Environmental Assessment
For
Board Camp Project

January 2020

Responsible Agency:
US Forest Service, Ouachita National Forest
Mena-Oden Ranger District

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Chapter 1
Purpose of and Need for the Proposed Action

Proposed Action

The Mena-Oden Ranger District proposes to implement the following management activities*:

- Commercial thinning – 1,173 acres
- Plantation Thinning – 491 acres
- Seed tree with reserves – 585 acres
- Site preparation by chainsaws, prescribed burning, herbicide application, or mechanical means – 585 acres
- Hand plant shortleaf pine seedlings (if necessary) – 585 acres
- Stand improvement by release using chainsaws or herbicides – 585 acres
- Stand improvement by precommercial thinning (PCT) chainsaw using chainsaws – 585 acres
- Pretreatment/Stocking/TSI certification checks – 585 acres
- Fuel reduction prescribed burning – 2,149 acres
- Non-native invasive, exotic, and nuisance plant species treatment – 12,889[1] acres
- Wildlife pond rehabilitation – 4 ponds
- Wildlife opening rehabilitation – 16 acres
- Wildlife stand improvement midstory reduction – 1,564 acres
- Shale borrow site use – 2 acres
- Temporary road construction – 11 miles
- Road reconstruction – 1 mile
- Road closure – 1 mile
- Road maintenance – 37 miles
- Trail maintenance – 32 miles
- Soil and water restoration – 320 acres
- Unauthorized road and trail closure – as needed
- Install gates and berms – as needed
- Firewood cutting areas – as needed

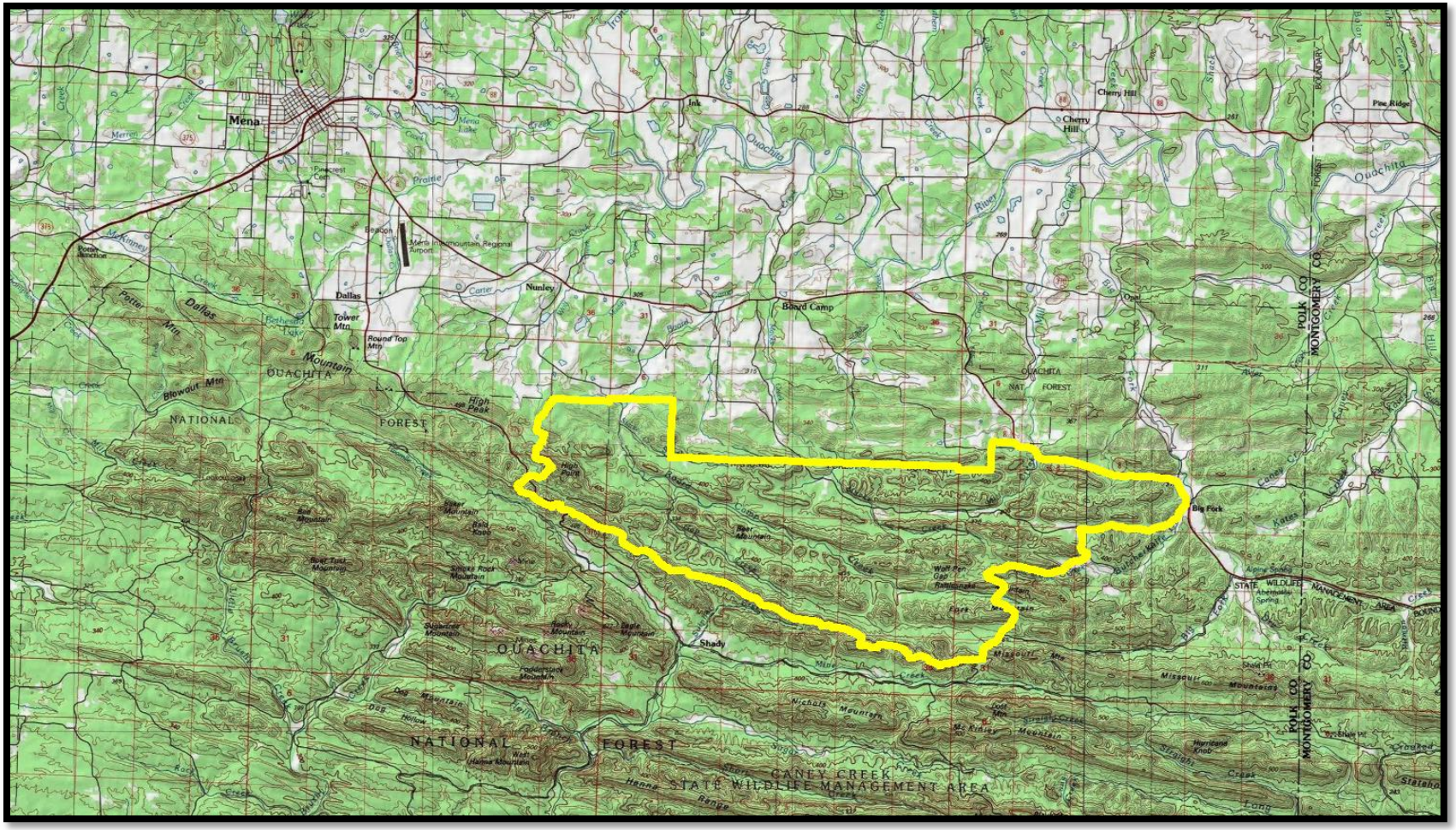
*All figures are approximate.

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

The analysis area for Board Camp is composed of Compartments 909, 910, 911, 912, 913, 914, 915, 916, 917 and 919. Geographically, the project area is primarily to the south of Mena, Arkansas, in Township 3S, Range 28W, Sections 7,8, 15, 16, 17, 18, 19, 20, 21 30, and 31 and T3S, R29W, Sections 7, 13-18, 19-24, 25-29 and 35-36, T3S, R30W Sections 11-14 and 24 in Polk County, Arkansas.

The proposed action will occur in Management Areas (MA) 9 and 14.

Figure 1.1. Board Camp Vicinity Map



Purpose of and Need for the Action

The purpose of this action is to restore the health and vigor of the Board Camp area. Implementing these activities would provide for a diversity of plant and animal communities throughout the Board Camp area, provide early seral habitat in a well-distributed grass/forb or shrub/seedling stage, reduce fuel accumulation, and produce a sustainable yield of wood products.

Need for the Action

- Current conditions in the Board Camp area do not meet the desired conditions for the forest Management Areas (MA's) and the ecological systems that occur within.
- Pine stands contain damaged, poorly formed and diseased trees. The trees are overcrowded or densely stocked, which reduces growth and crown development. These conditions result in stress and reduced vigor and health, thus increasing susceptibility to insects and disease.
- There is limited access to those stands in need of silvicultural treatments, resulting in the need for temporary road construction. Some existing roads are not useable by log trucks for hauling, creating the need for road re-construction.
- There is a lack of high quality forage habitat for species requiring early successional habitat within the project area.
- Standing water is not readily available throughout the Board Camp area year-round and is needed for consumption by wildlife and as reproductive sites for native amphibian species.
- There are known populations of exotic and invasive plant species throughout the project area.
- Past fire suppression activities have removed the natural role of fire from the landscape. This absence of fire has resulted in excessive fuel accumulations.
- The absence of fire has also resulted in reduced open understories necessary for the growth of many native plant communities, wildlife foods, and the natural regeneration of pine and oak.

Table 1.1. Existing Conditions Contrasted to the Desired Conditions

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Activities
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 Land and Resource Management Plan, RLRMP, p. 58).	70% of the pine stands and 83 % of the pine-hardwood stands within the project area are older than 70 years of age. This combined with overstocked conditions reduces the health and vigor of the stands and increases their susceptibility to damage from insects and disease.	Reduce basal area levels in stands that are overstocked. Reduce the percentage of older age classes in the project area.	• Commercial thinning on 1,173 acres • Plantation thinning on 491 acres • 585 acres of regeneration treatments
Grass-forb and seedling-sapling conditions are well represented, particularly in the portions suitable for timber management, where they make up at least 6 percent of the landscape (RLRMP, p.6).	Early seral (0-10 age year) habitat makes up 0% of suitable acres, no early seral habitat exist in wildlife openings.	Provide at least 369 acres (6% of the suitable acres) of early seral (grass-forb or shrub-seedling) conditions.	• 585 acres of regeneration treatments
Contribute to the economic base of local communities by providing a sustained yield of wood products at a level consistent with sound economic principles and appropriate multiple use objectives. (RLRMP p. 68)	Pine plantations contain damaged and poorly formed trees. These plantations are also overcrowded and densely stocked, which results in reduced growth and crown development. These conditions result in poor quality wood products.	Reduce basal area levels in pine plantations and other overstocked stands.	• Commercial thinning on 1,173 acres • Plantation thinning on 491 acres
Provide for a diversity of plant and animal communities throughout the planning area. • Improve habitat for game and non-game species. (RLRMP, p.20) • Manage for identified natural plant communities. (RLRMP pp. 6-19) • Increase prescribed burning on the	Due to past fire suppression activities, the natural role of fire has been removed from the landscape. This has limited the amount of open understories necessary for wildlife foods, the lack of natural regeneration of pine and oak species, and the loss of habitat conditions for fire adapted plant species.	Increase fire frequency to meet desired intervals for various ecosystems present in project area. (RLRMP, Part I) Ouachita Shortleaf Pine-Oak Forest: >= 50% of the community every 5-7 years, with an occasional growing	• Prescribed burning on 2,149 acres

Desired Conditions	Existing Conditions	Site Specific Needs	Proposed Activities
forest to help achieve and maintain desired future conditions. (RLRMP, OBJ011 p. 59)		season fire. Ouachita Shortleaf Pine-Oak Woodland: >= 50% of the community every 4-5 years, with an occasional growing season fire.	
Reduce fuel loads of National Forest System lands that have the greatest potential for catastrophic wildland fire (RLRMP, p. 68).	Fire suppression has resulted in excessive fuel accumulations, increasing the risk of damage to resources in the event of wildfire.	Minimize the risk of resource damage by reducing fuel loadings.	• Prescribed burning on 2,149 acres
Develop and operate the road system, maintained to the minimum standard needed to meet the requirements of the proposed actions, protect the environment, and provide for reasonable and safe access. (RLRMP p. 67)	There is no access to some of the stands proposed for harvest and silvicultural activities. Some of the roads would not support timber hauling in their current condition.	Provide access to stands in need of silvicultural treatment. Improve road conditions on travel ways proposed for timber hauling.	• 11 miles temporary road construction • 37 miles system road maintenance • Reconstruct 1 mile of existing roads
Treat forest to eliminate non-native, invasive species. (RLRMP, OBJ03, p. 59)	Non-native, invasive species present within the project area include *Sericea lespedeza* and *Albizia julibrissin.*	Eradicate or control the spread of non-native invasive species across the project area.	• Mechanical removal • Removal with herbicide treatment

Scope of This Environmental Analysis

Relevant Planning Documents

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

- Revised Land and Resource Management Plan (RLRMP or Revised Forest Plan) for the Ouachita National Forest (USDA Forest Service, 2005a)
- Final Environmental Impact Statement (FEIS), Revised Land and Resource Management Plan, Ouachita National Forest (USDA Forest Service, 2005b)
- Travel Analysis Report for Board Camp

The Revised Forest Plan guides all natural resource management activities for the Ouachita National Forest. The forest management direction, communicated in terms of Desired Conditions (pp. 6-26); Strategies (pp. 27-72); and Design Criteria (pp. 73-123) that apply to the forest lands identified in this proposal are incorporated by reference.

Table 1.2. Reference for Revised Forest Plan Standards by Management Area

Management Area Number	Management Area Description	Project Area National Forest System Acres	Revised Forest Plan Reference Management Area Design Criteria*
9	Water and Riparian Area	1,182	Part 2, p. 34; Part 3, pp. 103-108
14	Ouachita Mountains, Habitat Diversity Emphasis	11,707	Part 2, p. 35; Part 3, p. 108

* Part 3–Design Criteria of the Revised Forest Plan (pp. 73-97) present standards applicable Forest-wide.

History of the Planning and Scoping Process

The Board Camp project was first listed in the Schedule of Proposed Actions (SOPA) in November 2019. A Project Announcement Letter (PAL) or "scoping letter" was mailed to interested publics on November 21, 2019, requesting input on the proposed actions regarding management of the Board Camp area. The PAL was also published to the Forest's website at that time. One comment on road maintenance of a road near the project area (Earth Lane) was received during scoping. The mangement of this travel route is under consideration.

Issues

Forest policy requires analysis of alternatives to herbicide use. For this reason, the following issue will be analyzed in depth:

- **Issue 1:** Herbicide use may create a safety hazard to workers and forest visitors.
  Method of measurement: Hazard quotient values of herbicides

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.

Chapter 2
Alternatives Including the Proposed Action

Alternative Design

Alternatives to be Documented in Detail

Three (3) alternatives were identified by the ID Team and approved by the Responsible Official to be evaluated and documented in detail:

- Proposed Action
- No Herbicide
- No Action

Proposed Action

See Appendix A for list of activities by compartment and stand; see Appendix B for maps displaying activity locations.

Commercial Thinning

Currently, these stands are composed of shortleaf and loblolly pines with some thicker hardwood patches. We would commercially thin these stands by cutting and removing pine trees down to a target basal area (BA) of between 60 and 70 square feet per acre and, if needed, the hardwood trees down to a target BA of 10 square feet per acre. In those stands that are less than 30 years of age or dominated by loblolly pines, we would commercially thin the pines to a lower basal area of 60 square per acre and, if needed, the hardwood trees down to 10 square feet per acre, as well. By reducing stand density through the removal of pine and, again, if needed, hardwood trees with crooks, poor crowns, disease and other unhealthy characteristics, we would improve the current tree-crown expansion and diameter vigor.

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 insect and disease infestations. Hardwood and soft mast species, if needed, would also 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)

Seed-tree with Reserves

The seed-tree with reserves regeneration method is designed to obtain natural regeneration from seed trees retained throughout the life of the stand. A seed-tree with reserves cutting is the start of a two-aged regeneration method involving the cutting and removal of all pine and hardwood tree species except for a basal area range of between 5

and 15 square feet per acre that are widely and uniformly dispersed for seed production. Residual tree composition would consist of both dominant and codominant shortleaf pine and hardwood species. We would further base pine leave trees on the following characteristics—tree form, tree health, tree vigor, seed production—and, in the case of hardwoods leave trees, on species of wildlife interest. The basal area for remaining overstory or midstory hardwood trees should be approximately 5 square feet per acre. Leave trees would be retained throughout the life of the stand in order to ensure a mixed species composition and supply of wildlife habitat (Forest Wide Design Criteria WF001-WF005, WF007, VM003, VM004, FI005, FR001-FR009, FR011, FR014, and TH001)

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

Site preparation improves the access for planting; reduces competing hardwoods; and makes a seedbed suitable for regeneration. In those stands receiving a seed-tree with reserves cutting, we would prepare the sites in accordance with Forest Wide Design Criteria FR013 (Revised Forest Plan).

We would incorporate various methods including herbicide, manual, mechanical, and prescribed burning either separately or in combination with one another in an effort to prepare the site for shortleaf pine regeneration.

Herbicide

In order to achieve desired goals for site-preparation treatments, herbicide applications would be necessary. A mixture of herbicides with the active ingredients of imazapyr, metsulfuron methyl, glyphosate, 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, glyphosate, 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 the foliage of trees and shrubs less than six feet in height; 2) frill treatment, which involves the application of herbicides by spray bottle into cuts that expose the tree's sapwood; and 3) cut-stump treatment, which involves the application of herbicides by spray bottle to the surface of cut stumps. We would conduct foliar-spray methods 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 the time of year (Revised Forest Plan - Forest Wide Design Criteria HU001-HU016, and HU018).

Manual

Manual treatments would consist of hand-operated tools (e.g., chainsaws) used to cut or girdle overstory and midstory vegetation in an effort to prepare the sites for regeneration (Revised Forest Plan—Forest Wide Design Criteria FR013).

Mechanical

Mechanical methods would include mechanical scarification (where prescribed burning is not feasible) raking, piling, and mechanical ripping (if natural regeneration were deemed unsuccessful). We would implement all of these methods with a bulldozer using either the blade or various other attachments (Forest Wide Design Criteria FR013).

Prescribed Burning

We would use prescribed burning as a means of site-preparation either separately or within fuel reduction burn units depending on their location. This type of prescribed burning involves the application of controlled and moderate to high intensity fire in an effort to control competing vegetation (hardwoods); reduce accumulated leaf litter; and prepare the site for seeding and/or hand planting. We would implement site-preparation burns during the time between leaf emergence and leaf fall. We would target vegetation measuring three inches and less in diameter at the ground level for higher rootstock eradication. This would result in less competition for shortleaf pine seedlings and other desirable fire-dependent species, while creating an open understory. Prescribed burning would maintain between 10 and 20 percent of hard-mast producers and 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).

Hand Planting with Shortleaf Pine

We would incorporate planting on a case-by-case basis in order to accomplish desired stocking levels. Containerized shortleaf pine seedlings would be planted in loosened soil created by a mechanical ripper mounted on a bulldozer in order to take advantage of microsites and increase seedling survival. We would adjust tree spacing based on past regeneration survival percentages (Forest Wide Design Criteria FR007).

Timber Stand Improvement by Release

Release operations are treatments conducted to regulate species composition and improve the quality of young stands. We would release of shortleaf pine seedlings from undesirable vegetation in those stands scheduled for regeneration cuttings. We would perform release treatments within three to five years of stand establishment.

We would use manual treatments (e.g. chainsaws or machetes) when boles of desired trees are not shaded. And, we would use herbicide methods—specifically foliar applications and/or cut-surface treatments (see "***Herbicide***")—when competing vegetation is more than half the height of desired regeneration and, therefore, shading the boles. 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 PCT

Precommercial thinning (PCT) is the removal of trees not for immediate financial return but to reduce stocking to concentrate growth on more desirable [shortleaf pine] trees (Helms 1998). We would perform this treatment, manually, using chainsaws or machetes

in order to release shortleaf pine trees from other shortleaf pine trees in favor of better spacing [e.g. 250-500 trees per acre (Revised Forest Plan – Table 3.5)].

Firewood Areas

We would make available firewood cutting 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).

Fuel Reduction Prescribed Burning

We would treat each burn unit with controlled broadcast fire as needed approximately every 1 to 5 years during either the growing or dormant season. We would maintain this recurring schedule 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. We would implement these burns during the time between leaf emergence and leaf fall. We would target, for higher rootstock eradication, vegetation that is three inches and less in diameter at the ground level. This would result in less competition for pine seedlings and other desirable fire dependent 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. We would retain some duff for soil protection. We would target, for reduction, vegetation 1¼ inches in DBH and less in diameter in an effort to create an open understory, stimulating growth of native grasses and forbs, and increasing foraging for browsing animals.

Prescribed burning would aim to maintain 10-20 percent of hard mast producers, and 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).

