Environmental Assessment

MOUNTAIN FORK PROJECT

Polk County, Arkansas

Responsible Agency:
USDA Forest Service
Ouachita National Forest
Mena and Oden Ranger Districts

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Purpose of and Need for the Proposed Action

A. INTRODUCTION

The Mountain Fork Project Area (MFPA) located on the Mena Ranger District (Figure 1), is the subject of this environmental assessment (EA). It is within Forest Service Region 8 (Southern Region) and is part of the Ouachita National Forest (ONF), which is composed of approximately 1.8 million acres in Arkansas and Oklahoma. The existing conditions in this watershed are compared to the ONF Revised Land and Resource Management Plan (Revised Forest Plan, USDA Forest Service, 2005a) as directed by the National Forest Management Act (NFMA) requirements. Management opportunities are proposed and analyzed in order to move the watershed toward desired condition(s) as stated in the Revised Forest Plan.

The Mena Ranger District contains over 194,000 National Forest System acres. The MFPA is located within the Mountain Fork 6th level watershed (111401080101). Cumulative effects analysis as well as Travel Analysis were completed for the entire 29,421 acre watershed area which contains the MFPA. The MFPA includes approximately 13,400 acres of this larger watershed area, or about 21 square miles; 11,046 acres are National Forest, 252 acres are State lands (Queen Wilhelmina State Park), and 2,102 acres are private land. The project area is bound on the south by the Ouachita National Forest administrative boundary, on the west by the Arkansas-Oklahoma state line, on the north by Arkansas Highway 88 and partially on the east by Forest Service Road 417 (Figure 1). The District Ranger for the Mena and Oden Ranger Districts is the line officer who has the responsibility and authority for conducting analyses, preparing necessary documentation, and making decisions on proposed actions under his jurisdiction.

B. PROPOSED ACTION

The Mena and Oden District Ranger proposed the following resource management activities for the project area.

Table 1: Proposed Action Activities

ACTIVITY	APPROXIMATE NET MEASURE (acres unless noted)	IMPLEMENTATION YEAR RANGE
Commercial Thinning	2,211	2014-2022
Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	164	2012-2022
Hand Planting with Shortleaf Pine	164	2014-2022
Timber Stand Improvement by Release	164	2014-2022
Pre-commercial Thinning	14	2014-2022
Firewood Areas	As Available	2014-2022

ACTIVITY	APPROXIMATE NET MEASURE (acres unless noted)	IMPLEMENTATION YEAR RANGE
Fish Passage Restoration	5 stream crossings	2012-2022
Bat Roost Boxes	6 boxes	2012-2022
Wildlife Stand Improvement (mid-story removal)	316	2014-2022
Non-Native Invasive Species Eradication by Herbicide and/or Manual Methods	11,046[1]	2012-2022
Fuel Reduction Prescribed Burning – Dormant or Growing Season	1,587	2012- ∞
Fireline Construction	2 miles	2012-2022
Fireline Reconstruction	2 miles	2012-2022
Soil Stabilization (Unauthorized OHV trails)	12 miles	2012-2022
Unauthorized Road – Close	1/2 mile	2012-2022
Unauthorized Road – Close and Decommission	11.5 miles	2012-2022
System Road – Permanent Closure	1.6 miles	2012-2022
System Road Construction	2.4 miles	2014-2022
System Road Reconstruction	1.5 miles	2012-2022
Temporary Road Construction	7.6 miles	2014-2022
Road Maintenance	37 miles	2012-2022
Construction of Trail Shelter	1 shelter	2012-2022

1 – This figure represents the total area of National Forest System lands that could be subject to non-native species eradication. The actual area of non-native species eradication needs are unknown at this time, but are estimated to be approximately 1-5% of this figure.

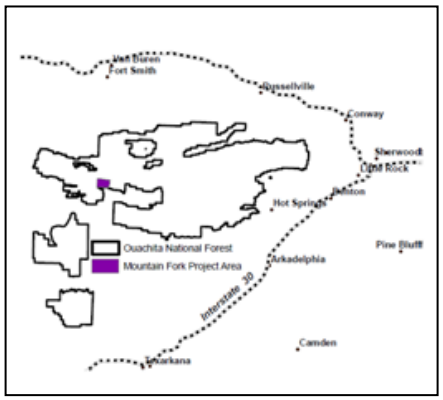
The analysis area for the MFPA is composed of all or portions of Compartments 875-877, 893, and 895-899. Geographically, the project area is located approximately 8 miles west of Mena, Arkansas in T1S, R31W, Sec 7; T1S, R32W Sec 7-31 in Polk County, Arkansas (See Figure 1).

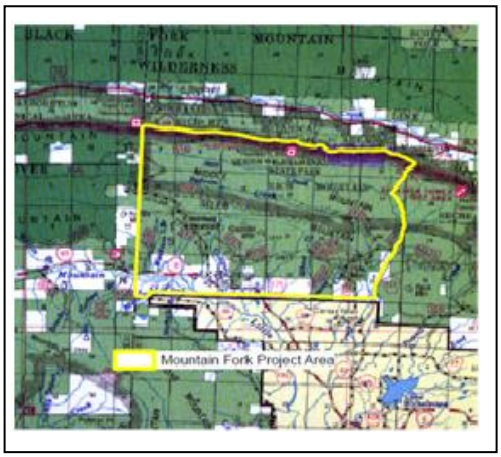
National Forest land within the analysis area is prescribed to be managed under the Revised Forest Plan direction for the following management areas (MA): Special Interest Areas (MA 2), Rare Upland Communities (MA 6), Water and Riparian Communities (MA 9), and Ouachita Mountains-Habitat Diversity Emphasis (MA 14). These are shown in Map 1 (see Appendix B).

Proposed actions for the MFPA are scheduled for phased implementation beginning in fiscal year (FY) 2012 (a fiscal year is the period October 1 – September 30). Timber harvest activities and associated road construction could be expected to commence in 2014 and continue for a period of 1 to 5 years. Site preparation and planting activities could begin as early as 2012 on the tornado affected areas and continue for a period of 2 to 3 years. Wildlife stand improvement would commence concurrently or after the harvest activities and continue for a period of 2 to 3 years. Prescribed burning activities would commence concurrently with site preparation and wildlife habitat activities and could continue in perpetuity. Each burn unit would be treated with controlled broadcast fire approximately every 1 to

5 years. This recurring schedule would be on a continuous basis and extend indefinitely beyond the 10-year period during which other proposed management activities would occur. All other activities may be implemented between 2012 and 2022 (see Table 1).

Figure 1 – Vicinity Maps for the Mountain Fork Project





C. NEED FOR THE ACTION

Contrasts between existing and desired MA conditions aid the interdisciplinary team in discovering the possible and probable needs for proposed management activities. Management activities (proposed actions) determined to be within the scope of analysis were generated from these contrasts (Table 2).

Table 2: Desired Condition *versus* Existing Condition

Desired Condition "Objective"	Existing Condition	Site Specific Need	Management Activity
Take steps to improve forest health by reducing the likelihood of insect infestations, disease outbreaks, and establishment of non-native, invasive species on National Forest System lands (Revised Forest Plan, p 58).	Trees in many stands are overcrowded or densely stocked. These stands are vulnerable to infestation by southern pine beetle. Bark beetle mortality could reduce a sustained yield of wood products. Poor tree growth in densely stocked stands is reducing yield of quality saw timber products. Non-native species are present within the analysis area.	Need to restore healthy conditions by limiting overstory, removing unhealthy trees and reducing stocking. Numerous sites across the project area need treatment for non-native invasive species through mechanical or chemical means.	Thinning and Wildlife Stand Improvement Treatments; Non-native Invasive Species Eradication

Desired Condition "Objective"	Existing Condition	Site Specific Need	Management Activity
Lands in and around "Firewise Communities" and other "Communities at Risk" are the highest priority for mechanical treatment including commercial and non-commercial thinning and/or midstory removal followed by prescribed fire (usually done within two years of mechanical work) (Revised Forest Plan, p 68).	Approximately 480 acres are considered wildland-urban interface (WUI). An additional 3,273 acres are within ½ mile of private land.	Increase prescribed fire frequency to a 1 to 5 year interval, and reduce fuels to 3.5-4.0 tons per acre and FRCC to 1 on approximately 1,587 acres within the analysis area to meet desired intervals for various ecosystem types present (See Revised Forest Plan, Part I); reduce the accumulated fuels and wildfire hazard to minimize damage to forest resources (biotic and abiotic) and people's homes. Opportunity for stocking reduction has been identified on 2,211 acres (commercial thinning activities), which is approximately 10 percent of the National Forest System lands in the MFPA. Pre-commercial thinning activities are currently needed on 14 acres, and in the future on 164 acres damaged in the 2009 tornado. Opportunity for wildlife stand improvement by midstory reduction has been identified on 316 acres. The majority of treated areas would be in stands classified as overstocked.	Fuel Reduction Prescribed Burning; Fireline Construction; Fireline Reconstruction; Thinning and Wildlife Stand Improvement Treatments
Maintain or restore community diversity – and a significant component of species diversity (Revised Forest Plan, p 58).	Over 99% of National Forest System lands within the project area have highly altered fire regimes, while less than 1% have moderately altered fire regimes (FRCC 3 and 2, respectively) The majority is in a fire regime condition class that has been significantly altered from the historical range and risk of losing key ecosystem components is high. The fuel loading is approximately 10.5 tons per acre, which is approximately 6-7 tons above target. This has resulted in limited open understories necessary for wildlife foods, lack of natural regeneration of pine and oak and loss of suitable habitat conditions for plants adapted to fire.		
Manage the forest transportation system…to reduce road-related barriers to aquatic organism passage (Revised Forest Plan, p 67).	Five stream crossings inhibit movement of fish and other aquatic organisms.	Improve aquatic organism passage at stream crossings that inhibit fish passage within the project area.	Fish Passage Restoration
Habitat conditions sustain healthy populations of native and desired non-native wildlife and fish species (Revised Forest Plan, p 20).	Roosting habitat and maternity roosting sites for tree roosting bat species are deficient.	Identify sites to improve bat roosting.	Bat Box Placement

Desired Condition "Objective"	Existing Condition	Site Specific Need	Management Activity
Identify roads and trails that should be reconstructed or decommissioned to reduce sediment and improve watershed condition (Revised Forest Plan, p 62). No new system roads will be constructed within [MA 2] (Revised Forest Plan, Design Criteria 2.01, p 101). Provide a safe transportation system that meets the minimum needs of various resources and their users, minimizes wildlife habitat disturbance, and satisfies some public demand for motorized recreation (Revised Forest Plan, p 67).	There are approximately 86 miles of road (open and closed combined) in the larger 6th level watershed (private and national forest land) Of all the classified (authorized) roads in this watershed, 65 percent (48 miles) are categorized as open and 35 percent (26 miles) are closed. Approximately 12 miles of unauthorized roads are located on national forest land. This contributes to sediment and impacts water quality. Current open road density is approximately 0.74 miles/ miles^2 in all Management Areas.	Maintain open road density at or below Forest Plan Standard of $\leq$ 1 mile per square mile in MAs 14, and 0.75 mile per square mile in MA 2.	System Road Permanent Closure; System Road Permanent Closure and Decommission; Unauthorized Road Closure; Unauthorized Road Closure and Decommission
Planting may be used on a case-by-case basis to accomplish desired stocking levels [of regeneration] (Revised Forest Plan, p 81, FR007).	164 acres or approximately 4.5 percent of suitable acres (MA 14) within the project area was damaged in the April 2009 tornado.	Up to approximately 164 acres need regeneration.	Hand Planting
Contribute to the economic base of local communities by providing a sustained yield of high-quality wood products at a level consistent with sound economic principles, local market demands, and desired ecological conditions. Develop local economy marketing opportunities to improve utilization of hardwood products (Revised Forest Plan, p 68).	Merchantable timber on suitable acres exists within the project area. No hardwood firewood areas are available to the public within or adjacent to the project area.	Make pulpwood and sawtimber available for sale. Make hardwood firewood areas available to the public.	Commercial Thinning; Firewood Area Availability Wildlife Stand Improvement Treatments

Desired Condition "Objective"	Existing Condition	Site Specific Need	Management Activity
Supply a spectrum of recreational facilities and opportunities that are responsive to user demands. Provide abundant and diverse opportunities for enjoying scenery, streams, lakes and rivers, heritage sites, geological features, and wildlife (Revised Forest Plan, p 64.)	The analysis area includes a portion of the Ouachita National Recreation Trail.	Existing trails need eradication of non-native invasive species. Consider Scenic Integrity Objectives in the design of ground disturbing projects. Construct trail shelter.	Non-native species eradication; Trail Shelter Construction;

D. PURPOSE OF THE ACTION

The purpose or goal of the Mountain Fork Project is to move the existing conditions of the project area toward the desired condition(s) objectives, stated as a site specific need, as identified in the Revised Forest Plan for MA 2, MA 6, MA 9, and MA 14 (See Table 3).

E. SCOPE OF ENVIRONMENTAL ANALYSIS

History of Planning and Scoping Process

On August 9, 2011, District Ranger, Tim Oosterhous, initiated the NEPA scoping process by sending out a scoping notice to agencies and interested parties. The scoping letter explained the NEPA process and the proposal for the MFPA. This notice was also posted to the ONF website and the proposal has also been included in the Ouachita National Forest's "Schedule of Proposed Actions". Thirty-one responses were received.

The intent of public involvement is to determine the scope of analysis for the proposed action, encourage public understanding and participation, become aware of and responsive to values of the public, have a foundation from which to evaluate how the public could be affected, and improve public participation in land and resource decision-making.

Relevant Planning Documents

The following documents directly influence the scope of this environmental analysis:

- Revised Land and Resource Management Plan for the Ouachita National Forest (RLRMP or Revised Forest Plan, USDA Forest Service, 2005a), and the accompanying Final Environmental Impact Statement (FEIS, USDA Forest Service, 2005b)
- Biological Evaluation for the Mountain Fork Project
- Travel Analysis Report for the Mountain Fork Project

Treatments described for the MFPA analysis are consistent with the standards of the Revised Forest Plan (Table 3). Treatments and environmental effects are typical of those projected for implementation in the Revised Forest Plan and analyzed in the Final Environmental Impact Statement for the Revised Land and Resource Management Plan (RFP-FEIS) (USDA Forest Service, 2005b).

The National Fire Plan (2000) provides direction for hazardous fuel reduction, restoration, rehabilitation, monitoring, applied research, technology transfer and established a framework for a 10-year Comprehensive Strategy. The Comprehensive Strategy addresses four principle goals and anticipated outcomes (Table 12).

Table 3: Reference for Revised Forest Plan Standards by Management Area

Management Area	Reference
2. Special Interest Area (Rich Mountain Recreation Area)	Part 2, pp 29-30; Part 3, p 101
6. Rare Upland Communities	Part 2, pp 32-33; Part 3, p 102
9. Water and Riparian Communities	Part 2, p 34; Part 3, pp 103-108
14. Ouachita Mountains, Habitat Diversity Emphasis	Part 2, p 35; Part 3, p 108

F. ISSUES

Issues Eliminated From Further Study

This section details issues that are not appropriate for this project or resources that would not be affected by the proposed actions, and provides the reasons for which these issues are eliminated from further study.

- Management activities impacts to parklands, prime farmlands, ecologically critical areas, jurisdictional wetlands or municipal watersheds. None of these areas would be impacted from proposed management activities described in this EA.

- Management actions impacts to civil rights and minority groups. None of the proposed activities would treat or impact any groups differently than any other groups.

- Federal, state or local law violations with the implementation of proposed treatments. No federal, state or local laws would be violated with implementation of proposed treatments described in this EA. The Revised Forest Plan standards would be implemented for all treatments.

- Management activities contribution to forest fragmentation. Forest fragmentation occurs when a landscape is broken into small islands of forest within a mosaic of other forms of land use or ownership. The proposed management actions would not create a change in land use nor ownership. Fragmentation usually refers to permanent changes within the landscape such as farmland, or converting forestland into parking lots or residential developments. The activities proposed would only make temporary changes to the landscape; no forest fragmentation would occur.

Issues to be Analyzed in Depth

These issues require further consideration in order to analyze environmental effects. Disclosure of effects on these specific environmental factors can be found in Chapter 3:

- Herbicide use may adversely affect water quality, wildlife, fish, humans, and other resource areas. Addressed by analyzing herbicide use throughout Chapter 3.

- Smoke from site preparation and fuel reduction prescribed burning impacts to smoke sensitive targets and air quality. Addressed in the air quality section of Chapter 3.

- Management actions impact to long-term soil productivity. Addressed in the soil section of Chapter 3.

- Management actions impact to water quality. Addressed in the water resources and quality section of Chapter 3.

- Management actions impact to floodplains or riparian areas. Addressed in the riparian areas and floodplains section of Chapter 3.

- Management actions impact to hunting and fishing opportunities. Addressed in the transportation and infrastructure and the recreation resources sections of Chapter 3.

- Management actions impact to accumulation of fuels. Addressed in the wildfire and accumulated fuels section of Chapter 3.

- Management actions impacts to heritage, historic or cultural resources. Addressed in the heritage resources section of Chapter 3.

- Management actions impact to forest health as well as insect/disease control. Addressed in the vegetation section of Chapter 3.

- Management actions impact to wildlife and fisheries populations or habitats. Addressed in the biological section of Chapter 3.

- Management actions impact to Proposed, Endangered, Threatened and Sensitive Species (PETS) or their habitat. Addressed in the biological section of Chapter 3.

- Management actions contribution to introduction and spread of non-native invasive species. Addressed in the biological analysis section of Chapter 3.

- Management actions impact to financial or economic impact on the local economy. Addressed in the local or county economy and the financial efficiency analysis section of Chapter 3.

- Management actions impact to human health and safety. Addressed in the air quality and public health and safety section of Chapter 3.

- Management actions impact to scenery resources. Addressed in the scenery resources section of Chapter 3.

- Management actions impact to recreation resources. Addressed in the recreation resources section of Chapter 3.

- Management actions contribution to climate change. Addressed in the climate change analysis section of Chapter 3.

G. DECISIONS TO BE MADE

The District Ranger must decide which alternative to select. The District Ranger must also determine if the selected alternative would or would not be a major Federal action, significantly affecting the quality of the human environment.

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Chapter 2

Alternatives Including the Proposed Action

A. INTRODUCTION

At the direction of the District Ranger, an Interdisciplinary Team (ID Team) met regularly throughout 2010 and 2011 to evaluate the Mountain Fork Project. Interdisciplinary Team members and their areas of expertise are listed in Chapter 4 of this EA. The ID Team discussed and reviewed the data collected for the analysis area during field reconnaissance. Those discussions involved current conditions, management needs, goals, objectives, opportunities and Revised Forest Plan desired conditions for the analysis area. The ID Team then developed a Proposed Action that was submitted to the District Ranger for his review.

The District Ranger approved the Proposed Action in August 2011, forwarded it to those on the district mailing list and posted it on the Ouachita National Forest website. This mailing was sent to individuals, state and local agencies, private industry and other interested and potentially affected organizations that have, traditionally, commented on the Mena and Oden Ranger District's resource management activities. The ID Team then began to analyze the *Proposed Action* and develop other alternatives to address issues and/or concerns identified during the public scoping process.

The alternatives, including the *Proposed Action*, are the heart of this EA. This chapter describes in detail activities of the *Proposed Action* alternative and other alternatives. Then, based on descriptions of relevant resources; predicted effects on quality of the human environment (disclosed in Chapter 3); and predicted attainment of project objectives, the alternatives are compared (see Tables 5-7), providing a clear basis for choice by the decision maker.

This chapter includes the following sections:

- Alternative Design and Evaluation Criteria
- Alternatives Considered but Eliminated from Detailed Study
- Alternatives Documented in Detail
- Other Past, Present and Reasonably Foreseeable Future Actions
- Summary Comparison of All Alternatives

B. ALTERNATIVE DESIGN AND EVALUATION CRITERIA

The District Ranger, working with the ID Team, identified and approved the following design and evaluation criteria. These were used by the ID Team to design and evaluate the project. Later, the District Ranger will use these same criteria when making a final selection of which alternative to implement.

Technical Requirements

Revised Forest Plan

The *Proposed Action* alternative and all action alternatives adhere to all applicable management requirements in the Revised Forest Plan. The Forest-wide Design Criteria for Management Areas 2, 6, 9, and 14 are incorporated by reference into all action alternatives.

Project Specific

Prescribed Burning (Smoke Management)

- Place smoke signs along travel ways that lead into the burn area(s).
- Stop forest visitor traffic along travel ways if the visibility is less than 100 feet.

Soils

USDA Forest Service Region 8 soil quality standards and their threshold levels are described in a R8 supplement to the Soil Management Handbook FSH 2509.18 for Soil Quality Monitoring Chapter 2), which became effective in July 2003. Soil and Water Standard 003 (SW003) from the Revised Forest Plan (p 74) sets two additional Forest determined threshold levels in addition to those found in the above FSH supplement. These indicators and their threshold levels were chosen as scientific research has shown them to cause, or contribute, to reduced productivity, and because they provide relatively practical and observable field indicators in determining change in productivity. SW003 will be used in determining significant change in soil productivity, and in helping to assess the condition of the project area. The Mountain Fork soils report in the project file contains specific recommendations for managing soil organic matter, minimizing soil displacement and the risk of soil rutting and puddling, reducing soil compaction where yarding or other activities using heavy equipment will be used, and reducing soil erosion where soil-disturbing activities are planned.

Erosion mitigation measures described are designed to limit erosion to acceptable levels under normal circumstances. These measures include: limiting heavy equipment activities when soils are wet; carefully locating and limiting roads and skid trails; seeding and water barring skid trails and landings after use; covering steep skid trails with mulch, and protection of streamside areas. Monitoring has shown that these measures, when properly implemented, are effective at minimizing erosion.

To minimize compaction, heavy equipment would be limited to July through November in stands with severe compaction hazards. Operations during December through June are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks.

Operations would be limited to April through November in stands with high compaction hazards. Operations during December through March are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. Soil conditions would be monitored and operations would be suspended when soils become wet.

In this analysis area, Soil Map Units 30, 79, 83, and 137 have a severe erosion hazard rating. Any activities planned on these units should have an erosion control plan approved by the Forest Hydrologist and/or Forest Soil Scientist. These areas need to be considered when planning and

implementing treatments, including prescribed burning. Awareness of these areas will help in targeting management activities away from such susceptible areas of the forest and minimizing the impact of erosion. Where fire lines are planned and established for prescribed burned areas, efforts need to be made to prevent excessive compaction, erosion and soil displacement in accordance with Regional and Forest soil quality standards.

Soil mapping units identified as being in the 100-year flood plain or as being a hydric soil require special management considerations and evaluations so that proposed actions will not adversely alter the natural values of these areas. Soil Map Units 36 and 55 are identified as a flood plain unit in this analysis area. These mapped areas help to give an approximate determination of the 100-year boundary where their width is determined to be more than 200 feet. Additional evaluation should be made on all flood plain and wetland locations involving existing or planned structures (i.e.: bridges, roads, buildings, or other development) within 100-year flood plains regardless of flood plain width or wetland size. For detailed information, reference E.O. 11988, E.O. 11990, FSM 2526 and FSM 2527.

Heritage Resources

Boundaries will be identified for each eligible/potentially eligible heritage resources and equipment will be kept out of these areas during harvest, fish passage construction, and mechanical site preparation.

The following measures by compartment and site will be implemented to protect heritage resources:

- Compartment 893, site 3PL319 – Place a barrier on FS road 415 to stop logging trucks from accessing the road. The barrier will be placed before the road reaches the historic house site. This will allow access into Stand 1 by means of a single temporary road.
- Compartment 893, site 3PL772 – Boundary will be identified prior to harvesting.
- Compartment 893, site 3PL773 – Boundary will be identified prior to harvesting.
- Compartment 893, site 3PL774 – Boundary will be identified prior to harvesting.
- Compartment 893, site 3PL775 – Boundary will be identified prior to harvesting.
- Compartment 893, site 3PL776 - Boundary will be identified prior to harvesting.
- Compartment 893, site 3PL1348 – Although this site is not near a cutting unit, it will, nonetheless, be identified and protected during harvesting.
- Compartment 893, site 3PL1380 – Boundary will be identified prior to harvesting. Stand will be accessed from the south via FS road 505.
- Compartment 895, site 3PL812 – Boundary will be identified prior to harvesting.
- Compartment 896, site 3PL791 – This site is within the tornado blow down area. Boundary will be identified prior to piling of downed timber.
- Compartment 897, site 3PL375 - Boundary will be identified prior to harvesting.

Biological Resources

Revised Forest Plan standards specific to Leopard darters are to be followed:

All soil disturbing activities within Streamside Management Areas (SMAs) will follow the Revised Forest Plan standard **SW004** for erosion control measures as related to the **Leopard darter** as follows:

- Will be completed within 15 days or less.
- Will be during low or no flow conditions and employ erosion/sediment control techniques such as; sediment screens, filters, seeding and mulching to control sediment loss.
- Temporary erosion control measures will be applied prior to completion of activities during times if weather conditions indicate the need to control sediment.
- Disturbed areas shall be seeded and mulched.
- Fireline construction/reconstruction within SMAs will be constructed by hand.

See Biological section for more information.

Public Health and Safety

Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides. These include posting warning signs on areas that have been treated; temporary area closure; selectively targeting application for only that vegetation that needs to be controlled rather than using a broadcast application; establishing buffer zones of non-treatment around private property, streams, roads and hiking trails; carefully transporting only enough herbicide for one day's use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident pre-planning and emergency spill plans in place. These measures along with others are incorporated into contracts; and through good enforcement and administration they will be effective in reducing the risk of accidental contamination of humans or the environment.

Exposure to herbicide will be mitigated by requiring workers to wear proper attire and safety equipment; have properly functioning equipment; apply herbicide at proper rates; work in an organized fashion so as to not re-enter treated areas; by not exceeding the "typical" length of workday (7 hours); and other measures typically included to protect workers health and safety..

C. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

No Prescribed Burning Alternative

It is recognized that some individuals have concerns about use of prescribed burning on the ONF. The most important reason for not analyzing a *No Prescribed Burning* alternative was that the Revised Forest Plan strongly encourages the use of this management practice to achieve Plan objectives and desired conditions. It was developed through extensive public involvement by resource management professionals and scientists. The use of prescribed burning to reduce accumulated fuels is considered essential for management of the MFPA where the opportunity lends itself (Revised Forest Plan, p 68).

Prescribed burning is the main management activity on the ONF that can affect local and regional air quality; however, the current National Fire Plan and the Healthy Forest Initiative (both found at: http://www.forestsandrangelands.gov) both direct the Forest Service to utilize prescribed burning more frequently. Despite potential air quality effects, prescribed burning can provide important and necessary ecological benefits in forested landscapes (RFP-FEIS, p 33).

No Harvest Alternative

A *No Harvest* alternative was considered by the ID Team but was eliminated from detailed analysis for three reasons. First, the ID Team felt the *No Action* alternative adequately addressed the overall effects of a no harvest alternative. Second, one of the priorities for the MFPA is to produce a sustained yield of wood products at a level consistent with sound economic principles and other multiple use goals (Revised Forest Plan, p 68).

Regeneration Harvest Alternative

The ID Team considered an alternative with regeneration harvests, but it was eliminated from further analysis. Considering the sensitivity of the watershed involved in this project, the additional disturbance to the area by regeneration harvest could not be justified. Additional sedimentation exceeded the threshold for "moderate" risk in the ACE model and could therefore cause degradation to water quality in the watershed. The current proposed action, on the other hand, with thinning treatments only and reduced entry for prescribed burns does not exceed that threshold and limits the risk to water quality to "low".

Reduced Road Closure Alternative

It is recognized that some individuals would like all open national forest jurisdiction roads to remain open and currently closed national forest jurisdiction roads to become available for vehicular traffic within the MFPA. This alternative was considered by the ID Team but eliminated from detailed analysis for a number of reasons.

The spatial distribution and arrangement of the roads system over the landscape determine its impact on a number of resources. Road density may also be an indicator of potential wildlife disturbance, habitat fragmentation, recreation opportunities and the cumulative potential for erosion and sedimentation from road surfaces.

Revised Forest Plan standard TR005 (p 91) states, 'As part of roads analyses conducted at the watershed or compartment scale, calculate open road density for wildlife purposes by including all open roads (permanent, local arterial and collector roads, regardless of jurisdiction) and designated Off-Highway Vehicle (OHV) trails'.

Revised Forest Plan objective OBJ05 (p 59) states, 'For wildlife purposes, strive to achieve a total open road density of 1.0 mile per square mile for all MAs except MA 1 [Wilderness] and MA 4 [Research Natural Areas and National Natural Landmarks] (where the desired density is zero open roads per square mile) and MA 2 [Special Interest Areas], MA 16 [Lands Surrounding Lake Ouachita and Broken Bow Lake], MA 17 [Semi-Primitive Areas], MA 19 [Winding Stair Mountain Recreation National Area and Associated Non-Wilderness Designations] and MA 21 [Old Growth Restoration] (where the desired density is 0.75 mile of open road per square mile or less during critical periods for wildlife, i.e., March to August) '.

Lastly, the road maintenance budgets have steadily declined and budgets per mile of road have not increased at the same rate as the maintenance cost per mile of road (i.e., for surface blading, ditch cleaning, culvert cleaning, road surfacing repair and replacement, signing, vegetation removal, hazard tree removal, down tree removal and road closure device repair).

The existing open road density for the watershed across all land jurisdictions already stands at 1.04 miles/mile^2 (.74 miles/mile^2 on National Forest System lands only), which meets the Revised Forest Plan standard of 0.75 mile per square mile for Management Area 2, and 1.0 mile per square mile for all other MAs encompassed by this project area.

D. ALTERNATIVES DOCUMENTED IN DETAIL

Alternative 1: No Action

Timber harvest would be deferred until a later entry. However, ongoing Forest Service permitted and approved activities would continue in the MFPA:

- **Fire Suppression** – human (arson) and natural caused wildfires would be suppressed.
- **Hunting** – deer, turkey, squirrel and other types of game hunting would continue under the rules and regulations of the Arkansas Game and Fish Commission.
- **Public vehicle access** – all existing open roads would remain open except in the event of emergencies, such as fire suppression and rescue operations that warrant the need for temporary road closure.
- **Fishing** – sport fishing would continue under rules and regulations of the Arkansas Game and Fish Commission.
- **Firewood harvest** – under permitting rules of the ONF, the public would continue to harvest firewood in designated areas.
- **Road maintenance** – normal and emergency road maintenance would continue on all existing roads.
- **Camping** – camping would continue under the rules and regulations of the ONF. Special restrictions would apply during times of fire threat.
- **Mining** – Mining currently permitted to operate within the MFPA would continue.

All of these activities, with some modifications to the transportation layer, would continue to occur if the *Proposed Action* alternative is implemented.

Alternative 2: Proposed Action

Following are descriptions of activities that would occur under the *Proposed Action* alternative. See Table 1 on page 5-for a summary of the proposed amounts (acres, miles, etc.) for each activity under this alternative. See Appendix A for compartment and stand listings of activities.

Commercial Thinning

Current composition is mostly shortleaf pine with some thicker hardwood patches. These stands would be commercially thinned to a target basal area (BA) of approximately 60 to 70 square feet per acre. Stands less than 30 years of age and those dominated by loblolly pine would generally be thinned to the lower limit of 60 BA per acre. This thinning would improve the existing stand and regulate growth by adjusting stand density through cutting and removal of both pine and hardwood trees, while striving to retain healthy, well-formed leave trees. The post-thinning stocking levels would allow for a more advantageous distribution of site resources; thereby, creating vigorous timber stands that are less susceptible to Southern Pine Beetle infestations. Thinning hardwood species also increases their health and vigor. Hardwood and soft mast species will be released where possible during thinning operations. Post harvest stocking levels of hardwood species would be maintained at an approximate rate of 10 to 30 percent in pine dominated stands and approximately 30 to 50 percent in mixed pine and hardwood stands in accordance with Forest Wide Design Criteria FI005 and TH001(Revised Forest Plan).

Site Preparation (Herbicide, Manual or Mechanical, and Prescribed Burning)

Site preparation improves access for planting, reduces competing hardwoods and prepares a seedbed suitable for desired natural regeneration of shortleaf pine. In stands damaged by the 2009 tornado, preparation of the site for shortleaf pine would occur in accordance with Forest Wide Design Criteria FR013 (Revised Forest Plan).

Various methods of site preparation involving herbicide, manual or mechanical, and prescribed burning would be used either separately or in combination with one another.

Herbicide

To achieve desired goals for site preparation and release treatments, herbicide application may be necessary. A mixture of herbicides with the active ingredients imazapyr, metsulfuron methyl and/or triclopyr would best achieve desired condition goals based on past practices. This mixture provides improved control over imazapyr alone, while reducing costs. Triclopyr, metsulfuron methyl and imazapyr, would be applied at the lowest rate necessary to control targeted vegetation and not exceed the label rate. Site specific risk assessments were conducted using the procedure developed by Syracuse Environmental Research Associates (SERA).

Application methods would include: 1) foliar spray, which involves application of herbicide to foliage of trees and shrubs less than six feet in height; 2) frill treatment, which involves application of herbicide by spray bottle into cuts that expose the tree's sapwood; and 3) cut-stump treatment, which involves application of herbicide by spray bottle to the surface of cut stumps. Application of foliar-spray methods would be made during the spring and summer seasons when vegetation is green and growing. Cut-surface treatments, which include frill and cut-stump treatments, however, are not dependent upon time of year (Revised Forest Plan - Forest Wide Design Criteria HU001-HU016, HU018).

