Very little of the timber activity would occur in hardwood types where the benefit values would be lower.

Alternative B. This alternative would have the third highest PNV with a combination of the third highest Benefits and third lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Little timber activity would occur in hardwood types where the benefit values would be lower.

Alternative C. This alternative would have the highest PNV with a combination of the highest Benefits and the highest Costs. Harvest levels would rise quickly to within 98 percent of the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Much of the timber activity would occur in hardwood types where the benefit values are lower. This alternative also would have the highest Forest Health treatment costs. These factors would combine to make it the highest cost alternative.

Alternative D. This alternative would have the second highest PNV with a combination of the second highest Benefits and the second lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by period 2) generating a high level of dollar benefits. Less timber activity would occur in hardwood types where the benefit values are lower. This alternative also would have high Forest Health treatment costs.

Alternative E. This alternative would have the lowest PNV with a combination of the lowest Benefits and the second lowest Costs. Harvest levels would rise slowly to within 87 percent of the Long Term Sustained Yield capacity (by period 2) generating a lower level of dollar benefits while recognizing the tradeoffs to meet ecological objectives. Much of the timber activity would occur in hardwood types where the benefit values would be lower. This alternative also would have a high Forest Health treatment cost. While this alternative would be both low cost and the lowest benefit alternative (when evaluated in dollars), it would have a moderate level of spending for Forest Health related activity. This added cost would be offset by a slower rise in timber harvest levels with an associated lower timber cost.

Lands

Of the 2,509,589 acres within the Forest boundary, 1,780,457 acres (as of 9/30/04), or 71 percent are lands administered by the National Forest. Of this total, approximately 701,000 acres have Public Domain status. This total is updated at the end of each fiscal year reflecting changes due to land adjustment activities during that fiscal year.

Landownership adjustment is a program for acquiring or exchanging land or interests in land for public benefit. Private land suitable for Forest purposes that will consolidate Forest lands may be considered for interchange, exchange, purchase, or donation. Forest lands that are isolated, detached, projecting narrow strips are considered for disposal through exchange. Lands that would yield greater public benefit in private ownership are also considered for disposal through exchange.

Land and Water Conservation funds (L&WCF), if available, can be used to purchase priority tracts. Land exchange is also a valuable tool; however, it is more expensive and time consuming than purchase. Priority is given to exchanges that 1) consolidate National Forest System lands; 2) acquired lands with significant resource benefits; 3) dispose of lands that are isolated or have lost

National Forest character; 4) provide for community expansion/enhancement; or 5) protect and enhance access rights of the United States.

A scattered ownership pattern compounds management problems and hinders the public use and enjoyment of Forest lands. Intermingled ownership results in numerous problems concerning boundaries, title claims, and encroachments. Rights-of-way for public access into these lands become increasingly difficult to acquire. Over the past 15 years, tens of thousands of acres have been acquired through purchase and exchange, greatly increasing management efficiency by consolidating lands, reducing landlines and corners to maintain, decreasing habitat fragmentation, and decreasing the need for right-of-way acquisitions. Land exchange is also a tool sometimes used to resolve boundary and use conflicts when the opportunity arises.

Resource protection and management require unrestricted easements for the Forest transportation system. Private tracts are intermingled with Federal ownership. Rights-of-way must be obtained over private tracts to provide access to the many isolated parcels of Forest lands. During the last five-year period, an average of two rights-of-way cases per year were processed.

Land Boundary Management

The Forest boundary management program entails both the location and maintenance of property corners and boundary lines so that they are legally defensible, visible, and preferably conflict free. Land boundaries across the Forest total approximately 4,300 miles. Projected constrained budgets will necessitate a collaborative forest-wide effort to prioritize boundary management needs for efficient program management.

Occupation Conflicts

Unauthorized occupations of Forest lands are treated as conflicts requiring resolution. Resolutions may include: allowing continued occupancy under a permit; processing a claim of unwritten rights alleged to be superior to the written land title of USA; processing a Small Tracts Act case (sale, interchange, or exchange) where improvements were located on USA through reliance on a defective survey; or prosecuting a case of willful trespass. Each case will have its own unique set of facts that must be clearly understood in order to determine and arrive at the appropriate resolution. An inventory of occupation conflicts is maintained with cases prioritized to efficiently allocate limited program resources.

Direct, Indirect, and Cumulative Effects

Adjustments to the land boundaries of the National Forest System lands are accomplished under standard criteria. A map of National Forest System lands available for exchange is maintained in the Forest Supervisor's office, with copies in District Offices. The types of lands that will be considered suitable for acquisition through purchase, exchange, or donation are described in the Landownership Adjustment Strategy, available at the Forest Supervisor's Office. Because each tract of land subject to acquisition or disposal is unique, it is beyond the scope of the Forest Plan to address the effects of land exchanges. Such effects are addressed at the time that the land exchange takes place. The land program does not change by alternative.

Land Uses – Special Uses

All uses and occupancy of National Forest System land, except for disposal of timber and other forest products, minerals, and grazing of livestock, are designated as "special use." Proposals for use are screened prior to acceptance of an application and must receive an authorization prior to occupancy of National Forest System lands unless that requirement is waived by the regulations pertaining to special uses. The Forest receives about 100 inquiries for use of Forest lands each year. About 80 of these inquiries result in applications for new permits or amendments to permits or easements. The number of inquiries and permits issued has almost doubled since the last planning period, and this upward trend is expected to continue.

Easements, special-use permits, and communication site leases are used to authorize the occupancy use and rights of Forest lands. As of September 2004, the Forest had 549 active special-use permits for 6,100 acres of Forest land and 738 miles of utility lines, roads, and water transmission lines. Annual Forest receipts from special-use permits are about $149,000. This amount is expected to increase as new uses are authorized and fees for existing uses are adjusted to reflect fair market value for the use of National Forest System lands.

Each land use authorization contains terms and conditions designed to protect the public interest in accordance with applicable statutes, rules, and regulations. Periodic reviews and inspections of land uses seek to ensure that the terms and conditions are met and to identify and correct non-compliance with permits. All alternatives would require the same management direction for proposal screening.

The Forest has approximately 10 special use permits that were issued under now expired authorities for uses no longer permitted on National Forest System lands. The Forest will look for opportunities to eliminate these occupancies through available land adjustment authorities or by requiring the removal of the occupancy at the end of the permit term. Occupancies previously authorized by agreements such as Memoranda of Understanding and Interagency Agreements will be replaced with special use permits, leases, or easements as these agreements expire.

Uses of National Forest System land that create a permanent occupancy will not be authorized. Examples of such a use are recreation residence permits and sanitary landfills. The Forest has no recreation residence permits or landfill permits, and none will be issued.

More than 30 miles of utility corridors are on the eastern part of the Forest. These corridors are used by Reliant Corporation, Arklahoma Corporation, Mobil Pipeline, and Entergy. Whenever possible, utility companies and highway departments jointly use right-of-way corridors.

New utility corridors will follow existing significant transportation and utility corridors to the extent practicable. Existing and planned corridors are discussed in the section on Facilities. When it is not practicable to follow existing corridors, the following are examples of the criteria to be used in determining locations:

- Minimize occupied acres by using the most direct route confined only to essential clearing limits
- Avoid slopes in excess of 35 percent whenever possible (ideal locations would be less than 8 percent)
- Circumvent capital improvements, recreation areas, wilderness areas, scenic areas, and other high resource value areas
- Ascertain net public benefits (benefit-cost analysis)

Sixteen PL-566 reservoirs within the Forest are under special use permit to state and local government agencies. For the existing permitted reservoirs, the Forest will cooperate with the holders to the extent practicable in the management of these facilities. PL-566 reservoirs are multipurpose installations for recreation, water supplies, flood control, and fishing. Depending on intended use, coordination with state fish and wildlife agencies, state Health Departments, Corps of Engineers, Federal Power Commission, National Resource Conservation Service, Research Conservation and Development Districts, and county and city governments is required for effective permit administration. Construction of new PL-566 reservoirs will be discouraged under the action alternatives.

Wind generation is also gaining acceptance as an alternative energy source in some regions of the United States. Although the Ouachita National Forest has no special use authorizations issued for wind generation, the Forest has been identified as having a high potential for development by the industry. Wind farms are located on mountain crests or in expansive open areas where wind currents are a reliable source of power.

Each application for a permit is screened and evaluated to determine if it is allowed by law and is in the public's best interest. No permits for occupancy of National Forest System land can be issued unless authorized by a specific law. The Forest currently administers 543 permits. Table 3.96 shows the types and permits issued on the Forest in 2003 and 2004.

Table 3.96 Distribution of Major Special Use Permits, 2004

Type of Permit	Amount 2003	Amount 2004
Recreation	48	52
Agriculture	8	8
Community and Public Information	20	21
Research, Study, and Training	7	13
Transportation	284	295
Communications	69	78
Water Uses	46	48
Industry	20	22

Direct, Indirect, and Cumulative Effects

Annually, the number of requests for special use permits is growing. With a fragmented ownership pattern, the requests for use of National Forest System land will not change substantially with any of the alternatives. Over time, requests for authorizations would probably increase as rural lands are developed. With emphasis on scenic quality and recreational opportunities, Alternative D could stimulate requests for new permits. Land use proposals are generated by the public; therefore, the number of applications and subsequent authorizations cannot be controlled by the Forest Service or even accurately predicted. These proposals would be assumed to be the same for all alternatives and would be assumed to have similar effects.

During the past 30 years, industry, public utilities, and government agencies have increased demand for electronic sites within the Forest. Because communication facilities have been found to have detrimental effects on some mammals and migratory bird species and also affect visual resources, new electronic uses are confined to existing approved sites. Site plans for existing approved sites will be updated and modified to include tower construction restrictions designed to protect wildlife and visual resources. Generally, reducing tower height below 200 feet releases the tower owner from lighting requirements for the safety of aircraft; however, this is not always the case. The Federal Aviation Administration conducts a flight path study to make the determination if tower lighting is required. Therefore, it is possible that reducing tower height may not result in fewer lighted communication towers on the Forest if the towers are within a flight path.

While reduced tower height and elimination of supporting wires are believed to reduce the negative effects of towers on wildlife and visual resources, the effects on current and future permit holders may be a decrease in effectiveness of the towers, an increase in the number of antennas needed, and an increase in power usage. The effective tower range is expected to decrease. This may result in the need for additional towers to be built to maintain the existing coverage area or existing users abandoning the sites for more favorable locations. Lower tower height may also discourage additional holders or tenants from occupying the sites because tower space at the optimum higher levels is not available, and the tower space that is available may not be high enough to connect them with other towers. Microwave users are more likely to be affected by changes in tower height because of dependency on line of site communications. Other users may be able to compensate for the shorter height by changing equipment and increasing power of transmissions. Shorter towers will reach antenna holding capacity sooner than taller towers resulting in requests to construct additional towers on the site. Requiring self-supporting towers or monopoles instead of wire supported towers is not expected to increase costs to holders for tower replacement or for initial construction. Self-supporting towers have a larger footprint at the base of the tower than towers supported by wires, but the larger tower base needed for a self-supporting tower is offset by a much larger cleared area required under towers supported by wires. Monopole towers tend to be shorter than other towers and may be camouflaged to blend in with surrounding vegetation. The camouflage capability of monopole towers may be useful in reducing adverse effects on visual quality.

The effects of wind generation facilities on wildlife are not completely known although preliminary data suggest that noise disturbance from wind generation affects nesting of some bird species, and there has been increased mortality to bats and migratory birds attributed to these facilities. The Forest will continue to manage the currently designated communication sites. If new communication sites are proposed, the sites will be designated by following the formal process found in the Forest Service Handbook (FSH 2709.11).

Only slight differences in effects on special uses are anticipated by alternative. Little change from the current condition is expected under Alternative B. The effects of implementing Alternative C could result in conflicts between management practices to improve forest health and uses authorized under existing permits. Potential conflict could arise when prescribed fires are in or near permit areas or from smoke impacting instruments at some facilities. Because Alternative C has the potential to result in construction of additional temporary roads, that alternative may also result in more requests for access across National Forest System lands using roads constructed for vegetative management activities. Under Alternative D, proposals located along high traffic roads will become more expensive for the permit holder to implement due to the cost to mitigate or relocate uses to protect views. Alternative E will most likely have the same effects as Alternatives C and D, but to a lesser degree.

Alternatives proposing to add wilderness areas will have no measurable effect on existing uses. Designating land as wilderness will decrease the amount land available for certain types of uses such as communication facilities.

Facilities

Transportation Facilities

The Forest road system is extensive and complex. Facilities accommodating wheeled vehicles ranging from passenger cars to double tree-length log trucks are of primary concern. The road system's ability to meet user needs ranges from completely adequate to totally inadequate, depending on condition and intended use. The Forest roads inventory contains pertinent information for each road and trail. A set of road maps (7.5 minute series USGS quadrangle base) with transportation information is maintained in the Forest Supervisor's office. Table 3.97 summarizes the road inventory as of September 30, 2004. This inventory is a record of roads contained in the Forest database, INFRA. Although roads are included in the Forest database, the mileages are not associated with jurisdictional boundaries, and the database includes roads that extend outside of the Forest boundary and roads on private land as well as on National Forest System land.

Table 3.97 Road Miles by Surface Type as of September 30, 2004

Jurisdiction	Surface Type						
	Asphalt	Crushed Aggregate	Bituminous	Improved	Native	Paved	Total Miles
County	1	1,055	274	178	53	19	1,580
Forest Service	14	2,018	23	752	2,965	0	5,772
Private	0	54	6	31	54	0	145
State	82	3	1,091	0	0	50	1,226
Total Miles	97	3,130	1,394	961	3,072	69	8,723

Source: INFRA

Roads are classified as arterial, collector, or local. Arterial roads are generally heavily traveled, multipurpose access routes for areas in excess of 30,000 acres. Collector roads provide access to areas of intermediate size. Local roads are generally lightly traveled, single purpose access routes for areas less than 5,000 acres.

Management and operation of Forest roads involve cooperative agreements, cost share agreements, closures, obliterations, road use permits, and road maintenance. Forest Development Road Cooperative Agreements exist with Garland, Logan, Montgomery, Perry, Polk, Saline, Scott, Sebastian, and Yell counties in Arkansas and with LeFlore and McCurtain counties in Oklahoma. Each agreement identifies roads by jurisdiction and provides a process for one party to improve a road under the other's jurisdiction.

The Forest and Weyerhaeuser Company entered into a Road Right-of-Way Construction and Use Agreement (cost share) in 1971 that provides for development, operation, use, and maintenance of a road system to serve both parties. Initially, roads totaling 371 miles were designated as cost share roads. At the end of FY 2003, 201 cost share supplements had been executed that added an additional 180 miles to the cost shared network.

Each road under Forest maintenance responsibility is maintained at one of five maintenance levels. Roads requiring only custodial care, with closures of a minimum of one year, are Level 1. Primitive roads permitting limited passage of high clearance vehicles are Level 2. Roads maintained for safe and moderately convenient travel suitable for passenger cars on which the average daily traffic is generally less than 15 are Level 3. Roads with average daily traffic ranging from 15–100 are Level 4, and roads with average daily traffic exceeding 100 are generally Level 5. User comfort is an increasingly important consideration from Levels 3 to 5.

County and state roads within and adjacent to the Forest totaling 427 miles in Oklahoma and 1,793 miles in Arkansas were nominated to the Federal Highway Administration (FHWA) for inclusion in the Forest Highway Program. On March 1, 1983, 89 routes totaling 516 miles were approved as Forest highways in and around the Forest (308 miles in Arkansas and 208 miles in Oklahoma). Routes necessary to protect the Federal interest with respect to the Forest system were designated as Forest highways. Submitted routes not designated were deemed to be of greater importance to the state/local transportation network than for management of the Forest and its related traffic. A map of Forest highways is maintained in the Supervisor’s Office at Hot Springs, Arkansas.

Three types of timber access roads are built on the Forest. The lowest standard is a temporary road used in areas where future access is not planned. When its use is completed, the road is decommissioned. The other two basic roads are permanent facilities that are used and managed to provide for present and future access needs. The lowest standard permanent road is suitable only for high clearance vehicles, generally unsurfaced, uses outsloped sections, and is usually closed to traffic for a minimum of one year between timber sales or other activities. This standard of road is Traffic Service Level (TSL) D and, if closed between uses, is intermittent service. The next higher standard permanent road is TSL C. TSL C roads are generally surfaced and are built and maintained for safe use by passenger cars. They are typically open year round for constant service. As user comfort, traffic flow, user costs, and safety factors become increasingly more important, access roads are built and operated at one of the two higher standards, TSL B or TSL A. Table 3.98 shows the road miles by jurisdiction and maintenance level for the Forest, and Table 3.99 shows the transportation network by maintenance level.

Table 3.98 Maintenance Level of Forest Service Roads of September 30, 2004

Jurisdiction	Maintenance Level					
	1	2	3	4	5	Total
National Forest	2,741	1,688	1,122	200	21	5,772

Source: INFRA

Table 3.99 Transportation Network by Maintenance Level as of September 30, 2004

Total Inventory	Arterial	Collector	Local	Total
Miles	785	2,355	5,583	8,723
Percent	9	27	64	
National Forest System Roads Only	**Arterial**	**Collector**	**Local**	**Total**
Total	57	693	5,022	5,772
Percentage	1	12	87	

Source: INFRA

Direct, Indirect, and Cumulative Effects

Forest roads are designed to specifications that provide safe travelways, while protecting forest resources. Roads expose and compact soils and alter surface water flow. Roads also fragment wildlife habitat. With the exception of minor differences due to wilderness recommendations, the alternatives do not differ with respect to the future road system. Therefore, there are no differences in effects among alternatives. A forest-wide Roads Analysis was conducted to inform the Forest Plan decision, and it was determined that the current inventory meets the current transportation needs for Level 3, 4, and 5 roads. Some shifting in maintenance level may occur (some Level 2 roads may become Level 3 roads and vice versa), but overall miles of road in these categories will remain essentially the same. Effects of roads have been analyzed in the appropriate sections of this chapter (see the Soils, Terrestrial Habitat and Species, and Aquatic Habitat and Species sections). Closures of roads apply to Level 1 and 2 roads within the Forest system and are covered by separate environmental analysis at the time of the action. Likewise, temporary roads (for timber operations) are covered by project level environmental analysis.

Non-Transportation Facilities

The Forest is reviewing existing facilities and administrative sites to determine which sites or facilities should be disposed of or sold. Any revenue generated from the sale or disposal of these facilities is to be deposited into a Sisk Act Account to provide for deferred maintenance or construction of new facilities. This authority was provided by the Interior Appropriations Act for Fiscal Year 2006, Title V. Forest Service Facility Realignment and Enhancement. There are no differences by alternatives for the non-transportation facilities. The information below is presented to provide context information for structures and utilities.

Structures

The Forest Facility Master Plan, signed March 8, 2004, provides guidance for the continued use, maintenance, improvement, and disposal of facilities on the Forest for the next decade. The Facility Master Plan states that there are 147 administrative structures on the Forest, 38 of which have been identified for decommissioning. The Forest Facility Master Plan is in the process of being updated to reflect consolidation of administrative and land management functions at the field (district) level.

In addition to the administrative structures, as of September 2005, there were 238 other government-owned structures including lookout towers, recreation sites, and dams. Four district ranger offices are leased from private owners; one is leased from General Services Administration; and seven are owned by the Forest Service. All 12 district work centers are Forest Service-owned. Seventeen residential structures range in age from 31 to 70 years. The Ouachita Conservation Center is fully operational with five residences, two offices, three dorms, five training shops, eight storage buildings, a warehouse, canteen, mess hall, laundry, gym, educational building, swimming pool, basketball/tennis court, and dispensary owned by the Ouachita National Forest and operated by the Job Corps.

Two lookout towers, Tall Peak, and Rich Mountain, are managed as recreation sites by the Forest Service. A third tower at Bee Mountain was dismantled, and there are no plans to replace it. A fourth tower at the Tiak Workcenter is maintained by the Forest Service and is being used to house a Forest Service radio repeater. Twenty-seven dams on National Forest System land administered by the Forest Service are classified as follows: three Class C-medium hazard and twenty-four Class D-low hazard. Of PL-566 projects administered by local water improvement districts, nine dams are constructed wholly or partially on Forest land.

Utilities

Currently, there are five major underground pipelines transporting oil and gas and three major overhead powerlines traversing the Forest. These utilities crisscross the Forest without regard to existing transportation corridors or co-location. To minimize future impacts to National Forest System lands from major utility uses, the Forest has designated two multi-facility corridors to maximize co-location of future uses: one corridor is between Norman and Danville, Arkansas, along Arkansas State Highway 27. The other corridor is between Broken Bow and Heavener, Oklahoma, along US Highway 259.

Major utility lines, primarily oil and gas pipelines, large water lines, or power transmission lines, were generally constructed in straight lines between two points to minimize the number of miles of utility line. The way these older existing lines were laid out and constructed fragmented the Forest. The corridors have been difficult to access for continuing maintenance because they do not have road access. Future major utility development will follow existing highway corridors where ever possible to eliminate the poor access and prevent additional fragmentation by opening a new corridor.

The effects of locating major utility lines within designated corridors may increase initial construction costs for the proponent because the line may be much longer than a utility line constructed in a straight line between points. Locating utilities along highways will widen the highway corridor and may adversely affect the viewshed. Conversely, locating major utilities along the designated corridors should improve access to the utility lines. Better access should result in better maintained utilities at reduced costs. Locating utility lines in the utility corridor will also reduce disruption to wildlife and avoid introduction of invasive species to interior forest areas.

Developed and Dispersed Recreation

National Forests nationwide provide over 191 million acres of public land offering a variety of outdoor recreation opportunities. The Ouachita National Forest in Arkansas and Oklahoma contributes approximately 1.8 million acres to the national total and provides unique settings for activities such as primitive and developed camping, hunting, fishing, hiking, backpacking, horseback and OHV riding, canoeing/kayaking and whitewater rafting, as well as picnicking, sightseeing, nature watching, walking for pleasure, and driving for pleasure. Features on the Forest include wild and scenic rivers, scenic byways, wilderness, the Winding Stair National Recreation Area, and Red Slough Wildlife Area. The 192-miles of the Ouachita National Recreation Trail that lie within the Forest provide a long distance hiking opportunity across the length of the Forest.

Market Area

Market areas have been established for different national forests to better evaluate public demand for recreation opportunities. Past research has demonstrated that most national forest visits originate from within a 75-mile (1½ hour driving time) radius (Overdevest and Cordell 2001). For this analysis, the market area has been defined as all counties that fall within a 75-mile straight-line radius from the Forest boundary.

The market area for the Ouachita National Forest includes portions of five states: Arkansas, Oklahoma, Missouri, Texas, and Louisiana. Larger cities located within the market area include: Tulsa, OK; Shreveport, LA; Little Rock and Ft. Smith, AR; and Springfield, MO.

Adjoining the market area to the north are two additional national forests, the Ozark–St. Francis National Forests (1.2 million acres) and the Mark Twain National Forest (1.4 million acres). Hot Springs National Park and the Buffalo National River also provide opportunities for recreation on federally managed public lands. Corps of Engineer-managed land surrounding several small water impoundments (Blue Mountain Lake and Nimrod Lake) and the large impoundment of Lake Ouachita and Broken Bow Lake provide many opportunities for camping, fishing, boating, swimming, and hunting. In addition, several state parks in and near the Forest provide an outstanding variety of recreational opportunities.

The Forest has completed a comprehensive review of its recreation capabilities and established regions of the Forest best suited to respond to current and potential recreational demands. Figure 3.37 displays the recreation regions.

The following summary describes the recreation opportunities by regions within the Forest:

- The eastern region of the Forest offers premier short hiking and biking trails. It also abounds with opportunities to see and learn about the history of the area. Many sightseers visit this and the southern region as part of an interwoven experience with other tourist opportunities in the area.

- The southern region features a variety of exceptional water-based recreation including fishing, non-motorized boating, and passive enjoyment of streams, rivers, and lakes. Developed campgrounds provide services for extended stays. Unique botanical, mineral, and prehistoric resources are featured in information and education programs. Hiking and biking enthusiasts enjoy a network of short and long distance trails.
- The northwestern region assists in supplying demand for equestrian uses as access to other large expanses of lands diminish. Developed campgrounds provide services for extended stays to these and other users. Mountaintop scenic drives include wayside stops to learn about the area's rich history.
- The northern region offers opportunities for high quality hunting, wildlife viewing, and remote backcountry experiences. This region also has land characteristics that are well suited for developing carefully focused OHV and horseback riding opportunities managed in an environmentally responsible manner.
- The southwestern region offers opportunities for horseback and OHV riding, high quality stream fishing, and unique birding opportunities.

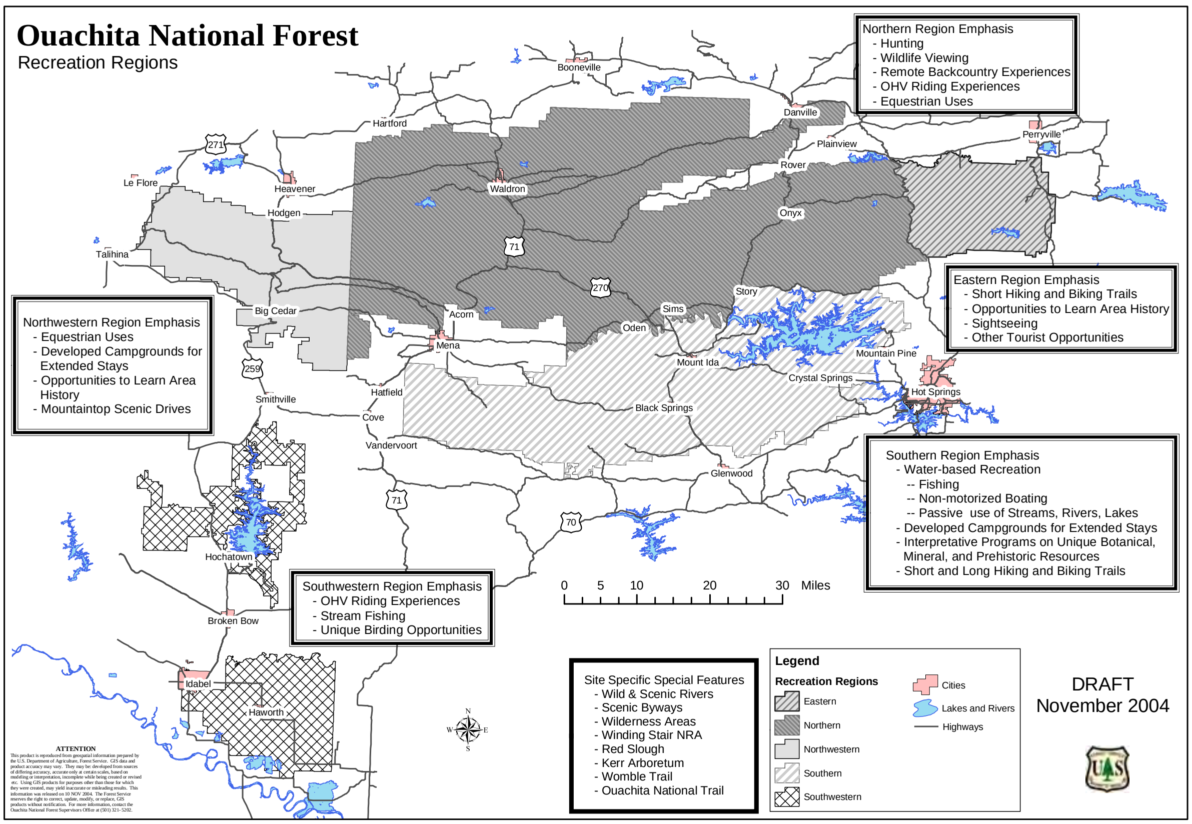

Figure 3.37 Ouachita National Forest Recreation Regions

Recreation Demand and Trends

Recreation demand is a complex mix of people's desires and preferences, availability of time, price, and availability of facilities. The evaluation of current and future demand for recreation on the Ouachita National Forest is based on recent surveys that identify and quantify:

- Estimated number of current recreation visits to the Ouachita National Forest
- Participation rates for recreation activities within the Forest market area
- Future activity demand based on projected trends from research
- Activity demand by demographic strata

The National Visitor Use Monitoring (NVUM) conducted by the Forest Service provides baselines for estimating current use of recreation sites on the Ouachita National Forest as shown in Table 3.100. These numbers only account for people visiting developed or dispersed sites for the purpose of engaging in a recreation activity. They do not include the hundreds of thousands of people who drive through the Forest for other reasons.

Table 3.100 Baselines for Recreation Use on the Ouachita National Forest

Type of Recreation Site	Current Percentage of Total Estimated National Forest Recreation Visits*
Day-Use Developed Sites	13 percent
Overnight-Use Developed Sites	15 percent
Wilderness (Dispersed Sites)	2 percent
General Forest Areas (Dispersed Sites)	70 percent
Total	100 percent (1,536,300 estimated visits)

*Refer to summary of methodology in Appendix B.

Based on this NVUM data, "developed recreation" areas on the Ouachita National Forest accommodate approximately 28 percent of the estimated recreation visits. The remaining 72 percent of recreation visits can be defined as "dispersed recreation," which occurs away from developed sites in general forest areas and designated wilderness.

People within the defined market area for the Forest engage in a variety of recreation activities. Table 3.101 lists the types of activities that can be enjoyed on the Forest and trends in public demand based on the National Survey on Recreation and the Environment (NSRE), an on-going national telephone survey sponsored by the US Forest Service. Data reflects participation in an activity within the defined market area and not necessarily on the Ouachita National Forest.

Table 3.101 Participation Rates and Number of People (x 1,000) over 16 Years Old Participating in Recreation Activities in Ouachita National Forest Market Area and Estimated Percentage Increases through 2050

Recreation Activity	2001 Participation Rate	2000 # of People	2010 (factor) *	2020 (factor)*	2030 (factor)*	2040 (factor)*	2050 (factor)*
Developed Camping	6.8 percent	51.50	(1.27) 65.41	(1.6) 82.4	(1.98) 101.97	(2.44) 125.66	(3.01) 155.02
Primitive Camping	2.0 percent	15.07	(0.98) 14.77	(1.00) 15.07	(1.00) 15.07	(1.05) 15.82	(0.92) 14.77
Picnicking	2.1 percent	16.15	(1.11) 17.93	(1.23) 19.87	(1.37) 22.13	(1.53) 24.71	(1.71) 27.62
Swimming	0.4 percent	3.02	(1.06) 3.20	(1.13) 3.41	(1.20) 3.62	(1.29) 3.90	(1.41) 4.26
Backpacking, Unroaded Camp	1.0 percent	7.21	(1.23) 8.87	(1.57) 11.32	(1.96) 14.13	(2.08) 15.00	(2.71) 19.54
Viewing	19.0 percent	143.48	(1.15)	(1.31)	(1.48)	(1.66)	(1.86)

Recreation Activity	2001 Participation Rate	2000 # of People	2010 (factor) *	2020 (factor)*	2030 (factor)*	2040 (factor)*	2050 (factor)*
Scenery			165.00	187.96	212.35	238.18	266.87
Off-Highway Vehicles	0.3 percent	2.62	(1.05) 2.75	(1.10) 2.88	(1.16) 3.04	(1.23) 3.22	(1.34) 3.51
Driving for Pleasure	9.2 percent	69.45	(1.15) 79.86	(1.31) 90.98	(1.48) 205.20	(1.66) 234.92	(1.89) 267.47
Other Motorized Travel	2.6 percent	19.65	(1.15) 22.60	(1.31) 25.74	(1.48) 29.08	(1.66) 32.62	(1.86) 36.55
Hiking/Walking	12.9 percent	96.31	(1.19) 114.61	(1.38) 132.91	(1.59) 153.13	(1.78) 171.43	(1.94) 186.84
Horseback Riding	0.3 percent	2.62	(1.09) 2.86	(1.19) 3.12	(1.27) 3.33	(1.30) 3.41	(1.31) 3.43
Hunting	4.6 percent	34.72	(0.97) 33.68	(0.93) 32.29	(0.89) 30.90	(0.83) 28.82	(0.76) 26.39
Viewing Wildlife, Birds & Fish	16.1 percent	121.64	(1.21) 147.18	(1.46) 177.59	(1.70) 206.79	(1.89) 229.90	(2.02) 245.71
Fishing	8.8 percent	66.34	(1.09) 72.31	(1.17) 77.62	(1.24) 82.26	(1.26) 83.59	(1.26) 83.59
Wilderness	1.5 percent	11.59	(1.23) 14.26	(1.57) 18.20	(1.96) 22.72	(2.08) 24.11	(2.71) 31.41
Visiting Historical Sites	1.7 percent	13.13	(1.22) 16.02	(1.47) 19.30	(1.77) 23.24	(2.13) 27.97	(2.55) 33.48
Visiting Nature Centers	0.9 percent	6.94	(1.22) 8.47	(1.47) 10.20	(1.77) 12.28	(2.13) 14.78	(2.55) 17.70
General Relaxing	8.0 percent	60.08	(1.11) 66.69	(1.23) 82.43	(1.35) 90.48	(1.49) 99.86	(1.65) 110.58
Gathering Berries, Natural Products	1.6 percent	11.79	(1.11) 13.09	(1.23) 14.50	(1.37) 16.15	(1.53) 18.04	(1.71) 20.16
Nature Study	0.2 percent	1.51	(1.23) 1.86	(1.60) 2.42	(1.98) 2.99	(1.89) 2.86	(2.02) 3.05

*Increase or decrease factors utilize 2001 use data for future projections.
Source: *Ouachita and Ozark National Forest Recreation Realignment Report,* Overdevest and Cordell, 2001 and from *Outdoor Recreation in American Life, A National Assessment of Demand and Supply Trends,* H. Ken Cordell, Principal Investigator, 1999

Demographic information collected within the market area also revealed trends affecting recreation demand. General relaxing, viewing scenery, viewing wildlife, and hiking/walking emerged as the most favored activities across the surveyed demographic groups (Overdevest and Cordell 2001).

Recreation Opportunity Spectrum (ROS)

The ROS is the method used by the Forest Service to inventory and manage outdoor recreation settings and to insure that a broad mix of these settings remain available to provide the recreating public with experiences ranging from high challenge and remoteness (primitive) to more developed and managed settings found in most Forest Service recreation areas (rural). The Ouachita National Forest continues to provide recreation experiences in each category of ROS within the outer limits listed above. However, the majority of the Forest is managed for recreation experiences in the mid-range (Semi-primitive Motorized - SPM), where the forest visitor may enjoy nature in an atmosphere where some challenge and remoteness is available but rarely completely removed from human influence and activity. The ROS changes very little between Alternatives A through E, maintaining the existing Forest focus on SPM experiences, while sustaining the primitive experiences available in wilderness.

