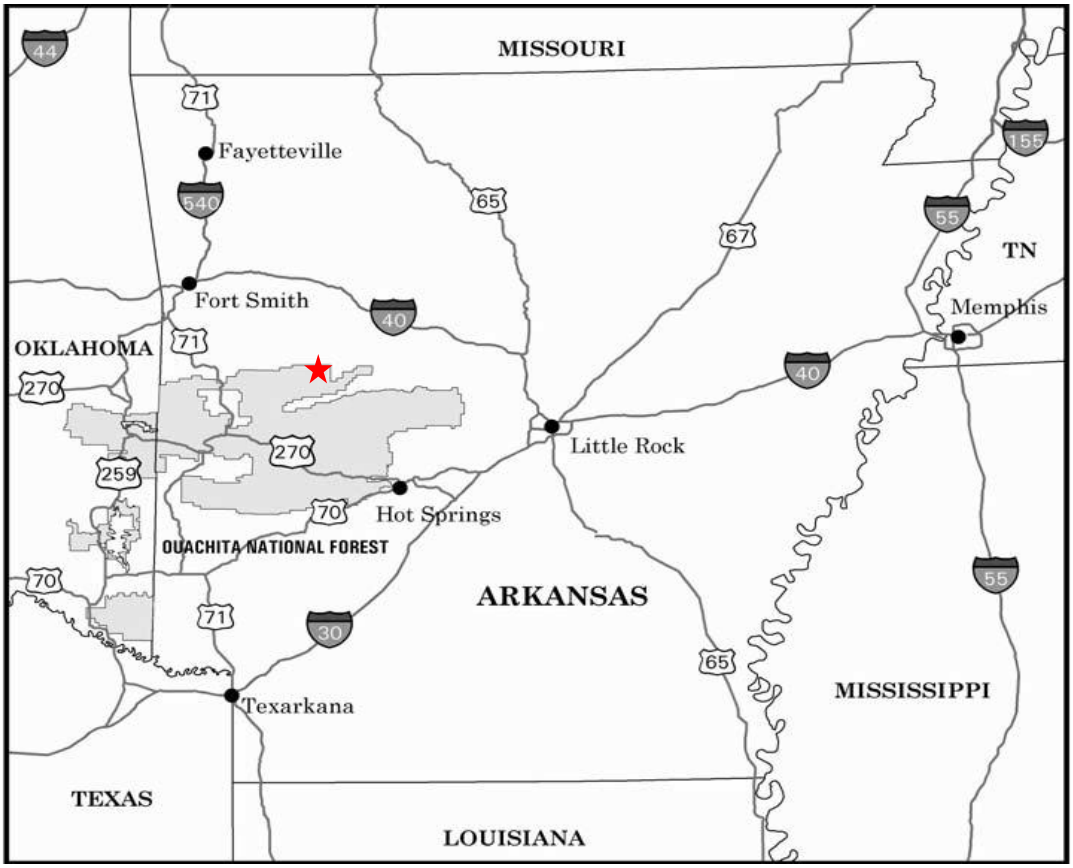
Environmental Assessment

LADD'S CREEK ECOSYSTEM MANAGEMENT UNIT
POTEAU-COLD SPRINGS RANGER DISTRICT
COMPARTMENTS 207, 208 AND 209
LOGAN AND YELL COUNTIES, ARKANSAS



APRIL 2020

Responsible Official: District Ranger, PO Box 417, Booneville, AR 72927

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CHAPTER 1 PURPO6SE AND NEED

PROPOSED ACTION

The District Ranger on the Poteau-Cold Springs Ranger District, Ouachita National Forest, proposes to implement management activities in the *Ladd's Creek* Ecological Management Unit (Compartments 207, 208, 209), henceforth referred to as *Ladd's Creek*. Activities proposed include timber harvesting, silvicultural treatments, wildlife treatments, and road system improvements. These activities should begin in 2020, if an action alternative is selected. *Ladd's Creek* **project area** consists of approximately 3,847 acres of national forest lands and 99 acres of private land. See the table below.

Summary of existing National Forest lands and private ownership in the *Ladd's* analysis area. These are ***approximate*** acres based on Geographical Information Systems (GIS).