Manual

Manual treatments consist of hand-operated tools (e.g., chainsaws) to cut or girdle overstory and midstory vegetation and herbicides in combination with manual ground tools as a means to aid delivery of herbicide into the cambium (see "***Herbicide***") (Revised Forest Plan - Forest Wide Design Criteria FR013).

Mechanical

Mechanical methods include piling followed by mechanical ripping once heritage surveys are completed (Revised Forest Plan - Forest Wide Design Criteria FR013).

Prescribed Burning

The tornado damaged areas would receive a site preparation burn where they are located within fuel reduction burn units. This burning involves application of controlled, moderate to high intensity fire to control competing vegetation (hardwoods), reduce accumulated leaf litter and preparation of sites for seeding and/or hand planting. Site preparation burns are implemented during the time between leaf emergence and leaf fall. Vegetation three inches and less in diameter at the ground level would be targeted for higher rootstock eradication. This will result in less competition for pine seedlings and other desirable fire dependant species, while creating an open understory. Site preparation burns are located within fuel reduction burn units and will generally be burned in conjunction with fuel reduction burns.

Prescribed burning would aim to maintain 10-20 percent of hard mast producers. The pretreatments, if any, would retain all soft mast producing species present in order to sustain their presence subsequent to prescribed burning.

Hand Planting with Shortleaf Pine

The April 2009 tornado left behind a very poor or non-existent shortleaf pine seed source. Therefore, shortleaf pine seedlings will be hand planted on an approximate 7 x 10 foot spacing. Based on past seedling survival rates, this should result in a fully stocked shortleaf pine stand (Revised Forest Plan - Forest Wide Design Criteria FR007).

Timber Stand Improvement by Release

Release operations are treatments conducted to regulate species composition and improve quality of young stands. Release of shortleaf pine seedlings from undesirable vegetation would occur in those stands scheduled for planting. Those stands would receive this treatment within three to five years of stand establishment.

Manual treatments (e.g. chainsaws or machetes) would be used when boles of desired trees are not shaded. Herbicide methods—specifically foliar applications and/or cut-surface treatments (see "***Herbicide***")—would be used when competing vegetation is more than half the height of desired

regeneration and, therefore, shading the boles. The hardwood patches would receive thinning in order to provide areas for mast production at the approximate rate of 20 percent in each stand (Revised Forest Plan - Forest Wide Design Criteria FI001-FI004).

Timber Stand Improvement by Pre-commercial Thinning

In areas with excessive numbers of saplings (i.e., >1,000 trees per acre) a thinning treatment is conducted. This reduces the stem density to a stocking level of no more than 700 stems per acre. Pre-commercial thinning involves the cutting of trees not for immediate financial return, but to reduce stocking to concentrate growth on the remaining desirable trees. Hardwoods would be retained as a portion of the desirable trees following Revised Forest Plan standards. Pre-commercial thinning is accomplished using chainsaws (Revised Forest Plan - Forest Wide Design Criteria FI001-FI004).

Firewood Areas

Firewood cutting would be available in those stands culturally treated with the objective of reducing the amount of existing hardwood for regeneration or wildlife stand improvement (Revised Forest Plan - Forest Wide Design Criteria FW001, FW002).

Wildlife Stand Improvement by Midstory Reduction

The goal of midstory removal is to thin out mid-canopy vegetation to increase growth of understory forbs, grasses, and shrubs, to enhance wildlife forage, and increase growth and vigor of overstory mast producers. Stands would be thinned from below to approximately a seven-inch diameter at breast height (DBH); however, determining which trees would be removed would be based more upon individual tree crown location and how the crown is shading the understory rather than on a DBH limit. Therefore, trees larger than seven inches DBH would occasionally be removed. Although the purpose is mainly to reduce a hardwood midstory layer, hardwoods would be retained following Revised Forest Plan standards.

Non-native Invasive Species Treatments

Manual treatments and herbicide treatments would be applied to all areas within the project area as needed to control and or eliminate the spread of non-native invasive plant species (e.g., tall fescue, sericea lespedeza, autumn olive, honey suckle, privet). These treatments would include use of approved USDA herbicides and manual treatments such as prescribed fire, mid-story reduction and manual uprooting.

Herbicides would be applied to existing wildlife openings, timber stands, closed roads, and along roadways as needed for elimination of non-native noxious weeds. A mixture of herbicides containing one or more of the active ingredients clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr and an adjuvant for increased control would be used to eradicate noxious weeds encroaching timber stands, wildlife openings and roadways. This application provides for control of undesired non-native invasive and noxious plant species and aids in the release and establishment of native plant species.

Fish Passage Restoration

Proposed fish passage restoration would include activities such as addition of drainage structures, culvert replacement, and/or addition of riprap along with possible road reconstruction and/or crossing reconstruction.

Bat Box Placement

Rocket box style bat boxes would be placed along ridges, flood plains and mid-slopes or wildlife openings to provide summer roosting habitat and possible maternity roosting sites for tree roosting bat species.

Fuel Reduction Prescribed Burning

The project area has been divided into 3 burn units ranging in size from 289 to 908 acres, for a total of 1,587 acres. Each burn unit will be treated with controlled broadcast fire approximately every 1 to 5 years during either the growing or dormant season. This recurring schedule will be on a continuous basis and extend indefinitely beyond the 10-year period during which other proposed management activities will occur. Prescribed burning is a key management tool to achieve improved Fire Regimes and Condition Classes for National Forest lands (Revised Forest Plan - Forest Wide Design Criteria PF001-PF006)

Growing Season

Growing Season burning involves application of controlled, moderate to high intensity fire to control competing vegetation (hardwoods), prepare sites for seeding, and perpetuate fire dependent species (e.g., shortleaf pine). Other added benefits would include reducing accumulated fuels, stimulating growth of native vegetation, and improving wildlife habitat. These burns are implemented during the time between leaf emergence and leaf fall. Vegetation three inches and less in diameter at the ground level would be targeted for higher rootstock eradication. This will result in less competition for pine seedlings and other desirable fire dependant species, while creating an open understory, stimulating growth of native grasses and forbs, and increasing foraging for browsing animals.

Dormant Season

Dormant Season burning involves application of controlled, low intensity fire to reduce accumulated fuels, stimulate growth of native vegetation, and improve wildlife habitat. There would be approximately 80 percent coverage in areas to be burned, with expected fuel reduction of approximately 30 percent. Some duff would be retained for soil protection. Vegetation 1¼ inches in DBH and less in diameter would be targeted for reduction to create an open understory, stimulating growth of native grasses and forbs, and increasing foraging for browsing animals.

Prescribed burning, and treatments preceding the burns, would aim to maintain 10-20 percent of hard mast producers. The pretreatments, if any, would retain all soft mast producing species present in order to sustain their presence subsequent to prescribed burning (Revised Forest Plan - Forest Wide Design Criteria PF001-PF006).

Fireline Construction

Firelines would be constructed to contain the prescribed burns. Firelines would be waterbarred and seeded after use to control erosion and provide temporary linear openings for wildlife (Revised Forest Plan - Forest Wide Design Criteria PF005).

Fireline Reconstruction

Existing firelines or temporary road construction prisms would be reconstructed to contain the prescribed burns. Fireline would be waterbarred and seeded after use to control erosion and provide temporary linear openings for wildlife (Revised Forest Plan - Forest Wide Design Criteria PF005).

Soil Stabilization

Unauthorized user created all terrain vehicle (ATV) and off-highway vehicle (OHV) trails would be closed, re-seeded, and mulched; and slopes would be re-contoured and restored to natural condition, and waterbarred to prevent additional soil erosion and watershed resource damage (Revised Forest Plan - Forest Wide Design Criteria SW008).

Unauthorized Road – Close and Decommission

User created roads and old roadways created by past watershed entries not needed for future management activities would be closed and decommissioned. Methods of decommissioning range from blocking the road entrance (earthen mound) to full obliteration, and may include re-vegetation, waterbarring, establishing drainways, removing unstable road shoulders, removing drainage structures (culverts), recontouring and restoring natural slopes. Some user created roads and old roadways created by past watershed entries are needed for timber harvest, but would be closed and decommissioned post-harvest (Revised Forest Plan - Forest Wide Design Criteria TR005 and TR007).

System Road – Permanent Closure

The end segment of Forest Service road 417 past the hunter's camp would be gated and closed to all highway and off-highway vehicles (Revised Forest Plan - Forest Wide Design Criteria TR005).

System Road – Construction

Approximately 2.4 miles of system roads would be constructed to accommodate access for management activities (Map 4). These roads would be added to the system as classified roads, but would be closed to vehicular traffic after use with a gate or berm (Revised Forest Plan - Forest Wide Design Criteria TR001-TR004, TR007-TR013, and TR015-TR018).

System Road – Reconstruction

Portions of roads M96, and 417, totaling 1.5 miles, would be reconstructed to facilitate access, hauling of timber from stands proposed for commercial harvest, and to improve fish passage (Revised Forest Plan - Forest Wide Design Criteria TR003, TR010, TR012, and TR016).

Temporary Road Construction

Approximately 7.6 miles of temporary road would be constructed to access and haul timber from stands proposed for commercial harvest. After use, these temporary roads would be closed with earthen berms and seeded (Revised Forest Plan - Forest Wide Design Criteria TR001, TR004, TR007-TR009, TR013, and TR015-TR018).

Road Maintenance

There are approximately 37 miles of existing classified road that would require general road maintenance. This maintenance includes slide and slump repair, surface blading, spot surfacing with gravel, maintenance of drainage structures, ditch cleaning and clearing the roadside of vegetation (Revised Forest Plan - Forest Wide Design Criteria TR011).

Trail Shelter Construction

A wooden trail shelter with a sheltered cooking and eating area, including a picnic table would be constructed along the Ouachita National Recreation Trail at the Oklahoma State Line as time and funding allows.

Trail Maintenance

Trail maintenance every 1 to 3 years is proposed for approximately six miles of the Ouachita National Recreation Trail. Treatment would include suppressing woody and herbaceous vegetation, repairing trail tread, and drainage repair.

These recurring treatments would be on a continuous basis and extend indefinitely beyond the 10-year period during which other proposed management activities would occur. No herbicide would be used along the trail due to densities/diversity of PETS plants.

Alternative 3: Proposed Action without Herbicide

A *Proposed Action without Herbicide* alternative was developed in accordance with Ouachita National Forest policy. This alternative addresses the same ecosystem management objectives as the *Proposed Action*. All proposed activities listed in the *Proposed Action* (Table 1 on page 5) would occur. Herbicide use would be replaced by manual methods (see following list). Refer to Appendix A for compartment and stand listings.

- ***Site Preparation***: Mechanized methods using dozer with rippers; manual methods using hand tools and chainsaws; and/or prescribed burning would be used to prepare sites for planting.
- ***Timber Stand Improvement by Release***: Pine and hardwood seedlings would be released from competition by manually cutting target species.
- ***Non-native Invasive Species Treatment***: The non-native invasive species treatment would be conducted by prescribed burning, mowing or weed eating and manual uprooting of targeted species.

E. OTHER PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

The following table summarizes activities that have occurred in the past ten years within the MFPA. Ongoing activities are listed above in ***Alternative 1: No Action***.

Table 4: Summary of Past Actions

Year	Compart-ment	Stand	Activity	Acres	Sale Name (if applicable)
2002	896	9	Site Preparation for Planting - Mechanical	7	
2002	896	9	Site Preparation for Planting - Mechanical	28	
2002	896	10	Site Preparation for Planting - Mechanical	2	
2002	896	12	Site Preparation for Planting - Mechanical	7	
2002	896	13	Site Preparation for Planting - Mechanical	2	
2002	896	18	Site Preparation for Planting - Mechanical	3	
2002	896	unknown	Site Preparation for Natural Regeneration - Chemical	12	
2002	896	unknown	Site Preparation for Natural Regeneration - Chemical	9	
2002	896	unknown	Site Preparation for Natural Regeneration - Other	12	
2002	899	9	Site Preparation for Natural Regeneration - Chemical	27	
2002	899	10	Site Preparation for Natural Regeneration - Chemical	13	
2002	899	14	Site Preparation for Natural Regeneration - Chemical	14	
2003	896	9	Full planting concurrent with site prep	7	
2003	896	9	Full planting concurrent with site prep	7	
2003	896	10	Full planting concurrent with site prep	2	
2003	896	12	Full planting concurrent with site prep	7	
2003	896	13	Full planting concurrent with site prep	2	
2003	896	18	Plant Trees	3	

Year	Compart-ment	Stand	Activity	Acres	Sale Name (if applicable)
2003	896	unknown	Fill-in or Replant Trees	11	
2003	896	unknown	Fill-in or Replant Trees	9	
2003	896	unknown	Site Preparation for Natural Regeneration - Other	12	
2003	896	unknown	Site Preparation for Natural Regeneration - Other	9	
2003	899	9	Fill-in or Replant Trees	27	
2003	899	9	Site Preparation for Natural Regeneration - Other	27	
2003	899	10	Fill-in or Replant Trees	13	
2003	899	10	Site Preparation for Natural Regeneration - Other	13	
2003	899	14	Fill-in or Replant Trees	14	
2003	899	14	Site Preparation for Natural Regeneration - Other	14	
2004	896	unknown	Site Preparation for Planting - Other	12	
2004	896	unknown	Site Preparation for Planting - Other	9	
2004	899	9	Site Preparation for Planting - Other	27	
2004	899	10	Site Preparation for Planting - Other	13	
2004	899	14	Site Preparation for Planting - Other	14	
2005	896	9	Area release and weeding	7	
2005	896	10	Area release and weeding	2	
2005	896	12	Area release and weeding	7	
2005	896	13	Area release and weeding	2	
2005	896	18	Area release and weeding	3	
2005	899	9	Area release and weeding	27	
2005	899	10	Area release and weeding	13	
2005	899	14	Area release and weeding	14	
2009	896	8	Blow down Salvage (regeneration needed)	10	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE
2009	896	13	Blow down Salvage (regeneration needed)	10	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE

Year	Compart-ment	Stand	Activity	Acres	Sale Name (if applicable)
2009	896	14	Blow down Salvage (regeneration needed)	10	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE
2009	897	3	Blow down Salvage (regeneration needed)	27	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE
2009	897	15	Blow down Salvage (regeneration needed)	7	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE
2009	899	8	Blow down Salvage (regeneration needed)	101	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE
2009	899	10	Blow down Salvage (regeneration needed)	33	GA MOUNTAIN FORK STEWARDSHIP TORNADO SALVAGE

Cumulative effects analysis will be conducted for this project area using the larger land base 6th level watershed area.

Oak decline has not been a major problem in the MFPA.

Private land is mostly residential, pastureland, grazed woodlands, or private timber land.

The past, present, and reasonably foreseeable future activities identified here and proposed in this EA are the activities considered when analyzing for cumulative effects.

F. SUMMARY COMPARISON OF ALL ALTERNATIVES

Tables 5 - 7 provide a comparison of alternatives.

Table 5: Summary Comparison of Actions by Alternative (acres unless otherwise noted)

Action (in acres unless specified otherwise)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without herbicide
Commercial Thinning	0	2,211	2,211
Site Preparation by Herbicide, Manual, Mechanical and/or Prescribed Burning	0	164	164 (no herbicides)
Timber Stand Improvement by Release	0	164	164
Timber Stand Improvement by Pre-commercial Thinning	0	14	14
Hand Planting	0	164	164

Action (in acres unless specified otherwise)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without herbicide
Firewood Areas	0	as available	as available
Wildlife Stand Improvement by Midstory Removal and Selective Herbicide Treatment of Cut Stumps	0	316	0
Wildlife Stand Improvement by Midstory Removal Only (no herbicides)[2]	0	0	316
Fish Passage Restoration (# of stream crossings)	0	5	5
Non-native Invasive Species Eradication by herbicide and/or manual methods	0	11,046[1] acres, where NNIS occur	11,046[1] acres, where NNIS occur (manual methods)
Bat Roost Box Placement (number of boxes)	0	6	6
Fuel Reduction Prescribed Burning	0	1,587	1,587
Fireline Construction (miles)	0	2	2
Fireline Reconstruction (miles)	0	2	2
Soil Stabilization (miles)	0	12	12
Unauthorized Road – Close and Decommission (miles)	0	11.5	11.5
Unauthorized Road – Close (miles)	0	.5	.5
System Road – Permanent Closure (miles)	0	1.6	1.6
System Road Construction (miles)	0	2.4	2.4
System Road Reconstruction (miles)	0	1.5	1.5
Temporary Road Construction (miles)	0	7.6	7.6
Road Maintenance (miles)	0	37	37
Ouachita National Recreation Trail Shelter Construction (# shelters)	0	1	1

1 – This figure represents the total area of National Forest System lands that could be subject to non-native species eradication. The actual area of non-native species eradication needs are unknown at this time, but are estimated to be approximately 1-5% of this figure.

Table 6: Summary Comparison of Objectives Met by Alternative (acres unless otherwise noted)

Objective (measure)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without Herbicide
Lands in and around "Firewise Communities" and other "Communities at Risk" are the highest priority for mechanical treatment including commercial and non-commercial thinning and/or midstory removal followed by prescribed fire (usually done within two years of mechanical work).	0	4,136	4,136
Maintain or restore community diversity – and a significant component of species diversity.	0	4,136	4,136
Take steps to improve forest health by reducing the likelihood of insect infestations, disease outbreaks, and establishment of non-native, invasive species on National Forest System lands.	0	4,136 + NNIS treatment on 1-5% of total area	4,136 + NNIS treatment on 1-5% of total area
Identify roads that should be reconstructed, closed, or decommissioned to reduce sediment and improve watershed condition (miles).	0	15	15
Provide a safe transportation system that meets the minimum needs of various resources and their users, minimizes wildlife habitat disturbance, and satisfies some public demand for motorized recreation	1.04 miles/mile^2 of open road density across all jurisdictions	.97 miles/mile2 of open road density across all jurisdictions	.97 miles/mile2 of open road density across all jurisdictions
Manage the forest transportation system…to reduce road-related barriers to aquatic organism passage (# stream crossings improved).	0	5	5
Habitat conditions sustain healthy populations of native and desired non-native wildlife and fish species (# of bat boxes placed).	0	6	6
Planting may be used on a case-by-case basis to accomplish desired stocking levels [of regeneration].	0	164	164
Contribute to the economic base of local communities by providing a	0	2,549	2,549

Objective (measure)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without Herbicide
sustained yield of high-quality wood products at a level consistent with sound economic principles, local market demands, and desired ecological conditions. Develop local economy marketing opportunities to improve utilization of hardwood products.			
Supply a spectrum of recreational facilities and opportunities that are responsive to user demands. Provide abundant and diverse opportunities for enjoying scenery, streams, lakes and rivers, heritage sites, geological features, and wildlife (number of trail shelters constructed).	0	1	1

Table 7: Summary Comparison of Environmental Effects by Alternative

Environmental Effect (measure)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without Herbicide
Sedimentation – associated risk for aquatic biota *	Low	Low	Low
Early Seral Habitat Created (acres)	0	0	0
Volume Harvest (CCF)	0	24,618	24,618
Air Quality Meets Air Quality Index (Yes/No)	Yes	Yes	Yes
Availability of Adequate Wildlife Habitat for Management Indicator Species	Yes	Yes	Yes
Forest Service lands in watershed treated with herbicides for site preparation	None	164	None
Forest Service lands in watershed treated with herbicides for non-native invasive species eradication.	None	Restricted to existing locations of non-native invasive species throughout entire project area**	None

Environmental Effect (measure)	Alternative 1: No Action	Alternative 2: Proposed Action	Alternative 3: Proposed Action without Herbicide
Soil Productivity maintained	Yes	Yes	Yes
Road Density Objectives Met	Yes	Yes	Yes
Scenic Integrity Objectives Met	Yes	Yes	Yes
Reduce Hazardous Fuels	No	Yes	Yes
Recreation Opportunity Objectives Met	Yes	Yes	Yes

* 6th level watershed

** Estimated to be less than 5% of the project area.

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Chapter 3

Affected Environment and Environmental Consequences

A. INTRODUCTION

Direct, indirect and cumulative impacts of alternatives to the key resources and values listed in Chapter 1 are disclosed in this section.

Analysis Tools Used

Several computer models were used to generate relative outputs from alternatives analyzed. The Aquatic Cumulative Effects (ACE) model was used to calculate background and effects sedimentation. The habitat capability portion of CompPATS was used to calculate present habitat capabilities. The V-Smoke Model was used to calculate smoke emissions and effects. Effects from past actions, those planned for the future and approved by previous decisions, and actions described in the alternatives were calculated by hand and are summarized in this document. The Quick-Silver investment analysis was used to calculate the economic returns for the project. Full reports for each of the issues analyzed in this section, providing additional details and methodology, are located in the project file. Site specific risk assessments for herbicide use were conducted using the procedure developed by Syracuse Environmental Research Associates (SERA).

B. EFFECTS ANALYSIS

Air Quality

This section includes a summary of applicable air quality rules and regulations; a description of current air quality of the surrounding area around the MFPA; and an assessment of effects of potential emissions from uncontrollable stand replacement wildfires (*No Action* alternative) or prescribed burns (*Proposed Action* and *Proposed Action without Herbicide* alternatives) associated with the MFPA.

Occasional brief exposure of the general public to low concentrations of drift smoke is more a temporary inconvenience than a health problem. High smoke concentrations can, however, be a very serious matter, particularly near homes of people with respiratory illnesses or near health-care facilities, or on roadways. Human health effects related to particulate matter in smoke include: increased premature deaths; aggravation of respiratory or cardiovascular illnesses; and changes in lung function, structure and natural defense. Smoke becomes a safety issue when it affects visibility on roadways.

Smoke can have negative short-and long-term health effects. Fire management personnel who are exposed to high smoke concentrations often suffer eye and respiratory system irritation. To mitigate this supervisors work with staff to limit their direct exposure to smoke by rotating staff from positions on the fire line with heavy exposure to areas with less exposure to smoke. Under some circumstances,

continued exposure to high concentrations of carbon monoxide at the combustion zone can result in impaired alertness and judgment. Cases of this occurring are limited in number and have occurred in association with multiple extended work periods, not the one work period that is characteristic of prescribed burn operations on the Ouachita National Forest.

Smoke is composed of hundreds of chemicals in gaseous, liquid and solid forms, some of which are toxins including carbon monoxide, particulate matter, acrolein and formaldehyde. Over 90 percent of particulate emissions from prescribed fire are small enough to enter the human respiratory system. Studies have shown small decline in lung functions among firefighters throughout a typical fire season but that lung functions return to preseason levels within a few months. There have been limited studies on the long term health effects of smoke on wildland firefighters (Reinhardt, 2000).

Existing Condition

The Class I Caney Creek Wilderness is approximately 22 miles southeast of the project area, and the smoke sensitive Black Fork Wilderness is 1.5 miles to the north and Upper Kiamichi Wilderness is just adjacent to the project area to the west. Other smoke sensitive targets identified for the MFPA are the communities of Mena (10 miles east), Fort Smith (46 miles north) and Russellville (84 miles northeast) and Hot Springs, Arkansas (77 miles east).

The United States Environmental Protection Agency's (EPA) AirData Website was used to determine if there were any nonattainment areas for the eight criteria air pollutants. As of October 2009, Crittenden County, Arkansas is designated non-attainment for 8-hour ozone. All other criteria pollutants are not present in proportions to designate additional geographic areas as nonattainment (U.S. EPA, 2009).

Analysis of Effects: Air Quality

The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (carbon monoxide (CO), particulate matter (PM) 10 and 2.5 micrograms (µg), ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and lead (Pb)) (U.S. EPA, 1990).

VSmoke was used to determine emissions concentration within a given time frame during typical prescribed burn operations and the resulting Air Quality Index of the emissions plus back ground concentrations. Timelines for measuring effects of burns would be 1-2 days after each burn. This particular project is proposing to prescribed burn the areas on a 1-5 year rotation.

Alternative 1: No Action

Direct Effects

There would be no direct effects to air quality with this alternative. This alternative does not include prescribed burning and therefore would have negligible potential for directly affecting air quality.

Indirect and Cumulative Effects

Since the *No Action* alternative does not include vegetation or fuels manipulation, indirect and cumulative effects of this alternative could include severe wildfires as a result of the increase in fuel abundance and continuity through time. Any wildfire that might occur under the no action might

occur outside of normal prescribed burn weather conditions and would be harder to control resulting in a larger wildfire that could consume more fuel and produce more emissions.

It is difficult to estimate the length or amount of smoke emission from a wildfire that is uncontrolled. VSmoke provides analysis of cumulative effects to air quality by incorporating not only emissions from the analyzed fire, but also background particulate levels and carbon dioxide levels. It is acknowledged that multiple simultaneous uncontrolled wildfires could cumulatively increase particulate levels. It is difficult or nearly impossible to quantify such emissions in a planning analysis.

Alternative 2: Proposed Action and **Alternative 3: Proposed Action without Herbicide**

Direct, Indirect and Cumulative Effects

The prescribed burns for the MFPA would be divided into 3 burn units ranging in size from 289 to 908 acres, totaling approximately 1,587 acres to mitigate smoke, as well as to strategically take advantage of road systems and natural barriers to reduce the need to construct control lines. Prescribed burn plans are required for each burn. Such plans provide burn unit locations, smoke sensitive targets and mitigation required to limit negative effects of burning on human health and safety to the extent possible.

In addition to protecting the Class I Caney Creek 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 Clean Air Act (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" (RFP – FEIS, Chapter 3, p 27).

The smoke dispersion modeling analysis (using VSmoke-GIS) for a dormant season burn was performed for approximately 908 acres to be burned within Forest Service parameters. This burning unit represents the largest burning unit that would be prescribed burned on any given day. The hour of burn was selected that had the largest emissions for any hour on the day of the burn (1700 hours). This time period has daytime dispersion characteristics to disperse the pollutants from the fire. The location of the model fire is at approximately 34.655 degrees latitude and -94.437 degrees longitude (368265.169 meters east and 3835765.135 meters north using US Albers projection).

Table 8: Emission and Heat Release Rates for the Action Alternatives

	Particulate Matter 2.5 (fine particles)	**Carbon Monoxide Emission (fine particles)**	**Heat Release Rate**	**Background Concentration of Fine Particles**	**Background Concentration of Carbon Monoxide**
Weehunt (Dormant Season)	**1657.988 grams per second**	**20098.754 grams per second**	**831.2 megawatts**	**12.6 micrograms per cubic meter**	**2.6 parts per million**

The proportion of smoke subject to plume rise was -0.75, which means 75 percent of the smoke is being dispersed gradually as it rises to the mixing height, and 25 percent is dispersed at ground level.

The meteorological conditions modeled were:

1) Mixing height was 3,400 feet above ground level (AGL).
2) Transport wind speed and surface wind speed were 15 and 8.5 miles per hour, respectively.
3) There were no clouds in the sky.
4) Surface temperature was 75 degrees Fahrenheit and the relative humidity was 35 percent.
5) The calculated stability class from VSmoke was moderately unstable.

The VSmoke model produces three types of outputs that estimate: a) the ability of the atmosphere to disperse smoke and the likelihood smoke will contribute to fog formation, b) downwind concentrations of particulate matter and carbon monoxide, and c) visibility conditions downwind of the fire.

The Dispersion Index (DI) is an estimate of the ability of the atmosphere to disperse smoke to acceptably low average concentrations downwind of one or more fires. This value could represent an area of approximately 1,000 square miles under uniform weather conditions. Typically, the DI value should be greater than 30 when igniting a large number of acres within an area. The calculated DI value was 51, which predicts the atmosphere has a good capacity to disperse smoke.

Meteorological forecasts and prescribed burning is not an exact science and there is an inherent risk that forecasted weather may not materialize as predicted on any given day. Smoke may not behave as predicted and the communities downwind of prescribed burning may be impacted. The 'burn boss' would continually monitor weather parameters throughout each prescribed burning event in order to implement Revised Forest Plan standards and burn plan mitigations.

Combining the DI and relative humidity values provide an estimate of the likelihood of smoke contributing to fog formation. The Low Visibility Occurrence Risk Index (LVORI) ranges from 1 (lowest risk) to 10 (greatest risk). The LVORI was developed based on Florida automobile accident reports when fog/smoke was a factor, and the associated weather. Normally, a desirable value is less than 4. The base line risk of having a vehicle accident with smoke and/or fog reported is about 1 in 1000 accidents. The LVORI value for this VSmoke analysis was 1 and this is equal to the base line.

High concentrations of particulate matter, especially fine particles (PM2.5), and carbon monoxide can have a negative impact on people's health. The EPA has developed a color coding system called the Air Quality Index (AQI) to help people understand what concentrations of air pollution may impact their health. When the AQI value color code is orange, then people who are sensitive to air pollutants, or have other health problems, may experience health effects. This means they are likely to be affected at lower levels than the general public. Sensitive groups of people include the elderly, children and people with either lung disease or heart disease. The general public is not likely to be affected when the AQI is code orange. Everyone may begin to experience health effects when AQI values are color coded as red. People who are sensitive to air pollutants may experience more serious health effects when concentrations reach code red levels.

The analysis shows the air quality at downwind distances less than 6.21 miles from the edge of the fire may have a 1-hour particulate matter concentrations predicted to be code red or worse, while distances

less than 9.85 miles are predicted to be code orange or worse. At distances less than .38 miles from the edge of the fire the one-hour carbon monoxide concentrations are predicted to be code red or worse, and distances less than .62 miles from the fire are predicted to be code orange or worse.

Smoke can also have an impact on how far and how clearly we can see on a highway or in viewing scenery. The fine particles in smoke are known to be able to scatter and absorb light, which can reduce visibility conditions. The visibility estimates from VSmoke are valid only when relative humidity is less than 70 percent. Also, visibility estimates assume smoke is passing in front of a person who is looking through the plume of smoke. The visibility thresholds used for both modeling analyses were to maintain a contrast ratio of greater than 0.05 and a visibility distance of 0.25 mile. Visibility conditions may exceed the threshold less than 328 feet from the edge of the fire.

The VSmoke-GIS model estimates were for pre-selected fine particulate matter concentrations (39, 89, 139, 352 and 527 micrograms per cubic meter) to be predicted downwind of the fire (see plume map in project record). The downwind spacing interval was set at 0.025 kilometers and the model ceased making downwind estimates at 30 miles from the edge of the fire. The stability class used for the VSmoke-GIS analysis was moderately unstable and this is the same as the calculated stability from VSmoke.

Wind direction for prescribed burns would be chosen to limit the impact of emissions on identified sensitive sites such as Caney Creek Wilderness and the City of Mena. No negative effects to the air quality from the prescribed burning were predicted for the Class I Caney Creek Wilderness.

The cumulative effects of prescribed burning on air quality consist of the downwind impact of multiple, simultaneously burning prescribed burns, in addition to other emissions in the area. These cumulative effects are rather short-lived, because once the burn is over and smoke has dissipated, the effect is over. Impacts to air quality will generally be confined to no more than a few hours or at most 1-2 days. VSmoke provides analysis of cumulative effects to air quality by incorporating not only emissions from the analyzed prescribed burn, but also background particulate levels and carbon dioxide levels. It is acknowledged that multiple simultaneous prescribed burns could cumulatively increase particulate levels. While it is difficult or nearly impossible to quantify such emissions in a planning analysis, voluntary compliance with the State of Arkansas Smoke Management Program will insure compliance with applicable Federal and State regulations governing open burning.

Soil Productivity

This section includes a description of existing conditions and an assessment of potential effects to soil productivity from project actions by alternative for the MFPA. The temporal bound used for cumulative effects on soil productivity is three years; the spatial bound includes all soils where management activities are proposed.

The desired conditions for this project area and the soil resource are to maintain the watershed's natural hydrologic function (i.e., the functional integrity of the natural drainage system and the watershed's inherent capacity to absorb and retain water), and to maintain the inherent productivity of the soil resource. This can be accomplished through proper planning and implementation of all soil disturbing activities that will meet Revised Forest Plan standards, the Final EIS to the Revised Land

and Resource Management Plan for the Ouachita National Forest, and the Region's soil quality standards (Region 8 supplement to the Soil Management Handbook FSH 2509.18 for Soil Quality Monitoring).

Existing Condition

The MFPA is located within the Black Fork/Rich Mountains and Kiamichi/Ouachita River Land Type Associations of the Ouachita Mountain Section of the Ouachita Mixed Forest-Meadow Province. Topographic features of this area consist of practically level alluvial land along Mountain Fork of the Little River, to gently rolling, very steep ridges and side slopes of hills. Geology is predominantly from the Jackfork Sandstone Formation, with lesser amounts in the lower southwestern elevations from the Stanley Shale Formation. These geologic formations originated during the Pennsylvanian and Mississippian Periods, respectively.

Within the analysis area elevations range from about 900 to 2,600 feet above mean sea level. North slopes are relatively cooler and damper, while south slopes tend to be warmer and drier. Slope gradients range from 0 to 60 percent.

A total of 30 different soil map units were mapped on National Forest System lands in the analysis area (Map 5) (Olson, 2012).

In this analysis area, Soil Map Units 30, 79, 83, and 137 (approximately 18% of the area) have a severe erosion hazard rating and slopes in most of these areas exceed 35 percent. Approximately 51% of the area has a moderate erosion soil rating (Soil Map Units 9, 38, 40, 54, 55, 56, 67, 77, 80, 92, and 130); and approximately 31% of the area has a slight erosion soil rating (Soil Map Units 2, 20, 31, 33, 61, 62, 76, 89, 91, 106, 107, and 139).