Unauthorized Road and Trail – Close and Decommission

We would close and decommission unauthorized roads and trails [user created all-terrain vehicle (ATV), off-highway vehicle (OHV)]. Methods of decommissioning range from blocking the road entrance (earthen mound) to full obliteration, which includes closing, re-seeding, mulching and re-contouring slopes to natural condition, and using water diversion methods to prevent additional soil erosion and watershed resource damage. (Forest Wide Design Criteria TR005 and TR007)

Resource Protection – Gate or Berm Installation

We would install gates or berms to access roads or entrances to wildlife openings, abandoned mines, and unauthorized roads added to system; system roads permanently closed; and system roads closed and decommissioned to protect soil, water, wildlife resources and reduce existing open road density. Approximatly one mile of road within the project area has been identified in need of closure for resource protection on acquired land in Compartment 914.

Temporary Road Construction

We would construct approximately 11 miles of temporary road to access stands proposed for commercial timber harvest and haul timber from those stands. After use, we would close these temporary roads with earthen berms and then seed them. Upon termination of management activity, we would decommission and revegetate temporary roads. We would effectively block temporary roads to normal vehicular traffic within 50 feet of the beginning of the road and include dips and/or waterbars for erosion control. We would remove all temporary crossings. We would also restore the natural contours and slope on temporary road segments that have grades of 14 percent or greater. (Revised Forest Plan—Forest Wide Design Criteria TR001, TR004, TR007-TR009, TR013, and TR015-TR018).

Road Reconstruction

Approximatly one mile of road reconstruction is needed to reduce resource damage and allow access to stands proposed for commercial timber harvest and haul timber from those stands.

Road Maintenance

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

Trail Maintenance

We would require general trail maintenance on approximately 32 miles of existing OHV trails. This maintenance includes slide and slump repair, surface blading, maintenance of drainage structures, ditch cleaning and clearing of vegetation (Revised Forest Plan - Forest Wide Design Criteria TR011).

Soil and Water Restoration

There is potential need to restore eroding areas using heavy equipment and various stabilization and sedimentation control methods such as: rip-rap, root wads, log cribbing, seeding, plantings and mulching etc..

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. We would thin from below those stands proposed for midstory reduction to approximately a seven-inch diameter at breast height (DBH). However, we would base tree be removal more upon individual tree crown location and how the crown is shading the understory rather than on a DBH limit. Therefore, we would occasionally remove trees larger than seven inches in DBH. Although the purpose is mainly to reduce a hardwood midstory layer, we would retain hardwoods according to Revised Forest Plan standards.

Wildlife Opening Rehabilitation

We would treat existing wildlife openings and right of ways with a mixture of herbicides or manual methods in order to control non-native invasive plants and woody encroachment (see non-native invasive treatment above). Once herbicide treatments are complete, we would disk, fertilize, lime, and seed existing openings with native grasses/plants to provide enhanced foraging opportunities for wildlife.

Pond Rehabilitation

We would restore existing wildlife ponds by reshaping banks; clearing trees and brush; and repairing failing dams. We would rehabilitate disturbed soils by seeding and/or planting with native species and by fertilizing, liming, and mulching to provide enhanced foraging opportunities for wildlife.

Non-native Invasive, Exotic and Nuisance Plant Species Treatments

We would apply both manual and herbicide treatments to all areas within the project area, as needed, to control and/or eliminate the spread of non-native invasive, exotic and/or nuisance plant species (e.g., tall fescue, sericea lespedeza, autumn olive, honey suckle, privet). In these treatments, we would use approved USDA herbicides and manual treatments such as prescribed fire, mid-story reduction, mowing/weed-eating, girdling and manual uprooting, mechanical or similar treatments.

We would use 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 to eradicate noxious weeds. 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.

No Herbicide

This alternative addresses Forest direction requiring analysis of an alternative to herbicide use when feasible and practical to accomplish management purposes. The No Herbicide Alternative is the same as the Proposed Action except that we would utilize mechanical methods or chainsaws and other hand tools, instead of herbicide application, for site preparation, release, midstory removal, overstory development, and control of non-native invasive plants.

No Action

No-Action does not mean that activities in the project area would not occur. We would continue road maintenance for public safety. We would continue to maintain access to the project area for outdoor recreation purposes. The Forest Service would respond to wildfires. We would continue salvage operations and/or suppression of insect or disease outbreaks. It is also possible that we would continue management activities qualifying as categorical exclusions (36 CFR Part 220) within the project area.

Technical Requirements

The technical requirements described below apply to the Proposed Action and the No Herbicide Alternative.

Cultural Resources

HP1: Site Avoidance During Project Implementation

For cultural resource sites that are eligible for NRHP inclusion and for sites that the NRHP eligibility is undetermined: avoidance of historic properties would require the protection from effects resulting from the undertaking. Effects would be avoided by establishing clearly defined site boundaries and buffers around archeological sites where activities might result in an adverse effect. Buffers would be of sufficient size to ensure that integrity of the characteristics and values which contribute to the properties' significance would not be affected.

HP2: Site Protection During Prescribed Burns

- *Firelines.* Historic properties located along existing non-maintained woods roads used as fire lines will be protected by hand-clearing those sections that cross the sites. Although these roads are generally cleared of combustible debris using a small dozer, those sections crossing archeological sites will be cleared using leaf blowers and/or leaf rakes. There will be neither removal of soil, nor disturbance below the ground surface, during fireline preparation. Historic properties and features located along proposed routes of mechanically-constructed firelines, where firelines do not now exist, will be avoided by routing fireline construction around historic properties. Sites that lie along previously constructed dozer lines from past burns where the firelines will be used again as firelines, will be protected during future burns by hand clearing sections of line that cross the site, rather than re-clearing using heavy equipment. Where these activities will take place outside stands not already surveyed, cultural resources surveys and regulatory consultation will be completed prior to project implementation. Protection measures, HP1, HP3, and HP4, will be applied prior to project implementation to protect historic properties.
- *Burn Unit Interior.* Combustible elements at historic properties in burn unit interiors will be protected from damage during burns by removing excessive fuels from the feature vicinity and, as necessary, by burning out around the feature prior to igniting

the main burn, creating a fuel-free zone. Burn out is accomplished by constructing a set of two hand lines around the feature, approximately 30 to 50 feet apart, and then burning the area between the two lines while the burn is carefully monitored. Combustible features located in a burn unit will also be documented with digital photographs and/or field drawings prior to the burn. Historic properties containing above ground, non-combustible cultural features and exposed artifacts will be protected by removing fuel concentrations dense enough to greatly alter the characteristics of those cultural resources. No additional measures are proposed for any sites in the burn interior that have been previously burned or that do not contain combustible elements or other above ground features and exposed artifacts as proposed prescribed burns will not be sufficiently intense to cause adverse effects to these features.

- *Post-Burn Monitoring.* Post-burn monitoring may be conducted at selected sites to assess actual and indirect effects of the burns on the sites against the expected effects. State Historic Preservation Office (SHPO) consultation will be carried out with respect to necessary mitigation for any sites that suffer unexpected damage during the burn or from indirect effects following the burn.

HP3: Other Protection Measures

If it is not feasible or desirable to avoid an historic property that may be harmed by a project activity (HP1), then the following steps will be taken: (1) In consultation with the Arkansas SHPO, the site(s) will be evaluated against National Registry Historic Places (NRHP) significance criteria (36 CFR 60.4) to determine eligibility for the NRHP. The evaluation may require subsurface site testing; (2) In consultation with the Arkansas SHPO, tribes and nations, and with the Advisory Council of Historic Preservation
(ACHP) if required, mitigation measures will be developed to minimize the adverse effects on the site, so that a finding of No Adverse Effect results; (3) The agreed-upon mitigation measures will be implemented prior to initiation of activities having the potential to affect the site.

HP4: Discovery of Cultural Resources during Project Implementation

Although cultural resources surveys were designed to locate all NRHP eligible archeological sites and components, these may go undetected for a variety of reasons. Should unrecorded cultural resources be discovered, activities that may be affecting that resource will halt immediately; the resource will be evaluated by an archaeologist, and consultation will be initiated with the SHPO, tribes and nations, and the ACHP, to determine appropriate actions for protecting the resource and mitigating adverse effects. Project activities at that locale will not resume until the resource is adequately protected and until agreed-upon mitigation measures are implemented with SHPO approval.

<u>Soils</u>

Allow heavy equipment operations on hydric soils, soils with a severe compaction hazard rating, and floodplains with frequent or occasional flooding hazard only during the months of July through November. Operations during December through June are allowed with the use of

methods or equipment that does not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW001, p. 74) This standard applies to operations in portions of stand **Compartment 910 Stand 4.**

Allow heavy equipment operations on soils that have a moderate-high or high compaction hazard rating only during the months of April through November. Operations during December through March are allowed with the use of methods or equipment that does not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas. (Revised Forest Plan, SW002, p. 74) This standard applies to operations in portions of following stands: **Compartment 910 Stand 4 and 8 Compartment 911 Stand 1 and 5 Compartment 912 Stand 38 and 60 Compartment 913 Stand 16, 45, and 51 Compartment 914 Stand 3, 4, 13, 14, 28, 29 and 53.**

In this analysis area, Soil Map Units 11, 112, 114, and 175 have a severe erosion hazard rating. Erosion control measures will be applied within 30 days of completion of soil disturbing activities and within 15 days or less if such activities are conducted within a streamside management area. 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. Stands within the project area which have severe erosion rating include portions of the following: **Compartment 910, Stand 2, 3, 7, 9, 10, 12, 13, 13, 14, 16, and 17 Compartment 911 Stand 1, 2, 7, 9, 11, 12, 13, 19, 21, 22, and 23 Compartment 912 Stand 1, 2, 7, 9, 10, 16, 18, 32, 34, 37, 38, 39, 40, 58 Compartment 913 Stand 5, 7, 8, 10, 11, 13, 20, 27, 28, 29, 31, 33, 34, 36, 38, 39, 45, 46, 51 Compartment 914 Stand 1, 4, 6, 8, 11, 12, 13 16, 17, 20, 21, 22, 31, 33, 39, 45, 46, and 47 Compartment 915 Stand 1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 15, 22, 23, 24, 25, 27, 28, and 37 Compartment 916 Stand 2, 4, 5, 6, 7, 11, 12, 14, 19, 26, 27, 31, 36, 39, 45, and 48 Compartment 917 Stand 1, 2, 3, 4, 5, 6, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, and 34 Compartment 939 Stand 3 .**

Recreation

Vegetation management treatment buffers are not required for OHV trails in Board Camp project area. The Wolf Pen Gap trail system is comprised of dual use roads and trails and logging skid trails should not cross OHV trails to avoid impacts to the trails. Travel routes with dual designations may be used but travel routes specifically designed for OHV traffic shoud not be impacted by logging traffic.

Biological

Heavy equipment operations around a seep located in Compartment 905 Stand 27 should be avoided.

Public Health and Safety

During prescribed burning activities, sign travel-ways as needed notifying the public there may be smoke along the road, flaggers or warning signs may be positioned along the travel ways during active flaming if needed. Inform the public of potential burn days, times, information

contacts, and suggested alternatives for those concerned with smoke. Notify local, county and state law enforcement that burning will take place.

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 appropriate 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.

Alternatives Considered But Eliminated from Detailed Study

Optimal Harvest

The presence of Wolf Pen Gap trail complex within the Board Camp project area presents many obstacles to optimal silviculture treatment. In addition to the proposed treatments, other stands were identified that could benefit from thinning and even age management to promote forest health. In developing the final proposed actions, an effort has been made to minimize the cost of road and trail repairs, as well as watershed sediment loads, and impacts to trail system users. The ID Team selected only the highest priority silviculture treatments and eliminated the optimal harvest alternative from detailed analysis.

Proposed Action without Road Construction

In response to public comment on past environmental assessments, a No Road Construction Alternative was considered. Under this alternative, there would be no road construction (temporary or system); only proposed timber harvest (and dependent management actions) accessible by current transportation system would occur.

The ID Team concluded that a No Road Construction alternative would not satisfy the purpose and need of providing at least 6% of the suitable acres in early seral conditions. Under this alternative, no early seral habitat from suitable acres would be created. For this reason, the ID Team eliminated this alternative from detailed analysis.

Proposed Action without Harvest Activity

In response to comments received in development of past projects, an alternative similar to the Proposed Action but without harvest applications was considered by the ID Team but eliminated from detailed analysis because the ID Team concluded that a No Action Alternative adequately

addressed the overall effects of a no harvest alternative.

Proposed Action without Prescribed Burning

In response to comments received in development of past projects, an alternative similar to the Proposed Action, but without the application of prescribed burning (other than existing authorized burn decisions), was considered by the ID Team but eliminated from detailed analysis. The ID Team concluded that a No Action Alternative adequately addressed the overall effects of a no prescribed burning alternative.

Other Past, Present, and Reasonably Foreseeable Future Actions

Limited silvicultural treatments have occurred in the last 15 years within the Board Camp Project Area or in the adjacent watersheds. Habitat Restoration activities are planned to begin in 2021 in the compartments to the West of the Board Camp Project area in the Brier Creek watershed. Activities authorized in the Brier Creek environmental analysis are expected to be complete prior to the implementation of the Board Camp decision. Trail and road improvements authorized under the Wolf Pen Gap environmental analysis 2015 is ongoing.

Salvage operations and/or suppression of insect or disease outbreaks would be authorized under the following decisions: Environmental Assessment for Salvage of Dead, Down, and or Damaged Timber (2007); Implementation of Suppression for Control of Southern Pine Beetle and Other Bark Beetles (2013).

Summary Comparison All Alternatives

The following tables provide a comparison of alternatives utilizing both quantitative and qualitative measures.

Table 2.1. Summary Comparison of Management Activities by Alternative

Activity and Measure	Proposed Action	No Herbicide	No Action
Commercial Thinning (acres)	1,173	1,173	0
Plantation Thinning (acres)	491	491	0
Seed-tree with Reserves/Even-aged Management (acres)	585	585	0
Site Preparation by Prescribed Fire, Herbicides, Manual, and Mechanical application	585	585	0
Hand Planting with Shortleaf Pine (acres)	585	585	0
Timber Stand Improvement (Release) by Herbicide and/or Manual Methods (acres)	585	585	0
Timber Stand Improvement (Precommercial Thinning) by Manual Methods (acres)	585	585	0
Pretreatment/Stocking/TSI Certification Checks (acres)	585	585	0
Fuel Reduction Prescribed Burning – in Site Prep and Wildlife Stand Improvement Units (acres)	2,149	2,149	0
Shale Borrow Site Use (acres)	2	2	0
Wildlife Pond Rehabilitation (ponds)	4	4	0
Wildlife Opening Rehabilitation (acres)	16	0	0
Wildlife Stand improvement midstory reduction (acres)	1,564	1,564	0
Temporary Road Construction (miles)	11	11	0
Road Maintenance (miles)	37	37	0
Road Closure (miles)	1	1	0
Trail Maintenance (miles)	32	32	0
Road Reconstruction (miles)	1	1	0
Non-Native, Invasive Species Eradication by Herbicide and/or Manual Methods (acres)	12,889[1]	0	0
Soil and Water Restoration (acres)	320	320	0
Resource Protection Gates or Berms	As needed	As needed	0
Unauthorized Roads– Close and Decommission	As needed	As needed	0
Firewood Areas	As needed	As needed	0

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

Table 2.2. Summary Comparison of Effects on Environment by Alternative

Effect	Proposed Action	No Herbicide	No Action
Revenue/Cost Ratio	1.53	1.31	N/A
Open Road Density	0.92	0.92	0.92
Soil Loss Below Threshold	Yes	Yes	Yes
Potential Risk to Beneficial Uses *Camp Creek 080401010104*	High	High	Moderate
Acres of Early Seral Habitat Created	585	585	0

Chapter 3
Affected Environment and Environmental Consequences

Analysis Methods

Air Quality – Calculations of emissions from the proposed project were conducted to assess the increase in emissions loading in the project area and throughout the state. The emissions were calculated using a range of consumption values (in tons per acre) for each unit based on best available information and professional judgment (Region 8 Air Quality Specialist Melanie Pitrolo).

Soils – The Ouachita National Forest Universal Soil Loss Equation (USLE) model was used to predict whether soil loss from proposed management actions would be below maximum allowable thresholds. The model was developed by ONF personnel, and modified by Forest Soil Scientists.

Water Quality – The Aquatic Cumulative Effects (ACE) model was used to determine the possible cumulative impacts of management activities on water quality. This model addresses the effects of timber harvesting, roads and wildlife management activities on water quality and fisheries. The model calculates sediment loadings resulting from proposed management activities. The model also assigns a risk rating of low, medium or high for adverse effects to aquatic beneficial uses. The model was developed for the Ouachita National Forest in Arkansas and Oklahoma and is specific to the physiographic zones within the Ouachita National Forest.

Financial Efficiency – Quick-Silver (version 7.0) was used to determine the financial efficiency of each Alternative. This program is a project analysis tool that utilizes a Microsoft Access database for use by forest managers to determine the economic performance of long-term investments.

Public Health and Safety – SERA (Syracuse Environmental Research Associates, Inc.) Pesticide Human Health and Ecological Risk Assessments were used to analyze the risks associated with the herbicides proposed for use in this project. Project specific SERA worksheets were completed for herbicides clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr to determine Hazard Quotients (HQ) for the proposed application rates of these herbicides. An HQ is the ratio of a projected level of human exposure divided by some index of acceptable exposure or an exposure associated with a defined risk. HQs of 1.0 or less indicate scenarios with acceptably low risk.

Biological –Selected terrestrial management indicator species were modeled using the CompPATS wildlife habitat capability model (HCM) to compare habitat capabilities for each alternative.

Air Quality

Current Conditions

Air pollution is the presence in the atmosphere of one or more contaminants of a nature, concentration, and duration to be hazardous to human health or welfare (Sandberg and others 1999). Air quality is a measure of the presence of air pollution. Ambient air quality is defined by the Clean Air Act as the air quality anywhere people have access, outside of industrial site boundaries. National ambient air quality standards (NAAQS) are standards of air quality designed to protect human health or welfare and are applied to six criteria pollutants. Although the proposed project includes several different activities, not all proposed activities result in air emissions. Thus, this air analysis will only focus on the one proposed activity, prescribed burning, that results in an increase in air emissions.

Emissions from wildland fire include carbon dioxide, water, carbon monoxide, particulate matter, hydrocarbons or volatile organic compounds, and nitrogen oxides. Carbon monoxide is the most abundant pollutant emitted from wildland fire. It is of concern to human health, because it binds to hemoglobin in place of oxygen and leads to oxygen deprivation and all of the associated symptoms, from diminished work capacity to nausea, headaches, and loss of mental acuity. Carbon monoxide concentrations can be quite high adjacent to the burn unit, but they decrease rapidly away from the burn unit toward cleaner air. Carbon monoxide exposure can be significant for those working the line on a prescribed fire, but due to rapid dilution, carbon monoxide is not a concern to urban and rural areas even a short distance downwind

Nitrogen oxide (NOx) emissions from wildland fires are very small, and hydrocarbon emissions are moderate. Alone they are not very important to human health, but they are precursors to the criteria pollutant, ozone. Ozone is formed in the atmosphere when nitrogen oxides and hydrocarbons combine in the presence of sunlight. Fire-related NOx and hydrocarbon emissions become more important to ozone levels only when other persistent and much larger pollution sources already present a substantial base load of precursors. The most important pollutant from wildland fire emissions is fine particulate matter ($PM_{2.5}$) due to the amount emitted and the effects on human health and visibility (Hardy et al. 2001). The term fine particulate refers to particulate matter 2.5 microns or less in diameter.