Land Designation --- National Forest Management Areas	C-207	C-208	C-209	Total
MA 14 Suitable for timber production (Land Class 500-timber production emphasis)	258	384	3	**645**
MA 14 Suitable (Land Class 511-contains key area for wildlife, fish, rare plants)	63	0	0	**63**
MA 14 Suitable (Land Class 630-recreation emphasis)	0	0	133	**133**
MA 14 Suitable (Land Class 650-wildlife emphasis)	90	81	0	**171**
MA 14 Suitable Total	411	465	136	**1,012**
MA 14 Unsuitable Total	**621**	**307**	**120**	**1,048**
TOTAL MANAGEMENT AREA 14	**1,032**	**772**	**256**	**2,060**
MA 17 Suitable (Land Class 500-timber production emphasis)	**0**	**0**	**12**	**12**
MA 17 Suitable (Land Class 600-special/timber production secondary to other resources)	0	0	119	**119**
MA 17 Suitable (Land Class 630-recreation emphasis)	0	0	368	**368**
MA 17 Suitable Total	**0**	**0**	**499**	**499**
MA 17 Unsuitable Total	**0**	**218**	**1,070**	**1,288**
TOTAL MANAGEMENT AREA 17	**0**	**218**	**1,569**	**1,787**
TOTAL NATIONAL FOREST LANDS	**1,032**	**990**	**1,825**	**3,847**
Private acres within boundary	99	0	0	**99**
Total Acres within project area (private and NF lands)				**3,946**

LOCATION

Ladd's Creek is approximately 8 miles southeast of Booneville, Arkansas, just east of the small community of Sugar Grove, Arkansas. Blue Mountain Lake and the Community of Magazine are north of this project area. The project area is in the northern portion of the Ouachita National Forest. The private land is in Compartment 207 in the northwest portion of the Ladd's Creek project area. Dry Creek Wilderness Area is adjacent to the south.
See Location map. Legal descriptions are:

- Logan County Township 5 North Range 26 West Sections 26,32, 33, 34,35, 36
- Logan County Township 4 North Range 26 West Sections 1, 2, 3 4, 5
- Yell County Township 5 North Range 25 West Section 31
- Yell County Township 4 North Range 25 West Section 6

See Locations Map and Stands Map below.

LOCATION MAP – LOGAN AND YELL COUNTIES, ARKANSAS

LADDS CREEK

Compartments 207, 208, 209

Highways

Project Area

Ranger District Boundary

County Line

National Forest System Lands

Designated Wilderness

Hogan Mountain Walkin Turkey Hunting Area

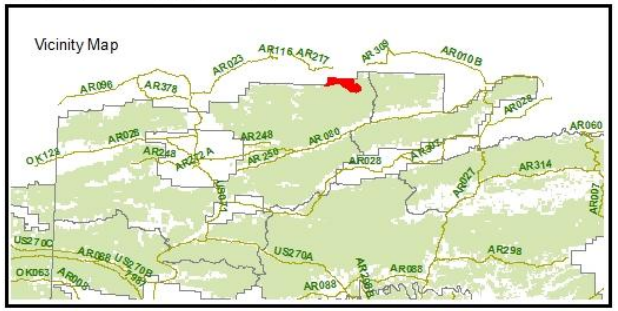
Cold Springs Ranger District
Scott, Logan &
Yell Counties, Arkansas