Within the MFPA, approximately 10% of the soils have a severe compaction hazard rating (Soil Map Units 61 and 106); less than 1% has a high compaction hazard rating (Soil Map Units 2 and 147); approximately 6% has a moderate to high compaction hazard rating (Soil Map Units 54, 56, 62, 89, and 139); approximately 59% has a moderate compaction hazard rating (Soil Map Units 9, 20, 30, 31, 33, 38, 40, 55, 67, 76, 80, 91, 92, 130 and 139); and approximately 35% has a slight compaction hazard rating (Soil Map Units 77, 78, 79 and 107).

More details regarding the area's topography, geology, soil inventory and mapping unit descriptions can be found in the Soil Resource Report which is part of the project record.

Approximately 12 miles of unauthorized roads/OHV trails have created soil erosion.

Analysis of Effects: Soils

Management actions (road construction, skidding, timber harvest, scarification, prescribed burning, etc.) may cause unacceptable levels of erosion, sedimentation, compaction and/or nutrient loss and, as a result, a decrease in long-term soil productivity within the analysis area.

Soil Erosion: Erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Soils are considered detrimentally eroded when soil loss exceeds soil loss tolerance values (i.e.; the Forested T-factor). Soil map unit Forested T-factors in this analysis area range from 0.43 to

0.84 tons/acre/year of allowable soil loss. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Forested T-factors and soil susceptibility to erosion vary by soil and mapping unit. Soil "K-Factors" indicate a soil's inherent erodibility. Nationally, soil K-factors can range from about 0.10 to 0.64. Soil map unit K-factors in this analysis area range from 0.19 to 0.37. Soils with higher K-factor values and soil map units with severe erosion hazard ratings require more intensive management efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity. Erosion can best be managed to stay within the Forested T-factor values by leaving sufficient amounts of the forest floor, slash and other onsite woody debris material that typically dominates an effective surface cover, not overly compacting soils that would reduce water infiltration rates and result in increased overland flow rates, and not allowing water to concentrate and channel on roads, skid trails and landings. Following are some research findings and conclusions from erosion studies conducted in the Ouachita Mountains:

- Natural erosion from undisturbed forest soils is very low, generally in the neighborhood of 0.01-0.15 tons/acre/year.
- Soils in the Ouachita Mountains typically do not have high inherent soil erodibility values (high K-Factor) due to high surface gravel and rock contents and high concentrations of fine roots in the surface soil.
- Implementation of Best Management Practices (BMPs) or soil conservation treatment measures minimize the exposure of soils to erosion. Erosion rates approaching or exceeding Forested T-factor rates are rare when soil conservation treatment measures and water quality BMPs are used. Attention should be given to Streamside Management Zone guidelines within the BMPs.
- Accelerated erosion rates last for only a few years due to rapid vegetative recovery rates.
- The transportation system is the most common cause of accelerated erosion that occurs in forested watersheds.
- Once erosion problems have developed (gully erosion, drainage channel gullying and head cutting, road washouts, etc.) they can be very difficult and costly to mitigate.

In this analysis area, Soil Map Units 30, 79, 83, and 137 (approximately 18% of the area) have a severe erosion hazard rating and slopes in most of these areas exceed 35 percent. These areas need to be considered when planning and implementing treatments, including prescribed burning. Activities planned on these units should have an erosion control plan approved by the Forest Hydrologist.

Medium thinning is proposed in stands that fall in these soil map units. 22 acres of Stand 4 in Compartment 896, 35 acres of Stand 3 in Compartment 899, and 19 acres of Stand 4 in Compartment 899 are on soils with a severe erosion hazard rating.

Approximately 51% of the area has a moderate erosion soil rating (Soil Map Units 9, 38, 40, 54, 55, 56, 67, 77, 80, 92, and 130). Soil map units which have a moderate erosion hazard will likely contain inclusions of small areas having slopes in excess of 35% which do have a severe erosion hazard rating. Awareness of these areas will help in targeting management activities away from such susceptible areas of the forest and minimizing the impact of erosion. Where fire lines are planned and established for prescribed burned areas, efforts need to be made to prevent excessive compaction, erosion and soil displacement in accordance with Regional and Forest soil quality standards.

Approximately 31% of the area has a slight erosion soil rating (Soil Map Units 2, 20, 31, 33, 61, 62, 76, 89, 91, 106, 107, and 139). Mitigation measures proposed for all action alternatives to minimize erosion would be followed in accordance with the Revised Forest Plan.

Soil Compaction: 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 condition by causing increased overland flow during storm events and reduced plant growth due to a combination of factors, including reduced amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. It is generally acknowledged that all soils are susceptible to soil compaction or decreases in soil porosity. The soils in this planning area are most susceptible to compaction when wet.

Compaction monitoring on the ONF has found that compaction can be excessive on heavy traffic areas such as landings, primary skid trails and temporary roads, particularly when soils are wet or are rock free, or nearly rock free in the surface six inches. Requiring a limited operating season on soils with a high or severe compaction hazard rating and limiting activity when soils are wet (Revised Forest Plan, pp 74-75 and 85-87; RFP-FEIS, p 46) are used to limit compaction effects.

17 acres of medium thinning are proposed on soils with severe compaction hazard rating (Compartment 896 – Stand 6). To minimize compaction, heavy equipment would be limited to July through November in stands with severe compaction hazards. Operations during December through June are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks.

2 acres of heavy thinning are proposed on soils with a high compaction hazard rating (Compartment 899 – Stand 13). Operations would be limited to April through November in stands with high compaction hazards. Operations during December through March are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. Soil conditions would be monitored and operations would be suspended when soils become wet.

Soil Map Units 54, 56, 62, 89, and 139 have a moderate-high compaction rating, thus there will likely be inclusions of soils within these units which may have high to severe compaction hazard ratings.

The Mountain Fork soils report in the project file contains specific recommendations for managing soil organic matter, minimizing soil displacement and the risk of soil rutting and puddling, reducing soil compaction where yarding or other activities using heavy equipment will be used, and reducing soil erosion where soil-disturbing activities are planned.

Fire Effects on Soil: Prescribed burning may affect soil(s) positively or negatively (RFP-FEIS, pp 46-47). Positive indirect effects include enhancement of nutrient availability and phosphorus cycling and reduction of soil acidity. Prescribed burning may also help in reducing rates of soil acidification. Negative direct effects include excessive soil heating that can kill soil biota, alter soil structure, destroy organic matter, and loss of site nutrients through excessive volatilization. Soil erosion and additional nutrient loss through leaching may occur later during rainstorms. Negative effects are principally related to the severity and frequency of burning.

High severity burns, as often occurs during wildfires, can adversely affect long-term soil productivity. Such things as excessive nutrient loss from the site through atmospheric volatilization and deep

leaching, loss of soil organic matter and even soil structure, and reduced infiltration rates can be seriously compromised, further leading to accelerated erosion rates.

Management actions, however, have been proposed to conduct prescribed burns in properly managed conditions to produce a light to moderate fire intensity. During prescribed burning actions sufficient amounts of unburned material would be left intact to minimize erosion. Burns would be implemented such that not more than 20 percent bare soil would be exposed on units receiving fuels reduction or wildlife enhancement burns, and not more than 30 percent bare soil would be exposed on units receiving site preparation burns. The RFP-FEIS (Chapter 3, p 46) states that light to moderate burns would result in little to no detectable change in the amount of organic matter in surface soils. These burns would not change the structure of mineral soils because elevated temperatures in the soil would be less and of brief duration (i.e. fire would not stagnate in one spot for long periods of time). Light to moderate-severity burns would expose soil on less than 30 percent of the area and vegetative recovery would usually take one year or less. Soil biota would also be temporarily reduced but would recover quickly.

Recent research and monitoring in the Ouachita Mountains indicates that soil quality and long-term productivity may have improved under shortleaf pine-bluestem ecosystem restoration. Shortleaf pine-bluestem restorative treatment measures include repeated prescribe burning at 3- to 5-year intervals. Masters et al. (1993) found pH to increase slightly on harvested and burned areas when burned on a 3- to 4-year cycle. Leichty et al. (2005) found that shortleaf pine-bluestem stands that had been established 20-years earlier, on same or similar soils as in this project area, had increased levels of soil pH, mineralizable nitrogen and total amounts of nitrogen, carbon, calcium and organic matter as compared to the pine-hardwood control stands.

The proposed prescribed burns would occur every 1 to 5 years during and be of low to moderate intensity. Some of the prescribed burns would occur on slopes greater than 35 percent. Only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves and small twigs should be consumed. This would leave the underlying layer, which consists of more decomposed needles, leaves and twigs, to protect the soil from excessive nutrient loss. This organic layer, along with the trees and other living vegetation on the site, would also serve to prevent or minimize any soil movement.

Herbicide Use Effects on Soils: Herbicides may affect soil productivity through biotic impacts, soil erosion, and nutrient leaching (USDA Forest Service, 1989, pp IV-95 through IV-96). Depending on application rate and soil environment, herbicides can stimulate or inhibit soil organisms. Adverse effects can occur when herbicides are applied well above label rate. Use of herbicides at lowest effective rates required by mitigation measures does not reduce activity of soil biota (Fletcher and Friedman, 1986).

Use of herbicides will not disturb the soil surface, so treated areas will have intact litter and duff that minimizes the potential for accelerated erosion. Nitrogen loss from erosion and leaching will also be minimal and should not exceed 14 lb/acre. The overall nitrogen budget over a timber rotation period is positive and results in a long-term nitrogen buildup. Overall, the risk to reduced long term soil productivity from herbicides is minimal. The herbicides selected for use in the analysis area would not be directly applied to the soil. Proper application procedures and timing are critical in ensuring minimal effects to the soil. Triclopyr and imazapyr are soil active herbicides with relatively low soil mobility.

Alternative 1: No Action

Direct Effects

Erosion: The *No Action* alternative would typically result in the least amount of direct erosion. Only undisturbed natural erosion would be expected to continue.

Compaction and Displacement: No soil disturbing activities would be planned in the *No Action* alternative**.** Therefore, there would be no direct or indirect effects on the soil from the implementation of this alternative as no heavy equipment use would be planned.

Nutrient Loss: The *No Action* alternative would result in no direct nutrient loss.

Indirect Effects

Indirect effects to soil productivity in the analysis area could be the result of a high severity wildfire. Under this scenario, existing high fuel loadings along with limited fire suppression equipment access into some areas would equate to the most acres that could be negatively affected in terms of soil erosion and nutrient loss.

Cumulative Effects

No soil disturbing activities would be planned in the *No Action* alternative. Therefore no cumulative effects of this alternative in concert with other past, present, or reasonably foreseeable activities is expected.

Alternative 2: Proposed Action

Direct Effects

Erosion: The Revised Forest Plan Forest-wide Design Criteria identify maximum allowable soil loss thresholds (Revised Forest Plan, SW003, p 74). In order to determine whether the proposed practices and connected actions meet these guidelines, the Universal Soil Loss Equation (USLE) was used to calculate soil loss resulting from proposed actions by several impacted soil units.

For the project area, two worst case USLE modeling scenarios were completed to determine if they would meet the Forest standard. These consisted of two thinning units of approximately 76 and 48 acres, followed later dormant season burning as connected actions. The worst case soil units being impacted with the above proposed actions are Soil Map Units 83 (Pirum-Octavia-Panama complex, 35 to 60 percent slopes, rubbly, severe erosion hazard, slight compaction hazard) and 30 (Carnasaw-Octavia complex, 30 to 50 percent slopes, severe erosion hazard, moderate compaction hazard). The location of these is Stand 4 of Compartment 896 and Stand 3 of Compartment 899. It should be noted that no harvest activities are proposed on slopes with grade greater than 35%.

A total of five proposed treatment areas were modeled. These included the "worst-case analysis" described above, and three additional units which represent more typical harvest units and expected erosion rates for the project area. The more typical harvest units include Stand 4 of Compartment 897, Stand 9 of Compartment 897, and Stand 12 of Compartment 895. Two of these three stands are

proposed for heavy intensity thinning of approximately 22 and 75 acres, respectively. Stand 9 of Compartment 897 is proposed for moderate intensity thinning of approximately 64 acres. Stand 4 of Compartment 897 is on the Carnasaw-Sherless soil complex (Soil Map Unit 130). Stand 9 of Compartment 897 is on the Octavia-Carnasaw complex (Soil Map Unit 77). Finally, Stand 12 of Compartment 895 is on the Pirum-Clebit-Carnasaw complex (Soil Map Unit 80). All of these units tend to have slopes of 15-35%. These soils have moderate erosion and slight to moderate compaction hazards, and include a connected action of fuel reduction burning. The Universal Soil Loss Equation (USLE) analysis results are shown in Table 9.

Table 9: Proposed Action Alternative USLE soil loss analysis
(in tons/acre between re-entries)

Compartment-Stand Proposed Harvest[1]	Representing	Allowable Soil Loss[2] (tons/acre)	USLE Calculated Soil Loss[3] (tons/acre)
C-896, Stand 4 (Moderate Thinning, 76 ac)	Worst Case Soil Condition	8.25	5.50
C-899, Stand 3 (Moderate Thinning, 48 ac)	Worst Case Soil Condition	8.10	5.87
C-897, Stand 4 (Heavy Thinning, 22 ac)	Typical Soil Condition	8.10	6.81
C-895, Stand 12 (Heavy Thinning, 75 ac)	Typical Soil Condition	8.10	5.90
C-897, Stand 9 (Moderate Thinning, 64 ac)	Typical Soil Condition	8.85	6.37

[1] No harvest activities are proposed on slopes with grade greater than 35%.
[2] See Revised Forest Plan Soil and Water Design Criteria SW003.
[3] Based on implementation of erosion control measures which include seeding and installing water bars.

All five treatment units shown in Table 9 meet the Forest standard of staying within the allowable soil loss Forested T-factor. These treatment units, along with other proposed treatment units of similar or less intense soil disturbing management actions, therefore, would remain within acceptable limits over the entire project area when erosion control measures are adequately implemented.

Erosion mitigation measures described (see mitigation measures for the *Proposed Action* alternative) are designed to limit erosion to acceptable levels under normal circumstances. These measures include: limiting heavy equipment activities when soils are wet; carefully locating and limiting roads and skid trails; seeding and water barring skid trails and landings after use; covering steep skid trails with mulch, and protection of streamside areas. Monitoring has shown that these measures, when properly implemented, are effective at minimizing erosion.

Compaction: To minimize compaction, heavy equipment would be limited to July through November in stands with severe compaction hazards. Operations during December through June are allowed with the use of methods or equipment that does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks.

Operations would be limited to April through November in stands with high compaction hazards. Operations during December through March are allowed with the use of methods or equipment that

does not cause excessive soil compaction. This does not apply to roads, primary skid trails, or log decks. Soil conditions would be monitored and operations would be suspended when soils become wet.

Requiring a limited operating season on soils with a high or severe compaction hazard rating and limiting activity when soils are wet (Revised Forest Plan, pp 74-75 and 85-87; RFP-FEIS, p 46) are used to limit compaction effects.

Within the MFPA, approximately 10% of the soils have a severe compaction hazard rating. Soil compaction would be limited to this area and, with the limited equipment operation period, is not expected to impair soil productivity.

Soil Displacement: The *Proposed Action* alternative would result in some soil displacement from log skidding and dozer-constructed firelines, log decks and permanent and temporary road construction. Where these actions are being dedicated to these uses for future management actions, soil displacement is acceptable. This is generally performed during erosion control mitigation work by blading back areas where topsoil has been deposited. To minimize the potential for soil displacement during harvest activities within the unit, equipment operation would only be allowed during dry soil conditions and over an intact forest floor and the front end of ground skidded logs would be elevated above ground during skidding. Where topsoil has been removed (displaced) from areas not dedicated to other uses, the soil would be bladed back over from where it came. These actions and mitigation measures (see Revised Forest Plan (SW007, p 75) would result in displacement having only a minimal impact to soil productivity.

Nutrient Loss: Some short-term loss in nutrient capital is expected due to tree harvest and prescribed burning which result in some biomass removal, accelerated erosion, volatilization and deep leaching. This is expected to continue for 2-years following project implementation. On the positive side, harvesting and prescribed burning would temporarily increase availability of nutrients resulting in improved vegetative growth during this same period.

Timber harvesting would result in the removal of tree boles only. The prescribed burns primarily would be dormant season burns of light to moderate severity. This means that, in addition to the targeted fraction of 10-hour and larger fuels planned for consumption, only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves and small twigs would also be consumed. Most of the nutrient capital would remain on-site by leaving most of the underlying forest floor duff layer, which consists of more decomposed needles, leaves and twigs, intact and unburned. This remaining organic layer, along with the remaining trees, unconsumed slash and other large woody debris and other living vegetation, would serve to minimize the temporary loss of the nutrient capital. Implementing the *Proposed Action* alternative, therefore, would result in no long-term effect on the soils nutrient capital.

Indirect Effects

Fire and soil nutrients: Any long-term negative effects to the soil would be related to high severity burns or very short (less than 3-year) re-burn frequency of the burns. Typical burn severity would be limited by established burning parameters and mitigation measures designed to protect soils and overstory trees and to minimize risk of escape. These parameters result in retention of enough leaf

litter to protect soil from the negative effects listed above in most cases. Burn frequencies would be 3-years or greater which would allow recovery of forest floors and soil biota and would not deplete soil nutrients.

With standard prescribed burn planning and mitigation, negative effects to soil productivity from prescribed burning under the *Proposed Action* alternative are not expected. This is because the burns would be light to moderate in severity and cool enough to protect overstory trees, and the lower portion of the litter layer would remain in place.

Cumulative Effects

The effect to long-term soil productivity as a consequence of those actions being proposed in the *Proposed Action* alternative relates to the cumulative effects from erosion, compaction, displacement and the soils nutrient capital as noted above. By adhering to mitigation measures and following all applicable Revised Forest Plan direction, long-term soil productivity would be maintained. In addition, fuel loadings throughout most of the project area would be reduced from timber harvesting and prescribed burning, and the construction of temporary roads would allow increased access for fire suppression needs. These actions would reduce the probability of a major future high severity wildfire, which could impair long-term productivity. When considering both the direct and indirect effects, the *Proposed Action* alternative would result in maintaining long-term soil productivity. Cumulative Effects associated with the soil resource are, in substantial measure, included with the Aquatic Cumulative Effects analysis and adequately addressed by the correlating modeling, including time and space bounds. Soil compaction is, for the most part, confined to certain identifiable soil types/mapping units and forest stands within the project area, and Revised Forest Plan standards and Arkansas State Water Quality Best Management Practices provide adequate mitigating measures to minimize adverse effects. Soil disturbing activities are included with the 6^{th} level watershed analyses in the Aquatic Cumulative Effects modeling.

Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

Direct, indirect and cumulative effects of this alternative would be similar to the *Proposed Action* alternative, except erosion, compaction, displacement and nutrient loss could be slightly more. This is due to an increased possibility that prescribed burning may require a greater burn intensity to meet management objectives, or the use of mechanical equipment would be needed in lieu of herbicide use. The use of herbicides in the *Proposed Action* alternative, however, would result in a lower probability that mechanical scarification would actually be needed when compared to this alternative. Conversely, if herbicides are not used, the probability of the need for mechanical scarification would increase.

Water Resources & Quality

Existing Condition

The MFPA is located within the Mountain Fork 6th level watershed (111401080101). Cumulative effects analysis as well as Travel Analysis was done for the entire 29,421 acre watershed area which contains the MFPA. One of the thinning units falls into the adjacent watershed, however, as it is only 17 acres, no adverse effects are anticipated for that watershed.

Stream flow within the MFPA is generally east or southwest from the slopes of Rich, Middle, Self, Weehunt, Quentin and Pine Mountains toward the Mountain Fork of the Little River. Major drainages include the Mountain Fork of the Little River, and Mill, Bufram, White, Red, and Collins Creeks.

The primary beneficial uses for the streams and tributaries in the Mountain Fork Project Area are fisheries (Arkansas Pollution Control and Ecology Commission, 2002), which provide for the protection and propagation of aquatic life. There are two groundwater wells on the northern boundary of the project area within Queen Wilhelmina State Park; however, these wells do not produce enough water to adequately service the State Park and Lodge, are contaminated with a variety of elements and require treatment. The Arkansas Department of Parks and Tourism and Freedom Water Association have developed a rural water system extension to service the State Park and Lodge.

Mill Creek and the Mountain Fork of the Little River drain into Broken Bow Lake approximately 27 miles southwest of the project area. The Mountain Fork is considered an "extraordinary resource water". Also contained within the project area are 20 existing ponds (¼ to ½ acre in size). The primary beneficial use of the ponds is water supply for animals and lotic aquatic biota.

There are no section 303(D) impaired water bodies within the project area[1].

The Mountain Fork Project Area has a low aquatic risk, indicating minimal adverse effects from sediment increases to aquatic beneficial uses.

Five stream crossings within this project area inhibit movement of fish and other aquatic organisms (Map 4).

Analysis of Effects: Water Resources and Quality

Alternative 1: No Action

Direct Effects

A direct effect of management activities on water quality occurs when an activity places a pollutant directly into a watercourse. Roads contribute more sediment to streams than any other land management practice (Gucinski et al., 2000). Stream crossings and some water diversion features serve as direct conduits for erosion from the road or road ditch directly into the channel. The *No Action* alternative would not provide road treatment activity that would reduce sediment contributions. Specifically, five fish passages would not be improved, 1.6 miles of road would not be closed, and 1.5 miles of road would not be repaired. Specific recommendations regarding needs for reducing road-related sedimentation can be found in the Mountain Fork Travel Analysis Report, on file at the Mena Ranger District office.

Indirect Effects

Indirect effects are those impacts from management activities that do not have a direct connection to the stream course. Roads also provide an indirect source of sediment to the stream network. The *No*

[1] ARDEQ 2008; http://www.adeq.state.ar.us/water/default.htm

Action alternative would not provide road treatment activity that would reduce sediment contributions. Specific recommendations regarding needs for reducing road-related sedimentation can be found in the Mountain Fork Travel Analysis Report.

Cumulative Effects

Existing trends would persist within the MFPA. Implementation of the *No Action* alternative would maintain baseline sediment rates. The risk level associated with the *No Action* alternative was 'low' from the ACE model for 6th level watersheds 111401080101 (see project file).

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

Direct Effects

When herbicides are transported, mixed, and applied, there is a risk that the herbicide could be spilled. Herbicides may enter streams, ponds, and lakes during treatment by direct application or drift.

Indirect Effects

When herbicides are applied, there is a risk that the chemical could move offsite, possibly entering streams, ponds, lakes, or infiltrate ground water by vertical seepage into aquifers. The Forest Service has specific regulations for the use and application of herbicides, and the Ouachita NF adheres to additional design criteria for herbicide application in the Revised Forest Plan. When all BMPs or regulations are implemented, there should be no significant movement of herbicide offsite.

The introduction of herbicides into the water is treated as an indirect effect since standards and guidelines (BMPs) do not permit direct application. Herbicide monitoring across the Forest has found only trace amounts of herbicide have ever been detected in streams (Ouachita National Forest, 1993).

Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. The application of triclopyr for site preparation and release was included in the analysis. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a significant threat to beneficial uses. Based on this evaluation, the BMPs used in the transportation, mixing, application and disposal are effective at protecting beneficial uses.

Cumulative Effects

Because the herbicides do not bioaccumulate, there are no cumulative effects to beneficial uses.

Alternative 3: Proposed Action without Herbicide

Direct Effects

A direct effect of management activities on water quality occurs when an activity places a pollutant directly into a watercourse. Road maintenance and/or construction, fireline construction and reconstruction and timber management activities such as construction of skid trails, temporary roads and log landings could result in increases in erosion and sedimentation. Roads contribute more sediment to streams than any other land management practice (Gucinski et al., 2000).

While it is impractical to eliminate all soil from entering a stream, it is possible to limit it from directly entering streams through design and implementation of Best Management Practices (BMPs). BMPs can be applied before, during and after pollution-producing activities to reduce or eliminate introduction of pollutants into receiving waters. BMPs are basically a preventative rather than an enforcement system. BMPs are a whole management and planning system in relation to sound water quality goals, including both broad policy and site-specific prescriptions. Within the Revised Forest Plan, standards are synonymous with BMPs.

Monitoring is used to determine implementation and effectiveness of management activities. Reviews of individual BMPs and combinations of BMPs across the ONF have shown that management activities such as temporary road crossings or timber harvest in combination with SMA buffers do not have a significant adverse effect on beneficial uses (Clingenpeel, 1989; Clingenpeel, 1990; Neihardt, 1994; USDA Forest Service, 1994; Vestal, 2000). Based on results of research and monitoring efforts and mandatory implementation of Revised Forest Plan standards, an adverse direct effect resulting from these proposed management actions would be unlikely.

Indirect Effects

Indirect effects are those impacts from management activities that do not have a direct connection to the stream course. The indirect effects would include increased runoff and peak flows as a result of vegetation removal and compacted surfaces, which result from road and landing construction and from harvest activities. The disturbed surfaces resulting from the above activities and increased flows could cause increases in erosion and sediment delivery to channels. Miller, Beasley and Lawson (1985) demonstrated in harvest treatment areas that peak flows and sediment yield did not increase significantly.

The effect of nutrients released to streams as a result of management activities is also an indirect effect. Beasley, Miller and Lawson (1987) statistically found no effect from selection harvesting and only a temporary effect for one year after clear cutting. Because of the dilution of untreated areas, and the limited amount of site rehabilitation harvest, the effect of nutrients released to streams would not likely be a significant impact to water quality.

Based on results of research and monitoring efforts and mandatory implementation of BMPs, an adverse indirect effect resulting from these proposed management actions would be unlikely.

Cumulative Effects

Sediment is the best measure to determine the effect of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller, 1981). Sediment increases adversely affect fish productivity and diversity (Alexander and Hansen, 1986). Increases in water yields as a result of harvesting methods could also indicate cumulative effects. However, water yield models do not characterize all effects of management activities such as road construction. Often the increase in water yield is less than natural variability. Changes in water nutrients could model cumulative effects. However, nutrient fluxes within streams as a result of management activities are minor. For purposes of this analysis, an Aquatic Cumulative Effects (ACE) model was used. The ACE model predicts sediment yields as a surrogate for determining cumulative effects for water quality and associated beneficial uses. The objective of this analysis is to determine possible cumulative effects of management activities on water quality and its associated beneficial uses.

Local research has shown that effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Miller, Beasley and Lawson, 1985). Three years prior and the year of implementation bind the timeframe of the ACE model. This captures the effect of other management activities that may still affect the analysis area. Proposed actions are assumed to occur in a single year. This will express the maximum possible effects that could occur. This is consistent with most project level environmental analyses that have an operability of five years. Past activities that have a lasting effect such as roads and changes in land use are captured by modeling sediment increase from an undisturbed condition (results of monitoring on the ONF indicate there are no adverse cumulative effects when Forest standards are followed). Background information on the process and data used to predict sedimentation is on file at the Mena Ranger District office. Wildlife treatments such as midstory reductions would be implemented by crews using chainsaws and would not result in any soil disturbance, but have been added as a treatment for analysis. Firelines would use recently reconstructed roads or maintained roads where possible. By the time prescribed burning, scarification or wildlife treatments are conducted, any sediment contributed from road construction or harvest actions would be stabilized or returned to or near normal conditions (USDA Forest Service, 2005c, p 5). The objective of this analysis is to determine possible cumulative effects of management activities on water quality and its associated beneficial uses. There are two methods to address cumulative effects for the ONF. The first is to model changes in land use and disturbance with respect to increases in sediment. The second is to conduct stream surveys and compare these results to reference watersheds within their respective sub ecoregion.

A valid cumulative effects analysis must be bounded in space and time. For purposes of project level planning, 6th level watersheds are appropriate spatial bounds for this cumulative effects analysis. Table 10 displays current watershed risk levels, potential to adversely affect aquatic beneficial uses, and the distribution of land jurisdictions.

Table 10: Aquatic Cumulative Effects Analysis.
These are approximate acres only based on field examinations, Geographic Information Systems (GIS) and Global Positioning Systems (GPS). See Watershed Map in Appendices.

Watershed	Beginning Watershed Risk Level	Potential to Adversely Effect	Private Land (acres)	State Land (acres)	Forest Service (acres)	Total[1] (acres)
111401080101	Low	Low	2,102	252	11,046	13,400

Watershed 111401080101 has a beginning watershed risk level of 'low'. The probability is low for adverse effects to aquatic species for this 6th level watershed as a result of Alternative 2 or Alternative 3. If the results remain within this range there should also be no adverse effect on water quality with respect to beneficial uses (e.g., fish communities). Forest Service objectives are to maintain or improve health through implementation of Revised Forest Plan standards and Arkansas State BMPs.

Sediment delivery will be reduced as a result of proposed road closures. The proposal includes plans to permanently close 1.6 miles of system road; close 12 miles of unauthorized road; and close 7.6 miles of proposed temporary roads. The 1.5 miles of the System Road Reconstruction will not increase the open road density (see travel analysis report), and will contribute less sediment to waterways.

Table 11 summarizes predicted sediment increases for the action alternatives. This predicted sediment increase indicates a low risk for this watershed.

Table 11: Risk Assessment

Watershed	Predicted Sediment in tons[1]	Percent Increase[2]	Risk for Aquatic Biota
111401080101	148.92	407	Low[3]

1 – Per year for first 2-3 years

2 – Cumulative to an undisturbed condition in the watershed

3 – Indicates minimal adverse effects from sediment to aquatic beneficial uses and only requires the application of Forest standards.

Riparian Areas and Floodplains

Existing Condition

Soil Map Units 36 and 55 are identified as flood plain units experiencing frequent flooding in this analysis area. These mapped areas help to give an approximate determination of the 100-year boundary where their width is determined to be more than 200 feet.

Executive Order 11988 and Forest Service policy require the ONF to consider impacts of management activities on 100-year floodplains to assure that management actions do not adversely alter the natural values of such areas. Soil resources mapping units identified as being in the 100-year floodplain or as being a hydric soil, require special management considerations and evaluations. Additional evaluation should be made on all floodplain and wetland locations involving existing or planned structures (i.e.: bridges, roads, buildings, or other development) within 100-year flood plains regardless of flood plain width or wetland size (For detailed information, reference Executive Order (E.O.) 11988, E.O. 11990, FSM 2526 and FSM 2527). Riparian areas are protected by implementation of stream management areas (SMAs). SMAs at a minimum include the first 100 feet adjacent to perennial drainages and water bodies greater than ½ acre and the first 30 feet adjacent to other defined drainages and ponds less than ½ acre.

Analysis of Effects: Riparian Areas and Floodplains

The geographic boundary for this analysis section is the MFPA (including all or portions of Compartments 875-877, 893, and 895-899.

Commercial thinning is planned in stands that include portions of Soil Map Units 36 and 55 which experience frequent flooding. These stands are identified as Compartment 893 – Stand 9; Compartment 895 – Stands 2, 3, 4, 7, 8, 9, and 12; Compartment 896 – Stands 8, 24, and 25; Compartment 897 – Stand 8, 9, 11, and 15; Compartment 898 – Stand 6; and Compartment 899 – Stand 7. Mid-story reduction in Compartment 893 – Stand 11 and Compartment 896 – Stands 23 and 27 also fall into these soil mapping units as does Compartment 896 – Stand 21 which is proposed for site prep/planting/release on the tornado damaged area. 3 of the 5 fish passages and associated road reconstruction sites also fall into riparian area and floodplain areas.

Alternative 1: No Action

Direct Effects

A direct effect of management activities on water quality (riparian areas and floodplains) occurs when an activity places a pollutant directly into a watercourse. Roads contribute more sediment to streams than any other land management practice (Gucinski et al., 2000). Stream crossings and some water diversion features serve as direct conduits for erosion from the road or road ditch directly into the channel. The implementation of the *No Action* alternative would not provide road maintenance (other than routine) activities that would reduce sediment contributions. Specifically, five fish passages would not be improved, 1.6 miles of road would not be closed, and 1.5 miles of road would not be repaired. Specific recommendations regarding needs for reducing road-related sedimentation can be found in the Mountain Fork Travel Analysis Report, on file at the Mena Ranger District office.

Indirect Effects

Indirect effects are those impacts from management activities that do not have a direct connection to the stream course. Roads also provide an indirect source of sediment to the stream network. The implementation of the *No Action* alternative would not provide road maintenance (other than routine) activities that would reduce sediment contributions. Specific recommendations can be found in the Mountain Fork project file, Travel Analysis Report.

Cumulative Effects

Implementation of the *No Action* alternative would continue the existing trends. According to ACE model results, cumulative effects as a result of sediment increases are at a low risk level for this watershed (See "*Water Resources and Quality"* section, above).

Alternative 2: Proposed Action

Refer to the discussion of effects for Alternative 2 under the "*Water Resources and Quality*" section for disclosure of effects of herbicide treatment to riparian areas and floodplains.

Alternative 3: Proposed Action without Herbicide

Direct Effects

A direct effect of management activities on water quality (riparian areas and floodplains) would be when an activity places a pollutant directly into a watercourse. Road maintenance, construction and/or

reconstruction, fireline construction and reconstruction and timber management activities, such as construction of skid trails, temporary roads and log landings, can result in increases in erosion and sedimentation. While it is impractical to eliminate all soil from entering a stream, it is possible to limit it from directly entering streams through design and implementation of BMPs and (where necessary) monitoring. Hence, an adverse direct effect resulting from proposed management actions would be unlikely. Refer to discussion for direct effects of the proposed treatment activities for "*Water Resources and Quality*".