Under the Clean Air Act, the Environmental Protection Agency (EPA) establishes air quality standards to protect public health, including the health of "sensitive" populations such as people with asthma, children, and older adults. EPA also sets limits to protect public welfare. This includes protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings. EPA has set national air quality standards for six common air pollutants (also called the criteria pollutants):

- ozone (O^3)
- particulate matter (PM)
- carbon monoxide (CO)
- nitrogen dioxide (NO^2)
- sulfur dioxide (SO^2)
- lead (Pb)

If the air quality in a geographic area meets or is cleaner than the national standard, it is called an attainment area; areas that don't meet the national standard are called nonattainment areas. If an area is designated as nonattainment, it signifies that the air in the area is unhealthy to breathe.

The criteria pollutants of most concern on the Ouachita National Forest are particulate matter and ozone. Fine particulate matter is the leading cause of regional haze (also known as visibility impairment), while ozone can harm sensitive vegetation within the forest. Additionally, at elevated concentrations these two pollutants can impair the health of both employees of and visitors to the National Forest. Arkansas and Oklahoma state air regulators monitor ozone and fine particulate matter at several locations near the proposed project. Specifically, ozone monitoring is conducted in Polk County in Arkansas, and in McCurtain County, Oklahoma. Fine particulate matter monitoring is conducted in Polk County, Arkansas. None of these monitors have measured values greater than the air quality standards (NAAQS) set by EPA. Additionally, it should be noted that none of the counties where this project is proposed are designated nonattainment for any criteria pollutants, including ozone and particulate matter.

OZONE

Meeting ozone standards provides important public and environmental health benefits. EPA has worked closely with states and tribes to identify areas in the country that meet the standards and those that need to take steps to reduce ozone pollution. EPAs final designations are based on air quality monitoring data, recommendations submitted by the states and tribes, and other technical information. Most of Arkansas is listed as **Unclassifiable /Attainment**. Polk County falls within this category. See the adjacent map. (Environmental Protection Agency / 2008 Ground-level Ozone Standards as required by the Clean Air Act Region 6 Final Designations, April 2012)

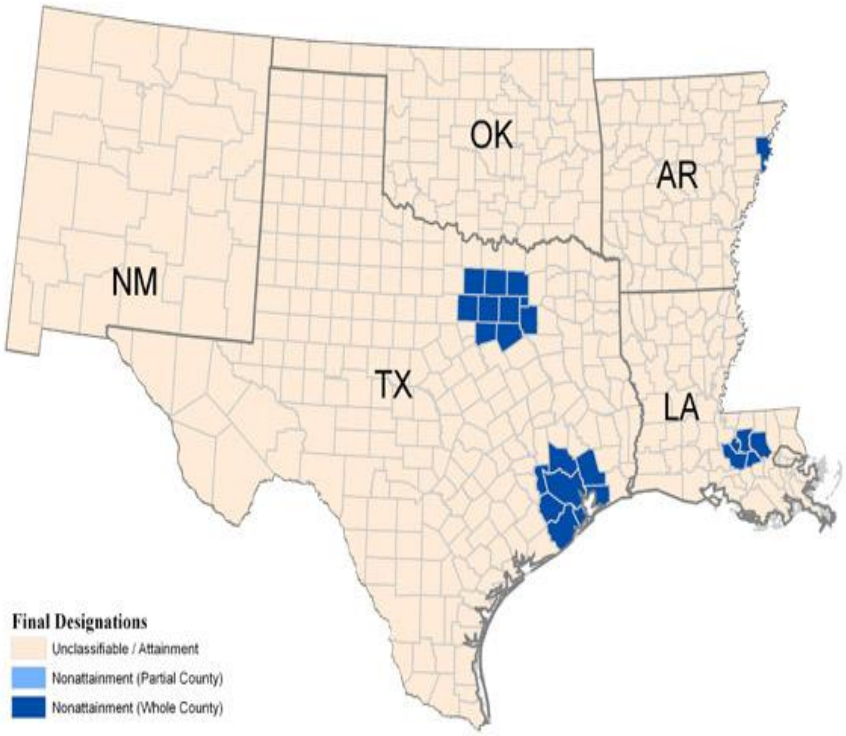


Figure 2.1. Map of final designations - EPA region 6

http://www.epa.gov/ozonedesignations/2008standards/final/region6f.htm

While air quality monitoring describes ambient pollution levels, emissions inventories provide information on the contribution of various pollution sources to total emissions for specific

geographic areas. Emissions from prescribed fires are unlikely to be a significant contributor to ozone. In much of the rural South, ozone formation tends to be NOx-limited and prescribed fires are usually not a major NOx source when compared to others, such as vehicles. Also, the amount of NOx and Volatile Organic Compounds (VOC) coming from forestry activities is small compared to other sources. And most importantly, weather and climate conditions in this area tend to preclude prescribed burning from becoming a significant contributor to ozone formation. Most ozone events occur in mid-spring through late summer when hot temperatures and high-pressure air masses may stagnate over an area, and pollution is not dispersed. Prescribed burning is not typically conducted under these types of weather conditions because of the smoke dispersion issues.

Direct & Indirect Effects

Proposed Action

Fine particulate matter is emitted from prescribed fires and is a contributor to ambient levels of this pollutant. Within Polk county where burning is proposed, fire emissions currently account for nearly 44% percent of all fine particulate emissions (508 tons/year from fires compared to 1,148 tons/year total emissions). In the state of Arkansas, fire emissions account for 32% of all fine particulate matter emissions (50,198 tons/year from fires compared to 155,786 tons/year total emissions). Other sources of fine particulate emissions include fuel combustion and operations at industrial facilities, waste disposal and recycling operations, construction, and agricultural activities. The source for the above data is EPA's National Emissions Inventory for 2014, available online at http://www.epa.gov/air/emissions/index.htm

Calculations of emissions from the proposed project were also conducted to assess the increase in emissions loading in the project area and throughout the state. The emissions were calculated using a range of consumption values (in tons per acre) for each unit based on best available information and professional judgment (Region 8 Air Quality Specialist Melanie Pitrolo). Consumption is assumed to be between two and four tons per acre, with an average emission factor of 12 pounds of fine particulate matter per ton of fuel consumed. Calculations of emissions from the proposed units show that the resulting emissions increase as a result of this project range from 258 tons per year to 516 tons per year in Polk County This is a resulting increase of between 22% – 45% in the County, and 0.2 % increase in state-wide emissions for the year.

All prescribed burning activities on the Ouachita National Forest, including those proposed in this action, are conducted in accordance with the State Smoke Management Guidelines in order to alleviate the smoke related impacts outlined above. Smoke management planning in accordance with the State 8 Smoke Management Guidelines has been successful in protecting health and safety during past activities. The Guidelines require that smoke dispersion modeling be conducted for most burn units to ensure that the smoke management objectives are met; if modeling shows potential impacts, adjustments or mitigations will be necessary in order to go forward with the burn. Each burn unit will be planned in accordance with the Guidelines such that specific parameters are met, including wind speeds and directions. While a few larger units have the potential to transport smoke beyond the National Forest, potential impacts will be mitigated by burning with a wind direction away from the Forest boundary.

Mitigation measures in the form of 'priorities and objectives' and 'design criteria' (Revised Forest Plan, pgs. 62-69 and 73-97) are included under all action alternatives to minimize potential for these effects. Key is the development of a burning plan prior to implementation that considers wind direction and other smoke dispersal factors. A burning plan would be prepared for each burn to ensure that the combustion products (smoke) do not intrude into smoke-sensitive areas. Burning would only occur when conditions are right for adequate smoke dispersal away from smoke sensitive areas (burn plan would address prescription parameters). Proposed burn areas under the Proposed Action are large enough for efficient burning and small enough to allow burning to be completed by mid-afternoon (1500–1630 hrs.), so that most smoke is dispersed by nightfall when smoke tends to sink down slope into valleys. Prescribed burning would be spread over time and space to minimize local cumulative smoke effects. With these measures, effects from smoke under the Proposed Action are expected to be small and within federal and state acceptable levels.

Based on existing air quality information, no long-term adverse impacts to air quality standards are expected from the proposed project. The proposed project is designed to ensure that the State Smoke Management Guidelines are followed, and as such does not threaten to lead to a violation of any Federal, State or Local law or regulation related to air quality.

No Herbicide

The effects on air quality would be the same as the Proposed Action. The only difference between the Proposed Action and this alternative is that herbicide use is not proposed in this alternative.

No Action

There would be no direct effects to air quality with this alternative. Indirectly, large wildfires could occur with the natural accumulation of fuels. This alternative does not include prescribed burning and therefore would have negligible potential for affecting air quality other than that which may occur under a wildfire situation. Smoke hazards from a reduced visibility and nuisance perspective have the potential to be increased due to the accumulation build-up of unburned fuels.

Cumulative Effects

There would be no cumulative effects resulting from any of the alternatives, because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on this resource.

Climate Change

This proposed project would affect a relatively small amount of forest land and carbon on the Ouachita National Forest and might temporarily contribute an extremely small quantity of GHG emissions relative to national and global emissions. This proposed action would not convert forest land to other non-forest uses, thus allowing any carbon initially emitted from the proposed action to have a temporary influence on atmospheric GHG concentrations, because carbon would be removed from the atmosphere over time as the forest regrows. Furthermore, the proposed

project would transfer carbon in the harvested wood to the product sector, where it may be stored for up to several decades and substitute for more emission intensive materials or fuels. This proposed action is consistent with internationally recognized climate change adaptation and mitigation practices.

A complete and quantitative assessment of forest carbon stocks and the factors that influence carbon trends (management activities, disturbances, and environmental factors) for the Ouachita National Forest is available in the project record (Dugan et al., 2019). This carbon assessment contains additional supporting information and references supporting this analysis.

Cultural and Historical Resources

Current Conditions

An effect to a cultural resource is the "…alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." (36 CFR 800.16(i)) Any project implementation activity that has potential to disturb the ground has potential to directly affect archeological sites, as does the use of fire as a management tool. Specific activities proposed that have potential to directly affect cultural resources include timber harvesting and associated log landings, skid trails, and temporary roads, prescribed burning and associated fireline construction and road maintenance or reconstruction where ground disturbance takes place outside existing right-of-way area.

Proposed activities that do not have potential to affect cultural resources, and therefore, are not considered undertakings for purposes of this project include: Non-commercial thinning, timber stand improvements, on-going maintenance of existing Forest roads or reconstruction of previously surveyed roads where ground disturbance does not take place outside existing road prisms and existing drainage features, rehabilitation/closure of temporary roads, log landings, and skid trails using non-ground disturbing methods, road decommissioning using non-ground disturbing methods, and non-native invasive plant species control using non-ground disturbing methods.

Direct & Indirect Effects

Proposed Action and No Herbicide

In general, proposed activities have the potential to affect cultural resources by encouraging increased visitor use to those areas of the Forest in which cultural resources are located. Increased visitor use of an area in which archeological sites are located can render the sites vulnerable to both intentional and unintentional damage. Intentional damage can occur through unauthorized digging in archeological sites and unauthorized collecting of artifacts from sites. Unintentional damage can result from such activities as driving motorized vehicles across archeological sites, as well as from other activities, principally related to dispersed recreation, that lead to ground disturbance. Effects may also include increased or decreased vegetation on protected sites due to increased light with canopy layer reduction outside of the protected buffer.

Proposed access changes, soil restoration work and opening of forested areas from timber harvest can impact cultural resources. Surface artifacts or features may be exposed, disturbed or removed due to increased access and visibility.

Project components that have potential to directly affect archeological sites are primarily timber, prescribed fire, road management, and some wildlife management activities. Adverse effects to cultural resources resulting from proposed activities could be avoided provided site avoidance and site protection measures are properly applied to the known historic properties (see Chapter 2, technical requirements). In that instance, project activities would not be expected to adversely affect archeological sites.

No Action

There would be no change in effects from the current condition, and the potential threat to integrity of cultural resources would remain unchanged.

Cumulative Effects

Proposed Action and No Herbicide

There would be no additive effect from this project because there are no past, present or reasonably foreseeable future actions affecting cultural resources.

No Action

There would be no change in effects from the current condition; there would be no cumulative effects.

Recreation, Scenery, Wilderness, Roadless Areas

Current Conditions

Wolf Pen Gap OHV Trail Complex exist within the project area. Roads within the Board Camp Project require vehicles with a relatively high ground clearance. Hiking, dispersed camping, swimming, OHV, mainly 4-wheelers and dirt-bikes, berry picking, fishing, hunting, trapping and driving for pleasure are the predominant recreational activities.

The Board Camp 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 Board Camp Project ranges from approximately 900 feet to 1900 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 (FEIS, 2005b, pg. 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.

The Board Camp Project analysis area is comprised of three Scenic Integrity Objective (SIO) levels including high (17%) moderate (59%), and low (18%). 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.

The closest wilderness area, Caney Creek Wilderness, is located approximately 2 miles south of the project area. The Brush Heap Roadless area is located approximately 4 miles south of the project area.

Direct & Indirect Effects

Proposed Action and No Herbicide

Forest visitors may experience disturbance by the sights and sounds of logging trucks and harvest operations. They may be temporarily displaced during prescribed fire activities. Increases in wildlife food sources due to prescribed burning and wildlife habitat improvement may result in enhanced hunting and wildlife viewing opportunities. In the short term, vegetation removal through harvest, wildlife habitat improvement, stand improvement, and prescribed burning would negatively impact the scenic quality of the area. These management activities would result in dead and dying vegetation, slash and root wads. In the long term, these same activities would provide a more open view of the forest, enhancing the viewing depth. The Scenery Treatment Guide – Southern Regional National Forests (April 2008) would be followed to reduce impacts to scenic quality. There would be no effects on roadless or wilderness areas because no management activites are proposed within the roadless area.

Management activities that have the greatest potential of affecting scenery are road construction and large-scale, long-term vegetation management (FEIS, 2005b, Chapter 3, pg. 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. Of the management applications, even-aged management may be the most visually impacting (FEIS, 2005b, Chapter 3, pg. 266). The commercial thinning, seedtree harvest, loblolly thinning, pine restoration, midstory treatment, pond reconstruction, wildlife opening work 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 (FEIS, 2005b, Chapter 3, pg. 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) (FEIS, 2005b, Chapter 3, pg. 265).

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 (FEIS, 2005b, Chapter 3, pg. 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 (FEIS, 2005b, Chapter 3, pg. 266).

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

Unauthorized roads and trails would be closed to vehicle use. 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. Roads (authorized and unauthorized) open to the general public would be reduced to achieve desired open road density within the Board Camp Project. This could cause Forest visitors to relocate to other areas of the Forest and also cause a reduction in roads used for driving pleasure.

Dispersed Campsite Closure

Dispersed campsites exist within this project area. As necessary dispersed campsites within this watershed may be closed due to soil compaction, active erosion, sedimentation, and aquatic or heritage resource concerns and unauthorized road and trail use. (Forest Wide Design Criteria SW008) this could cause Forest visitors to relocate to other areas.

Cumulative Effects

Trail and road improvments authorized under the Wolf Pen Gap environmental analysis 2015 is ongoing. Road maintenance, especially right-of-way maintenance, affects scenery. Road management controls how much of the landscape is seen by having roads open or closed (FEIS, 2005b, Chapter 3, pg. 266).

Local Economy and Financial Efficiency

Current Conditions

Government jobs comprise 37% of total jobs in Polk County. The Leisure and Hospitality industry is the largest private employer in Polk County (22% of total jobs) followed by Trade, Transportation, and Utilities (16%), and Natural Resources and Mining (10%). Jobs associated with timber (growing and harvesting, sawmills and paper mills, and wood products manufacturing) make up 4% of total jobs in the county. Forest Service land comprises 66% of the Polk county's total land base (Headwaters Economics, 2017).

Direct & Indirect Effects

Proposed Action and No Herbicide

Many management actions are performed by contractors (site preparation, stand improvement, etc.). These activities would provide jobs to the local community and create a stream of revenue to local businesses.

Under The Proposed Action and the No Herbicide Alternative, there would be both costs and revenues associated with the sale of timber. Costs include activities that are directly involved with timber management (site preparation, timber sale administration, road maintenance, etc.) Revenues are generated from the sale of timber. QuickSilver7 was used to evaluate the financial efficiency of each alternative; these results are displayed in the table below.

Table 3.1. Comparison by Financial Efficiency

Financial Measure	Proposed Action	No Herbicide
Present Value of Revenues ($)	$1,835,994.08	$1,835,994.08
Present Value of Costs ($)	$1,202,842.19	$1,397,968.03
Present Net Value ($)	$633,151.89	$438,026.05
Revenue/Cost Ratio	1.53	1.31

The Revenue/Cost Ratio is highest for theProposed Action. Past practice has shown that manual release usually requires re-treatment; therefore a follow-up release (no herbicide) treatment was included in the analysis for those acres proposed for manual release.

No Action

No additional jobs or revenue would be generated for the local community.

Cumulative Effects

Proposed Action and No Herbicide

In 2020, additional ecosystem management activities, including timber harvests, will be implemented in Polk County by the Ouachita National Forest. The economic effects of the Proposed Action and No Herbicide Alternative would be additive to the jobs and revenue provided by these ongoing and future activities.

No Action

Future Forest Service contracts located within Polk County would occur, but there would be no additive effects on the local economy from not implementing the proposed actions.

Transportation and Infrastructure

Current Conditions

The project area encompasses approximately 16,284 acres, of which approximately 12,889 are Forest Service lands). There are approximately 37.3 miles of road in the project area; 22.5 miles are designated as National Forest system roads. Project area roads also include 14 miles of private and county roads. Approximately 11.5 miles of NF system roads in the project area are closed seasonally, 13.7 miles of NF system roads are closed (administrative use only).

Open Road Density (ORD) is calculated by converting the acres within the project area into square miles (total acres/640 acres) and then dividing that figure into the linear measure of open roads within the project area. Many of the open roads within the project area cannot be closed because they serve as important travel ways for people and goods. The ORD for the project area is 0.92 miles per square mile.

Direct & Indirect Effects

Proposed Action and No Herbicide

Temporary roads would be closed after management activities are completed. Unauthorized user-created trail may be gated, bermed, and or decommissioned as per the Revised Land and Resource Management Plan. Any road crossings found to inhibit fish passage within the project area would be evaluated for rehabilitation. There is a need to reconstruct parts of FS Road 549 in Compartment 914 and 915 to prevent soil erosion and allow access to haul routes.