Developed Recreation

A developed site is a distinct place containing a concentration of facilities and services used to provide recreation opportunities to the public. It represents a significant investment in facilities and management under the direction of an administration unit in the National Forest System. Recreation sites are developed within different outdoor settings to facilitate desired recreational use. Developed recreation sites include such facilities as campgrounds, picnic areas, shooting ranges, swimming beaches, visitor centers, and historic sites. Development levels range from 1 to 5. Level 1 represents the most primitive, natural settings with minimal or no site amenities. Level 5 represents the highest level of development.

The Ouachita National Forest has five Level 5 sites including Camp Clearfork, Cedar Lake Recreation Area, Charlton Recreation Area, Lake Sylvia Recreation Area, and Little Pines Recreation Area; twenty-seven Level 4 sites; sixty Level 3 sites; and forty Level 2 sites. Different levels of development may be present within large campgrounds; however, the designated development level represents at least 70 percent of the facilities.

Supply of Developed Recreation Sites

The Forest Service defines the capacity of developed recreation sites in terms of “people at one time” (PAOTs) that a site can support. Currently, there are 57 significant sites considered as developed sites (there are 132 sites described above by level) managed by the Ouachita National Forest to accommodate different recreation activities. See Appendix B for a description of the NVUM process and discussion of recreation visits by alternatives over time. Table 3.102 displays the current capacities of day-use developed areas as of September 2004 and Table 3.103 shows the current capacities of overnight use developed sites for the same time period.

Table 3.102 Current Capacities of Day-Use Developed Areas

Type of Day Use Developed Areas	Total Number of Areas	Total Capacity (PAOT)
Picnic Areas	11	581
Beaches & Swimming Areas	2	535
Shooting Ranges	11	188
Parking areas, overlooks, historical & minor interpretive sites	7	210
Visitor Centers	2	120
Organization Use Site	2	285
Total Day-Use Capacity	35	1,919

Table 3.103 Current Capacities of Overnight-Use Developed Sites

Level of Campground	Total Number of Campgrounds	Total Capacity (PAOTs)
Level 2	3	100
Level 3	9 (1 horse camp)	570
Level 4	5	1,030
Level 5	5 (1 horse camp)	2,217
Total Overnight Capacity	22	3,917

Overall, developed recreation use on the Ouachita National Forest is increasing. Capacity of Ouachita National Forest recreation sites generally exceeds demand during most periods with the exception of very high use holidays and some weekends during the summer months. This short-term, seasonal, high demand has not been recognized as significant, and no additional developed or dispersed recreational facilities have been designed or constructed to alleviate this condition. Some short-term visitor dissatisfaction due to overcrowding, noise, and space competition is noted. However, adequate facilities are available in other, less well-known and used areas to fill this demand. No significant or lasting resource damage has been attributed to or is expected to occur because of this temporary, but recurring, phenomenon. The Forest plans no significant increase under any alternative to the PAOT of existing developed recreation facilities.

Dispersed Recreation

Dispersed recreation is defined as those activities that occur outside of developed recreation sites such as boating, wildlife watching, sightseeing, hunting, fishing, OHV travel, hiking, and biking. Estimates of recreation visits can be found in Appendix B. There are approximately 100 sites such as trailheads and boat ramps that facilitate dispersed use of the forest. Developed access points for dispersed recreation are shown in Table 3.104.

Table 3.104 Developed Access Points for Dispersed Recreation

Type of Developed Site	Total Number of Sites	Total Capacity (PAOT)
Trailheads	43	675
River Access Points	6	245
Lake Boat Ramps	6	24
Fishing Sites	44	880
Total	99	1,824

In addition to developed access points for dispersed recreation, there are approximately 617 existing miles of designated non-motorized trail for hiking, biking, and horse riding. There are no designated motorized-use only trails on the Forest; however, there are trails including Wolf Pen Gap, Fourche Mountain, and Sugar Creek that are authorized for both motorized and non-motorized uses. Existing miles (September 2004) of non-motorized trail are shown in Table 3.105.

3.105 Miles of Non-Motorized Trails

Type(s) of Non-Motorized Use Allowed	Existing Miles of Designated Trails
Hike only	92
Hike and Bike only	294
Hike and Horse only	24
Hike, Bike, and Horse only	207
Total	617

The 1.8 million acres of Ouachita National Forest offer abundant opportunities for wildlife and fish enthusiasts. The Forest is managed to provide both adequate habitat for the game and non-game species and opportunities for hunting and fishing. Early seral habitat is necessary for forage of many animals, and particularly important for game species such as quail. Streams and lakes are also stocked to provide fishing opportunities. The following tabulation gives the acres of early seral habitat and miles or acres of fish stocking conducted in cooperation with the Arkansas Game and Fish Commission and the Oklahoma Department of Wildlife Conservation:

Early Seral Habitats	465,535 Acres
Stocked (Put & Take) Streams	3 Miles of Stream
Stocked (Put & Take) Lakes	1,160 Acres

Geocaching, a relatively new dispersed recreational activity which utilizes hand-held electronic global positioning units to “hunt” for a previously hidden “cache” (usually a small watertight container with a log book or prize inside), is gaining in popularity throughout the eastern National Forests, including the Ouachita National Forest. If appropriate resource stewardship principles were observed, resource damage because of this activity would be minimal. However, geocaching activities have some potential to increase resource impacts because of increases in use of primitive and semi-primitive areas and depending upon the methods and locations used for hiding the cache.

Concentrated overnight camping and day use in riparian corridor areas adjacent to the Little Missouri Wild and Scenic River have begun to cause degradation of these areas through soil compaction, erosion, proliferation of fire pits and rings, and damage to existing vegetation. Surveys have been conducted to determine the amount and type of use taking place in this area and to assist in determining the most appropriate solutions to restore and protect these areas.

Off-Highway Vehicle Use

Off-highway vehicles include all classes of motorized vehicles that are capable of traveling off hardened surfaces, such as 4-wheel drive vehicles (jeeps, automobiles, or sport utility vehicles), motorcycles, and all-terrain vehicles (ATVs). Collectively, such vehicles are known as off-highway vehicles or OHVs. Although OHVs are owned and used for many reasons, this discussion addresses only off-highway recreational use of OHVs within the Ouachita National Forest.

The 1990 Amended Forest Plan treats public use of off-highway vehicles (OHVs) on the Ouachita National Forest as suitable except where expressly prohibited, such as in wilderness areas, the forest floor of the Broken Bow unit, and the “wild” portion of the Little Missouri Wild and Scenic River. During scoping for plan revision, the practice of allowing cross-country OHV travel on the Ouachita National Forest was identified as an issue.

In 2004, the Chief of the Forest Service identified unmanaged recreation as one of the top four threats to the health of National Forest System land and resources. The Chief commissioned the National OHV Policy and Implementation Teams, who identified a number of undesirable impacts on National Forest System lands from unmanaged OHV use, including:

- user-created unplanned roads and trails
- severely eroded soils
- damaged wetlands and harm to wetland species
- habitat destruction
- degraded water quality
- the spread of invasive species—plants, animals, and disease-causing pathogens
- user conflicts
- destruction of cultural sites
- disturbance to sites sacred to Native Americans

OHVs provide an opportunity for the public to explore public lands, and use on the Forest has increased in keeping with the popularity of this recreational activity in other parts of the country. Nationally, the total number of vehicles estimated to be in use grew from just under three million in 1993 to over eight million in 2003, with industry reports confirming the sale of over one million such vehicles in 2003 alone (Cordell 2005). Based on regional exit surveys from national forests in Puerto Rico and the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, and Virginia, OHV use (primary and secondary) represents about 4 percent of the total recreational visits for the region, but over two times that rate (9.2 percent) on the Ouachita National Forest (English 2004). Those same surveys reported that, nationally, OHV use represents 5.6 percent of total national forest visits.

In actual numbers, about 152,000 incidents of OHV use occur on the Ouachita National Forest annually. Here, the use of OHVs for family outings, retrieval of big game, access to and set-up of hunting camps, and general recreational use has been allowed on designated trails and open roads as well as on the forest floor (cross-country) with few restrictions. Over time, such use has become a culturally accepted and expected form of recreation by many citizens living within or near the Forest, especially those involved in deer hunting and, to a lesser extent, turkey and bear hunting. The Forest has also become a major destination for general recreational use of OHVs, drawing people primarily from Arkansas, Louisiana, Oklahoma, and Texas.

The Forest conducted six open house meetings during the fall of 2003 and visited with nearly 500 citizens to solicit and receive comments about potential changes to OHV management direction and about their preferences for OHV use within the Forest. A strong preference to continue allowing retrieval of big game was expressed by many who participated in these meetings.

Concentrated use of OHVs in some geographic areas has resulted in resource damage and conflicts with other users as well as adjacent landowners and has become an important topic of public and agency concern. With the growing popularity of such vehicles in the United States and the Forest, a change in existing management direction for use of these vehicles is needed.

ALTERNATIVES

Alternative A (No Action Alternative)

Current ROS distributions would not be expected to vary from description provided in the Affected Environment. Developed and dispersed recreation opportunities including associated scenery management would continue to be provided under the guidance of the 1990 Forest Plan. No changes to existing recreation management would be made. Public access (travel ways, use corridors, waterways, and trails) would be managed at current levels for recreation opportunities.

Alternative B

Recreation opportunities and development would remain the same as in Alternative A; however, cross-country travel by motorized vehicles would be considered unsuitable requiring that a system of designated routes be developed with appropriate public input. Recreation opportunities found under Alternative B would continue to be provided at their current levels.

Alternative C

A variety of recreation settings and opportunities would occur in areas where these activities would be compatible with ecosystem health and community safety. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Alternative D

Additional Primitive (ROS – P) recreational opportunities would be provided through the recommendation of additional areas for inclusion into the National Wilderness System and the addition of smaller parcels of land to existing wilderness areas. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input. Cross-country travel for big game retrieval would be a suitable use.

Alternative E (Selected Alternative)

A variety of recreation settings and opportunities would occur in areas where these activities would be compatible with ecosystem health and community safety. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Direct, Indirect, and Cumulative Effects on Recreation

Capacity for the Forest’s developed recreation areas, with the exception of short-term peak use mostly during holidays, is currently adequate and projected to remain adequate for at least the duration of the next planning cycle. However, with limited capacity, some sites experiencing increased overuse and crowding at peak times such as holidays and weekends may lower visitor satisfaction. Use would reach capacity more often over time and some visitor’s expectations would not be met. When compared to Alternative A, Alternatives B, C, D, and E would have no increases or decreases in existing developed recreation areas.

Alternatives differ little in terms of their effects on non-motorized trails. Alternative D, for example, could lead to the elimination of mountain biking on about 14 miles of trail that pass through a recommended wilderness area (if Congress were to designate this area as a wilderness). Information gathered during the 2000 NVUM studies indicates that the Forest’s trail system is currently adequate to meet hiking, biking, and horseback riding demand and will continue to be able to meet anticipated increases in demand for these activities over the upcoming planning period.

Cross-country horse trail use would be considered suitable in most locations on the Forest under all alternatives. The effects of this activity include resource impacts when a user-created trail develops.

Satisfaction of some users is greater if horseback riders are allowed off-trail where there is a sense of freedom. However, other forest visitor's satisfaction is decreased when resource impacts from these cross-country horse users affect their experience. At this time, there are no plans to increase equestrian-only trail miles or to construct additional horse camps.

According to the Wilderness Act of 1964, allocation of lands to wilderness affects all mechanical and motorized transport forms of recreation. Since any additional allocation to wilderness status for this planning cycle is anticipated to be relatively small, the resultant impacts will remain minor. Even the 30,127 acres considered for wilderness recommendation under Alternative D would have relatively minor effects as the terrain is rugged and ample other opportunities exist for mountain biking in other locations on the Forest.

Variations in OHV management direction by alternative are displayed below. Alternative A contains the management direction (suitability) for public use of off-highway vehicles (OHVs) on the Ouachita National Forest in the 1990 Amended Forest Plan, and therefore, would present no change. Under the 1990 Forest Plan, drivers may not operate OHVs in designated wilderness areas, developed recreation areas (MA 3), Research Natural Areas and National Natural Landmarks (MA 4), the Ouachita Seed Orchard (MA 7), or any other area posted closed to cross-country traffic by motorized vehicle. All alternatives have these restrictions in common. Differences are listed in the tabulation below.

Alternative	Comparison of OHV Direction
A	Cross-country travel suitable unless posted closed and on open roads (those not barricaded or posted closed) and designated trails
B	Cross-country travel unsuitable
C	Cross-country travel unsuitable
D	Cross-country travel unsuitable, except for large game retrieval
E	Cross-country travel unsuitable

Alternatives C, D, and E contain recommendations for additional acres to be designated as wilderness. Alternatives C and E recommend an additional 1,793 acres (as wilderness additions), and Alternative D recommends these additions plus an additional 30,127 acres in three new areas for wilderness designation. Under Alternatives C, D, and E, the additional acreage recommended for wilderness designation would be removed from areas where trails or roads could be designated for OHVs as those acreages would be managed as a part of MA 1, Wilderness, where OHVs are prohibited.

Alternatives A and D would allow retrieval of large game. Alternative A would allow game retrieval because cross-country travel would be a suitable use; under Alternative D, such cross-country travel for game retrieval would be a specific exception. This exception for game retrieval would not be included in Alternatives B, C, or E, which would likely have a marked effect on hunting access and hunter attitudes toward the National Forest.

Table 3.106 displays estimates of potential game populations by alternative. Alternative E emphasizes hunting, fishing, and non-consumptive wildlife opportunities. Effects of this emphasis will include increased opportunities for hunting, fishing, and non-consumptive wildlife viewing on some parts of the Forest because of increased vegetation management and management for recreation purposes. This will increase user satisfaction for visitors in some areas. Effects on hunters of small and big game will generally be positive. Some specific areas on the Forest will not be managed for game species that were managed in the past; this will affect hunters more negatively by decreasing the places or the success ratio. Some areas would be managed differently than in the past, and hunter satisfaction may increase in those areas. Hunting decreases the satisfaction of some other users, especially trail users, due to safety concerns. Effects may include a decrease in use on certain trails during the hunting season to avoid safety hazards. The quantity of stocked (put and take) streams and reservoirs is expected to change over alternatives.

Table 3.106 Estimates of Potential Game Populations by Alternative

Type of Game Habitat	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Deer per square mile	12.8	13.2	22.7	13.4	13.7
Northern bobwhite per square mile	35.2	29.1	42.7	37.8	36.6
Eastern Wild Turkey per square mile	3.4	2.7	5.9	3.2	3.3
Early Successional Habitat[1] (1,000 acres)	57.00	60.00	60.00	57.00	57.00

[1]Early successional habitat includes total acres in the grass/forb/shrub condition forest-wide.

Under all alternatives except Alternative A, public use of OHVs would continue to be suitable on routes and in areas where such use is not prohibited, but it is anticipated that the Forest would move toward a system of designated trails and roads for public use of OHVs and other motorized vehicles within four years. Designation of such a system may require additional environmental analysis (with public involvement). Under all alternatives, routes posted closed or closed to vehicle use by a gate, earthen barrier (berm), or other obvious means, and areas posted closed to cross-country travel by motorized vehicle (e.g., wilderness, walk-in turkey hunting areas during certain seasons, portions of wild and scenic river corridors) would not be available for public use of OHVs. The Forest Supervisor may issue new prohibitions that close additional areas to OHV travel during the transition period between the 1990 Forest Plan management direction and adoption of a system of designated routes.

For purposes of this analysis, it is assumed that user-defined trails would continue to be created under all alternatives, although at varying intensities. Because user-defined trails are not carefully chosen and designed after study of variables such as soils, topography, proximity to streams, sensitive habitats, or cultural sites, and season of use, there is a high likelihood that greater impacts to soil, water resources, vegetation, wildlife and wildlife habitat, cultural sites, and users on user-defined routes will occur than on routes that are established following careful consideration of these variables and professional design work.

Although there is an assumption that some user-defined trails would continue to develop, there is also an expectation that such development would diminish under all alternatives as the public becomes aware of the damage such trails cause. Alternatives B, C, D, and E should result in fewer user-defined trails, due primarily to education through publication of designated routes, interaction with law enforcement officers and other officials, and an expectation that the majority of OHV drivers are law-abiding citizens. After a period of adjustment during which the public becomes familiar with the new direction for use of OHVs and begins to adhere to the established policies, Alternatives B, C, D, and E would show further decreases in creation of user defined trails and the associated problems of erosion, water degradation, habitat destruction, damage to cultural sites, and conflicts between users.

Under all alternatives, there would be a continuing need for law enforcement. Under Alternatives B, C, D, and E, once the designated routes are in place, it is anticipated that some OHV users would continue to travel cross-country, taxing law enforcement resources. Enforcement of OHV use on designated routes may divert time away from other law enforcement duties. Over time, violations and effects to Forest Law Enforcement resources would be expected to diminish as the public becomes more familiar with the OHV restriction and published information receives wider distribution. An undetermined adjustment period would be necessary.

OHV use has both direct and indirect effects on vegetation: direct effects include crushing and uprooting of plants, and indirect effects include soil compaction and other soil modifications that may reduce opportunities for restoration of plant cover (Wilshire, Shipley, and Nakata 1978). Forest areas that are rutted from OHV use and littered with damaged vegetation are not only unsightly, they are representative of adverse impacts to the long-term productivity of the land.

Many studies have been conducted on the impacts of OHVs on many different types of soil. Schubert and Associates (1999) reported that the U.S. Geological Survey reviewed the impact of OHVs on more than 500 soils from more than 200 sites in various climatic zones and with different vegetative cover and concluded that virtually all soil types examined are vulnerable to OHV damage. Most studies of problems associated with soil disturbance caused by OHVs list the following as problems:

- rutting and associated root disturbances
- destabilization of the soil base and decreased soil aggregate stability
- disturbance and loosening that increases susceptibility to wind and water erosion
- nutrient depletion due to loss of topsoil
- formation of surface crusts, increasing runoff
- lower soil moisture and higher soil density that inhibits germination and emergence of seedlings
- reduced water infiltration and increased sediment transportation and deposition
- degraded and destroyed habitat for plants and soil dwelling animals

While riding on designated trails and roads poses inherent environmental risks, these risks intensify when riders travel off trails and roads, because previously undisturbed areas are impacted. Because OHV use is increasing, the number of riders who ride off designated routes is also likely to increase. This percentage, however small, creates additional environmental impacts. More studies are needed to quantify the amount and extent of soil loss attributable to OHV use. Alternative A does not contain provisions to decrease the number of drivers who ride off-route. Alternatives B, C, and E would provide direction for no off-route driving, and Alternative D would have the same no off-route riding restrictions with the exception for game retrieval.

Limited information is available about air quality impacts from OHVs. Stokowski and LaPointe in "Environmental and Social Effects of ATVs and ORVs: An Annotated Bibliography and Research Assessment' state, "The few published air quality studies related to ATV uses tend to be limited to research focusing on snowmobile operation. Some internet sources also discuss air quality, though the internet-publicized research is primarily supported by interest groups. In general, there seems to be a noticeable lack of research about levels and effects of ATV emission." According to Kasnitz and Maschke (citing California Air Resources Board 1996:7), "One two-stroke off-road motorcycle or all-terrain vehicle emits as much hydrocarbon pollution per mile as 118 passenger cars, while relatively cleaner four-stroke engines still emit more than seven times the level of carbon monoxide as new cars." Because a policy of limiting OHVs to designated trails and roads is not expected to decrease the number of OHV users within the Forest, all alternatives would be considered to be equal in terms of air quality effects.

One observable soil disturbance as a result of OHV riding is stripped vegetation cover. Soil that is not stabilized is likely to erode faster during rainfall/runoff events, be more susceptible to wind erosion, and is more easily loosened by additional OHV traffic. Disturbed soil particles that are air borne eventually settle out and this contamination works its way into nearby waterways contributing to degraded water quality through sediment deposit (Smith 1999).

In research conducted on four stream basins within the Ouachita National Forest (Chin and others 2004), four findings were made:

- pools downstream of OHV crossings were muddy and sediment laden
- sands and fines are substantially higher in stream pools within basins affected by OHVs
- quantitative date for embeddedness (spaces around rocks in the streambed) did not show clear differences between OHV affected and non-affected streams
- OHV affected streams were not as deep as were reference streams

Activities that contribute to increased soil erosion, such as cross-country OHV riding, will continue to contribute to degraded water quality and aquatic habitat. A shift to designated trails and roads could positively influence water quality in proportion to the quantity of OHV traffic shifted off the forest floor and onto designated routes.

Bury (1980) reported that OHV crossings in streams destroyed aquatic plants and disrupted the habitat of invertebrates, fish, amphibian, some reptiles, and some birds. Riparian habitat is particularly susceptible because damage that leads to increased sedimentation has the potential to alter entire ecosystems. Refer to the discussions concerning aquatic habitat and species elsewhere in this document for lists of sensitive species that could be affected.

While habitat disturbance is fairly easy to detect and understand, a less well-researched impact, effects of noise, is also of concern. Noise from OHVs disturbs wildlife and may cause them to relocate (Bury 1980). Displacement of species that are dependent upon a limited habitat has the potential to affect their long-term viability if a sufficient quantity of suitable habitat is not available and species are forced to survive and reproduce in marginal or unsuitable habitat (Schubert and Smith 2000). As in humans, noise may cause hearing impairment and loss. Lack of hearing disables creatures exposing them to increased predation and increased difficulty in locating prey. Within their species, hearing impairment may lead to inability to recognize mating signals, warning calls, and calls by juveniles (EPA 1971).

The network of user-defined trails that unrestricted OHV use often produces has the effect of fragmenting wildlife habitat. The presence of humans in areas previously unused or lightly used causes disturbance. During vulnerable seasons, such as breeding or nesting season, human disturbance may cause nest abandonment, decline in parental care, shortened feeding time, and increased stress (MacArthur 1982). Some species mortality is directly attributable to collisions with OHVs. Bury (1980) found that mortality was greatest among ground nesting birds and rodents.

A system of designated routes (such as might be developed under Alternatives B through D) would offer the advantage of careful consideration during the planning and design phase and fragile habitats could be avoided. After the trails and roads were designated, wildlife species could establish feeding and breeding routines that would not be unexpectedly interrupted. By limiting stream crossings to designated points, a system of designated routes would greatly reduce damage to aquatic habitat and water quality.

One unintentional consequence of driving OHVs off-route is that soil and some vegetative matter lodges in the tires of the OHVs and is transported into other areas. Such inadvertent transport of materials may allow the spread of invasive species and disease-causing pathogens. Although more research is needed to quantify the actual risk posed by off-route riding, it is reasonable to conclude that alternatives that include provisions to limit off-route driving have the greatest potential to reduce the spread of invasive species.

OHVs are a very popular use within the Ouachita National Forest; however, the Forest is also used for other types of recreation. There are nine Walk-In Turkey areas on the Forest and a number of other areas that offer a semi-primitive recreation experience. Turkeys are particularly sensitive to the effects of noise; therefore, introduction of OHVs into areas on user-defined trails is detrimental to the recreational users who enjoy turkey hunting. Other recreational users seek time in the Forest for solitude. Introduction of OHVs into areas where there are people seeking a semi-primitive experience is detrimental to their enjoyment.

As discussed above, user defined trails cause damage to the forest floor, and those damages cost money to repair. Diversion of funds from other programs to repair unnecessary damage conflicts with other programs and deflects time and money away from those programs. Restricting use to designated routes would help to eliminate damage from user-defined trails.

The closure of unrestricted cross-country travel would serve to protect cultural properties across a broad landscape. When OHVs leave designated routes and create user-defined trails, no analysis to determine if historic or cultural properties would be damaged has been undertaken. Thousands of identified cultural sites exist within the Forest. Disturbance by OHVs to cultural sites as well as sites sacred to Native Americans is an unacceptable practice. If a system of designated routes was established, all known sites could be avoided.

According to Cordell (2005), “Federal agencies such as the Bureau of Land Management and the US Forest Service provide the majority of opportunities for OHV use and the demand for such use is growing rapidly in the face of limited other opportunities.” Allowing cross-country travel and the unrestricted development of user-defined routes have many negative impacts; however, the resulting trails allow OHV users to experience new experiences and settings. The Ouachita National Forest is one of the few large areas of public land where OHV use is permitted.

While there is a great demand for places for people to enjoy their OHVs, the potential for conflicts is increasing as use increases. There are conflicts among users and conflicts with private landowners (inholders and adjacent landowners). User conflicts, such as those experienced when some hunters and hikers encounter OHV riders, are increasing as demands for OHV access increase. Among OHV riders, some prefer to have routes or areas to themselves, and their satisfaction is decreased when large numbers of OHV riders spoil their experience.

Because places where people may ride OHVs are limited and the Forest provides an easily accessible venue for such activity, large numbers of people travel from neighboring states to use the Forest. After the DEIS was circulated for comments, the Forest received many comments from persons in several states concerned about their access to the Forest for OHV riding. Among the communications was a letter from an officer with the Arkansas Game and Fish Commission that noted, “These people ARE NOT going to stop riding their ATV’s in the forest and no amount of laws or regulations can or will stop them. We need to allow it and control it through enforcement.” Law enforcement officers for the Forest report that illegal use of alcohol is prevalent and there is, in general, a lack of concern or awareness about environmental damage, with a particular lack of understanding about the damage caused to riparian habitat. Yet, many OHV users express a desire to protect and enjoy the natural environment.

People who own land within and near the Forest have reported that OHV users often trespass onto their property, leave trash, are noisy late into the night, abuse alcohol, and are belligerent when confronted. Forest inholders expect to enjoy solitude when they live in areas surrounded by the Forest, not long-lasting intrusive sounds and actions by others. They report that tire ruts and trash left by OHV users impair the natural beauty of the Forest. A management direction that makes cross-country travel unsuitable should help to avoid some of these conflicts.

Within the Forest and within the Southern Region as a whole, higher rates of hunting and fishing were reported than for other regions (English 2004). During public involvement in the OHV use issue and during the comment period for the DEIS, many people asked questions about access for hunters and disabled persons. As a result of these concerns, cross-country access for retrieval of large game animals would be an exception under Alternative D. Because access for game retrieval would be limited to deer and bear hunting seasons only, such access would not have the same detrimental effect on the environment as year-round cross-country access. With regard to access for persons with disabilities, the agency already has an established policy: if a road or area is closed to the able-bodied, it is also closed to the disabled individual. Both the Arkansas Game and Fish Commission (AGFC) and the Oklahoma Department of Wildlife Conservation (ODWC) allow access to state managed areas for disabled persons if certain qualifications are met. Because the AGFC and ODWC are the primary agencies for regulating hunting, the US Forest Service cooperates fully with them to enforce regulations relating to hunting.

The Forest is one of the last available areas open to the general public to ride OHVs. Limiting cross-country travel by motorized vehicles has the potential to sustain the opportunity to enjoy OHV recreation over a longer period of time than direction that allows unmanaged cross-country travel. With designated routes, the Forest would have the opportunity to create routes that are logical and well connected. A system that allows OHVs to be driven on designated routes would preserve opportunities for access. Access for short periods of time, such as for game retrieval (Alternative D), would not likely cause irreparable damage; however such an exception would show favoritism to one group and still has the potential for damage to the Forest that would cost money to repair. Land is a nonexpandable resource and must be protected. A Forest direction to guide the use of OHVs and a system of designated routes could minimize or eliminate the undesirable impacts from unmanaged OHV use. Improved management of OHVs with the Forest would allow the Forest Service to protect the resources of the Forest and ensure that high-quality motorized recreation experiences are provided to the public.

Other sections of the FEIS address additional recreation environmental consequences related to Scenery, Wild and Scenic Rivers, Wilderness, Roadless Areas, Special Areas, and Heritage Resources.

Commodity and Commercial Uses

Timber

The Multiple-Use Sustained Yield Act of 1960 recognizes timber as one of the five major resources for which national forests are to be managed. National Forest timber resources are managed to provide wood products for the use of the citizens of the United States, provide an even flow of timber to help local economic stability, provide for regeneration of tree stands, and maintain diversity of forest vegetation.

The 1982 planning regulations define timber production as "the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. The term timber production does not include production of fuel wood (36 CFR 219.3). National Forest System lands which are considered 'suitable' for timber production are the basis for setting the quantity of timber that may be sold from the Forest. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity (ASQ)."

Lands considered unsuitable for timber production include those:

- that are administratively withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service
- that are not producing or capable of producing crops of industrial wood (such as bodies of water, roads, administrative sites, and lands that produce less than 20 cubic feet per acre per year)
- where technology is not available to prevent irreversible assurance that lands can be adequately restocked within five years after final harvest, based on existing technology and knowledge, as reflected in current research and experience
- where there is, at present, inadequate information concerning responses to timber management activities
- where timber management is inconsistent with, or not cost efficient in meeting the management requirements and multiple-use objectives specified in each alternative

Management Areas

Nine of the 17 Management Areas (MAs) are entirely unsuitable for timber production in all alternatives. These MAs considered wholly unsuitable for timber production include:

MA 1. Wilderness and Poteau Mountain
MA 3. Developed Recreation Areas
MA 4. Research Natural Areas and National Natural Landmarks
MA 5. Experimental Forests
MA 6. Rare Upland Communities
MA 7. Ouachita Seed Orchard
MA 8. Administrative Sites/Special Uses
MA 9. Water and Riparian Communities
MA 20. Wild and Scenic River Corridors

The eight remaining MAs contain a mix of lands both suitable and unsuitable for timber production:

MA 2. Special Interest Areas
MA 14. Ouachita Mountains, Habitat Diversity Emphasis
MA 15. West Gulf Coastal Plain, Habitat Diversity Emphasis
MA 16. Lands Surrounding Lake Ouachita and Broken Bow Lake
MA 17. Semi-Primitive Areas
MA 19. Winding Stair Mountain NRA
MA 21. Old Growth Restoration
MA 22. Renewal of the Shortleaf Pine/Bluestem Grass and RCW Habitat

Community Types

Of the community types represented within the eight Management Areas that contain land suitable for timber production, the potential for timber production is mainly from the pine-oak forests and woodlands. The pine-oak community type consists of four sub-types: Ouachita pine-oak forest;

Ouachita pine-oak woodland; Ouachita shortleaf pine-bluestem, and West Gulf Coastal Plain pine-oak forest. These community types and the portion of the Forest they represent are shown in the following tabulation.

Community Type	Percent of Total Forest
Pine-Oak Forest	50.00
Pine-Oak Woodland	16.60
Shortleaf Pine/Bluestem	3.60
West Gulf Coastal Plain Pine-Oak	0.40
Total (Pine-Oak)	70.60

Forest Land Tentatively Suitable for Timber Production

The tentatively suitable lands (36 CFR 219.14) are displayed in Table 3.107, by alternative. Suitable acres (total Forest acres as of April 2003) for the Forest vary from the base in Alternative A to a slight decrease in Alternative B and are decreased by 1,793 acres (Flatside, Poteau Mountain, and Upper Kiamichi Wilderness additions) in Alternatives C and E. Under Alternative D, new recommended Wilderness would result in a reduction of 30,127 acres to lands classified as suitable for timber production. Areas not capable of timber production were classified as “Physically Incapable” and removed from the tentatively suitable classification. Areas such as water or land developed as roads and administrative or recreation sites were classified as “Non-Forest” and not considered suitable for timber production. Other areas where timber resource production was determined not to be compatible with meeting other resource objectives were classified as “Not Appropriate.” This would include the acres in the following Management Areas, plus active RCW clusters:

MA 2. Special Interest Areas
MA 3. Developed Recreation Areas
MA 4. Research Natural Areas and National Natural Landmarks
MA 5. Experimental Forests
MA 6. Rare Upland Communities
MA 7. Ouachita Seed Orchard
MA 8. Administrative Sites/Special Uses
MA 9. Water and Riparian Communities
MA 20. Wild and Scenic River Corridors

Table 3.107 Suitability Classification by Alternative

Classification	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Total Land	**1,780,101**	**1,780,101**	**1,780,101**	**1,780,101**	**1,780,101**
Non-Forest	-31,283	-31,283	-31,283	-31,283	-31,283
Withdrawn	-104,218	-104,218	-104,218	-104,218	-104,218
Physically Incapable	-5,479	-5,479	-5,479	-5,479	-5,479
Tentatively Suitable	**1,639,121**	**1,639,121**	**1,639,121**	**1,639,121**	**1,639,121**
Not Appropriate	-622,893	-622,893	-622,893	-622,893	-622,893
Recommended Wilderness	0	0	-1,793	-30,127	-1,793
Recommended Botanical Area	0	0	0	0	-1,673
Suitable Acres	**1,019,694**	**1,019,694**	**1,017,901**	**989,567**	**1,016,228**

Timber Production on the Ouachita National Forest

Although the Ouachita National Forest contains a wide variety of tree species, timber products are grouped and sold as either pine or hardwood. Pine sawtimber and small roundwood (pulpwood and posts) include both shortleaf and loblolly pine. Pine sawtimber is pine timber 9.6 inches and larger in diameter at breast height (DBH) or 4.5 feet from the ground. Pine roundwood is all pine timber from 5 to 9.5 inches DBH.

Table 3.108 shows sold volumes for fiscal years (FY) 1994 to 2003. Annual total timber volume sold declined 55 percent from 1994 to 2003. The unusually low volume sold in 2002 is due to recovery from an ice storm event in December 2000. Sawtimber volume sold decreased approximately 43 percent when FY 2003 is compared to FY 1994.

Table 3.108 Total Timber Volume Sold, 1994-2003 in Hundred Cubic Feet (CCF)

Fiscal Year	Sawtimber	Roundwood (pulpwood and posts)	Total (CCF)
1994	153,164.60	94,948.18	248,112.78
1995	183,609.75	90,013.00	273,622.75
1996	185,861.62	58,181.24	244,042.86
1997	136,350.53	42,709.47	179,060.00
1998	198,721.04	61,154.03	259,875.07
1999	94,333.69	35,838.83	130,172.52
2000	140,550.12	65,909.55	206,459.67
2001	158,722.96	31,824.87	190,547.83
2002	31,992.18	2,191.12	34,183.30
2003	86,628.31	24,235.58	110,863.89

Table 3.109 shows the acres harvested from 1994 to 2003 by type of treatment or cutting method. Uncontrollable events such as the December 2000 ice storm have the potential to influence greatly the acres in need of harvest for salvage purposes.