The commercial thinning, mid-story reduction, and manual restocking actions proposed would not have a direct effect on riparian areas and floodplains due to the fact that once final layout is completed around the SMAs as defined above, those areas will be avoided.

Indirect Effects

Indirect effects are those impacts from management activities that do not have a direct connection to the stream course. The indirect effects would include increased runoff and peak flows as a result of vegetation removal and compacted surfaces, which result from road and landing construction and from harvest activities. Through mandatory implementation of Revised Forest Plan standards and (where necessary) monitoring, an adverse indirect effect resulting from these proposed management actions would be unlikely. Refer to discussion for indirect effects of the proposed treatment activities for "*Soil Productivity*" and "*Water Resources and Quality*" for disclosure of indirect effects of proposed management activities to riparian and floodplains.

The commercial thinning, mid-story reduction, and manual restocking actions proposed may have an indirect impact on sediment loading in the riparian areas and floodplains. However, this will be minimal due to the fact that once final layout is completed around the SMAs as defined above, those areas will be avoided.

In addition the action alternatives would replace nonfunctioning culverts with structures that would be engineered with adequate fish passage. This will have a positive indirect effect of reducing sediment from roads in the project area.

Cumulative Effects

By practicing a "*light hand on the land*" policy during all soil disturbance activities, adhering to mitigation measures common to all action alternatives, and following all applicable Revised Forest Plan direction, effects on riparian areas and floodplains would be minimized.

Table 11 summarizes predicted sediment increases. According to the ACE model, predicted sediment increases as a result of implementing either of the action alternatives indicate a low risk.

Transportation & Infrastructure

Existing Condition

Local residents mostly use the National Forest System lands within the Mountain Fork Project Area for day use and road-related activities such as firewood gathering and recreation activities such as hunting, fishing, hiking, mountain biking, and driving for pleasure.

The road system appears to meet a variety of both public and administrative needs. There are approximately 86 miles of road (open and closed combined) in the larger 6th level watershed (private and national forest land) (Travel Analysis Maps are in the project file). Thirty-five percent (30 miles) of roads within the watershed analysis area are of County, State or Private jurisdiction; 65 percent (56 miles) are of Forest Service jurisdiction. Of all the classified (authorized) roads in the Mountain Fork Watershed, 65 percent (48 miles) are categorized as open and 35 percent (26 miles) are closed. An open road is available for vehicular traffic by the public, whereas a closed road is not.

Approximately 12 miles of unauthorized roads are located on national forest land.

The Revised Forest Plan for the ONF describes road density objectives for each MA. The ONF measures road density (miles of road per square mile of area) by considering only authorized open roads (permanent, local arterial and collector roads, regardless of jurisdiction) and designated OHV trails. For the purposes of this analysis, road densities were calculated in this manner.

The existing open road density for the watershed across all land jurisdictions is 1.04 miles/mile^2 (.74 miles/mile^2 on National Forest System lands only), which meets the Revised Forest Plan standard of 0.75 mile per square mile for Management Area 2, and 1.0 mile per square mile for all other MAs encompassed by this project area.

Approximately 1.5 miles of road require reconstruction prior to use for forest management activities, mostly at crossings being repaired for better fish passage. Approximately 2.4 miles of road construction and 7.6 miles of temporary road construction are needed for forest management activities, and these roads would be closed after use (Map 4).

Analysis of Effects: Transportation and Infrastructure

The geographic bounds for the analysis of effects of Transportation and Infrastructure in this EA include the transportation system within the 6th level watershed (111401080101). Timelines for measuring the effects would be until all activities proposed are completed.

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

There would be no change in the existing road system and access other than standard scheduled routine maintenance. Existing trends would continue. Improvements would not occur to travel and access, or aquatic habitat.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

Summary - Direct effects would include .5 miles of unauthorized road being added to the road system as a closed road (limited to administrative access), 11.5 miles of unauthorized road being closed and decommissioned, 1.6 miles of permanent system road closure, 2.4 miles of new system road construction (these roads would also be closed to public access after the completion of all proposed actions), 1.5 miles of road reconstruction, and 7.6 miles of temporary road construction (Map 4). All

road closures would be to both highway and off-highway vehicles. All other roads would retain the designation shown by the MVUM for the Ouachita National Forest. Emergency and regular road maintenance would be conducted on existing open roads. The 5 stream crossings with culverts being replaced to restore aquatic habitat would be engineered with adequate fish passage structures. The *Proposed Action* and *Proposed Action without Herbicide* alternatives would replace nonfunctioning culverts. Indirect effects of the proposed transportation work would be improved access for timber harvesting, prescribed burning, silvicultural treatments, and wildlife work as well as safe public access. Maintaining an open road density which meets the Revised Forest Plan standard will have a cumulative effect of improving the open road density across the entire ONF.

Description of Individual Actions

System Road Construction – The *Action* alternatives propose to construct approximately 2.4 miles of system road to accommodate access for management activities. These roads would be added to the system as classified roads, and closed year round to highway and off-highway vehicular traffic after administrative use to protect soil, water and wildlife resources (by avoiding an increase in open road density).

System Road Permanent Closure – Approximately 1.6 miles of open system road would be closed year round to highway and off-highway vehicles with a gate to protect soil, water and wildlife resources within the analysis area.

System Road Reconstruction – Approximately 1.5 miles of existing open system road would be reconstructed to facilitate access, restore fish passage, and to reduce sediment and improve watershed condition.

Temporary Road Construction – Approximately 7.6 miles of temporary road would be constructed to access and haul timber from stands proposed for commercial timber harvest. After use, these temporary roads would be permanently closed year round to highway and off highway vehicles with earthen berms and seeded.

Unauthorized Road, Close and Decommission – Approximately 11.5 miles of unauthorized roads would be closed year round to highway and off-highway vehicles with an earthen mound, waterbarred and seeded to protect soil, water and wildlife resources within the project area.

Unauthorized Road, Close – Approximately .5 miles of unauthorized road will be closed year round to highway and off-highway vehicles.

Road Maintenance – There are approximately 37 miles of existing classified road (open and closed) that would require road maintenance prior to proposed treatments and throughout this project area's entry cycle to reduce sediment and improve watershed condition. This maintenance includes slide and slump repair, surface blading, spot surfacing with gravel, maintenance of drainage structures, ditch cleaning and clearing the roadside of vegetation. This is in addition to regularly scheduled maintenance.

Wildfire Hazards and Fuels

Following is a summary of the direct, indirect and cumulative effects of fire and fuel management for each alternative.

National Direction

The *Comprehensive Strategy*[2] addresses four principle goals and anticipated outcomes. These goals and outcomes are summarized in Table 12.

Table 12: Goals and Objectives from National Fire Plan Comprehensive Strategy

Goals	Outcomes
1. Improve Prevention and Suppression	Fire fighter safety is paramount. Educate property owners to reduce risk of fire. Improve readiness of joint agency and local firefighter resources to protect communities and the environment from wildfire. Reduce incidence of injury due to catastrophic wildfire.
2. Reduce Hazardous Fuels	Focus hazardous fuel removal where needs are greatest. Strive to reduce risks to public health, communities and the environment.
3. Restore Fire Adapted Ecosystems	Rehabilitate, restore, educate and monitor fire adapted ecosystems by utilizing all available tools to provide a healthy, sustainable ecosystem for future generations.
4. Promote Community Assistance	Work with communities to promote greater participation and awareness of their role in protection. Seek opportunities to better utilized products and outcomes associated with fuel reduction treatments.

Existing Condition

History and Fuel Loading

Historically, fire frequency in the Ouachitas ranged from 2-40 years with the lowest frequency occurring during the settlement period. Most actual frequencies are greater than the measured fire-return interval since only fires intense enough to produce scars are seen in the record; some low severity fires go undocumented in fire histories. Fire suppression became a significant disturbance factor in the area beginning in the 1930's, as ownership of depleted farms and forestland reverted to State and Federal Governments. After 70 years of effective fire suppression, the shortleaf pine forest of the Ozarks and Ouachita Mountains are no longer open and no longer support the grass and forb understory described as characteristic of those forests in earlier times (USDA Forest Service, 1999, pp 16-17). Annual burning was also common throughout the shortleaf pine region after European settlement (Stanturf et al., 2002, p 613).

[2] A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Strategy Implementation Plan. December 2006. http://www.forestsandrangelands.gov/plan/documents/10-YearStrategyFinal_Dec2006.pdf

A description of the existing vegetative component of the MFPA is provided in the "*Vegetation*" section of this chapter.

There are approximately 10.5 tons per acre, on average, of accumulated fuels available in the MFPA.

Fire Regime and Condition Class

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Hann et al. 2004). The majority of the MFPA is within Fire Regime Group (FRG) I (LANDFIRE: LANDFIRE National Vegetation Dynamics Models 2007). Fire Regime Group I denotes a fire return interval (frequency) of 0-35 years, and a low severity.

Fire Regime Condition Classes (FRCCs) are a qualitative measure describing the degree of departure from historic fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure and fuel loading. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects and disease or other activities. Descriptions of condition classes are found in Table 13 (Hann et al. 2004). FRCC mapping completed in 2003 based on treatment history specific to the MFPA, consideration of additional burning during the project area analysis, and fire history data indicated that 99% of the acres are currently in Condition Class 3, and <1% are in FRCC 2.

Approximately 480 National Forest System acres of this project area are considered wildland-urban interface, an additional 3,273 National Forest System acres are within ½ mile of private land.

There were no acres of prescribed burning between 1992 and 2011 in this project area (see Table 4).

Table 13: Fire Regime Condition Class Descriptions

Condition Class	Fire Regimes
Class 1	Fire regimes are within historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within historical range.
Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased), resulting in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historic range.
Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed form historical frequencies by multiple return intervals, resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

Analysis of Effects: Wildfire Hazards and Fuels Management

The geographic boundary for the effects on wildfire hazards and fuels would be the entire 13,400 acre Mountain Fork Project Area and the immediate forested areas surrounding sensitive areas noted in the 'Air Quality' effects section in this chapter.

Timelines for measuring the effects are current fuel loading and future fuel buildup for the next 10 to 15 year period.

Alternative 1: No Action

Direct and Indirect Effects

Essentially, no proposed activities would occur under the *No Action* alternative except those that are routine. No prescribed fire fuel treatments would be implemented. No existing dead and down fuels would be removed. Using the *First Order Fire Effects Model (FOFEM,* http://www.fire.org) to predict fuel loading in untreated stands, it is estimated that fuel loading for the Shortleaf Pine-Oak cover type could be as high as 10.5 tons per acre. Suppression of wildfires would continue within the MFPA as directed in the Revised Forest Plan. Prescribed fire would not be permitted to meet resource objectives and consequently, there would be no direct effects on riparian areas from prescribed burning.

Based on Mena/Oden Ranger District fire history, arson caused ignitions are the most common cause of wildfire in this area. Based on this fire history, risk of ignition is expected to remain the same or increase because of the wildland urban interface and the numerous roads though the area. The MFPA is well roaded, making it accessible to recreationists, hunters and other forest users. It is feasible that mortality due to insect outbreaks, disease and forest competition would increase, providing more hazardous fuels to the MFPA. As both surface and ladder fuels continue to increase, the ability of suppression tactics to protect resource investments, such as plantations would become more difficult. The *No Action* alternative would be expected to have a higher risk of wildfires doing extensive damage to the surrounding environment. Fires in untreated stands would display higher rates of spread and intensities then treated stands. This could lead to an increased risk for firefighters and the public.

Cumulative Effects

The cumulative effects of the *No Action* alternative would result in continuance and worsening of current vegetative and fire regime conditions within the project area. Without additional vegetation treatments that would remove or breakup existing fuel patterns, conditions would be set for the risk of larger and more intense wildfires due to fuel accumulation (Helms, 2006).

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Direct and Indirect Effects

Under these alternatives, existing fuel loading would be directly decreased by up to 7.0 tons per acre on the 1,587 acres proposed for fuel reduction prescribed burning after repeated burns. Indirectly, the wildfire hazard would decrease on those same acres and would impede a wildfire's catastrophic potential due to fuel load irregularity.

Suppression of human-caused wildfires would continue within the MFPA as directed by the Revised Forest Plan. Based on Mena/Oden Ranger District fire history, arson caused ignitions are the most common cause of wildfire in this area. Based on this fire history, risk of ignition is expected to remain the same or increase because of the wildland urban interface and the numerous roads though the area. The MFPA is well roaded, making it accessible to recreationists, hunters and other forest users. Wildfire size and intensity would be reduced as a result of proposed timber harvest and prescribed burning (reduction of accumulated fuels) over the project area because fuel loads would be reduced. Such reduction would improve suppression strategies.

Prescribed fire would be applied through SMAs (MA 9) to facilitate greater prescribed burn objectives within the project area. Firing techniques would be employed to limit flame heights in most instances to less than four feet to reduce fire intensity, which would protect the forest floor from adverse impacts from heat. In all other management areas prescribed fire would be designed to improve wildlife habitat diversity and reduce natural and activity-created fuels. The ONF monitoring report for 2001 mentioned that on areas treated with prescribed fire, fuel loadings have been reduced to 2 to 3 tons per acre.

It is anticipated that wildfire conditions in areas of prescribed fire use under the *Proposed Action* and *Proposed Action without Herbicide* alternatives would be low-intensity, allowing direct attack at the head and flanks with hand crews; hand lines should stop the spread of fire. Wildfires that burn into areas previously subjected to prescribed fire cause less damage and are controlled more easily (USDA Forest Service, 1989, p 3).

Cumulative Effects

As available fuel (woody debris and vegetation) are treated on a cyclic basis, the treated portion of the MFPA could expect to provide a higher level of protection from high-intensity wildfire through time. The rationale for this is based on reduction of vegetation and dead woody debris that influences wildfire intensity by regularly applying low to moderate intensity prescribed fire over a large forested area. Fire intensity levels directly affect suppression capability and burn severity.

Under the *Proposed Action* and *Proposed Action without Herbicide* alternatives, the expectation is that low-intensity wildfire can be maintained over much of the MFPA if proposed treatments are applied. It is also anticipated that the FRCC over some of the project area would move from a FRCC 3 to a FRCC 2, and possibly from FRCC 2 to a FRCC 1.

Heritage Resources

It is by order of the following acts that the USDA Forest Service must protect heritage, historic, and cultural resources from management actions. These acts include: the Antiquity Act of 1906, The National Historic Preservation Act (NHPA) of 1966, The National Environmental Policy Act (NEPA) of 1969, Executive Order 11593, the Archaeological and Historic Preservation Act of 1974 and the Archaeological Resources Protection Act of 1979.

In compliance with these acts, the Mena and Oden Ranger Districts conduct cultural resource surveys (CRS) prior to any ground-disturbing activities. Based upon the results of these surveys, protective measures and mitigations have been developed with approval of the Arkansas State Historic

Preservation Office (SHPO), Caddo Nation, Choctaw Nation, Chickasaw Nation, Quapaw Tribe, and the Osage Nation and will be implemented in order to prevent management activities from negatively impacting potential sites.

The cultural resource report was forwarded for review by the SHPO, Caddo Nation, Choctaw Nation, Chickasaw Nation, Quapaw Tribe, Osage Nation and the Arkansas State Archeologist. Concurrence was received from SHPO on November 23, 2011.

An archaeological survey was conducted within the Mountain Fork Project Area between the months of April 2010 and April 2011. As a result of the survey, one new site was identified and two previously recorded sites were revisited. All three sites are deemed eligible for nomination to the National Register of Historic Places (NRHP). An additional eight previously recorded sites recorded within the project boundary are also eligible for nomination to the NRHP. All eleven sites will be removed from the proposed timber sale and protected during forestry activities. In the event that additional heritage resources are discovered during project implementation, work will cease until the district archaeologist can assess the significance of the new finds.

Approximately 164 acres within Compartments 896, 897, and 899 will be mechanically prepared for reforestation beginning in 2012; these shortleaf pine plantations were destroyed by the tornado that struck Mena on April 9, 2009. A small portion of these stands was harvested after the storm, but most of them were never touched. An attempt to enter the area to do heritage surveys proved to be difficult as many of the areas were still impenetrable. Therefore these surveys will be conducted after the down timber is piled, before any ground disturbance occurs. Approximately 77.5 of these acres have been previously surveyed leaving 90.5 acres. An addendum to the heritage resource survey will be completed once these acres have been surveyed. At that time additional treatments, such as burning and site prep, can be completed. As stated before, any sites found will be protected.

Analysis of Effects: Heritage Resources

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

There would be no direct or cumulative effects to Heritage Resources due to the *No Action* alternative since no planned activities would disturb heritage sites. However, an indirect action of this alternative is that no surveys would be completed on the 90.5 acres mentioned in the summary above. The down timber and new vegetation would continue to block that area for many years to come. Any information that could be gained from potential sites in this area would not be discovered.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

Due to the fact that all sites are removed from proposed activity units and protected during forestry activities (see discussion under the Design Criteria and Mitigation Measures to Ensure Environmental Protection, page 15), and that in the event that additional heritage resources are discovered during project implementation, work will cease until the district archaeologist can assess the significance of

the new finds, no adverse direct, indirect, or cumulative effects to heritage resources are expected. In addition the opportunity to survey the tornado affected area would be a direct effect of either of these alternatives.

Vegetation

This discussion focuses on vegetation, age-class distribution, species diversity and forest health as it relates to timber resources. Vegetation is also discussed in other sections of this chapter including soil productivity, water resources and quality, biological and scenery resources. Refer to these sections for a more complete understanding of how each alternative would affect the Mountain Fork Project Area vegetative conditions and the resources dependent on vegetation.

Existing Condition

Age Class and Species Diversity

The stands proposed for treatment within the Mountain Fork Project Area are embedded in a forested mosaic of varying age stands with different species compositions (Table 14). This project area is likewise embedded in a vegetated mosaic on a much larger scale.

Shortleaf pine occurs in nearly pure stands on the warmer, south-facing slopes within the Mountain Fork Project Area, but does not occur naturally in large homogenous stands. A significant number of hardwood species are associated with the shortleaf pine plant community. Oak, maple, and hickory species are the most common.

Pine-hardwood forest types occupy slopes with a northern exposure as well as some lower slopes adjoining riparian plant communities that colonize floodplains, waterways and moist drainages. The most notable drainages in this project area include Mill, Bufram, White, Queen, Red, Collins, and Mackey Creeks; Nichols and Weehunt Branchs; and the Mountain Fork of the Little River. Mesic hardwood forest types as well as the hardwood-pine forest type make a significant component of the overall forest in the Mountain Fork Project Area. Past disturbance events such as timber harvesting, weather, disease and insect infestations are evident in many places. The overall health of the forest is good.

In all pine stands within the analysis area a large component of hardwood trees species is present; whether in the overstory (highest layer of the canopy), midstory (a middle layer), or understory (within 1 to 10 feet of the ground) stratifications. Tree tally for hardwoods vary widely ranging from 37 to 9,689 stems per acre. The dominant hardwood tree species observed in the overstory canopy is oak. In the midstory oak, hickory, and elm are common. The understory layer consists of oak and hickory regeneration along with maple, elm, flowering dogwood, blackgum, ash, and greenbriar, among others.

Over the last one hundred years, a decline in fire occurrence has caused the Mountain Fork Project Area's understory to redevelop rapidly. In addition, much of the analysis area has been harvested in the recent past (less than 80 years) allowing more sunlight to reach the forest floor (in the short term) than would in a mature, non-managed forest, resulting in substantially more woody shrub cover. As a result, shortleaf pine forest no longer support open, grass and forb understories characteristic of an earlier time (USDA Forest Service, 1999).

The flush of growth allowed by the exclusion of fire and selective harvesting of trees has resulted in the present-day understory and midstory vegetation, which consists of more shade tolerant tree species like blackgum, sweetgum, and red maple. These existing forests are generally more closed and less biologically diverse than open-pine and oak woodlands of the past (USDA Forest Service, 1999).

Table 14: Current Age Class Distribution for the Mountain Fork Project Area

Age Class	Forest Type						
	Pine	Pine-hardwood	Hardwood-Pine	Hardwood	Total Acres**	Total Suitable Acres*	Age-class percent of Total Suitable Acres**
0-10	244	18	0	25	287	207	4
11-20	266	48	0	0	314	314	7
21-30	533	0	0	0	533	500	11
31-40	350	0	37	0	387	387	8
41-50	91	0	185	173	449	173	4
51-60	0	146	0	0	146	0	0
61-70	16	0	0	179	195	195	4
71-80	376	137	0	146	659	396	8
81-90	83	95	0	389	567	89	2
91-100	771	406	165	1,803	3,145	971	21
101-110+	1,931	188	442	1,729	4,290	1,461	31
Total	**4,661**	**1,038**	**829**	**4,444**	**10,972**	**4,693**	**100**

* Suitable acres are approximate and consist of stands that are managed for timber production.
** Acres are approximate based on results from the XTools extension for AcrGIS and do not include wildlife openings, ponds or roads.

Mature Growth

There are approximately 3,826 acres of mature-growth pine and pine-hardwood forest types 80 years and greater in MAs 2 and 14 totaling approximately 34% percent of these MAs in the Mountain Fork Project Area. There are currently 2,172 acres of mature growth hardwood 100 years and greater in MAs 2 and 14 totaling approximately 20% of these MAs in the project area. The majority of hardwood trees in the Mountain Fork Project Area fall in the 91-100 and the 101-110+ year old age classes. This meets and exceeds the Revised Forest Plan standard (p 78, WF006).

Early Seral Conditions

There are approximately 225 suitable acres of early seral habitat within the Mountain Fork Project Area. 164 acres of this early seral habitat consists of lands that were affected by the April 2009 tornado. It also includes existing group holes and a waterline R-O-W (right of way). This comprises approximately 5 percent of the suitable acres within the Mountain Fork Project Area.

Hard Mast Production

There are approximately 4,879 acres of hardwood and hardwood-pine forest types aged > 50 years in the Mountain Fork Project Area. These hard-mast producing stands comprise approximately 44 percent of the Mountain Fork Project Area.

Retention and Recruitment of Hardwoods

There are approximately 5,273 acres of hardwood and hardwood-pine forest types within the analysis area (48% of National Forest System lands). These acres include the above mentioned 4,879 acres of hardwood and hardwood-pine forest types aged > 50 years.

Stand Vigor and Health

In the project area overall, stand vigor and health is good. Oak decline, which was prevalent in the recent past, has subsided and widespread insect infestations do not appear to be a major problem at this time. However, information derived from stand examinations in pine and pine-hardwood stands did reveal an average basal area of over 100 square feet per acre in some stands. This indicates overcrowding (see project file). Many stands exceed 100 square feet of basal area and 70 years of age. These conditions result in stress and reduction in vigor and health which increases susceptibility to insects and diseases.

Analysis of Effects: Vegetation

Alternative 1: No Action

Direct Effects

Age Class and Species Diversity

Under the *No Action* alternative, no management activities would occur. At present, the imbalance in age classes would remain the same (see Table 14), as there would be no creation of early seral habitat. Natural disturbance would be the only potential for early seral conditions.

Due to the lack of thinning, the canopy structure would remain closed for a period of 10 to 20 years longer. As a result, woody vegetation would thrive, while herbaceous, shade-intolerant plants and, consequently, species diversity would deteriorate.

Mature Growth

Mature growth vegetation (80 years or greater for pines and 100 years or greater for hardwoods) would thrive under the *No Action* alternative, as there would be no timber removal.

Early Seral Conditions

Current early seral habitat conditions would remain. No artificial regeneration of shortleaf pine would occur in the tornado damaged stands. Natural regeneration without this intervention would be difficult with the current inadequate seed source. Due to the lack of thinning canopy structure in overcrowded stands would remain closed for a period of 10 to 20 years longer. As a result, woody vegetation would thrive, while herbaceous, shade-intolerant plants and early seral conditions, overall, would deteriorate unless a natural disturbance (wind storm, tornado, ice, disease, insect infestation) takes place.

Retention and Recruitment of Hardwoods

There are approximately 5,273 acres of hardwood-pine and hardwood forest types in the project area. Currently there is not a need to recruit hardwoods into the project area. Retaining large oaks may be a problem as they would continue to decline and die; the young oak would be out competed for growing space by the faster growing species. These trends would continue under the *No Action* alternative.

Hard Mast Production

See above explanation under "*Retention and Recruitment of Hardwoods*."

Stand Vigor and Health

In the absence of management activities, existing trend data show that stands in the project area would grow older and basal areas would become higher. Hence, stand vigor and health would decrease due to greater competition for resources like water, nutrients and solar radiation.

Indirect Effects

Age Class and Species Diversity

Mid to late successional age classes could revert to earlier successional age classes as a result of natural events. Because of this natural creation of early seral conditions, species diversity would actually increase. However, in the absence of management activities, this increase in diversity would be short-lived, as woody vegetation would eventually grow to such a height and density that it would out-compete shade-intolerant grasses and forbs for sunlight.

Mature Growth

Southern pine beetles (SPB) periodically pose threats to forest resources and 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 (ONF) and 52 percent of the project area are pine-dominated, and epidemic outbreaks of SPB pose a serious threat to this resource (RFP-FEIS, Chapter 3, p 170). Without any management activities, mature growth pine and pine-hardwood forest types would become more susceptible to SPB and Ips beetle infestations and actually decrease in acres. In addition, the oak dominated sites would be more susceptible to Oak Decline.

Early Seral Conditions

Early seral habitat conditions could increase as mid seral and late seral pine and pine-hardwood forest types succumb to SPB and Ips beetle infestations.

Retention and Recruitment of Hardwoods

As overstory oaks disappear, (due to old age and Oak Decline) less desirable hardwoods (with respect to wildlife), like blackgum, sweetgum and red maple, would fill the niche formerly occupied by white and red oaks.

Hard Mast Production

See above explanation under "*Retention and Recruitment of Hardwoods*."

Stand Vigor and Health

Without management activities, existing trend data show that stand vigor and health would deteriorate and susceptibility to SPB and Ips beetle infestations would increase.

Cumulative Effects

No cumulative effects would occur as a result of the *No Action* alternative for any of the six elements addressed and existing trends would continue.

Alternative 2: Proposed Action

Direct Effects

Age Class and Species Diversity

The *Proposed Action* alternative would not create any new early seral age classes in the project area. The early seral age classes would remain at 5 percent and decline as the stands age overtime. Creating early seral age classes would require a natural disaster, i.e. insect and/or disease outbreak, tornado, ice storms, flooding.

The *Proposed Action* alternative would not reduce the acres in the hardwood-pine forest type and would not reduce any hardwood forest types. These forest types would remain intact along streams, drains and northern slopes in an effort to create diversity and retain mast areas for wildlife.

Under the *Proposed Action* alternative, Timber Stand Improvement (TSI) treatments such as release and intermediate cuttings like commercial thinning would alter species diversity within the project area. Under these treatments, some pine and hardwood tree species would be cut (or cut and removed in the case of commercial thinning) in order to reduce stocking and improve health of stands.

Where available, retention of a diverse hardwood component in hard mast producing species such as oaks and hickories would occur. However, in all treatments, the management objective would strive to maintain 10 to 30 percent of stems in hardwoods, primarily oaks and hickories.

Mature Growth

The *Proposed Action* alternative would not remove any acres of mature-growth pine from the 80+ year age classes. Compliance would be made with the Revised Forest Plan standard of 5 percent minimum (or approximately 548 acres minimum) for "mature growth pine habitats (80 years or greater)". The *Proposed Action* alternative would maintain the current amount of approximately 3,862 acres or about 34 percent of mature-growth pine and pine-hardwood forest types within the project area (Revised Forest Plan, p 78, WF006).

The *Proposed Action* alternative would not affect the mature growth hardwood. Approximately 548 acres of mature-growth hardwood habitats (100 years and older) are required to meet the Revised forest Plan standard of 5 percent by project area. Currently, there are approximately 2,172 acres or 20 percent of mature-growth hardwood and hardwood-pine within the project area (Revised Forest Plan, p 78, WF006).

Early Seral Conditions

Revised Forest Plan standard WF001 sets 6 percent of the suitable acreage to be held in early seral habitats as the objective. Currently, there is approximately 5 percent in this condition. The *Proposed Action* alternative would retain approximately 5 percent until 2014, when the group selection stands reach 11 years of age. Once this happens the percentage will drop to 4 percent. As stated earlier, the risks to water quality outweigh the need to meet the 6% minimum.

Retention and Recruitment of Hardwoods

In compliance with Revised Forest Plan standard FR003 (p 80), the *Proposed Action* alternative would base the hardwood sprout/seedling component objective (10 to 30 percent of stems in hardwoods, primarily oaks and hickories) on the composition of the stand prior to any disturbance whether it be natural or man-made. No regeneration cutting would be performed within the project area.

Hard Mast Production

The *Proposed Action* alternative would increase hard mast production by reducing basal areas and, thus, competition for resources in those pine and pine-hardwood forest types containing a hardwood component. Hard mast production in hardwood and hardwood-pine forest types would increase too, but only slightly, as only prescribed burning and about 230 acres of midstory reduction would occur in these forest types. In compliance with Revised Forest Plan standard WF003 (p 78), the *Proposed Action* alternative would provide, and designate, areas for mast production at the approximate rate of 20 percent of the project area.

Stand Vigor and Health

The *Proposed Action* alternative would reduce basal areas in stands by the following cutting methods:

- Commercial thinning (including first thinnings) on approximately 2,211 acres.
- Pre-commercial thinning on approximately 14 acres.
- Wildlife Stand Improvement (WSI) on approximately 316 acres.

Intermediate cuttings like commercial thinning would occur in pine, pine-hardwood, and hardwood-pine forest types having a mean age of approximately 56 years. These stands also have a mean basal area of approximately 165 square feet per acre. Unthinned stands contribute to slower diameter growth (Smith, 1986). The *Proposed Action* alternative would reduce the basal areas of these stands by approximately 61 percent in the commercial thinning units, thereby increasing growing space and stand vigor.

Indirect Effects

Age Class and Species Diversity

Commercially thinning would potentially alter the species diversity in the stand by removing more pine trees than hardwood tree, thus creating a more diverse landscape. Trees will continue to age. Some regeneration will occur at log decks and in temporary road beds. Release treatments would reduce competing hardwood understory vegetation creating more growing space for desirable shortleaf pine and hardwood seedlings and saplings.

Mature Growth

See above explanation under "*Age Class and Species Diversity*".

Early Seral Conditions

The *Proposed Action* alternative would increase early seral conditions within the project area by about 7 acres through road closures and fireline construction/reconstruction. However, none would remain in early seral conditions indefinitely.

Retention and Recruitment of Hardwoods

Retained hardwoods would potentially have better form and better mast production. The seedlings produced would also bear these traits thus producing a more vigorous stand overall.

Hard Mast Production

See above explanation under "*Retention and Recruitment of Hardwoods*".

Stand Vigor and Health

Old age is the factor most frequently associated with SPB outbreaks. Unthinned stands are also a factor associated with SPB outbreaks. Through commercial thinning, the *Proposed Action* alternative would reduce the amount of unthinned pine and pine hardwood stands existing in the project area by 2,211 acres and, in effect, decrease its susceptibility to SPB infestations and diseases.

Cumulative Effects

Age Class and Species Diversity

There would be no cumulative effects to age class and species diversity in the project area. The effects, rather, would be direct and indirect, as no treatments other than proposed in this alternative would affect age class and species diversity.

Mature Growth

There would be no cumulative effects to mature-growth vegetation in the project area. The effects, rather, would be direct and indirect, as no treatment other than timber removal would affect mature-growth vegetation.

Early Seral Conditions

There would be no cumulative effects to early seral vegetation in the project area. The effects, rather, would be direct and indirect, as no treatments other than proposed in this alternative would affect early seral vegetation.

Retention and Recruitment of Hardwoods

The *Proposed Action* alternative, with timber removal, site preparation and release treatments, would cumulatively alter hardwood extent and abundance only in those pine, pine-hardwood and hardwood-pine forest types scheduled for intermittent cuttings. However, within these treatment stands, post harvest stocking levels would be maintained at an approximate rate of 10 to 30 percent in pine dominated stands and 30 to 50 percent in mixed pine-hardwood stands receiving intermittent cuttings.

Hard Mast Production

See above explanation under *"Retention and Recruitment of Hardwoods"*.

Stand Vigor and Health

By removing timber, preparing sites for shortleaf pine seedlings and reducing competing vegetation through prescribed burning and release treatments, the *Proposed Action* alternative, would cumulatively affect stand vigor and health within the project area by reducing competition, increasing growing space and preventing SPB infestations and uncharacteristic stand replacement wildfire.

Alternative 3: Proposed Action without Herbicide

All direct, indirect, and cumulative effects would be similar to the *Proposed Action* alternative with the following exceptions.

Direct Effects

Age Class and Species Diversity

Initially, direct effects would be similar to the *Proposed Action* alternative except that no herbicides would be used for stand establishment.

Indirect Effects

Age Class and Species Diversity

Manual release treatments would reduce competing hardwood understory vegetation creating more growing space for desirable shortleaf pine and hardwood seedlings and saplings, but release would take a greater number of entries compared to Alternative 2, and in many cases, depending on staff capacity for multiple stand entries, treatments would not achieve desired species composition.

Biological

Effects on Biological Diversity

The following discussion provides a review and determination for Management Indicator Species (MIS) within and near the analysis area and Proposed, Endangered, Threatened and Sensitive (PETS) species and their associated habitats possibly or potentially affected by the proposed action and/or alternatives.