No Action

Other than routine road maintenance, and unauthorized road closures no other transportation-related activities would occur.

Cumulative Effects

There are no other past, present or reasonably foreseeable future actions within the project area that would contribute effects to the transportation system.

Soil Resource

Current Conditions

Soil maps and mapping unit descriptions and interpretations are based upon the fact that different soil types result from different combinations of geology, geomorphology, topography, vegetation and climate which influence land use activities, capabilities, and various interpretations for management. The nature, patterns and extent of these soils give each mapping unit its own set of interpretations for use and management. Soil properties and associated management implications/precautions of these soil units were analyzed with respect to the proposed practices within each alternative. See project file for the Soil Mapping Unit Legend, Soil Mapping Unit Descriptions, Soil Map and other maps of interest.

Wetlands and Floodplains

Soil mapping units, which are subject to flooding (indicated in the unit name) and/or as having hydric soils as a major component, require special management considerations and evaluations so that proposed actions will not adversely alter the natural values of these areas. Soil mapping units 8, 36, 54, 55, 56, and 60 delineate areas that contain floodplains and possibly other areas that have a risk of flooding. These units give an approximate determination of areas in which the probability of flooding in any given year is at least 1 percent at higher elevations and increases as elevation decreases within the mapping unit. Evaluations should be made on all floodplains and wetland locations involving existing or planned structures (i.e. Bridges, roads, buildings, or other development) regardless of floodplain width or wetland size. In this analysis area, there are no hydric soils or jurisdictional wetlands mapped. For detailed information, reference E.O. 11988, E.O. 11990, FSM 2526 and FSM 2527.

Direct & Indirect Effects

Proposed Action and No Herbicide

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 (Forested T-factor) values. Ground disturbing management practices influence erosion principally because they remove vegetative ground cover and often concentrate and channel runoff water. Forested T-factors and the soils susceptibility to erosion vary by soil and mapping unit. Soils with higher K-factor values and those 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 which typically dominates an effective surface cover, not overly compacting soils which 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.

The Revised Forest Plan Forest-wide design criteria identify maximum allowable soil loss thresholds (pp. 74-75). In order to determine whether the proposed actions meet these criteria, the Universal Soil Loss Equation (USLE) was used to calculate soil loss resulting from proposed

treatments. For this analysis, worst case-modeling scenarios were analyzed for soil map units with a severe erosion hazard potential, which would be impacted by the most intensive soil disturbing management actions.

The total calculated soil loss for the proposed management activities and the maximum allowable soil loss for three-year recovery period are displayed in the table below. These values are based on adequate implementation of erosion control treatment of log decks, temporary roads and primary skid trails (scarify waterbar and seed).

Table 3.2. Comparison of Proposed Action and Allowable Soil Loss

Soil Map Unit	Compartment/ Stand	Treatment	Soil Loss (tons/acre)	
			Proposed Action	Allowable
7	910/4	Plantation thinning	3.10	13.25
111	916/16	Commercial Thinning	8.84	14.75
8	912/32	Seedtree	10.18	12.75

These worst-case scenarios meet the Forest criteria of staying within the allowable soil loss Forested T-factor. These treatment units, along with other proposed treatment units of less intense soil disturbing management actions, would remain within acceptable limits over the entire project area when erosion control measures are adequately implemented.

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 decrease soil porosity. The soils in this planning area are most susceptible to compaction when wet.

The soil resource inventory identified 2 soil map units with a severe rating (0.03% of project area) no soil mapping unit with a high compaction rating (0% of project area), and 3 soil map units with a moderate-high rating (0.3% of project area). The latter hinges on whether or not the mapping unit has dominantly more than 15 percent by volume rock fragments in the soil surface, primarily due to low proportions of rock content in the top 6-inches of soil. Low rock content, combined with heavy equipment operation on wet soils, can result in unacceptable levels of compaction. To ensure that compaction effects are kept within acceptable levels, additional mitigation would be implemented. On soils with a moderate-high or high compaction hazard rating, logging would be limited to the drier periods of the year, namely April through November. On soils with a severe compaction hazard rating, logging would be limited to a July through November operating season. Even during these drier periods, extra care would be taken to monitor soil conditions and suspend operations when soils become wet. Given this mitigation, soil compaction would be limited and is not expected to impair soil productivity.

Fire. Any long-term negative effects to the soil would be related to high severity burns or very short (less than three-year) 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. Underburn frequencies would be three-years or greater, which would allow recovery of forest floors and soil biota and would not deplete soil nutrients.

Cumulative Effects

Effects from past actions are no longer impacting the soil resource. There are no present actions impacting the soil resource. There is always the potential for a wind or insect/disease event that would result in salvage or sanitation harvests within the same areas proposed for harvest under this project. Because salvage or sanitation harvests in response to these natural events would also follow the Revised Forest Plan guidance designed to protect the soil resource, any additive effect would be minimal.

No Action

Erosion - Only the undisturbed natural erosion would be expected to continue. This, however, does not consider the potential indirect effects of accelerated erosion rates that could occur in the event of a wildfire.

Compaction and Displacement - This alternative would result in no additional compaction or displacement as no heavy equipment use is planned.

Nutrient Loss - This alternative would result in no direct nutrient loss. However, in the event of a wildfire, the nutrient loss could well be the most excessive of any of the three alternatives. The excessive amount of nutrient loss under this scenario would then show this alternative to be the worst of the three alternatives analyzed.

Cumulative Effects - There would be no change to the existing condition and long-term soil productivity would continue to be maintained.

Water Quality

Current Conditions

The project area contains portions of two 6th level subwatersheds HUC 080401010104 (Camp Creek) and HUC 080401010202 (Big Fork). Streams of the project area drain north to the Ouachita River. Streams within the Board Camp project area include Board Camp Creek, Gap Creek, Starkey Creek, Macks Creek, Mill Creek and their unnamed tributaries. There are no impaired waterbodies (ADEQ 303(d) listing 2016), or designated ground sources (wells) for public drinking water.

Direct & Indirect Effects

Proposed Action

Direct effects of management activities would result from logging equipment and vehicles traversing stream crossings, fireline and road construction through streams, etc. These activities could place pollutants directly into a watercourse. While it is impractical to eliminate all soil from entering a stream, it is possible to limit the amount that directly enters streams by designing and implementing BMPs found within the RLRMP and Arkansas Forester's BMPs. 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 to water quality are those occurring at a later time or distance from the triggering management activity. Indirect effects are from management activities that do not have a direct connection to a stream course.

Timber harvest and fire can increase nutrients released to streams, with potentially positive or negative effects. Research studies in the Ouachita Mountains have shown increases in concentrations of some nutrients following timber harvest, but increases are generally small and short-lived, particularly where partial harvests are implemented (Oklahoma Cooperative Extension Service, 1994). Small increases in nutrient concentrations may have a beneficial effect on these typically nutrient-poor stream systems. Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed fire lines accounted for the majority of sediment from all watersheds.

Road maintenance and/or construction 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 (Lugo & Gucinski, 2000).

Increases in water yield are generally proportional to decreases in vegetative cover. Because vegetative cover would to some extent decrease, water yield increases are expected to be minor (Oklahoma Cooperative Extension Service, 1994). Stream channels in the area are capable of withstanding small increases in flow.

Forest monitoring has demonstrated that indirect effects from vegetation manipulation from harvest or stand improvement with buffers did not have a significant effect on water quality (Clingenpeel, 1989). Beasley et al. (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there was no meaningful impact to water quality.

The Proposed Action includes the use of the herbicides clopyralid, fluroxypyr, glyphosate, imazapic, imazapyr, metsulfuron methyl, and triclopyr for site preparation, release and for the control of non-native invasive species. 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 RLRMP. When all BMPs or regulations are implemented, there should be little 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 for silvicultural purposes. Herbicide monitoring across the Forest has found that only trace amounts of herbicide have ever been detected in streams (Clingenpeel, 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 meaningful threat to beneficial uses. Based on this evaluation, the BMPs used in the transportation, mixing, application and disposal are effective at protecting beneficial uses. Based on the results of these research and monitoring efforts and the mandatory implementation of BMP's an adverse direct or indirect effect resulting from these proposed management actions is unlikely.

No Herbicide

The effects of management activities would be the same as those described above except the listed effects from herbicide would not occur.

No Action

Although proposed soil disturbing activities resulting in stream sedimentation would not occur, watershed improvement activities, such as road decommissioning and fish passage restoration improvements would also not take place.

Cumulative Effects

Proposed Action, No Herbicide and No Action

The Aquatic Cumulative Effects (ACE) model was used to determine the watershed condition of the 6th level HUC subwatershed, as well as assess proposed project impacts. Watershed Condition Ranking (WCR) is a risk ranking integrated in the model that returns a High, Moderate, or Low ranking based on predicted sediment delivery to streams and effects on fish community diversity and abundance. The primary variables driving ACE, and subsequently the WCR, are road density, urban areas, pasture lands and project treatments.

Local research has shown that the effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Beasley, Miller, & Lawson, 1987). The timeframe of this model is bound by three years prior and one year following implementation. This captures the effects of other management activities that may still affect the project area. This is consistent with most project level environmental analyses that have an operability of five years. Proposed actions are constrained to a single year. This expresses the maximum possible effect that could occur. Past activities that have a lasting effect (such as roads and changes in land use) are captured by

modeling the sediment increase from the current condition. The predicted sediment delivery and risk level for each subwatershed is displayed in the table below.

Table 3.3. Sediment Delivery by Alternative

Subwatershed *6th level HUC ID#*	**Alternative**	**Sediment Delivery**		**Risk Level**
		Tons Per Year Increase	**% Increase***	
Camp Creek 080401010104	*Current Condition*	-	533	Moderate
	No Action	118	544	Moderate
	Proposed Action & No Herbicide	403	568	High
Big Fork 080401010202	*Current Condition*	-	379	Low
	No Action	129	388	Low
	Proposed Action & No Herbicide	239	396	Low

*Percent increase over sediment delivery from undisturbed condition

The predicted sediment delivery from the Proposed Action and the No Herbicide Alternative would change the current risk level in the Camp Creek watershed from moderate to high. Environmental effects are measurable and observable for short periods of time following storm flow events. Environmental effects persist and can change the hydrologic system with observable changes for as long as the causing action persist. Monitoring of aquatic biota is recommmended(USDA Forest Service, 2015).

To more realistically model predicted sediment, the Aquatic Cumulative Effects (ACE) Adjustment Protocol offers dispersing project impacts by spreading implementation over multiple years, rather than model all treatments to occur in one year. Apportioning implementation over five years resulted in a moderate risk to beneficial uses. Environmental effects are measureable and observable for short periods of time following storm flow events. These effects are short term (less than a few weeks) and do not affect large portions of the watershed (USDA Forest Service, 2015). Extensive stream surveying/monitoring has been conducted over the past 20 years in Board Camp and Gap Creek this monitoring will continue (USDA Forest Service, 2015). Careful attention has been given to prevent the exceedance of the sediment threshold set forth in the 2015 Wolf Pen Gap environmental assessment (EA p.72-74)

Big Fork watershed has a beginning risk level of Low and the resulting risk level following modeling of the proposed actions was Low. There is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits (USDA Forest Service, 2015).

Vegetation

Current Conditions

Based on recent forest inventories, the current acreage of the various age classes and the percentage of the Project Area they comprise are tabulated by forest type in the table below. This distribution is only forested land.

Table 3.4. Current Age Class Distribution by Forest Type

Age Class (years)		**Forest Type** (acres)				**Total**		
		Pine	**Pine-Hardwood**	**Hardwood-Pine**	**Hardwood**	Forested Acres	Suitable Acres	Percent Suitable Acres
0-10		0	13	0	0	13	0	0
11−20		335	96	25	38	494	490	8
21−30		382	239	0	12	633	610	10
31−40		545	223	319	62	1,149	768	13
41−50		336	8	120	26	490	391	6
51−60		130	66	25	0	221	178	3
61−70		45	0	0	80	125	125	2
71−80		105	212	44	90	451	426	7
81-90		540	352	225	200	1,317	496	8
91-100		1,802	1,706	404	833	4,745	1,886	31
101+		1,058	1,006	548	631	3,243	748	12
Total	Acres	5,278	3,921	1,710	1,972	12,881	6,118	100
	%	41	31	13	15			

Early Seral Conditions (Revised Forest Plan, WF001)**.** There are approximately no acres of early seral stage habitat (0-10 year age class) in the pine forest type. There are currently 8 acres of permanent wildlife openings that occur within the project area.

Mature Growth (Revised Forest Plan, WF006)**.** There are approximately 6,518 acres of pine and pine hardwood mature-growth (80 plus years of age) forest types, totaling 50% of the project area. There are 1,206 acres of hardwood and hardwood-pine mature-growth (100 plus years of age) forest types, totaling 9% of the project area.

Retention and Recruitment of Hardwoods. There are approximately 3,682 acres of hardwood and hardwood-pine forest types representing almost 29% of the timber resource within the project area. These forest types would be managed for retention (leave) and recruitment (addition) of hardwoods.

Hardwood Mast Production (Revised Forest Plan, WF003)**.** There are approximately 3,096 acres of 50+ year old hardwood and hardwood-pine forest types totaling almost 24% of the timber resource within the project area or almost 84% of the total hardwood and hardwood-pine forest types.

Stand Vigor and Health. Trees in most of the pine stands are crowded or densely stocked. This condition results in stress, reduced vigor and health, and increased susceptibility to insects and diseases. Hardwood stands, especially those near ridgelines, are stressed from periodic drought

and are also overstocked resulting in reduced vigor and health with increasing susceptibility to infestations by insects such as the Red oak borer *Enaphalodes rufulus*.

Non-Native Invasive Species. Several non-native invasive plant species have been detected throughout the project area. The most prevalent are found along roadways and other openings and are sericea lespedeza (*Lespedeza cuneata*), mimosa/silktree (*Albizia julibrissin*) and fescue grass species (*Lolium* spp.), which was widely used for erosion control and as a local forage grass. Japanese honeysuckle (*Lonicera japonica*) is found along roadways, openings, under dense canopies and within streamside management areas.

Direct & Indirect Effects

Proposed Action

The table below details the age class distribution of the project area after implementation of timber cutting activities. Age class distributions are shown for pine types and for all forested land (total of all forest types). There would be changes to both the pine and hardwood forest type age class distributions.

Table 3.5. Post-Timber Cutting Age Class Distribution by Forest Types

Age Class (years)		**Forest Type** (acres)				**Total**		
		Pine	**Pine-Hardwood**	**Hardwood-Pine**	**Hardwood**	Forested Acres	Suitable Acres	Percent Suitable Acres
0-10		585	13	0	0	598	585	10
11−20		335	96	25	38	494	490	8
21−30		382	239	0	12	633	610	10
31−40		545	223	319	62	1,149	768	13
41−50		336	8	120	26	490	391	6
51−60		130	66	25	0	221	178	3
61−70		45	0	0	80	125	125	2
71−80		105	172	44	90	411	386	6
81-90		442	284	225	200	1,151	330	5
91-100		1,658	1,612	404	833	4,507	1,648	27
101+		957	966	548	631	3,102	607	10
Total	Acres	5,520	3,679	1,710	1,972	12,881	6,118	100
	%	72.88	11.69	11.59	3.85			

Early seral habitat would increase to comprise 10% of suitable acres in the project area. Mature-growth pine (80 plus years of age) would decrease to almost 46% of the pine forest types. Diseased, damaged and suppressed trees would be cut and removed through commercial and non-commercial thinning activities on approximately 3,818 acres of pine and pine-hardwood stands. By reducing stand densities through thinning, stand vigor would improve.

During the regeneration cutting of pine stands, the target hardwood sprout/seedling component is

10 to 30 percent of stems, primarily in oaks and hickories (RLRMP, FR003, p.80). Hardwoods would be cut and removed in pine regeneration cutting areas through subsequent release treatments of shortleaf pine seedlings. However a minimum of 10 percent hardwood seedlings and/or saplings would be retained or maintained throughout the life of the stand where possible. Recruitment of hardwoods within these stands could also be impeded by these activities. Within the stands proposed for midstory reduction, selected suppressed and intermediate trees would be cut, thus increasing mast production for released trees.

Non-native invasive species (NNIS) would be reduced by treating identified populations across the project area with a combination of herbicide application and prescribed burning. Conversely, ground-disturbing activities such as timber cutting, temporary road construction, road maintenance, bridge construction, fish passage restoration, fireline construction/reconstruction, fireline maintenance, and wildlife pond construction/rehabilitation could increase the population and spread of NNIS by destroying individual stems which would result in prolific sprouting. They would also provide seedbeds for NNIS germination. Mechanical equipment could also dislodge seeds and transport them to unaffected areas. Implementation of Best Management Practices would reduce the possibility of introducing or spreading non-native invasive plants during project implementation.

No Herbicide

The effects of this alternative would be the same as those listed for the Proposed Action except that only manual or mechanical methods would be used in vegetation management activities. NNIS control would be more difficult; therefore, increasing the likelihood of continued spread. Site-preparation and release activities would be less successful, thus making stand establishment more difficult.

No Action

In the absence of natural disturbances, through time, the current age classes would retain the same distribution in relation to one another. However, the distribution would be increasingly skewed to the older age classes. The forest would continue to age, thus, moving more pine and hardwood acreage into mature growth. In the absence of fire or other vegetation management activities, trees would grow up and shade out shrubs, forbs, and grasses and reduce their quantities. In the absence of thinning and regeneration cuttings, forest health would be at risk due to the increased potential for forest pests such as the southern pine beetle and other pine beetles. Forest health and stand vigor would continue to decline.

The lack of active NNIS control would allow plants to continue to produce seed and opportunistically spread throughout the project area.

Cumulative Effects

Potential wind events or insect/disease outbreaks could trigger management actions that would affect many vegetative characteristics, including age class distribution (early seral, mature growth), and stand health and vigor. These effects would be additive to those occurring within the project area.

Public Health and Safety

Current Conditions

Refer to the present conditions described in the "Air Quality" section and the "Water Resources & Quality" section of this chapter.

Direct and Indirect Effects

Proposed Action

Refer to the "Air Quality" section of this chapter for disclosure of effects on public health and safety from prescribed burning.

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. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a meaningful threat to human health or aquatic organisms.

The risk characterization for the general public on the Syracuse Environmental Research Associates (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:

1) posting warning signs on areas that have been treated
2) selectively targeting for application only that vegetation that needs to be controlled rather than using a broadcast application
3) establishing buffer zones of non-treatment around private property, streams, roads and hiking trails
4) carefully transporting only enough herbicide for one days use
5) mixing it on site away from private land, open water or other sensitive areas
6) properly maintaining and operating equipment (e.g. no leaks)
7) having good accident preplanning and emergency spill plans in place.

In the event of an accidental spill, the Emergency Spill Plan (Forest Service Manual 2109 Chapter 30) would be followed. This plan contains procedures for spill containment and cordoning-off of the spill area. These measures along with others given in the RLRMP are incorporated into contracts and through good enforcement and administration would be effective in reducing the risk of accidental contamination of humans or the environment.