Table 3.109 Acres by Cutting Method by Year

Year	Clearcut	Seedtree	Shelter-wood	Uneven-Aged	Thinning	Salvage	Total
	Acres						
1994	17[1]	1,307	1,047	11,715	14,152	0	28,238
1995	0	403	1,114	8,742	14,312	2,277	26,848
1996	0	752	1,057	9,033	12,474	1,517	24,833
1997	0	1,156[2]	-	9,348	13,919	1,474	25,897
1998	0	2,509[2]	-	7,674	23,684	288	34,155
1999	0	1,805[2]	-	5,677	9,810	1,075	18,367
2000	0	1,838[2]	-	2,857	16,706	18	21,419
2001	0	937[2]	-	1,157	5,984	46,294	54,372
2002	0	460[2]	-	1,334	5,873	1,566	9,233
2003	0	2,068[2]	-	2,760	12,073	118	17,019

[1]Clearcut for Research
[2]Seedtree and Shelterwood reported together

Hardwood sawtimber and small roundwood include all the various hardwood species, primarily oaks and hickories. During the ten-year period FY 1994–2003, hardwood was sold primarily for fuelwood purposes and was made available during site preparation activities after pine timber had been harvested. During this period, an average of 857 hundred cubic feet (CCF) of fuelwood was harvested per year.

The average value of all Forest products sold during FY 2003 was $143.42 per thousand board feet (MBF) for sawtimber and $7.09 per hundred cubic feet (CCF) for pulpwood. The total value of FY 2003 timber cut was $10,331,013.42. Total value of timber sold in FY 2003 was $7,010,818.62.

During the ten-year period FY 1994–2003, timber sales yielded almost 147 million cubic feet (MMCF) or 810 million board feet (MMBF) of sawtimber and more than 59 million cubic feet (MMCF) of small roundwood products (pulpwood and posts). Between 1995 and 2002, standing timber inventories of growing stock increased from 1,171 cubic feet/acre to 1,410 cubic feet/acre, an increase of 239 cubic feet/acre.

During the ten-year period FY 1994–2003, the Forest averaged slightly more than 109 timber sales per year, with an average of 73 sales per year individually valued at more than $10,000. The sale program for FY 2003 included 491 sales, of which, 32 sold for more than $10,000 individually. Currently, 57 percent of the Forest's sawtimber sale program is designated for sale to purchasers classified by the Small Business Administration as “small business.” Forest timber receipts have grown from 32 dollars in 1909 to 10.3 million dollars in 2003.

National Timber Supply and Demand

According to the 2000 Renewable Resources Timber Assessment:

- Consumption of forest products will continue to increase over the next 50 years, but the rate of increase will be slower than over the last 50 years. Rising consumption will be accompanied by increases in U.S. timber harvest; rising log, chip, and product imports; and greater use of recovered paper.
- The composition of both production and consumption will change. Pulp and paper products will account for a larger share, the relative importance of composite products will remain steady, and the importance of lumber will decline.
- The projected prices of sawtimber in the South are a notable exception to the overall projection of moderate price increases: prices are projected to rise as a result of limited availability.
- Over the next 50 years, most of the increase in the Nation’s timber harvest will occur in the East and especially on non-industrial lands in the South.
- United States timber harvest is expected to increase 24 percent by 2050; harvest of softwoods will increase 30 percent and harvest of hardwoods will increase by 17 percent. Most of the increase will be used for manufacturing paper, paperboard, and composite products.
- Plantations for softwood species will play an important role in future domestic harvest expansion. By 2050, 54 percent of total U.S. softwood growing stock removals will come from plantations in private ownership.
- Timber inventories will increase over the next 50 years. Softwood timber inventories will rise on all ownerships in all regions by 53 percent for the U.S. as a whole; softwood inventories on public lands alone will rise by more than 70 percent. Hardwood inventories will increase by 27 percent.
- Over the next 50 years, the species composition of U.S. forests will shift toward softwoods in the South and toward hardwoods in the North, but remain largely unchanged in other regions.
- By 2050, the age structure of forests managed on an even-aged basis will be similar to current conditions on private lands but shift toward older age classes on public lands.

- Harvests on national forests decreased from 2.0 billion cubic feet in 1991 to 0.8 billion cubic feet in 1997 and are projected to remain near the 1997 harvest level over the next 50 years.
- Although domestic production will continue to account for most of the U.S. consumption, the share of total consumption met by imports will rise from 20 percent today to 26 percent by 2050.

Regional Timber Supply and Demand

The Ozark-Ouachita Highlands Assessment (USDA FS 1999d) identified favorable growth/removal ratios for the region's softwoods. With an increase in the softwood inventory, harvest is expected to increase faster in the Highlands relative to other areas of the South. By 2020, the scale of softwood harvests in the Highlands is projected to be nearly double that of 1990 levels, and higher than the projected 33 percent increase in the South. Even with the increased removal, softwood inventories will continue to rise.

Local Timber Supply and Demand

Timber supply is the relationship between the quantity of timber that landowners will offer and price. Timber demand is the relationship between the quantity demanded by wood product manufacturers and price. The interaction of supply and demand defines timber markets. Softwood sawtimber is used in the manufacture of dimension lumber, timbers, poles, and plywood. Hardwood sawtimber is not a large market for the Forest. Softwood and hardwood pulpwood and low quality timber are primarily used to make paper, packaging material, and composite panels.

Timber from the Forest is primarily processed at local sawmills, plywood plants, and paper mills in Arkansas and Oklahoma. These mills have an annual capacity for softwood sawtimber alone of over 1,454,546 hundred cubic feet (ccf). Demand for timber in the local area far exceeds what has been supplied by the Ouachita National Forest historically and will continue to do so under all alternatives.

As an indicator of demand, the Forest sells almost all of the timber that is offered. Less than one percent of the volume offered does not sell. Sales not sold are primarily for salvage material.

In a report published by Bentley and others (2002), softwood sawtimber production declined 4.4 percent, and softwood pulpwood production increased 328.9 percent from 1996-1999 for the Ouachita region of Arkansas. This report also showed that within the nine Arkansas counties in which the Forest Service owns over 5 percent of the land, softwood sawtimber production was 541,910 ccf, and softwood pulpwood production was 245,020 ccf in 1999.

In counties with National Forest System lands, National Forest land comprises from less than one percent of forested county acreage to 77 percent of the forested county acreage. In seven counties with Forest lands, the Forest occupies over 25 percent of the forested acreage and in two counties, Montgomery (76 percent) and Scott (77 percent), the Forest occupies over three-fourths of the forested acreage. Table 3.110 displays the forested acres by county and the acres of National Forest System land within each county, and provides an indication of the importance of National Forest System land to supplying demand for timber products based on the percent of National Forest System land within each county. While National Forest acres are not 100 percent forested, data to determine the forested acres of National Forest ownership by county are not readily available; therefore, all acres are assumed to be forested.

Table 3.110 Forested Acres and Acres of National Forest Land by County

County and State	Acres in County	Forested Acres in County	ONF Acres and % of Forested Acres in County
Ashley, AR	589,717	387,077	1,675 <1%
Garland, AR	433,998	347,478	119,715 34%
Hot Springs, AR	393,608	298,170	320 <1%
Howard, AR	375,990	266,594	1,531 <1%
Logan, AR	454,293	300,981	18,586 6%
Montgomery, AR	499,756	439,596	334,400 76%
Perry, AR	352,584	290,624	99,170 34%
Pike, AR	385,972	323,047	10,365 3%
Polk, AR	550,013	426,664	206,356 48%
Saline, AR	463,787	374,126	58,959 16%
Scott, AR	572,088	479,064	369,619 77%
Sebastian, AR	343,316	185,658	18,956 10%
Yell, AR	593,892	426,648	188,817 44%
LeFlore, OK	1,014,248	674,788	221,356 33%
McCurtain, OK	1,168,921	850,931	132,840 16%

Direct and Indirect Effects

Land suitable for timber production, long-term sustained yield capacity (LTSY), and allowable sale quantity (ASQ) were considered in evaluating the effects of implementing the alternatives on the forest product resource. LTSY is defined as "the highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple use objectives" (36 CFR 219.3). The Forest long-term sustained yield capacity under each alternative is shown in Table 3.111.

Table 3.111 Long Term Sustained Yield by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Long Term Sustained Yield (MMCF per year)	50.0	57.8	73.7	63.2	69.3

SPECTRUM, a linear program-based forest planning model used to optimize land allocation and activity and output scheduling over a specified planning horizon, was used to calculate LTSY. The model utilized period-by-period outcomes, including changes in vegetation growth stage, acres treated, and timber harvest volumes to derive the LTSY estimates above and ASQ volumes. Data provided to the model included the allocation of acres of land to a management area; identification of suitable lands for timber management; current vegetation conditions; and the identification of vegetation treatments and associated management objectives for each alternative.

ASQ is the maximum quantity of timber that may be sold from the land suitable for timber production for a period specified by the Forest Plan. The average annual ASQ for the first decade for each alternative is displayed in 3.112.

Table 3.112 Allowable Sale Quantity (ASQ) by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Average Annual ASQ (MMCF)	26.2	26.2	33.0	25.0	27.0

Estimated harvest acres for each alternative are shown in 3.113 for suitable lands. All alternatives have fewer acres allocated to uneven-aged harvest than Alternative A. Alternative C, with the greatest focus on forest health, has higher acreages allotted to thinning when compared to other alternatives. Alternatives D and E have higher acreages projected to be thinned than Alternative A. All alternatives may also have additional harvesting due to unplanned management activities, such as salvage, on both suitable and unsuitable lands.

Table 3.113 Timber Harvest Acres (x 1,000) by Alternative and Cutting for 10- and 50-Year Periods

Treatment	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Uneven Aged	250	250	110	110	100	100	200	200	125	125
Thinning	262	408	174	366	517	690	277	461	285	407
Even-Aged Regen.	57	81	60	95	60	124	57	129	57	118

Table 3.114 shows the estimated annual revenue, costs, and net revenue of the timber program for each alternative for the first ten-year period. The costs shown are the direct costs associated with the timber sale program (sale preparation, administration, and stand establishment with associated treatments). The net revenue is the difference between revenues and costs. Alternative E is the alternative with the greatest net revenue during the first ten-year period.

Table 3.114 Projected Average Annual Timber Program Revenue, Costs, and Net Revenue for the First 10-Year Period, in Millions of Dollars

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Revenue	24.3	22.9	24.9	23.5	24.4
Costs	18.3	16.4	23.1	18.0	17.6
Net Revenue	6.0	6.5	1.8	5.5	6.8

All of the alternatives have positive net revenues for all periods. Table 3.115 contains a summary comparison of alternatives, and other differences are discussed in the following narratives. Alternative C has the highest LTSY and the lowest net revenue at the ten-year period. Alternative C also has the highest ASQ. Alternative E has the second highest LTSY and the greatest net revenue at both the ten-year and 50-year period.

Table 3.115 Summary Comparison of Alternatives for Timber-Related Measures

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Suitable acres	1,019,694	1,019,694	1,017,901	989,567	1,016,228
LTSY (MMCF)	50.0	57.8	73.7	63.2	69.3
Annual ASQ (MMCF) 1st 10-Yr Period	26.2	26.2	33.0	25.0	27.0
Net Revenue $ Million 1st 10-Yr Period	6.0	6.5	1.8	5.5	6.8
Net Revenue $ Million 5th 10-Yr Period	17.2	18.9	20.5	21.8	23.4

Cumulative Effects

The cumulative ecological and social effects from timber harvest activity by alternative are covered in other sections of this chapter. Timber harvest is considered along with other management activities as they pertain to the resource under consideration.

Table 3.116 displays Allowable Sale Quantity (ASQ), Long Term Sustained Yield Capacity (LTSY), and total acres projected to be harvested annually.

Table 3.116 Measures of Cumulative Timber Effects

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Annual ASQ (MMCF) 1st 10-Yr Period	26.2	26.2	33.0	25.0	27.0
LTSY (MMCF)	50.0	57.8	73.7	63.2	69.3
Annual Acres Harvested 1st 10-Yr Period	56,900	34,400	67,700	53,400	46,700
Annual Acres Harvested 5th 10-Yr Period	79,600	65,400	100,400	86,300	74,600

ASQ ranges from a high of 33.0 Million Cubic Feet (MMCF) for Alternative C to a low of 25.0 MMCF for Alternative D. LTSY ranges from a low 0f 50.0 MMCF to a high of 73.7 MMCF. This is reflective of the changes presumed to occur over time as alternatives are continued.

Acres harvested represent a combination of uneven-aged harvest, commercial thinning, and even-aged regeneration harvest. The level of uneven-aged harvest is determined by the acres allocated to that method in the first 10-year period and does not vary over time. Acres allocated to uneven-aged harvest range from 250,000 in Alternative A to 100,000 acres in Alternative C. This represents a range of 25,000 acres to 10,000 acres harvested annually. Harvested acres may vary over time depending upon the existing stand conditions and the intensity of stand management. Thus, over time, as more stands are in a condition to support repeated thinnings, the number of acres thinned increases. Likewise, over time, as more stands are in a condition where they are suitable for regeneration, the number of acres regenerated increases.

Alternative C represents the most intensive vegetation management to create a healthy forest condition. As a result, more acres are harvested, and current and future allowed volume levels are the highest.

While Alternative E would have the second highest ASQ and LTSY, harvest activities would be focused on that portion of the Forest that could most efficiently support them. As a result, fewer acres are treated more intensively to maintain current harvest levels while ensuring increased future capacity.

While Alternative A (No Action) and Alternative B have the same ASQ, their primary difference is in the amount of acres allocated to uneven-aged harvest. By treating an additional 140,000 acres with thinning and even-aged regeneration harvesting, Alternative B ultimately attains a higher level of allowed future harvest while impacting fewer acres annually.

Alternative D combines a high allocation to uneven-aged harvest with more intensive thinning and even-aged regeneration in areas identified for their ecological and wildlife habitat potential. Therefore, some of these areas do not have the highest timber production potential. Thus, while ultimately allowing a moderate level of future harvest, Alternative D treats more acreage with a lower yield capacity.

Minerals

The majority of the lands on the Ouachita National Forest were acquired through land purchase or exchange. In some instances, mineral rights were outstanding, that is, rights were held by a third party at the time the Forest Service purchased the land from the surface owner; and in other cases, the landowner reserved the minerals as a condition of sale or exchange. As a result, the United States has varying degrees of control over surface operations related to mineral extraction, depending on the mineral ownership. There are about 1,780,457 acres of surface estate owned by the federal government and administered by the Ouachita National Forest. About 701,000 acres, 39 percent of the National Forest have Public Domain (PD) surface and mineral status. These are lands that have never been conveyed out of federal ownership, and were later reserved for national forest purposes. The U.S. acquired, through purchase or exchange, the remaining 1,079,457 acres, or 61 percent of the National Forest.

Total federal mineral ownership under the federal surface estate is 1,485,245 acres, which is about 84 percent of the Forest area. There are 295,212 acres of federal surface within the Forest that are subject to privately owned mineral interests. This comprises about 16 percent of the forest area. Of this, 82,021 acres (about 5 percent of the federal surface) are subject to 100 percent private mineral ownership. The mineral interests under the remaining 213,191 acres of federal surface (about 11 percent of the forest) are split between federal and private ownership, with the U.S. owning some fractional mineral interest under these 213,191 acres.

Minerals activities on the Ouachita National Forest are primarily associated with hardrock minerals exploration and production, and gas exploration. Minerals and gas potentials are not affected by the Forest Plan alternatives; however, alternatives can affect access to and exploration of the mineral estate. Gas and hardrock minerals potential for all Ranger Districts is displayed in Table 3.117. The geologic table for the Geologic Formations on each of the Ouachita National Forest Ranger Districts is displayed in Table F.1 in Appendix F. The geologic descriptions are also found in Appendix F. The USDI Bureau of Land Management (BLM) has provided the evaluation on the gas development for the Ouachita National Forest titled “Oil and Gas Reasonable Foreseeable Development Scenario” in Appendix F.

Table 3.117 Minerals Potential for the Ouachita National Forest

Ranger District	Formations[1] (% of total formations on each Ranger District)	Minerals Potential			
		Quartz	Other Hardrock[2]	Gas[3]	Coal Bed Methane
Choctaw	Pa 90% PMs/Pj/Pjv/Phs 10%	Low	Low	Med to Med-High	Med to Med-High
Caddo	Ms 40%, Mda 15%, Ob 15%, Ow 15%, Oc 5% Pj/Smb/Ocm/Obp 10%	High	High	Low	Low
Cold Springs	North of Highway 80: Pau 35%, Pam 15%, Pma 15%, Phs 5%, Psv 30%	Low	Low	Med	Med-Low
	South of Highway 80: Pal 95%, Pam 5%	Low	Low	Low	Low
Fourche	North of Highway 28: Pal/Pam 75%, Pau 25%	Low	Low	Med	Med-Low
	South of Highway 28: Pal/Pam 95%, Pjv/Pj 5%	Low	Low	Med	Low
Jessieville	MS 25%, Pal 3%, Pj 30%, Pjv 15% (North 2/3 from Highway 298)	High	Med	Low	Low
	Ob 7% Ow 10%, Om 5%, Mda/Smb/Obf/Obp 5% (South 1/3 from Hwy 298)	High	Med	Low	Low
Kiamichi	Pj 60%, Pjv 5%, Pa 20%, Pms 15%	Med	Med	Med	Low
Mena	North of Mena, AR: Pj 50%, Pjv 10%, Ms 20%, Pal 20%:	Med	Med	Low	Low
	South of Mena, AR: Ms 50%, Mda 25%, Smb 15%, Obp 10%	Med	Med	Low	Low
Oden	Pam/Pal 30%, Pj 30% Obp/Smb 5%, Ms 30%, Pjv 5%	High	Med	Low	Low
Poteau	North of Poteau River: Phs 10%, Pau 10% Pma/Psv 80%	Low	Low	Med	High
	South of Poteau River: Pal/Pam 90% Pjv/Pj 10%	Low	Low	Med	Low
Womble	Ow 15%, Mda 5%, Oc 15%, Ocm 20%, Ob 0%, Om 15%, Ms/Obp/Smb 20%	High	High	Low	Low
Winona	Pj 50%, Ms 15%, Pal/Pam 30%, Pjv/Mda/Ow/Obp 5%	High	Med	Low	Low
Tiak	Idabel area: Qt/Qal 45%, Kto 40%, Kk 7%, Kw 7%, Ka/Kgw/Kbr 1%	Low	Low	Med	Low
	Broken Bow area: Mst 55%, Sb 30%, MDSa 8%, Pjf/Ob/Op/Obf/Ow/ Oc/Sm/Kh/Qal 7%	Low	Low	Med	Low

[1] Geologic formations occurring on each Ouachita National Forest Ranger District and approximate percent of the Ranger District comprised by each formation within it.
[2] Hardrock: refers to metallic and valuable non-metallic subsurface minerals, but not sand, gravel, and stone (Common Variety Mineral Materials) considered part of the surface estate.
[3] Gas: Exploration Potential and Production from USDI Bureau of Land Management, Jackson District Office, Energy Minerals Department.

Lands Statutorily Unavailable For Mineral Leasing or Permit

1. Subject to valid existing rights, the minerals in lands designated under the Eastern Wilderness Act of 1975 and subsequent wilderness acts for Arkansas (1984) and Oklahoma (1988) are statutorily withdrawn from all forms of disposition under all laws pertaining to mining and mineral leasing. The Ouachita National Forest has six congressionally designated wildernesses, statutorily withdrawn from mining and leasing: Black Fork Mountain, Caney Creek, Dry Creek, Flatside, Poteau Mountain, and Upper Kiamichi for a total of approximately 64,469 acres: therefore, there are no issued federal mineral leases or permits within these designated areas.

2. Subject to valid existing rights, rivers congressionally designated a "Wild River" in federal land ownership are withdrawn from mineral production including the bed or bank or lands situated within ¼ mile of the bank. This restriction does not apply to those segments of a Wild and Scenic River that are designated as "scenic" or "recreational." The Ouachita National Forest has two congressionally designated rivers and one river recommended for designation. Currently, only one segment on the Little Missouri River is a congressionally designated "Wild" river segment. Table 3.118 lists the congressionally designated Wild and Scenic Rivers on the Ouachita National Forest.

Table 3.118 Listed (Congressionally designated) Rivers on the Ouachita National Forest

Arkansas Rivers	Wild Segment	Scenic Segment	Recreational Segment
Little Missouri River, Segments I and III	4.4 miles	11.3 miles	--
Cossatot River, Segments A and B	--	6.9 miles	4.2 miles
Brushy Creek Tributary to Cossatot, Segment C	--	4.4 miles	--
Total Listed	4.4 miles	22.6 miles	4.2 miles

Table 3.119 contains rivers that have not been designated, but are recognized under Alternatives C, D, and E as having qualities that would make them eligible. Thus, the potential exists for these river segments to be designated in the future.

A 16.5-mile segment of the Glover River with 15.5 miles of National Forest System lands would be recommended for designation under Alternatives C, D, and E.

Table 3.119 Rivers Eligible for Further Study as Wild and Scenic Rivers

Arkansas Rivers	Wild Segment	Scenic Segment	Recreational Segment
Ouachita River	--	15.3 miles	35.6 miles
N. Fork of Saline River	--	3.8 miles	6.0 miles
Mid Fork of Saline	--	---	3.2 miles
Caddo River	--	--	25.2 miles
Alum Fork of Saline	--	3.9 miles	--
Little Missouri			2.3 miles
Oklahoma Rivers			
Mountain Fork River	--	9.1 miles	--
Glover River	--	15.5 miles	--

Federal Minerals Management

Legal and Administrative Framework

Statutory and regulatory direction separates mineral resources in the publicly owned lands of the United States into three categories: locatable, leasable, and salable. Forest Service policy governing the exploration and development of mineral activities on National Forest System lands is guided by statutes, regulations, and Executive Orders. Statutory and regulatory direction for mineral resources on the Ouachita National Forest can be found in Appendix F.

Locatable Minerals

The General Mining Law of 1872 applies to all mineral deposits in National Forest System lands reserved from the public domain. A review of mineral withdrawals was conducted to determine if withdrawals on the Ouachita National Forest should remain in effect or be recommended for removal. The USDI Bureau of Land Management is the lead Federal agency for monitoring and managing administrative mineral withdrawals. The withdrawals do not affect leasable energy and common variety disposals unless so stated in the withdrawal authority. The mineral withdrawal review is in Appendix F.

Minerals, such as metallic minerals, that would be locatable minerals on public domain lands are hardrock leasable minerals on acquired lands. The Ouachita National Forest is currently working with an exploration operation on one mining claim (see Table 3.120), and locatable minerals issues with a group of four mining claims. Since 1990, primary issues with mining claims on the Ouachita National Forest involved working with quartz mining claimants to voluntarily relinquish their mining claims and convert into the quartz contract program (salable minerals). Over 500 mining claims were voluntarily relinquished between 1989 and 1994.

Table 3.120 Mining Claim Cases on the Ouachita National Forest (September 2004)

Case	Location	Type	Impact Acres
ESMC-12131	T1N R28W Sec.8 (Poteau/Cold Springs RD)	Mining Claim	0.1
ESMC-10673-676	T3S R24W Sec 20 (Caddo RD)	Mining Claim	0.0

Leasable Minerals

There are two types of leasable minerals: non-energy hardrock minerals and energy (oil, gas, coal) minerals. Leasable “hardrock” minerals interests on the Ouachita National Forest include five leases for quartz crystal, one lease for wavellite, and two prospecting permits for wavellite on the Womble, Caddo, and Jessieville Ranger Districts. Only three of the leases are in production, and mining is intermittent. All are small scale, family-run operations. Each of these three are approximately five to six acres in size. Of the remaining three leases, one has been idle for 30 years (no surface impact), one is undergoing a re-exploration phase (several exploration trenches within a ½ acre area), and the third is about to commence reclamation on five impacted acres. The two prospecting permits are located within an aggregate pit used primarily for aggregate for county roads.

Non-energy (Hardrock) Leasable Minerals

On acquired lands, the exploration and development of hardrock minerals, such as gold and silver, is authorized by a federal prospecting permit or preference right lease issued by the Bureau of Land Management (BLM), Department of Interior. As of September 2004, the Forest has six non-energy (hardrock) leases (five for quartz crystal and one for wavellite) and two prospecting permits (both for wavellite) issued by the USDI Bureau of Land Management. Table 3.121 contains a list of hardrock leasable cases on the Forest.

A party desiring a prospecting permit makes an application to the appropriate BLM office. Based on the review of the Forest Plan and NEPA analysis, the Regional Forester either consents or denies consent to issuance of the prospecting permit by the BLM. Hardrock prospecting permits have an initial term of two years with the option of a four-year renewal.

If the BLM believes the deposit can be mined, milled, and sold at a net profit, they will request Forest Service consent to issuance of a 20-year preference right lease. Even though valuable deposits of minerals may be found, the Forest Service could deny consent to issuance of the preference right lease based on the environmental analysis and other factors.

For non-energy leasable minerals, public scoping and a site-specific analysis are completed by the Forest Service upon the BLM's receipt of a permit or preference right lease application. This is done prior to issuance of the permit or lease. BLM cannot issue a permit or lease on hardrock leasable minerals without the consent of the Regional Forester.

Table 3.121 Hardrock Leasable Cases on the Ouachita National Forest

Case	Location	Mineral Commodity	Impact Acres
Womble RD			
ES-8092	T2S R25W Sec. 34	Quartz Crystal	5.00
ES-35436	T2S R26W Sec. 1	Quartz Crystal	0.25
ES-36143	T2S R26W Sec. 22	Quartz Crystal	4.00
ES-36588	T3S R24W Sec. 4	Quartz Crystal	5.00
ES-50206	T2S R25W Sec. 3	Wavellite PP	0.10
ES-51144	T2S R25W Sec. 3	Wavellite PP	0.10
Caddo RD			
ES-35118	T3S R24W Sec. 9 & 10	Quartz Crystal	5.00
Jessieville/Winona RD			
ES-08	T1S R22W Sec. 11	Wavellite	0.10

Energy Leasable Minerals (Oil and Gas, Coal)

Through the passage of the 1920 Mineral Leasing Act, Congress established a program to provide for oil and gas and coal development on federal lands, including the National Forests reserved from the public domain. This Act authorizes the Secretary of the Interior to issue leases for removal of certain minerals (including coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, and gas). The Mineral Leasing Act for Acquired Lands of August 7, 1947, extends the provisions of the mineral leasing laws to acquired National Forest System lands and requires the consent of the Secretary of Agriculture prior to leasing. The National Forest System lands on the Ouachita National Forest are 61 percent acquired lands. Deposits of coal can only be mined by underground methods. There are no known deposits of mineable coal on the Forest.

In accordance with the Energy Security Act of 1980, energy leases and permits will continue to be processed notwithstanding the current status of the revision of the Ouachita National Forest, Forest Plan. The implementing regulations for the Onshore Oil and Gas Leasing Reform Act of 1987, (36 CFR 228, Subpart E) provide the basis for the analysis of alternatives and decisions on federal oil and gas leasing.

The Minerals Management Service (MMS) of the Department of Interior collects all minerals revenues generated from federal leases and permits. The MMS distributes 25 percent of the energy mineral revenues generated from acquired lands to the State of Arkansas under the authority of Public Law (PL) 60-136, 25 Percent Fund Act of 1908; in addition, the non-energy mineral receipts are distributed by the Forest Service under one of two public laws: 1) PL 60-136, 25 Percent Fund Act of 1908, or 2) PL 106-393, Secure Rural School and Community Self-Determination Act of 2000, depending on the election made by each county. In those cases where the leases involve public domain minerals, 50 percent of the mineral revenues are distributed by the MMS to the State of Arkansas.

The Forest Plan may make two decisions related to minerals: 1) availability of lands for future leasing (36 CFR 228.102(d)), and 2) consent to lease the available lands (36 CFR 228.102(e)), subject to standard lease terms, or subject to additional constraints (stipulations) as required by the prescription for a specific management area. Those areas of the Forest with leasing interest or mineral potential are analyzed using the “Reasonable Foreseeable Development Scenario” developed by the BLM (Appendix F). This study looked at the long-term (10 years) potential for oil and gas development in the study area and projected the number of wells that could be drilled during the 10-year period. Under all alternatives, including the Selected Alternative, Alternative E, the BLM will be able to issue oil and gas leases in areas where the Plan makes both the availability and the consent decision. The environmental analysis and documentation for federal oil and gas is more detailed than it is for other leasable minerals because of the two oil and gas lease decisions, which are carried forward to the Revised Forest Plan after analysis.

Federal oil and gas leases contain standard lease terms (SLTs) which provide that the operations must be conducted in a manner that minimizes, to the extent possible, adverse impacts to the land, air, and water; to cultural, biological, and visual and other resources; and to other land uses or users. Federal environmental protection laws such as the Clean Air Act, Clean Water Act, Endangered Species Act, and Historic Preservation Act apply to all proposed activities.

In addition, based on the management prescription for a specific area contained in the Forest Plan, the lease may have been issued subject to a stipulation that modifies the standard lease rights. Conditions, or restrictions in the stipulations, are considered consistent with the lease rights granted, provided that they do not require relocation of proposed operations by more than 200 meters, require that the operations be sited off the leasehold, or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.

There are three different nationally approved stipulation forms:

- No surface occupancy (NSO) – Used when surface occupancy of certain lands is prohibited.

- Timing/season – Used to prohibit surface occupancy of certain lands during specific times, such as for protection during nesting season.

- Controlled surface use (CSU) – Used when restrictions will apply to occupancy, such as requiring additional mitigation to resolve potential conflicting uses, or to meet visual quality objectives.

A lease may also be issued subject to a lease notice (LN). A notice does not contain any new restrictions. It simply puts the lessee on "notice" that his operations must be in compliance with the applicable statute(s), such as the Endangered Species Act, if applicable at the time surface occupancy is proposed.

In addition to the two lease stipulations that may be required, there are two LNs that can be used:

- LN #3, which indicates all, or part, of the leased lands may contain animal or plant species classified under the Endangered Species Act.

- LN #4, which indicates all, or part, of the leased lands may be classified as wetlands, floodplain, or riparian areas that will require special protection.

Lessees may request modification waivers, or one-time exception of an NSO stipulation, or any other stipulation, and the Forest Service may authorize the BLM to grant the change if: 1) the change is consistent with Federal law and the Forest Plan, 2) management objectives which led to the stipulation can be met following the change, and 3) the environmental impact of the change is acceptable.

In all cases where the minerals are privately owned, the Forest Service must obtain the best surface protection possible using the terms of the deed severing the subsurface from the surface estate, applicable Secretary Rules and Regulations and other state and federal laws (i.e. Endangered Species Act), and cooperation and negotiations with the operator.

Gas on the Ouachita National Forest

The first gas production on the Forest commenced from a single coal bed methane gas well on the Poteau Ranger District in Yell County in 2004 (T4N R32W, with an impact area of approximately one-half acre). The coal bed methane is associated with a known coal deposit being mined on private lands several miles north of the Forest boundary. Coal bed methane well life is projected at five to 10 years. The well currently produces approximately 200,000 mcf.

Gas Pipelines on the Ouachita National Forest

Gas pipelines (referred to as "flowlines" for oil), are essential and unique to the transport needs of the energy minerals that are produced. The Forest has permitted gas pipelines constructed in the one-fourth mile access road to the coal bed methane operation near Hartford, Arkansas, and in the one-half mile segment on the Forest adjacent to a county highway.

Salable Mineral Materials

The Mineral Materials Act of July 31, 1947, as amended by the Multiple Use Mining Act of July 23, 1955, authorized the disposal of mineral and vegetative materials and defined common variety mineral materials. Common varieties of mineral materials (CVMM) include aggregate, landscaping rock, riprap, flagstone, and other earthen construction materials. Mineral materials are not federal leasable minerals. Under this Act, they can be sold to individuals or companies through negotiated or competitive bidding or given as free use to public agencies (e.g., county and state highway departments) for public purpose use. Any sale of mineral materials must be made at no less than fair market value. Sale of mineral materials is at the discretion of the Forest District Ranger.

The CVMM program is administered by the Forest Service for disposals of quartz in Arkansas, and pit run gravel (aggregate) and building stone in Arkansas and Oklahoma. In 2003, the Forest issued 44 contracts and permits for CVMM disposals of aggregate and surface collected building stone totaling 161,696 tons valued at $101,000. CVMM removals take place at 22 dispersed sites on 67 acres (average 3 acres per site) across the Forest. The main aggregate pit on the Forest is 17 acres in size operated primarily by Montgomery County in Arkansas for county road and public building projects, and is the largest minerals operation on the Ouachita National Forest.

The primary CVMM pits and building stone sites and their respective sizes are listed in Table 3.122.

Table 3.122 Common Variety Mineral Material Locations and Sizes on the Forest

Case	Location	Impact Acres
Designated Aggregate (Gravel) Pit Sites:		
Womble RD		
Mauldin (County)	T2SR25W Sec 3 E	10.00
Mauldin	T2SR25W Sec 3 W	7.00
Crystal Springs (County)	T2S R22W Sec 33 S	6.70
Crystal Springs (COE and Public)	T2S R22W Sec 33 E	6.70
Caddo RD		
Meyers Creek	T3S R22W Sec.16	2.50
Pigeon Roost	T4S R23W Sec.14	4.50
Rattlesnake	T4S R24W Sec.4&5	5.00
C-58	T4S R25W Sec.15	4.00
Blocker Creek	T4S R27W Sec.36	4.00
C-74 Polk Cr.	T4S R26W Sec.8	2.00
Buck Branch	T5S R27W Sec.16	0.50
C-76	T4S R256W Sec.19	0.50
Jessieville/Winona RD		
Blue Jay Hollow	T3N R17W Sec.22	2.00
Poteau/Cold Springs RD		
Franklin	T2N R28W Sec.35	0.25
Hinkle Southside	T2N R31W Sec.10	0.25
Poteau Mtn.	T3N R32W Sec.5	2.00
Bruton	T2N R29W Sec.33	0.25
Reelfoot Ranch	T2N R30W Sec.12	0.50
Pilot Mtn.	T4N R29W Sec.24	2.00
Jack Creek	T4N R27W Sec.4	2.00
Oklahoma RDs - McCurtain County		
Two ponds	T2S R25E Sec 11	2.00
Cedar Creek	T4S R23E Sec 27	2.00
Designated Building Stone Site:		
Oden RD		
Hackberry Mtn.	T1S R26W Sec.1&2	3.00

In 1988, Congress passed legislation directing that quartz minerals "salable" minerals be administered by the Forest Service. There are 27 quartz crystal contracts and one novaculite contract currently on the Forest in Arkansas. These are all located on the Womble, Caddo, Oden, Jessieville, and Winona Ranger Districts and are displayed in Table 3.123.