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 CFR 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 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 population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality."

The MIS Revised Forest Plan selection process reviewed the Ouachita National Forest list of MIS, and concluded that 24 species as listed in Table 15 were adequate to address the effects of management on fish and wildlife populations, their habitat needs as well as demand species and species of special interest.

Management Indicator Species Selected for this Project

The entire list of 24 MIS was reviewed and a subset selected as MIS for this project. MIS selected include both terrestrial and aquatic species. Species with no known occurrence within the project area or lacking suitable habitat were not selected as MIS for this Ecological Assessment.

Table 15: Management Indicator Species and primary reason for selection.
(The far right column indicates which Forest MIS species are selected for this project.)

Common Name	Scientific Name	Primary reason(s) for selection	Selected as MIS for Project (Yes/No)
Terrestrial MIS			
Northern Bobwhite	*Colinus virginianus*	To help indicate effects of management on public hunting demand and to help indicate effects of management on the pine-oak	No (lack of suitable habitat)

Common Name	Scientific Name	Primary reason(s) for selection	Selected as MIS for Project (Yes/No)
		woodland community	
Eastern wild turkey	*Meleagris gallopavo*	To help indicate effects of management on public hunting demand	Yes
White-tailed deer	*Odocoileus virginianus*	To help indicate effects of management on public hunting demand	Yes
Red-cockaded woodpecker	*Picoides borealis*	To help indicate effects of management on recovery of this endangered species and to help indicate effects on management of shortleaf pine-bluestem woodland community	No (lack of suitable habitat outside MA 22)
Prairie warbler	*Dendroica discolor*	To help indicate effects of management on early successional component of forest communities	No (lack of suitable habitat)
Scarlet tanager	*Piranga olivacea*	To help indicate effects of management on mature forest communities	Yes
Pileated woodpecker	*Dryocopus pileatus*	To help indicate effects of management on snags and snag-dependent species	Yes
Ponds and Lakes (No recreational lakes or ponds exist within the project areas)			
Bluegill	*Lepomis macrochirus*	To help indicate management effects on health of ponds and lakes and demand for recreational fishing.	No
Redear sunfish	*Lepomis microlophus*		No
Largemouth bass	*Micropterus salmoides*		No
Arkansas River Valley Streams (Analysis area occurs outside of the Arkansas River Valley Ecoregion)			
Yellow bullhead	*Ameiurus natalis*	To help indicate effects of management on aquatic habitat and water quality in streams within the Arkansas River Valley Ecoregion.	No
Central stoneroller	*Campostoma anomalum*		
Redfin darter	*Etheostoma whipplei*		
Green sunfish	*Lepomis cyanellus*		
Longear sunfish	*Lepomis megalotis*		
Gulf Coastal Plain Ecoregion Streams (Analysis area occurs outside of the Gulf Coastal Plain Ecoregion)			
Pirate perch	*Aphredoderus sayanus*	To help indicate effects of management on aquatic habitat and water quality in streams within the Gulf Coast Plain Ecoregion.	No
Central stoneroller	*Campostoma anomalum*		
Creek chubsucker	*Erimyzon oblongus*		
Green sunfish	*Lepomis cyanellus*		
Longear sunfish	*Lepomis megalotis*		
Ouachita Mountain Ecoregion Streams			
Central stoneroller	*Campostoma anomalum*	To help indicate effects of management on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion.	Yes
Johnny darter	*Etheostoma nigrum*		Yes
Orangebelly darter	*Etheostoma radiosum*		Yes
Redfin darter	*Etheostoma whipplei*		No (does not occur in analysis area)
Northern studfish	*Fundulus catenatus*		Yes
Northern hog	*Hypentelium*		Yes

Common Name	Scientific Name	Primary reason(s) for selection	Selected as MIS for Project (Yes/No)
sucker	*nigricans*		
Green sunfish	*Lepomis cyanellus*		Yes
Longear sunfish	*Lepomis megalotis*		Yes
Striped shiner	*Luxilus chrysocephalus*		Yes
Smallmouth bass	*Micropterus dolomieu*		Yes
Channel darter	*Percina copelandi*		Yes
Forest-wide			
Smallmouth bass	*Micropterus dolomieu*	To help indicate the effects of management on meeting public fishing demand in streams	Yes

Methodology Used Modeling MIS Forest Trends

The selected terrestrial MIS were modeled using the CompPATS wildlife habitat capability model (HCM) to compare habitat capabilities over the next decade (2012-2022) for each alternative. Projected numbers of terrestrial MIS per square mile are listed in Table 16 by alternative.

In order to show future Forest-wide trends for modeled terrestrial MIS, a comparison of habitat capability numbers projected for this project was made to the pre-existing habitat condition (baseline). First year projections are based on habitat conditions after initial project implementation and ten year projections are estimated ten years after initial project implementation.

Table 16: Response of Selected Management Indicator Species to Alternative by Decade of Implementation.

	Management Indicator Species			
Alternative	**White-tailed Deer**	**Pileated woodpecker**	**Wild Turkey**	**Scarlet Tanager**
	Individuals per square mile			
Alternative 1 – No Action				
Baseline	22	46	9	39
Project 1st year	22	46	9	39
Project at 10 years	20	48	9	41
Alternative 2 – Proposed Action and Alternative 3 - Proposed Action without Herbicide				
Baseline	22	46	9	39
Project 1st year	30	43	11	39
Project at 10 years	20	48	9	41

Effects Analysis

The analysis of effects discussion below is separated and organized as follows. 1) Terrestrial species are discussed before aquatic species are discussed. 2) Some species are lumped into species groups when the effects on each are similar. 3) Each species, or group of species, is discussed by alternative. 4) For each alternative, direct, indirect, and cumulative effects on each species or group of species is discussed.

Terrestrial MIS Species

Demand Species

- **Eastern Wild Turkey** (*Meleagris gallopavo*)

The eastern wild turkey is a demand species selected because it is a game species with economic importance, and it uses a wide range of habitat types with habitat diversity including grass and forb openings interspersed with mast producing hardwoods.

Existing Condition **-** The ONF minimum population objective is 3.3 turkeys per square mile (9,177 turkeys) after 10 years and 3.9 per square mile at 50 years (RFP - FEIS). Turkey harvest, turkey poult surveys, Landbird point survey data indicate a downward trend. These data would appear to indicate a reduction in the number of turkey while habitat capability modeling using CompPATS indicates a positive trend and remains above the level projected in the 2005 Plan. The sustained high levels for habitat capability would indicate that the drop in harvest levels, reductions in poults per hen, and birds detected on the Landbird points are due to factors other than habitat.

Although there are some variations in poult production, harvest, and birds detected on Landbird point counts, the habitat capability shows positive trends and sufficient data exist to believe that this species is in no danger of losing population viability or falling below the desired population levels. The Arkansas Game and Fish Commission has shortened and or eliminated seasons to stimulate a positive response. Indications are that the eastern wild turkey and its habitat are doing well on the Forest but trends warrant watching.

- **White-tailed Deer** (*Odocoileus virginianus*)

White-tailed deer was selected as a demand species for its big game status, economic importance, and its association with early successional seral stages, brushy stages, interspersed hardwoods and associated edges.

Existing Condition **-** Based on annual spotlight survey data collected between 2000 to present, average deer density has varied from 29 deer per square mile in FY 2001 to 95 deer per square mile in FY 2008. The average density for the Forest for all years is 51 deer per square mile. Deer harvest data indicate an increasing harvest in the counties encompassed by the Forest with the highest harvest year in FY 2006. Deer harvest has increased from a low of 7,394 in 2002 to over 20,000 in FY 2006 and down to 18,726 in FY 2008. The Forest Plan indicates a desired terrestrial habitat capability to support an average of 13.7 deer per square mile after 10 years. This is calculated on a land base of 1,780,101

acres for a habitat capability that would support 38,105 deer. Spotlight survey data and deer harvest data indicate an increasing population trend. Habitat capability modeling exceeds the Revised Forest Plan projections for every year in the period 2000-2009, and is showing a stable trend.

The habitat capability model places heavy weight on the value of early successional habitat for deer and gives lesser weight to thinning and prescribed burning. In contrast to the declines in even age regeneration cutting, the acreage of thinning and the acreage of prescribed burning have increased significantly. In view of the increasing deer population, it is apparent that these increases (thinning and burning) have offset the losses of early successional habitat for deer (USDA Forest Service, 2008).

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would allow forested lands to change without the interference of landscape scale land management. This alternative would have no direct, indirect or cumulative effects on wild turkey and only insignificant indirect effects on white-tailed deer over the next decade. Habitat conditions would remain viable for these species.

Affect on Forest-wide Population Trends:

The HCM indicates that deer habitat capability is above and would remain above that recommended by the RFP but would decline slightly over the next decade. No cumulative effects are anticipated that would affect forest-wide trends.

Eastern wild turkey habitat capability as predicted by the model would be expected to remain stable over the next decade due to these species dependence on mature forest conditions. Alternative 1 would not change existing conditions allowing existing forested communities to mature thus benefiting this species. No cumulative effects are anticipated that would affect forest-wide trends.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The Mena RD is proposing the use of the following herbicide active ingredients for site preparation, seedling release, and control of non-native invasive species: clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr. Since no risk assessment studies have been conducted specific to wild turkey, northern bobwhite was chosen as the closest analog with the exception of clopyralid which includes bioassays for mallard duck.

Table 17: Summary of No Observed Adverse Effect Level (NOAEL) Values for Each Proposed Herbicide Active Ingredient

Active Ingredient	*NOAEL**	*Toxicity Risk to Mammals*	*Risk Assessment*
Fluroxypyr	100mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	175 mg/kg/day	*very low toxicity at applied rates* U.S.	Syracuse Environmental Research Associates, Inc. 2006
Imazapic	45 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004b
Imazapyr	250 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004c
Metsulfuron Methyl	25 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004d
Triclopyr	100 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2003
Clopyralid	75 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004a

NOAEL = is the highest tested dose or concentration of a chemical or agent, at which no such adverse effect is found in exposed test organisms where higher doses or concentrations resulted in an adverse effect.

In all situations of field application of these chemicals specimen label rates for each chemical would be followed and applied rates would be at or below the recommended application rate. In all bioassay test for each chemical the concentration tested and NOAEL observed far exceeds concentration rates that would be applied in field applications and thus no direct, indirect or cumulative effects to eastern wild turkey (using quail analog) or white-tailed deer are anticipated.

Table 18: Summary of LD50 Values for Each Proposed Herbicide Active Ingredient

Active Ingredient	*LD_{50}**	*Toxicity Risk to Bobwhite and or Mallard*	*Risk Assessment*
Fluroxypyr	>2000mg/kg of body weight	U.S. EPA/OPP (1998a) classifies fluroxypyr acid and fluroxypyr-MHE as *Practically Nontoxic* to birds	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	>2000mg/kg of body weight	U.S. EPA/OPP (1993) classifies glyphosate as no more than *slightly toxic* to birds	Syracuse Environmental Research Associates, Inc. 2006
Imazapic	>2150mg/kg of body weight	*Practically Nontoxic*	Syracuse Environmental Research Associates, Inc. 2004b
Imazapyr	>2150mg/kg of	All acute exposure studies	Syracuse Environmental Research

Active Ingredient	*LD_{50}**	*Toxicity Risk to Bobwhite and or Mallard*	*Risk Assessment*
	body weight	in birds show that imazapyr has *very low toxicity*	Associates, Inc. 2004c
Metsulfuron Methyl	>2250 mg/kg of body weight	All acute exposure studies in birds show that metsulfuron methyl has *very low toxicity*	Syracuse Environmental Research Associates, Inc. 2004d
Triclopyr	849mg/kg to 2055 mg/kg of body weight	U.S. EPA/OPP (1998b) has classified triclopyr as being *slightly toxic to birds*	Syracuse Environmental Research Associates, Inc. 2003
Clopyralid	LC_{50}** 4640ppm LD_{50} 5620mg/kb of body weight	*No signs of toxicity* reported in mallard duck or bobwhite	Syracuse Environmental Research Associates, Inc. 2004a

LD_{50}*- lethal dose for 50% of population tested
LC_{50}** - lethal concentration for 50% of population tested

Acute oral and dietary studies of the listed chemicals proposed for use in the analysis area exhibit a range in toxicity from practically nontoxic to slight toxicity to birds. These determinations were based on concentrations of herbicides in quail diets (For Clopyralid both quail and mallard results were used) that would in all cases far exceed concentrations applied in field treatment applications.

Wild turkeys are omnivores foraging on the ground for a wide variety of food items such as; insects, seeds, nuts, fruits and other plant food. Since foraging occurs primarily on the ground there is the potential for exposure in herbicide application areas. However the potential exposure to herbicides would likely in all cases of field application fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given the restrictions for field application rates established by herbicide specimens labeling it is improbable that there would be any direct, indirect or cumulative effects on wild turkey.

Affect on Forest-wide Population Trends:

Actions proposed under Alternative 2 would have the same effects on turkey and deer populations as Alternative 3.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Direct effects for turkey from the proposed vegetation treatments could come in the form of trees being felled on nests or increased logging disturbance causing abandonment of nests. However these potential direct effects would be minimal since only a small portion of the analysis area would be impacted. Re-nesting would also likely occur in most situations of disturbance thus offsetting overall losses in brood production. Proposed treatments would not pose any direct effect to white-tailed deer.

Noise disturbance from felling and removal of timber would likely cause deer and turkey to temporarily move to adjacent habitats unaffected by the proposed treatments. These indirect effects would be short in duration and affected individuals would be expected to move back into treated areas post harvest.

All proposed timber treatments would open up the canopy, allowing sunlight penetration to the forest floor, and an increase of soft mast, grasses and forbs essential to turkey and deer. Overall the proposed treatments would create a variety of habitats (foraging, nesting, brooding, fawning, escape cover etc.) within the home ranges of these species. Habitat benefits derived from the various harvest treatments would depend directly on the size and type of harvest. Thinning treatments would provide more long term habitat benefits due to their size and varying landscape attributes (soil types, moisture gradients, slopes and aspects). Given the proposed treatments it is likely that treatments would provide long term indirect benefits for deer and turkey populations within the analysis area for at least the next 5-10 years.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect and cumulative effects would be the same as those determined for proposed timber management treatments.

Trail Shelter Construction and Trail Maintenance

Direct, indirect and cumulative effects would be the same as those determined for proposed timber management treatments.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burning would occur in both growing and non-growing seasons. Direct impacts to deer and turkey are unlikely since these species are highly mobile and would be able to avoid burns. There is the potential for turkey nests to be lost if burns occur during nesting periods. This potential impact however would be limited in scope considering only a small portion of the available nesting habitat within the analysis area would be burned at any one time. Indirect effects of prescribed burning would be to consume woody debris allowing early forest stage and demand species easier access to browse.

Burning would also encourage growth of herbaceous browse which is essential for growth and development of deer. Deer especially are dependent on crude protein found in herbaceous browse for growth and antler development. Cumulative effects of prescribed burning alongside other treatments would provide foraging, fawning and cover habitats.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct impacts to deer and turkey are anticipated since actions would be to close currently open roads. Indirect benefits would be likely since proposed actions would provide linear flight and travel corridors and linear foraging areas. Cumulatively the proposed action would increase the amount of suitable foraging areas in the analysis area for the next 5-10 years as permanently closed and decommissioned roads are reclaimed by surrounding habitats.

Fish Passage Restoration

Proposed fish passage would occur at various stream crossings within the project area. Proposed work would include replacing drainage structures or modifying the upstream or downstream side with large rock or cobble to allow for fish passage. In an effort to avoid impacts to MIS species all restoration work would take place during low flow periods. No direct, indirect, or cumulative impacts are anticipated due to the limited scope and short duration of work involved.

Bat Box Placement

Rocket box style bat boxes would be placed along ridges, flood plains and mid-slopes to provide summer roosting habitat and possible maternity roosting sites for tree roosting bat species. There would be no direct, indirect, or cumulative impacts to these MIS species.

Affect on Forest-wide Population Trends:

The HCM indicates that selection of this alternative would increase then maintain local deer and turkey habitat carrying capacities over the first decade. Alternative 3 would have no long term effects on Forest-wide population trends for these species.

Snag Dependent Species

- **Pileated Woodpecker** *(Dryocopus pileatus)*

The pileated woodpecker is a MIS selected to indicate the effects of management on snags and snag-dependent species. It is a member of the cavity nesting, tree trunk probing, insectivore guild, prefers dense, mature to overmature hardwood, hardwood-pine and mature pine forest types. The most important characteristics of forests used by pileated woodpeckers are forest contiguity, mature trees and snags, openness of forest floor, amount of decaying wood litter, and a relative humidity that promotes fungal decay and the ant, termite, and beetle populations upon which these birds feed (Bull and Jackson, 1995). Pileated woodpeckers are a primary excavator of cavities important to obligate secondary cavity nesters, and are a key indicator for the retention of a complete community of cavity nesting species. Nest cavities are constructed by both sexes usually in dead limbs and trunks in areas that are shaded most of the day. Nest tree species and size vary but most are in trees larger than 15 inches (38 cm) diameter at breast high (DBH) with entrances ranging from 16-69ft (5-21m) above the forest floor (Bushman and Therres, 1988). The diet of pileated woodpeckers consists mainly of insects (70%), especially carpenter ants, insect larvae, and wood-boring beetles. Additional food items include other insects, fruits and berries, hard mast (acorns) and seeds of sumac (Hamel, 1992; DeGraaf et al., 1991).

Population trend and habitat capability data are mixed. Landbird monitoring data from 1997-2009 indicate stable to slightly decreasing trend. CompPATS estimates for the habitat capability using all forest types indicate an increasing trend. These data are for pine, pine-hardwood, hardwood, and hardwood-pine stands with the greatest value being for stands greater than or equal to 41 years old. As these stands age, the habitat capability to support the pileated woodpecker should continue to improve. The current habitat capability being able to support 13,628 birds exceeds the Revised Forest Plan population objectives of 11,265. The pileated woodpecker and its habitat appear to be secure within the Forest.

Mature Forest Community Species

- **Scarlet Tanager (***Piranga olivacea***)**

The scarlet tanager is a Management Indicator Species, selected to help indicate the effects of management on mature forest communities. The scarlet tanager migrates into Arkansas from the south in spring, becoming a "common summer resident in extensive upland woods" in the Ouachita Mountain region; higher elevations result in higher populations of scarlet tanager (James and Neal, 1986). Males arrive in breeding areas in April and May, and establish territories several days before females arrive. Once females arrive and mate selections are made, they choose a nesting site and construct the nest alone (Isler and Isler, 1987). Nests are typically placed in a leaf cluster, on a horizontal limb, where there is a clear unobstructed view of the ground, and with clear open flyways from adjacent trees to the nest (Senesac, 1993; Hamel, 1992; DeGraaf et al., 1991).

Habitats include deciduous forest of various types, pine-oak woodlands, parks, orchards, and large shade trees in suburban areas (Senesac, 1993; Bushman and Therres, 1988; Isler and Isler, 1987). Scarlet tanagers are most common in areas with closed canopy, a dense understory with high shrub diversity, and little ground cover (Bushman and Therres, 1988). Tanagers are insectivorous during the breeding season feeding on prey items such as aphids, weevils, woodborers, leaf beetles, cicadas, scale insects, dragonflies, ants, termites, caterpillars, moths, parasitic wasps, and bees. Foraging often occurs mid-canopy with frequent sallies into the air to catch flying insects. From late summer through winter tanagers consume fruits and berries, perhaps to buildup fat reserves for fall migration (Prescott, 1965).

The Landbird point and habitat capability data from 1997 – 2009 indicate an overall stable trend for the scarlet tanager. On the Forest, there are 481,226 acres of hardwood and hardwood/pine forest types greater than 41 years old that will continue to mature. This species and its habitat are secure within the Forest and continued long-term viability of this species is not in question. With the maturing of over 500,000 acres of hardwood and hardwood-pine the continued availability of adequate habitat is secure.

Direct, Indirect and Cumulative Effects of each Alternative

<u>Alternative 1: No Action</u>

No direct effects on pileated woodpecker or scarlet tanager would occur under Alternative 1. Selection of this alternative for the most part would have positive indirect effects on populations of pileated woodpecker and scarlet tanager. These two species prefer mature forest habitats. Selection of this alternative would prevent timber harvest, allowing the forest to continue to age. As a result, the older forests preferred by these species would continue to grow and mature.

Affect on Forest-wide Population Trends:

The HCM indicates that local habitat capabilities for pileated woodpecker and scarlet tanager would increase and remain stable under this alternative. Forest-wide population trends for these species would be positive.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The direct, indirect and cumulative effects of herbicide application for the control of vegetation in site preparation and TSI areas would have little or no impacts on pileated woodpecker or scarlet tanager. The only direct, indirect and cumulative impacts to pileated woodpecker and scarlet tanager would concern the temporary loss of fruits and berries that make up their annual diet. Vegetation impacted by herbicide treatment is not typically used as foraging substrate by pileated woodpeckers because it decomposes rapidly and does not host preferred insect prey species. Since scarlet tanagers are primarily mid-to-upper canopy foragers it is unlikely that effects of herbicide application would be encountered. However, tanagers feed on a wide variety of insect prey, many of which spend time in or traveling through understory vegetation where herbicide application would occur. Although scarlet tanagers may consume some insect prey that has been exposed to herbicide treatments the realistic dose estimates for such exposures would be insignificant (Also see herbicide effects discussion/tables for wild turkey and Diana fritillary).

Affect on Forest-wide Population Trends:

Effects on forest-wide trends for Alternative 2 would be the same as Alternative 3.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Proposed treatments would result in direct effects to pileated woodpecker and scarlet tanager. These species could lose active nests if harvest is conducted during the nesting season, but adults would be expected to move to undisturbed habitat and perhaps re-nest. These treatments would also have both negative and positive indirect effects on pileated woodpecker and scarlet tanager due to removal of trees from the landscape reducing the upper tree canopy. Since both of these species prefer closed canopy forest they would be expected to abandon those portions of the harvest area with little or no closed tree canopy. However, standards and guidelines established in the Revised Forest Plan for the retention of hardwoods and snags in harvest areas would mitigate impacts to pileated woodpecker and scarlet tanager foraging and nesting habitats. Fallen trees and snags created as a result of proposed actions would also enhance foraging and nesting habitat opportunities for pileated woodpecker. The Proposed Action would also improve future nesting and foraging habitat for scarlet tanager by helping to improve health and vigor of oak/hickory forest communities as a result of decreased competition. The HCM indicates that viable populations of pileated woodpecker and scarlet tanager would be maintained locally under this alternative.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct effects to scarlet tanager and pileated woodpecker are anticipated since actions would be to close currently open roads, reassign designation of existing roads and rehabilitate impacted areas.

Indirect benefits would be likely since proposed actions would provide linear flight and travel corridors. No cumulatively impacts are anticipated.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect and cumulative impacts to pileated woodpecker and scarlet tanager would be same as those for timber management and road and trail closure treatments.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Direct, indirect and cumulative effects to pileated woodpecker and scarlet tanager would be same as those for timber management treatments.

Fish Passage Restoration

None of the proposed actions listed above would have any direct, indirect or cumulative effects on Pileated woodpecker or Scarlet tanager since these proposed actions occur outside of suitable habitats or in areas already disturbed by other actions.

Bat Box Placement

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect or cumulative impacts to these MIS species are anticipated.

Trail Shelter Construction and Trail Maintenance

Direct, indirect and cumulative impacts to pileated woodpecker and scarlet tanager would be same as those for timber management treatments.

Affect on Forest-wide Population Trends:

The HCM predicts that Alternative 3 would maintain local habitat capability for pileated woodpecker and scarlet tanager over the next decade and would have no measurable effects on Forest-wide trends of these MIS species. Viable populations of pileated woodpecker and scarlet tanager would be maintained locally under this alternative.

Aquatic MIS

Three of the five aquatic MIS categories as listed in Table 3.32 of the RFP-FEIS do not occur within the proposed treatment areas and thus were not selected for further analysis. The aquatic communities found within this analysis area are: *Ouachita Mountain Ecoregion Streams and Forest Wide*.

One Management Indicator fish species of the Ouachita Mountain Ecoregion has no known occurrences in the drainages involved in the proposed analysis area, either at the project site, or downstream. As a result, redfin darter was not selected as MIS (Mena stream survey data 2007 and 2010, Robison and Buchanan, 1988).

- The 10 fish species selected for this project [Central stoneroller (*Campostoma anomalum*), Green sunfish (*Lepomis cyanellus*), Longear sunfish (*Lepomis cyanellus*), Orangebelly darter (*Etheostoma radiosum*), Northern hog sucker (*Hypentelium nigricans*), Northern studfish (*Fundulus catenatus*), Smallmouth bass (*Micropterus dolomieu*) Striped shiner (*Luxilus chrysocephalus*), Johnny darter (*Etheostoma nigrum*), and Channel darter (*Percina copelandi*)] represent a variety of niches filled by fish species in the Ouachita Mountain Ecoregion.

Robison and Buchanan (1988) provide habitat descriptions below for the ten fish MIS selected for this project. The central stoneroller inhabits small, generally clear streams with gravel, rubble, or exposed bedrock substrates . . . [and] is often the most abundant species in small, clear upland streams. The green sunfish is a highly adaptable species and can be found in almost every type of aquatic habitat in Arkansas. The longear sunfish also occurs in many aquatic habitats, but is most abundant in small, clear, upland streams with rocky bottoms and permanent or semi-permanent flows. The orangebelly darter occurs in a variety of habitats from small, gravelly, high-gradient streams to larger more sluggish lowland rivers. The northern hog sucker prefers clear, permanent streams with gravel or rock substrate and generally prefers deep riffles, runs, or pools having a current. The northern studfish is found in clear flowing streams and rivers of moderate to high gradient and permanent flow. It preferred stream habitats are quiet, shallow waters along the margins of pools having rock and gravel substrates. The smallmouth bass is mainly an inhabitant of cool, clear mountain streams with permanent flow and rocky bottoms and is more intolerant to habitat alteration than any of the other black basses, and it is especially intolerant of high turbidity and siltation. The striped shiner tends to prefer small to moderate-sized streams with permanent flow, clear water and rocky or gravel substrates. It prefers some current but tends to avoid strong currents. The johnny darter is found in clear moderate to high gradient streams with sand or sand gravel mixed bottoms and usually found in slow current near the edges of pools. The channel darter prefers clear water of small to moderate streams and occurs in moderate to swift current riffles over silt-free gravel or rocky bottoms. The johnny and channel darter were retained as MIS within the range of the Threatened leopard darter under the RFP-FEIS.

Effects on Aquatic MIS Fish Species

The effects of each alternative to aquatic species will be addressed as a group with a few individual comments below as appropriate.

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Aquatic habitats are protected under all alternatives by management standards in the Revised Forest Plan. Alternative 1 would have no directs effects on MIS fish species. Indirect effects to MIS fish species under this alternative would continue to persist and contribute sediments to streams from; sites with eroded soils not being stabilized, roads needing repairs/closures and stream crossings with barriers to aquatic organism passage. No cumulative effects are anticipated.

Affect on Forest-wide Population Trends:

Implementation of this action would have no effect on future Forest-wide trends for these species.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The use of herbicides in site preparation and TSI and non-native invasive species treatment areas is not likely to have any direct, indirect or cumulative effects on MIS fish species. All streams perennial and intermittent and lakes and ponds would be protected by streamside, lake and pond management, herbicide application buffers. Buffers are to be clearly marked before treatment so applicators can easily see and avoid them (Revised Forest Plan, p 87).

Affect on Forest-wide Population Trends:

Effects on forest-wide trends for Alternative 2 would be the same as Alternative 3.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

None of the proposed timber management actions are expected to have any direct, indirect, or cumulative effects on aquatic MIS fish species. Each of these fish, and all aquatic habitats used by these species, are currently protected by streamside management areas, as defined in the Revised Forest Plan.

Fish Passage Restoration

Proposed fish passage restoration would occur at various stream crossings within analysis area which are currently barriers to aquatic organism passage. Drainage structures would be replaced or modified on the downstream/upstream sides with large rock or cobble to allow for fish passage. It is possible that individual fish downstream of proposed restoration sites might be indirectly impacted by increased sedimentation during any construction activities. However, removal/replacement of barriers would restore free migration of fish throughout the stream habitat. In an effort to avoid impacts to MIS fish species all restoration work would take place during low flow periods thus limiting potential for any impacts to downstream populations. No direct or cumulative impacts are anticipated due to the limited scope and short duration of work involved.

Bat Box Placement

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative impacts to MIS fish species are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burns would be implemented on a burn by burn basis and spread over several years. This along with strict guide lines outlined in the Revised Forest Plan for protection of perennial streams would limit the potential for any direct, indirect, or cumulative impacts to MIS fish species or habitats.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct or indirect impacts to MIS fish species are anticipated since actions would be to close currently open, reassign designation of existing roads and rehabilitate impacted areas that are currently in use. Cumulatively, decommissioning of roads may benefit fish species by decreasing stream siltation and sedimentation.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Road/fireline treatments will have no direct effects on MIS fish species. Removal of vegetative cover and soil disturbance as roads/firelines are established shaped and drainage structures installed would temporarily increase sedimentation, concentrate runoff, and potentially impact water quality, but failure to reconstruct some of these roads and to maintain other roads would have more detrimental impacts than the proposed roadwork. The potential for sedimentation would be reduced by implementing RFP standards and guidelines. Cumulatively, road construction treatments are anticipated to benefit MIS fish species by decreasing stream siltation and sedimentation.

Trail Shelter Construction and Trail Maintenance

Proposed treatments would have no direct, indirect, or cumulative impacts on MIS fish species. All proposed treatment sites are located outside stream habitats and streamside buffer zones and would not contribute to any potential stream impacts.

Affect on Forest-wide Population Trends:

Implementation of this action would have no impact on future Forest-wide trends for these species.

Proposed, Endangered, Threatened and Sensitive Species

A review of each species listed on the Regional Forester's Sensitive Species list for the Ouachita National Forest was given special consideration during project planning for the Mountain Fork project. The Forest Service's Sensitive Species list for the Mena and Oden Ranger Districts, the Arkansas Natural Heritage Commission inventories of PETS species, the USDI -FWS list of Endangered and Threatened Wildlife and Plants, Vernon Bate's sensitive plant survey of the Mena and Oden RDs (Bates, 1990; Bates, 1991), and Forest and District records were all examined for potential PETS species locations.

Consultation History for PETS species included in the Revised Forest Plan can be found in the Biological Evaluation for the Mountain Fork project which is included in this EA as Appendix C. The Biological Evaluation for the Mountain Fork project (MFPBE) reviewed all PETS species identified to occur or potentially occur on the Ouachita National Forest. In all, 81 species were reviewed in the MFPBE including 14 PET species and 67 Sensitive species. Of those, the MFPBE reviewed 18

species in detail. Detailed descriptions of these PETS species, their habitats, and a discussion of the effects of the proposed actions on each are included in the MFPBE. The information below addresses direct, indirect, and cumulative effects of all alternatives on the selected PETS species as those species occurring or potentially occurring in the analysis area. The other PETS species listed in the MFPBE and are excluded from further discussion here as no direct, indirect, or cumulative effects are expected.

Effects on Proposed, Endangered, Threatened and Sensitive Species

The analysis of effects discussion below is separated and organized as follows. 1) Species will be discussed in the order shown in the table below. 2) Some species are lumped into species groups when the effects on each are similar. 3) Each species, or group of species, is discussed by alternative. 4) For each alternative, direct, indirect, and cumulative effects on each species or group of species is discussed.

Table 19: PETS Species evaluated for the proposed Mountain Fork Project Area.

Group	Scientific Name	Common Name	Status
Mammal	*Myotis sodalis*	Indiana bat	Endangered
Mammal	*Myotis leibii*	Eastern small-footed bat	Sensitive
Fish	*Percina pantherina*	Leopard darter	Threatened
Fish	*Lythrurus snelsoni*	Ouachita shiner	Sensitive
Crayfish	*Orconectes menae*	A crayfish	Sensitive
Crayfish	*Procambarus tenuis*	A crayfish	Sensitive
Snail	*Stenotrema pilsbryi*	Rich Mountain slitmouth snail	Sensitive
Amphibian	*Plethodon ouachitae*	Rich Mountain salamander	Sensitive
Insect	*Speyeria diana*	Diana fritillary	Sensitive
Vascular Plant	*Carex latebracteata*	Waterfall's sedge	Sensitive
Vascular Plant	*Castanea pumila* var. *ozarkensis*	Ozark chinquapin	Sensitive
Vascular Plant	*Cypripedium kentuckiense*	Southern Lady's slipper	Sensitive
Vascular Plant	*Amorpha ouachitensis*	Ouachita leadplant	Sensitive
Vascular Plant	*Polymnia cossatotensis*	Cossatot Mountain leafcup	Sensitive
Vascular Plant	*Solidago ouachitensis*	Ouachita Mountain goldenrod	Sensitive
Vascular Plant	*Tradescantia ozarkana*	Ozark spiderwort	Sensitive
Vascular Plant	*Trillium pusillum* var. *ozarkanum*	Ozark least trillium	Sensitive
Vascular Plant	*Verbesina walteri*	Carolina crownbeard	Sensitive

Effects Analysis

- **Indiana bat (***Myotis sodalis***)**
- **Eastern small-footed bat (***Myotis leibii)*

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct effects on Indiana bat or Eastern small-footed bat. Indirect and cumulative effects would include the natural succession of early seral habitats into mature forest. This process could result in an overall decline of foraging habitat and open midstory for ease of movement. Without the continued presence of a diversity of seral habitats Indiana bat or Eastern small-footed bat populations could be affected. No cumulative effects would be expected in the absence of proposed activities.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The Mena RD is proposing the use of the following herbicide active ingredients for site preparation, seedling release, and control of non-native invasive species: clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr. Direct effects/impacts to Indiana and small footed bat are unlikely due to herbicide use for site preparation only affecting 164 acres of tornado damaged area in pine/pine hardwood stands, and non-native invasive species treatments along road right of ways occurring in unsuitable habitat. Both positive and negative indirect effects could occur from potentially reducing/increasing vegetation and consequently the insect population numbers of diversity in treatment areas. No cumulative effects/impacts are anticipated from the proposed herbicide treatments.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Timber management treatments all have the potential to affect bat species within the analysis area. For instance, falling trees could directly affect roosting bats and/or maternity sites. Roosting and/or maternity sites could potentially be felled or damaged by falling trees. Disturbance within treatment areas may also cause bats to temporarily abandon treatment sites. Thinning of forest stands could indirectly alter foraging areas and temporarily change insect populations and densities within treatment areas. However direct effects/impacts to Indiana and small-footed bats would be highly unlikely since these bat species tends to prefer mesic old growth hardwood forest, rocky ridges and outcrops, and cave-like structures for roosting and maternity sites. Although the afore mentioned habitats are present within the proposed analysis area these habitats do not fall within areas suitable for timber production and thus would be protected from any potential direct impact related to timber management.