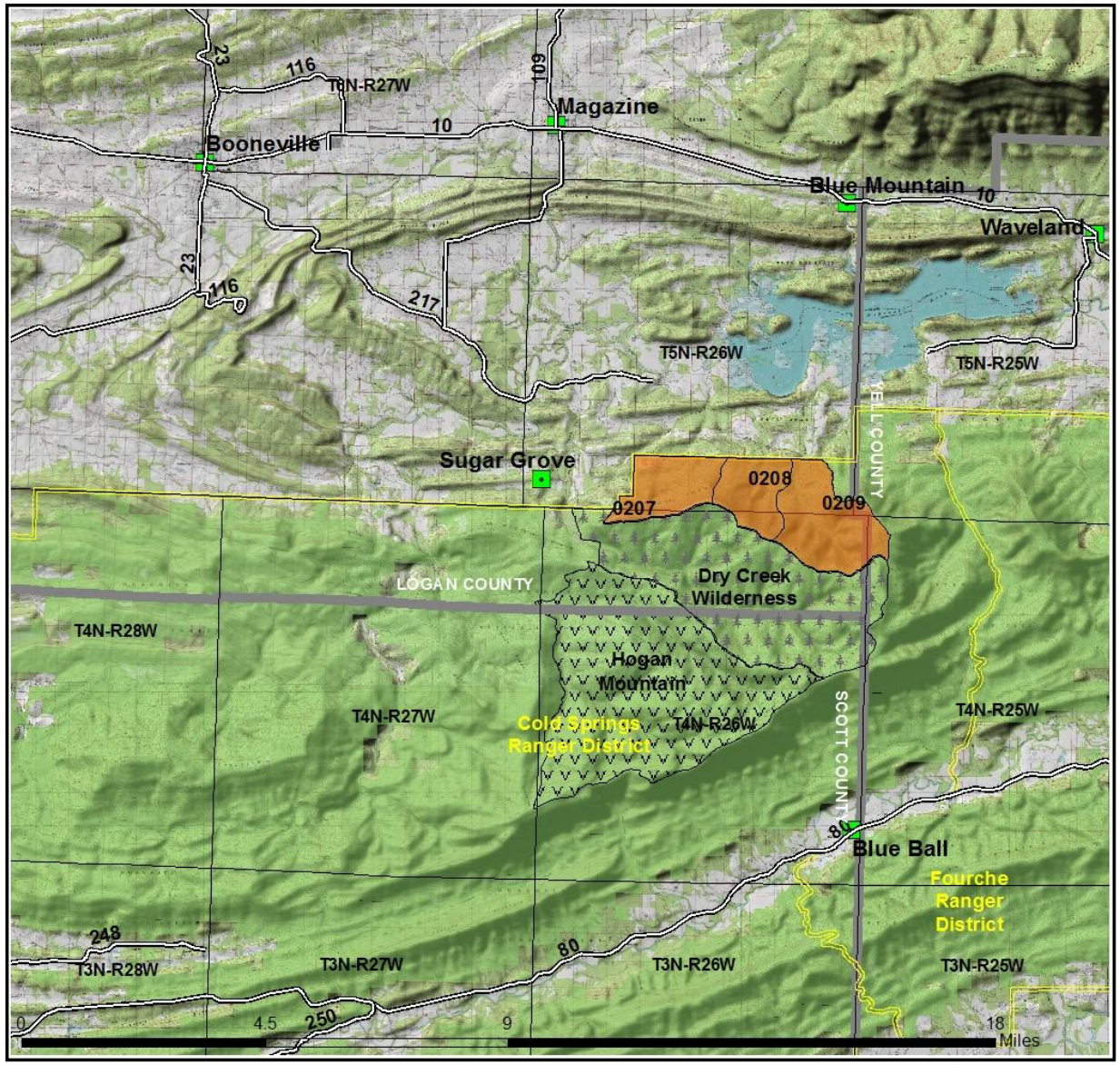
U.S. Forest Service - R8
Ouachita National Forest

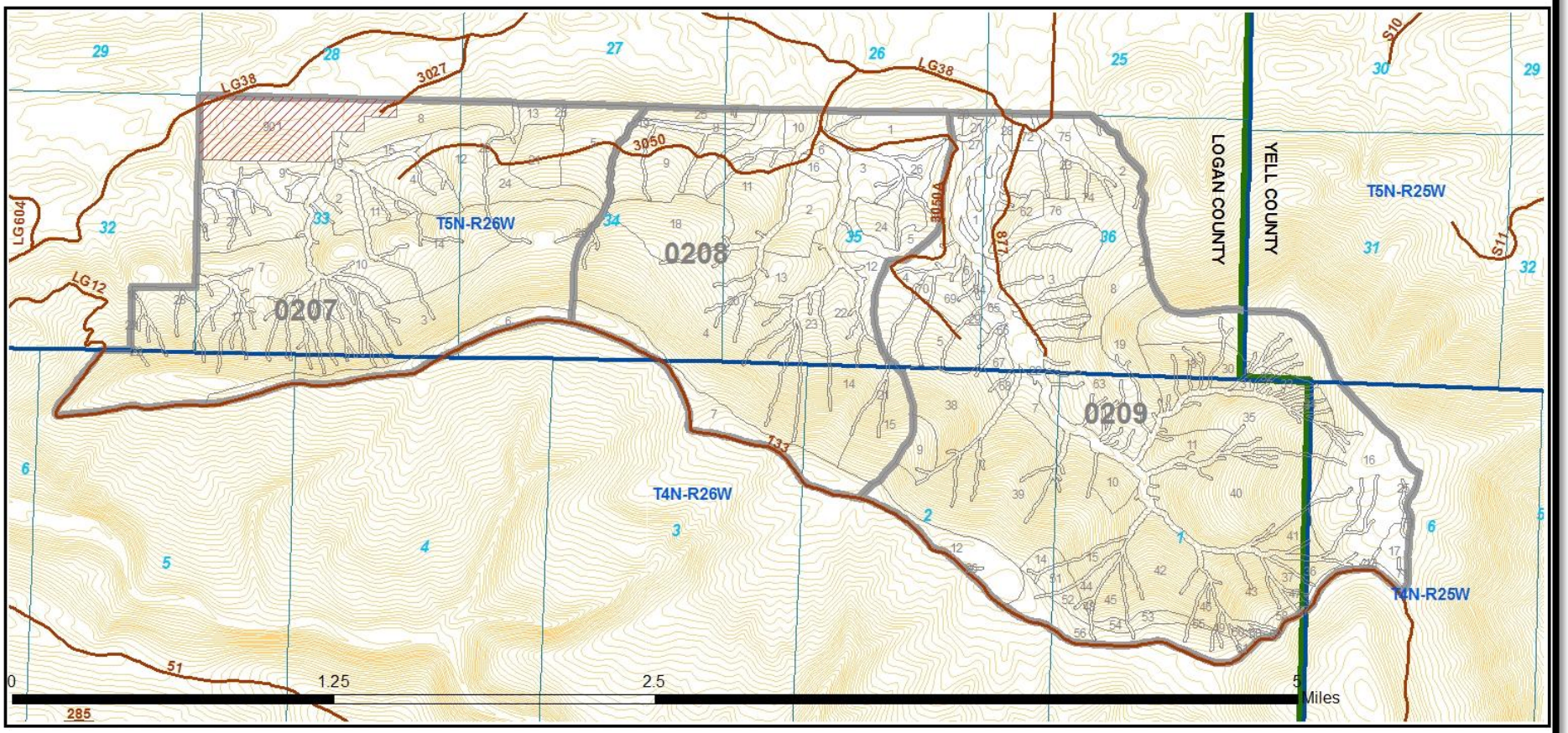
For more information, contact
the Cold Springs Ranger District
at 2190 E. Main Street,
Booneville, AR or phone
(479) 675-4743.