Table 3.123 Quartz Common Variety Minerals in Arkansas

Case	Location	Mineral Commodity	Impact Acres
Womble RD			
OQC-20	T2S R25W Sec. 35	Quartz Crystal	0.25
OQC-69	T2S R25W Sec. 34	Quartz Crystal	0.10
OQC-117	T3S R23W Sec. 3	Quartz Crystal	0.10
OQC-212	T3S R25W Sec. 12	Quartz Crystal	2.50
OQC-213	T3S R25W Sec. 12	Quartz Crystal	2.50
OQC-230	T2S R23W Sec. 36	Quartz Crystal	0.25
OQC-236	T2S R26W Sec. 16	Quartz Crystal	2.00
OQC-241	T3S R24W Sec. 11&12	Quartz Crystal	3.00
OQC-243	T2S R25W Sec. 35	Quartz Crystal	2.00
OQC-265R	T3S R24W Sec. 8	Quartz Crystal	2.00
OQC-266R	T3S R24W Sec. 3	Quartz Crystal	2.00
OQC-268R	T2S R23W Sec. 36	Quartz Crystal	2.00
Caddo RD			
OQC-01	T3S R24W Sec. 9	Quartz Crystal	5.00
OQC-166	T3S R24W Sec. 3	Quartz Crystal	0.10
OQC-227	T3S R24W Sec. 21	Quartz Crystal	0.10
OQC-231	T4S R26W Sec. 31	Novaculite	2.00
OQC-263	T3S R24W Sec. 10	Quartz Crystal	2.00
Oden RD			
OQC-251	T1S R24W Sec. 22	Quartz Crystal	2.50
OQC-252	T1S R24W Sec. 22	Quartz Crystal	2.50
Jessieville/Winona RD			
OQC-114	T2N R17W Sec. 18	Quartz Crystal	0.10
OQC-205	T2N R17W Sec. 17	Quartz Crystal	0.10
OQC-160	T2N R20W Sec. 26	Quartz Crystal	2.00
OQC-179	T2N R18W Sec. 8	Quartz Crystal	4.00
OQC-232	T1S R21W Sec. 11&12	Quartz Crystal	1.00
OQC-240	T2N R18W Sec. 8	Quartz Crystal	0.10
OQC-250	T1S R24W Sec. 12	Quartz Crystal	4.00
OQC-261	T1N R20W Sec. 12	Quartz Crystal	0.50
OQC-262	T1N R20W Sec. 12	Quartz Crystal	0.50

Quartz minerals, aggregate, and building stone operations are relatively small scale mining operations impacting from one-tenth of an acre to 6 acres. Quartz operations average 1.2 acres in size. Existing pits for aggregate average 2.8 acres in size. Building stone surface removals impact average one-tenth acre (these are hand removal of loose surface stone requiring no excavations or surface disturbance).

On the Forest, occasional removal of small amounts of material by hand from surface exposures of rock for personal purposes (rockhounding) is considered a reasonable recreational pursuit as long as no resource damage occurs and no hazards are created in the undertaking. Panning in Forest streams is permitted as a hobby interest primarily to hone panning skills in preparation for serious gold panning pursuits in other states (economic gold deposits are not noted in the Ouachita Mountains). Panning can only occur in the bed of the stream (not the bank), using only the edge of the pan or a small trowel to loosen gravels, and material retrieved can only be for personal use. No hazards or significant disturbances can be created from this activity. Groups interested in pursuing an organized recreational rock collecting and/or panning activity must submit their proposal in writing to the local District Ranger for consideration. Any such activity approved by the District Ranger may require the submission of a reclamation bond. The Forest receives several requests per month regarding rockhounding and panning.

Rockhounding on quartz crystal contracts requires approval by the District Ranger and includes specific safety requirements for the public. Three quartz contracts are operated solely for rockhounding. Five contracts for commercial quartz crystal also allow the public to rockhound under stringent safety conditions required by the Forest Service.

Direct, Indirect, and Cumulative Effects

Locatable Minerals

There have been no development or production operations for locatable minerals in the Forest Planning period from 1990. Since 1988, when Congress changed the status of quartz minerals on the Ouachita National Forest in Arkansas from locatable minerals to salable minerals, the Forest has only worked with exploration proposals on mining claims. If this trend continues, there are no known direct or indirect effects from the proposed activities on the locatable minerals.

Leasable Minerals/Non-Energy

There are no differences between Alternatives A, B, C, and E regarding Leasable Minerals. Alternative D differs because it would recommend an additional 30,127 acres for wilderness, and minerals activity would not be permitted in wilderness. Of the six permits for non-energy leasable minerals, only three are in production and mining is intermittent. All are small scale, family-run operations. Each of these three is approximately five to six acres in size. Of the remaining three leases, one has been idle for 30 years (no surface impact), one is undergoing a re-exploration phase (several exploration trenches within a ½ acre area), and the third is about to commence reclamation on five impacted acres. The two prospecting permits are located within an aggregate pit used primarily for aggregate for county roads. Exploration and possible future mining impacts are fully contained within the existing pit. Because this type of activity is generally confined to small areas, is on a declining trend, and is subject to stringent standards through the Forest Plan, it is not expected that any alternative would have an effect on the leasable non-energy minerals.

Leasable Minerals/Energy

Projections for coal bed methane indicate that additional wells are likely to be drilled in the area of the coal bed in the area of Hartford, Arkansas. Advanced drilling technology currently being employed in the Hartford area indicates that multiple drill holes can be drilled from a minimal number of well pad sites to access coal bed methane. The BLM's reasonable foreseeable development scenario (see Appendix F) for oil and gas is a model or projection of possible oil and gas exploration and/or development activity (leasing, exploration, development, production, and abandonment) in a defined area for a specified period of time (usually 10 years). The scenario is based primarily on the subsurface geology, past development history, current activity, and anticipated future demand with consideration of other significant factors, such as economics, technology, physical limitations on access, existing or anticipated infrastructure, and transportation.

It is divided into a forecast primarily for the Poteau, Cold Springs, and Fourche Ranger Districts in Arkansas, and Kiamichi and Choctaw Ranger Districts in Oklahoma, where most of the exploration interest has taken place on the Ouachita National Forest.

The Arkoma Basin just north of the Forest has a high potential for gas reserves. It is anticipated that gas production from coal bed methane will reduce significantly in the next five years as the methane trapped from the coal seam is removed. Aside from the economic benefit, removal of coal bed methane significantly reduces the possibility of hazards from that gas in the coal seam area.

From 1990 to 2003, only three gas wells were drilled, and all were dry. In 2004, drilling for coal bed methane in the northwestern part of the Forest commenced. Coal mining is taking place on private lands several miles north of the Forest. The nature of the coal deposit is such that it is not anticipated that coal mining will occur on the Forest (at least not so in the next planning period). However, it is likely that additional wells for gas will be drilled. In fact, a proposal for six wells is currently under review. Coal bed methane wells typically produce for only five to 10 years before being fully reclaimed. It is anticipated that coal bed methane interest in the area will have been fully evaluated within the next five years. Average impact is three acres per well pad; two acres per well pad for new access road. Given a low, medium, and high scenario, the Table 3.124 displays the likely impacts from drilling for gas.

Table 3.124 Area Disturbed from Gas Drilling

Number of Wells	Area Disturbed from Drilling (Acres)		
	Well Pads	Access Roads	Total
Low 16	48	32	80
Medium 66	198	132	330
High 132	396	484	880

According to BLM, the low scenario more closely reflects drilling scenarios for the Ouachita National Forest. It is assumed that all wells would be drilled within ten years. Therefore, surface disturbance associated with exploration would be spread out over ten years at an average of one to two wells (1.6) per year. The total acreage disturbed will be approximately 80 acres total or an average of eight acres per year. The bulk of these acres are reclaimed immediately after cessation of drilling operations. Well pads for dry wells are fully reclaimed, along with their associated access road. Well pads for producing wells are reclaimed also except for one-half acre needed for surface production equipment. Access roads to producing wells are partially reclaimed to the minimum width needed for support equipment to surface production equipment. Flow or pipelines will follow access roads with the occasional exception of cross-country routing when necessary. Pipelines are immediately reclaimed once the gas pipes are placed in the pipeline trenches.

The producing well sites (approximately 80 percent of the total wells drilled) will be reduced to a maximum one-half acre area after the well is put in production. Table 3.125 displays the estimated area disturbed from production, under a low, medium, and high scenario.

Table 3.125 Area Disturbed from Production

Number of Wells	Area Disturbed from Production (Acres)			
	Well Pads	Flowlines	Roads	Total
Low 3	1.5	4.5	6	12
Medium 41	20.5	61.5	82	164
High 97	48.5	145.5	194	388

The total acreage from drilling and production disturbed after all wells are drilled will be approximately 12 acres for 3 producing wells. Producing wells will average approximately 1.2 acres per year surface disturbance until such time that the well ceases to produce and is then fully reclaimed. It should be noted that the total amount of disturbances will not occur at the same time, and wells will be abandoned and restored during the years of field development.

Coal Bed Methane

The coal bed methane scenario is unique for the Ouachita National Forest and is a relatively recent situation, commencing in 2004. Prior to 2003, there was no interest expressed in coal bed methane on the Forest. If the coal bed methane well that was drilled and is producing on the Poteau Ranger District in 2004 is the start of a trend, it is expected that as many as 6 to 8 more coal bed methane wells will be drilled by 2008. Then by 2018 at the latest, all wells will have ceased producing (commencing in 2009) and would have been fully reclaimed, along with associated access roads and flow or pipelines. Well pads will be 2 acres initially, reduced to one-fourth of an acre for surface production equipment. Average road access will be 1.5 acres, and pipelines/flowlines will be one acre (pipelines that result in cross-country routing will typically be minimum to near minimum widths of 3 to 10 feet). Pipelines placed in road rights-of-way do not increase surface impacts already considered for the road. In the case of coal bed methane scenario, 100 percent of the wells drilled will be producers. Table 3.126 displays the area disturbed from production of coal bed methane, both the drilling operation and the overall production operation.

Table 3.126 Area Disturbed from Production of Coal Bed Methane

	Area Disturbed from Production of Coal Bed Methane				
	Wells (#)	Pad Site (acres)	Access Road (acres)	Pipeline (acres)	Total (acres)
Drilling	7	14	10.5	0	24.5
Production	7	1.75	10.5	7	19.25

On average, 24.5 acres, or 2.5 acres per year, will be impacted. However, within two months from the commencement of drilling, 1/5 of the surface impacts (average ½ acre) will be fully reclaimed resulting in an average two acres surface impact per year. Within five to 10 years, 100 percent of the surface impacts will be fully reclaimed. If pipelines associated with production are discounted because reclamation is immediate once the pipe is placed in the line, then total surface impacts are 12.25 acres, or 1.2 acres per year. The current well drilled and producing on the Forest in 2004 has a ¼-mile access road and ¼-acre area on the pad site for production equipment (total ½ acre). The gas pipeline is in the road right-of-way. An additional ½-mile pipeline was placed along a county road, for an approximate ½-acre impact. The ¼-acre pad section and ¼-mile road access road will continue to be used for the next 5 to 10 years until production is completed. The additional gas pipeline section was immediately reclaimed once the pipe was placed in the line.

To minimize effects, access and pipeline routes will follow existing roads wherever possible, although new road and pipeline construction may become necessary in some cases. The locations of all well pads, access roads, and pipeline routes are evaluated based on appropriate NEPA procedures and the effects of actions on sites located by engineers, geologists, or special use scientists are disclosed. Gas pipelines are essential and unique to the transport needs of the energy minerals that are produced. Pipelines mainly occupy road rights-of-ways in linear covered and reclaimed trenches. Vegetative clearing widths vary from 10 to 30 feet. Pipelines following cross-country routes will be constructed to minimum 3 to 10 foot clearing widths. As soon as a pipe is placed in the pipeline trench, the trench is immediately fully reclaimed. The amount of time the surface is disturbed from trenching is very temporary, ranging from hours to several days. To adequately disclose what environmental impacts are associated with this projected activity, the drilling process needs to be itemized and analyzed.

Typical Drilling Scenario

Historically, wells in Arkansas are drilled on a 640-acre spacing. The number of wells drilled is dependent on the oil and gas market values and the perceived impact of the lease stipulations by the oil and gas industry.

In this geographic area, the standard approach is to drill vertical holes from a single drill pad down to the target formation. The deeper the suspected oil/gas bearing rock layer lies, the larger the drill rig must be and, consequently, the larger the drill pad must be to accommodate it. Since the known producing zones north of the Forest boundary, primarily in the Arkansas River Valley, lie relatively shallow with deeper plays to 6,000 feet, smaller drill rigs and pads are needed.

Preparation for the drilling process includes construction of an access road, a drilling pad, and a reserve pit. Typically, one to two acres are cleared and graded level for construction of the well pad; however, depending on the topography of the well site and access area, this construction may require the creation of cut slopes and fill areas that may disturb additional area. The excavated reserve pit is usually about five feet deep and is lined with bentonite clay. Plastic or butyl liners (or its equivalent) that meet state standards for thickness and quality are used on occasions when soils are determined incapable of holding pit fluids. Constructed access roads normally have a running surface (width) of approximately 15 feet and a right of way of 30 feet; the length is dependent upon the well site location in relation to existing roads or highways. The average length of road construction will be about one-half mile or less (approximately one acre of disturbance).

Because the cost of rig time in drilling a well is usually several thousand dollars a day, drilling is conducted 24 hours a day, seven days per week when possible, yielding a short period of time when the site is impacted by the drilling activity. Wells are usually drilled in seven to 30 days depending on the depth of the hole, the number and degree of mechanical problems, if a well is a dry hole or a producer, etc. Wells would be drilled by rotary drilling rig using mud as the circulating medium. Mud pumps would be used to force mud down the drill pipe, thereby forcing the rock cuttings out of the wellbore. Water used in the drilling process would normally be from a well drilled on the site; however, water could be pumped to the site from a local pond, stream, or lake through pipe laid on the surface. Water could also be hauled to the site by the use of water tanker trucks. Shallower wells could be drilled with air instead of mud. Pad size and access would be the same.

Approximately 500 barrels of drilling mud will be kept on the location. Mud will also be needed for some down hole logging programs. Water production will be expected during the life of the field, separation, dehydration, and other production processing may be necessary. Construction of facilities off federal lands may be needed to handle this processing. Some processing or temporary storage may be necessary on site, usually in the form of tanks.

Material used in construction of the pads and access road (i.e., rock, shale, or gravel fill) is obtained from pre-approved sources. Shale and/or gravel used in construction of the drilling pad are stockpiled when restoring the area. For all surface-disturbing activities, the topsoil to be removed is stockpiled for redistribution over the disturbed area prior to fertilizing and reseeding of the site. Surface soil material stockpiles should be located to avoid mixing with other subsurface materials during construction and reclamation. Stockpile locations should be located so wind and water erosion are minimized and reclamation potential is maximized. In areas where excavation will be extensive or extreme, or where bedrock will be encountered, existing topsoil is replaced. Restoration of the area includes reseeding of the area with natural grasses as determined by the authorized Forest officer. If drilling results in a producing well, the drilling pad must be reduced to a maximum area of 10,000 square feet (0.23 acres) and the remainder is restored to blend into the natural terrain. For a producing well, the operator will either install tanks on site to hold the oil and any produced water or a pipeline will be hooked up to the well head and the product transported off site. A producing gas well will have a pipeline connected to the wellhead, and the gas will then be pumped off through these gathering lines. Either way, the amount of space required for these facilities is considerably less than the original pad size and will be reclaimed around the unneeded edges.

Pipelines and/or flow lines will be constructed in conjunction with the construction of the access roads whenever possible to minimize additional disturbance. Pipeline right-of-way shall not exceed 30 feet in width. Exact right-of way widths may be set by ground conditions. Whenever possible, when buried, pipelines must be at a depth of at least 48 inches. Any deviation from the 48-inch depth must be approved by the appropriate Forest Service officer prior to any surface disturbing activity taking place. When possible, a common point of collection shall be established to minimize the number of production sites. All pipeline designs, construction, operation, and maintenance shall comply with Federal Safety Standard for Gas Lines, Code of Federal Regulations, Part 192, Title 49, unless more stringent requirements are required by the state.

If the well is a dry hole, or cannot produce commercial quantities of oil/gas, then it will be closed off by plugging and capping the top of the pipe in the hole. All equipment will be removed from the site and the drill pad area will be re-sloped and seeded with a mixture of native plants.

The BLM estimates that, if serious drilling occurs because of a major gas find (aside from coal bed methane) only 19 percent to 61 percent in the Low and Medium categories (and 74 percent in the high category) of the total wells drilled on the Forest will produce commercial amounts of gas. That is, in the “Low” category, of 16 total projected scenario wells to be drilled over the next 10 years, only 3 of the wells would likely be producers. In the “Medium” scenario category of 66 wells drilled, 41 may possibly result in production. The rest will be reclaimed within a month of building the drill pad.

With an average of 5 acres of disturbance for each well (2 acre for the access road and 3 acres for the drill pad), about 8 acres total each year may possibly be disturbed on the Ouachita National Forest for oil and gas development. About 90 percent of the well pad surface disturbance will be reclaimed within a month in the case of a producing well, with the remaining 10 percent being reclaimed at the end of the production phase of the well. For non-producing wells, 100 percent will be reclaimed within a month.

Specific impacts to air quality include fugitive dust from vehicle traffic on the access road and during construction of the drill pad. There will be tailpipe emissions from the vehicles transporting the rig and pipe to the site as well as from diesel motors for running the on site engines. In the few cases that natural gas may be encountered, some gas will be flared to the atmosphere in the production tests.

Water quality may be locally degraded by sedimentation resulting from airborne dust settling out on streams and lakes and from erosion of the access road and drill pad. A small fraction of the stockpiled topsoil from the site could be washed into the local drainage by storm runoff in the 7 to 30-day window that drilling is taking place.

Soil impacts include displacement and compaction. There will be an average of three acres per drill site (one acre of new road and two acres for the drill pad) of soil disturbance. The surface of the road and drill pad will be compacted by the use of vehicles and machinery. Impacts to soil resources are reduced by requiring pads to be constructed to protect topsoil until fully reclaimed. Topsoil is then replaced on the reclaimed site. Pads are also insloped and designed to reduce water runoff. When reclaiming the access road and drill pad, it is standard procedure to use a ripper to relieve compaction prior to re-contouring, spreading the topsoil over the disturbed area, and seeding with native species. When gravel has been brought in to surface parking and work areas, that gravel is removed as part of the reclamation process.

Vegetation occupying the areas to be disturbed for road and pad will be uprooted and destroyed. Any commercial timber will be sold ahead of road and pad building. Wildlife will be displaced from the immediate area of surface disturbance, and the noise, lights, and activity of workers and machines could disturb wildlife in the surrounding environs. However, some species will benefit from the creation of vegetative edge effects and early serial habitat creation. Aquatic animals could be impacted by airborne dust settling on the nearby streambeds and pond bottoms. Sediment washed down from the disturbed sites would also adversely impact aquatic life.

Species on the Threatened or Endangered List will not be adversely impacted by drilling activity. Habitat areas containing these plant and wildlife species are inventoried and special stipulation(s) will be included in the leases that are issued. Even if a new Threatened or Endangered species or the new location of an existing one is found subsequent to a lease being issued, the standard terms of an oil/gas lease require that a survey for Threatened or Endangered species be completed in any proposed drilling location. If any are found, accommodation for it (up to and including completely moving the drill site) must be done before surface activity can be permitted.

It is possible that oil/gas drilling will cause some adverse impact on recreational activities such as bird watching or hunting. These will be short in duration, however, and very localized in effect. There could also be an increase in habitat created for some game animals thus making the local population larger and the hunting experience more successful.

Based on the topography of the Forest, most visual impacts will be fairly subtle and easily screened from most viewsheds. There will be some added visual contrast by small open spaces in areas that were at one time completely forested.

As with Threatened or Endangered species, cultural resource surveys must be done of all proposed access roads and drill pad locations to insure no heritage resources are disturbed or lost. Depending on the sensitivity of the cultural resource and its susceptibility to disturbance, the road/drill site location can be moved. In a few cases, the oil/gas operator may choose to pay for complete excavation and curation of the cultural site in order to keep the proposed drill location in its original place.

There will be a positive economic effect on the local economy in areas close to drill sites. The drilling operation will rely on local merchants for food, fuel, and supplies (see Cumulative Effects), and often housing as well. Pad and road construction is often subcontracted to local companies or companies employing local expertise.

Salable (Common Variety) Minerals

Common varieties of mineral materials (CVMM) include aggregate, landscaping rock, riprap, flagstone, and other earthen construction materials. The Forest and local, state, and county agencies and the public uses mineral materials from existing pits on the Forest for road aggregate. Some pit removals are for commercial purposes (approximately 12 contracts per year) under Forest

Service issued contracts that are open only for one-year periods. Most contracts are issued to the public for personal purposes such as gravel for resurfacing driveways and stone for yards and fireplace construction. Most of the mineral materials used by the Forest Service are extracted from designated pits on the Ranger Districts. These removals take place at dispersed sites across the Forest. Short duration and small tonnage building stone contracts are issued to members of the public when requested for hand removal of surface exposed building stone.

No new mineral material sites are being proposed in the current planning period. However, if a new pit were to be developed, the environmental effects of establishing it would include scraping off and stockpiling the topsoil for later use in reclamation of the site. There would be some soil loss from wind and rain runoff. A localized decrease in air quality would result from dust released from the mining of the material as well as vehicle traffic to and from the pit. Vehicle emissions would also temporarily lower the local air quality. Wildlife and vegetation would be displaced from the pit site itself. Noise associated with operating equipment, vehicle, and people in and around the pit and access road could disturb some nearby fauna. Depending on the site-specific location, visual quality may be impaired. However, vegetative screening can usually mitigate this to a large degree. Prior to any surface disturbance of the site, the mandatory surveys for threatened and endangered species and cultural resources will have been done. If any of these resources are present and mitigating measures would not be adequate to protect them, then the site would not be developed.

Rockhounding

There is virtually no impact on other Forest resources from rockhounding or panning. The rockhounders will employ bare hands, small rock hammers and hand tools, or garden trowels. There are no economic implications from rockhounding and/or panning.

Private Mineral Rights (Reserved and Outstanding Mineral Rights)

Forest Service direction for the administration of reserved and outstanding rights is found in Chapter 2830 of Forest Service Manual 2800.

The exercise of private-mineral rights produces both mineral exploration and mineral development in various areas of the Ouachita National Forest. The purpose of this section is to discuss how the Forest Service manages mineral exploration and development on reserved and outstanding rights (ROR) under federal surface ownership.

The only minerals operation on Private Minerals under the Ouachita National Forest is a single coal bed methane gas well. Impacts to the Forest are discussed previously, and no alternative will affect the production of coal bed methane gas with the exception of Alternative D, which recommends an additional 30,127 acres for wilderness.

An important difference in the administration of ROR is that the development of private minerals is a right of the mineral owner. Reserved mineral rights are subject to state laws and Secretary's Rules and Regulations (SR&R) that were made part of the severance deed when the land was purchased by the United States. In reserved mineral cases under SR&R 1937, 1947, 1950, and 1963, the operator must submit an operating plan. If the operating plan is acceptable, the Forest Supervisor will issue a "Reserved Minerals Permit." If the operating plan is not acceptable, the Forest Service shall meet with the mineral owner or lessee to negotiate modifications needed to make the plan acceptable. For outstanding minerals the mineral owner or lessee provides the Forest Service a proposed operating plan. Outstanding mineral rights are subject to the terms of the Severance Deed and State Law. The Forest Service reviews the plan and negotiates the operating conditions for mitigation of surface disturbance with the operator and has no recourse to disallow the project, except through acquisition of the mineral estate.

The following discusses two interrelated potential effects relating to outstanding and reserved mineral rights on the Ouachita National Forest: 1) the potential effects of the alternatives on the exercise of private mineral rights on National Forest System lands, and 2) the potential effects of private mineral rights operations on National Forest System lands.

The exercise of private mineral rights to explore and develop privately owned minerals on NFS lands is a private decision, not a federal decision. Tens of thousands of acres on the Ouachita National Forest System lands were acquired subject to these private mineral rights. All alternatives are subject to these existing private rights (outstanding and reserved mineral rights), and the U.S. is bound by the terms of the mineral reservation.

The alternatives do not create any measurable potential conflict with private mineral rights.

Direct and Indirect Effects

Of the 1,417,815 acres of combined Federal mineral and surface estate lands available for lease, there are three levels of restrictions on mineral development: 1) lands leased subject to standard lease terms; 2) lands leased subject to a Controlled Surface Use (CSU) stipulation; and 3) lands leased subject to a No Surface Occupancy (NSO) stipulation. Table 3.127, Oil and Gas Leasing Consent Decisions, lists the acres and percentage of lands available subject to each level of restriction, under each alternative. Alternatives C and E each recommend 1,793 acres for wilderness designation, and Alternative D recommends 30,127 acres for wilderness designation. The consent decision would change based on the designation of these areas for wilderness.

Table 3.127 Oil and Gas Leasing Consent Decisions – Acres and % Forest Affected by Each Alternative (% based on 1,780,101 Total Forest Acres)

Stipulation	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
	Acres over Percent				
No Leasing (Wilderness and "Wild" River)	65,714, 4%	65,714, 4%	67,507, 4%	93,841, 5%	67,507, 4%
NSO: No Surface Occupancy Stipulation	66,875, 4%	66,875, 4%	66,875, 4%	66,875, 4%	66,875, 4%
CSU: Controlled Surface Use Stipulation	755,979, 43%	755,979, 43%	755,979, 43%	755,979, 43%	755,979, 43%
Standard Stipulations	891,533, 49%	891,533, 49%	889,740, 49%	863,406, 49%	889,740, 49%

When considering the total acreage of the Forest, the following applies for each alternative evaluated in the FEIS: 82,021 acres (5 percent of the Forest) is 100 percent private mineral rights, and 65,714 acres (4 percent of the Forest) are acres currently designated as Wilderness and/or a Wild portion of a Wild and Scenic River which are withdrawn from any type of mineral development. The minerals potential for the Forest cannot be fully evaluated on those lands that are not available for mineral entry. Consequently, the mineral resource will not be explored or developed on withdrawn status lands.

The direct effect of each alternative on the amount of minerals available for lease with standard lease terms is minimal. This includes the Selected Alternative (Alternative E). While acreages would change in various alternatives, the changes would not be sufficient to significantly affect the percentages for any lease category in any of the alternatives. The total acreage available for lease would remain virtually the same.

The acreage added to the restricted category would indirectly make mineral operations on the Forests more difficult and potentially more expensive for the lessee but it would allow for increased resource protection on the Forest. In addition, these restrictions could force companies off National Forest System lands onto lands with reserved or outstanding mineral reservations where the Forest would have less control over surface disturbing activities. From a minerals management perspective on the Forest:

- Alternatives A and B provide the best opportunities to explore for and develop the mineral resources on the Ouachita National Forest because they follow the 1990 Forest Plan parameters and do not place an emphasis on new wilderness additions that effectively withdraw affected lands from mineral entry.
- Alternative C emphasizes ecosystem health and recommends 1,793 acres of wilderness additions to three existing wildernesses. This alternative provides good opportunities for minerals exploration and possible development.
- Alternative D emphasizes recreation and scenery management and the addition of 30,127 acres of wilderness including additions to three existing wildernesses and creation of three new wildernesses. The emphasis in this alternative would have the greatest relative impact on minerals exploration and possible development.
- Alternative E combines elements of B, C, and D and blends increased active management in some areas with recreation and scenery emphasis in others. Alternative E recommends the addition of 1,793 acres to three existing wildernesses. This alternative will provide good opportunities for minerals exploration and possible development.

Cumulative Effects

The following discussion applies to the cumulative effects of the consent to allow exploration decision. It does not address the cumulative effects of each alternative on the minerals program or resource because there are no changes by alternative to the minerals program with the exception of Alternative D, which would recommend 30,127 additional acres of wilderness. Wilderness acres are not open for mineral exploration. Therefore, Alternative D would have the effect of reducing the potential for mineral exploration by 30,127 acres; however, the locations of the recommended wilderness are not known to be mineral deposit areas.

The cumulative effects anticipated to result from mineral activity on the Forest over the next ten years will be associated with coal bed methane exploration and possible development, possible natural gas exploration, existing hardrock minerals operations (quartz, novaculite, gravel, and building stone), and with new proposed hardrock minerals operations.

It is projected that there will be 7 to 16 gas wells drilled on the Forest, with 7 being commercially productive. The rest would be dry holes and the sites reclaimed. For each of the producing well sites, the area needed for production would be less than was needed for the drilling phase. The size of the drill pad would decrease from two acres of disturbance down to about ¼-acre, with the unneeded portion reclaimed. Thus, there would be a residual of 1¼ acres per new producing well (one acre for the access road and ¼-acre containing the pump jack and ancillary tanks or pipelines) not reclaimed until production ceased. Cumulative effects from pipelines are limited when construction occurs in established rights-of-ways.The time it takes to dig the linear pipeline trench, place the pipeline, backfill the trench and pipeline, and reclaim the trench is only a matter of hours for a given linear section. Special trenching machinery allows for a light touch on the land surface when trenching is required across country. Minimum pipeline width is approximately 36 inches. Pipelines are immediately reclaimed. After gas production ceases, pipelines are flushed and may be left in place or removed. The determination to leave a pipeline in place or remove it as part of the reclamation is made in the Environmental Analysis. There would be approximately 15 acres of new, unreclaimed area over the 10-year plan period. The average surface disturbance over the term of the Forest Plan would approximately be 1 ½ acres per year.

In the next 10-year planning period, 5 new quartz operations are expected to occur, involving an approximate total of 15 new impacted acres for an average of 1 ½ acres per year. Most case sites are operated intermittently. The nature of hardrock mining operations on the Forest requires that they proceed at a slow and methodical pace. These are all surface operations. Potential impacts to offsite resources are primarily from runoff. This is negated or minimized by requiring mining design to keep runoff waters onsite. New common variety mineral material operations are expected to occur at the rate of at least 40 to 60 per year. These are small tonnage, short duration removals primarily from within the existing 22 pits and the primary building stone site on the Forest. Operations outside of existing pits are small tonnage (generally several pickup loads), hand removals of surface exposed building stone. Site-specific environmental analysis is conducted on all new sites. Gravel pits on the Forest are long-term impacts to allow controlled centralized access to essential pit-run aggregate resources. Pits are designed to prevent water runoff and consequent siltation from leaving the pit site and impacting adjacent Forest resources. All pits on the Ouachita National Forest are worked intermittently by counties and Forest Service contractors removing material for public projects (roads, etc) as needed. Cumulative effects outside of existing pits are limited to minor vegetative disturbance (no surface disturbing excavations). Some existing pits may undergo limited expansion. An average of 1-acre expansion per year total for all existing pits would result in an overall average of 0.05 acres per pit per year.

There are positive economic impacts resulting from oil and gas exploration and development activities. Lessees/operators usually contract locally for road and drill pad construction. They purchase food, fuel, lodging, and other supplies from local sources and may subcontract certain parts of the operation to local well servicing companies. Most of the salaries paid to workers are spent in the local area. The estimated dollars that an average drill rig generates per day is over $200 per worker. A typical well drilling operation will have an average of 10 to 20 workers. This translates into about $2,000 to $4,000/day spent in the local area. Since the average gas well in this area takes two to four weeks to complete, $28,000 to $112,000 per well goes into the economy. There are 59 hardrock mining cases for quartz crystal, novaculite, wavellite, aggregate (gravel), and building stone, and one energy case for coal bed methane. The accumulated total existing surface impacts from these operations located across the Forest is approximately 120 acres. Average surface impact is less than two acres per case. This represents less than one-tenth of one percent of the total Forest land base.

Livestock Grazing

About 114,537 acres in Oklahoma and 161,278 acres in Arkansas are considered suitable for livestock grazing. Since 1979, the number of grazing allotments has declined from 111 to 18 in 2004. There are 10 allotments in Arkansas and eight in Oklahoma (as of September 2005). Six of the eight allotments in Oklahoma were established as part of the land acquisition of the Broken Bow unit in 2003. Currently, three of the Arkansas allotments are vacant. During the 2004 grazing season, permits were held by 32 permittees for a total of 903 head of cattle or 5,081 animal unit months (AUMs).

Beginning with the 2004 grazing season, livestock stocking rates were based on primary range which includes transitory regeneration areas (stands with trees ranging from three to 10 years old) and permanent pastures. About 68 acres of suitable range in Arkansas (Womble Ranger District) are maintained as permanent pasture land. These pastures are non-transitory with livestock forage production being the primary management objective.

No forest grazing associations are organized, but approximately 101,195 acres of intermingled Weyerhaeuser Company lands on the Jessieville Ranger District are under cooperative grazing agreement with the Forest Service. This agreement, signed in December 1967, gives the Forest Service the authority to administer these intermingled lands for all grazing purposes. Weyerhaeuser pays a fee to the Forest Service for grazing administration services and receives a pro-rata share of the grazing receipts generated.

Demand for Forest grazing has been decreasing since 1975. Declining demand is seen as a result of several contributing socioeconomic factors:

- The Forest has a predominance of aging permittees who are starting to phase out their operations or retire altogether. This, coupled with younger generations moving away from single-family livestock operations, has resulted in a loss of permittees without replacement. The elimination of traditional "woods grazing," where livestock were simply placed on the Forest, and the change to a 6-month grazing season rather than year-long grazing further discouraged grazing on the Forest.
- Large livestock operators who depend solely on livestock operations as their primary source of income are not interested in Forest grazing since they have no control with regard to public access on Forest rangelands.
- As annual grazing fees are increased in an effort to recover "fair market value" for public land grazing, many permittees have responded by lowering their permitted herd sizes or by leaving the public land grazing program altogether.

Demand is expected to continue declining. For planning purposes, grazing capacity is constrained at an availability level of 12,036 AUMs. Projected demand is less than "Current Direction" AUM's capacity and "Maximum Potential" AUMs for all periods. Current grazing allotment for the Forest are displayed in Table 3.128.