All proposed timber management treatments could indirectly effect/impact Indiana and small footed bats. It is likely that proposed actions would temporarily exclude roosting bats from treatment areas during implementation, but actions would not likely exclude bats from foraging in treatment areas. Proposed actions would likely benefit Indiana and small-footed bats as well as other local bat species by improving foraging habitats. Insects populations would likely increase with increased plant diversity due to more open conditions. Increased openness of the forest mid-story would also benefit foraging bats by easing movement through the forest.

No long-term cumulative impacts are anticipated by the proposed timber management actions.

Trail Shelter Construction

Direct, indirect and cumulative effects/impacts would be the same as those determined for timber management treatments.

Trail Maintenance

Direct, indirect and cumulative effects/impacts would be the same as those determined for timber management treatments.

Fish Passage Restoration

Proposed fish passage restoration would occur at various stream crossings within the analysis area. Drainage structures would be replaced or modified on the downstream/upstream sides with large rock or cobble to allow for fish passage. It is likely that the proposed treatments would temporarily increase stream siltation during construction; however this effect would not be persistent nor would it contribute to significant stream sedimentation. There are no direct, indirect, or cumulative effects/impacts to Indiana or small-footed bat anticipated.

Bat Box Installation

Rocket box style bat boxes would be placed along ridges, floodplains and mid-slopes to provide summer roosting habitat and possible maternity roosting sites for tree roosting bat species. Currently there are nine North American bat species known to use bat houses seven of which occur in Arkansas. Although Indiana and small-footed bats are not known to use bat house structures five other bat species (little brown bat, free-tailed bat, big brown bat, evening bat, northern long-eared bat) which do occur in the area would likely benefit from their placement. No direct, indirect, or cumulative effects/impacts are anticipated for Indiana and small-footed bats from the placement of bat boxes.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

There will be no direct effects/impacts on Indiana or small-footed bats from prescribed burning treatments. The only known Indiana and small-footed bat hibernaculum on Forest is Bear Den Cave located in southeastern Oklahoma. The indirect effects of prescribed burns would be to possibly reduce the amount of understory vegetation that inhibits free bat movement and foraging activity by maintaining uncluttered foraging pathways and easier access to roost trees. The cumulative effects of

prescribed fire would be minimal because proposed burns would only affect twelve percent of the project area and would be burned in sections during the 10-year period covered by this document. The variety of fire intensities that would occur due to environmental conditions would provide a habitat mosaic with varying degrees of midstory vegetation removal and occasional overstory tree mortality.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Proposed road/trail closures would be used to protect wildlife, soil and water resources. Methods of closure would range from blocking the road/trail entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

No direct effects/impacts to Indiana and small-footed bats are anticipated since actions would be to close currently open roads and rehabilitate impacted areas. Indirect benefits would be likely since proposed actions would provide linear flight corridors and linear foraging areas for bats. Cumulatively effects would increase the amount of suitable foraging areas in the analysis area for the next 5-10 years as permanently closed and decommissioned roads are reclaimed by surrounding habitats.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect, and cumulative effects/impacts would be the same as those determined for timber management treatments and road and trail closures.

- **Leopard darter (***Percina pantherina)*
- **Ouachita shiner** *(Lythrurus snelsoni*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Direct, indirect and cumulative effects would be the same as those determined for MIS fish species.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The Mena RD is proposing the use of the following herbicide active ingredients for site preparation, seedling release, and control of non-native invasive species: clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr.

The use of herbicides in site preparation, timber stand improvement and non-native invasive species treatment areas is not likely to have any direct, indirect or cumulative effects/impacts on leopard darter or Ouachita shiner. All streams perennial and intermittent would be protected, by 100 and 30-foot herbicide application buffers and; all source waters would be protected by 300-foot buffers. Buffers are to be clearly marked before treatment so applicators can easily see and avoid them (Revised Forest Plan, HU006, p 87).

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

None of the proposed timber management actions are expected to have any direct, indirect, or cumulative effects on leopard darter or Ouachita shiner. These species and their habitats are, currently protected by streamside management areas, as defined in the Revised Forest Plan.

Fish Passage Restoration

Proposed fish passage restoration would occur at various stream crossings within the analysis area. Drainage structures would be replaced or modified on the downstream/upstream sides with large rock or cobble to allow for fish passage. No direct effects are anticipated since leopard darters are not known to occur at the proposed treatment sites. There is a slight possibility that individual eggs, larva and/or adults could be directly harmed by fish passage restoration activities if the tributaries to the Mountain Fork River proper are used seasonally for spawning. It is possible that individual fish downstream of proposed restoration sites might be indirectly impacted by increased sedimentation during any construction activities. However, this effect would not be persistent nor would it contribute to significant stream sedimentation due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Revised Forest Plan standards specific to Leopard daters would be followed.

- **All soil disturbing activities within Streamside Management Areas (SMAs)** will follow the Revised Forest Plan standard **SW004** for erosion control measures as related to the **Leopard darter** as follows:

    - Will be completed within 15 days or less.
    - Will be during low or no flow conditions and employ erosion/sediment control techniques such as sediment screens, filters, seeding and mulching to control sediment loss.
    - Temporary erosion control measures will be applied prior to completion of activities during times if weather conditions indicate the need to control sediment.
    - Disturbed areas shall be seeded and mulched.
    - Fireline construction/reconstruction within SMAs will be constructed by hand.

Removal/replacement of these structures causing barriers to aquatic organisms would restore free migration of fish throughout stream habitats. No cumulative effects/impacts to leopard darter or Ouachita shiner are anticipated.

Bat Box Installation

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative effects/impacts to leopard darter or Ouachita shiner are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Effects from prescribed fire would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Prescribed burns would occur over approximately 12% of the analysis area sometime during the 10 years following implementation of the proposed project. This along with strict guide lines outlined in the Revised Forest Plan for protection of perennial streams would limit the potential for any direct, indirect, or cumulative effects/impacts to leopard darter or Ouachita shiner or their habitats.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Proposed road/trail closures would be used to protect wildlife, soil and water resources. Methods of closure would range from blocking the road/trail entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

No direct or indirect impacts to leopard darter or Ouachita shiners are anticipated since actions would be to close currently open, reassign designation of existing roads and rehabilitate impacted areas that are currently in use. Cumulatively, decommissioning of roads may benefit fish species by decreasing stream siltation and sedimentation.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect and cumulative effects/impacts would be the same as those determined for Fish Passage Restoration. Also, the following Revised Forest Plan standards specific to leopard daters would be followed.

> **All soil disturbing activities within Streamside Management Areas (SMAs)** will follow the Revised Forest Plan standard **SW004** for erosion control measures as related to the **Leopard darter** as follows:

- Will be completed within 15 days or less.
- Will be during low or no flow conditions and employ erosion/sediment control techniques such as sediment screens, filters, seeding and mulching to control sediment loss.
- Temporary erosion control measures will be applied prior to completion of activities during times if weather conditions indicate the need to control sediment.
- Disturbed areas shall be seeded and mulched.
- Fireline construction/reconstruction within SMAs will be constructed by hand.

Trail Shelter Construction and Trail Maintenance

Proposed treatments would have no direct, indirect, or cumulative impacts on leopard darter or Ouachita shiner. All proposed treatment sites are located outside stream habitats and streamside buffer zones and would not contribute to any potential stream impacts.

- **A crayfish** *(Orconectes menae)*
- **A crayfish** *(Procambarus tenuis)*

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Direct, indirect and cumulative effects would be the same as those determined for MIS fish species.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

These crayfish species appear to be tolerant of moderate disturbance hence their occurrence in maintained road side ditches. However all proposed actions, would be implemented according to the Revised Forest Plan, and thus would pose no direct, indirect or cumulative impact risk to these crayfish species except for fish passage restoration work. All other proposed actions would avoid streamside management areas and wetlands, but fish passage restoration could directly impact crayfish by crushing individuals within the stream channel. No indirect impacts are anticipated due to the limited scope and short duration of work involved. Cumulatively, restoring fish passage will facilitate travel routes for these crayfish.

- **Rich Mountain slit-mouth snail** (*Stenotrema pilsbryi*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effects on this sensitive snail species.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Neither of these Alternatives would impact this species since it is wholly associated with Rare Upland Communities (MA 6-rock glaciers usually above the 1600 ft. contour, and usually under hardwood forest cover with bare rocky ground) which are considered unsuitable for timber management. Therefore, there would be no direct, indirect or cumulative effects to individuals or their habitat.

- **Rich Mountain salamander** *(Plethodon ouachitae)*

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effect on this sensitive salamander species.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Application

The Mena RD is proposing the use of the following herbicide active ingredients for site preparation, seedling release, and control of non-native invasive species: clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr. Neither the published literature nor the U.S. EPA files (U.S. EPA/OPP, 1993, 1998a) include data regarding the toxicity of any of these chemicals or their formulations to amphibian species except for triclopyr. Most all bioassay studies use various fish species as the closest potential analogs to amphibians. Given the great disparity of risk assessment information for terrestrial amphibians the risk characterizations obviously lead to uncertainty in the risk assessment. Therefore all measures would be taken to limit the potential of exposure to terrestrial amphibian communities with the planning area.

Table 20: Summary of LD50 Values for Each Proposed Herbicide Active Ingredient

Active Ingredient	LC50*	Toxicity Risk to Bluegill	Risk Assessment
Fluroxypyr	14.3-100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	70-170mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2006
Imazapic	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004b
Imazapyr	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004c
Metsulfuron Methyl	>150mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004d
Triclopyr	Varies greatly with formulation	Appears to be somewhat toxic with great variation	Syracuse Environmental Research Associates, Inc. 2003
Clopyralid	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004a

LC50** - lethal concentration for 50% of population tested

Herbicide application for site preparation will only occur in 164 acres of reforestation areas that do not contain suitable habitat. Direct, indirect and cumulative impacts would be the same as those determined for timber management treatments.

Herbicide application for NNIS species would be allowed throughout the proposed planning area since application of herbicides would be to individual plants, along roadsides that do not support salamander habitat, and at application levels (<1 pound/ac) that would fall below any risk thresholds. Although it is extremely unlikely any individuals would be directly impacted there is the possibility that NNIS treatments could occur in salamander habitats and therefore individual salamanders could be indirectly impacted. No cumulative impacts are anticipated.

Alternative 3: Proposed Action without Herbicide

Timber Management (commercial thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Rich Mountain salamander habitats are generally confined to steep, rocky, north facing slopes, of mixed deciduous hardwoods adjacent to riparian habitats. Since Rich Mountain salamander habitats are somewhat restrictive no direct or indirect impacts are anticipated from the proposed timber management actions. All proposed actions would occur outside of streamside buffer areas and slopes under 35%. No cumulative impacts are anticipated.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect, and cumulative impacts would be the same as those determined for timber management treatments.

Fish Passage Restoration

Proposed fish passage restoration would occur at various stream crossings within the analysis area. Drainage structures would be replaced or modified on the downstream side with large rock or cobble to allow for fish passage. This proposal would affect approximately 20-25 linear feet of stream at each crossing. Direct, indirect, and cumulative impacts would be the same as those determined for crayfish species.

Bat Box Installation

No direct, indirect or cumulative impacts are anticipated as a result of placing bat boxes within the analysis area. The proposed treatment would require minimal ground disturbance and would not result in the loss of salamander habitat.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Rich Mountain salamanders have a high rate of dehydration and depend on habitats with high soil moisture content. Rocky slopes and rotten logs are used to escape heat and dry conditions (Trauth et al., 2004). Given the preferred habitats of this salamander it is unlikely that prescribed burning would have any direct, indirect or cumulative impact.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct or indirect impacts to Rich Mountain salamander are anticipated since actions would be to close currently open, reassign designation of existing roads and rehabilitate impacted areas that are

currently in use. Decommissioning of roads may benefit Rich Mountain salamander by decreasing stream siltation and sedimentation and by reconnecting habitats separated by road systems

Trail Shelter Construction

The proposed shelter location is within known habitats of Rich Mountain salamander and may have a direct impact on individual salamanders. However the potential for impact would be limited due to the small construction area of the shelter. No indirect or cumulative impacts are anticipated.

Trail Maintenance

Direct effects may occur to individual Rich Mountain salamanders during trail maintenance activities such as snag felling but are anticipated to be minimal due to the limited treatment area of available habitat. No indirect or cumulative impacts to Rich Mountain salamander are anticipated from the proposed trail maintenance actions.

- **Diana fritillary** (*Speyeria diana*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct effects on Diana fritillary. Indirect and cumulative effects would include the natural succession of early seral habitats into mature forest. This process could result in an overall decline of some woody shrubs, and annual and perennial broadleaf herbaceous plant species, that provide shelter and food sources (nectar) for this butterfly species. Without the continued presence of early seral stage habitats Diana fritillary populations would be expected to decline.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

The Mena RD is proposing the use of the following herbicide active ingredients for site preparation, seedling release, and control of non-native invasive species: clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr. Given the great diversity of species of terrestrial invertebrates, the use of data from a single species (Bee - Apis mollifera) for the risk characterization obviously leads to uncertainty in the risk assessment. However, given the preponderance of scientific studies available this information is applicable and represents the best science resource to date.

Bioassay studies of the listed chemicals proposed for use in the project area all exhibit very low toxicity to invertebrate species (bees). These determinations were based on concentrations of herbicides applied to bees that would far exceed concentrations applied in field treatment applications. Given the low risk of toxicity exhibited in invertebrate testing no direct impact to Diana fritillary is anticipated. Indirect effect of herbicide application would most likely come in the temporary loss of some woody shrubs, and annual, and perennial broadleaf herbaceous plant species that provide shelter

and food sources (nectar) for this butterfly species. While some butterfly habitats may be impacted by the treatment activities, maintaining or expanding suitable habitat would be "beneficial" for the species in the long-term. No long term cumulative impacts are anticipated due to the limited scope of treatments in both space and time.

Table 21: Summary of LD50 Values for Each Proposed Herbicide Active Ingredient

Active Ingredient	LD50*	Toxicity Risk to Bee - Apis mollifera	Risk Assessment
Fluroxypyr	>25µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2006
Imazapic	No LD50 stated	Nontoxic	Syracuse Environmental Research Associates, Inc. 2004b
Imazapyr	No LD50 stated	Nontoxic	Syracuse Environmental Research Associates, Inc. 2004c
Metsulfuron Methyl	>25µg/bee	Relatively Nontoxic to bees and White butterfly (Brassica nepus)	Syracuse Environmental Research Associates, Inc. 2004d
Triclopyr	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2003
Clopyralid	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2004a

LD50*- lethal dose for 50% of population tested

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Since adult butterflies are highly mobile it is extremely unlikely that they would be directly affected by timber management actions. However, there is the possibility of direct effects to eggs and larvae if trees are felled or equipment impacts larva in the leaf litter.
Although timber management actions may directly affect eggs and larvae of butterflies these same actions (timber removal, TSI, WSI) would also allow for increases in new herbaceous plant growth which may contain high quality nectar producers and violets for egg deposition beneficial for this butterfly species.

The proposed timber management actions would have no cumulative effects on Diana fritillary. All treatment actions would create some disturbance to the understory vegetation and could result in the temporary loss (one growing season) of some woody shrubs, and annual, and perennial broadleaf herbaceous plant species that provide shelter and food sources (nectar) for this butterfly species. While some butterfly habitats may be impacted by the treatment activities, maintaining or expanding suitable habitat would be "beneficial" for the species in the long-term.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect, and cumulative impacts would be the same as those determined for timber management treatments.

Trail Shelter Construction and Trail Maintenance

Direct, indirect and cumulative impacts would be the same as those determined for timber management treatments.

Fish Passage Restoration

Since proposed fish passage actions would occur outside of habitats preferred by this butterfly species no direct, indirect or cumulative impacts are anticipated.

Bat Box Installation

No direct, indirect or cumulative impacts are anticipated as a result of placing roosting or nest boxes within the analysis area. Placement would require minimal ground disturbance and would not result in the loss of vegetation upon which Diana fritillary is dependent. Bats or bat colonies using bat houses are unlikely to pose any added predatory risk to Diana fritillary since this is a diurnal butterfly species and bats are nocturnal feeders.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

No direct impacts from prescribed burning are anticipated on adult Diana fritillary since adult butterflies are naturally adept at avoiding natural and prescribed fire. There is the possibility that prescribed burning may directly impact eggs and larvae over-wintering in the leaf litter. However prescribed burning should far outweigh the onetime loss of eggs and larvae by enhancing and expanding the acres of suitable foraging and egg laying habitat throughout the project area. Indirect effects of proposed burning would enhance and increase in acres of suitable foraging and egg laying habitat. No cumulative effects are anticipated from proposed burning activities.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Proposed road/trail closures would be used to protect wildlife, soil and water resources. Methods of closure would range from blocking the road/trail entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

No direct impacts to Diana fritillary are anticipated since actions would be to close currently open roads, reassign designation of existing roads and rehabilitate impacted areas. It is likely proposed actions would indirectly benefit butterflies by allowing these areas to revegetate thus providing potential foraging habitat. Cumulatively the proposed road/trail closures would increase the amount of suitable foraging area in the analysis area for the next 5-10 years until these areas are reclaimed by surrounding habitats.

- **Waterfall's sedge** (*Carex latebracteata*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effect on this sensitive plant species as a result of deferred management.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

Herbicide application for Non-native invasive species would be allowed throughout the proposed planning area, but current estimates of acres requiring treatment is approximately 1% to 5 % (110 to 552 acres). The Revised Forest Plan restricts herbicide use within 300 feet, if aerially applied, or within 60 feet, if ground-applied of any threatened, endangered, proposed, or sensitive plant. RFP exceptions provide for treatment using herbicide when necessary to protect the PETS plant or to prevent the loss or significant degradation of its habitat (HU010). Direct effects to Waterfall's sedge could occur as a result of direct contact with herbicide or with personnel conducting chemical control activities. However, positive indirect effects are likely to occur from reducing densities and competition from non-native invasive plants. As part of implementation, each site proposed for treatment would be evaluated for the presence of populations or habitat for Waterfall's sedge and other PETS species and for determining the best treatment method. No cumulative effects are anticipated from the proposed herbicide treatments.

Botanical field surveys of all other proposed herbicide treatment areas found no occurrence of Waterfall's sedge. No direct, indirect, or cumulative impacts are anticipated.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Botanical field surveys found no occurrence of Waterfall's sedge within proposed timber treatment areas. The proposed timber management actions would have no direct, indirect, or cumulative impact on Waterfall's sedge.

Fish Passage Restoration

Botanical field surveys of the proposed fish passage restoration sites found no occurrence of Waterfall's sedge. No direct, indirect, or cumulative impacts are anticipated.

Bat Box Installation

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative impacts to Waterfall's sedge are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burns would occur over approximately12% of the analysis area sometime during the 10 years following implementation of the proposed project. Effects would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Vegetative portions of plants and some seed loss may occur depending on intensity and duration of burn events. It is likely that Waterfall's sedge would benefit indirectly from burning due to the removal or top-killing of competing vegetation. This benefit would be most obvious in areas of rocky, shallow soils were post fire plant competition would be less.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct, indirect or cumulative effects would occur to Waterfall's sedge since botanical surveys found no occurrence and actions would be to close currently open roads that are in use and do not contain suitable habitat due to impacts of over use.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Botanical field surveys of the proposed road/fireline treatment areas found no occurrence of Waterfall's sedge. No direct, indirect, or cumulative impacts are anticipated.

Trail Shelter Construction and Maintenance

Botanical field surveys of the proposed trail shelter construction found no occurrence of Waterfall's sedge. No direct, indirect, or cumulative impacts are anticipated.

- **Ozark chinquapin** (*Castanea pumila ozarkensis*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effect on this sensitive plant species as a result of deferred management.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Application

Direct, indirect, and cumulative impacts for Non-native invasive species treatments would be similar to those determined for Waterfalls sedge. All proposed herbicide treatments would follow Forest Plan

(USDA 2005) direction and exclude Ozark chinquapin from treatment. No direct or cumulative impacts to Ozark chinquapin are anticipated.

Botanical field surveys of all other proposed herbicide treatment areas found no occurrence of Ozark chinquapin. No direct, indirect, or cumulative impacts are anticipated.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Timber management actions are proposed for upland shortleaf pine, pine/hardwood and hardwood stands that may support habitats conditions conducive to this sensitive plant species. Field surveys found one location of Ozark chinquapin which is outside of any proposed treatment area. The proposed timber management actions would have no direct, indirect, or cumulative impact on Ozark chinquapin.

Fish Passage Restoration

Botanical field surveys of the proposed fish passage restoration sites found no occurrence of Ozark chinquapin. No direct, indirect, or cumulative impacts are anticipated.

Bat Box Installation

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative impacts to Ozark chinquapin are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burns would occur over approximately12% of the analysis area sometime during the 10 years following implementation of the proposed project. Effects would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Overall prescribed fire is not likely to be directly detrimental to Ozark chinquapin. Individuals may be set back but would be expected to re-sprout from stumps. No cumulative impacts to Ozark chinquapin are anticipated as a result of the application of prescribed fire.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Proposed road/trail closures would be used to protect wildlife, soil and water resources. Methods of closure would range from blocking the road/trail entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

No direct, indirect or cumulative effects would occur to Ozark chinquapin since botanical surveys found no occurrence and actions would be to close currently open roads that are in use and do not contain suitable habitat.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Botanical field surveys of the proposed road/fireline treatment areas found no occurrence of Ozark chinquapin. No direct, indirect, or cumulative impacts are anticipated.

Trail Shelter Construction and Trail Maintenance

Botanical field surveys of the proposed trail shelter construction found no occurrence of Ozark chinquapin. No direct, indirect, or cumulative impacts are anticipated.

- **Southern lady's-slipper** (*Cypripedium kentuckiense*)

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effect on this sensitive plant species as a result of deferred management.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

Botanical field surveys of all proposed herbicide treatment areas found that they do not support habitats conditions conducive to Southern lady's slipper. No direct, indirect, or cumulative impacts are anticipated.

Alternative 3: Proposed Action without Herbicide

Timber Management (thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

The above actions are proposed for upland shortleaf pine, pine/hardwood and hardwood stands that do not support habitats conditions conducive to Southern lady's slipper. Field surveys found approximately 73 new locations of Southern lady's slipper. All sites are within streamside management areas and are protected by the standards in the Revised Forest Plan. The proposed timber management actions would have no direct, indirect or cumulative impact on Southern lady's slipper.

Fish Passage Restoration

Botanical field surveys of the proposed fish passage restoration sites found no occurrence of Southern lady's slipper. No direct, indirect, or cumulative impacts are anticipated.

Bat Box Installation

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative impacts to Southern lady's slipper are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burns would occur over approximately12% of the analysis area sometime during the 10 years following implementation of the proposed project. Effects would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Overall prescribed fire is not likely to directly impact Southern lady's slipper due to the wet habitat conditions in which it normally occurs and prescribed burning occurring during the plants dormancy. Indirectly, plants may benefit post burn due to reduced competition. No cumulative impacts are anticipated as a result of the proposed treatments.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

No direct, indirect or cumulative effects would occur to Southern lady's slipper since botanical surveys found no occurrence and actions would be to close currently open roads that are in use and do not contain suitable habitat.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Surveys found that proposed sites do not contain suitable habitats capable of supporting this sensitive plant species except at stream crossings and botanical surveys found no occurrence of Southern lady's slipper. No direct, indirect, or cumulative impacts to Southern lady's slipper are anticipated.

Trail Shelter Construction and Trail Maintenance

Surveys found that proposed sites do not contain suitable habitats capable of supporting Southern lady's slipper. No direct, indirect, or cumulative impacts are anticipated.

The following plants will be considered together:

- **Ouachita leadplant** (*Amorpha ouachitensis*)
- **Cossatot Mountain leafcup** *(Polymnia cossatotensis)*
- **Ouachita goldenrod** (*Solidago ouachitensis*)
- **Ozark spiderwort** (*Tradescantia ozarkana*)
- **Ozark least trillium** (*Trillium pusillum ozarkanum*)
- **Carolina crownbeard** *(Verbesina walteri)*

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would have no direct, indirect or cumulative effect on these sensitive plant species as a result of deferred management.

Alternative 2: Proposed Action

All direct, indirect, and cumulative effects would be similar to the *Proposed Action without Herbicide* alternative with the following exception.

Herbicide Treatments

Direct, indirect, and cumulative impacts for Non-native invasive species treatments would be the same as those determined for Waterfalls sedge.

Botanical field surveys of all other proposed herbicide treatment areas found no occurrence of these sensitive plant species or no suitable habitat. No direct, indirect, or cumulative impacts are anticipated.

Alternative 3: Proposed Action without Herbicide

Timber Management (commercial thinning, manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction)

Timber management actions are proposed for upland shortleaf pine, pine/hardwood and hardwood stands that do not support habitats conditions conducive to these sensitive plant species. Field surveys found no occurrence of these plant species within stands proposed for treatment. If these plant species were to occur within the analysis is would most likely be in or directly adjacent to stream buffer zones, mesic north-slope or cliff and talus habitats considered unsuitable for timber management. The proposed timber management actions would have no direct, indirect or cumulative impact on these sensitive plant species.

Fish Passage Restoration

Botanical field surveys of the above proposed action areas found no occurrence of these sensitive plant species. No direct, indirect, or cumulative impacts are anticipated.

Bat Box Installation

Bat boxes would be mounted to metal poles driven into the ground thus limiting ground disturbance. As a result no direct, indirect, or cumulative impacts to these sensitive plant species are anticipated.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burns would occur over approximately12% of the analysis area sometime during the 10 years following implementation of the proposed project. Effects would vary due to fire intensity, aspect, and slope and it would be expected that some degree of forest floor cover would be removed. Overall prescribed fire is not likely to directly impact these plant species due to the wet habitat and rocky conditions in which they normally occur and prescribed burning occurring during the plants dormancy. No indirect or cumulative impacts are anticipated as a result of the proposed actions.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Proposed road/trail closures would be used to protect wildlife, soil and water resources. Methods of closure would range from blocking the road/trail entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

No direct, indirect or cumulative effects would occur to these sensitive plant species since botanical surveys found no occurrence and presently sites do not contain suitable habitat for these sensitive plant species due to impacts of over use.

Road/Fireline Construction, Reconstruction and Maintenance Treatments

Direct, indirect, and cumulative impacts would be the same as those determined for Road and Trail closures.

Trail Shelter Construction

Botanical field surveys of the above proposed action areas found no occurrence of these sensitive plant species. No direct, indirect, or cumulative impacts are anticipated.

Trail Maintenance

Individual plants may be setback from pruning/weeding or crushed during trail maintenance activities but impacts would be minimal due to the limited area of treatment within the available habitat for these sensitive plant species in the analysis area. No indirect or cumulative impacts to these sensitive plant species are anticipated from the proposed trail maintenance actions.

Terrestrial, Riparian and Aquatic Ecosystems of the Ouachita National Forest Selected for this Project

Table 22 summarizes the terrestrial, riparian and aquatic ecosystem composition of the project area.

Table 22: Percentage of Terrestrial, Riparian and Aquatic Communities within project area.

Terrestrial Communities		Percentage of Project Area
Ouachita Shortleaf Pine-Oak Forest and Woodland: (3 subsystems)		
	Ouachita Shortleaf Pine-Oak Forest	39%
	Ouachita Shortleaf Pine-Oak Woodland	12%
	Ouachita Shortleaf Pine- Bluestem (Red-cockaded Woodpecker Habitat)	0
West Gulf Coastal Plain Pine-Hardwood Forest		0
Ouachita Dry-Mesic Oak Forest		35%

Terrestrial Communities	Percentage of Project Area
Ouachita Mesic Hardwood Forest	<1%
Ouachita Montane Oak Forest	1%
Ouachita Dry Oak Woodland	0
Ouachita Novaculite Glade and Woodland	0
Central Interior Highlands Dry Acidic Glade and Barrens	<1%
Central Interior Acidic Cliff and Talus	<1%
Calcareous Prairie	0

Riparian and Aquatic Communities	Percentage of Project Area
Ouachita Mountain Forested Seep	<1%
Ouachita Riparian	13%
West Gulf Coastal Plain Small Stream and River Forest	0
South Central Interior Large Floodplain	0
West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)	0
Ouachita Rivers and Streams	(included in Ouachita Riparian)
Ouachita Ponds, Lakes and Waterholes	(included in Ouachita Riparian)

Effects Analysis on Ouachita National Forest Terrestrial, Riparian and Aquatic Ecosystems

Pine Dominated Communities:

Ouachita Shortleaf Pine-Oak Forest

This subsystem represents the closed-canopy, somewhat fire-dependent, more densely forested component of pine-oak dominated systems on the Forest. The defining characteristic of this subsystem is canopy closure in excess of 70 percent. This habitat supports 25 animal and 4 plant species of viability concern.

Desired Condition: The desired condition for vertical structure is 6-14 percent in grass/forb or seedling/sapling/shrub condition and 60-90 percent in the mature forest condition. At least 50 percent of the spatial extent of the pine-oak forest is treated with prescribed fire every 5-7 years with an occasional growing season fire.

Ouachita Shortleaf Pine-Oak Woodland

This subsystem represents the more open canopy, fire-dependent, less densely forested component of pine-oak dominated systems on the Forest. The defining characteristics of this subsystem are canopy

closure of less than 60 percent, abundant herbaceous groundcover, and a mix of pine and oak among the dominant canopy trees. This habitat supports eight animal species of viability concern.

Desired Condition: The desired condition for vertical structure is 6-14 percent in grass/forb and seedling/sapling/shrub and 60-90 percent in the mature woodland condition. Prescribed fire is applied to at least 50 percent of this community every 3-5 years, with an occasional growing season fire.

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would allow forested lands to change without the interference of landscape scale land management. This alternative would have no direct, indirect or cumulative effects on these ecological communities.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Timber management and related actions would have a positive direct effect on Ouachita shortleaf pine-oak forest maintaining and increasing mature forest conditions but would have a negative direct effect on Ouachita shortleaf pine-oak woodland. The percentage of early seral habitats for pine-oak communities within the project area is below the optimal range of 6 to 14 percent and proposed timber management and related actions would not help increase the overall percentage of early seral habitat. No indirect or cumulative effects are anticipated.

Prescribed burning would directly affect both of these communities within the project area. Since pine-oak ecosystems are fire dependent, periodic burning would indirectly benefit plant and animal communities within these systems. Burning would help thin overstocked stands, create and maintain early seral components, increase nutrient flow and aid the natural recruitment and establishment of native plant communities. No cumulative effects are anticipated.

All of the other proposed treatments would have little or no direct effects on these pine ecological communities within the project area. No indirect or cumulative effects are anticipated.

Hardwood Dominated Communities:

Ouachita Dry-Mesic Oak Forest

This system is found throughout the Ozark and Ouachita Highlands. It occurs on dry mesic to mesic sites and gentle to moderately steep slopes. Soils are moderately drained to well-drained and more fertile than those associated with drier, more open oak woodlands. A closed canopy of oak-hickory species typifies this system. Maples may occur on more mesic sites. Wind, drought, lightning and occasional fires influence this system. This habitat supports 20 animal and four plant species of viability concern.

Desired Condition: The desired condition for vertical structure is 4-10 percent in grass/forb and seedling/sapling/shrub and 60-90 percent in the mature forest condition. To mimic natural fire

regimes, many of these communities will receive prescribed burns. Prescribed fire is applied to at least 50 percent of this community every 5-7 years with an occasional growing season fire.

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would allow forested lands to change without the interference of landscape scale land management. This alternative would have no direct, indirect or cumulative effects on these communities.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Timber management and related actions would directly affect approximately 277 acres (7 percent) of the Ouachita Dry-Mesic Oak Forest within the project area. Pine thinning and mid-story reduction treatments would reduce subcanopy woody vegetation allowing for oak species seed establishment and future recruitment in to larger tree size classes and reduced competition for resources would increase stand vigor, improve stand health and mast production. No indirect or cumulative impacts are anticipated from Alternative 2 or Alternative 3.