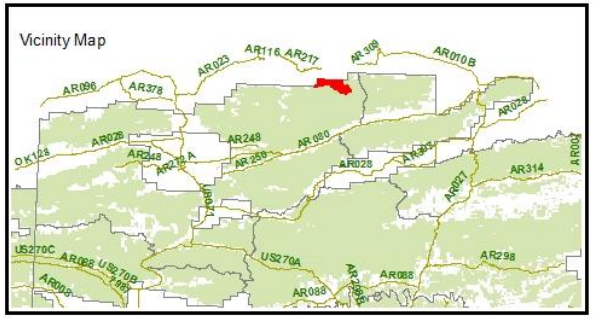
Map Creation Date - October 21, 2018

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.









STAND MAP

Cold Springs Ranger District
Scott, Logan &
Yell Counties, Arkansas

U.S. Forest Service - R8
Ouachita National Forest

For more information, contact the Cold Springs Ranger District at 2190 E. Main Street, Booneville, AR or phone (479) 675-4743.

Map Creation Date - October 22, 2018

Road
Compartments
County Line
Township
Sections

LADDS CREEK

Compartments 207, 208, 209

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Management Areas

Management actions are needed to move the project area towards the design criteria for Management Area 14 (Ouachita Mountains, Habitat Diversity Emphasis), Management Area 9 (Water and Riparian Communities), Management Area 17 (Semi-Primitive Areas) in the Revised Forest Plan *(USDA Forest Service. 2005a)*. Detailed descriptions of these management areas as of 03/17/2016 are located on the website:
http://www.fs.usda.gov/detail/ouachita/landmanagement/planning/?cid=fsm9_039823

Purpose and Need for the Actions

Field examinations and inventories of the *Ladd's Creek* project determined that the existing conditions do not meet the desired conditions of Management Areas 14 and 17. The Proposed Actions would move this project towards the desired conditions established by the Interdisciplinary Team and the design criteria in the Revised Forest Plan.

The following pages describe existing conditions, desired conditions, site specific needs, possible management activities, and the purpose and need for this project. Maps of the project area are also on the following pages.

Results of National Forest Management Act (NFMA) analysis describing desired conditions, existing conditions, site specific needs, and possible management activities.