Table 3.128 Grazing Allotments for Forest

Allotment Name	Type	Unit	Total Area	National Forest System Area	AUM Capacity
Arkansas					
Aly	Active	Jessieville	11,266	2,372	826
Bear Creek	Active	Jessieville	37,243	13,177	1,606
Graham Creek	Active	Jessieville	22,362	7,435	1,364
Irons Fork	Active	Jessieville	30,284	16,752	1,130
Liberty	Vacant	Jessieville	22,435	10,976	195
North Fork	Vacant	Jessieville	40,719	35,044	2,014
Ouachita Pinnacle	Active	Jessieville	40,719	35,044	537
Possum Kingdom	Active	Jessieville	31,300	16,833	844
Mauldin	Vacant	Womble	145	145	123
Alum Fork	Active	Winona	26,000	23,500	114
			AR TOTAL	161,278	8,775

Allotment Name	Type	Unit	Total Area	National Forest System Area	AUM Capacity
Oklahoma					
Buffalo Creek	Active	Tiak	17,500	17,500	538
Holly Creek	Active	Tiak	21,000	21,000	263
Upper Glover	Active	Tiak	5,600	5,600	506
Cedar Creek	Active	Tiak	30,800	30,800	760
Lower Mountain Fork	Active	Tiak	5,500	5,500	381
Otter Creek	Active	Tiak	17,400	17,400	141
Sycamore Creek	Active	Kiamichi	16,812	9,229	490*
Lenox	Active	Kiamichi	8,804	7,508	182*
			OK TOTAL	114,537	3,261
FOREST TOTAL				275,815	12,036

* Numbers represent actual use in AUMs.

Direct and Indirect Effects

Grazing by domestic livestock may alter vegetation structure and composition and thus, habitat for some wildlife species. Habitats for wildlife may be improved, degraded, or unchanged as a result of grazing. Effects depend upon the wildlife species, cattle stocking rates, the amount of forage removed, and the time of year that grazing is allowed. Cattle can reduce available cover for ground nesting birds and in some cases, destroy nests by trampling; however, their forage also helps to maintain the herbaceous grass/forb condition required by species such as Northern bobwhite, whip-poor-will, wild turkey, and white-tailed deer. Some soil compaction and erosion can occur in areas where cattle congregate; however, both of these effects are beneficial to certain plant species, which require sunlight to germinate, and disturbed soil to receive seed for regeneration. Fecal material deposited in or near ponds and streams can contribute to bacterial contamination of the water. Grazing on the Ouachita is limited to a six-month season, mid-April to mid-October. Cattle are removed from the Forest during the winter months that are wetter, making soils more susceptible to damage and eliminating competition between deer and cattle for scarce winter forage.

Cumulative Effects

The projected level of grazing does not vary by alternative. Although soil compaction and erosion may result from grazing, these effects are minor and are tempered by the Forest policy of removing cattle from the allotments during the winter months and limiting forage removal to no more than 50 percent of annual growth. Research has shown there are only minor dietary overlaps and little competition between deer and cattle during the growing season. Grazing may reduce the abundance of native grasses and forbs in management areas where the desired condition is a shortleaf pine-bluestem ecosystem.

Heritage Resources

Cultural resource surveys have been completed on over 20 percent of the total area of the Ouachita National Forest, resulting in documentation of almost 8,000 prehistoric and historic archeological sites. The following discussion provides a brief overview of the results of these investigations. Additional information concerning the cultural history of the area can be found in reports such as *From Clovis to Comanchero* (Hofman and others 1989), *Prehistory of Oklahoma* (Bell 1987), and

Archeology and Bioarcheology of the Lower Mississippi Valley and Trans-Mississippi South in Arkansas and Louisiana (Jeter and others 1989).

Heritage Properties

Heritage properties within the Ouachita National Forest consist of three main classes: Prehistoric Archeological Sites, Historic Archeological Sites, and Historic Buildings/Structures.

Prehistoric Archeological Sites are quite varied in nature and consist of isolated occurrences of stone tools or lithic debris to extensive quarries and workshops covering a few hundred acres. Many of the known prehistoric archeological sites are diffuse scattered occupations where lithic debris represents the majority of the cultural materials present. These are largely upland sites and probably represent seasonal and/or special activity occupations from all stages of cultural development. Intensive use of the stream valleys is documented, but did not occur at the exclusion of the upland areas. The larger stream valleys contain larger, more permanent villages, as opposed to the more temporary nature of the upland sites. The majority of the larger stream valleys, however, still remain in private ownership.

The southern edge of the Ouachita Mountains contains extensive outcrops of novaculite, a type of chert, which was used extensively in the manufacture of chipped stone tools by people occupying the Ouachita Mountains and surrounding regions during prehistory. Quarry and workshop sites are numerous in the areas where the novaculite is exposed, and these sites may stretch for miles along the mountain crests. In the northwestern and western portion of the Ouachita Mountains, additional varieties of chert occur, mostly in the Johns Valley formation. Each exposure was utilized extensively for knapping material suitable for stone tools. A third material, silicified sandstone (probably Jackfork Sandstone), was also widely utilized in the northwestern mountains.

The archeological sites within the Ouachita National Forest represent the full range of prehistoric cultural development (i.e., PaleoIndian, Archaic, and Late Prehistoric). Although scarce, PaleoIndian sites do occur, but only as isolated occurrences of lanceolate projectile points. Sites with Late PaleoIndian/Early Archaic Dalton components, however, are relatively common throughout the Ouachita Mountains. Sites dating to the Archaic period occur abundantly. These sites are represented as single isolated artifacts to extensive sites covering more than 200 acres. It is believed that many of the novaculite quarries were utilized during this time period. Overall, little is known about the subsistence of the populations during the Archaic period. Archeologists have conducted limited investigations at several sites within the Little Missouri and Ouachita watersheds during recreation construction projects. Large burned rock features were documented at two of the sites suggesting intensive food preparation activities.

During the first two weeks of December 2004, evaluation excavations occurred with Passport In Time (PIT) volunteers in a large Archaic Period site in LeFlore County, Oklahoma, within the Kiamichi River watershed. Ground Penetrating Radar was used as an aid in selecting areas within the site to be examined by the PIT volunteers. The testing confirmed that the site was occupied during the mid-late Archaic period; some of the dartpoint styles date as early as 6000-8000 B.P. Specific areas within the site were revisited many times during the mid-late Archaic period resulting in several burned rock cooking features. These features occur both as intact burned stone clusters, suggesting intact hearths, and jumbled piles, suggesting discard piles. An abundance of lithic debris, representing most stages of tool manufacture, suggests that tool manufacture and refurbishing was also a major activity.

Although testing and/or excavation have occurred at a limited number of these sites, understanding of how the prehistoric cultural groups used the resources within the mountains remains limited. Many of the early archeological surveys within the mountains suggested that the prehistoric site density was rather low. In recent years, however, a fairly high density of prehistoric sites has been found (in portions of the Forest, it is as high as one archeological site per 10 acres). Many of these may be low density lithic scatters with low potential for providing important information regarding the prehistoric use of the Forest area; however, many of the sites are recognized as potentially containing intact deposits and features which will be important in understanding of the prehistoric life ways.

More is known of the historic use of the mountains because archeological surveys have documented the presence of numerous farmsteads, extensive logging operations, and intensive mining. Prior to the establishment of the Ouachita National Forest, the majority of the lands within the Ouachita Mountains were privately owned. Evidence of the transportation systems remain in many areas of the Forest. Road segments, mapped on the General Land Office maps in the 1840s, can still be located. The earliest historic occupation occurred as settlers/farmers began moving into the larger river valleys. They first settled the fertile bottomlands, and then began slowly moving into the adjacent uplands as populations increased. Many of the small farms located in the uplands failed due to the poor, rocky soils. The archeological evidence of these small farms consists of house foundation piers, cellar and well depressions, chimney foundations (many of the chimneys were constructed of mud rather than stone), and flowering vegetation. These farmsteads were accompanied by extensive fields; today they are characterized by the presence of vegetation changes, rock walls, and stone field clearing piles and alignments. The small upland farms were then often acquired by timber companies who were increasing land holdings within the mountains. Following the establishment of the Ouachita National Forest, the Forest Service began acquiring tracts from small landowners as well as large cut-over tracts from the timber companies.

Extensive logging occurred within the mountains from the late 19^{th} century into the early 20^{th} century. Archeological evidence for these activities is abundant. Logging sites occur as locations of small portable sawmills and logging trams. Two major, early 20^{th} century sawmill towns in Arkansas, Mauldin and Forrester, were located within the Ouachita Mountains and are on lands now managed by the Forest.

Mining has been an important activity within the Ouachita Mountains. Although no extensive mines occur, intensive exploration has occurred. One of the more well-known minerals that was historically mined and continues to be mined is quartz crystal. Limited evidence of quartz mining in prehistoric times has been documented within the southern portion of the mountains. Historic mining of crystal has occurred for well over a century. Extensive quartz mining occurred in the Mt. Ida, Arkansas vicinity during World War II, and one of these mines has been documented as an historic/archeological site. Numerous small quartz exploration pits across the southern portion of the mountains have been documented as archeological sites.

Manganese was also intensively mined in a few areas within the Caddo, Mena, and Womble Ranger Districts. Numerous shafts and adits are documented within these three districts. The North Mountain mine, on the Caddo District, was one of the larger operations. These mines were often directly associated with local milling operations; remains of several of these manganese mills have been documented as historic sites. The most extensively documented is near the Shady Lake Recreation Area on the Mena Ranger District. Slate mines and one slate mining town are located on the Caddo District.

Numerous other types of historic archeological sites occur and have been documented within the Forest. These include grist mills, schools, churches, developed springs, cemeteries, whiskey stills, and Works Progress Administration (WPA) and Civilian Conservation Corps (CCC) constructed sites. Included in the inventory of historic buildings on the Forest are 95 structures that have been listed on the National Register of Historic Places.

The CCC enrollees contributed undocumented numbers of man-hours to the creation of recreation areas, transportation systems, fire protection, and reforestation for the Ouachita National Forest. Most of the Forest's major recreation facilities and many of its major access routes were constructed, at least in part, by the CCC. The recreation sites contain structures as simple as picnic shelters to those as elaborate as bathhouse facilities. Many of the recreation areas were landscaped with stone walls, flagstone walks, and hiking trails. Stone, earthen, and concrete dams that created small reservoirs were constructed at several of the recreation areas such as at Shady Lake and Lake Sylvia in Arkansas and Cedar Lake in Oklahoma.

In addition to the recreation facilities, the CCC constructed administrative buildings such as work centers, residences, district offices, and fire towers. The CCC constructed a dam, and the WPA constructed several buildings for the Ouachita Girl Scout Council in Perry County, Arkansas. This facility, known as Camp Ouachita, served the Girl Scouts of central Arkansas for almost half a century. It was only in 1980 that the Scouts vacated this facility due to insufficient potable water. Currently, the caretaker's cottage and the Great Hall have been restored, and plans are being developed for the other buildings. Almost a dozen former CCC camps are currently documented as historic sites across the National Forest. No structures remain on any of these sites, only foundations.

The CCC and WPA constructed facilities have played a very important role in serving the recreation needs of the citizens of Arkansas, Oklahoma, and surrounding states. Many of these structures still serve important roles. Most of the CCC and WPA buildings, many of the structures (such as bridges and dams), and some of the landscaping features are currently listed on the National Register of Historic Places. Other structures, such as some of the CCC constructed stone culvert headwalls, are eligible for listing on the National Register. In addition to the structures specifically constructed for Forest needs, the Forest Service has acquired other historic buildings that may have local and regional historical significance, including two farmhouses located on the Oden and Poteau Districts.

The heritage program on the Ouachita National Forest is currently overseen by a Heritage Program Manager, five Zone Archeologists, and eight Heritage Resource Technicians. In compliance with the National Historic Preservation Act, the Forest routinely consults with the Oklahoma and Arkansas State Historic Preservation Officers, the Oklahoma State Archeologist, the Tribal Historic Preservation Officers at the Caddo Nation of Oklahoma, and the Choctaw Nation of Oklahoma, as well as the Cultural Resource staff of the Chickasaw Nation, and the Native American Graves Protection and Repatriation Act Representative of the Quapaw Tribe.

Direct and Indirect Effects

All planned projects receive review and, if necessary, inventories are conducted prior to any land disturbing activities. As required by National Historic Preservation Act, sites that have not been evaluated for significance must be protected and managed as if they were listed on the National Register. Inventory surveys are continuing on a project-by-project basis.

If direct effects (physical disturbance) to significant cultural resources cannot be avoided during project implementation, mitigation may include data recovery through consultation. Other direct and indirect effects may occur as a result of recreation use and could include soil erosion and compaction of historic properties.

Alternative C, the alternative with the highest projected rate of ground-disturbing activities (acres of timber harvesting per year), would have a slightly higher probability of negatively affecting heritage resources than the other alternatives, because acres of timber harvesting increase, there is a greater chance that some potentially significant heritage resources will not be detected during regular (pre-treatment) heritage resource surveys. Making the same assumption of correlation between activity level and impacts to heritage resources and using the acres of vegetation management as a measure, Alternative A has the second highest potential for impacts to heritage resources followed by Alternatives D, E, and then B. Forest-wide standard HR 004 ("If previously undocumented cultural resources are encountered during ground disturbing activities, halt activities until site significance is determined, regardless of whether the area has been previously disturbed") provides a safeguard.

Prescribed fire may be used to cost effectively control damaging vegetation growth on historic ruins and cemeteries, if hand lines or foam/foil are used to reduce heat effects. In order to mitigate disturbances to historic resources, fire lines are installed in existing disturbed areas, or by using natural firebreaks, if feasible.

Similarly, road construction and increased road and OHV trail use could result in the degradation of sites and a reduction in the number of intact historic properties due to increased public access, erosion, and vandalism. The Forest mitigates these potential impacts by not issuing special use easements or permits for roads in or near known archeologically significant areas unless there is no practical alternative location.

Indirectly, natural processes are unavoidably degenerating archaeological deposits through time. Forms of green mitigation may handle erosion, where revegetation with native grasses minimizes tree growth (USDI Technical Brief 8 1992). Tree removal may be used to reduce root penetration and mass wasting from tree throws. All land management activities are reviewed prior to implementation for potential disturbance to significant resources.

Cumulative Effects

Many management activities would not alter heritage resources beyond the natural or cultural impacts they have already received. However, cumulatively, the repeated implementation of all project activities could result in the degradation of historic or prehistoric properties, unless these cumulative actions are considered in management treatments. This is the primary reason that the avoidance option is commonly used. However, in some cases (where vegetation is uncontrolled and results in overstocked, undesirable, or decadent growth conditions that could damage significant heritage resources) avoidance may result in benign neglect. Cumulatively, historic properties could be degraded, destroyed, or subjected to increased site vandalism with continuation of special use permits, increases in and the expansion of mineral extraction sites, the creation of new roads, and expansion and renewal of wildlife plots and pond construction.

Scenery Resources

Scenery Management System (SMS)

Approximately 88 percent (or approximately 1,566,802 acres) of the Ouachita National Forest is classified as moderate to high in importance for visual quality. Much of the Forest can be seen from adjacent or interior roads, trails, recreation areas, vistas, waterways, adjacent towns, and communities due in large part to the wide, open valleys and rounded mountainous terrain that characterize the area. The more scenic landscapes (those in High or Moderate Scenic Class) are generally associated with or occur adjacent to lakes, rivers, and streams, in or near highly developed recreation areas and along trail corridors. The scenic class distribution for the Forest is shown in Table 3.129 with 1 being the highest and 8 being the lowest (the Forest had no acres in scenic classes 6 and 7).

Table 3.129 Acres (April 2003) By Scenic Class for the Ouachita National Forest

Scenic Class*	Acres
1	577,806
2	979,652
3	118,143
4	16,497
5	329
8	87,674
TOTAL	1,780,101

*The Forest had no acres in scenic classes 6 and 7.

Elevations in the Ouachita National Forest range from 2,681 feet at the base of Rich Mountain Lookout Tower to lower elevations of approximately 300 feet along the Fourche La Fave River at the eastern edge of the forest. Views beyond the immediate foreground are influenced by terrain as well as vegetation type and density. The steep to rolling ridges and valleys characterizing the forest are covered with an almost-continuous canopy of deciduous and/or pine forest, creating a natural-appearing landscape character. Portions of the forest canopy have been opened as a result of periodic southern pine beetle infestation and habitat improvement projects, and since the mid-1990s, an increase in oak decline. Openings vary in size from less than an acre to more than 25 acres. Another alteration to forest canopy is attributable to less frequent timber harvest, which has the effect of restricting long Forest views.

Visual Absorption Capability (VAC) is the relative ability of landscapes to defuse human-caused alterations without loss of landscape character or scenic quality. Components of VAC are the degree of visual screening effect inherent in the natural landscape provided by landforms, vegetative cover, and rocks; variety or pattern–generally, the higher the “pattern effect,” the greater the absorption capability; vegetation height, density, and regenerative capability; soil color and geologic stability. The more homogeneous the canopy tree species composition is (as in some pine stands on the Forest), the lower the visual absorption capacity or the greater the contrast of alterations. Areas with steep slopes also have a lower ability to absorb linear alterations than do flatter landscapes.

The Ouachita National Forest generally has a high to very high VAC as a result of generous rainfall, fertile soils, relatively few rock outcrops or talus slopes, and a long growing season. These conditions are less prominent in the north (drier) and eastern parts of the Forest, where sites are somewhat less resilient than in the middle, southwestern portions. Limited management activities such as light timber management, prescribed fires, most road building, disease and pest control activities, if not screened completely by intervening vegetation, are generally only visually evident for one growing season. Unplanned, significant events, such as wildfire, storm damage, and large scale insect and/or disease outbreaks or larger scale management activities, may be evident over a longer period depending upon their location and severity and/or until native vegetation on the site has recovered to reduce contrasts to an acceptable level and intervening or screening vegetation has developed sufficiently to render the occurrence visually unnoticeable.

Physiographic Landscape

The Ouachita National Forest encompasses the Ouachita Mountains in the west central portion of Arkansas and the southeastern portion of Oklahoma. The Ouachita Highlands, the name given to this broad uplifted region, are the only extended area of substantial local relief (high hills and mountains) between the Appalachians and the Rockies and are a unique feature of the North American landscape (USDA Forest Service 1999).

The landscape can be divided into sections based on their individual characteristics of climate, physiography, water, soils, air, hydrology, and potential natural communities (McNab and Avers 1994). The Forest is principally within the physiographic region referred to as the Ouachita Mountains Section. The most northern and southern portions of the Forest also include small portions of the Arkansas Valley and Western Mid Coastal Plains Sections, respectively. Each Section can be further subdivided into Subsections for area-wide planning and watershed analysis. Table 3.130 shows the configuration of these major landscape sections and subsections. These data present the characteristics both common and unique to Subsections within the Ouachita National Forest. As a context to the landscape character descriptions, the following narrative describes the historical range of ecological variability found within the Ouachita Highlands.

Table 3.130 Subsections found on the Ouachita National Forest

Map Code	Section Name	Subsection Name	Subsection Number
1	Arkansas Valley	Western Arkansas Valley Mountains	231Gb
2	Ouachita Mountains	Fourche Mountains	M231Aa
3	Ouachita Mountains	Western Ouachita Mountains	M231Ab
4	Ouachita Mountains	Central Ouachita Mountains	M231Ac
5	Ouachita Mountains	Athens Piedmont Plateau	M231Ad
6	Mid Coastal Plains - Western	Southwestern Arkansas	231Eb
7	Mid Coastal Plains - Western	Red River Alluvial Plain	231Em

Landscape Character

Landscape character descriptions were written for the Forest’s four largest Subsections: Western Arkansas Valley, Fourche Mountains, Western Ouachita Mountains, and Central Ouachita Mountains (described earlier in this section). A fifth description was prepared for the Red River Alluvial Plain Subsection. Although two other Subsections, Athens Piedmont Plateau (M231Ad) and Southwestern Arkansas (231Eb), contain more acreage within the administrative boundary than Red River Alluvial Plain, NF ownership of these lands is sparse and highly fragmented. Forest ownership of the alluvium of the Red River, in contrast, is more contiguous.

Landscape character descriptions focus on key attributes found consistently throughout the mapped unit to succinctly convey “word-pictures” to the reader. They are based on the attributes of landform, water, cultural elements, and vegetation, although greater emphasis is usually placed on description of vegetation because vegetation is more easily changed than other attributes in a national forest setting (USDA Forest Service 1995).

Existing Visual Quality

Table 3.131 Current Inventory[1] under Visual Quality Objectives

Visual Quality Objective	Acreage	Percent of Landbase
Preservation (includes recommended wilderness)	66,185	3.7
Retention	58,128	3.3
Partial Retention	216,363	12.2
Modification	481,755	27.1
Maximum Modification	765,141	53.8
Total	1,584,914	100.0

[1]The scenic resources of the Ouachita National Forest are currently managed in accordance with the 1990 Amended Land and Resource Management Plan. The scenic resource management direction in the 1990 Forest Plan is the Visual Quality Objective (VQO), as determined by the Visual Management System (VMS). The scenic resource has been re-inventoried to comply with the Scenery Management System (SMS). See Landscape Aesthetics, A Handbook for Scenery Management, Agricultural Handbook Number 701 for description of the SMS system and cross-walk between the SMS-SIOs and the VMS-VQOs.

National Forest System lands have been inventoried to identify Scenic Classes from 1 (highest level) to 5 (lowest level).

The crosswalk between Visual Quality Objectives (Visual Management System) and Scenic Integrity Objectives (the updated Scenery Management System) is as follows:

SMS Integrity Ratings	**VMS VQO Rating**
VERY HIGH (Unaltered)	Preservation
HIGH (Appears Unaltered)	Retention
MODERATE (Slightly Altered)	Partial Retention
LOW (Moderately Altered)	Modification
VERY LOW (Heavily Altered)	Maximum Modification
UNACCEPTABLY LOW (not a management objective)	

Scenic Integrity Ratings and Images

Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be complete. Deviations from the aesthetic character that is valued by constituents also diminish an area's scenic integrity. Table 3.132 presents a summary of the ratings and the scenic qualities they represent.

Table 3.132 Scenic Integrity Summary

Criteria for Scenic Integrity of Landscape Character Image/Sense of Place	Very High (VH)	High (H)	Medium (M)	Low (L)	Very Low (VL)	Unacceptably Low (UL)
Dominance Landscape Character vs. Deviation	Landscape Character	Landscape Character	Landscape Character	Deviation	Deviation	Deviation
Degree of Deviation From the Landscape Character	None	Not Evident	Evident but not dominant	Dominant	Very Dominant	Extremely Dominant
Intactness of Landscape Character	Landscape Character Fully Expressed	Landscape Character Largely Expressed	Slightly Altered and Character Expression Moderate	Altered and Low Expression of Character	Heavily Altered and Very Low Expression of Character	Extremely Altered

The most common and most notable impacts to scenic integrity on the Forest are:

- Breaks or unnaturally-appearing openings in forest canopies from logging, firebreaks, utility lines, and other such features
- Structures above the forest canopy such as utilities and cell phone towers
- Canopy species composition, such as species with uniform characteristics (height, texture, such as in even-age pine stands). There may be instances (such as in the Western Coastal Plain subsections) where mostly uniform pine stands are typical of this ecosystem's landscape character
- Dramatic changes in forest canopy types (mixed hardwood against a geometric pine plantation)
- Evidence of recent logging activity such as slash piles and visible stumps
- Roads and road cuts on steep slopes

For the purposes of the Forest Plan revision, Scenic Integrity Objectives (SIOs) were established forest-wide and applied to the landscape using Geographic Information System (GIS) technology. This approach allowed Forest planners a broad overview of Forest visual resource values while also providing detailed information on visual quality at a smaller, project scale. The SIO values for the Ouachita National Forest were aggregated into four general categories: Very High (for wilderness, recommended wilderness, and current and eligible wild and scenic rivers), High, Medium, and Low as shown in Table 3.133. The Very Low scenic integrity objective was not used in this analysis. The SIOs define the different levels of acceptable alteration that may affect the visual resource on the Forest.

Table 3.133 Scenic Class Conversion to Scenic Integrity Objectives for the Forest

Scenic Class*	Acres	Scenic Integrity Objective (SIO)	Total SIO Acres
1 (wilderness and wild and scenic rivers)	97,714	Very High	97,714
1	502,235	High	502,235
2	969,975	Moderate	969,975
3	112,845	Low	210,177
4	16,432	Low	
5	328	Low	
8	80,572	Low	
		Total Acres	1,780,101

*The Forest had no acres in scenic classes 6 and 7.

Direct and Indirect Effects

Scenic quality on the Ouachita National Forest has not emerged as an issue during public involvement or direct comment. As a result, scenery management has not been identified as a significant issue for this analysis. Regardless of the lack of direct comments about scenery management, the public's choice of recreational activities and frequent reports of viewing scenery as a prominent recreational activity suggests a desire for quality scenery and scenic experiences. Such preferences became evident during the six public meetings held concerning OHV use on the Forest.

The scenic resource is affected by management activities that alter the appearance of what is visible in the landscape. Short-term scenic effects are usually considered in terms of degree of visual contrast with existing or adjacent conditions that result from management activity. The scenic landscape can be changed over the long-term or cumulatively by the alteration of the visual character. Management activities that result in visual alterations inconsistent with the assigned SIO, even with mitigation, affect scenery. Management activities that have the greatest potential of affecting scenery are road construction, large-scale and long-term vegetation management, insect and disease control, utility rights-of-ways, and mineral extraction. Other management activities that also can impact the scenic resource at a lesser degree are Threatened and Endangered species habitat management, prescribed fire, fire suppression, land exchange, old growth forest management, recreation, administrative site facility construction, and wildlife management.

Alternatives that receive the highest percentage of management emphasis would result in more protection and enhancement to the scenic resources than alternatives having lower emphasis values. Alternatives D and E have the highest percentage of acceptability, and Alternative C has the lowest. Alternatives A and B continue to use the VMS system.

Negative impacts to scenery from road construction, vegetation management, insect and disease control, special use utility rights-of-ways, and mineral extraction would be the greatest in Alternative C. Impacts would be the lowest in Alternative D because of the high recreation and corresponding scenic component of recreation contained in that alternative. Many of these impacts would be avoided by implementing mitigation measures.

All alternatives propose prescribed fire as a management tool for maintenance or restoration of community types. Drifting smoke, blackened vegetation, and charred tree trunks would be the main negative visual effects. Visual contrast from fireline construction would also be evident. The contrast levels and duration vary with fire intensity. Blackened vegetation usually lasts a short time, but charring of trees may be evident for many years. Repeated prescribed fire often results in a reduced midstory and understory species layer that increases viewing distance, and tends to promote an herbaceous layer (flowering species). Insects and diseases result in weakened, dead, or dying trees and contribute to unattractive contrasts in the landscape. Management efforts to control insect infestations and diseases can minimize or reduce visual effects. However, control efforts that include removal of infected trees and buffer areas often appear as undesirable clearcutting to forest visitors.

Alternatives A and B are minimal change alternatives and continue to utilize the Forest Visual Management System to manage visual resources. Alternative C seeks to maximize forest health and would have an appreciably lower overall visual quality as a result of intensified forest health activities. Alternatives D and E are both designed to increase recreation opportunity and visual quality; however, Alternative E shares that emphasis with forest health and would, therefore, have reduced emphasis on recreation and visual quality when conflicts occurred with forest health issues.

Utility rights-of-way (ROW) have a high potential for affecting the scenic resource for long periods. Cleared ROWs, utility structures, and associated facilities often have high visual contrast and may be incongruent with existing landscapes. Cleared ROWs generally contrast in form, line, color, and texture when compared to the natural appearing landscape. None of the alternatives maximize or allow marked increases in utility line ROWs.

Mineral management and development activities can involve major landform alteration, as well as form, line, color, and texture contrasts, causing substantially adverse scenic impacts. On the Ouachita National Forest, significant activity in natural gas location and recovery is currently underway. In addition, the Forest is well-known across the country for its quartz crystal deposits, which are mined commercially as well as by Forest visitors. Disturbances for gas location and recovery primarily involve road building and short-term impacts to vegetation. Crystal mining is held to minimum sizes; however, most crystal mines are open-pit mines that require careful site location, on-going maintenance, and restoration to protect visual quality. Gravel mining seldom takes place on the Forest and has a low visual impact due to associated low activity levels.

Road maintenance, especially ROW maintenance, affects scenery. Mowing frequency and timing alters the appearance of the landscape. Road construction introduces unnatural visual elements into the landscape and causes form, line, color, and texture contrasts. Road management controls how much of the landscape is seen by having roads open or closed. None of the alternatives propose increased road building over existing levels.

Vegetation management has a great potential to alter the landscape and impact the scenic resource. Timber harvest practices can cause long-term effects on scenery by altering landscape character through reduction in species diversity, manipulation of the prominent age class, and alteration of opening size, location, and frequency. The potential effects may be positive or negative, depending on their consistency with the desired condition of the landscape.

Of the management applications, even-aged management may be the most visually impacting. Among the even-aged regeneration methods, clearcutting and seed-tree harvest produce the highest visual contrasts because this practice requires the removal of most of the forest canopy and the creation of openings. These openings would vary in their effects on scenery depending on size, shape, location, and nearness to other openings. Openings that repeat the size and general character of surrounding natural openings and the landscape character would impact scenery the least. Alternative C would allow the greatest manipulation of vegetation of all alternatives. However, treatment of insect and disease outbreaks often requires vegetation manipulation methods that may appear to be clearcuts or seedtree harvests with longer lasting impacts. Under the circumstances of an insect and disease outbreak and for the health of the overall forest, these impacts may be necessary and warranted. Single-tree selection and group selection harvest are normally less evident because they do not cause large openings in the canopy. Uneven-aged regeneration methods can affect scenery, causing contrasts in form, line, color, and texture from slash production. All vegetative impacts as a result of timber harvest are short-term because of rapid vegetation growth.

Site preparation activities affect scenery by exposing soil and killing other vegetation. These effects are generally short-term. Mechanical site preparation and prescribed fire usually improves the appearance of the harvest area by removing the unmerchantable trees and most of the broken stems. Stand improvement work can affect scenery by browning the vegetation, reducing visual variety through elimination of target species. Alternative C would support more site preparation than the other alternatives with Alternative E following second.

Prescribed fire forest-wide and midstory reduction in pine-bluestem communities are common wildlife management practices. Midstory reduction and prescribed fire reduce midstory diversity and, over time, produce stands with open understories allowing views into the landscape. Creation of wildlife food plots and enhancement of existing food plots and wildlife areas (such as walk-in turkey areas) may also impact scenic quality through the creation of forest canopy openings.

Recreation facilities are deviations from the natural landscape. Forest Service recreation facilities are designed to blend into the landscape without major visual disruption. None of the alternatives increase recreation site numbers or support major expansions of recreation areas. However, vegetation management for visitor safety and forest health may take place in recreation areas and may impact the primarily recreational nature of the site for short periods.

Cumulative Effects

Due to a demand for “wilderness experiences” expressed by the public, designation of wilderness will be regarded as a positive effect on scenery. Old-growth forest character will be created over time. Alternatives C and E propose to add 1,793 acres of wilderness in three parcels to existing wilderness areas. These additions are not expected to impact scenic resources. Alternative D proposes to add 30,127 acres of additional wilderness. This addition would enhance visual quality in the area of the new wilderness; however, this addition represents less than 1.7 percent of the entire Forest. No appreciable cumulative impacts to scenic resources outside the general area of the new wilderness are expected.

Wilderness and Roadless Areas

Wilderness

Congressionally designated wilderness areas are protected by law and valued for their ecological, historical, scientific, and experiential resources. There are six designated wilderness areas on the Forest containing a total of 64,469 acres (Table 3.134) or 3.6 percent of the total Forest area. The Ouachita National Forest does not contain any wilderness study areas or recommended wilderness study areas.

Table 3.134 Designated Wilderness

Name	Acres
Caney Creek Wilderness	14,460
Dry Creek Wilderness	6,310
Poteau Mountain Wilderness	11,299
Flatside Wilderness	9,507
Black Fork Mountain Wilderness	13,139
Upper Kiamichi Wilderness	9,754
Total	64,469

The 1982 NFMA regulations direct that roadless areas within the National Forest System be “evaluated and considered for recommendation as potential wilderness areas during the forest planning process” (36 CFR 219.17). The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in Section 2 (c) of the 1964 Wilderness Act (FSH 1909.12). Roadless areas are places that have retained or are regaining a natural, untrammeled appearance, and where signs of prior human activity are disappearing or being muted by natural forces. One of the most important criteria for identifying roadless areas in the East is a road density of no more than one-half mile of improved road per 1,000 acres.

During this Forest Plan revision, a new comprehensive review was completed to identify areas that met roadless requirements and could be evaluated as potential additions to the National Wilderness Preservation System. This analysis began with the previously identified roadless areas.

Status of Former RARE II Areas

Areas previously identified as RARE II Areas (1978) were Beech Creek in LeFlore County, Oklahoma; Rich Mountain in Polk County, Arkansas and LeFlore County, Oklahoma; Bear Mountain and Little Blakely, located adjacent to Lake Ouachita in Garland County, Arkansas; and Blue Mountain in Scott and Polk Counties, Arkansas, and Brush Heap in Polk County, Arkansas.

During this Forest Plan revision, the review found that Beech Creek exceeds the criterion of no more than one-half mile of improved road per 1,000 acres. Furthermore, significant private land inholdings exist in the Beech Creek area, and many of those acres have been recently harvested. The portions of the Beech Creek area that are under Forest management—Beech Creek Botanical Area and Beech Creek Scenic Area—already have congressional designations that protect the unique values of the area. Because of the road density and private land inholdings, Beech Creek did not meet the criteria for an inventoried roadless area. Under all action alternatives, Beech Creek would remain in Management Area 19, as Beech Creek Botanical Area and Beech Creek National Scenic Area and would be managed to protect and further the scenic and botanical values identified in the legislation that designated these areas.

The Rich Mountain area exceeds the criterion of no more than one-half mile of improved road per 1,000 acres. Furthermore, the area is bounded on one side by a major US highway and by the Talimena Scenic Drive on the other, one of the most popular drives in Oklahoma and Arkansas. The area is bisected by cleared power line rights-of-way and is subject to sight and sound influences from surrounding human activity. The Oklahoma portion of this formerly listed roadless area is already a congressionally designated area (Robert S. Kerr Memorial Arboretum, Nature Center, and Botanical Area). Because of the road density and sight and sound influences from the Talimena Scenic Drive and power line rights-of-way, Rich Mountain did not meet the criteria for an inventoried roadless area. In Alternatives C, D, and E, Rich Mountain would move from Management Area 19 to Management Area 2, Special Interest Areas, where it would continue to be managed for the benefit of existing natural and botanical values of the area. In Alternatives A and B, Rich Mountain would remain in Management Area 19.