In the Board Camp Project Area, seven herbicide active ingredients fluroxypyr, glyphosate, impazapic, imazapyr, metsulfuron methyl, and triclopyr would be used at or below the rates allowed. The Revised Forest Plan allows for their use at the lowest effective rate. Site-specific

risk assessments developed by the SERA have been conducted for the Board Camp Project Area as required by the Revised Forest Plan and are located in the project file (USDA Forest Service, 2005a, Part 3, p 87, HU002). These worksheets allow for the generation of project-specific analysis of potential herbicide use.

The Board Camp Project Area 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 (2011), 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.**"

Active ingredient, ***imazapic***, may be used at a rate of 0.188 pound/acre within the Board Camp Project Area. 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).

The Board Camp Project Area calls for the potential use of 1.25 pound/acre of ***imazapyr*** to be used for site preparation treatments and 0.5 pound/acre for release treatments. The rate of 1.25 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.

The Board Camp Project Area calls for the potential use of 0.06 pound/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 pound/ acre. The rate of 0.06 pound/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.

Triclopyr triethylamine salt would be applied at a rate of up to 4 pounds/acre for cut-surface treatments and ***triclopyr butoxyethyl*** at a rate of up to 2 pounds/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. However, these hazards can be mitigated by requiring workers follow the safety measures listed at the beginning of this section.

In conclusion, application of herbicides at the stated rates would pose only an acceptably low risk to the workers and public in the environment.

No Herbicide

Refer to the Air Quality section of this chapter for disclosure of direct, indirect, and cumulative effects on public health and safety from prescribed burning.

Since no herbicides would be utilized under this alternative, there would be no direct, indirect, or cumulative effects on public health and safety resulting from herbicide use.

No Action

The prescribed burning and application of herbicides prescribed in the Proposed Action would not take place. Under the No Action Alternative, there would be no application of herbicides; therefore, there would be no effects to public health and safety in regards to the application of herbicides.

Cumulative Effects

There are no other past, present or reasonably foreseeable future applications of herbicide within the project vicinity that would be additive to the effects for this project area.

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 federally Proposed, Endangered, Threatened and Forest Sensitive (PETS) species and their associated habitats possibly or potentially affected by the proposed alternatives.

Current Conditions

Proposed, Endangered, Threatened and Sensitive Species (PETS)

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 Board Camp Creek 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, 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 (BE) for the Board Camp Creek Project Area (BCCPA) included in the project file. The Biological Evaluation for the BCCPA reviewed all PETS species identified to occur or potentially occur on the Ouachita National Forest. In all, 79 species were reviewed including 16 PET species and 63 Sensitive species. Of those, the BCCPA-BE reviewed 27 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 BCCPA-BE. 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. No direct, indirect, or cumulative effects would occur to the other PETS species listed in the BE that do not occur within the BCCPA and therefore are excluded from further discussion.

Effects Analysis 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 3.6. PETS Species evaluated for the proposed Board Camp Creek Project Area.

Group	Scientific Name	Common Name	Status
Mammal	*Myotis septentrionalis*	Northern Long-eared bat	Threatened
Mussel	*Lampsilis powellii*	Arkansas fatmucket	Threatened
Mussel	*Margaritafera monodonta*	Spectaclecase	Endangered
Mussel	*Theiliderma cylindrical*	Rabbitsfoot	Threatened
Mammal	*Perimyotis subflavus*	Tricoloured bat	Sensitive
Mussel	*Cyprogenia sp. cf. aberti*	Western fanshell mussel	Sensitive
Mussel	*Pleurobema rubrum*	Pyramid pigtoe	Sensitive
Mussel	*Alasmidonta marginata*	Elktoe	Sensitive
Mussel	*Toxolasma lividum*	Purple Lilliput	Sensitive
Mussel	*Obovaria arkansasensis*	Southern hickorynut	Sensitive
Mussel	*Pleurobema cordatum*	Ohio pigtoe	Sensitive
Crayfish	*Orconectes menae*	Mena crayfish	Sensitive
Fish	*Notropis perpallidus*	Peppered Shiner	Sensitive
Fish	*Notropis ortenburgeri*	Kiamichi Shiner	Sensitive
Fish	*Noturus taylori*	Caddo Madtom	Sensitive
Fish	*Percina brucethompsoni*	Ouachita Darter	Sensitive
Amphibian	*Plethodon caddoensis*	Caddo Mtn salamander	Sensitive
Insect	*Danaus plexippus*	Monarch butterfly	Sensitive
Vascular Plant	*Amorpha ouachitensis*	Ouachita false indigo	Sensitive
Vascular Plant	*Carex latebracteata*	Waterfall's sedge	Sensitive
Vascular Plant	*Castanea pumila* var. *ozarkensis*	Ozark chinquapin	Sensitive
Vascular Plant	*Solidago ouachitensis*	Ouachita Mtn goldenrod	Sensitive
Vascular Plant	*Streptanthus squamiformis*	Pineoak jewelflower	Sensitive
Vascular Plant	*Cypripedium kentuckiense*	Kentucky Lady's slipper	Sensitive
Vascular Plant	*Valerianella nuttallii*	Nuttall's cornsalad	Sensitive
Vascular Plant	*Draba aprica*	Open ground draba	Sensitive
Vascular Plant	*Valerianella palmeri*	Palmer's cornsalad	Sensitive

- **Northern Long-eared bat (***Myotis septentrionalis)* **Threatened**
- **Tricoloured bat** (*Perimyotis subflavus*) **Sensitive**

Direct & Indirect Effects

Proposed Action

Actions will occur more than 30 miles from known occupied, roost trees within the Alum Creek Experimental Forest on the Jessieville Winona Fourche Ranger Districts in Arkansas. There is one known NLEB hibernaculum within the BCCPA: the Heath Mine (Heath et. al, 1986). This mine is on private lands and was last sampled in 1985 by David Saugey (Jordan, pers. comm. 2019). No actions are proposed that would occur within 0.25 miles of the Heath Mine, which is located on private lands. Other known NLEB hibernacula are known to be close to the project

area but are at least 1.5 miles or farther from the project boundary. Three of these are on USFS lands: Golden, Twin Mines and Sugarlick and one mine is on private: Pip Mine.

The Board Camp Mine which is within the project area is known from past surveys to have tricoloured bats but not known to have NLEB. This mine occurs along a streamside and is within the SMZ buffer. There is also a known adit (Loop 06) but no bats are known from this site.

Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as: *group selection, clear cut, seed-tree, shelterwood, short-leaf restoration*) 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 both positively and negatively affect bat species within the analysis area. For instance, falling trees could directly affect roosting bats and/or maternity sites by felling roosting and/or maternity trees or damage by falling trees. If a maternity tree is felled, young non-volant pups could be killed. Disturbance within treatment areas may also cause bats to temporarily abandon treatment sites but actions would not likely exclude bats from foraging in treatment areas. Thinning of forest stands could indirectly alter foraging areas and temporarily change insect populations and densities within treatment areas. Insects populations would likely increase with increased plant diversity due to more open conditions and increased openness of the forest mid-story would also benefit foraging bats by easing movement through the forest.

No direct or indirect effects would occur to tricoloured bats or to northern long-eared bats as no winter hibernacula exists in the analysis area.

Herbicide Treatments (timber stand improvement activities and non-native invasive control)
Manual Treatments for Non-Native Invasive, Exotic and Nuances Control:
Direct effects to these bats are unlikely due to herbicide applications for timber stand improvement and non-native invasive species treatments occurring during the day when bats are not active. Both positive and negative indirect effects could occur from potentially reducing/increasing vegetation and consequently the insect population numbers of diversity in treatment areas. Direct and indirect effects for manual control methods would be the same as those determined for timber management treatments.

Prescribed Burning (such as; fuel reduction and fire restoration treatments):
Prescribed burning would not directly affect northern long-eared bats in the winter because there are no known hibernacula's in the analysis area. Prescribed burning would not likely affect tricoloured bats in the winter because of the location of the Board Camp Mine occurring along the stream, where there are wetter conditions. Habitat surrounding the mine is within the streamside management area and these areas typically have wetter conditions and would likely not burn or at least not burn hot. Fire, heat, particulates such as carbon monoxide and smoke from prescribed burning could indirectly effect bats but would be expected to be minimal because most would be burnt in the dormant season. Indirect effects may also burn up or create roost or maternity trees or possibly reduce the amount of understory vegetation improving bat movement and foraging activity by maintaining uncluttered foraging pathways and easier access to roost trees. Disturbance from smoke may also cause bats to temporarily abandon treatment sites, but actions would not likely exclude bats from foraging in treatment areas. The variety of

fire intensities that would occur due to environmental conditions would provide a habitat mosaic with varying degrees of understory and midstory vegetation removal and occasional overstory tree mortality. Prescribed fire would help maintain and create habitat for these bat species.

Pond and Wildlife Openings Rehabilitation:
Wildlife openings and ponds play an important role in the foraging ecology of woodland bat species. Many bat species take advantage of wildlife ponds for drinking and foraging since openings often support a high concentration of insects and a rich diversity of insect populations. The uncluttered flying space provided by openings allows bats to freely maneuver, find and catch insect prey and expend less energy than they normally would in a more heavily forested habitat.

Ponds provide important ecological niche habitats essential to certain species of amphibians, birds, reptiles and insects as well as mammals like bats. Wildlife ponds often support hydrophytic (water dependent plant species) vegetation not found in riparian systems which in turns supports a whole host of aquatic insect species also not found in streams and river systems. This diversity of vegetation and associated insect populations would provide excellent foraging habitats for bats.

The direct and indirect effects of rehabilitating ponds would be similar to those for timber harvest and non-native invasive treatments.

Soil Stabilization and Restoration (such as; stream restoration, soil erosion stabilization, dispersed campsite closure, unauthorized road/trail closure and decommissioning):
Proposed soil stabilization and restoration treatments would be used to protect wildlife, soil and water resources. No direct effects to bats are anticipated since actions would be the closure of currently open roads/trails and rehabilitate impacted areas. Indirect benefits would be likely since proposed actions would provide linear flight corridors and linear foraging areas for bats.

Road Construction (Temporary), Reconstruction and Maintenance Treatments and Shale Borrow Site Use:
Direct and indirect effects/impacts would be the same as those determined for timber management and soil stabilization and restoration treatments.

Resource Protection – Gate or Berm Installation:
Road closure structures would be placed at various road accesses to wildlife habitat areas and roads in order to protect potential sensitive species habitats, for public safety concerns and to decrease open road density in the analysis area. No direct or indirect impact to these bat species is anticipated.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

The No Action alternative would have no direct effects on northern long-eared bats. Indirect 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.

Cumulative Effects

Proposed Action & No Herbicide

No cumulative effects are anticipated from the proposed action. Proposed timber management activities are anticipated to have an overall positive effect for the NLEB and tricoloured bat by improving and maintaining roosting and foraging habitat.

No Action

No Action would result in 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, bat populations could be affected. There are no known reasonably foreseeable future activities expected to occur on private, state and city lands, therefore, no cumulative effects are expected to occur.

Direct & Indirect Effects

- **Spectaclecase (***Margaritafera monodonta***) Endangered**
- **Arkansas fatmucket (***Lampsilis powellii***) Threatened**
- **Rabbitsfoot (***Theiliderma cylindrical***) Threatened**
- **Southern hickorynut (***Obovaria arkansansis***) Sensitive**
- **Elktoe** (*Alasmidonta marginata*) **Sensitive**
- **Purple Lilliput (***Toxolasma lividum***) Sensitive**
- **Ohio Pigtoe (***Pluerobema cordatum***) Sensitive**
- **Pyramid pigtoe (***Pluerobema rubrum***) Sensitive**
- **Western fanshell (***Cyprogenia sp. cf aberti***) Sensitive**
- **Caddo Madtom (***Noturus taylori***) Sensitive**
- **Ouachita Darter (***Percina brucethompsoni***) Sensitive**
- **Kiamichi Shiner (***Notropis ortenburgeri***) Sensitive**
- **Peppered Shiner (***Notropis perpallidus***) Sensitive**
- **Mena crayfish (***Orconectes menae***) Sensitive**

Proposed Action

All proposed management activities except for: *Road Construction, Reconstruction and Maintenance Treatments, Soil Stabilization and Restoration, Herbicide treatment outside SMA for reducing small woody vegetation in areas of WSI treatments and NNIS outside SMA:* No direct or indirect effects would occur to any of the PETS species from proposed management activities because these species and their habitats do not occur within the planned treatment

areas. These aquatic PETS species and their habitats are currently protected by streamside management areas, as defined in the Revised Forest Plan (USDA Forest Service, 2005a).

Road Stream Restoration, Road Construction (Temporary), Reconstruction and Maintenance Treatments, Soil Stabilization and Restoration and NNIS inside the SMA:
Indirect effects could occur to habitat and known species locations that occur downstream within the watershed analysis area outside the Forest Administration boundary from increased siltation during restoration activities. No direct effects will occur for the T&E mussels and PETS fish, crayfish and mussel species.

Removal of vegetative cover and soil disturbance as temporary roads, Reconstruction of roads and maintenance are established shaped and drainage structures installed would temporarily increase sedimentation, concentrate runoff, and potentially impact water quality, but failure to relocate some of these roads and to maintain other roads would have more detrimental impacts than the proposed roadwork. Fire-lines would take advantage of existing roads and trails plus natural barriers (streams) thus eliminating the need to manually construct new lines.

No direct effects are anticipated. Indirect effects may occur from input of sediments. Disturbance will be temporary and of short duration and work within SMA's would be completed during low flow periods with implementing RFP standards and guidelines. No cumulative effects are anticipated to the aquatic PETS.

Herbicide Treatments (non-native invasive control-within SMA) ***for Non-Native Invasive, Exotic and Nuances Control***:
Herbicide application and manual control methods for NNIS species would be allowed throughout the proposed planning area as needed for elimination/control of non-native invasive weeds. The Mena-Oden 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, 2005) include data regarding the toxicity of any of these chemicals or their formulations specific to these sensitive aquatics. Most all bioassay studies use various fish species, mainly bluegill and trout species, which will be used as the closest representative to these aquatic PETS species.

Table 3.7 Summary of LD_{50} Values for Each Proposed Herbicide Active Ingredient

Active Ingredient	LC_{50}*	Toxicity Risk to Bluegill	Risk Assessment
Fluroxypyr	14.3-100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	0.96mg/L-429mg/L	Practically Nontoxic To moderately toxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	4.0mg/L to	Practically Nontoxic	Syracuse Environmental

Active Ingredient	LC_{50}*	Toxicity Risk to Bluegill	Risk Assessment
	10.4mg/L		Research Associates, Inc. 2011b
Metsulfuron Methyl	>150mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004c
Triclopyr	20 mg a.e/L to 210 mg a.e./L+ Varies greatly with formulation	Appears to be somewhat toxic with great variation	Syracuse Environmental Research Associates, Inc. 2011c
Clopyralid	>100mg/L	Practically Nontoxic	Syracuse Environmental Research Associates, Inc. 2004d

LC_{50}** - lethal concentration for 50% of population tested
NOAEC+ – no observable adverse effect concentration=a.e. (acid equivalent)

Direct and indirect effects to these aquatic PETS species could occur as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities but are not likely due to approximately 99% of NNIS treatments will be occurring outside streamside management area protection buffers (aquatic habitats).

Direct and indirect effects could occur to these aquatic PETS species as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities but are not likely due to following RFP protections and conservation measures:

> *The RFP only allows herbicide use within MA 9 for control of vegetation on dams or for control of invasive and/or exotic species. Application would be approved by the Forest Supervisor following site-specific analysis and a monitoring plan (design criteria 9.13). Only a non-soil active herbicide with appropriately labeled formulation for both aquatic and terrestrial site use would be used.*

As part of implementation, each site proposed for treatment would be evaluated for the presence of populations or of habitat for PETS species and for determining the best treatment method and timing and these aquatic PETS species are not known to occur within the project area.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

Aquatic habitats are protected under all alternatives by management standards in the Revised Forest Plan. The No Action alternative would have no directs effects on aquatic PETS species. Indirect effects would continue to contribute sediments to streams from stream crossings and creating barriers to aquatic organism passage.

Cumulative Effects

All alternatives

Road Reconstruction and maintenance and soil stabilization treatments within the BCCPA are anticipated to benefit aquatic PETS species by decreasing overall stream siltation and sedimentation and improving water quality. None of the other proposed management actions are expected to have any cumulative effects on these forest PETS species. All fish, crayfish and mussels and aquatic habitats used by these species are protected by streamside management areas as defined in the Revised Forest Plan (USDA Forest Service, 2005a).

- **Caddo Mountain salamander** *(Plethodon caddoensis)* **Sensitive**

Proposed Actions

Even though direct effects could occur from tree felling by crushing individual salamanders on the ground, it is unlikely, due to the very small area of impact, timing of implementation, and preferred habitats. These salamanders generally occur in habitats such as; steep, rocky, north facing slopes, of mixed deciduous hardwoods adjacent to riparian habitats and certain mine locations. These salamanders require moisture and are usually found along the wetted streamside management areas on northern slopes.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

The No Action alternative would have no direct effect. Indirect and effects would include the natural succession of early seral habitats into mature forest.

Direct, Indirect, and Cumulative Effects from Proposed Actions

Areas along streams will be protected, these streamside management areas will be delineated using the protocols in the Forest Plan. Therefore no direct, indirect or cumulative impacts are anticipated from the proposed actions.

- **Monarch butterfly (*Danaus plexippus*) Sensitive**

Direct & Indirect Effects

Proposed Action

Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as; *group selection, clear cut, seed-tree, shelterwood, short-leaf restoration*) 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 and 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.

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.

Herbicide Treatments (timber stand and wildlife stand improvement activities and non-native invasive control)***. Manual Treatments for Non-Native Invasive, Exotic and Nuances Control***: The Mena-Oden 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 Monarch butterfly 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.

Table 3.8. Summary of LD_{50} Values for Each Proposed Herbicide Active Ingredient

Active	LD_{50}*	Toxicity Risk to	Risk Assessment

Ingredient	Bee - *Apis mollifera*		
Fluroxypyr	>25µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2009
Glyphosate	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	No LD50 stated	Nontoxic	Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	>860 mg/kg body weight***	Nontoxic	Syracuse Environmental Research Associates, Inc. 2011b
Metsulfuron Methyl	>25µg/bee	Relatively Nontoxic to bees and White butterfly (Brassica nepus)	Syracuse Environmental Research Associates, Inc. 2004c
Triclopyr	620mg/kg body weight	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2011c
Clopyralid	>100 µg/bee	Relatively Nontoxic	Syracuse Environmental Research Associates, Inc. 2004d

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

Direct and indirect impacts for manual control methods would be the same as those determined for timber management treatments.

Prescribed Burning (such as; fuel reduction and fire restoration treatments):
No direct impacts from prescribed burning are anticipated on adult Monarch butterfly 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 watershed. Indirect effects of proposed burning would enhance and increase acres of suitable foraging and egg laying habitat.