Desired Conditions	Existing Conditions	Site Specific Needs	Possible Management Activities
Maintain or restore community diversity-and a significant component of species diversity-by utilizing prescribed burning in appropriate portions in Management Area 14 (Revised Forest Plan, pp 35).	Trees in many pine stands are crowded or densely stocked; many Forest stands are older than 70 years of age. These conditions result in stress and reduced vigor and health, increasing susceptibility to insects and disease.	Need to restore healthy conditions by limiting overstory and open the overstory to create suitable wildlife habitats by removing unhealthy trees and reducing stocking.	Commercial Thinning Wildlife Stand Improvements Prescribed Burning
To have at least 6% and not more than 14% of the suitable land in the 0-10-year age class in Management Area 14 (Revised Forest Plan, pp. 7-8).	There are 34 acres of suitable in the 0-10-year age class in Management Area 14, not meeting the minimum of 6%	The early seral stage habitat should be between 61-142 acres within Ladd's Creek to meet objective.	Modified Seed Tree Modified Shelter wood Clear Cut Construct, close and seed temporary roads
To have a at least 6% and not more than 10% of the suitable land in the 0-10-year age class in Management Area 17 (Revised Forest Plan, pp 78).	There are 0 acres of suitable in the 0-10-year age class in Management Area 17, not meeting the minimum of 6%	The early seral stage habitat should be between 30-50 acres within Ladd's Creek to meet objective.	Modified Seed Tree Modified Shelter wood Clear Cut Construct, close and seed temporary roads
To reduce midstory and allow development of grasses and forbs at ground level (Revised Forest Plan, OBJ06, pp. 59, WF001, pp. 78).	Midstory is too dense to allow development of grasses and forbs	Need to reduce the midstory.	Wildlife Stand Improvement (WSI) & Prescribed Burning
To have sufficient numbers of nest structures (Revised Forest Plan, pp. 77, WF009, pp.79)	Nest boxes are either non-existent or need to be replaced	Need to increase numbers of nest structures	Install nest boxes at pond construction & reconstruction sites and in each regeneration area

Desired Conditions	Existing Conditions	Site Specific Needs	Possible Management Activities
To provide at least one permanent water source per 160 acres for wildlife objectives (Revised Forest Plan, WF010, pp. 79)	There are 6 existing ponds.	Need a total of 25 water sources for wildlife.	Pond construction and/or reconstruction
To ensure a viable, healthy forest. (Revised Forest Plan, pp.58-60, 80-83).	Feral hogs have been seen adjacent to this project area and are expected to be within this project area.	Need to ensure that project area is free or has limited numbers of nuisance species, such as feral hogs.	Control and trap feral hogs
Manage the project area for native species while limiting nonnative species and off-site species (Revised Forest Plan, pp.6, 58, 59, 60, and 82).	There are various nonnative and off-site species including loblolly pine, mimosa, lespedeza, privet, etc.	Need to remove and/or reduce the nonnative and off-site species within the project area and where possible replace with native species.	Prescribed burning Clear cut Loblolly Herbicide Hand Tools
Improve or maintain soil quality (Revised Forest Plan pp.74).	There are 200 acres of mod-high, and high, compaction concerns on soils in the project area.	Need to ensure Best Management Practices are followed and use mitigation where necessary.	Mitigation
To have a healthy forest stand (Revised Forest Plan, pp.58-60, 80-83).	Conditions do not exist for successful natural regeneration. There are several stands that are dense and need treatment, mostly in the 10-20-year age class. Competition among species is reducing growth rate affecting tree quality.	Need to create a bed for seed fall after the regeneration harvests. Need to create a suitable seedbed in regeneration sites after initial prescribed burning in even-age regeneration stands. Need to create a suitable seedbed in the even-age regeneration stands after initial prescribed burning and hand tools. Need to reduce the stocking rate in stands, where needed. Need to decrease competition for limited nutrients and water among species.	Reforestation Treatments Prescribed Burning Site Prep by Hand tools Site Prep Mechanical Scarification Hand planting of shortleaf pine, Pre-commercial Thin Hand Tool Release Commercial Thinning
To have the understory and midstory more open, & dominated by herbaceous vegetation (Revised Forest Plan, WF001, pp. 78)	The understory and midstory currently meet the Forest Plan objectives as a result of past prescribed burning practices.	Need to ensure that the understories and midstories maintain open condition with prescribed fire	Prescribed burning and WSI treatments
Improve or maintain water resources (Revised Forest Plan pp. 74).	This project area falls within 2 6th level watersheds: 1. Blue Mountain Lake 2. Dry Creek-Petit Jean River	Need to ensure that management activities meet Revised Forest Plan standards for water quality and follow Arkansas Best Management Practices (BMP's)	Mitigation
To have a reliable and abundant hard mast crop. (Revised Forest Plan, OBJ003, pp. 78)	Hardwood crowns are not developed to produce a reliable and abundant hard mast crop due to overstocked conditions.	Need to develop hardwood crowns with WSI treatments, so that residual hardwoods will produce a more reliable & abundant mast crop	Commercial Thinning WSI treatments