Bear Mountain failed to meet the criterion of less than one-half mile of improved road per 1,000 acres and because of unnatural sound intrusions from Lake Ouachita and adjacent land areas and was not considered an inventoried roadless area. Under alternatives B, C, D, and E, the Bear Mountain area would be managed as part of Management Area 16, Lands Surrounding Lake Ouachita and Broken Bow Lake and would continue to be managed to preserve their recreational, aesthetic, wildlife and water quality values. Under Alternative A, there would be no change from 1990 Forest Plan management.

Little Blakely was removed from consideration as an inventoried roadless area because it did not meet the criterion of having no more than one-half mile of improved road per 1,000 acres. In addition, the Little Blakely area is located adjacent to Lake Ouachita State Park and near Blakely Mountain Dam, a Corps of Engineers facility with an industrial visual quality that is not supportive of a wilderness experience. Under all alternatives, the Little Blakely area would be placed in Management Area 17, Semi-Primitive Areas, and would continue to be managed to preserve its semi-primitive character.

Portions of Blue Mountain and an expanded Brush Heap area met the roadless criteria and were reanalyzed for wilderness potential. For these two areas, a report evaluating their wilderness potential is located in Appendix G. Blue Mountain and Brush Heap would be placed in Management Area 17, Semi-Primitive Areas and would continue to be managed to preserve the semi-primitive character under Alternatives A, B, C and E. Blue Mountain and Brush Heap areas would be deferred from most timber harvest and road building for the duration of the planning cycle, with the exception of actions necessary for forest health such as the thinning of existing pine plantations to control southern pine or Ips beetle outbreaks. Under Alternative D, theses areas would be recommended for wilderness designation.

Other Areas Evaluated

The roadless analysis for this Plan revision resulted in one new area that met the inventoried roadless criteria, Irons Fork Mountain. Bee Mountain and Ashford Peak in McCurtain County, Oklahoma, were identified as inventoried roadless areas in a significant amendment to the 1990 Forest Plan in 2002 and were reviewed during this Plan revision for wilderness suitability. Finally, three potential additions to existing wilderness areas were also identified as meeting roadless criteria: Flatside Addition, Poteau Mountain Addition, and Upper Kiamichi Addition. The wilderness evaluations for these three areas are located in Appendix G.

Irons Fork Mountain would be recommended for wilderness designation in Alternative D. In Alternatives B, C, and E, it would be managed under Management Area 17, Semi-Primitive Areas and would continue to be managed to preserve the semi-primitive character. Under Alternative A, most of the area would be managed under Management Area 17; however, a portion would also be managed under Management Area 14. Under Alternatives B, C, and E, Irons Fork Mountain would be deferred from most timber harvest and road building for the duration of the planning cycle, with the exception of actions necessary for forest health such as the thinning of existing pine plantations to control southern pine or Ips beetle outbreaks. Alternative A would provide much of the same protection as B, C, and E; however, that portion in Management Area 14 would be open to road building and timber harvest.

Bee Mountain and Ashford Peak in McCurtain County, Oklahoma, were identified as inventoried roadless areas in a significant amendment to the 1990 Forest Plan completed in 2002 and were reviewed during this Plan revision for wilderness suitability. Ashford Peak and Bee Mountain are currently managed for the renewal of the Shortleaf Pine-Bluestem ecosystem and habitat for the Red-cockaded Woodpecker *(Picoides borealis*), a Forest PET species. Because the Red-cockaded Woodpecker is an Endangered species, the need to manage for continued existence of that species overrides consideration of the area for wilderness designation. Bee Mountain and Ashford Peak would be managed under Management Area 22 for all alternatives.

Wilderness Potential

Wilderness potential was analyzed in three main categories—capability, the qualities that make a roadless area suitable or not suitable for wilderness; availability, an assessment of the non-wilderness resources and demand of the area; and need, a consideration of the amount of wilderness already in the area and region (see Appendix G for the detailed analysis).

New wilderness or wilderness additions would be assigned to Management Area 1c as shown in Table 3.135. Alternatives C, D, and E all contain recommendations to add acreage to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness. In addition, Alternative D would include new wilderness recommendations for Blue Mountain, Brush Heap Mountain, and Irons Fork Mountain. The wilderness evaluations for these areas are located in Appendix G.

Table 3.135 Allocation of Inventoried Roadless Areas to Management Areas by Alternative

Area	Alt A	Alt B	Alt C	Alt D	Alt E
Ashford Peak	MA 22	MA 22	MA 22	MA 22	MA 22
Bee Mountain	MA 22	MA 22	MA 22	MA 22	MA 22
Black Fork Mountain	MA 14	MA 17	MA 17	MA 17	MA 17
Blue Mountain	MA 14 & MA 17	MA 17	MA 17	MA 1c	MA 17
Brush Heap	MA 17 & MA 20	MA 17	MA 17	MA 1c	MA 17
Flatside Addition	MA 17	MA 17	MA 1c	MA 1c	MA 1c
Irons Fork Mountain	MA 14 & MA 17	MA 17	MA 17	MA 1c	MA 17
Poteau Mountain Addition	MA 1a	MA 1b	MA 1c	MA 1c	MA 1c
Upper Kiamichi Addition	MA 14 & MA 21	MA 14 & MA 21	MA 1c	MA 1c	MA 1c

MA_1b - Poteau Mountain Management Area.
MA 1c – Recommended Wilderness Additions. Lands are managed as if they are wilderness until released.
MA 14 – Ouachita Mountains-Habitat Diversity Emphasis. Lands are managed for multiple resource values and are subject to the full range of forest management practices, including prescribed fire, timber harvest and road construction.
MA 17 – Semi-Primitive Areas. Lands are managed to retain the semi-primitive character of the area. Most timber harvest and road construction are deferred for the planning period. Some vegetation management may occur for forest health and in existing plantation areas.
MA 20 – Wild and Scenic Corridors.

The four small areas adjacent to existing wilderness areas, Black Fork Mountain Addition, Flatside Addition, Poteau Mountain Addition (East Unit), and Upper Kiamichi Addition were considered for wilderness designation. Because of the extensive development and human activity in and around the Black Fork Addition, it was determined that this area would not be a good addition to the Black Fork Mountain Wilderness Area. Instead, the Black Fork Mountain Addition should be managed as a part of Management Area 17 in Alternatives B, C, D, and E (where lands are managed to retain the semi-primitive character of the area) and retained in Management Area 14, Ouachita Mountains, Habitat Diversity Emphasis in Alternative A.

The Flatside, Poteau Mountain, and Upper Kiamichi Additions would be recommended for wilderness designation in Alternatives C, D, and E. Under Alternatives A and B, the Flatside area would be a part of Management Area 17, and the Upper Kiamichi area would be a part of Management Area 14 and 21 where it would be managed in MA 14 for timber production and wildlife and range values and in MA 21 for old growth conditions. Under Alternative A, the Poteau Mountain Area would be a part of MA 1a, and it would be managed the same under Alternative B, although under MA 1b (because MA 1a under the 1990 Amended Plan is the same as MA 1b under Alternatives B, C, D, and E). MA 1a and 1b are managed to perpetuate the natural biophysical condition, solitude, and off-highway vehicle use.

Direct and Indirect Effects

Management direction remains essentially the same for the existing six designated wilderness areas on the Forest under all alternatives. Therefore, there would be no significant direct or indirect effects to the existing wilderness resource, regardless of alternative. Wilderness additions would be recommended under Alternatives C and E with the addition of 620 acres to the Flatside Wilderness, 77 acres to Poteau Mountain Wilderness, and 1,096 acres to the Upper Kiamichi Wilderness. Under Alternative D, wilderness recommendations total 30,127 acres. The recommended additions would consolidate boundaries and make the existing wilderness boundaries more manageable and visible to the public. Overall, wilderness use in the Ouachita National Forest is considerably below the existing capacity. Therefore, additions for the sake of satisfying excess demand were not an issue during this plan revision. Wilderness accessibility is generally excellent for all population centers located inside the Forest's draw area. Exceptions include 43 population centers (listed in Appendix G, most of which are located at the extreme outer limit of the Forest's draw area). Although these 43 population centers lack convenient access to wilderness areas on the Ouachita National Forest, they have adequate to abundant options for wilderness experiences in other, nearby wilderness as indicated by the accessible wilderness listings for each area, also found in Appendix G. A summary of the number of areas and acres for each alternative is presented in Table 3.136.

Table 3.136 Comparison of Recommended Wilderness Acres by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Areas	0	0	3	6	3
Acres	0	0	1,793	30,127	1,793

Designation as recommended wilderness or wilderness additions would preserve additional areas where natural processes occur more or less unimpeded and provide additional areas for solitude and primitive recreation. These areas would be islands within the Forest where the naturalness, uniqueness, and representative ecosystems of the designated areas would be maintained. The highest priority would be to manage for the naturalness of the area.

Roadless areas that are recommended for wilderness are not available for activities such as vegetation management or road construction. These areas are managed much the same as designated wilderness until a final determination is made by Congress. One of the potential negative effects of wilderness designation or recommendations for wilderness designation is that the areas so treated may be subject to insect or disease outbreaks that, except under extraordinary circumstances, cannot be controlled and may result in devastation of forest stands or whole landscapes. To the extent that such outbreaks are natural occurrences confined to the wilderness or recommended wilderness area, the devastation may be acceptable. Where outbreaks of non-native diseases or non-native, invasive species occur in areas where they normally cannot be treated, however, there may be broader implications for ecosystem health in the National Forest as a whole.

Fire management may be affected by designation of additional wilderness areas. Fire suppression of all human-caused wildfires would minimize the potential effects on wilderness values; however, fires in these areas would likely become larger in size than they would under the 1990 Forest Plan management because of the restrictions on motorized equipment such as bulldozers. In emergency situations, mechanized equipment and motorized transport, use of helicopters, air tankers, and other aircraft may be approved by the Forest Supervisors and/or Regional Forester. These actions would impact wilderness character and visitor experiences and leave evidence of man, although rehabilitation could help to reduce those impacts afterward.

Direct effects of managing these areas as recommended wilderness include those associated with closing and rehabilitating any existing roads or, indirectly, allowing them to return to a natural state. Indirectly, water quality and air quality should remain high, and the imprint of human influence should diminish over time.

Opportunities for solitude and remoteness would increase, as would opportunities for primitive and unconfined recreation due to road closures and prohibiting motorized use. Non-motorized dispersed recreation activities such as hiking, horseback riding, camping, fishing, and hunting would continue and use levels would be expected to remain about the same as current levels. Contrasts between roadless areas and other forested lands would increase. Additional acreage for recommended wilderness would increase the Forest's wilderness carrying capacity and allow user impacts to be dispersed across a larger area, perhaps providing an increase in wilderness visitor satisfaction. However, road closures would also result in decreased access for some activities. A decrease in opportunities for bicycling, OHV riding, and other forms of recreation requiring motorized transport or mechanized equipment would result. Bicycle and motorized use would be displaced to other areas.

A total of 14.8 miles could be closed to bicycles under Alternative D, due to wilderness recommendations. Maintenance of trails and facilities, including the Ouachita National Recreation Trail, located inside any recommended wilderness area would be done using hand tools only, and access would be by non-mechanized/non-motorized means. The minor amount of motor vehicle recreation use currently taking place in these areas would cease.

Research indicates there would be increases in visitation and economic benefits resulting from tourism in the surrounding local communities. However, there could also be reductions in economic benefits associated with the management, harvesting, manufacturing, and retail sale of timber products from the roadless areas, since timber management activities would not be allowed in these areas. There would be reduced opportunities to recover commercial minerals, and mineral exploration and development would be hindered. Little or no mineral development or its associated impacts would be expected in any recommended wilderness or wilderness addition. Educational opportunities for the scientific study of natural ecological processes would increase.

The naturalness, uniqueness, and representative ecosystems of the designated areas would be maintained. Natural ecological processes would continue, including plant succession. Larger blocks of undeveloped land and reduction in open road density in areas recommended for wilderness would favor area sensitive and disturbance sensitive species. Existing old fields, wildlife openings, and other habitat improvements for fish and wildlife would not be maintained in prescriptions areas recommended for wilderness. These early successional habitat areas would succeed to forest. New permanent wildlife openings would not be created. These factors would reduce habitat for early successional species. Fish stocking in areas recommended for wilderness would be restricted to reestablishment or maintenance of indigenous, Threatened, Endangered, or Sensitive species. Rare communities and Threatened and Endangered species would be managed within the limitation of activities allowed within wilderness.

The magnitude of the wilderness recommendations in Alternatives C and E (1,793 acres in a nearly 1.8 million acre National Forest) is so slight that the potential negative effects of designation would be negligible. Alternative D would present more potential negative effects of the kinds previously described, but the magnitude of the changes would likely still be very small, because less than two percent of the National Forest would be added to the wilderness/recommended wilderness category.

Table 3.137 displays the ecosystems represented currently by designated wilderness on the Forest and those that potentially could be added as recommended wilderness.

Table 3.137 Ecological Sections and Subsections in which Wilderness (W) or Recommended Wildernesses (RW) are located on the Ouachita National Forest, by Alternative

Section/Subsection	Alternative				
	A	B	C	D	E
Ouachita Mountains/Fourche Mountains (M231Aa)	W	W	W + RW	W + RW	W + RW
Ouachita Mountains/East Central Ouachita Mountains (M231Ab)	W	W	W + RW	W + RW	W + RW
Ouachita Mountains/West Central Ouachita Mountains (M231Ac)	W	W	W + RW	W + RW	W + RW
Middle Coastal Plains, Western Section/Southern Oklahoma Subsection (231 Em)	0	0	0	0	0
Middle Coastal Plains, Western Section/Southwestern Arkansas Subsection (231 Eb)	0	0	0	0	0

Scenic Areas, Special Areas, the Ouachita National Trail, and Scenic Byways

Affected Environment

Special interest areas are designated to protect and, where appropriate, foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, paleontological, archeological or other characteristics. Special interest areas may be designated administratively or may receive designation by law. Other uses are permitted in these areas to the extent that these uses are in harmony with the designation. This section discusses designated Scenic Areas, Botanical Areas, and Wildlife Areas as managed under the 1990 Amended Forest Plan. Other sections of the EIS also deal with special areas. For example, outstandingly remarkable streams are reviewed under the Wild & Scenic Rivers section. Table 3.138 displays scenic areas and acreage and location of each.

Table 3.138 Scenic Areas, 1990 Forest Plan, as amended

Scenic Area	Acres	District
Beech Creek	7,500	Kiamichi Unit, Oklahoma RD
Blowout Mountain	526	Mena/Oden
Dutch Creek Mountain	624	Fourche/Cold Springs
Crystal Mountain	100	Caddo/Womble
Irons Fork	1,450	Jessieville
South Fourche	1,495	Winona
Indian Nations Scenic and Wildlife Area	41,051	Choctaw & Kiamichi Units, Oklahoma RD
TOTALS	52,746	Acres

Scenic Areas

Beech Creek National Scenic Area includes the 7,500 acres that constitute the headwaters of Beech Creek. Located in the southernmost designated area of the Winding Stair Mountain National Recreation Area complex, the area offers special opportunities to enjoy solitude or a primitive, unconfined type of recreation. No developed recreation facilities are found here and there are few, if any, directional or information signs. Mountain bikes, hang gliders, and motorized vehicles are not permitted.

Blowout Mountain Scenic Area is located north of Mt. Ida, Arkansas, on either side of US Highway 270 just east of the Big Brushy Recreation Area. Blowout Mountain is noted for its stands of mature growth pine and the vistas afforded from overlooks from Highway 270 on the Mena/Oden Ranger District.

Dutch Creek Mountain Scenic Area is known for large old growth pine and hardwood timber and related plant and animal species. It is located to the south of Arkansas Highway 80, west of Blue Ball. The Scenic area is located primarily on the Fourche Ranger District; however, a portion of the area is located across the District boundary line on the Poteau/Cold Springs Ranger District.

Crystal Mountain Scenic Area, also know as Crystal Scenic, is located on either side of Forest Road 177, primarily on the Caddo Ranger District, approximately two and one-half miles west of the intersection of Montgomery county Road 28 and Forest Road 177. The area contains large mature growth short-leaf pine.

Irons Fork Scenic Area is located on the Jessieville/Winona Ranger District approximately two miles south of Aly in Yell County and is bounded by Arkansas Highway 27 to the west and Forest Roads 11 (north) and 148 (south). Irons Fork contains unusually long placid pools within the drainage of Irons Fork Creek and characteristic hardwood tree species on the north slopes and pine on the south. The Ouachita National Recreation Trail passes through this Scenic Area.

South Fourche Scenic Area is contained in two separate parcels along the South Fourche La Fave River, a popular floating stream. Cove Creek Lake bounds the south side of the north unit of South Fourche Scenic Area and Cedar Lake is located just upstream of the south unit. Discoveries of rare plants and habitats have led to consideration of this area as a Botanical Area.

Indian Nations Scenic and Wildlife Area, 41,409 acres located adjacent to the Oklahoma – Arkansas State Line, is divided along its length by the Winding Stair National Recreation Area and the Talimena Scenic Drive. This area supports a relatively natural mixed hardwood and shortleaf pine forest. Mast production and den trees for wildlife are numerous. Recreational opportunities include hiking and equestrian trails, fishing at two small manmade lakes, two walk-in turkey areas, several hunting camps along Holson Valley Road, and areas of historical and interpretive interest such as a pioneer cemetery and pioneer homesteads.

Other Special Areas

Rich Mountain Recreation Area, located in Arkansas adjacent to the Arkansas – Oklahoma state line, is a 12,980 acre, primarily primitive, recreation area located atop Rich Mountain. The recreation area parallels the Talimena Scenic Drive, which is located on the north side of the area. Hiking, nature study, and spectacular views from the top of Rich Mountain to the south are all featured in this area.

Rich Mountain Botanical Area, located across the Talimena Scenic Drive from the Rich Mountain Recreation Area is composed of 3,200 acres managed for recreation and scenic and wildlife values. Located atop Rich Mountain in Arkansas at the Arkansas–Oklahoma state line, this area is vegetated with native hardwood species along the Talimena Scenic Drive and a mixed forest condition in the remaining areas. Rich Mountain Botanical Area is part of a larger complex of recreation and botanical areas showcasing the unique features of Rich Mountain.

Beech Creek Botanical Area, a 400-acre inclusion located completely within Beech Creek Scenic Area, is comprised of stands of mature beech trees unique to the area. The Beech Creek Botanical Area is situated in a narrow band along the shores of Beech Creek with scattered beech trees located within the immediate, adjacent forest.

Richardson Bottoms Wildlife Viewing Area. Richardson Bottoms was originally a moist hardwood forest, logged the area in the early 1980s. The area was subsequently planted with loblolly pine to create a pine plantation. Beavers cut the pine saplings and built a series of dams along a seasonal stream leading into Irons Fork and created a 100-acre wetland, unique to the Ouachitas. The area is located on the Jessieville/Winona Ranger District west of Jessieville. Facilities include a parking area, trails, and interpretive displays to enhance wildlife viewing opportunities for the public.

Red Slough Wildlife Area, a 5,814-acre wetland is located on the Tiak Ranger District in southeastern Oklahoma near the Red River. The wetland is composed of mudflats, emergent marshes, shallow and deep pools, riparian areas, bottom land hardwood, scrub/shrub wetlands, and wet prairies. A premier bird and wildlife area, Red Slough is managed by the Forest Service, Natural Resources Conservation Service, and the Oklahoma Department of Wildlife Conservation.

The Ouachita National Trail and Scenic Byways

The Ouachita National Trail, Arkansas Scenic Byway 7, Talimena Scenic Drive, Mountain Pass Scenic Drive, and Mountain Gateway Scenic Drive are linear features with scenic qualities managed under the 1990 Forest Plan to preserve or enhance their visual condition.

Ouachita National Recreation Trail – The Ouachita National Recreation Trail (ONRT), established by the Chief of the Forest Service in September 1978, traverses the Forest from east to west approximately in its geographic center. The ONRT, located in both Arkansas and Oklahoma, is 223 miles long, 192 miles of which are situated on the Ouachita National Forest. In the west, the trail begins at Talimena State Park on U.S. Hwy. 271 near Talihina, Oklahoma. The eastern boundary is south of Perryville, Arkansas on Hwy. 9. Another 31 miles of trail, located on private and other public lands, extends to Pinnacle Mountain State Park, 15 miles west of Little Rock, Arkansas. Elevations range from 600 to 2,600 feet as the trail passes through forested mountains, across sweeping valleys and near clear-running streams. Spur trails connect to various recreation areas and points of interest. Numerous road crossings and access points provide opportunities for point-to-point hikes of various distances. In 2001, 137 miles of the trail were opened to mountain bike use.

Two National Forest Scenic Byways are found within the boundaries of the Ouachita National Forest: Arkansas State Highway 7 Scenic Byway traverses the Forest from north to south, and the Talimena Scenic Drive, located in both Arkansas and Oklahoma, crosses the westernmost part of the Forest from east to west.

Arkansas Scenic Byway 7, a State of Arkansas and US Forest Service Scenic Byway, extends approximately 21 miles from the Forest's south boundary near Iron Springs Recreation Area to the point where the Byway leaves the Forest near Fourche Junction (junction of Arkansas Highways 7 and 10) to the north. The drive affords motorists panoramic views of the Ouachita Mountains and forests and provides spectacular vistas of the Ouachita Forest's landscape, including annual displays of spring wildflowers and fall foliage.

Talimena Scenic Drive, located in both Arkansas (17 Miles) and Oklahoma (37 miles) straddles the crest of Rich Mountain in the Western Ouachita Mountains for 54 miles and is both a National Scenic Byway and also a US Forest Service Scenic Byway. The Talimena Drive affords visitors opportunities for viewing extended vistas, outdoor recreation, and natural and cultural feature interpretation. The Byway begins in Oklahoma at the Talihina Visitor Center, parallels a part of the Ouachita National Recreation Trail, and skirts the Robert S. Kerr Memorial Arboretum and Nature Center to the north and Upper Kiamichi Wilderness Area to the south before entering Arkansas. In Arkansas, the Byway parallels Rich Mountain Recreation Area to the south and Rich Mountain Botanical Area to the north, ending at the Mena Visitor Center near Mena, Arkansas.

The ***Mountain Pass Scenic Drive*** is that part of Hwy. 259 from Octavia north to its junction with Hwy. 59 at Page, Oklahoma. Sixteen miles of the total 23 mile Mountain Pass Scenic Drive are located within the Forest boundary. The ***Mountain Gateway Scenic Drive*** is a portion of Highway 59 from the Arkansas state line to the east side of Heavener. Sixteen miles of this scenic drive are located within the Forest boundary. Efforts are currently under way to gain designation of both routes as National Scenic Byways.

Direct and Indirect and Cumulative Effects

No alternative proposes new scenic areas or scenic byways. Under Alternatives B, C, D, and E, a new category of watchable wildlife areas was created to give special recognition to several deserving areas. None of the existing special areas would be deleted in any alternative, and under Alternative E, the South Fourche Scenic Area would be expanded and managed as a Botanical Area. Rich Mountain Botanical Area would move from Management Area 19(d) to Management Area 2c and Rich Mountain Recreation Area would move from 19(b) to Management Area 2d, under Alternatives B, C, D, and E; and no changes in management would be made. The change from Management Area 19 to Management Area 2 is to remove areas within Management Area 19 that were not a part of the Winding Stair Mountain National Recreation and Wilderness Area Act of 1988.

Alternative E would propose to add a new Botanical Area consisting of the existing South Fourche Scenic Area plus 1,095 additional acres to Management Area 2c, Botanical Areas. The South Fourche Botanical Area would be recommended due to globally rare plant species, a perched wetland, a saltlick, and an herbaceous marsh. South Fourche, under the 1990 Amended Forest Plan is managed under a desired condition that calls for a natural landscape accessible by trails and/or nearby roads. Under Alternative E, upland areas would be treated periodically with prescribed fire and could be thinned or regenerated to restore native vegetation or specific habitats. Such management would represent a change from the 1990 Amended Forest Plan where the entire scenic area is treated as off limits to timber harvest.

Scenic qualities of the Ouachita National Trail, Arkansas Scenic Byway 7, Talimena Scenic Drive, Mountain Pass Scenic Drive, and Mountain Gateway Scenic Drive would continue to be protected in Alternatives B, C, D, and E by use of the Scenery Management System, but not under a separate Management Area. The Scenery Management System would provide protection to high concern level travel routes such as these.

Under Alternative E, Management Area 2 would be increased by adding Rich Mountain Botanical Area, Rich Mountain Recreation Area, a new category, watchable wildlife areas, and 1,095 acres to the South Fourche area. Under Alternatives B, C, and D the same changes would be incorporated, without the addition of the South Fourche Botanical Area. Although the overall size of MA 2 would increase under all alternatives, except A, management of these special areas would change little. The changes in management represent no major changes from the 1990 Amended Forest Plan. Because treatment of these would not change markedly under any alternative, cumulative effects are considered to be relatively minor.

Research Natural Areas

According the Forest Service Manual (FSM 4060), "Research natural areas are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands. Research natural areas are for nonmanipulative research, observation, and study." There are four designated Research Natural Areas (RNAs) on the Ouachita National Forest—Lake Winona RNA, Roaring Branch RNA, Tiak RNA, and Gap Creek RNA—and one candidate area, described as follows.

The 1990 Amended Forest Plan identified the R.R. Reynolds area as a candidate research natural area and allocated it to Management Area 4 (Research Natural Areas and National Natural Landmarks) in Amendment 14 (dated 4/05/94) to that Plan. The accompanying environmental assessment (EA) analyzed the environmental consequences of this re-allocation of land from Crossett Experimental Forest (part of Management Area 3) to Management Area 4; the EA is incorporated by reference.

Amendment 14 to the 1990 Amended Forest Plan came about after the Forest Supervisor's staff and Southern Research Station scientists completed a study of this 80-acre unmanaged natural area, which is characterized by relatively undisturbed loblolly pine-hardwood forest. The study analyzed this area for inclusion in the national network of RNAs, using the factors listed in 36 CFR 219.25 and FSM 4063.4, and determined that the area was suitable as an RNA. No further action was taken until recently, when the Southern Research Station re-affirmed its interest in seeing this area become a formally designated RNA.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-542: 16 USC 1271-1287, October 2, 1968) and its amendments provide for the protection of selected rivers and their immediate environments. To be eligible for designation, rivers must possess one or more outstandingly remarkable values such as scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values. Designation preserves rivers in free-flowing condition, protects water quality, and protects their immediate environments for the benefit and enjoyment of present and future generations.

Most rivers are added to the National Wild and Scenic Rivers (WSR) System through federal legislation after a study of the river's eligibility and suitability for designation. The Forest Service is required to consider and evaluate rivers on lands they manage for potential designation while preparing their broader Land and Resource Management Plans under Section 5(d)(1) of the Act.

Rivers and stream corridors accommodate uses such as picnicking, fishing, sightseeing, day hiking and walking for pleasure; developed and primitive camping, boating (canoeing, kayaking, rafting, tubing), swimming, and nature study. The National Survey on Recreation and the Environment 2000 interviewed over 15,000 people to determine participation in a variety of activities. According to the results, 76.1 million Americans reported participating in boating (including rafting, kayaking, and canoeing), and 20 million participated in rafting, tubing, or other types of floating on flowing waters.

According to the Ozark-Ouachita Highlands Assessment Social and Economic Conditions Report (1999), trends in water based activities participation - including such rivers and streams as listed above - are projected to increase into the year 2010. The largest increases in participation over this period are projected to occur in pleasure sightseeing (25 percent), developed camping (22 percent), picnicking (21 percent), and visiting beach or water sites (20 percent).

Demand for WSR designation is expressed primarily through public comment and responses to agency proposals. The degree to which public input favors designation indicates the demand for a wide range of uses, activities, and resources qualities associated with WSR management. Although demand is closely related to the current population and the projected growth of the local area, WSR designation would likely produce increased levels of recreation use in designated corridors.

The Ouachita National Forest contains two Wild and Scenic Rivers, the Little Missouri River (15.7 miles) and the Cossatot River (15.5 miles). These two Wild and Scenic Rivers total 31.2 miles in combined length and are managed by the Forest Service – 4.4 miles are classified as wild, 22.6 as scenic and 4.2 miles as recreational. The Cossatot Wild and Scenic River contains an additional segment that is located outside the Forest boundary and is managed by the Division of State Parks, Arkansas Department of Parks and Tourism, and the US Army Corps of Engineers.

Table 3.139 identifies the designations of each existing Wild and Scenic River by section.

Table 3.139 Existing Wild and Scenic Rivers on the Ouachita National Forest

River and Segments	County	Miles	Classification
Cossatot			
Segment A[1]	Polk	4.2	Recreational
Segment B[1]	Polk	6.9	Scenic
Segment C[1]	Polk	4.4	Scenic
Little Missouri			
Segment I	Polk and Montgomery	11.3	Scenic
Segment III	Polk and Montgomery	4.4	Wild

[1] Cossatot Wild and Scenic River Segment designations were changed in this document to avoid confusion when comparing the 1990 Amended Plan designations, which used Roman numerals to designate proposed segments, and the current congressionally designated segments of the Cossatot WSR. Segments designated with A, B and/or C represent current congressionally authorized and designated additions to the National Wild and Scenic River System.

An inventory and analysis of streams potentially eligible for the National Wild and Scenic River System was completed as part of the 1990 Amended Forest Plan. In that plan, fifteen separate waterways were reviewed for eligibility and suitability using criteria established in the Wild and Scenic Rivers Act and the Final Revised Guidelines for Eligibility, Classification, and Management of River Areas.

In addition to the Cossatot, Little Missouri, Saline, and Ouachita Rivers, which are listed on the National Park Service's National Rivers Inventory (NRI), the Ouachita National Forest reviewed eleven additional streams identified during the previous Forest planning process for eligibility and suitability. The Caddo, Little Cedar Creek and Cedar Creek, Mill Creek, Fourche La Fave, South Fourche La Fave, and Clearfork (all in Arkansas); and the Kiamichi River, Beech Creek, Billy Creek, and Little Cedar Creek (in Oklahoma) were reviewed for Wild and Scenic designation. The Ouachita and Saline Rivers were found to be eligible under this analysis. However, the minimal Federal land ownership of the corridor of each of these two rivers has shifted the sponsorship of a formal designation request from the Forest Service to the State of Arkansas. To date, no formal request by the State has been made to incorporate the Ouachita and Saline Rivers into the National System. The remainder of the streams that were identified and reviewed were found not to contain outstandingly remarkable values (ORV) and were not found to be eligible for recommendation. No waterways on the Ouachita National Forest were designated as Congressional Study Rivers.

In January 2002, the Ouachita National Forest completed a significant amendment to the Land and Resource Management Plan for acquired lands located in McCurtain County, in southeastern Oklahoma. An EIS was prepared to analyze alternatives for amending the existing plan to allocate these lands to Forest management areas. The amendment also addressed qualifications of the Glover and Mountain Fork Rivers, both listed on the NRI, for possible recommendation as Wild and Scenic Rivers. The State of Oklahoma had previously designated the segment of the Mountain Fork River from upper Broken Bow Lake to the Oklahoma – Arkansas state line as scenic under the Oklahoma Scenic Rivers Act of 1970.

The study found the Glover River, Segment I (from the confluence of East and West Forks to the National Forest boundary – 16.5 miles) to qualify for eligibility as a scenic river. Segment II of the Glover River (that part of the river beyond the current National Forest boundary to the confluence with Little River, 15.5 miles) is located outside the National Forest boundary, and the study recommended that this segment be studied for possible Wild and Scenic River designation by the appropriate state agency.

The Mountain Fork River, Segment I (15.9 miles, starting at the Oklahoma – Arkansas state line and ending downstream at the bridge on Oklahoma State Highway 4 is in private ownership and the study recommended that this segment be studied by the appropriate state agency to determine qualification for inclusion. Segment II of the Mountain Fork (9.1 miles long starting at the bridge on Oklahoma State Highway 4, and ending at the upper end of Broken Bow Lake) was found to be eligible for designation as scenic, due to its outstandingly remarkable scenic, recreational, fish and wildlife, geological, and archaeological/historic values. Segment II contains only 2.3 miles of National Forest System land within its 9.1-mile length. Therefore, the study recommended that this segment be studied by the appropriate state agency to determine its qualification. Segment III (from Broken Bow Dam to U.S. Highway 70), of the river was deemed ineligible since it is not considered free flowing.

No other rivers or streams were identified for study as potential Wild and Scenic Rivers during the analysis and public involvement phases of Plan revision.

The 1986 Land and Resource Management Plan (Forest Plan) has been amended over 40 times since the Plan was written. During that time, changes to the Forest Plan have been made when conditions changed or when new requirements or adaptations to existing requirements made the Forest Plan outdated or incomplete. The rivers and streams which were first studied during the years since the first Plan was written and then amended to include the McCurtain County, Oklahoma lands, have all been managed to maintain the values that were evaluated in the first Wild and Scenic River studies. These streams and rivers and their riparian corridors have been left to evolve naturally without the interference of most human-caused activity. The results of the original findings for the rivers and streams under the original EIS and the Acquired Lands in Southeastern Oklahoma EIS remain essentially the same. No new streams have been identified either by the Forest or the public that should be studied. No additional land acquisitions have been made by the Forest Service that would better qualify lands over which the Forest had no control in the original plan to be found eligible now by virtue of land ownership alone. And, conditions have not changed appreciably in any of these streams since the last analysis was completed. Therefore, there is no proposal to change recommendations previously made or to make new recommendations for streams to be afforded wild and scenic status in Alternatives B, C, D, and E.

Direct and Indirect and Cumulative Effects

Eligible Rivers

The identification of a river for study through the forest planning process does not trigger any protection under the Act until designation by Congress. Identifying rivers as eligible, or eligible and suitable, does not create any new agency authority; rather, it focuses the management actions within the discretion of the Forest Service on protecting identified river values. For agency-identified study rivers, the preliminary (inventoried) classification is to be maintained absent a suitability determination that recommends a classification other than the preliminary classification. The recommended classification is to be maintained throughout the duration of the forest plan. Table 3.140 describes the eligible river segments and their classifications. Until designation decisions are made or additional river studies are completed, National Forest System lands associated with eligible river corridors will be managed to perpetuate their eligibility for designation within the Management Area for Wild and Scenic River corridors. Management activities that enhance conditions consistent with maintaining the eligibility of the subject river corridors may be allowed.