Ouachita Montane Oak Forest
Ouachita Mesic Hardwood Forest

All proposed treatments would occur outside of Montane and Mesic hardwood communities and thus would have no direct, indirect or cumulative effects on these communities.

Central Interior Highlands Dry Acidic Glade and Barrens
Central Interior Acidic Cliff and Talus

All proposed treatments would occur outside of Glade and Talus communities and thus would have no direct, indirect or cumulative effects on these communities.

Riparian and Aquatic Ecosystems:

Ouachita Riparian

This system is found along streams and small rivers within the Ozark and Ouachita regions. In contrast to larger floodplain systems, this system has little to no floodplain development and often contains cobble bars and steep banks. Ozark-Ouachita Riparian communities are typically higher gradient than larger floodplains and experience periodic, strong flooding. These communities are often characterized by a cobble bar with forest directly adjacent and little or no marsh development. Canopy cover can vary within examples of this system, 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 typically 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. This habitat supports 24 animal and 11 plant species of viability concern.

Desired Condition: The desired condition for this system is a largely undisturbed, mature or old growth community with intact hydrologic functions and processes within a minimum protective buffer of 100 feet on each side of perennial streams and 30 feet on each side of defined channels. Water quality is good to very good and riparian vegetation remains intact during and after vegetation management activities, such as harvesting, prescribed burning, road or fireline construction and pesticide application.

Ouachita Mountain Forest Seep

Forested seeps occur in the Ouachita Mountains of Arkansas and Oklahoma. Examples may be found 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 drains. The soil remains saturated to very moist throughout the year. The vegetation is typically forested 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 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. This habitat supports eight animal and four plant species of viability concern.

Desired Condition: The desired condition for this system is a largely undisturbed, mature community with a protective buffer 100 feet from the seep boundaries. Old growth seep communities develop and regenerate naturally in relatively small patches.

Ouachita Ponds, Lakes, and Waterholes

Ponds, lakes, and waterholes consist of all lentic (still, impounded, or otherwise non-flowing) aquatic systems on the forest. These systems provide a water source for a wide range of plants and animals. In addition, these waterbodies provide critical reproductive habitat for amphibians and critical foraging habitat for bald eagles. Most of the lakes and ponds over one-half acre are managed for sustainable sport fishing. Enhancement of sport fisheries through stocking, habitat enhancement, and fertilization/aquatic weed control is practiced by the Forest in cooperation with the appropriate state fish and wildlife agencies. This habitat supports eight animal species of viability concern.

Desired Condition: The desired condition for unstocked ponds and waterholes is habitat suitable for amphibians and other wildlife and a source of water for upland wildlife species. The desired conditions for fishable waters are high-quality angling opportunities and good to excellent water quality, site productivity, associated vegetation, and habitat for associated riparian and aquatic dependent species.

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

Alternative 1 would allow forested lands to change without the interference of landscape scale land management. This alternative would have no direct, indirect or cumulative effects on the Ouachita Riparian aquatic communities.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

All of the proposed treatments would occur outside of riparian and aquatic ecosystems with the exceptions of prescribed burning, roads and fish passage restoration treatments and thus would have no direct, indirect or cumulative effect on these communities.

Prescribed burning, roads and fish passage treatments would collectively affect approximately <1% percent of the Ouachita Riparian community within the project area. Prescribed fire would be allowed to move into riparian areas resulting in low intensity and sporadic burning. Fireline construction would be done by hand line at right angles to stream crossings, thus limiting potential for impacts. No cumulative effects are anticipated from Alternative 2 or Alternative 3.

Non-Native Invasive Species

Non-native invasive (NNIS) plants are plants alien to the environment in which they have been introduced. Causes of introduction are associated with various anthropogenic practices such as agriculture, ornamental cultivation, soil restoration efforts, or through accidental import / release, etc. Since NNIS did not evolve within the host environment they are not as susceptible to the host environments natural plant predators (insects and diseases). This lack of natural control allows NNIS to spread rapidly with little natural opposition and to cause economic or environmental harm or harm to human health. Due to this threat from NNIS the Southern Region developed the Southern Region Noxious Weed Strategy and Regional Forester's list of invasive exotic plant species of management concern. As part of the project area analysis the Regional Forester's list was reviewed and from that list it was determined through field surveys that 8 NNIS occur within the MFPA.

NNIS currently known to exist in the analysis area:

Silk Tree (mimosa) – *Albizia julibrissin*, Air Potato (climbing yam) – *Dioscorea batatas*, Sericea lespedeza – *Lespedeza cuneata*, Chinese privet – *Ligustrum sinense*, tall fescue – *Lolium arundinaceum*, and Japanese honeysuckle – *Lonicera japonica*.

Direct, Indirect and Cumulative Effects of each Alternative

Alternative 1: No Action

This alternative would allow forested lands to change without the interference of landscape scale land management and would have no direct, effect on NNIS. Indirectly the lack of active NNIS control would allow the various NNIS to continue to produce seed and opportunistically spread in the analysis area. This uncontrolled spread would likely result in the transport of seed and plants along roads and waterways into other watersheds thus cumulatively effecting large areas of landscape, native plants and animal species.

Alternative 2: Proposed Action

Alternative 2 would have a direct effect on non-native invasive plants because the existing plants (e.g., tall fescue, sericea lespedeza and privet, etc.) are prescribed to receive herbicide/manual applications. However, various proposed actions such as timber harvest, road construction, wildlife opening restoration, etc. would all promote the spread of non-native invasive plants. It is for this reason that

non-native invasive plants eradication treatments by herbicide are proposed to directly mitigate and facilitate control of spread. Through the proposed herbicide/manual treatments, non-native invasive plants would be suppressed and or eliminated thus limiting the possibility of cumulative effects. See Appendix C and Chapter 2 of the EA for discussion of proposed treatments for non-native invasive plants.

Alternative 3: Proposed Action without Herbicide

Alternative 3 would have no direct effect on NNIS. It would be unlikely that proposed manual treatments could effectively control the spread of NNIS and that indirect and cumulative impacts to plant and animal communities within and adjacent to the analysis area would be similar to the Alternative 1.

Local or County Economy

Existing Condition

The MFPA is located within Polk County. The Polk County seat is located in Mena, Arkansas, and as of 2008, Polk County's population totaled 20,257 people. Approximately 10 percent of Polk County, Arkansas' workforce is employed in the agriculture, forestry, fishing and hunting industries. The local timber industry depends on national forest land for a source of raw material. There are 96 firms in Polk County related to forestry, fishing, hunting, agricultural support, construction or manufacturing. Compared to the rest of the United States, Polk County shows a greater reliance on agriculture, forestry, fishing and hunting (9.5% of employment compared to 1.5% in the US as a whole), and manufacturing (21.4% compared to 14.1% in the US). Employment reliance on construction is roughly similar between Polk County and the rest of the United States (8 versus 7%, respectfully; Headwaters Economics 2009). Many local residents depend on firewood from timber and wildlife activities on the district such as regeneration harvest, site preparation and wildlife midstory reduction.

Between 2007 and 2009, Polk County received land payments in lieu of taxes from the federal government as summarized in Table 23[3]:

Table 23: 2007-2009 Federal payments in lieu of taxes to Polk County, Arkansas.

County	2009	2008	2007
Polk	$250,182	$286,269	$187,993

Table 24 summarizes 2007 employment data from the U.S. Census Bureau[4] for Polk County. The Census Bureau's Economic Census is conducted every five years.

[3] http://www.uscounties.org/PrinterTemplate.cfm?Section=Find_a_County&Template=/cffiles/counties/pilt_res.cfm&state=AR

[4] Polk County: http://factfinder.census.gov/servlet/GQRTable?_bm=y&-qr_name=EAS_2007_CBPGQRT4&-ds_name=CB0700A1&-geo_id=05000US05113&-_lang=en

Table 24: 2007 U.S. Census Bureau employment data

County	Business Sector	Number of establishments (2007)[a]	Number of employees (2007)[b]
Polk	logging	17	81
Polk	forestry support	1	0-19
Polk	mining	3	20-99
Polk	mining support	1	0-19
Polk	construction	45	255
Polk	wood product manufacturing	10	257

a – This figure represents the number of locations with paid employees any time during the year.
b - This figure includes full- and part-time employees, including salaried officers and executives of corporations, who are on the payroll in the pay period including March 12. Included are employees on paid sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

Analysis of Effects: Local or County Economy

Alternative 1: No Action

Direct Effects

Local forest industry workers would be subject to additional periods of unemployment and would have to travel longer distances to find employment.

Indirect Effects

Less of the income of local workers would return to the local economy, both as a result of lower wages and spending outside of the local area.

Cumulative Effects

Lack of activity or treatment in this project area would have a negative long-term impact on local forestry employment, local forest industry as a whole and the economic health of the surrounding local businesses and communities. This negative impact would increase if combined with a lack of project implementation in the surrounding area.

Alternative 2: Proposed Action

Direct Effects

The *Proposed Action* alternative would provide an equal level of employment to workers in the local logging and wood processing industries. However, compared to the *Proposed Action without Herbicide* alternative, it would provide slightly less employment for forestry workers performing the release of pine regeneration with chainsaw and herbicide, rather than by the treatment by chainsaw only. This is due to the higher efficiency and effectiveness of the herbicide application, and thus a reduction in the amount of labor required. Otherwise, this alternative would have equal effect on the employment of forestry workers performing other silvicultural work and similar wildlife treatments.

Indirect Effects

The money that local forest industry workers and companies earned would be circulated within businesses of the local communities.

Cumulative Effects

Continued active forest management would result in forest health being maintained or improved. This would then contribute to long-term stabilization of forest industry and local businesses, which would continue to grow and provide needed goods and services. Additionally, managing for hardwoods has potential to improve habitat conditions for hard mast dependent species like eastern wild turkey and whitetail deer. This, in turn, would increase the amount of revenue coming into the local community through hunting.

Alternative 3: Proposed Action without Herbicide

Direct Effects

Of the three alternatives, full implementation of *Proposed Action without Herbicide* alternative results in the highest level of employment to local forestry workers, logging contractors, forest product mill workers, etc. This is a result of providing slightly more employment for forestry workers performing release of pine regeneration with chainsaws rather than by herbicide application.

Indirect Effects

The money that local forest industry workers and companies earned would be circulated within businesses of the local communities.

Cumulative Effects

Continued active forest management would result in forest health being maintained or improved. This would then contribute to long-term stabilization of forest industry and local businesses, which would continue to grow and provide needed goods and services.

Payments to Counties

This section is included because timber harvest is proposed and National Forest land is included in Polk County.

On October 3, 2008 the Secure Rural Schools and Community Self-Determination Act of 2000 (SRS Act) was amended and reauthorized in P.L. 110-343. This law ensures that for four years (2008 – 2011), counties across the country can continue to count on stable and transition payments that provide funding for schools and roads, make additional investments in projects that enhance forest ecosystems, and improve cooperative relationships. With notable exceptions, the SRS Act, as amended, is similar to the original program. The structure and significant elements of Title I were amended but Titles II and III remained intact with few changes (see http://www.fs.fed.us/srs/).

The SRS Act gives counties the option between two payment methods: (1) a newly modified 25 percent seven year rolling average payment of receipts from national forest lands or (2) a share of the State payment as calculated under the new SRS Act. The new formula uses multiple factors, including acres of federal land within an eligible county, average of the three highest 25-percent payment, and an income adjustment based on the per capita personal income for each county. Counties electing to receive a share of the SRS State payment are bound to this decision through 2011. Those choosing the 25 percent payment are bound to it for two years. The full funding amount for each of the fiscal year

payments is $500 million for FY 2008 and then 90% of the preceding year's full funding amount for FY 2009 through FY 2011. Polk County elected to accept a share of the State payments made under the new formula.

Analysis of Effects: Payments to Counties

Effects Common to All Alternatives

Regardless of the alternative implemented, there will be no effect on payments to Polk County because they are receiving a set share of the State payments made under the new formula.

Financial Efficiency

Forest Service regulations require financial efficiency analysis in order to disclose a summary of the direct, indirect and cumulative effects for each alternative.

Analysis of Effects: Financial Efficiency

The geographic boundary for effects on the local or county economy is Polk County. The timeframe used for measuring these effects is the duration of implementation of the activities included in the project financial efficiency analysis. The following analysis includes harvest and regeneration activities through stand establishment and release.

Alternative 1: No Action

Direct, Indirect, and Cumulative Effects

The Federal government would spend no money for timber sales or resource management in the MFPA and there would be no timber sale receipts. The goals and objectives of the Revised Forest Plan for providing commodities and services that yield a net public benefit would not be met in the MFPA until the next scheduled management entry (approximately 10 years).

Alternative 2: Proposed Action

Direct Effects

The MFPA would be harvested by two to three timber sales with an estimated volume of 24,618 CCF (100 cubic feet) of pine and hardwood saw timber and pulpwood. Total gross revenue from tree harvest units would be estimated at $1,057,488.98. This alternative has a positive revenue/cost ratio of 3.36.

The timber stumpage value would cover all direct costs connected with the timber sale, including road construction and reconstruction, sale administration and sale preparation. The positive revenue/cost ratio of the *Proposed Action* alternative also allows the Forest Service to implement other resource activities planned. This includes hand planting of shortleaf pine, site preparation and stocking surveys, release, WSI, fish passage restoration, non-native invasive species eradication, and nest box placement. The Timber Sale Financial Present Net Value would be approximately $742,784.28 (see project file for Quick-Silver Investment Analyses).

Indirect Effects

The full implementation of the *Proposed Action* alternative would indirectly support local Polk County businesses through sale of fuel, supplies and equipment, as well as food and other personal needs of the workers and their families.

Cumulative Effects

The economic stability of the surrounding area is supported in the present and future through continuation of individual jobs and the forest industry as a whole.

Alternative 3: Proposed Action without Herbicide

Direct Effect

The MFPA would be harvested by two to three timber sales with an estimated volume of 24,618 CCF (100 cubic feet) of pine and hardwood saw timber and pulpwood. Total gross revenue from tree harvest units would be estimated at $1,057,488.98. This alternative has a positive revenue/cost ratio of 3.68.

The timber stumpage value would cover all direct costs connected with the timber sale, including road construction and reconstruction, sale administration and sale preparation. The positive revenue/cost ratio of the *Proposed Action without Herbicide* alternative also allows the Forest Service to implement other resource activities planned. This includes hand planting of shortleaf pine, site preparation and stocking surveys, release, WSI, fish passage restoration, non-native invasive species eradication, and nest box placement. The Timber Sale Financial Present Net Value would be approximately $769,814.18 (see project file for Quick-Silver Investment Analyses).

Indirect Effect

The full implementation of the *Proposed Action without Herbicide* alternative would indirectly support local Polk County businesses through sale of fuel, supplies and equipment, as well as food and other personal needs of the workers and their families. This indirect support of local businesses would be somewhat higher than the *Proposed Action* alternative due to the small increase in forestry worker salaries.

Cumulative Effects

The economic stability of the surrounding area is supported in the present and in the future through continuation of individual jobs and the forest industry as a whole.

Public Health and Safety

Following is a summary of the direct, indirect and cumulative effects to public health and safety by alternative. These include those effects from prescribed burning, herbicide use, and worker safety.

Existing Condition

As stated in the "Air Quality" section, existing emission sources occurring in the general vicinity of the analysis area consist mainly of mobile sources. These would include, but are not limited to,

combustion engines (such as those found in motor vehicles); dust from unpaved surfaces; smoke from local, county, agricultural and forest burning; and other activities.

As of August 2011 one county (Crittenden – near Memphis, Tennessee) in northeast Arkansas was listed as marginal "nonattainment" (those areas that do not currently meet National Ambient Air Quality Standards (NAAQS)) for 8-hour Ozone (O_3) criteria pollutant only (U.S. EPA, 2009). This means that Polk County (southwest Arkansas) is in compliance with NAAQS for the criteria pollutants of concern for the proposed project (U.S. EPA, 1990).

Analysis of Effects

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

No direct effects would occur. Negative indirect effects to public health and safety could occur in the event that a wildfire occurs and creates excessive smoke.

Alternative 2: Proposed Action

Direct Effects

Reference the "*Direct Effects to Air Quality*" section for disclosure of effects of prescribed burning on public health and safety. A potential risk to public safety is caused by smoke from prescribed burning, which can impact local individuals with respiratory problems, and can reduce visibility on highways and roads. Proper implementation as outlined in required burning plans would provide for smoke dispersal, minimizing this risk.

The RFP-FEIS discloses effects to human health and safety from prescribed fire and vegetation management activities. The activities that are proposed would not pose any threat to public health and safety beyond that of the woods workers who conduct actual on-the-ground activities. With proper personal protection equipment the likelihood of injuries would be decreased.

Seven herbicide active ingredients; triclopypr, imazapic, glyphosate, imazapyr, fluroxypyr, clopyralid, and metsulfuron methyl; would be used at or below the rates allowed. The Revised Forest Plan allows for their use at the lowest effective rate.

SERA (Syracuse Environmental Research Associates, Inc.) Human Health and Ecological Risk Assessments were used to analyze the risks associated with the seven herbicides proposed under this Alternative. Site-specific risk assessments developed by Syracuse Environmental Research Associates have been conducted for the MFPA as required by the Revised Forest Plan (p 87, HU002) and are located in the project file. The SERA Human Health and Ecological Risk Assessments worksheets are a series of excel spreadsheets designed to analyze the risks associated with use of specific herbicides. These worksheets allow for the generation of project specific analysis of potential herbicide use.

The project area analysis calls for the potential use of 2 pounds/ acre of Glyphosate for foliar spray treatments. In the SERA Final Report for the Risk Assessment on Glyphosate (2006) they used a typical application rate of 2 pounds/ acre and found the following:

"*Based on the typical application rate of 2 lbs i.e./acre, none of the hazard quotients for acute or chronic scenarios reach a level of concern even at the upper ranges of exposure. This is consistent with the risk characterization given by U.S. EPA/OPP (1993, p. 53):* ***Based on the current data, it has been determined that effects to birds, mammals, fish and invertebrates are minimal****".*

Given this, no further analysis of Glyphosate was done.

The project area analysis calls for the potential use of 0.75 pounds/acre of imazapyr to be used for all treatments. The rate of 0.75 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At this rate the spreadsheets indicate the use of imazapyr does not pose any identifiable hazard to workers or the general public in Forest Service applications. Also at this rate the model asserts that no adverse effects associated with the toxicity of imazapyr can be anticipated in terrestrial or aquatic animals from the use of this compound in Forest Service applications. The model does show that adverse effects on aquatic plants are plausible with chronic exposure. This would be under a scenario where the herbicide reaches a static body of water either through runoff or percolation. For bodies of water that are flowing (e.g. streams) phytotoxic concentrations are likely to be transient and have little impact on any plant species. As for ponds, chronic effects are a possibility but one with limited probability (personal communication, Paul Mistretta, 5/2004).

Active ingredient imazapic may be used at a rate of 0.188 pounds/acre under the project area analysis. It will generally be applied as a foliar application to weeds. Typical exposures to imazapic do not lead to estimated doses that exceed a level of concern. For workers, no exposure scenarios, acute or chronic, generate a level of concern even at the upper ranges of estimated dose. For members of the general public, the upper limits for hazard quotients are below a level of concern except for the accidental spill of a large amount (> 200 gallons) of imazapic into a very small pond. Immediate consumption of water from this pond would reach a level of concern (SERA, 2004b, pp 3-22 to 3-24). Measures are taken to help ensure that these accidental spills do not happen and that the general public does not come in contact with herbicides. For example, by establishing buffer zones of non-treatment around private property, and streams; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident preplanning and emergency spill plans in place.

The project area analysis calls for the potential use of 0.06 pounds/acre of Metsulfuron methyl to be used for all treatments. In the SERA Final Report for the Risk Assessment on Metsulfuron methyl (2004d) they used a typical application rate of 0.03 pounds/ acre. The rate of 0.06 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At this rate the spreadsheets indicate the use of Metsulfuron methyl does not pose any identifiable hazard to workers or the general public in Forest Service applications. Also at this rate the model asserts that no adverse effects associated with the toxicity of Metsulfuron methyl can be anticipated in terrestrial or aquatic animals from the use of this compound in Forest Service applications. The model does show that adverse effects on aquatic plants are plausible. This would be under a scenario where the herbicide reaches a static body of water either through runoff or percolation. For bodies of water that are flowing (e.g. streams) phytotoxic concentrations are likely to be transient and have little impact on any plant species. It is not

anticipated that adverse effects in aquatic algae would result from exposure to Metsulfuron methyl at application rates used by the Forest Service.

Triclopyr-acid will be applied at a rate of up to 4 lbs. /acre for cut-surface treatments and Triclopyr-bee at a rate of up to 2 lbs. /acre for foliar spray. Project specific SERA worksheets were completed for these herbicides. These worksheets indicated an increased hazard under certain scenarios in the use of both herbicides. The increased hazard outputs for both chemicals were nearly the same so both will be included in one discussion.

The risk characterization of a worker applying herbicides using a "Directed ground spray (Backpack)" shows an increased risk for both the typical and upper level applications. This risk can be mitigated however, by requiring the worker to wear the proper attire and safety equipment; have properly functioning equipment; apply the herbicide at the proper rate; work in an organized fashion so as to not re-enter treated areas; by not exceeding the "typical" length of work day (7 hours) and other measures as outlined in the Southern Region's EIS for Vegetation Management in Ozark/ Ouachita Mountains (VEIS) (USDA Forest Service, 1989).

The risk characterization for the general public on the SERA worksheets shows several scenarios with an increased risk of acute/accidental and chronic exposures. Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides. These include posting warning signs on areas that have been treated; selectively targeting for application only that vegetation that needs to be controlled rather than using a broadcast application; establishing buffer zones of non-treatment around private property, streams, roads and hiking trails; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident preplanning and emergency spill plans in place. These measures along with others given in the Revised Forest Plan are incorporated into contracts and through good enforcement and administration will be effective in reducing the risk of accidental contamination of humans or the environment.

The risk characterizations for Terrestrial Animals and Aquatic Plants also show several scenarios with an increased risk of acute/accidental and chronic exposures. In order to reduce this exposure specific mitigation measures mentioned in the previous paragraph and in the Revised Forest Plan will be taken during application. Aquatic plants will be protected, for example, by not using any herbicide within 50 feet of open water. Exposure to terrestrial animals will be reduced by directed hand application to targeted plants. Exposure to terrestrial animals will generally come subsequent to the application as most animals will avoid the area or avoid being seen while humans are in the area doing the actual application. It was found that risk is at a low ("no risk") level, according to EPA standards for terrestrial animals, for all wildlife when typical application rates of herbicides are used. Typical rates are being proposed for use in this project area. Chronic effects are highly improbable since it is unlikely that terrestrial animals would be exposed more than once in a lifetime from Forest Service activities (Revised Forest Plan).

Fluroxypyr may be used at a rate of 0.5 pounds/acre under the project area analysis. It will generally be applied as a foliar application to weeds and woody brush in the project area. Typical exposures to fluroxypyr do not lead to estimated doses that exceed a level of concern. For workers, no exposure scenarios, acute or chronic, generate a level of concern even at the upper ranges of estimated dose. For members of the general public, the upper limits for hazard quotients are below a level of concern except for the accidental spill of a large amount (> 200 gallons) of fluroxypyr into a very small pond.

Immediate consumption of water from this pond would reach a level of concern (SERA, 2009, pp 36 to 41). Also, consumption of fish taken from the above pond shortly after the spill would reach a level of concern. Measures are taken to help ensure that these accidental spills do not happen and that the general public does not come in contact with herbicides. For example, by establishing buffer zones of non-treatment around private property, and streams; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident preplanning and emergency spill plans in place.

The project area analysis proposed treatments calls for the potential use of 0.5 pound/acre of Clopyralid to be used for the treatment of Kudzu in the project analysis area. In order to try to eradicate Kudzu an annual application of Clopyralid would be planned over a 4-5 year period. The rate of 0.5 pounds/acre of active ingredient was used in the risk analysis spreadsheets. At typical application rates the spreadsheets indicate the use of Clopyralid does not pose any identifiable hazard to workers or the general public in Forest Service applications. Also at these rates the model asserts that no adverse effects associated with the toxicity of Clopyralid can be anticipated in terrestrial or aquatic animals from the use of this compound in Forest Service applications (SERA 2004a). The upper limits for hazard quotients are below a level of concern except for the following: The accidental spill of a large amount (> 200 gallons) of Clopyralid into a very small pond. Immediate consumption of water from this pond would reach a level of concern. Immediate consumption of vegetation from the site after treatment would reach a level of concern. There is an increased risk for chronic exposure to the herbicide by large birds feeding on the contaminated vegetation on site at the upper level of application. These chronic effects are highly improbable, however, since the treated area would comprise less than one-tenth of one percent of their feeding habitat. The model also shows that adverse effects on aquatic plants are plausible with an accidental spill exposure. This would be under a scenario where the herbicide reaches a static body of water directly through a spill. In order to reduce this exposure specific mitigation measures as specified in the VEIS will be taken during application. These include establishing buffer zones of non-treatment around streams; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); posting the site with signs stating it has been treated and having good accident preplanning and emergency spill plans in place. These mitigation measures and others are required to be applied at all phases of the project including being incorporated as clauses in contracts (See VEIS; pp II-54 to II-61). These measures, through good enforcement and administration will be effective in reducing the risk of accidental exposure.

Herbicides and application methods were chosen to minimize risk to human and wildlife health and the environment. The Revised Forest Plan includes standards for applying herbicides to reduce the possibility of adverse effects. These standards are required to be met at all phases of the Mountain Fork project including being incorporated as clauses in contracts (Revised Forest Plan, Part 3, pp 77, 80, 87-89 and 106). In conclusion, application of herbicide at the stated rates would pose only an acceptably low risk to the workers and public in the environment.

Indirect Effects

Reference the "*Indirect Effects to Air Quality*" section for disclosure of effects of prescribed burning to public health and safety.

Indirect effects of herbicide use may include the following:

"Indirect dermal (reentry) exposure may occur if workers or members of the public brush up against wet vegetation in the sprayed area" (USDA Forest Service, 1989, pp 4-16).

"Members of the public may accidentally be exposed to the herbicide by eating food that has been directly sprayed. For example, someone could eat berries that have been directly sprayed, or they may eat meat from deer that have recently foraged on a sprayed site. Exposure to an herbicide is possible if a container of herbicide concentrate were to break open and spill into a drinking water supply..." (USDA Forest Service, 1989, pp 4-16).

Cumulative Effects

Reference the "*Cumulative Effects to Air Quality*" section for disclosure of effects of prescribed burning to public health and safety.

The seven herbicides proposed for use would be mixed and applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. There is no harmful synergistic effect from mixture of triclopyr, imazapyr and imazapic. Glyphosate would be used alone. Application rate and work time would not exceed levels that pose an unacceptable level of risk to human or wildlife health.

No additional herbicide use outside of this proposed action is expected in the near vicinity or time period. Therefore, no cumulative effects are expected to public health or safety as a result of herbicide use on this project.

Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

Reference the "Effects to Air Quality" sections for disclosure of effects of prescribed burning to public health and safety. Effects of project activities (with the exception of herbicide use) would be the same as the *Proposed Action* alternative. Since there is no herbicide use proposed in this alternative, no direct, indirect or cumulative effects to public health and safety resulting from the use of herbicides would occur.

Scenery Resources

The Forest Service utilizes the Scenery Management System (SMS) to evaluate land management activities in the context of the integration of benefits, values, desires, and preferences regarding aesthetics and scenery. The SMS "provides an overall framework for the orderly inventory, analysis, and management of scenery. The system applies to every acre of national forest and national grassland administered by the Forest Service and to all Forest Service activities..." (USDA Forest Service, 2000, p 12).

The Revised Forest Plan revision established SIOs forest-wide using Geographic Information System (GIS) technology. The approach allowed Forest planners a broad overview of Forest visual resource values while also providing detailed information on visual quality on a smaller scale, project scale.

The SIO values for the Ouachita National Forest where aggregated into four general categories: Very High, High, Medium and Low (RFP-FEIS, p 264).

A more definitive description of the SIO values can be found in the Revised Forest Plan (p 142). A project level SIO map is filed in the Mountain Fork project file.

Existing Condition

The Mountain Fork Project Area landscape is dominated by rolling hills to high elevation mountains (relative to the Ouachitas as a whole) aligned in an east-west orientation interspersed with broad valleys. The topography of the MFPA ranges from approximately 900 feet to over 2,600 feet. The dominant vegetation is pine-oak forest and woodlands. There are several distinct plant communities including sugar maple-oak-hickory forest, stunted white oak woodlands, and sandstone glades. Geologic substrates are predominately Mississippian and Pennsylvanian shale and sandstone (RFP-FEIS, p 25).

Management activities that have played a role in developing the existing landscape character include past timber sale activities (including road construction), wildlife ponds and openings, dispersed recreation and prescribed burning.

Natural disturbance factors of wind, ice storms, droughts, fire and insect or disease cycles have played a part in shaping the vegetation mosaic of the landscape. A viewer of the forest in the MFPA several hundred years ago would most likely have seen open to very open upland forests dominated by shortleaf pine and hardwoods (mostly oak) in varying proportions (USDA Forest Service, 1999). Riparian areas, sheltered coves and other mesic areas would tend toward hardwood dominance in multi-storied, very mixed species stands, with denser hardwood understories.

The MFPA is comprised of three SIO categories: High (75 percent), Moderate (24 percent) and Low (1 percent). A High value SIO area is where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character. A Moderate value SIO requires that management activities remain visually subordinate to the characteristic landscape. The Forest visitor notices changes in the landscape, but they do not attract attention. The natural appearance of the landscape remains dominant. In Low SIO areas where the character of the landscape may be dominated by resource activities, the forest visitor would be aware of road, timber harvest and other resource management activities.

Analysis of Effects: Scenery Resource

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

During the short-term (10 to 14 years), direct effects to scenic integrity would be very minimal and gradual within the Mountain Fork Project Area. The visitor would see no new human-caused activities. The forest vegetation would become denser and wildlife would become less visible without the impacts of timber harvest activities and prescribed burning. Scenic variety would lessen. Indirect and cumulative effects would be more permanent. With no vegetative treatments, open areas would disappear with encroachment of mid-story and under-story vegetation. Also, natural events such as

fire, wind, ice, insects and disease, could have a much more significant effect on the landscape and create a negative visual effect. With the loss of open area habitat, populations of many wildlife species would decrease resulting in an indirect effect to Forest visitors desiring to view wildlife within the MFPA.

Alternative 2: Proposed Action

Direct and Indirect Effects

Management activities that have the greatest potential of affecting scenery are road construction and large-scale, long-term vegetation management … (RFP-FEIS, Chapter 3, p 265).

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. Commercial thinning, midstory treatment, and repeated prescribed burning would interrupt the uniformity of the canopy and gradually replace it with a more open landscape adding to seasonal diversity associated with a grassy understory.

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 and reducing visual variety through elimination of target species (RFP-FEIS, Chapter 3, p 266).

Drifting smoke, blackened vegetation, and charred tree trunks would be the main negative visual effects from prescribed burning. 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) (RFP-FEIS, Chapter 3, p 265). Indirectly, prescribed burning substantially diminishes the potential for crown fires that could result in dead overstory trees and large burn scars on remaining live trees.

Prescribed fire and midstory reduction 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. Restoration of wildlife openings may also impact scenic quality through the creation of forest canopy openings (RFP-FEIS, Chapter 3, p 266).

Road maintenance, especially right-of-way maintenance, affects scenery. 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 (RFP-FEIS, Chapter 3, p 266).

There are two scenic turn-outs or vistas within the Mountain Fork Project Area. They are the Mountain Fork Vista and the Pioneer Cemetery. Proposed management activities would not appreciably affect these viewsheds.

Cumulative Effects

Most of the negative impacts to scenery associated with road construction and vegetation management within the MFPA would be avoided by implementing mitigation measures (RFP-FEIS, Chapter 3, p 265).

All vegetative impacts as a result of timber harvest within the Mountain Fork Project Area are short-term because of rapid vegetation growth (RFP-FEIS, Chapter 3, p 266).

No appreciable cumulative effects to scenic resources within the Mountain Fork Project Area are expected (RFP-FEIS, Chapter 3, p 267).

Alternative 3: Proposed Action without Herbicide

Direct, Indirect, and Cumulative Effects

The effects to the visual resource would be the same as the *Proposed Action* alternative except that the short-term browning and graying of vegetation and the residual snags associated with the herbicide application would not occur.

Recreation Resources

Existing Condition

The Recreation Opportunity Spectrum (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 midrange, Roaded-Natural (RN), 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 (RFP-FEIS, Chapter 3, p 216, after correction).

The ROS class for the MFPA is designated as follows:

***Roaded Natural (RN)*:** Predominately natural or natural-appearing environment with a low probability of experiencing isolation from 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.

There are no Forest Service developed recreation campgrounds or facilities within the Mountain Fork Project Area. However, there is an Arkansas State Park, Queen Wilhelmina that exists within the northeast boundary of the MFPA. There are three dispersed campsites within the MFPA. Roads within the MFPA require vehicles with a relatively high ground clearance. The 192-mile Ouachita National Recreation Trail (which traverses the entire forest from west to east) crosses the project area along the north boundary. Equestrian use is occurring within the project area but there are no designated equestrian trails recognized by the Forest Service as on the trail system.