Desired Conditions	Existing Conditions	Site Specific Needs	Possible Management Activities
To have healthy, productive stands in these areas (Revised Forest Plan, pp.58 - 60, 79-83).	Portions of this project area are acquired stands that have been cutover in the past and the entire project area is in Management Area 14 and Management Area 17	Manage the cutover stands to meet Mgt. Area 14 objectives. Continue to manage the remaining project area to meet Mgt.Areas14 and 17objectives. Need to increase growth rates in these stands and create new age classes.	Commercial Thinning Seed Tree Shelterwood Clear cut Prescribed Burning WSI Pre-commercial thinning
To reduce wildfire hazards. (Revised Forest Plan, pp. 25, OBJ42, OBJ43, pp.68, 69)	Natural fuel buildup and heavy visitor use increase wildfire hazards in Ladd's Creek.	Need to create conditions where a wildfire would not kill the overstory or threaten adjacent private properties.	Prescribed Burning, commercial thinning, Pre-commercial thinning, and WSI treatments.
To achieve open road density (open road per square mile) objective (1.0 mi per sq mi MA14 and 0.75 in MA17) driven by wildlife concerns (Revised Forest Plan, pp. 59, 67, 90-92)	There are 3,847 acres of NF and 99 acres of private land resulting in approx. 6.17 sections. There are 4.038 miles of open roads resulting in open road density of 0.65 mi. /rd. per sq. mile.	Need to maintain the open road density, where feasible.	None
To provide a safe transportation system that meets the minimum needs of the various resources and their users, minimizes wildlife habitat disturbance, and satisfies some public demand for motorized recreation (Revised Forest Plan, pp. 67).	Current road system is in constant use by hunters, sightseers, Forest Service personnel, and other forest visitors. .	Need to access harvest units and provide safe road system. Need to repair rusted-out drains and road surface and ditch erosion. Ensure safe road conditions through periodic maintenance	Road Construction Road Reconstruction Prehaul Maintenance Temporary Roads Decommission Seasonal Closing
There is a need to provide recreation and visual opportunities in the project area. (Revised Forest Plan, pp. 4, 5, 22, 23, 24, 64).	Heavily traveled roads and mostly mature forest conditions are present. There are no scenic level I or II roads. FS Road 133 – has maple trees along the road that the public visits in the fall during fall foliage.	Maintain roads to standard and manage the project area to meet habitat requirements. All mgt. activities would meet Scenic Integrity Objectives (SIO) in Mgt. Areas 17 and 17.	Road maintenance contract and monitor forest management practices.
To provide adequate protection of heritage resource sites. (Revised Forest Plan, pp. 21, 64)	There are 12 recorded sites. One (1) is eligible for listing or are of undetermined eligibility in the National Register of Historic Places and will be protected.	Need to use protective measure to ensure that known and found sites are protected.	Protection of any known sites (i.e. fencing cemeteries).

Desired Conditions	Existing Conditions	Site Specific Needs	Possible Management Activities
To have suitable seedbeds in regeneration stands.	Conditions do not exist for successful natural regeneration.	Need to create a suitable seedbed in the even-age regeneration stands	Reforestation Treatments Prescribed Burning Site Prep by Hand tools Mechanical Scarification Hand planting of shortleaf pine, if needed Herbicide

NEED TO MANAGE FOR OUACHITA MOUNTAINS-HABITAT DIVERSITY IN MANAGEMENT AREA 14

There is a need to keep the primary community types (Ouachita Pine-Oak Forest, Ouachita Pine-Oak Woodland, and Ouachita Dry-Mesic Oak Forest) within Management Area 14.

The purpose of Management Area 14 is to have a mosaic of shortleaf pine-hardwood (including pine-dominated, hardwood-dominated, and evenly mixed forests and woodlands). Grass-forb and seedling-sapling conditions should be well represented, particularly in the portions suitable for timber management, where they make up at least 6 percent of the landscape. These “early successional” conditions should exist primarily under partial canopies of overstory pines and/or hardwood trees. Mid-successional and mature forests and woodlands should be even more widespread, making up at least 70 percent of the landscape.

Adequate amounts of all forest conditions are needed to sustain viable populations of many of the plant and animal species native to the Forest. The habitat needs of other native species with specialized habitat needs are met in other appropriate MAs.

Visitors and managers should have access to a moderately extensive transportation system. Visitors should find non-motorized recreation opportunities available on a seasonal and shifting basis, depending on road closures and the scheduling of resource management activities. The main road system should be well maintained, but visitors may see timber harvest equipment and encounter logging traffic. A portion of the road system should be available for low clearance vehicle travel. Some portions are designated and available for OHV use. The remainder of the road system should be closed seasonally or long-term.