Resource Protection – Gate or Berm Installation:
Since proposed crossing actions are not likely within habitats preferred by this butterfly species, no direct or indirect impacts are anticipated.

Pond and Wildlife Opening Rehabilitation:
Direct and indirect effects would be the same as timber and non-native invasive weed treatments.

Soil Stabilization and Restoration (such as; stream restoration, soil erosion stabilization, dispersed campsite closure, unauthorized road/trail closure and decommissioning):
Proposed soil stabilization and restoration treatments would be used to protect wildlife, soil and water resources. No direct impacts to Monarch butterfly are anticipated since actions would be

to close currently open roads, and rehabilitate impacted areas. It is likely proposed actions would indirectly benefit butterflies by allowing these areas to re-vegetate thus providing potential foraging habitat.

Road Construction (Temporary), Reconstruction and Maintenance Treatments and Shale Borrow Site Use:
Direct and indirect would be the same as those determined for timber management and soil restoration treatments.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

The No Action alternative would have no direct effect on Monarch butterfly. Indirect and 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 Monarch butterfly populations would be expected to decline.

Cumulative Effects

There would be no cumulative effects resulting from the proposed action because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on Monarch butterfly.

Sensitive Plant Species

Sensitive plant species have been organized according to habitat type in order to more concisely describe direct, indirect and cumulative effects. The habitat types of sensitive plants within the analysis area are: streamside management area (SMA), glade or similar habitats, plants that prefer moderately disturbed habitat and mesic habitats.

Sensitive Plant Species of Streamside Management Areas

- **Ouachita false indigo** (*Amorpha ouachitensis*) **Sensitive**
- **Kentucky lady's-slipper** (*Cypripedium kentuckiense*) **Sensitive**

Direct & Indirect Effects

Proposed Action
Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as; *group selection, clear cut, seed-tree, shelterwood, short-leaf*

restoration) manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction):
Timber management treatments are proposed for upland shortleaf pine, pine/hardwood and hardwood stands and these areas only support habitat conditions for these sensitive species within streamside management areas and wetland communities such as; seeps and springs, which are protected by the standards in the Revised Forest Plan. The proposed timber management actions would have no direct or indirect impact on these sensitive plant species.

Herbicide Treatments (timber and wildlife stand improvement activities and non-native invasive control). ***Manual Treatments for Non-Native Invasive, Exotic and Nuances Control***:
Direct and indirect impacts from herbicide application or manual control methods for timber stand improvement treatments would be the same as those determined for timber management treatments.

Herbicide application and manual control methods for NNIS species would be allowed throughout the proposed planning area as needed for elimination/control of non-native invasive, exotic and or nuances plants. Direct effects to these sensitive plant species could occur as a result of contact with herbicide or with personnel conducting mechanical and chemical control activities but are not likely due to approximately 99% of NNIS treatments occurring outside suitable habitats, streamside management area protection buffers (aquatic habitats) and following RFP protections and conservation measures:

> *The RFP only allows herbicide use within MA 9 for control of vegetation on dams or for control of invasive and/or exotic species. Application would be approved by the Forest Supervisor following site-specific analysis and a monitoring plan (design criteria 9.13). Only a non-soil active herbicide with appropriately labeled formulation for both aquatic and terrestrial site use would be used. 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).*

Indirect effects would be reduced competition for resources from control of encroaching non-native invasive plants. As part of implementation, each site proposed for treatment would be evaluated for the presence of populations or of habitat for PETS species and for determining the best treatment method and timing.

Prescribed Burning (such as; 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. Overall prescribed fire is not likely to directly impact these sensitive plant species due to the wet habitat conditions in which they normally occur and prescribed burning occurring during the plants dormancy. Indirectly, plants may benefit post burn due to reduced competition.

Soil Stabilization and Restoration (including unauthorized road/trail closure and decommissing)***:***
Proposed soil stabilization and restoration treatments would be used to protect wildlife, soil and water resources. No direct effects would occur to these sensitive plant species since there are no known occurrence and that sites do not support habitat conditions conducive to these sensitive

plant species or presently, sites do not contain suitable habitat for these sensitive plant species due to impacts of over use. Indirect effects anticipated from rehabilitation of these sensitive plant species habitats are reduced stream siltation, soil compaction and sedimentation.

Road Construction (Temporary), Reconstruction and Maintenance Treatments and Shale Borrow Site Use:
Surveys found that proposed sites do not contain suitable habitats capable of supporting these sensitive plant species except at stream crossings and riparian habitats. Fire lines used for prescribed burning would take advantage of existing natural barriers such as existing roadways, trails and streams and utilizing hand lines and or back blading within streamside management areas limiting the amount of disturbance in preferred habitats. Direct or indirect effects are not anticipated because of the limited amount of disturbance to preferred habitats.

Resource Protection – Gate and Berm Installation: Pond and Wildlife Opening Rehabilitation:
Since proposed actions would occur outside of habitats preferred by these sensitive plant species no direct or indirect impacts are anticipated.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

No Action would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these sensitive species and their associated habitats which are at the edges of streams, in seeps, wetland and riparian areas. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally and to which these species are adapted. No direct or indirect effects on these sensitive plant species would occur as a result of deferred management.

Cumulative Effects

All alternatives

There would be no cumulative effects resulting from any alternative because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on these PETS plant species.

Sensitive Plants Preferring Moderate Disturbance
The next sensitive plant species receive some natural protection from human disturbance by the diversity of their preferred habitats, as described below. Many of the locations on NF lands are on sites that are outside the normal operating limits and activities. Several of the sites on NF lands are protected from habitat-altering activities by virtue of being within glade and riparian communities, Wilderness Areas, and Research Natural Areas. There are also sites located within

areas that have had timber management activities, road and trail construction and in areas that have been burned repeatedly.

These sensitive plant species prefer moderate disturbances to help sustain their populations. Soil disturbances, creation of small blocks of early successional habitat, reduction in competition for water and nutrients from neighboring plants, and exposing bare mineral soil for seed contact are some of the benefits they gain by disturbances such as timber management actions.

- **Waterfall's sedge** (*Carex latebracteata*) **Sensitive**
- **Ozark chinquapin** (*Castanea pumila ozarkensis*) **Sensitive**
- **Pineoak jewelflower** *(Streptanthus squamiformis)* **Sensitive**

Direct & Indirect Effects

Proposed Action

Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as; *group selection, clear cut, seed-tree, shelterwood, short-leaf restoration*) manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction):
Waterfall's sedge appears to respond well to moderate levels of disturbance and this is evidenced on the Mena RD by the large number of Waterfall's sedge populations found near maintained roads, mowed roadsides, old logging decks and re-vegetated logging roads. Although it is likely that vegetative portions of individual plants might be directly impacted by felling timber and timber removal this disturbance should not pose a significant risk to the local populations. Thinning of timber stands often indirectly improves habitat conditions for Waterfall's sedge by allowing more sunlight to reach the forest floor (increasing growth potential and seed production) and by providing areas of disturbed soil for dispersal of seeds and development of new growth. Individual plants may be damaged or even uprooted during timber harvest and planting but overall habitat conditions should improve for Waterfall's sedge as a result of the proposed actions. No cumulative impacts to waterfall's sedge are anticipated from the proposed timber management actions.

Botanical field surveys found no new location of Ozark chinquapin. Known locations are outside of the proposed timber management treatment area. The proposed timber management actions would have no direct, indirect, or cumulative impact on Ozark chinquapin.

Herbicide Treatments (timber and wildlife stand improvement activities and non-native invasive control). ***Manual Treatments for Non-Native Invasive, Exotic and Nuances Control***:
Direct and indirect impacts from herbicide application or manual control methods for timber and wildlife stand improvement treatments would be the same as those determined for timber management treatments.

Application and manual control methods for NNIS species would be allowed throughout the proposed planning area as needed for elimination/control of non-native invasive, exotic and or nuances plants. Direct effects to these sensitive plant species could occur as a result of contact

with herbicide or with personnel conducting mechanical and chemical control activities. Effects are expected to be minimal due to approximately 98% of NNIS treatments would be occurring outside suitable habitats, and following RFP protections and conservation measures:

> *Application would be approved by the Forest Supervisor following site-specific analysis and a monitoring plan (design criteria 9.13). Only a non-soil active herbicide with appropriately labeled formulation for both aquatic and terrestrial site use would be used. 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).*

Indirect effects would be reduced competition for resources from control of encroaching non-native invasive plants. As part of implementation, each site proposed for treatment would be evaluated for the presence of populations or of habitat for PETS species and for determining the best treatment method and timing. Due to the low number of individual plants likely to be impacted and relative abundance of plants within the overall watershed; species viability and distribution are not anticipated to be significantly impacted. No cumulative effects are anticipated.

Botanical field surveys found no new locations of Ozark chinquapin. Known locations are outside of the proposed treatment areas. All proposed herbicide treatments would follow Forest Plan (USDA FS 2005a) direction and exclude Ozark chinquapin from treatment. No direct, indirect or cumulative impacts to Ozark chinquapin 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. Vegetative portions of plants and some seed loss would likely 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. All known locations for Ozark chinquapin are outside of burn areas. 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.

Soil Stabilization and Restoration (stream restoration, soil erosion stabilization, dispersed campsite closure, unauthorized road/trail closure and decommissioning):
Proposed soil stabilization and restoration treatments would be used to protect wildlife, soil and water resources. No direct effects would occur to these sensitive plant species since there are no known occurrence and that sites do not support habitat conditions conducive to these sensitive plant species or presently, sites do not contain suitable habitat for these sensitive plant species due to impacts of over use. It is likely that Waterfall's sedge would receive some indirect benefits from restoration activities since Waterfall's sedge shows some preference for disturbed soils it is probable that portions of restored areas would provide suitable habitat for plant establishment.

Road Construction (Temporary), Reconstruction and Maintenance Treatments and Shale Borrow Site Use: ***Pond and Wildlife Opening Rehabilitation***:

Proposed treatments may directly impact individual plants through uprooting or by burying plants under displaced soils. In an effort to lessen the potential direct impacts to sensitive plants identified plant locations would be flagged and proposed segments will either be dropped from consideration or be re-routed to avoid significant plant populations and fire lines used for prescribed burning would take advantage of existing natural barriers such as existing roadways and streams and utilize hand lines within streamside management areas limiting the amount of disturbance in preferred habitats. Despite these efforts it is not possible to avoid all known or identified plant locations and thus it is likely that individual plants would be impacted by the proposed actions. With the occurrence of these sensitive plants being extremely low within the project area, the risk of impacting individual species is unlikely.

Field observations indicate that Waterfall's sedge would indirectly benefit from proposed actions in that this plant species tends to prefer sites with disturbed soils. Temporary roads once closed would provide opportunities for new plant establishment and growth as has been witnessed elsewhere in the watershed.

Resource Protection - Gate Installation/Berm Installation:
No direct, indirect or cumulative impacts from these proposed treatments are anticipated due to the limited area of disturbance and that sites do not support habitat conditions conducive to these sensitive plant species or presently, sites do not contain suitable habitat for these sensitive plant species due to impacts of over use.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

These sensitive plants grow in a wide variety of habitats, populations would be expected to remain viable and stable under this alternative. Ozark chinquapin occurs entirely as stump sprouts due to chestnut blight a condition in which it has persisted for decades. Individual plants within the analysis area would be expected to remain stable as long as stumps continue to persist. No direct or indirect effects are anticipated from the No Action alternative.

Cumulative Effects

All Alternatives

There would be no cumulative effects resulting from these alternatives because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on these PETS plants species.

Sensitive Plant Species of Glades and Similar Habitats

These plant species all prefer glade and similar habitats. These areas are isolated from most management activities due to the provisions of the Revised Forest Plan.

- **Nuttall's cornsalad** (*Valerianella nuttallii*) **Sensitive**
- **Open ground draba (***Draba aprica***) Sensitive**
- **Palmer's cornsalad (***Valerianella palmeri***) Sensitive**
- **Ouachita Mountain goldenrod** *(Solidago ouachitensis)* **Sensitive**

Direct & Indirect Effects

Proposed Action

All proposed management activities except for Prescribed Burning:
No effects to these sensitive plant species are anticipated since these plant species primarily occur in unsuitable areas for timber management.

Prescribed Burning (such as; site prep, 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 fire could directly impact these sensitive plant species but is unlikely due to implementation during plant dormancy and the systems terrain, which carry fire poorly. The proposed actions would mimic natural fire and would be expected to be within the normal range of habitat fluctuation that occurs naturally and which would benefit these sensitive plant species by restoring and maintaining their preferred habitats.

No Herbicide

The No Herbicide alternative would have no direct or indirect effects as a result of deferred herbicide use. However, effects from mechanical/non-herbicide treatments would be the same as in Proposed Action alternative.

No Action

The No Action alternative would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these sensitive plant species and their associated glade and similar habitats. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally and to which these species are adapted. No direct or indirect effects are anticipated on these plant species as a result of deferred management.

Cumulative Effects

Proposed Action & No Herbicide

There would be no cumulative effects resulting from the proposed action because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on these sensitive plant species.

No Action

The No Action alternative would allow natural processes to occur without human intervention. Only natural disturbances would cause changes to these sensitive plant species and their associated glade and similar habitats. These changes would be expected to be within the normal range of habitat fluctuation that occurs naturally and to which these species are adapted. The No Action alternative would have no cumulative effect on these plant species as a result of deferred management.

Management Indicator Species

The MIS Revised Forest Plan selection process reviewed the Ouachita National Forest list of MIS, and concluded that the 24 species listed in Table 14 (USDA Forest Service 2005b) 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 of 16 was selected as MIS for this project. MIS selected include both terrestrial and aquatic species.

Table 3.9. 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 woodland community	Yes
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 (outside MA 22)
Prairie warbler	*Dendroica discolor*	To help indicate effects of management on early successional component of forest communities	Yes
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 recreation fishing ponds exists within the project areas)			

Common Name	Scientific Name	Primary reason(s) for selection	Selected as MIS for Project (Yes/No)
Bluegill	*Lepomis macrochirus*	To help indicate management effects on health of ponds and lakes and demand for recreational fishing.	Yes
Redear sunfish	*Lepomis microlophus*		No
Largemouth bass	*Micropterus salmoides*		Yes
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
Highland stoneroller	Campostoma spadiceum		
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
Highland stoneroller	*Campostoma spadiceum*		
Creek chubsucker	*Erimyzon oblongus*		
Green sunfish	*Lepomis cyanellus*		
Longear sunfish	*Lepomis megalotis*		
Ouachita Mountain Ecoregion Streams			
Highland stoneroller	*Campostoma spadiceum*	To help indicate effects of management on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion.	Yes
Johnny darter	*Etheostoma nigrum*		No
Orangebelly darter	*Etheostoma radiosum*		Yes
Redfin darter	*Etheostoma whipplei*		No
Northern studfish	*Fundulus catenatus*		Yes
Northern hog sucker	*Hypentelium nigricans*		Yes
Green sunfish	*Lepomis cyanellus*		Yes
Longear sunfish	*Lepomis megalotis*		Yes
Striped shiner	*Luxilus chrysocephalus*		Yes
Smallmouth bass	*Micropterus dolomieu*		Yes
Channel darter	*Percina copelandi*		No
Forest-wide			
Smallmouth bass	*Micropterus dolomieu*	To help indicate the effects of management on meeting public fishing demand in streams	Yes

Effects Analysis: Management Indicator Species

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 are similar to the effects on others. 3) Each species, or group of species, is discussed by alternative. 4) Each alternative, direct, indirect, and cumulative effects on each species or group of species is discussed.

Terrestrial MIS

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 (2019-2029) for each alternative. Projected numbers of terrestrial MIS per square mile are listed in Table 3.8 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 3.10. Response of selected Management Indicator Species to alternative by decade of implementation.

Management Indicator Species						
Alternative	**White-tailed Deer**	**Pileated wood-pecker**	**Eastern Wild Turkey**	**Northern Bobwhite**	**Scarlet Tanager**	**Prairie Warbler**
	Individuals per square mile					
Baseline	14	33	6	11	29	5
Alternative 1 – No Action						
Project 1st year	14	33	6	11	29	5
Project at 10 years	14	35	6	11	31	0
Alternative 2 – Proposed Action & Alternative 3 - Proposed Action without Herbicides						
Project 1st year	24	26	7	48	28	51
Project at 10 years	20	32	6	34	30	20

Current Conditions

Demand and Pine-Oak Woodland Species

- **Northern Bobwhite Quail** *(Colinus virginianus)*

Northern Bobwhite was selected as a *Demand Species* indicator and also to indicate 'Early Forest Stage Cover.' It was selected because of its small game status, economic importance; preference

for forest openings interspersed with timber for cover and associated ecotones as an indicator of effects of management on the pine-oak woodland and pine bluestem communities.

This species has experienced population declines across Arkansas due to decreases in early seral stage habitat, loss of agricultural lands, and changes in agricultural practices. In the 2005 Forest Plan Environmental Impact Statement (EIS), the minimum population objective for the Northern Bobwhite is 36.6 birds per square mile, after 10 years (USDA Forest Service 2005b, p.166.). Northern Bobwhite call counts, Ouachita National Forest Landbird Point monitoring, and CompPATS Habitat Capability data all provide information on bobwhite populations and habitat capability.

Since FY 1997, the Ouachita NF has been conducting bird surveys on over 300 Landbird monitoring points. Northern Bobwhite data indicate a slight downward trend in birds detected over this 20-year period, but leveling out during the past 5 years. Estimated habitat capability for the Northern Bobwhite shows a fairly stable trend over the previous 9 years, but indicates a slight downward trend over the last 5 years. This is still far from reaching the projected FY 2015 desired forest-wide habitat capability of 101,748 based on 2005 Forest Plan. One major factor is that early seral habitat creation has never attained the 2005 Forest Plan objective of 5,500 acres per year (USDA Forest Service, 2015b).

The Northern Bobwhite population viability on the Ouachita NF is not expected to be threatened and populations are expected to improve through 2005 Forest Plan implementation. The Ouachita NF has pursued aggressive prescribed fire and thinning programs that are providing habitat improvements, especially associated with some 200,000 acres of shortleaf pine-bluestem grass ecosystem restoration. It is expected that these management actions will soon positively act to overcome the downward trends (USDA Forest Service, 2015b).

- **Prairie Warbler** (*Dendroica discolor*)

The Prairie Warbler is a MIS on the Ouachita National Forest, selected to help indicate the effects of management on the early successional component of forest communities. As a neo-tropical migrant, the Prairie Warbler is an international species of concern. This species uses early successional habitats such as regenerating old fields, pastures, and young forest stands. The vegetation selected may be deciduous, conifer, or mixed types. Habitats with scattered saplings, scrubby thickets, cutover or burned over woods, woodland margins, open brushy lands, mixed pine and hardwood, and scrub oak woodlands are most often selected.

In the 2005 Forest Plan Environmental Impact Statement (EIS), the minimum population objective (per square mile) for the Prairie Warbler is 40.5 birds, after 10 years (USDA Forest Service 2005b, p.166). Information on Prairie Warbler population and habitat capability trends are provided from data from Breeding Bird surveys, Phase II research on the Ouachita National, Ouachita National Forest Landbird Point monitoring, and CompPATS Habitat Capability.