The dominant social values associated with the MFPA are hiking and mountain bike riding, dispersed camping, OHV (mainly 4-wheeler and dirt-bike) use, hunting, and driving for pleasure. The development in this analysis area is expected to benefit these activities. The proposed management would increase available habitat for wildlife, improve overall forest health and create and improve opportunities for enjoying the ONF on foot and bicycle. The proposed actions are expected to be within acceptable limits of change to maintain the existing community lifestyle of this area.

Analysis of Effects: Recreation Resources

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

No direct effects would be expected from the implementation of the *No Action* alternative.

Indirect effects may be encroachment of hardwoods into dispersed camping sites and hiking trails with lack of vegetation treatment. The hunting, hiking, biking and wildlife viewing experience may not be as enjoyable due to the lack of vegetation management that provides habitat diversity for wildlife.

Opportunities for natural events, such as wildfire or insect and disease, would be expected to increase and the results could create greater visual impacts on the landscape than if managed.

No cumulative effects would be expected from the implementation of the *No Action* alternative.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

Timber Management

Immediate or direct effects to the recreation resource would be short term and may include a disturbance in the recreation experience by the sights and sounds of management activities such as logging operations, road construction and vegetation removal.

The proposed vegetation treatments would provide a deeper view into the Forest, offering more visual variety and opportunities for watchable wildlife. Also, improved habitat conditions as a result of the proposed treatments would improve availability of many game species for recreational hunting.

Fish Passage Restoration, Road/Fireline Construction, and Reconstruction and Maintenance Treatments

Maintenance and reconstruction will improve access for forest visitors. Roads open to the general public would be maintained to achieve desired open road density within the Mountain Fork Project Area.

Road and Trail Closures (Unauthorized Roads/OHV Trails and System Roads**)**

Any road closures could cause Forest visitors to relocate to other areas of the Forest and also cause a reduction in roads used for driving pleasure.

Prescribed Burning (Fuel reduction and fire restoration treatments**)**

Prescribed burning and smoke could displace campers during burn periods. Vegetation burned may cause Forest visitors to select other dispersed campsites for a 3 to 5 month period until the area(s) vegetation resprouts in the spring.

Trail Maintenance

Trail maintenance every 1 to 3 years is proposed for approximately six miles of the Ouachita National Recreation Trail. Treatment would include suppressing woody and herbaceous vegetation, repairing trail tread, and drainage repair.

Heavily shaded areas generally require little trail maintenance. However, areas that have been opened up to sunlight due to natural events (i.e. ice damage, wind, insects, or wildfire) or management activities (i.e. timber treatments, prescribed burning) would produce significant vegetative undergrowth resulting in extensive trail maintenance.

Greenbrier and blackberry are two main target species, in addition to taller bunch grasses, growing within the tread area. A 10-foot corridor, 5-feet on both sides of the trail tread center, would be treated as needed to keep the greenbrier and blackberry from engulfing the trail.

These recurring treatments would be on a continuous basis and extend indefinitely beyond the 10-year period during which other proposed management activities would occur. No herbicide would be used along the trail due to densities/diversity of PETS plants.

Trail conditions will be improved and maintained by this maintenance schedule.

Trail Shelter Construction

A wooden trail shelter with a sheltered cooking and eating area, including a picnic table would be constructed along the Ouachita National Recreation Trail at mile marker 46.4 (State Line) as time and funding allows. This will create an additional opportunity for trail users to enjoy.

Special Uses

The four existing special use permits would continue to be maintained and managed.

Gate

A gate would be installed on FS road 417 between the dispersed campsite and the low water crossing. The road behind the gate would be closed to public access. Refer to discussion of Road Closures.

Proposed management activities would meet the objectives for MA 2, the Rich Mountain Special Interest Area that exists along the northern boundary of the Mountain Fork Project Area.

No cumulative effects are expected as a result of Alternative 2 or Alternative 3 on the recreation resource within the Mountain Fork Project Area.

Climate Change

It is not currently feasible to quantify the direct and indirect effects of individual or multiple projects on global climate change; and therefore, determining effects of those projects or project alternatives on global climate change cannot be made accurately at any scale. However, in recognizing the sensitive nature of concerns about climate change, the qualitative direct, indirect, and cumulative climate change effects for each alternative will be addressed and analyzed to the extent possible.

Existing Condition

Forests are shaped by climate; and climate is shaped by forests. In fact, climate is the most important influence on vegetation in the Ouachita Highlands, and extremes of temperature and precipitation may have more impact on the distribution of species than long-term averages (USDA Forest Service, 1999).

Table 25 summarizes current climate and frost data for Mena, Arkansas[5]. The current climate in the MFPA has supported upland hardwood and pine forests, with inclusions of prairie for only about the past 4,000 years (USDA Forest Service, 1999). Boreal spruce, fir, and jack pine forests dominated the region about 14,000 – 20,000 years ago during a much cooler, damper, glacial-front climate. Oak, ash, elm, and other deciduous trees were dominant 10,000 - 14,000 years ago, and during the warmer, drier climate of about 10,000 years ago, prairies, oak savannas and oak-hickory forests expanded (Delcourt and Delcourt, 1991).

Table 25: Climate (Average Weather) Data for Mena, Arkansas

Statistic	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Minimum Temperature	°F	27	30.5	38.4	46.1	55.8	63.7	67.4	65.9	59.4	48.4	38	29.9	47.54
Maximum Temperature	°F	48.7	54.5	62.3	70.6	77.3	84.7	89.7	89.5	82.5	72.9	60.1	51	70.32
Heating Degree Days		842	630	454	218	66	3	0	2	24	169	481	760	304.08
Cooling Degree Days		0	0	0	19	114	278	420	394	203	33	2	0	121.92
Monthly Precipitation	inches	3.29	3.65	5.19	5.2	6.65	5.17	5.05	2.54	5.07	5.68	5.88	5.02	4.87

First and Last Frost Dates*

First Frost			Last Frost		
10%	**50%**	**90%**	**10%**	**50%**	**90%**
OCT 17	NOV 01	NOV 16	MAR 23	APR 04	APR 17

* For autumn the percentages show the likelihood of the first frost before the given date. For spring the percentages show the likelihood of the last frost before the given date.

[5] Mena, Arkansas, USA: Climate, Global Warming, and Daylight Charts and Data. http://www.climate-charts.com/USA-Stations/AR/AR034756.php

Carbon dioxide plays a critical role in regulating earth's surface temperature. Carbon dioxide is one of five main greenhouse gases (GHG), which retain heat by allowing short-wave radiation (light) to pass through, but act as a barrier to long-wave radiation (heat). Forests play a major role in the global carbon cycle by storing carbon in live plant biomass (approximately 50% of dry plant biomass is carbon), in dead plant material, and in soils. Forests contain three-fourths of all plant biomass on earth, and nearly half of all soil carbon. The amount stored represents the balance between absorbing carbon dioxide (CO^2) from the atmosphere in the process of photosynthesis and releasing carbon into the atmosphere through live plant respiration, decomposition of dead organic matter, and burning of biomass (Krankina and Harmon, 2006).

Through the process of photosynthesis, carbon is removed from the atmospheric pool. About half the carbon absorbed through photosynthesis is later released by plants through respiration as they use their own energy to grow. The rest is either stored in the plant, transferred to the soil where it may persist for a very long time in the form of organic matter, or transported through the food chain to support other forms of terrestrial life. When plants die and decompose, or when biomass or its ancient remains in the form of fossil fuels are burned, the original captured and stored carbon is released back to the atmosphere as CO^2 and other carbon-based gases. In addition, when forests or other terrestrial ecosystems are disturbed through harvesting, conversion, or natural events such as fires, some of the carbon stored in the soils and organic matter, such as stumps, snags, and slash, is oxidized and released back to the atmospheric pool as CO^2. The amount released varies, depending on subsequent land use and probably rarely is more than 50% of the original soil store (Salwasser, 2006). As forests become older, the amount of carbon released through respiration and decay can exceed that taken up in photosynthesis, and the total accumulated carbon levels off. This situation becomes more likely as stands grow overly dense and lose vigor.

Wildfires are the greatest cause of carbon release from forests. However, the greatest changes in forest sequestration and storage over time have been due to changes in land use and land use cover, particularly conversions from forest to agriculture and more recently from forest to urban development, dams, highways, and other infrastructure (Malmsheimer et al., 2008). At the global scale, if more carbon is released than is captured and stored through photosynthesis or oceanic processes, the concentration of CO^2 builds in the atmospheric pool. An increase in atmospheric carbon dioxide concentrations is expected to lead to increased levels of net primary productivity and an increase in overall biomass accumulation (Malmsheimer et al., 2008).

Human activities that release carbon dioxide have resulted in increasing concentrations sufficient to increase the earth's surface temperature above natural cycles. Current concentrations and recent increase rates exceed that of the last 420,000 years (Harmon, 2008). Given present climate change, predicted temperature increase for the region is between 3°C and 5°C (5.4°F and 9.0°F), and precipitation increase is about 20%. These predictions are from the output of the Hadley Centre's 'HadCM2' computer model, which is considered a 'middle-of-the-road' projection (the 30-year target period is 2070-2100, compared to a baseline of 1960-1990). Changes in temperatures as well as changes in precipitation can affect forests directly. In addition, a warmer climate may allow herbivores and pests to expand in both number and range (Logan et al. 2003). The southern pine beetle is expected to expand its range latitudinally and altitudinally, exposing vulnerable tree species to new or increased levels of attack (Logan and Powell, 2001; Williams and Liebhold, 2002). In all, a warmer climate is expected to encourage pest outbreaks of increasing frequency, duration, and intensity.

Climate change is also predicted to alter the frequency and intensity of severe weather events (IPCC, 2007). Species ranges and distributions may change as a result of the complex combinations of changes in temperature, precipitation, severe weather events, insects and diseases, herbivore populations, and other interrelated ecosystem factors, albeit in uncertain ways.

Analysis of Effects: Climate Change

Alternative 1: No Action

Direct, Indirect and Cumulative Effects

No management activities would occur under the *No Action* alternative, therefore no direct effects on GHG emissions and carbon cycling would occur.

Because no management activities would take place under this alternative, carbon would continue to be sequestered and stored in forest plants, trees (biomass) and soil. Unmanaged, older forests can become net carbon sources, especially if probable loss due to wildfires is included (Malmsheimer et al., 2008). In the absence of prescribed burning, fuel loadings would continue to increase and accumulate on the forest floor. In the event of a wildfire, fuel loading would be higher, increasing the risks of catastrophic damage to natural resources. This would result in a large release of GHG and carbon into the atmosphere. By deferring timber harvest activities, forests would continue to increase in density. Over time this could pose a risk of density dependent mortality, insects, and disease. This could result both in a release of carbon from tree mortality and decomposition as well as hinder the forest's ability to sequester carbon from the environment. Live, vigorous stands of trees retain a higher capacity to retain carbon.

Drier conditions could be expected as a result of climate change, causing native, local plant species to be maladapted to the changing climate. Droughts may decrease the success of local, native plant species regeneration following natural disturbance events, and increase the success of select, drought-tolerant non-native invasive species, which could delay forest recovery compared to recovery via supplemental artificial regeneration (planting) and non-native species eradication.

As GHG emissions and carbon cycling are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with the *No Action* alternative, or of this alternative in combination with other projects. It is not expected that the effects of this alternative, or of this alternative in combination with other projects, can be specifically attributed to the cumulative effects on global climate change.

Alternative 2: Proposed Action and Alternative 3: Proposed Action without Herbicide

Direct, Indirect and Cumulative Effects

The proposed harvest operations would result in a release of carbon and reduce carbon storage in the forest both by removing organic matter (trees) and by increasing heterotrophic soil respiration. However, much of the carbon that is removed is offset by storage in forest products. Forest management that includes harvesting provides increased climate change mitigation benefits over time because wood-decay CO_2 emissions from wood products are delayed (Malmsheimer et al., 2008).

Prescribed burning activities, although a carbon neutral process, would release CO_2, other green house gasses, and particulates into the atmosphere in the short-term. However, implementing the proposed prescribed burns on a 3 to 5 year cycle would reduce fuel loading and could be expected to reduce fire intensity and severity over the longer-term as well.

Indirectly, implementation of the proposed actions would increase the overall health, vitality, and growth within the project area, reduce the susceptibility to insects and disease, and lower the risk of a catastrophic wildfire through reduction of fuel accumulations in the project area. This would serve as a way to increase carbon storage within the project area and mitigate carbon accumulation in the atmosphere.

Drier conditions could be expected as a result of climate change, causing native, local plant species to be maladapted to the changing climate. Droughts may decrease the success of plant species regeneration following harvest, prescribed burning, or natural disturbance events, while increasing the success of select, drought-tolerant non-native invasive species. These interactions could increase needed levels of artificial regeneration (planting) and non-native species eradication over those planned in the *Proposed Action* or *Proposed Action without Herbicide* alternatives.

As GHG emissions and carbon cycling are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with the *Proposed Action* and *Proposed Action without Herbicide* alternatives, or of these alternatives in combination with other projects. It is not expected that the effects of these alternatives, or of these alternatives in combination with other projects, can be specifically attributed to the cumulative effects on global climate change.

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- Arkansas Archeology Survey
- Ark. Dept. Parks & Tourism
- ARK Dirt Riders
- AR Game & Fish Commission
- Arkansas Health Department
- AR Natural Heritage Comm.
- AR State Forestry Comm.
- AR State Police
- Arkansas Trail Blazers
- C & W Communications
- Caddo Tribe of Oklahoma
- Caddo Waterworks, Inc.
- Chickasaw Nation
- Choctaw Nation of Oklahoma
- Crystal Heaven Mining Co.
- Cossatot River State Park
- Dept. of the Army
- Mena Hospital Commission
- Mena Water Utilities
- Montgomery Co. Adv. Board
- Nightwing Consulting
- Office of Sec. Of Environment
- Osage Nation
- Ouachita ATV Club
- Ouachita Cycling Club
- Ouachita Watch League
- Pacific Legal Foundation
- Pearson Broadcasting of Mena, Inc.
- Polk Co. Chamber
- Polk Co. Courthouse
- Public Awareness Commission
- Quapaw Tribe
- RACE/Hartwood
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Chapter 7

Glossary of Terms

Age Class - One of the intervals into which the age range of trees is divided for classification or use.

Alternative - One of several policies, plans, or projects proposed for decision making.

Aquatic Ecosystem - The wetted stream channel, lake or estuary bed, water biotic communities, and the habitat features that occur therein.

***Basal Area* (BA) -** The cross-sectional area of a stand of trees measured at breast height. The area is expressed in square feet per acre and is a measure of stocking density.

Big Game - Those species of large mammals normally managed for sport hunting.

Canopy - The cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

C – One hundred, as in CCF.

CFR - Code of Federal Regulations

Classified Road – see "Road"

Commercial Thinning - Cutting by means of sales for products (poles, posts, pulpwood, etc.) in immature stands to improve the quality and growth of the remaining stand.

Commodity - Tangible or physical output, such as timber, livestock, minerals, water, etc., synonymous with RPAs "Market."

Condition Class - The dominant existing vegetation or physical features found on a unit of land. Forested condition classes are described by the dominant existing timber species and size class.

Cost Effective - Achieving specified outputs or objectives under given conditions for the least cost.

Cost Efficiency - The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate. (36 CFR 219.3)

Cost Efficient - Achieving a specified level of outputs (satisfying legal and administrative constraints) while maximizing net benefit, subject to those constraints. (36 CFR 219.3)

Critical Habitat - Habitat as defined by the Fish and Wildlife Service to be essential to meet the needs of an endangered species.

Cubic Foot - A unit of measure usually referring to wood volume (1 ft. x 1 ft. x 1 ft.)

Cultural Resources - Potential knowledge about human cultural systems, in the form of historical and prehistoric products and by-products of man. The physical remain (artifacts, ruins, burial mounds, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historical, or prehistoric events, as a sacred area of native peoples, etc.) of an area that is useful or important for making land-use planning decisions.

D.B.H. (Diameter at Breast Height) - The diameter of a tree measured 4 feet 6 inches from the ground.

Decommissioning - Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Defined Stream Channel – A channel that exhibits evidence of annual scour.

Demand - The amount of an output that users are willing to take at a specified price, time period, and condition of sale.

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, ski lifts, and buildings.

Dispersed Recreation - A general term referring to recreation use outside a developed recreation site, this includes activities such as scenic driving, hunting, backpacking, and recreation in primitive environments.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. (36 CFR 219.3)

Ephemeral Stream - A stream that does not have a defined channel and flows only in direct response to rainfall.

Final Environmental Impact Statement (FEIS) - The statement of environmental effects 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.

Economic Efficiency - The point of operation where the net benefit is maximized. Output levels would not be predetermined.

Ecosystem - An interacting system of organisms considered together with their environment; for example, the vegetation and animals within marsh, watershed, or lake ecosystems.

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.

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)

Epidemic - Applied to a population of pests that build up, often rapidly, to highly abnormal and generally injurious levels.

Firewood - See ***Fuelwood***

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.

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 nonforest use. Lands developed for nonforest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width. (36 CFR 219.3)

Forest System Roads - Roads that are part of the Forest development transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities.

FSH - Forest Service Handbook

FSM - Forest Service Manual

Fuels - Any materials that will carry and sustain a forest fire, primarily natural materials, both live and dead.

Fuelwood - Wood that is round, split, or sawn, and generally otherwise refuse material cut into short lengths or chipped for burning.

Game Species - Any species of wildlife or fish for which hunting 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.

Goods and Services - The various outputs, including on-site uses, produced from forest and rangeland resources. (36 CFR 219.3)

Ground Water - Subsurface water in a saturated zone or geologic stratum.

Growing Season - The months of the year a species of vegetation grows.

Heterotrophic – Obtaining nourishment by digesting plant or animal matter, as animals do, as opposed to photosynthesizing food, as plants do.

Interdisciplinary Team (I.D. Team) - Collective participation of two or more disciplines, or fields of specialized technical knowledge for natural resources management.

Intermittent Service Road - A road developed and operated for periodic service and closed for more than one year between periods of use. (Service Level D).

Land Class - The topographic relief of a unit of land. Land classes are separated by slope, which coincides with the timber inventory process. The two land classes used in the ALRMP are defined by the following slope ranges: 0 to 35 percent, greater than 35 percent.

Landing - Any place where round timber is assembled for further transport.

Landline - For Revised Forest Plan purposes, National Forest property boundaries.

Landscape - a spatial mosaic of several ecosystems, landforms, and plant communities across a defined area irrespective of ownership or other artificial boundaries and repeated in similar form throughout.

M - One thousand, as in MBF and MCF

Maintenance - The upkeep of the entire Forest Development Transportation Facility, including surfaces and shoulders, parking and side areas, structures, and such traffic control devices as are necessary for its safe and efficient utilization (36 CFR 212.1, FSM 1023.4, 7732,05). Maintenance is not for the purpose of upgrading a facility, but rather, to bring it to the originally constructed or subsequently reconstructed condition.

Management Area - An area with similar management objectives and a common management prescription.

Management Concern - An issue, problem, or a condition that constrains the range of management practices identified by the Forest Service in the planning process. (36 CFR 219.3)

Management Direction - A statement of multiple use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them. (36 CFR 219.3)

Management Emphasis - A reflection of allocation choices for an analysis area. Management emphasis, as used in FORPLAN is a 6-letter identifier used to describe (name) a prescription in FORPLAN Example: BRZREN is a description emphasizing the production of browse (BRZ) and contains non-motorized recreation (REN).

Management Indicator Species - A species selected because its population changes indicate effects of management activities on the plant and animal community. A species whose condition can be used to assess the impacts of management actions on a particular area.

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.

Mature Growth - Pine or pine-hardwood stands 80 years of age and older; and hardwood and hardwood-pine stands 100 years of age and over.

Maturity - A loose term for the stage at which a tree or other plant has attained full development, particularly height, and is in full seed production.

MCF - Thousand cubic feet. A quantity of wood volume.

Minimum Level - The minimum level of management that complies with applicable laws and regulations, that includes 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.

MMCF - Million cubic feet. A quantity of wood volume.

Monitoring And Evaluation - The evaluation on a sample basis of ALRMP management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

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)

Multi-Storied - A stand of timber having two or more recognizable tree canopy layers or height levels.

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 - Ouachita National Forest lands for which the Forest Service is assigned administrative responsibility.

National Forest Land and Resource Management Plan **(NFLRMP, LMP)** - 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 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.

Natural Regeneration - Renewal by self-sown seed or by vegetative means (regrowth).

No Action Alternative - The condition expected to exist in the future if current management direction would continue unchanged.

Nonforest Land - Land that does not support timber or is kept free of forest cover to meet needs of resource uses.

Nongame - Species of animals that are not managed as a sport - hunting or trapping resource.

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)

Obliteration - The reclamation of the land occupied by a facility for purposes other than transportation.

Off-road Vehicle **(ORV)** - Vehicles such as motorcycles, all-terrain vehicles, four-wheel drive vehicles, and snowmobiles.

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 exhibits characteristics of decadence. These characteristics may include, but are not limited to: low growth rates, dead and dying trees, snags, and down woody material.

Operable - Forested lands suitable and available for timber production on which the harvesting of timber products is economically feasible under existing local market and technological conditions.

Optimum - A level of production that is consistent with other resource requirements as constrained by environmental, social and economically sound conditions.

Outputs - The goods, services, products and concerns which are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. Also goods, end products or services that are purchased, consumed or utilized directly by people. A broad term for describing any result, product or service that a process or activity actually produces.

Overstory - That portion of the trees in a forest of more than one story, forming the upper or uppermost canopy layer.

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.

Pole-Timber - Growing stock trees of commercial species 5 to 8 inches in diameter 4.5 feet above ground.

Policy - A guiding principle that is based on a specific decision or set of decisions.

Practice - See Management Practice

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.

Prescribed 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.

Prescription - See Management Prescription, and Silvicultural Prescription

Primitive - A classification of the recreation opportunity spectrum that characterizes an essentially unmodified natural environment of a size or remoteness that provides significant opportunity for isolation from the sights and sounds of man, and a feeling of vastness of scale. Visitors have opportunity to be part of the natural environment, encounter a high degree of challenge and risk, and use a maximum of outdoor skills but have minimum opportunity for social interaction.

Primitive Roads - Roads constructed with no regard for grade control or designed drainage, sometimes merely by repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes usable with four-wheel drive vehicles only.

Proposed Action - In terms of the National Environmental Policy Act, the project, activity or decision that a Federal agency intends to implement or undertake, which is the subject of an environmental impact statement.

Public - The people of an area, state or nation that can be grouped together by a commonality of interests, values, beliefs or lifestyles.

Public Access - Usually refers to a road or trail route over which a public agency claims a right-of-way for public use.

Ranger District - Administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.

Reconstruction - Construction activities performed on an existing facility. Reconstruction includes those activities that alter the facility from its originally constructed or subsequently reconstructed condition.

Recreation - Any socially desirable leisure activity in which an individual participates voluntarily and from which he derives satisfaction.

Recreational Opportunity - Availability of a real choice for a user to participate in a preferred activity within a preferred setting, in order to realize those satisfying experiences that are desired.

Recreational Opportunity Spectrum **(ROS)** - Land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are: Primitive, Semi-primitive Non-motorized, Semi-primitive Motorized, Roaded Natural, Rural, and Urban.

Reforestation - The natural or artificial restocking of an area with forest trees.

Regeneration - The renewal of a tree crop, whether by natural or artificial means. Also the young crop itself, which commonly is referred to as reproduction.

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. See Southern Region.

Regional Guide - The Guide 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 region. It also disaggregates the RPA objectives assigned to the Region to the Forests within that Region.

Release – A treatment designed to free young trees from undesirable, usually overtopping, competing vegetation.

Responsible Line Officer - For land management planning purposes, the Forest Service employee who has been delegated the authority to carry out a specific planning action. (36 CFR 219.3)

Restoration - Work necessary to restore a facility to the original construction standard and repair to an acceptable condition any damage resulting from natural causes which exceed that normally occurring for the area and not anticipated or provided for in the annual maintenance plan.

Revegetation - The reestablishment and development of a cover crop.

Right-Of-Way - An accurately located strip of land with defined width, point of beginning, and point of ending. It is the area within which the user has authority to conduct operations approved or granted by the landowner in an authorizing document, such as a permit, easement, lease, license, or Memorandum of Understanding (MOU).

Riparian Area – Geographically delineated areas, with distinct resource values and characteristics that are comprised of the aquatic and riparian ecosystems, wetlands, and portions of 100-year floodplains. They also include all upland areas within the horizontal distance of approximately 100 feet from the edge of perennial streams and other perennial water bodies greater than 0.5 acres in size, and variable distances from other streams with defined stream channels.

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.

Rip rap - Rock or other material used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour, water or ice erosion.

Road - A motor vehicle travel way over 50 inches wide, unless designated and managed as a trail. A road may be classified, unauthorized, or temporary (36 CFR 212.1):

a. **Classified Roads**. Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).
b. **Temporary Roads**. Roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).
c. **Unauthorized Roads**. Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).]

Road Maintenance - The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

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.

Roaded Natural - A classification of the recreation opportunity spectrum that characterizes a predominantly natural environment with evidence of moderate permanent alternate resources and resource utilization. Evidence of the sights and sounds of man is moderate, but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man.

Rotation - The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage of maturity. The rotation includes a period for harvesting and reestablishment, normally about 5 years.

Sawtimber - Stands at least 10-percent stocked with growing stock trees in which half or more of total stocking is in sawtimber and poletimber trees, and in which sawtimber stocking is at least equal to poletimber stocking.

Scenic Integrity Objective - Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Sedimentation - The deposition of detached soil and rock material transported by or suspended in water.

Silviculture - (1) Generally, the science and art of cultivating forest crops, based on the study of the life history and general characteristics of forest trees and stands, with particular reference to local factors; (2) more particularly, the theory and practice of controlling the establishment, composition, constitution and growth of forests for varying purposes.

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.

Site Index **(S.I.)** - A numerical evaluation of the quality of land for plant productivity.

Site Preparation **(Site Prep)** - 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 Productivity - Production capability of specific areas of land.

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.

Small Game - Upland birds, excluding turkey, and small mammals normally hunted or trapped.

Softwoods - Coniferous trees, usually evergreen, having needles or scale-like leaves.

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.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard - A principle requiring a specific level of attainment, a rule to measure against.

Stream - A watercourse 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.

Structural Diversity (of vegetation) – The variety of plant forms in a given area and the number of recognizable "layers" created by these various growth forms. A forest stand might contain young and mature trees, high and low shrubs, ferns, grasses, wildflowers, and/or mosses, and have two, three, or more recognizable vegetation layers.

Suitable Forest Land - Land that is to be managed for timber production on a regulated basis.

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 alternatives foregone. A unit of land may be suitable for a variety of individual or combined management practices. (NFMA Regulations 219.3)

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.

Sustained Yield - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest without impairment of the productivity of the land. (36 CFR 219.3)

Temporary Road – see "Road"

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 and which has been designated in the Federal Register by the Secretary of Interior as a threatened species.

Tiering - The coverage of general matters in broader environmental impact statements with subsequent, narrower statements or environmental analyses incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

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.

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 planning purposes, the term "timber production'' does not include production of fuelwood. (36 CFR 219.3)

Timber Stand Improvement **(TSI)** - Measures such as thinning, pruning, release cutting, prescribed burning, girdling, weeding or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Transportation System - All roads needed to manage and administer the Forest resources. A network of roads.

Unauthorized Road **–** see "Road"

Understory - Vegetation growing under a higher tree canopy.

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 Revised Forest Plan.

Viable Population - A population that has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population on the planning area.

Visual Resource - The composition of basic terrain, geologic features, water features, vegetative patterns and land rise effects that typify a land unit and influence the visual appeal the unit may have for visitors.

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.

Water Rights - Rights given by state or Federal Governments for the diversion and use of water.

Wildlife Habitat Diversity - The distribution and abundance of different plant and animal communities and species within a specific area.

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.

APPENDIX A – ACTIONS BY ALTERNATIVE, COMPARTMENT AND STAND

Alternative 1. No Action			
Compartment	**Stand**	**Activity**	**Approximate acres**
all	all	None	13,400

Alternative 2. Proposed Action			
Compartment	**Stand**	**Activity**	**Approximate Acres (unless other units noted)**
893	1	Commercial thin	26
893	9	Commercial thin	120
893	16	Commercial thin	100
893	22	Commercial thin	2
895	2	Commercial thin	55
895	3	Commercial thin	47
895	4	Commercial thin	99
895	5	Commercial thin	54
895	6	Commercial thin	67
895	7	Commercial thin	22
895	8	Commercial thin	49
895	9	Commercial thin	64
895	10	Commercial thin	69
895	11	Commercial thin	52
895	12	Commercial thin	75
895	14	Commercial thin	96
895	20	Commercial thin	38
896	2	Commercial thin	44
896	4	Commercial thin	76
896	5	Commercial thin	42
896	6	Commercial thin	50
896	8	Commercial thin	13
896	15	Commercial thin	38
896	24	Commercial thin	167
896	25	Commercial thin	37
897	4	Commercial thin	22
897	5	Commercial thin	47
897	8	Commercial thin	39

Alternative 2. Proposed Action			
Compartment	**Stand**	**Activity**	**Approximate Acres (unless other units noted)**
897	9	Commercial thin	64
897	11	Commercial thin	76
897	15	Commercial thin	41
898	5	Commercial thin	17
898	6	Commercial thin	32
899	3	Commercial thin	48
899	4	Commercial thin	73
899	5	Commercial thin	25
899	7	Commercial thin	79
899	8	Commercial thin	16
899	11	Commercial thin	21
899	12	Commercial thin	43
899	13	Commercial thin	15
899	18	Commercial thin	33
899	19	Commercial thin	5
899	22	Commercial thin	13
Various	Various	Fireline Construction	2 miles
Various	Various	Fireline Reconstruction	2 miles
893	2	Fish Passage Restoration	1 culvert
893	17	Fish Passage Restoration	1 culvert
896	22	Fish Passage Restoration	1 culvert
897	17	Fish Passage Restoration	1 culvert
897	903	Fish Passage Restoration	1 culvert
Various	Various	Non-native Invasive Species Eradication (herbicide and/or manual methods)	550 (about 5% of NFS acres in project area)
896	10	Pre-commercial thin	3.5
899	9	Pre-commercial thin	4
899	14	Pre-commercial thin	6
896	21	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	10
896	28	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	10

Alternative 2. Proposed Action			
Compartment	**Stand**	**Activity**	**Approximate Acres (unless other units noted)**
896	29	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	10
897	22	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	27
899	19	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	66
899	22	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	6
899	23	Site Preparation by Herbicide, Manual, Mechanical, and/or Fire[1]	35
896	21	Hand Planting with Shortleaf Pine	10
896	28	Hand Planting with Shortleaf Pine	10
896	29	Hand Planting with Shortleaf Pine	10
897	22	Hand Planting with Shortleaf Pine	27
899	19	Hand Planting with Shortleaf Pine	66
899	22	Hand Planting with Shortleaf Pine	6
899	23	Hand Planting with Shortleaf Pine	35
896	21	Timber Stand Improvement by Release	10
896	28	Timber Stand Improvement by Release	10
896	29	Timber Stand Improvement by Release	10
897	22	Timber Stand Improvement by Release	27

Alternative 2. Proposed Action			
Compartment	**Stand**	**Activity**	**Approximate Acres (unless other units noted)**
899	19	Timber Stand Improvement by Release	66
899	22	Timber Stand Improvement by Release	6
899	23	Timber Stand Improvement by Release	35
896	5; 8-10; 12; 21; 23-28	Prescribed burning	390
897	4-5; 7; 9; 15; 20-21	Prescribed burning	908
899	4-5; 7-9; 11-14; 17; 22-23	Prescribed burning	
899	3-5; 18-19; 24	Prescribed burning	289
Various	Various	System Road Construction	2.4 miles
Various	Various	System Road Reconstruction	1.5 miles
Various	Various	Unauthorized Road – Close and Soil Stabilization	.5 miles
Various	Various	Unauthorized Road – Close, Decommission, and Soil Stabilization	11.5 miles
Various	Various	System Road Permanent Closure	1.6 miles
Various	Various	Temporary Road Construction	7.6 miles
Various	Various	Road Maintenance	37 miles
875	1	Trail Shelter	1 shelter
893	11	Wildlife Stand Improvement - Midstory Removal and Selective Herbicide Treatments	148
896	23	Wildlife Stand Improvement - Midstory Removal and Selective Herbicide Treatments	82

Alternative 2. Proposed Action			
Compartment	**Stand**	**Activity**	**Approximate Acres (unless other units noted)**
896	27	Wildlife Stand Improvement - Midstory Removal and Selective Herbicide Treatments	12
899	5	Wildlife Stand Improvement - Midstory Removal and Selective Herbicide Treatments	74
Various	Various	Bat Roost Boxes	6 boxes
Various	Various	Firewood Areas	As Available

Alternative 3. Proposed Action without Herbicide			
Compartment	**Stand**	**Activity**	**Approximate Acres**
Same as Alternative 2 - Proposed Action, but without the use of herbicides.			

APPENDIX B - MAPS

The following maps are provided in this appendix:

- Map 1. Management Areas (Revised Ouachita National Forest Plan)
- Map 2. Proposed Harvest, Silvicultural, and Wildlife Treatments
- Map 3. Proposed Fire and Fuels Management
- Map 4. Proposed Trail Shelter, Fish Passages, and Road Recommendations
- Map 5. Soil Resources
- Map 6. 6^{th} level Watersheds
  (Used for Aquatic Cumulative Effects and Transportation Analyses)

(Note: For electronic copy, please see separate pdf files for maps.)

APPENDIX C - BIOLOGICAL EVALUATION