There is a need to create a healthy forest in Management Area 14 by reducing competition for limited soil, water, nutrients, and sunlight in mature, pine stands where individual tree growth has slowed due to age and overstocked conditions. Currently, on many stands the understory, midstory and overstory are overstocked preventing sunlight from reaching the forest floor. The current conditions exceed the recommended stocking rates for pine identified on page 84 Table 3.6 of Revised Forest Plan. The mature trees at these high stocking rates with heavily stocked understories and midstories are increasingly susceptible to southern pine beetle (primarily) and other insect and disease infestation.

NEED TO MANAGE FOR SEMI-PRIMITIVE AREAS IN MANAGEMENT AREA 17

There is a need to keep a moderate level of solitude present in most areas. Visitors view a predominately naturally appearing landscape with some evidence of vegetation manipulation in the form of small openings, individual tree cutting, prescribed fire, and some stands managed as more open, shortleaf pine-bluestem grass or oak woodland communities. Dispersed recreation experiences, including hunting and hiking, are available with fewer disturbances from motorized traffic than the general forest area.

MANAGEMENT AND TIMBER HARVESTING OF SUITABLE STANDS

Even-age management is needed to contribute to healthier forest conditions by reducing the overstocked conditions utilizing commercial thinning (Objective OBJ10 – Reduce susceptibility to southern pine or Ips beetle outbreaks on at least 25,000 acres per year). Another benefit of even-age management is creating new age classes to contribute to a sustainable timber supply.

Commercial thinning of shortleaf pine (approx. 719 acres) is needed to reduce competition for limited soil, water, nutrients, and sunlight in mature, pine stands where individual tree growth has slowed due to age and overstocked conditions. Currently, in many stands the understory, midstory, and overstory are overstocked preventing sunlight from reaching the forest floor.

- **Commercial thinning to a target BA of 70 with a minimum 10% hardwood component** (approx. 719 acres) would reduce vegetation that competes for limited soil nutrients, water, and sunlight (USDA Forest Service. 2005a, Priorities pg. 58 and Objective pg. 59). The current conditions exceed the recommended stocking rates for pine identified on page 84 Table 3.6 of Revised Forest Plan. The mature trees at these high stocking rates with heavily stocked understories and midstories are increasingly susceptible to southern pine beetle (primarily) and other insect and disease infestation. Research has shown that Southern pine beetle (SPB) infestations in stands that have been thinned with 20-25 feet between trees will not spread to adjacent stands but will disburse (Managing Southern Forest to Reduce Southern Pine Beetle Impacts, May 1986, p19). Reducing hardwood density to 10 BA is also needed in some stands to further reduce competition for nutrients, water, and sunlight.

Modified seed tree (approx. 64 acres) is needed to create early seral stage habitat (USDA Forest Service. 2005a, Pg. 7, 35, and Objective OBJ06, Pg.59). All stands have moved to the next age class except for stands leaving the area deficient of early seral stage habitat within Forest Service system land. There may also be some early seral stage habitat on private land within the analysis area. The objective is to have at least 6% and not more than 14% of the suitable land in the 0-10-year age class in MA 14 and between 6-10% in MA 17.

The modified seed tree method of regeneration would increase the 0-10-year age class by approximately 64 acres and the **clear-cut method** would increase it by 37 acres within the suitable land class in order to meet Management Area 14 goals. After this management activity, the early seral stage habitat would be 13.3 % of the suitable even age acres and fall within the desired 6-14%, meeting Management Area 14 goals. (USDA Forest Service. 2005a, Pg. 7, 35, and Objective OBJ06 Pg. 59). Management Area 17 needs between 30-50 acres in the 0-10-year age class. It currently has none. Stands selected for the even-aged modified seed tree method of regeneration are mature pine stands located at least 10 chains away from existing young stands still considered regeneration openings on National Forest system lands or on private lands. Regeneration openings are young stands that have not grown to 20% of the height of the adjacent stand.

Timber salvage – would be allowed for both merchantable and/or non-merchantable stems for all catastrophic or isolated events. These salvage activities would be for both pine and hardwood species. Salvage timber could result from events such as, but not limited to, harvest of residual material from implemented activities, ie. Woodland ponds, midstory reduction, thinning, etc., or beetle outbreaks, fire, wind, or any other natural occurrence. These activities may need to occur in recreation areas and on or near trails for safety issues. In addition, silviculture activities may need to follow salvage activities if determined necessary.