Landbird data shows a slight upward trend since FY 2006 and a decline since 2012. Throughout the Prairie Warbler range, a downward trend is indicated. Habitat capability on the Ouachita also continues to show a downward trend, consistent with range wide trends, but hinting of having plateaued over the last four years. However, the population viability on the Ouachita NF

should not be threatened. The population decline has been exacerbated by the fact that the quantity of early seral habitat expected to be produced annually (5,500 acres), largely by seed tree and shelterwood cutting, has not yet been realized. Meanwhile, increases in thinning and prescribed fire in the pine and pine-hardwood types especially that associated with approximately 200,000 acres of shortleaf-bluestem ecosystem restoration, will benefit Prairie Warbler populations (USDA Forest Service, 2015b).

Direct & Indirect Effects

Proposed Action

Timber Management (thinning's (such as: *pre-commercial, commercial, woodland*), regeneration harvest (such as: *seed-tree, group selection, clear cut, shelterwood, short-leaf restoration*) manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction):
Direct impacts from the various proposed vegetation treatments could come in the form of trees being felled on nests or increased logging disturbance causing abandonment of nests. Re-nesting would also likely occur in most situations of disturbance thus offsetting overall losses in brood production.

The Proposed Action calls for the creation of several areas of early seral stage habitat. All proposed timber treatments would open up the canopy, allowing sunlight penetration to the forest floor, and an increase of early seral vegetation essential to bobwhite and prairie warbler. Overall the proposed actions would create a variety of habitats (foraging, nesting, brooding, 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. For example; seed tree harvest would provide benefits for a shorter time span and similar treatments like shelterwood and especially woodland/old growth restoration treatments would provide more long term habitat benefits due to their size and varying landscape attributes (soil types, moisture gradients, slope aspects).

Given the proposed treatments it is likely that the proposed action would provide long term indirect benefit's to bobwhite and prairie warbler. Populations of these birds within the analysis area could expect improved early seral habitat conditions for the next 5-10 years and beyond in timber harvest areas and indefinitely in woodland/old growth restoration areas.

Herbicide Treatments (timber and wildlife stand improvement activities and non-native invasive control). ***Manual Treatments for Non-Native Invasive, Exotic and Nuances Control***:
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 prairie warbler, northern bobwhite and or Mallard studies will be used to support a discussion of potential risks for these MIS species.

Table 3.11. Summary of LD_{50} 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	540mg/kg to 1500mg/kg of body weight	U.S. EPA/OPP (1993) classifies glyphosate as no more than *slightly toxic* to birds	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	>2150mg/kg of body weight	*Practically Nontoxic*	Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	>2510mg/kg of body weight	*Practically Nontoxic*	Syracuse Environmental Research Associates, Inc. 2011b
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. 2004c
Triclopyr	116mg/kg of body weight	U.S. EPA/OPP (1998b) has classified triclopyr as being *slightly toxic to birds*	Syracuse Environmental Research Associates, Inc. 2011c
Clopyralid	LC_{50}** 4640ppm LD_{50} 1465mg/kg of body weight	*No signs of toxicity* reported in mallard duck or bobwhite LC_{50}	Syracuse Environmental Research Associates, Inc. 2004d

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

Acute oral and dietary studies of the listed chemicals proposed for use in the project area exhibit a range in analysis 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 applications.

Prairie warblers generally forage for insects on leaves and twigs of hardwoods or conifers. Most foraging typically occurs within 1 – 10 feet of the ground. Since prairie warblers forage primarily in the understory and lower canopy there is the potential for exposure in herbicide application areas. This is also true for northern bobwhite since it is a ground nest and terrestrial gleaning omnivore-granivore.

Although it is possible for northern bobwhite and prairies warbler to 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 Monarch butterfly). Potential exposure to herbicides from proposed treatments would likely fall below risk factors (LD_{50} and LC_{50} values) established in the risk assessments for birds. Given; that adults are highly mobile and application most likely would occur outside the nesting season and the restrictions for field application rates established by herbicide specimens labeling, the probability that there would be any direct or indirect effects on bobwhite or prairie warbler is very low.

Effects for manual control methods would be the same as those determined for timber management treatments.

Prescribed Burning: (such as; site prep, fuel reduction and fire restoration treatments):
Prescribed burns would occur in both growing and non-growing seasons. Direct effects to adult bobwhites and prairie warblers are unlikely since these species are highly mobile and would be able to avoid burns. There is the potential for nests to be lost if burns occur during nesting periods. Indirect effects of prescribed burning would be to consume woody debris which would encourage growth of shrubs and herbaceous plants essential for foraging and nesting.

Pond and Wildlife Opening Rehabilitation:
Wildlife opening rehabilitation would increase and enhance the amount of available early seral habitat for these species within the watershed and provide areas of high nutrient forage as well as nesting habitat. Ponds would also serve as important water sources and foraging areas. Overall, these proposed wildlife treatments would have impacts similar to proposed vegetation treatments.

Soil Stabilization and Restoration (stream restoration, soil erosion stabilization, dispersed campsite closure, unauthorized road/trail closure and decommissioning):
Proposed soil stabilization and restoration treatments would be used to protect wildlife, soil and water resources. No direct impacts to quail and prairie warbler 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 and travel corridors and allow these areas to re-vegetate thus providing potential foraging habitat.

***Road Construction (Temporary), Reconstruction and Maintenance Treatments and Shale Borrow Site Use*:**
Effects would be the same as those determined for timber management treatments.

No Herbicide

The No Herbicide alternative would have an overall positive effect on the forest-wide trends for these species and would be the same as the Proposed Action except the effects attributed to herbicide use would not occur.

Effect on Forest-wide Population Trends

The Habitat Capability Model demonstrates that selection of this alternative would increase populations of bobwhite and prairie warbler. Indirect effects of the Proposed Action and No

Herbicide alternatives would in part be "beneficial" to these species by providing treatment areas with vegetative structural diversity and plant species diversity. Many of the browse items and associated insects would also persist in treatment areas for a period of time.

No Action

The No Action alternative would have no direct effects on prairie warbler or northern bobwhite. Selection of this alternative would have negative indirect effects on these species since both the bobwhite and prairie warbler prefers open and/or cutover areas, as noted above. No action would mean that no new open areas would be created for these species resulting in no creation of early-seral habitats as overstory vegetation becomes established and shades out sub-canopy competition. Natural recruitment of early seral communities would also be limited in that suppression of wildfires and timber insect infestations would still occur.

Effect on Forest-wide Population Trends

The Habitat Capability Model demonstrates that selection of this alternative would maintain or decrease populations of northern bobwhite and prairie warbler below minimum population levels recommended in the Revised Forest Plan by limiting development of early seral habitat.

Cumulative Effects

Proposed Action & No Herbicide

There would be no cumulative effects resulting from any alternative because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on these sensitive MIS species.

No Action

As demonstrated, the HCM selection of this alternative, populations would remain relatively constant of northern bobwhite and prairie warbler within the RCPA. Limited development of early seral habitat in the watershed would only provide minimal habitat for these species.

Demand Species

Current Conditions

- **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.

The Forest Plan 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 (USDA Forest Service. 2005b). Turkey harvest, poult production, Landbird point survey data indicate a downward trend. Habitat capability modeling indicates a slight negative trend but remains above the level projected in the RFP. 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.

Insufficient data exist to suggest that Eastern Wild Turkey may be in danger of losing population viability or falling below the desired population levels. Due to conflicting indicators, additional data should be collected to determine if additional management changes are warranted. Research across the South has shown that prescribed fire treatments, including the growing season burns, improve turkey habitat by opening up dense forest, reducing shrub and brush, and improving nesting and brood rearing habitat. Areas that were not burned for more than 2 years were almost devoid of turkey hens (Cox and Widener, 2008). No management changes are warranted at this time. In addition, research is currently ongoing on the Forest to look at habitat preferences of the Eastern Wild Turkey (USDA Forest Service, 2015b).

- **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.

The estimated habitat capability for deer for fiscal years 2006-2014 shows a downward trend; yet, with a slight increase in the last three years (2012-2014) and capability still within the desires range of 38,105 acres for 2015. Habitat carrying capacity is calculated using acres within the Ouachita NF and is influenced by the amount of prescribed fire and early seral habitat created, including regeneration, thinning, timber stand improvement, mid-story removal, wildlife stand improvement, wildlife openings, and site preparation (USDA Forest Service, 2015b).

For deer, the CompPATS habitat capability model places a greater value on early seral stage habitat and gives lesser value to habitat created by thinning and prescribed fire. In contrast to the declines in even-age regeneration cutting, the acres of thinning and prescribed fire have increased over the last five years.

The Final Environmental Impact Statement for the 2005 Forest Plan (USDA Forest Service 2005b) indicates in Table 3.59 (p. 166), a desired terrestrial habitat capability to support an average of 13.7 deer per square mile within the Ouachita NF after 10 years. This is calculated on a land base of 1,780,101 acres (2,796 square miles) for a habitat capability that would support 38,303 deer. The habitat capability as estimated by the CompPATS wildlife model exceeds the 2005 Forest Plan projections for every year in the period 2006 -2014 but is showing a decreasing trend. The 2005 Forest Plan objective is to create 5,500 acres of early seral stage (grass/forb) habitat per year, and only 606 acres were created by regeneration harvests in 2014 (USDA Forest Service, 2015b).

The decreasing habitat capability for the past few years as estimated by the CompPATS wildlife model is related to fewer acres than anticipated in grass/forb habitat (forest types ages 0-10 years) preferred by deer. Although acres of created early successional habitat have not matched the desired levels, deer harvest is showing a slightly increasing trend in the last few years. Deer are widespread, abundant, and the habitat capability still remains above the Forest Plan

projection. There are no indications of a need for adjustment in current management practices (USDA Forest Service, 2015b).

Direct & Indirect Effects

Proposed Action

Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as; *seed-tree, group selection, clear cut, shelterwood, short-leaf restoration*) manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction):

Direct impacts for turkey from the various 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 impacts 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 impact to white-tailed deer.

Noise disturbance from felling and removal of timber would likely cause turkey and deer to temporarily move to adjacent habitats unaffected by the proposed actions. These indirect impacts 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 actions 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. Treatments like thinning, modified seed tree or shelterwood treatments tend to provide more long term habitat benefits due to their size and varying landscape attributes (soil types, moisture gradients, slope aspects). Given the proposed treatments, it is likely that the proposed action would provide long term indirect benefits for deer and turkey populations within the analysis for a least the next 5-10 years.

Herbicide Treatments (timber and wildlife stand improvement activities and non-native invasive control)
Manual Treatments for Non-Native Invasive, Exotic and Nuances Control:
Since no risk assessment studies have been conducted specific to wild turkey, see effects of herbicide application, effects discussion for northern bobwhite and prairie warbler. Determinations for these bird species will also apply here.

Table 3.12. 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	540mg/kg to 1500mg/kg of body weight	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2011a
Imazapic	45 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004a
Imazapyr	486 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2011b
Metsulfuron Methyl	25 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004c
Triclopyr	116 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2011c
Clopyralid	75 mg/kg/day	*very low toxicity at applied rates*	Syracuse Environmental Research Associates, Inc. 2004d

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.

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, 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 or indirect effects to eastern wild turkey (using quail analog) or white-tailed deer are anticipated.

Effects/impacts for manual control methods would be the same as those determined for timber management treatments.

Prescribed Burning (such as; site prep, fuel reduction and fire restoration treatments):
Prescribed burning would occur in both growing and non-growing seasons. Direct impacts to adult deer and turkey are unlikely since these species are highly mobile and would be able to avoid burns. There is the potential for turkey nest 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 these MIS species. Deer especially are dependent on crude protein found in herbaceous browse for growth and antler development. Effects of prescribed burning would provide foraging, fawning and cover habitats.

Pond and Wildlife Opening Rehabilitation:
Wildlife opening rehabilitation would increase and enhance the amount of available early seral habitat for these species within the watershed and provide areas of high nutrient forage as well as fawning and nesting habitat. Ponds also serve as important water sources and foraging areas. Overall, these proposed wildlife treatments would have direct, indirect and cumulative impacts similar to proposed vegetation treatments.

All other proposed management activities (see descriptions in Proposed Action descriptions found in Chapter 2):
Effects would be the same as those determined for northern bobwhite and prairie warbler.

No Herbicide

The No Herbicide alternative would have an overall positive effect on the forest-wide trends for these species and would be the same as the Proposed Action except the effects attributed to herbicide use would not occur.

Effect on Forest-wide Population Trends:
The HCM indicates that selection of the Proposed Action and No Herbicide alternatives would increase then remain above baseline levels for deer and maintain local turkey habitat carrying capacities over the first decade.

No Action

The No Action alternative would allow forested lands to change without the interference of landscape scale land management. This alternative would have no direct effects on eastern wild turkey and white-tailed deer over the next decade and only events unrelated to human activities would create forestland openings used by these species.

Effect on Forest-wide Population Trends:
HCM indicates effects on forest-wide trends for the No Action alternative would maintain habitat conditions and remain viable for these species.

Cumulative Effects

There would be no cumulative effects resulting from any alternative because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on whitetail deer and eastern wild turkey.

Snag Dependent Species

Current Conditions

- **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 over mature 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).

Landbird monitoring data on the Ouachita NF indicate the long term trend to be stable to slightly decreasing for Pileated Woodpecker. The CompPATS wildlife model estimates for the habitat capability indicate a more defined decreasing trend for the last 5 years than Landbird data. These CompPATS wildlife model 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.

The CompPATS wildlife model takes into account the conditions in all forest types, and it factors in management practices including prescribed fire and thinning. These data show a downward trend since 2006, but for the last five years a stable to increasing trend. The overall situation should continue to improve as stands age. The current habitat capability that is estimated to support 13,066 birds exceeds the 2005 Forest Plan bird population objectives of 11,265 for FY 2015 (USDA Forest Service 2005b). The Pileated Woodpecker and its habitat appear to be secure within the Ouachita NF. There are no indications of a need to alter management direction.

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; DeGraff 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 data collected from 2006-2017 indicate an overall stable trend for the Scarlet Tanager, but showing 2014 as the year with the lowest number of tanagers recorded in the last ten years. This trend is not significant and could reflect natural variability. Ouachita NF habitat capability data point to a (statistically significant) downward trend since 2006, although the past five years have been stable. Recent data support a stable trend on the Ouachita NF and the Ozark-Ouachita Plateau where mature hardwood and mixed types are represented. On the Ouachita NF, there are over 200,000 acres of hardwood and hardwood/pine forest types greater than 41 years old. The Scarlet Tanager and its habitat are secure within the Ouachita NF, and the continued long-term viability of this species is not in question (USDA Forest Service 2015b).

Direct & Indirect Effects

Proposed Action

Timber Management (thinning's (such as; *pre-commercial, commercial, woodland*), regeneration harvest (such as; *seed-tree, group selection, clear cut, shelterwood, short-leaf restoration*) manual or mechanical site preparation, hand planting, firewood gathering, manual or mechanical timber stand improvement and midstory reduction):
Proposed treatments could result in direct and indirect 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 (USDA Forest Service, 2005a) 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.

Herbicide Treatments (timber stand improvement activities and non-native invasive control)

Manual Treatments for Non-Native Invasive, Exotic and Nuances Control:
Effects of herbicide application or use of manual control methods for non-native invasive treatments areas would have little or no impacts on pileated woodpecker or scarlet tanager. The indirect 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 Monarch butterfly).

Prescribed Burning (such as; site prep, fuel reduction and fire restoration treatments):
Effects to pileated woodpecker and scarlet tanager would be same as those for timber management treatments.

Pond and Wildlife Opening Rehabilitation:
Existing ponds and wildlife openings rehabilitation sites do not provide suitable foraging or nesting habitat for pileated woodpecker or scarlet tanager and thus no impacts to pileated woodpecker or scarlet tanager are anticipated.

All other proposed management activities (see descriptions in Proposed Action descriptions found in Chapter 2):
Effects would be the same as those determined for northern bobwhite and prairie warbler.

No Herbicide

The No Herbicide alternative would have an overall positive effect on the forest-wide trends for these species and would be the same as the Proposed Action except the effects attributed to herbicide use would not occur.

Effect on Forest-wide Population Trends:
The HCM predicts that the Proposed Action and No Herbicide alternatives would initially decrease and then increase local habitat capability for pileated woodpecker and scarlet tanager over the next decade, but remaining above RFP objectives for these MIS species. Viable populations of pileated woodpecker and scarlet tanager would be maintained locally under these alternatives.

No Action

No direct effects on pileated woodpecker or scarlet tanager would occur under the No Action alternative. Selection of this alternative for the most part would have positive indirect effects on populations of pileated woodpecker and scarlet tanager as these two species prefer mature forest habitats. Selection of this alternative would prevent timber harvest and related activities,

allowing the forest to continue to age. As a result, the older forests preferred by these species would continue to grow and mature.

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

Cumulative Effects

There would be no cumulative effects resulting from any alternative because there are no other past, present, or reasonably foreseeable future actions that would result in additional effects on pileated woodpecker and scarlet tanager.

Aquatic MIS

Current Conditions

Two of the five aquatic MIS categories as listed in Table 3.32 of the Revised Forest Plan Environmental Impact Statement (USDA Forest Service, 2005b) 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; Forest Wide; and Ponds and Lakes*.

Three Management Indicator fish species of the Ouachita Mountain Ecoregion have no known occurrences in the drainages involved in the proposed analysis area, either at the project site, or downstream. As a result, Johnny darter, Redfin darter and Channel darters were not selected as MIS (Mena stream survey data 2018, 2019; Robison and Buchanan, 1988).

> The 10 fish species selected for this project: Largemouth Bass (*Micropterus salmoides*), Bluegill (*Lepomis macrochirus*), Highland Stoneroller (*Campostoma spadiceum*), Green Sunfish (*Lepomis cyanellus*), Longear Sunfish (*Lepomis megalotis*), Orangebelly Darter (*Etheostoma radiosum*), Northern Studfish (*Fundulus catenatus*), Northern Hogsucker (*Hypentilium nigricans*), Smallmouth Bass (*Micropterus dolomieu*) and Striped Shiner (*Luxilus chrysocephalus*)] 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 highland 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 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 Northern Hogsucker lives in clear, permanent streams with gravel or rocky bottoms. Northern Studfish is found in clear mountain streams. Bluegill are found in clear, quiet, warm waters having at least some aquatic vegetation. Largemouth Bass is found in clear, quiet waters in natural and manmade lakes and ponds as well as backwaters and pools of streams and rivers.