Table 3.140 Eligible Rivers Tentative Classification (Miles shown are NFS lands)

River/Segments	County	Miles	Classification	Recommending Authority
Little Missouri River Segment II;	Montgomery, AR	2.3	Recreational	State of Arkansas
Ouachita River, Segment I	Polk, AR	7.6	Recreational	State of Arkansas
Ouachita River, Segment III	Montgomery, AR	28.0	Recreational	State of Arkansas
North Fork of the Saline River Segment I	Saline, AR	2.4	Recreational	State of Arkansas
North Fork of the Saline River Segment III	Saline, AR	1.6	Recreational	State of Arkansas
North Fork of the Saline River Segment IV	Saline, AR	2.0	Recreational	State of Arkansas
Middle Fork of the Saline River	Saline, AR	3.2	Recreational	State of Arkansas
Ouachita River, Segment IV	Montgomery, AR	15.3	Scenic	State of Arkansas
Glover River, Segment I	McCurtain, OK	16.5	Scenic	Forest Service
North Fork of the Saline River Segment II	Saline, AR	3.8	Scenic	State of Arkansas
Alum Fork of the Saline River	Saline, AR	3.9	Scenic	State of Arkansas
Glover River, Segment II	McCurtain, OK	15.5	Scenic	State of Oklahoma
Mountain Fork River, Segment II	McCurtain, OK	9.1	Scenic	State of Oklahoma
Caddo River	Montgomery, AR	25.2	Recreational	State of Arkansas

Management emphasis for the rivers and corridors is focused on protection and enhancement of the values for which they were established, without limiting other uses that do not substantially interfere with public use and enjoyment of those values. The establishment values include: wildlife, recreation, geological, archaeological, and scenic values. The number of eligible river miles remains constant in all alternatives.

Development along rivers and streams is not only reducing water quality and habitat on many rivers, but limiting public access for fishing and other river-related activities. Protection of rivers and streams through the forest planning process helps to assure high quality, free flowing rivers and streams, as well as river-related recreation opportunities.

Non-eligible Rivers

All rivers assessed and found non-eligible for recommendation as additions to the National System of Wild and Scenic Rivers, will be returned to the general forest area and their appropriate management area and managed under the requirements as stated for that MA. The non-eligible river segments will generally be found in MA 9 – Water and Riparian Communities, and will be managed for the benefit of a wide range of plant and animal species, riparian habitat and for general water quality. Non-eligible rivers are listed in Table 3.141.

Table 3.141 Rivers Reviewed and Found To Be Not Eligible

River and Segment	County	Miles	Determination Findings	Remarks
Little Cedar Creek	Perry & Saline, AR	5.5	No ORVs	Portions located inside Flatside Wilderness
Cedar Creek	Perry, AR	11.3	No ORVs	Portions located inside South Fourche Scenic Area
South Fourche La Fave River	Yell & Perry, AR	40.4	No ORVs	Forest lands adjoin for 9.1 of 40.4 study miles
Mill Creek	Scott, AR	15.8	No ORVs	Forest lands adjoin 8.1 of 15.8 miles
Clear Fork and Black Fork, Headwaters of Fourche La Fave River	Scott & Polk, AR	15.8	No ORVs	Forest lands adjoin 5.5 of 15.8 study miles
Fourche La Fave River, Segment I	Scott & Yell, AR	60.5	No ORVs	Forest lands adjoin 5.9 of 60.5 study miles
Fourche La Fave River, Segment II	Yell & Perry, AR	25.0	Not Free-flowing	Not considered further
Fourche La Fave River, Segment III	Perry, AR	28.4	No ORVs	Forest lands adjoin 0.4 mile of 28.4 study miles
Kiamichi River	Le Flore, OK	12.5	No ORVs	Forest lands adjoin 8.8 miles of 12.5 study miles
Beech Creek	Le Flore, OK	8.9	No ORVs	Forest lands adjoin 5.4 miles of 8.9 study miles
Little Cedar Creek (OK)	Le Flore, OK	4.0	No ORVs	Forest lands adjoin 2.8 miles of 4.0 study miles
Billy Creek	Le Flore, OK	4.3	No ORVs	Forest lands adjoin 3.5 miles of 4.3 study miles

The complete analysis and findings of eligibility studies as well as Wild and Scenic River Studies for the Little Missouri and Cossatot Rivers can be found in the Final Supplement to the Final Environmental Impact Statement, Land and Resource Management Plan, Ouachita National Forest, March 1990, Appendix E.

Military Use

Affected Environment

Over the last three decades, National Guard and Army Reserve units have used the Forest for military readiness activities. Permission for such use is statutorily authorized, but use of National Forest System lands for military training activities is permissible only if lands within the control of the Department of Defense are not available or suitable for the proposed training activities. Current direction is to issue special use permits to the National Guard and agreements to the Army Reserve for low impact military readiness activities if such use is compatible with other resource uses and meets other environmental requirements, as documented in an environmental review following NEPA procedures.

Military units use the Forest as a training ground for such activities as overnight survival training and orienteering in adverse conditions. Because the Forest contains rugged terrain, it has also been used as a training area for setting up mobile radio communication exercises. Occasional use of the Forest allows defense agencies to conduct training exercises in new and unfamiliar terrain.

In addition to being approved only after appropriate NEPA review, the special-use permits contain terms and conditions that specify the scope of the activity, precautions and prohibitions. The Forest Service requires that the requesting unit be aware of and respect private ownerships that are intermingled with Forest ownership. The permit holder is responsible for all costs associated with rehabilitation, repair, or replacement of damaged Forest resources.

During some past military exercises on the Forest, residents expressed concern over helicopter use, and for this reason, the Forest does not allow the establishment of ground bases, even on a temporary basis, for readiness training for military air operations. It is not possible to prohibit military use of air space over the Forest.

Direct, Indirect, and Cumulative Effects

To date, there has been only minor use of the Forest for military readiness activities. In addition, Forest use for such activities is temporary, only for short periods of time, and approved only after environmental and special use permit review. Future military use would not vary in response to the alternatives considered in this environmental impact statement.

Other Effects

Unavoidable Adverse Effects

Each alternative has the potential to result in some adverse environmental effects that cannot be avoided or mitigated, although all alternatives are designed to avoid adverse impacts, where possible. The Forest addresses impacts by assessing the potential for impact from each alternative when compared to current conditions and setting out standards that are required to be met before any project-level action takes place. The application of standards, best management practices, and monitoring and evaluation are intended to limit the extent, severity, and duration of these effects.

Some adverse effects are temporary or transitory in nature. For example, air quality could be diminished on a recurring, though temporary, basis due to the use of prescribed fire for various purposes. Although standards require prescribed fires to be scheduled at times when weather conditions would provide for smoke dispersion, the presence of smoke and haze over or adjacent to the Forest would detract from some people’s expectation of clean air. Other localized effects to air quality that are temporary and cannot be mitigated would be expected from recreation traffic, timber hauling, and the operation of other internal combustion engines.

Portions of the natural landscape would appear altered by management activities, particularly where activity is highly visible from travel routes. Prescribed fire in forest communities including subsequent blackened tree trunks and forest floors would also be apparent. These temporary adverse effects would eventually be reduced by regrowth of vegetation and weathering. Other impacts on the natural appearance of the landscape include roads and certain recreational structures that are highly visible despite efforts to blend them with landforms and mitigate the effect by landscaping.

In inventoried roadless areas, management activities such as wildlife habitat manipulations and some associated temporary road construction, recreational trail construction or use, or other activities could have an adverse effect on the potential future designation of these areas as wilderness, research natural areas, or other purposes requiring natural characteristics.

Both the amount and distribution of mature stands could be changed through implementation of any alternative. The rate and intensity of impacts varies by alternative. Some wildlife species rely on habitat conditions provided by late successional habitats; thus, a reduction or shift in the populations (range) of some wildlife species and an increase or expansion in the population or range of others can be expected.

Disturbance, displacement, or loss of fish and wildlife and their habitats may occur as a consequence of increased management activity or even from increased human recreational activity. Roads and their associated use can impact fish and wildlife by fragmenting habitat, increasing human presence (disturbance) and by increasing sediment runoff. Improved access for timber management, special uses, or access to private lands would have similar effects.

Although standards, BMPs, and monitoring plans are designed to prevent significant impacts on soil and water, the potential for impacts does exist. Sediment production could exceed natural rates in locations where roads are being built or maintained, management activities that include harvesting of timber take place, dispersed and developed recreation continues along riparian corridors, and forest communities/habitats are restored.

Relationship between Short-Term Uses and Long-Term Productivity

NEPA requires consideration of the "relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The relationship between the short-term uses of man’s environment and the maintenance and enhancement of long-term productivity is complex. Short-term uses are those that generally occur annually on parts of the Forest, such as prescribed fire and dispersed recreational camping.

Long-term means longer than a 10-year period, and productivity is the capability of the land to provide market and amenity outputs and values for future generations. Soil and water are the primary factors for productivity and represent the relationship between short-term uses and long-term productivity. The quality of life for future generations would be determined by the capability of the land to maintain its productivity. By law, the Forest Service must ensure that land allocations and permitted activities do not significantly impair the long-term productivity of the land.

The alternatives considered in detail, including the Selected Alternative, incorporate the concept of sustained yield of resource outputs while maintaining the productivity of all resources. The specific direction and mitigation measures included in the forest-wide management standards ensure that long-term productivity would not be impaired by the application of short-term management practices. Each alternative was analyzed using the SPECTRUM linear programming model (see Appendix B), and long-term productivity of the Forest's ecosystems was considered for all alternatives.

As stated earlier, the effects of short-term or long-term uses are extremely complex and depend on management objectives and the resources that are emphasized. None of the alternatives discussed in detail would be detrimental to the long-range productivity of the Ouachita National Forest.

Conditions of management areas and the effects of implementing the Revised Forest Plan would be monitored to provide data that ensure standards for long-term productivity are met. Monitoring requirements and standards would be common to all alternatives and are included in the Revised Forest Plan.

Irreversible/Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line, ROW, or road. An irreversible commitment of resources results from a decision to use or modify resources that is renewable only over a long period of time, such as soil productivity, nonrenewable resources, cultural resources, or minerals. The Selected Alternative and the other alternatives examined were all based on the principles of multiple use and long-term productivity for all resources. Measures to protect natural resources that could be irreversibly affected by management activities were incorporated into forest-wide standards.

Irretrievable commitment of resources is the production of renewable resources lost due to allocation decisions that forgo the production or use of renewable resources. Allocation decisions that do not allow for the production or use of most renewable resources for relatively long periods of time include those that establish wilderness, scenic areas, wild and scenic rivers, recreation sites, and the construction of new roads. The total number of acres committed to these uses does not vary significantly among alternatives, although the types of allocated uses vary. By contrast, non-wilderness allocation for areas is considered an irretrievable loss of increased wilderness opportunities. Tradeoffs between wilderness, roadless, and other uses are discussed previously in Chapter 3.

Under a given alternative, differences between output levels and the higher levels that otherwise could be produced also represent irretrievable commitment of resources. For example, a low level of forage use for livestock grazing or a low level of timber yield could be increased in the future, based on different management prescriptions, but the outputs between now and then would be "lost" or not available for use. The production thus lost would be irretrievable, but the action is not irreversible.

Archeological resources are nonrenewable and irreplaceable. Once disturbed, the impacted portion of a property cannot be replaced or repaired, even though controlled data recording techniques may recover part of the information contained in the damaged site. Archeological surveys and evaluations routinely use small shovel tests or larger excavations to address research designs or the potential to contain important information. These excavations are necessary to document the resource, but at the same time, such excavations are destructive (although in a controlled manner) to all or portions of archeological sites. The effects of such excavations are an irreversible effect. This is balanced by using conventional, accepted, and detailed archeological techniques and methods with a commitment to high standards. Any other resource management action or result, whether planned or inadvertent, that diminishes the character or integrity of a heritage property, has irreversibly committed a portion of that site's value.

Incomplete or Unavailable Information

The Ouachita National Forest has used the most current scientific information available and state-of-the art analytical tools to evaluate management activities and to estimate their environmental effects. However, gaps exist in our knowledge. The Council on Environmental Quality regulations describe the process for evaluating incomplete and unavailable information (40 CFR 1502.22 (a) and (b)). Incomplete or unavailable information relevant to reasonably foreseeable significant adverse impacts is noted in this chapter, where applicable, for each resource. Forest Plan monitoring is designed to evaluate assumptions and predicted effects. Should new information become available, the need to change management direction or amend the Forest Plan would be determined through the monitoring and evaluation process.

Environmental Justice

Concerns about environmental justice center on equity and fairness in resource decision-making. As required by Executive Order 12898, all federal actions must consider potentially disproportionate effects on minority or low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the National Environmental Policy Act (Council on Environmental Quality 1997). Those principles were considered in this analysis.

Environmental Justice issues are typically found in connection with proposals having adverse environmental effects that may affect public health. These kinds of effects are less likely in a Forest Plan decision because such decisions normally do not include site-specific projects or effects.

The Economic and Social Environment section discusses the demographic patterns of potentially affected minority and low-income populations and the environmental effects of the alternatives. There are no disproportionately adverse environmental or health effects on low-income or minority populations, regardless of alternative. Public involvement during plan revision was inclusive (see Appendix A).

Chapter 4 – List of the Preparers of this Final Environmental Impact Statement

The Forest Service employees who prepared this EIS are listed below in alphabetical order:

Jim Burton—Fire Team Leader
Alan Clingenpeel—Forest Hydrologist
Jack Cowart—GIS Specialist
Betty Crump—Plan Revision Ecologist
Jerry Davis—Forest Wildlife Biologist
Meeks Etchieson—Forest Archeologist
Tom Ferguson—Trails and Wilderness Coordinator
Robert Flowers—Plan Revision Recreation Specialist
Roger Fryar—Assistant Fire Team Leader
Finis Harris—Forest Silviculturist
Larry Hedrick—Integrated Resources Team Leader
Susan Hooks—Forest Botanist
Alett Little—Plan Revision Team Leader
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Ken Luckow—Forest Soil Scientist
Sarah Magee—Realty Specialist
Caroline Mitchell—Editorial Assistant
Lea Moore—Civil Engineer
John Nichols—Forest Geologist
Bill Pell—Planning and Recreation Team Leader
Ron Perisho—Forest NEPA Coordinator
Darrel Schwilling—Forest Landscape Architect
Elaine Sharp—Forester Lands/Special Uses
James D. Smith—Forest Health Protection
Richard Standage—Forest Fisheries Biologist
Pete Trenchi—Plan Revision Analyst
Gregg Vickers—Fire Planner
Mike White—Technical Services Team Leader
Ray Yelverton—Sales Forester

Chapter 5 – Distribution List

Copies of the EIS were distributed to the following individuals from the Ouachita National Forest's Plan Revision mailing list who requested particular formats of the documents (as of September 9, 2005). Individuals who did not make such a request received notification of document availability.

Individuals

Bill Abernathy
Frank Acker
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Bill Ballard
Mark Barre
Vernon Bates
Betty Beaver
Richard Beck
Lonnie Beggs
Dave Belakovich
John Bender
Glen Bishop
Jerry Black
Milburn Blanton
Elizabeth Boaz
Kent Bonar
Paul Botteron
Mary Bourne
Pete Bradford
Darrel Bratton
Les Brelsford
Clifford Brewer
James Briggs
Al Brooks
Bobby Brown
Michelle Brown
Terry Bryant
Jimmie Buford
Fred Burrows
John Burwell
Helen Buxton
Seth Buys
Frank Caldwell
John Callaham
Kevin Carr
Billy Carroll
Adam Castle
Edith Chambers
J.D. Chambers
Phil Chitwood
Charles Cleaves
Jerry Coleman
Joseph Colgrove
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Mark Diffee
Bill Dinkines
Frances Dobbs
Bill Dodd
David Dodd
Jim Dodd
Ray Donaldson
Mark Donnelly
Marth Doty
Tripp Dunn
Larry Durr
Martha Dzukowski
Paul Easley
David Edwards
Chris Elder
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Ray Ewing
David Falcetti
A. Farmer
Rick Farmer
Billy Fisher
Van Forga
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Jimmy Fryar
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John Geddie
Jim Gifford
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Nicholos Grauds
James Green
Kevin Green
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Robert Griswold
Mark Guthrie
Bill Ham
Mike Hamilton
Bobby Hand
Jim Hardesty
Mac Hardy
Anita Harper
Jimmy Harper
Joe Harper
John Harris
Jimmy Hart
A.G. Harvey
Alfred Harvey
Michael Harvey
James Havniear
William Haws
Bob Heinemann
J. Helm
John Henderson
Fred Herpich
Theresa Herrick
Charles Herring
John Heuston
Sally Hubbard
Don Hudson
Steve Hughes
Ronald Hunter
Jim Husman
Bill Johnston
Charles Jones
Larry Jones
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K. Kelly
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Tim King
Leo Knoernschild
Kurt Krans
J.D. Krouse
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Bob Limbird
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Jimmy Louton
Tim Love
Robert Lovett
R. Lybrand
Vicki Lyons
Gabrielle Mahy
Bill Manley
Rosendo Marin
T. Markham
Gerald Martin
James Martin
Ron Masters
Ronnie Mayberry
Ray McCullough
Allen McDowell
Patrick McFarlin
Julia Ann McKinney
Tom McKinney
Bob McLane
Gary McLaughlin
Dean McNewton
Rebecca McPeake
Warren Miles
Ottis Moore
David Morris
Joe Mude
Donald Muller
Julie Mullins
Olen Murdock
Bill Murphy
Dennis Nix
Dan Nolan
James Ory
M. Ozanich
Jerry Parker
Pat Parnell
Bob Paulk
Gene Peck
Jeffery Pitman
James Ragsdale
John Ramsey
Coy Reed
Jerry Rephan
Charles Reynolds
Hardie Reynolds
Don Richardson
Roy Richardson
Mary Rivera
Ricky Robinson
Carroll Rose
Doyle Rowland
Richard Rurup
Alvin Russon
Vernon Ryan
Victor Ryan
Doug Sanders
Tony Scalf
Loyd Schnieders
Klaus Schwarznau
Frank Scott
Holly Sells
Ray Settle, III
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Robert Short
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Edward Smith
Harold Smith
Mary Sue Smith
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Marvin Stewart
Joe Stoeckel
Todd Stone
Paul Stover
Alfred Strakshus
Joyce Stroope
Loy Sullivan
Donnie Summit
Ron Suttles
Fred Tadlock
Donald Taylor
J. Taylor
Terry Terrell
Billy Terry
Alan Teschner
Monty Thacker
R.J. Thacker
Dave Thessing
Rick Thomas
Willard Thomason
Gary Threadgill
Michael Thurmon
Sherman Tippy
Tim Tomlinson
Charlie Transue
Bill Tucker
Juanita Turner
Jack Upchurch
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M. Walston
James Watson
Dennis Weaver
John Wehunt
Beth Welna
J.L. Weston
Bo White
Charline White
Michael White
Don White, Jr.
Don Whitlow
J. Wilke
Paul Wilkins
Chuck Williams
Jerry Williams
Paul Williams
Dennis Wilson
Steve Wilson
Paul Wise
Charles Wood
James Wood
James Woods
Mark Wooten
Henry Wright
George Wynne, II
Terrie Yandell
Charles Young
Cyrus Young
Douglas Zollner

Distribution List – Governments, Agencies, and Other Organizations

Native American

Caddo Indian Tribe of Oklahoma
Cherokee Nation of Oklahoma
Chickasaw Nation of Oklahoma
Choctaw Nation of Oklahoma
Muscogee Creek Nation Tribe of Oklahoma
Osage Tribe of Oklahoma
Quapaw Tribe of Oklahoma
Seminole Tribe of Oklahoma
Wichita and Affiliated Tribes of Oklahoma

Federal Agencies

Advisory Council on Historic Preservation
Department of Army
Environmental Protection Agency
Federal Aviation Administration
Federal Highway Administration
Natural Resources Conservation Service
Rural Utilities Service
U.S. Air Force
U.S. Army Corp of Engineers
U.S. Department of Transportation
U.S. Navy
USDA Forest Service
USDA, National Agricultural Library
USDI Bureau of Land Management
USDI Department of the Interior
USDI Fish and Wildlife Service
USDI Geological Survey
USDI National Park Service

Distribution List – Governments, Agencies, and Other Organizations

Elected Officials

Arkansas
Honorable Blanche Lincoln
Honorable Mark Pryor
Honorable Marion Berry
Honorable Vic Snyder
Honorable John Boozman
Honorable Mike Ross

Oklahoma
Honorable Don Nickles
Honorable James Inhofe
Honorable Tom Coburn
Honorable John Sullivan
Honorable Tom Cole
Honorable Frank Lucas

State Government Agencies

Arkansas Archeological Survey
Arkansas Coop Extension Service
Arkansas Department of Environmental Quality
Arkansas Department of Highway & Transportation
Arkansas Department of Parks & Tourism
Arkansas Forestry Commission
Arkansas Game & Fish Commission
Arkansas Geological Commission
Arkansas Natural Heritage Commission
Arkansas Natural Scenic Rivers Commission
Arkansas State Clearing House
Arkansas State Plant Board
Oklahoma Archeological Survey
Oklahoma Conservation Commission
Oklahoma Department of Agriculture
Oklahoma Department of Commerce
Oklahoma Department of Environmental Quality
Oklahoma Department of Tourism and Recreation
Oklahoma Department of Transportation
Oklahoma Department of Wildlife Conservation
Oklahoma Forestry Association
Oklahoma Geological Survey
Oklahoma Native Plant Society
Oklahoma Scenic Rivers Commission

Distribution List – Governments, Agencies, and Other Organizations

Local/Regional Government Entities

Arkansas
Governor of Arkansas
Ashley County Judge
Garland County Judge
Hot Spring County Judge
Howard County Judge
Logan County Judge
Montgomery County Judge
Perry County Judge
Pike County Judge
Polk County Judge
Saline County Judge
Scott County Judge
Sebastian County Judge
Yell County Judge

Oklahoma
Governor of Oklahoma
LeFlore County Commissioners
McCurtain County Commissioners

Public Libraries

Booneville Public Library
Broken Bow Public Library
Buckley Public Library – Poteau
Crossett Public Library
Garland County Public Library
Glenwood Branch Library
Heavener Public Library
Howard County Library
Idabel Public Library
Malvern/Hot Spring County Library
Max Milam Library - Perryville
Montgomery County Library
Polk County Library
Saline County Public Library
Scott County Library
Sebastian County Public Library
Talihina Public Library
Yell County Library

Organizations

Arkansas Chapter of the Wildlife Society
Arkansas Nature Conservancy
Arkansas Wilderness Steering Commission
Arkansas Wildlife Federation
Equestrian Unlimited
Forest Conservation Council
Forest In Holders Guardian Habitat
Heartwood
Hot Springs Bicycle Association
League Of Women Voters
Mena Nature Club
National Wild Turkey Federation
Oklahoma Wildlife Federation
Ouachita Watch League
Ozark Society
Quail Unlimited
Sierra Club
The Nature Conservancy
Wildlife Management Institute
Yell County Wildlife Federation

Business/Industry

Allstate Timber Products, Inc.
Arkansas Forestry Association
Clarksville Wood Products, Inc.
Crouch & Associates
Davis Petroleum Services
Family Garden Nursery
Georgia Pacific Corp.
Green Bay Packaging, Inc.
Miller-Patterson
Mills Oil Company
Moore Forest Products, Inc.
Sullivan Lumber Company
Weyerhaeuser
Willhite Forest Products, Inc.

Education

Arkansas State University
Arkansas Tech University
Carl Albert State College
Garland County Community College
Henderson State University
Oklahoma State University
Ouachita Baptist University
Southern Arkansas University
University of Arkansas
University of Arkansas, Little Rock
University of Arkansas, Monticello
University of Oklahoma

Media

Arkansas Democrat Gazette
Arkansas Times Magazine
Associated Press - AR
Associated Press - OK
Booneville Democrat
Broken Bow Banner
Broken Bow News
Daily Oklahoman
Glenwood Herald
Heavener Ledger
Hot Springs Sentinel Record
Hugo Daily News-OK
Journal Record
LaVilla News
McCurtain County Gazette
Mena Star
Montgomery County News
Poteau News/Sun
Southeast Times
Southwest Times Record
SW Times Record-OK
Talihina American
Texarkana Gazette
Tulsa Tribune
Tulsa World
Valliant Leader
Village Voice
Waldron News
Yell County Record

Glossary of Commonly Used Terms

A

accessibility: The relative ease or difficulty of getting from or to someplace, especially the ability of a site, facility, or opportunity to be used by persons of varying physical and mental abilities.

activity: A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.

adit: A horizontal or nearly horizontal passage driven (excavated) from the surface to access the ore body for mining purposes. Sometime referred to as a tunnel; however, a tunnel is technically different in that it is open to the surface at both ends.

affected environment: The relationship of the physical environment to the changes that will or may take place as a result of human activity.

age-class distribution: An age-class is a distinct aggregation of trees originating from a single natural event or regeneration activity, or a grouping of trees, e.g., a 10-year age class, as used in inventory or management. An age-class distribution is the location and/ or proportionate representation of different age classes in a forest.

air pollution: The presence of substances in the atmosphere, particularly those that do not occur naturally. The substances are generally contaminants that substantially alter or degrade the quality of the atmosphere. The term is often used to identify undesirable substances produced by human activity, that is, anthropogenic air pollution. Air pollution usually designates the collection of substances that adversely affect human health, animal, and plants; deteriorates structures; interferes with commerce; or interferes with the enjoyment of life.

air quality (PSD) class: Three broad classifications established by the Clean Air Act to help prevent significant deterioration of air quality for all areas of the country that are known (or assumed) to be attaining National Ambient Air Quality Standards.

> **Class I:** Geographic area designated for the most stringent degree of air quality protection from future degradation of air quality. These congressionally-designated areas include wilderness areas over 5000 acres in size that were established as of August 7, 1977. wilderness areas and national parks where identified air quality related values might become (or currently are) adversely affected by even a small increment of additional air pollution. To date, there are 156 such areas, nation-wide.
>
> **Class II:** Geographic area designated for a moderate degree of protection from future air quality degradation. Any area that is not a Class I area is considered Class II.
>
> **Class III:** Geographic areas designated for the least protection from future air quality degradation. No Class III areas have been designated to date.

allocation: The assignment of management prescriptions or combination of management practices to a particular land area to achieve the goals and objectives of the alternative.

allowable sale quantity (ASQ): The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Forest Plan. This quantity is usually expressed on an annual basis as the “average annual allowable sale quantity.”

alternative: In forest planning, a mix of policies, plans, or projects proposed for decisionmaking designed in response to public issues or management concerns.

analysis area: A collection of lands, not necessary contiguous, sufficiently similar in character, that they may be analyzed at the forest plan level.

aquatic habitat types: The classification of instream habitat based on location within channel, patterns of water flow, and nature of flow controlling structures. Habitat is classified into a number of types according to location within the channel, patterns of water flow, and nature of flow controlling structure. Riffles are divided into three habitat types: low gradient riffles, rapids, and cascades. Pools are divided into seven types: secondary channel pools, backward pools, trench pools, plunge pools, lateral scour pools, dammed pools, and beaver ponds. Glides, the third habitat type, are intermediate in many characteristics between riffles and pools. It is recognized that as aquatic habitat types occur in various parts of the country, additional habitat types may have to be described. If necessary, the regional fishery biologist will describe and define the additional habitat types.

arterial roads: Roads that provide service to large land areas and usually connect with public highways or other forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. They are usually developed and operated for long-term land and resource management purposes and constant service. These roads generally serve areas more than 40,000 acres.

authorized use: Specific activity or occupancy, including a ski area, historical marker, or oil and gas lease, for which a special authorization is issued.

B

basal area (BA): the area, in square feet, of the cross section of a single tree measured at 4.5 feet above ground, usually expressed as square feet per acre.

best management practice (BMP): A practice, or a combination of practices determined to be the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

biodiversity: The variety of life, including the variety of gene pools, species, plant and animal communities, ecosystems, and the processes through which individual organisms interact with one another, and their environments.

biological control: The use of natural means, or agents, to control unwanted pests. Examples include introduced or naturally occurring insects, bacteria, or fungi that act as predators, parasites, or disease agents of pests. Biological controls can sometimes be alternatives to mechanical or chemical means.

C

C-factor: As expressed in the Region 8 Modified Universal Soil Loss Equation, C-Factor is the forest management factor in the equation to describe the ratio of soil loss from a site with specified forest management actions causing reduced plant cover to that of the undisturbed forest condition.

canopy cover: The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter. Small openings in the crown are included. Used to express the relative importance of individual species within a vegetation community, or to express the canopy cover of woody species. Canopy cover may be used as a measure of land cover change or trend. Often used for wildlife habitat evaluations.

canopy: The cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

capability: The potential of a land area to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and a given level of management intensity. Note: capability depends upon the current condition and site conditions including climate, slope, land form, soil and geology, and the application of management practices and protection from fire, insects, and disease.

class I areas: See air quality class.

clearcutting: The harvesting in one cut of all trees on an area for the purpose of creating a new stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded.

collector road: Roads that serve smaller land areas and are usually connected to a forest arterial or public highway. They collect traffic from forest local roads or terminal facilities. The location and standard are influenced by long-term multi-resource service needs, and travel efficiency. Forest collector roads may be operated for constant or intermittent service, depending on land-use and resource management objectives for the area served by the facility. These roads generally have two or more local roads feeding into them and generally serve an area exceeding 10,000 acres.

commercial thinning: Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.

commodity outputs: A resource output with commercial value. All resource products that are articles of commerce.

commodity: Tangible or physical output, such as timber, livestock, minerals, water, etc.

common variety minerals: Common Variety Mineral Materials (CVMM) - Authority for the disposal of mineral materials is provided by the Materials Act of July 31, 1947 (30 U.S.C. 601 et seq.), as amended. Common variety mineral materials include sand, gravel and building stone. On the Ouachita National Forest in Arkansas, per Section 323 of P.L. 100-446 (10=9/27/1988) it also includes deposits of quartz mineral. This includes quartz crystal used for esthetic purposes, high quality chemically pure quartz used for high-tech industrial purposes, novaculite, tripoli and other forms of quartz mineral. Common variety mineral materials are also referred to as "Salable" minerals and are available for sale by the Forest Service under contracts and permits issued by District Rangers.

concern level: A particular degree or measure of viewer interest in the scenic qualities of the landscape as viewed from travelways and use areas, rated level 1 (highest concern) to 3 (lowest concern).

construction: The displacement of vegetation, soil and rock, and the installation of man-made structures involved in the process of building a facility.

Continuous Inventory of Stand Conditions (CISC): the USDA Forest Service, Southern Region's forest stand database containing descriptive and prescriptive data about mapped stands of forest land.

conversion (forest management): A change from one forest type to another in a stand on land that has the capability of both forest types.

coppice: A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from stump sprouts or root suckers.

critical habitat: Habitat as defined by the U.S. Fish and Wildlife Service to be essential to meet the needs of an endangered species.

cultural resources: Physical remains of districts, sites, structures, buildings, networks or objects that were used by humans. They may be historic, prehistoric, archaeological, architectural or spiritual in nature. Cultural resources are non-renewable.

D

decommission: To stabilize or restore a road to a more natural state without any further maintenance. The entrance is obscured and the wheel tracks or pathway is no longer continuous and suitable for travel. The travel way has been removed from the transportation system. The road prism is not necessarily returned back to its original contours.

defined stream channel: A channel which exhibits evidence of annual scour.

demand: The amount of an output that users are willing to take at specified price, time period and condition of sale.

den trees: Living or dead trees with cavities used by wildlife.

desired condition: An expression of resource goals that have been set for a unit of land. Written as a narrative description of the landscape as it appears when goals have been achieved.

developed recreation area: Relatively small, distinctly defined area where facilities are provided for concentrated public use. Examples include campgrounds, picnic areas, and swimming areas.

developed recreation: Recreation that requires facilities that in turn result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

diameter at breast height (dbh): the standard method for measuring tree diameter at 4.5 feet from the ground.

dispersed recreation: A general term referring to recreation use outside a developed recreation site, this includes activities such as scenic driving, rock climbing, boating, hunting, fishing, backpacking, and recreation in primitive environments.

disturbance (ecology): Any relative discrete event in time that disrupts the ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

dominant: Trees with crowns extending above the general level of the main canopy of even-aged groups of trees. They receive full light from above, and partly from the sides.

E

early successional: Vegetative condition typically characterized by low density to no canopy cover and an abundance of herbaceous ground cover. May include forest 0 to 10 years of age, maintained openings, pastures, balds, or open woodlands.

ecosystem management: An ecological approach to natural resource management to assure productive, healthy ecosystem by blending social, economic, physical and biological needs and values.

ecosystem: A complete interacting system of organisms and their environment.

effects: Results expected to be achieved, or actually achieved, relative to physical, biological and social (cultural and economic) factors resulting from the achievement of outputs. Examples of effects are tons of sediment, pounds of forage, person-years of employment, income, etc. There are direct effects, indirect effects and cumulative effects.

endangered species: Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

endemic: Species restricted to a particular geographic area. Usually limited to one or a few small streams or a single drainage.

environment: All the conditions, circumstances, and influences surrounding and affecting the development of an organism, or group of organisms.

environmental analysis: An analysis of alternative actions and their predictable short and long-term environmental effects, which include physical, biological, economic, social and environmental design factors and their interaction. (36 CFR 219.3)

environmental impact statement: A disclosure document revealing the environmental effects of a proposed action, which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review. Final Environmental Impact Statement (FEIS) is the final version of the statement disclosing environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act.

environmental impact: Used interchangeably with environmental consequence or environmental effect.

epidemic: Applied to a population of pests that build up, often rapidly, to highly abnormal and generally injurious levels.

erosion: The wearing away of the land surface by the action of wind, water, or gravity.

essential habitat: Habitat in which threatened and endangered species occur, but which has not been declared as critical habitat. Occupied habitat or suitable unoccupied habitat necessary for the protection and recovery of a federally designated threatened or endangered species.

evapotranspiration: The transfer of water vapor to the atmosphere from soil and water surfaces (evaporation), and from living plant cells (transpiration).

even-aged management: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 211.3)

even-aged: A forest (stand) composed of trees having no, or relatively small, differences in age.

existing road: All existing roads, owned or administered by various agencies, which are wholly or partly within or adjacent to and serving the National Forests and other areas administered by the Forest Service, or intermingled private lands (ref: FSM 7705.21). These roads may or may not be included on the current Forest transportation inventory, but are evident on the ground as meeting the definition of a road.

existing wilderness: Those areas already designated as wilderness by Congress.

F

facility: A single or contiguous group of improvements that exists to shelter or support Forest Service Programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

federally listed: Any plant or animal species listed as threatened or endangered under the Endangered Species Act.

felling: The cutting down of trees.