Direct, Indirect and Cumulative Effects

All alternatives

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

Chapter 4
Persons and Agencies Consulted

Interdisciplinary Team

Jade Ryles	Natural Resources Manager
Jennifer Benefield	Forester
Chris Morgan	Silviculturist
Mitzi Cole	Wildlife Biologist
Morgan Issacs	Archeologist
Edwin Spence	Timber Management Assistant
Adam Strothers	Fire Management Officer
Russell Standingwater	Other Resources Assistant
Annetta Cox	GIS Specialist

Agencies Consulted

US Fish and Wildlife Service
Arkansas State Historic Preservation Office
Osage Nation
Caddo Nation
Quapaw Nation

Chapter 5
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Appendices

Appendix A: Activities by Compartment and Stand

The following tables list the specific actions proposed for each Forest compartment and stand. All treatments, except nest structures, and fish passage restoration are given in acres. Acreage values are estimates based on best available data; actual treated area may be revised to reflect more accurate field information and stand analysis.

The No Herbicide Alternative would consist of the same treatments as the Proposed Action, except that hand tool or mechanical methods would be employed to accomplish site preparation, release, midstory removal, overstory mast development, and non-native invasive plant control.

Table A.1. Proposed Activities by Compartment and Stand

Compartment 909							
Stand	**Management Area**	**Wildlife Stand Improvement**	**Commercial Thinning**	**Plantation Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by release, precommercial thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres	acres	acres
7	14	20					20
9	14	21					21
10	14	50					50
17	14	4					4
Total	-	95	0	0	0	0	95

Compartment 910									
Stand	**Management Area**	**Wildlife Stand Improvment**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by release, precommercial thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres	acres	acres	acres	acres
1	14		20			20	20	20	20
2	14		20			20	20	20	20
3	14			29					
4	14				60				
8	14		40	79		40	40	40	40
11	14	3							3
13	14			51					
16	14	117							117
17	14	10							10
18	14		40			40	40	40	40
22	14				36				
Total	-	130	140	159	96	140	140	140	270

Compartment 911

Stand	**Management Area**	**Wildlife Stand Improvement**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by release, precommercial thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres	acres	acres	acres
1	14	136						136
2	14				20			
3	14	11		12				11
5	14	19	21			21	21	40
6	14				61			
8	14	81						81
10	14			45				
15	14	4						4
17	14				8			
19	14	26						26
20	14			50				
24	14	14						14
26	14	6						6
Total	-	297	21	107	89	21	21	318

Compartment 912								
Stand	**Management Area**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres	acres	acres	acres
13	14			32				
32	14	40			40	40	40	40
42	14	18			18	18	18	18
Total	-	58		32	58	58	58	58

Compartment 913									
Stand	**Management Area**	**Wildlife Stand Improvement**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres		acres	acres	acres
1	14		14			14	14	14	14
2	14				20				
3	14				6				
4	14		13			13	13	13	13
8	14	51							51
9	14	8							8
10	14				31				
14	14			19					
16	14	24							24

27	14			154					
29	14		28			28	28	28	28
36	14			22					
38	14			30					
45	14			51					
Total	-	83	55	276	57	55	55	55	138

Compartment 914									
Stand	**Management Area**	**Wildlife Stand Improvement**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres		acres	acres	acres
1	14				21				
3	14	80							80
6	14				33				
14	14		40			40	40	40	40
22	14		40			40	40	40	40
31	14	293							293
42	14				23				
45	14			29					
57	14				42				
Total	-	373	80	29	119	80	80	80	453

Compartment 915

Stand	Management Area	**Wildlife Stand Improvement**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres		acres	acres	acres
6	14				22				
10	14		40			40	40	40	40
11	14		11			11	11	11	11
12	14				35				
15	14	10							10
16	14	192							192
17	14	24							24
23	14			18					
29	14	24							26
Total	-	250	51	18	57	51	51	51	403

Compartment 916								
Stand	**Management Area**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres		acres	acres	acres
3	14	18			18	18	18	18
6	14	40			40	40	40	40
8	14		58					

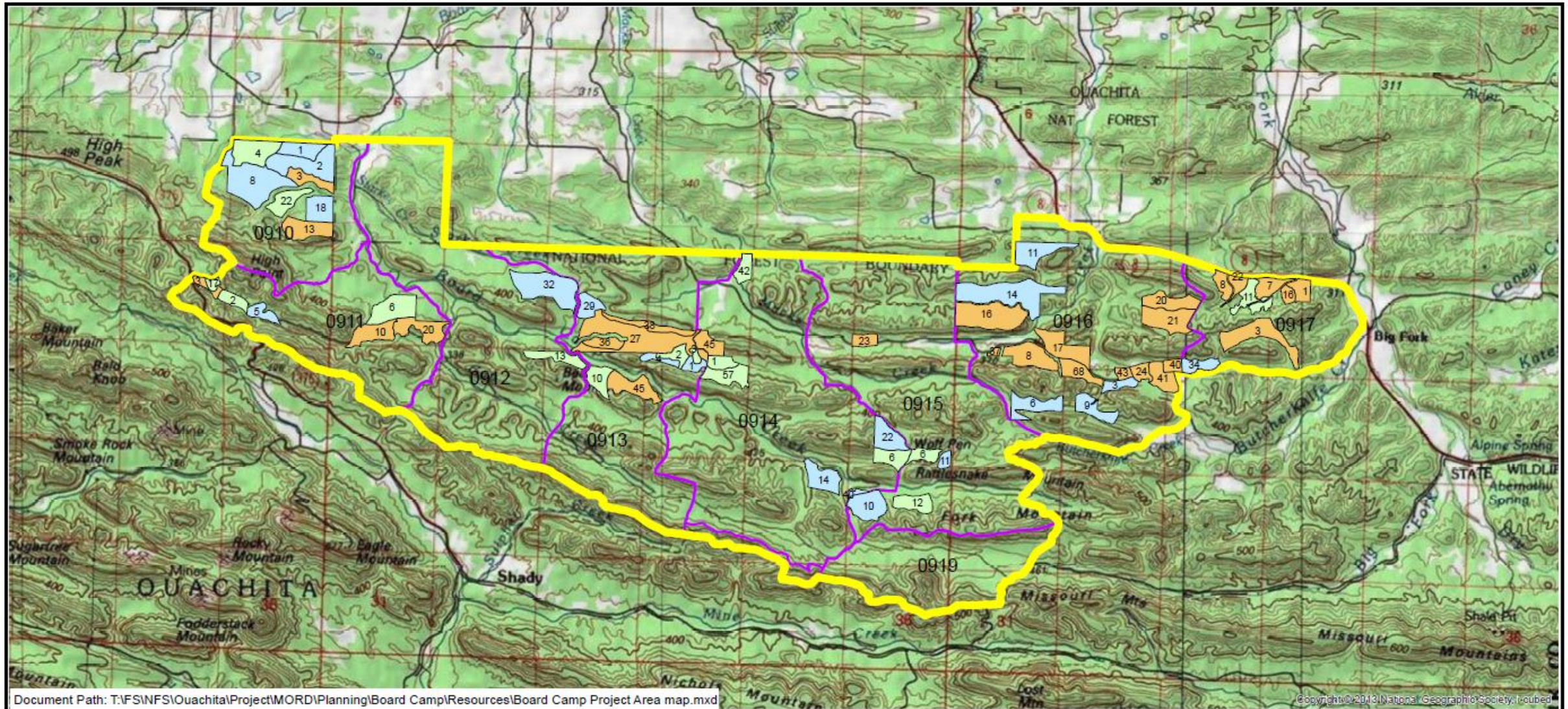
9	14	37			37	37	37	37
11	14	40			40	40	40	40
14	14	40			40	40	40	40
16	14		99					
17	14		60					
20	14		45					
21	14		63					
24	14		17					
40	14		14					
41	14		36					
43	14		10					
68	14		34					
Total	-	175	436	0	175	175	175	175

Compartment 917								
Stand	**Management Area**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres		acres	acres	acres
1	14		23					
3	14		75					
8	14		22					
11	14			25				
16	14		12					
22	14		16					
34	14	25			25	25	25	25
Total	-	25	148	25	25	25	25	25

Compartment 919									
Stand	**Management Area**	**Wildlife Stand Improvement**	**Seed Tree with Reserves**	**Commercial Thinning**	**Plantation Thinning**	**Precommercial Thinning**	**Site Preparation** *herbicide, manual, mechanical or prescribed fire*	**Stand Improvement** *by thinning, hand planting and regeneration checks*	**Fuel Reduction Prescribed Burn**
		acres	acres	acres	acres		acres	acres	acres
4	14	66							66
6	14	92							92
7	14	39							39
8	14	87							88
9	14	52							52
Total	-	336	0	0	0	0	0	0	337

Appendix B: Project Maps
The following maps are provided electronically at
http://www.fs.usda.gov/project/?project

Proposed Silviculture Activities
Proposed Wildlife Habitat Improvements
Transportation Activities



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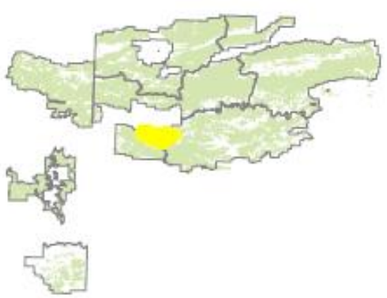
Vicinity Map



The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, and incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results.This information was released on the date shown below. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. Designation of a road, trail or area for motor vehicle use by a particular class of vehicle under 36 CFR 212.51 is not represented on this map. It is the responsibility of the user to acquire the current Motor Vehicle Use Map (MVUM). The MVUM identifies those roads and trails designated for the motor vehicle use under 36 CFR 212.51 for the purpose of enforcing the prohibition at 36 CFR 261.13.

N

0 0.5 1 2 Miles

Legend

Rx

- Plantation Thin
- Seed Tree
- Commercial Thin
- Board Camp Project Area
- Board Camp Compartments

Sheet 1 of 1

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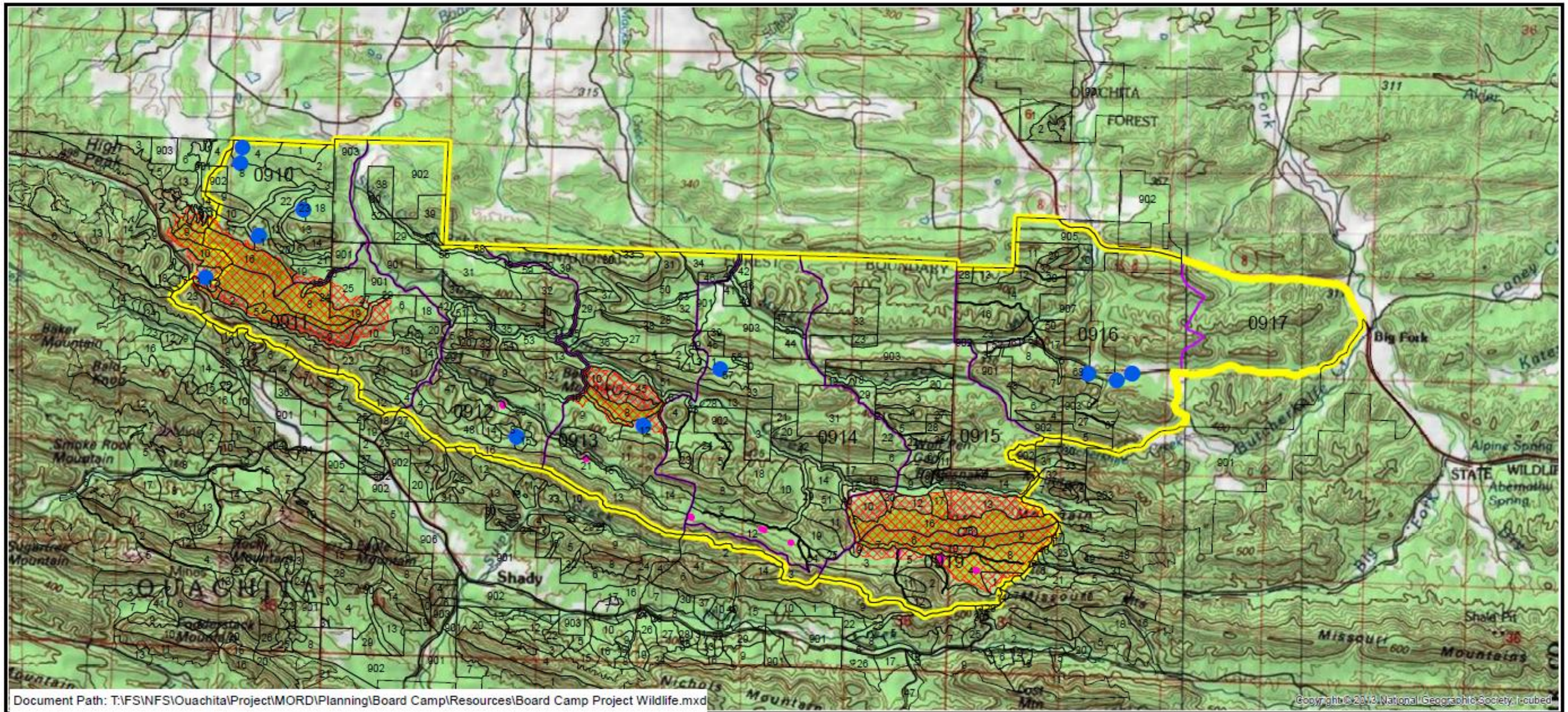
Board Camp

Silviculture Activities

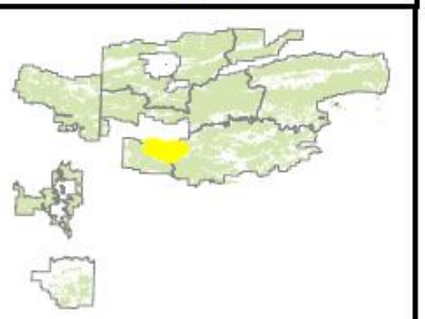
Mena Ranger District
Polk County, Arkansas

U.S. Forest Service - R8
Ouachita National Forest

For more information, contact the Mena Ranger District at 1603 Hwy. 71 North, Mena, AR or phone (479) 394-2382



Vicinity Map



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N

0 0.5 1 2 Miles

Legend

- Board Camp Pond Rehabilitation
- Board Camp Stands
- Board Camp Wildlife Opening Rehabilitation
- Board Camp Prescribed Burning Units
- Board Camp Wildlife Stand Improvement
- Board Camp Project Area
- Board Camp Compartments

Sheet 1 of 1

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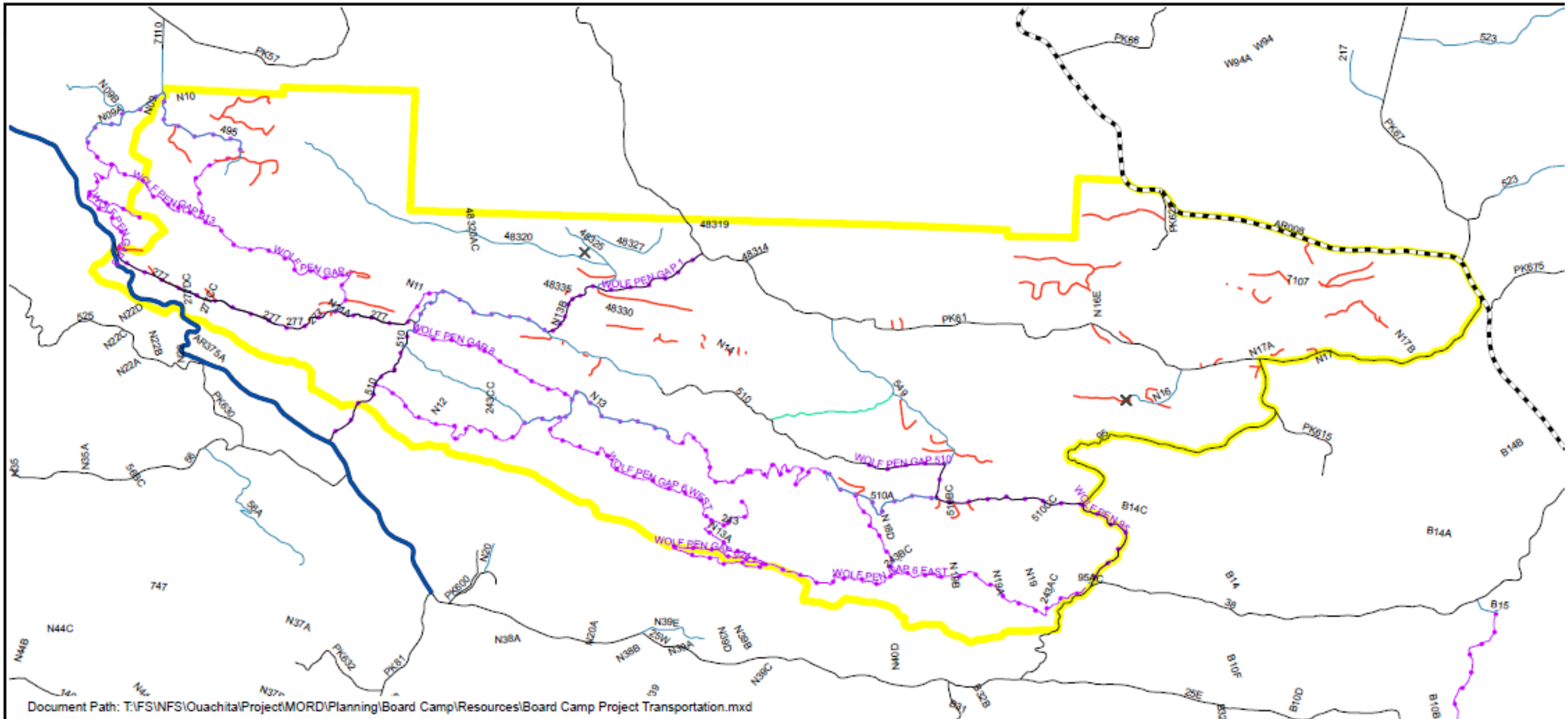
Board Camp

Wildlife Activities

Mena Ranger District
Polk County, Arkansas

U.S. Forest Service - R8
Ouachita National Forest

For more information, contact the Mena Ranger District at 1603 Hwy. 71 North, Mena, AR or phone (479) 394-2382



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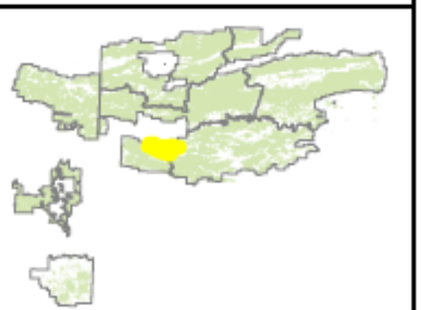
Vicinity Map



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N

0 0.5 1 2 Miles

Sheet 1 of 1

Legend

Operator Maintenance Level

- 2 - HIGH CLEARANCE VEHICLES
- 3 - SUITABLE FOR PASSENGER CARS
- 4 - MODERATE DEGREE OF USER COMFORT
- 5 - HIGH DEGREE OF USER COMFORT
- Road closure
- Temporary Roads
- National Forest Trail
- Shale Borrow Site
- Board Camp Project Area

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Board Camp

Transportation Activities

Mena Ranger District
Polk County, Arkansas

U.S. Forest Service - R8
Ouachita National Forest

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