Final Environmental Impact Statement (FEIS): The statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act

fire condition class: Based on coarse scale national data, classes measure general wildfire risk:

> **Class One:** Fire regimes are usually within historical ranges. Vegetation composition and structure are intact. The risk of losing key ecosystem components from the occurrence of fire is relatively low.
>
> **Class Two:** Fire regimes on these lands have been moderately altered from their historical range by increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified.
>
> **Class Three:** Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure, and diversity have been significantly altered.

fire regime: A generalized description of the role a fire plays in the ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), and regularity or variability. Five combinations of fire frequency exist.

fire use: The combination of wildland fire use and prescribed fire application to meet resource objectives.

floodplains: The lowland and relatively flat area adjoining inland waters, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year, and soil inundated by the 100-year flood.

forage: All browse and non-woody plants that are available to livestock or game animals used for grazing or harvested for feeding.

foreground: The area between the viewer and the middle ground in a landscape; generally from 0 to 1/2 mile distance.

Forest and Rangeland Renewable Resources Planning Act of 1974: An act of Congress requiring the preparation of a program for the management of the national forests' renewable resources, and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all National Forest System lands and renewable resources.

forest health: The perceived condition of a forest derived from concerns about factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.

forest land: Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover, and not currently developed for non-forest use. Lands developed for non-forest use including areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, adjoining road clearing, and power line clearing of any width.

Forest Service Handbook (FSH): A handbook that provides detailed instructions for proceeding with specialized phases of programs or activities for Forest Service use.

Forest Service Manual (FSM): Agency manuals that provide direction for Forest Service activities.

Forest Supervisor: The official responsible for administering the National Forest System lands in a Forest Service administrative unit. This may consist of two or more national forests or all the forests within a state. The Supervisor reports to the regional forester.

forest type: A descriptive term used to group stands of similar composition and development because of given ecological factors, by which they may be differentiated from other groups of stands.

forest: an area of trees with overlapping crowns.

forest-wide standard: A performance criterion indicating acceptable norms, specification, or quality that actions must meet to maintain the minimum considerations for a particular resource. This type of standard applies to all areas of the forest regardless of the other management prescriptions applied.

fuel break: Any natural or constructed barrier used to segregate, stop, and control the spread of fire, or to provide a control line from which to work.

fuel loading: The amount of fuel (flammable natural materials) expressed quantitatively in terms of weight of fuel per unit area.

fuel treatment: The rearrangement or disposal of fuels to reduce fire hazard. Fuels are defined as living and dead vegetative materials consumable by fire.

fuels management: The planned treatment of fuels to achieve or maintain desired fuels conditions.

fuels: Any materials that will carry and sustain a forest fire, primarily natural materials, both live and dead.

G

game species: Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations.

goal: A concise statement that describes a desired condition to be achieved. It is expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed. (36 CFR 219.3)

goods and services: The various outputs, including on-site uses, produced from forest and rangeland resources. (36 CFR 219.3)

grassland: Areas on which vegetation is dominated by grasses, grass-like plants, forbs, and/or cryptogams (mosses, lichens, and ferns), provided these areas do not qualify as built-up land or cultivated cropland. Examples include tall grass and short grass prairies, meadows, cordgrass marshes, sphagnum moss areas, pasturelands, and areas cut for hay.

grazing: Consumption of range or pasture forage by animals.

ground water: Subsurface water in a saturated zone or geologic stratum.

group selection: An uneven-aged regeneration method in which trees are removed periodically in small groups. Uneven age classes for trees are established in small groups. The width of groups is about twice the height of the mature trees, with small opening providing microenvironments suitable for tolerant regeneration, and the larger openings providing conditions suitable for more intolerant regeneration.

growing season: The months of the year a species of vegetation grows, from leaf emergence to leaf fall.

H

habitat: The native environment of an animal or plant in which all the essentials for its development, existence, and reproduction are present.

harvest method: A procedure by which a stand is logged. Emphasis is on meeting logging requirements rather than silvicultural objectives.

herbicide: A pesticide used for killing or controlling the growth of undesirable plants.

hydric soils: Soils developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.

I

infestation: The attack by macroscopic organisms in considerable concentration. Examples are infestations of tree crowns by gypsy moth, timber by termites, soil or other substrates by nematodes or weeds.

instream flow: The volume of surface water in a stream system passing a given point at a given time.

integrated pest management (IPM): The maintenance of destructive agents, including insects at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable.

intermediate stand treatments: A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest. Types include thinning, release and improvement cuttings.

intermittent service road: A road developed and operated for periodic service and closed for more than one year between periods of use.

intermittent streams: Streams that flow in response to a seasonally-fluctuating water table in a well-defined channel. The channel will exhibit signs of annual scour, sediment transport, and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels, and may be dry during significant periods of the year, depending on precipitation cycles.

interpretive services: Visitor information services designed to present inspirational, educational, and recreational values to forest visitors in an effort to promote understanding, appreciation, and enjoyment of their forest experience.

invasive species: A species that can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. An invasive species may be native or non-native.

L

land acquisition: Obtaining full landownership rights by donation, purchase, exchange, or condemnation.

land exchange: The conveyance of non-federal land or interests in the land in exchange for National Forest System land or interests in land.

landing: A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

land line location: Legal identification and accurate location of national forest property boundaries.

landscape character: Particular attributes, qualities, and traits of a landscape that give it an image and make it more identifiable or unique. Levels include Natural Evolving, Natural Appearing, Pastoral/Agricultural, Historic, Transitional, Suburban, and Urban.

landscape: An area composed of interacting ecosystems that are repeated because of geology, land form, soils, climate, biota, and human influences throughout the area. Landscapes are generally of a size, shape, and pattern that are determined by interacting ecosystems.

leasable minerals: See minerals (leasable).

lease: A contract between the landowner and another granting the latter the right to search for and produce oil, gas, or other mineral substances (as specified in the document) on payment of an agreed rental, bonus, or royalty. This right is subject to the terms, conditions, and limitations specified in the document.

leave tree: A tree (marked to be) left standing for wildlife, seed production, etc., in an area where it might otherwise be felled.

logging: The cutting and removal of trees from a forest.

M

management action: A set of management activities applied to a land area to produce a desired output.

management area: An area with similar management objectives and a common management prescription.

management direction: A statement of multiple-use goals, objectives, and standards for attaining them. Management direction is expressed forest-wide, by management prescription, and by management area.

management emphasis: The multiple-use values to be featured or enhanced within a given management prescription or management area.

management indicator species (MIS): An animal or plant selected for use as a planning tool in accordance with 1982 NFMA regulations (36 CFR 219.19). These species are used to help set objectives, analyze effects of alternatives, and monitor Forest Plan implementation. They are chosen because their population changes are believed to indicate the effects of management on selected biological components.

management practice: A specific action, measure, course of action, or treatment undertaken on a forest.

management prescription: Management practices and intensity selected and scheduled for application on a specific area to attain multiple use and other goals and objectives. (36 CFR 219.3)

management type: The tree species or species group that should be grown on a specific site, whether or not it presently occupies the site that best suits the particular site soil, aspect, elevation, and moisture provided by the area and the forest plan's objectives.

mast: The fruit of trees such as oak, beech, sweet chestnut and also the seeds of certain pines; for example, shortleaf and loblolly pines, particularly where considered as food for livestock and certain kinds of wildlife.

mesic: Sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet or dry.

mineral entry: All National Forest System lands which (1) were formerly public domain lands subject to location and entry under the U.S. mining laws, (2) have not been appropriated, withdrawn, or segregated from location and entry, and (3) have been or may be shown to be mineral lands, are open to prospecting for locatable, or hardrock, minerals.

mineral exploration: The search for valuable minerals on lands open to mineral entry.

mineral materials: Materials such as road aggregate, landscaping rock, rip-rap, and other earthen construction materials. These materials are used to build and maintain trails, roads, and campgrounds; to restore riparian and aquatic habitat; to repair flood damage, etc.

mineral resource: A known or undiscovered concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such form and amount that economic extraction of a commodity is currently or potentially feasible.

mineral soil: Weathered rock materials without any vegetative cover.

minerals, leasable: Coal, oil, gas, phosphate, sodium, potassium, oil shale and geothermal steam on public domain and acquired status lands, and hard rock minerals on acquired lands.

minerals, locatable: Hard rock minerals on public domain status land. May include certain nonmetallic minerals and uncommon varieties of mineral materials.

minimum level: The minimum level of management which complies with applicable laws and regulations, including prevention of significant or permanent impairment of the long-term productivity of the land, and which would be needed to maintain the land as a National Forest, and to manage uncontrollable outputs, together with associated costs and inputs.

mining claims: That portion of the public estate held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested to the locator of a deposit.

mitigation: Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

modified seed tree: A timber harvest cut designed to obtain natural regeneration from seed trees left for that purpose. Approximately 10-20 sq. ft. of pine and hardwood basal area per acre are retained in the overstory. Seed trees are retained indefinitely. This cut will establish a two-aged stand. This treatment differs from a traditional seedtree by retaining a mix of hardwoods and pines in the overstory after regeneration.

modified shelterwood: A timber harvest cut designed to establish natural regeneration and develop a two-aged stand. Approximately 20-40 sq. ft. of pine and hardwood basal area per acre are retained in the overstory. After seedlings are established, the overstory may be thinned again, to a density that will provide for the development of regeneration. The remaining large trees are retained indefinitely. This treatment differs from a traditional shelterwood by retaining a mix of hardwoods and pines in the overstory after regeneration.

monitoring and evaluation: The evaluation on a sample basis of Forest Plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

monitoring: The periodic evaluation on a sample basis of Forest Plan management practices to determine how fully objectives have been met, how closely management standards have been applied, and what effects those practices had on the land and environment.

motorized equipment: Machines that use a motor, engine, or other non-living power source. This includes, but is not limited to such machines as chain saws, aircraft, generators, motor boats, and motor vehicles. It does not include small battery or gas powered hand carried devices such as shavers, wristwatches, flashlights, cameras, stoves, or other similar small equipment.

multiple use: Management of all the various resources of the National Forest system so that they are utilized in the combination that will best meet needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources and services; and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of the uses that will give the greatest dollar return or the greatest unit output. (36 CFR 219.3)

N

National Environmental Policy Act (NEPA): An Act, to declare a National policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

National Forest Land and Resource Management Plan (Forest Plan): A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given national forest.

national forest land: Ouachita National Forest System lands for which the Forest Service is assigned administrative responsibility.

National Forest Management Act (NFMA): A law passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans, and regulations to guide that development.

national forest system (NFS): All National Forest System lands reserved or withdrawn from public domain of the United States and acquired through purchase, exchange, donation, or other means. National Grasslands and land utilization projects administered under Title III of the Bankhead–Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010–1012), and other lands, waters, or interests that are administered by the Forest Service, or are designated for administration through the Forest Service as a part of the system.

national forest system land: Federal land that has been legally designated as national forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III land.

National Recreation Trails: Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses, in or reasonably accessible, to urban areas.

National Register of Historic Places: The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the US Department of the Interior.

National Visitor Use Monitoring (NVUM): A systematic process to estimate annual recreation and other uses of National Forest System lands through user surveys.

National Wild and Scenic Rivers System: Rivers with scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act of Oct. 2, 1968, for preservation of their free-flowing condition.

National Wilderness Preservation System: All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

natural plant community: an association of plant species which are endemic to an area and whose characteristics have not been adversely affected by human disturbance.

natural regeneration: Renewal by self-sown seed or by vegetative means (regrowth).

net annual growth: The net change in merchantable volume expressed as an annual average between surveys in the absence of cutting (gross growth minus mortality).

net public benefits: An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued. Net public benefits are measured by quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

no surface occupancy (NSO): Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect the identified resource values.

no-action alternative: The condition expected to exist in the future if current management direction would continue unchanged.

non-attainment area: For National Ambient Air Quality Standards (NAAQS), where the pattern of "violations of standard" is sufficient to require remedial action; a boundary is determined around the location of the violations. The area within that boundary is designated to be in non-attainment of the particular NAAQS and an enforceable plan is developed to prevent additional violations.

non-commercial thinning: The thinning of commercial-size trees without a subsequent sale of associated wood products. Also called a pre-commercial thinning.

non-motorized recreation: A recreational opportunity provided without the use of any motorized vehicle. Participation in these activities is accomplished through the use of foot, or horseback travel. Motorized vehicle equipment may be authorized for administrative purposes of resource management.

non-point source pollution: A diffuse source of pollution not regulated as a point source. May include atmospheric, deposition, agricultural runoff, and sediment from land-distributing activities.

O

objective: A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3)

obligate species: a plant or animal species which occurs naturally only in a specific type of habitat.

obliteration: The reclamation of the land occupied by a facility for purposes other than transportation.

occupancy trespass: The illegal occupation or possession of National Forest land or property.

off-highway vehicle (OHV): Any vehicles capable of being operated off established roads.

old growth forests: an ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages in a variety of characteristics including tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. Old growth is not necessarily virgin or primeval. It can develop over time following human disturbances, just as it does following natural disturbances. Old growth encompasses both older forests dominated by early seral species and forests in later successional stages dominated by shade tolerant species.

old growth: A stand of trees that is usually well past the age of maturity as defined by the culmination of mean annual increment and often exhibit characteristics of decadence. These characteristics may include, but are not limited to: low growth rates, dead and dying trees, snags, and down woody material.

open road density: Calculated by converting the acres within the allocation of a contiguous block into square miles (total acres/640 acres) and then dividing that figure into the linear measure of open roads within the block. Open roads forming the boundary of a contiguous management prescription block contribute half of their length to open road density calculations. An open road is a motorized travelway (including designated motorized trails) used on a regular basis.

operating plan: A written plan, prepared by those engaged in mining activity on the forests, and approved by a forest officer for prospecting, exploration, or extraction activities that are slated to take place on National Forest System land.

outstanding mineral rights: Instances in which the minerals in federally: owned lands were severed prior to the transaction in which government acquired the land. Such rights are not subject to the Secretary of Agriculture's rules and regulations. Removal or extraction of these minerals must be allowed in accordance with the instrument severing the minerals from the surface and under applicable state and local laws and regulations. See also Reserved Mineral Right.

overstory: That portion of trees in a two: or multi-layered forest stand that provides the upper crown cover.

P

partnership: Voluntary, mutually beneficial and desired arrangement between the Forest Service and another or others to accomplish mutually agreed-on objectives consistent with the agency's mission and serving the public's interest.

payments in lieu of taxes: Payments to local or state governments based on ownership of federal land, and not directly dependent on production of outputs or receipt sharing.

perennial stream: A stream with a defined channel that flows at least 90 percent of the time. Includes channels that contain permanent pools of water that may be connected by areas without surface flow but which generally have subsurface flow.

personal use: The use of a forest product, such as firewood, for home use as opposed to commercial use or sale.

persons-at one-time (PAOT): A recreation capacity measurement term indicating the number of people that can use a facility or area at one time.

planning period: One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

policy: A guiding principle upon which is based a specific decision or set of decisions.

possible old growth: areas with the highest probability of being existing or future old growth based on the preliminary inventory criteria.

precommercial thinning: The selective felling or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

preferred alternative: After evaluation completed in the planning process, the alternative chosen by the Agency (Regional Forester) as the alternative that would most nearly meet Agency objectives

prescribed fire (burning): Controlled application of fire to wildland fuels in either their natural or modified state, under such conditions of weather, fuel moisture, soil moisture, etc. as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives of silviculture, wildlife management, grazing, fire hazard reduction, etc. NOTE: It seeks to employ fire scientifically to realize maximum net benefits with minimum damage and at acceptable cost.

prescribed fire: Any fire ignited by management actions to meet specific objectives including disposal of fuels, and controlling unwanted vegetation. The fires are conducted in accordance with prescribed fire plans, and are also designed to stimulate grasses, forbs, shrubs, or trees for range, wildlife, recreation, or timber management purposes.

prescription: See Management Prescription, and Silvicultural Prescription.

present net value (present net worth): The difference between net benefits and net costs, each discounted to the present.

proclamation boundary: The boundary contained within the presidential proclamation that established the national forest.

program: Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments.

project: A work schedule prescribed for a project area to accomplish management prescriptions. An organized effort to achieve an objective identified by location, activities, outputs, effects, time period, and responsibilities for execution.

proposed action: In terms of the National Environmental Policy Act, the project, activity, or decision that a federal agency intends to implement or undertake. The proposed action described in the Environmental Impact Statement is the Forest Plan.

proposed wilderness study area: Areas recommended for wilderness study by the Forest Service but which have yet to be acted on by Congress.

public access: Usually refers to a road or trail route over which a public agency claims a right-of-way for public use.

public net benefit: The change in the well being of a people as a whole after allowances for costs of factors of production and other goods and services incidental to the management decision.

public: The people of an area, state or nation that can be grouped together by a commonality of interests, values, beliefs or lifestyles.

R

range allotment: A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan.

range management: The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resources.

Ranger District: Administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.

reconstruction: Work that includes, but is not limited to, widening of roads, improving alignment, providing additional turnouts, and improving sight distance that improve the standard to which the road was originally constructed. Also undertaken to increase the capacity of the road or to provide greater traffic safety.

record of decision: A document separate from, but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the alternative assessed in the environmental impact statement chosen to implement.

Recreation Opportunity Spectrum (ROS): A method for classifying types of recreation experiences available, or for specifying recreation experience objectives desired in certain areas. Classes include:

> **Primitive (P):** An area characterized by having essentially unmodified natural environment of 5,000 or more acres. Interaction between users is very low; evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted. There is a high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk.
>
> **Semi-Primitive Non-Motorized (SPNM):** Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted. There is a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.
>
> **Semi-Primitive Motorized (SPM):** Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres, with a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Motorized use is permitted.
>
> **Roaded Natural (RN):** Area characterized by a predominantly natural or natural-appearing environment with a low probability of experiencing isolation from the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities. Opportunities for both motorized and non-motorized forms of recreation may be provided.
>
> **Rural (R):** Area characterized by a substantially modified natural environment with a low probability of experiencing isolation from the sights and sounds of man. A considerable number of facilities are designed for use by a large number of people. Facilities for intensified motorized use and parking are provided.
>
> **Urban (U):** Area characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Vegetative cover is often manicured. Sights and sounds of humans, on-site, are predominant. Facilities for highly intensified motorized use and parking are available with forms of mass transit often available to carry people throughout the site.

recreation: Any socially desirable leisure activity in which an individual participates voluntarily and from which he derives satisfaction.

recreational opportunity: Availability of settings for users to choose from (activities) that provide refreshment of the body or mind.

reference condition: Reference conditions are the characteristic mosaic of vegetation such as composition and structure and the frequency and severity of disturbances under the historic range of variability. Reference conditions are used to calculate Fire Regime Condition Class (FRCC) and can be used as a baseline measurement.

reforestation: The natural or artificial restocking of an area with forest trees.

regeneration cutting: Any removal of trees intended to assist regeneration already present or to make regeneration possible.

regeneration: The re-establishment of forest cover by seeding, planting, and natural means (also called reforestation). Also used as a noun referring to the young trees themselves.

region: An administrative unit within the National Forest system. The United States is divided into nine geographic regions. Each region has a headquarters office and is supervised by a Regional Forester. Within each region are located National Forests and other lands of the Forest Service.

Regional Forester: The official responsible for management of National Forest land within a USDA Forest Service region.

research natural area: An area set aside by the Forest Service specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

reserved mineral rights: Refers to those cases wherein the minerals were severed from the surface during the transaction whereby the government acquired the land. These rights are subject to the Secretary of Agriculture's rules and regulations that were applicable at the time of the transaction.

resource: An aspect of human environment which renders possible, or facilitates the satisfaction of, human wants, and the attainment of social objectives.

restoration: The process of modifying an ecosystem or repairing damage, such that natural processes will again function in the repaired system to achieve a desired, healthy and functioning condition.

retention: A visual quality objective in which human activities are not evident to the casual forest visitor.

revegetation: The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of humans (e.g., afforestation and range reseeding).

revision: To make the plan new or up-to-date. Plan revision must be considered and approved in accordance with the requirements for the development and approval of a forest plan. Revisions take place every 10-15 years, but may occur more frequently if conditions or public demands change significantly.

right-of-way: A right of use across the lands of others. It generally does not apply to absolute purchase of ownership.

riparian areas: Areas with three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the watercourse at a variable width.

riparian ecosystem: A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem identified by soil characteristics (alluvial soils inundated by a 100-year flood, wetland soils) and distinctive vegetative communities that require free and unbound water.

riparian: Land areas directly influenced by water. They usually have visible vegetative or physical characteristics showing this water influence. Streamside, lake borders, and marshes are typical riparian areas.

riparian dependent species: Species that are dependant on riparian areas during at least one stage of their life cycle.

ripping: A process where the soil is mechanically sliced or broken to improve tilth, aeration, and permeability.

road construction: Activity that results in the addition of forest system or temporary road miles.

Road Maintenance Levels: Levels are described as follows:

a. Level 1: Road normally closed to vehicle traffic.

b. Level 2: Road open for limited passage of traffic but not normally suitable for passenger cars.

c. Level 3: Road open for public traffic including passenger cars, but may not be smooth or comfortable.

d. Level 4: Road suitable for all types of vehicles, generally smooth to travel and dust may be controlled.

e. Level 5: Road is smooth and dust free, and the surface is skid resistant, if paved.

road reconstruction: Activity that results in improvement or realignment of an existing system road defined as follows:

road improvement: Activity that results in an increase of an existing road's traffic service level, expansion of its capacity, or a change in its original design function.

road realignment: Activity that results in a new location of an existing road or portions of an existing road, and treatment of the old roadway.

road: A motor vehicle path more than 50 inches wide, unless classified and managed as a trail. It may be classed as a system or non-system road.

roads analysis process (RAP): Roads analysis is an integrated ecological, social, and economic science based approach to transportation planning that addresses existing and future road management options. The intended effects are to ensure that decisions to construct, reconstruct, or decommission roads will be better informed by using a roads analysis. Roads analysis may be completed at a variety of different scales, but generally begins with a broad forest-scale analysis to provide a context for future analyses.

S

sapling: A usually young tree that is larger than a seedling, but smaller than a pole. Size varies by region.

Scenery Management System (SMS): A system for the inventory and analysis of the aesthetic values of the National Forest System lands. It replaces the Visual Management System (VMS) as defined in Agricultural Handbook #462.

scenic attractiveness: The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Classified as A (Distinctive), B (Typical or Common), or C (Undistinguished).

scenic class: A system of classification describing the importance or value of a particular landscape or portions of that landscape. Values range from 1 (highest value) to 7 (lowest value).

scenic integrity objective (SIO): A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations to the valued attributes of the characteristic landscape. Objectives include Very High, High, Moderate, and Low.

> **Very High (VH):** Generally provides for only for ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.
>
> **High (H):** Human activities are not visually evident to the casual observer. Activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.
>
> **Moderate (M):** Landscapes appear slightly altered. Noticeable human-created deviations must remain visually subordinate to the landscape character being viewed.
>
> **Low (L):** Landscapes appear moderately altered. Human-created deviations begin to dominate the valued landscape character being viewed but borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.

scenic integrity: A measure of the degree to which a landscape is visually perceived to be "complete." The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued for its aesthetic appeal. Scenic integrity is used to describe an existing situation, standard for management, or desired condition.

sediment: Solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

sedimentation: The deposition of detached soil and rock material transported by or suspended in water.

seed tree: An even-aged regeneration method where in a single cut, the removal of all merchantable trees in a stand, except for a small number of widely dispersed trees retained for seed production, and to produce a new age class in a fully-exposed microenvironment.

seep: A wet area where a seasonal high water table intersects with the ground surface. Seeps that meet the definition of a wetland are included in the Riparian Corridor.

Selected Alternative: The alternative chosen by the Regional Forester to implement as the Revised Forest Plan.

sensitive species: Those species that are placed on a list by the Regional Forester for which population viability is a concern.

seral stage: a developmental, transitory stage in the ecological succession of a biotic community.

shaft: A vertical excavation from the surface or within a mine, of limited area compared with its depth; made for finding or mining ore, lowering and hoisting miners, ventilation, and other purposes in an underground mining operation.

shelterwood: A regeneration method of regenerating an even-aged stand in which a new age class develops beneath the partially shaped microenvironment provided by the residual trees. The sequence of treatments can include three distinct types of cuttings: (1) an optional preparatory harvest to enhance conditions for seed production; (2) an establishment harvest to prepare the seed bed, and to create a new age class; and 3) a removal harvest to release established regeneration from competition with the overwood.

silvicultural system: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop, and provide for regeneration and according to the type of forest thereby produced.

silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

single-tree selection: A regeneration method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed uniformly throughout the stand to achieve desired stand structural characteristics.

site index: A numerical evaluation of the quality of land for plant productivity.

site preparation: The removal of competition and conditioning of the soil to enhance the survival and growth of seedlings or to enhance the germination of seed.

site: An area considered in terms of its physical and/or biological environment, e.g., riparian zone, a homogenous stand of vegetation, a campground, etc.

skid trail: A temporary pathway through the woods formed by loggers dragging (skidding) logs from the stump to a log landing or skid road, without dropping a blade and without purposefully changing the geometric configuration of the ground over which they travel.

skidding: A term for moving logs by dragging from stump to roadside, deck, or other landing.

slash: The residue left on the ground after harvesting, sanitation operations, windstorm or fire. It includes unutilized logs, uprooted stumps, broken or uprooted stems, tops, branches, leaves, etc.

snag: A dead or partially dead (more than 50 percent) hardwood or pine tree which is used by many species for perching, feeding, or nesting.

soil productivity: The capacity of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

southern pine beetle: One of the many species of pine bark beetles that are present in the forest at all times. When environmental and forest conditions become favorable, the beetle populations can increase and cause substantial timber losses over extensive areas in a relatively short period of time.

Southern Region: The Forest Service organizational unit consisting of thirteen Southeastern states and Puerto Rico.

special interest area: Areas supporting some unique biological element(s) such as novaculite glades, acid seeps, etc., that have been or will be protected.

special use authorization: A permit, term permit, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

special-use permits: Special uses are permits issued by the Forest Service for various land uses.

SPECTRUM: A computer modeling tool to model alternative resource management scenarios applied to landscapes through time in support of strategic and tactical planning. This includes scheduling vegetation manipulation activities to achieve ecosystem management objectives; modeling resource effects and interactions within management scenarios; and exploring tradeoffs between alternative management scenarios in support of decision-making.

spring: A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. Generally flows throughout the year. Springs that are the source of perennial or intermittent streams are included in the Riparian Corridor.

stand improvement: A term comprising all intermediate cuttings made to improve the composition, structure, condition, health, and growth of even-aged, two-aged, or uneven-aged stands.

stand: A contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

standard: A principle requiring a specific level of attainment, a rule to measure against.

stocking: The degree of occupancy of land by growing stock trees, measured by basal area or number of trees per unit area and spacing compared with a minimum standard: which varies by tree size and species or species group: to the occupancy that is required to fully utilize the growth potential of the land.

stream: A water course having a distinct natural bed and banks; a permanent source which provides water at least periodically; and at least periodic or seasonal flows at times when other recognized streams in the same area are flowing.

suitability: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

suitable for timber production: National Forest System land allocated by a Forest Plan decision to be managed for timber production on a regulated basis. *Regulated basis* means a systematic relationship between tree growth and timber harvest such that a specific timber volume objective level can be sustained indefinitely.

suitable: Land that is to be managed for timber production on a regulated basis.

suppression (fire suppression): Any act taken to slow, stop or extinguish a fire. Examples of suppression activities include line construction, backfiring, and application of water or chemical fire retardants.

T

targets: Assignments made to the Forest by the Regional Forester. A statement used to express planned results to be achieved within a stated period of time.

temporary road: A road authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be part of the forest transportation system and not necessary for long-term resource management.

ten (10)-year entry: This is the average length of time between regeneration harvests. This is considered only an average, with actual entries allowed to vary from 8 too 12 years. Entry is defined as when the timber is sold.

tentatively suitable: Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

terrestrial: of, or pertaining to, land as distinct from water.

thinning: A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.

threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Designated as a threatened species in the Federal Register by the Secretary of Interior.

timber production: The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of forest planning, timber production does not include the production of fuelwood or harvests from unsuitable lands. (36 CFR 219.3, 1982 rule)

timber stand improvement: A term comprising all intermediate cuttings made to improve the composition, constitution, condition, and increment of a timber stand.

timber: A general term applied to tree stands that provide a wood fiber product, specifically sawed lumber five by five inches or more in width and depth.

topography: The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

trail: A general term denoting a way for purposes of travel by foot, stock or trail vehicle. (A trail vehicle is one which is 40 inches or less in width and is designated for trail use.)

trailheads: The parking, signing, and other facilities available at the terminus of a trail.

transportation system: All roads needed to manage and administer the Forest resources. A road network.

trespass: The invasion of the property or rights of another without owner's consent.

two-aged stand: A stand composed of two distinct age classes that are separated in age by more than 20 percent of rotation.

U

understory: The trees and other vegetation growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion (overstory) of adjacent trees and other woody growth.

uneven-aged management: The manipulation of a forest for a continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of age or diameter (size) classes to provide a sustained yield of forest products. Managed uneven-aged forests are characterized by trees of many ages, or sizes intermingled singly or in groups. Trees are harvested singly or in small groups with the process of regeneration of the desirable species occurring either continuously or at each harvest. Each harvest usually includes thinning and cultural treatments to promote growth and maintain or enhance stand structure. The basic method for control (regulation) is some expression of volume (such as basal area), stand structure, and maximum tree size.

uneven-aged: a stand of trees in which the individual trees originated over a long period of time and, thus, differ widely in age; a regeneration system designed to produce such a stand.

unsuitable forest land (not suited): Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience; (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan.

V

viable population: Population of plants or animals that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area.

viewshed: The total landscape seen, or potentially seen, from all or a logical part of a travel route, use area, or waterbody.

visual resource: The composite of basic terrain, geological features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

water bars: A change in the grade of a roadbed, trail surface, or fire line used to divert water off the surface to prevent it from eroding ruts and possibly carrying sediment to a stream.

watershed: The entire area that contributes water to a drainage system or stream.

wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats and natural ponds.

wild and scenic river: A river or section of river designated as such by congressional action under the Wild and Scenic Rivers Act of Oct. 2, 1968, as supplemented and amended, or those sections of a river designated as wild, scenic, or recreational by an act of the legislature of the state or states through which it flows. A river can be classified under the following three categories:

> **wild river:** Free of impoundments and generally inaccessible except by trail, and within watersheds or shorelines that are essentially primitive.
>
> **scenic river:** Free of impoundments but accessible by roads, and within watersheds or shorelines that are still largely primitive and undeveloped.
>
> **recreational river:** Readily accessible by roads, with some development along their shorelines and may have undergone some impoundment or diversion in the past.

wilderness: Area designated by congressional action under the l964, l975, l980 and l983 Wilderness Acts. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

wildland fire: Any non-structural fire on wildlands other than one intentionally set for management purposes. Confined to a predetermined area. Not to be confused with “fire use,” which includes prescribed fire.

wildland-urban interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

wildlife habitat improvement: The manipulation or maintenance of vegetation to yield desired results in terms of habitat suitable for designated wildlife species or groups of species.

wildlife stand improvement (WSI): Habitat improvements involving the manipulation of either the overstory or understory crown canopy which benefit wildlife, fish, or threatened and endangered animals and plants.

wildlife: All non-domesticated mammals, birds, reptiles, and amphibians living in a natural environment, including game species and non-game species. Animals, or their progeny (i.e., feral animals: including horses, burros, and hogs), that once were domesticated, but escaped captivity, are not considered wildlife.

withdrawal: An order removing specific land areas from availability for certain uses.

withdrawn: National Forest System lands segregated or otherwise withheld from settlement, sale, location, or entry under some or all of the general land laws.

woodlands: an open stand of trees with crowns not usually touching (generally forming a 25 to 60 percent cover).

X

xeric: Pertaining to sites or habitats characterized by decidedly dry conditions.

Glossary of Commonly Used Abbreviations and Acronyms

$\mu g/m^3$	Microgram(s) per cubic meter
A	
ADA	Americans with Disabilities Act
AGFC	Arkansas Game and Fish Commission
AQI	Air Quality Index
AQRV	Air Quality Related Values
ARPA	Archaeological Resources Protection Act
ASQ	Allowable Sale Quantity
AUM	Animal Unit Month
B	
BA	Basal Area
BMP	Best Management Practice
C	
CAA	Clear Air Act
CCF	Hundred Cubic Feet
CFR	Code of Federal Regulations
CSU	Controlled Surface Use
CUS	Control of Undesirable Species
D	
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
E	
EF	Experimental Forest
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
F	
FEIS	Final Environmental Impact Statement
FIA	Forest Inventory and Analysis
FY	Fiscal Year

H	
HMA	Habitat Management Areas
I	
IMR	Implementation Monitoring Review
IPM	Integrated Pest Management
M	
MA	Management Area
MIS	Management Indicator Species
N	
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NRA	National Recreation Area
O	
ODWC	Oklahoma Department of Wildlife and Conservation
OHV	Off-Highway Vehicle
ONF	Ouachita National Forest
P	
PET	Proposed, Endangered, or Threatened Species
PETS	Proposed, Endangered, Threatened or Sensitive Species
R	
RCW	Red-cockaded Woodpecker
RD	Ranger District
RNA	Research Natural Area
ROS	Recreation Opportunity Spectrum
ROW	Right-of-Way
S	
SERA	Syracuse Environmental Research Associates
SHPO	State Historic Preservation Officer
SIO	Scenic Integrity Objective

SMA	Streamside Management Area
SMS	Scenery Management System
SPB	Southern Pine Beetle
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
T	
THPO	Tribal Historic Preservation Office
U	
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
W	
WUI	Wildland Urban Interface

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Plant Meeting, August 25, 2003 in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, and Jeff Holmes, entered final data into the database.

Plant Meeting, July 15, 2003. in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, worked on entering species info into database.

Plant Meeting, July 18, 2003. in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, worked on species document as references for the database.

Plant Meeting, July 23, 2003. in Hot Springs, AR Attendees: Susan Hooks, Theo Witsell, reviewed each species and its associated targets.

Plant Meeting, July 8, 2003. in Hot Springs, AR Attendees: Susan Hooks, Scott Simon, Betty Crump, Jeff Holmes, assigned species to targets and revised some key factors.

Plant Meeting, June 17, 2003 in Hector, AR Attendees: Susan Hooks and Mike Brod, reviewed the database and began developing a process for organizing data.

Plant Meeting, June 23, 2003 in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, Jeff Holmes, Betty Crump, Steve Osborne began work on targets, key factors and indicators.

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Index