SILVICULTURE TREATMENTS

There is a need to ensure that regeneration stands are stocked with a minimum of 150 seedlings per acres within 5 years after harvest. Treatments are necessary to enable young seedlings that have been naturally established or hand planted to compete for growing space. The objective would be to control existing hardwood vegetation that is competing to

occupy the regeneration stands because the older hardwoods have well established root systems and quickly "overtop" small pine seedlings. The shading effect quickly kills young pine regeneration. There is a need to increase the growth and improve the quality and vigor of trees within the stand. Site preparation activities may be required more than once to achieve the required minimum stocking. The following is proposed on regeneration stands (existing and new) to ensure stand restocking:

Reforestation site preparation – Site preparation would occur on approximately 135 acres (101 new regeneration and 34 acres of existing regeneration). Site preparation would consist of utilizing hand tools as a first treatment option if prescribed burning does not achieve the desired results or if prescribed burning cannot be conducted. If this option does not achieve the desired results, mechanical scarification would be used. Herbicide would be used if the previous treatments do not achieve the desired results. Regeneration stands would also be planted with shortleaf pine if the sites are not expected to seed within five years following harvest. The objective of reforestation site preparation treatments is to prepare the seed bed for regeneration. Site preparation improves access for planting, reduces competing hardwoods, and prepares a seedbed suitable for desired natural regeneration of shortleaf pine. In stands receiving a modified seed tree method of regeneration, preparation of the site for shortleaf pine regeneration would occur in accordance with Forest Wide Design Criteria FR013 (Revised Forest Plan).

- ***Mechanical -*** Mechanical scarification includes raking, piling, and ripping. The intent of mechanical scarification is to disturb the duff with a minimum amount of mineral soil exposure. Mechanical scarification may also include ripping on an 8-foot spacing along the contour throughout the regeneration stands. (Forest Wide Design Criteria FR013).

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

- ***Prescribed burning*** - The regeneration harvest and shortleaf pine forest restoration areas would receive a site preparation burn separately or within fuel reduction burn units depending on location. This burning involves application of controlled, moderate to high intensity fire to control competing vegetation (hardwoods), reduce accumulated leaf litter and preparation of sites for seeding and/or hand planting. Site-preparation burns are implemented during the time between leaf emergence and leaf fall. Vegetation three inches and less in diameter at the ground level would be targeted for higher rootstock eradication. This will result in less competition for pine seedlings and other desirable fire dependent species, while creating an open understory. Prescribed burning would aim to maintain 10-20 percent of hard mast producers. The pretreatments, if any, would retain all soft mast producing species present in order to sustain their presence subsequent to prescribed burning.

- ***Hand Planting with Shortleaf Pine -*** Planting may be used on a case-by-case basis to accomplish desired stocking levels. Shortleaf pine seedlings may 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. Tree spacing would be adjusted based on past regeneration survival percentages (Forest Wide Design Criteria FR007).

- ***Herbicide -*** To achieve desired goals for site preparation and release treatments, herbicide application may be necessary. A mixture of herbicides with the active ingredients imazapyr, 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, 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 foliage of trees and shrubs less than six feet in height; 2) frill treatment, which involves application of herbicide by spray bottle into cuts that expose the tree's sapwood; and 3) cut-stump treatment, which involves application of herbicide by spray bottle to the surface of cut stumps. Application of foliar-spray methods would be made during the spring and summer seasons when

vegetation is green and growing. Cut-surface treatments, which include frill and cut-stump treatments, however, are not dependent upon time of year (Revised Forest Plan - Forest Wide Design Criteria HU001-HU016, HU018).

Timber stand improvements by hand tool release (144 acres) - This treatment is usually necessary to enable the young seedlings to compete for growing space with or without the use of herbicide to control existing hardwood vegetation that is competing to occupy the site, the older hardwoods have well established root systems and quickly "overtop" small pine seedlings. When this occurs, the shading effect quickly kills young pine regeneration. Release generally occurs on trees less than ten years old to increase the growth rate and quality of the desired trees by reducing the competition for sunlight, nutrients and water among species. Without release, a healthy young stands growth rate would be slowed decreasing the stand's ability to withstand and overcome insect or disease infestations or respond to silviculture treatments. It is often necessary to release a stand more than once.

Timber stand improvements by pre-commercial thinning (178 acres) – 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). This mostly occurs in stands 8 to 15 years old. This treatment would be performed 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)]. This treatment is needed to ensure quality pine and hardwood are in place to provide for wildlife needs, provide a sustainable timber supply, and create healthy forest conditions.

WILDLIFE TREAMENTS

Woodland ponds (6 rehabilitation/19 new construction) are needed to maintain adequate water supply according to the (Revised Forest Plan. Design Criteria WF010, Pg. 79). The Forest Plan suggests at least one water source for every 160 acres. The project area currently has 6 existing woodland ponds which need reconstructed because dams have encroaching woody vegetation, which can result in water retention problems. No new woodland ponds need constructed to meet this objective. This action would ensure that wildlife has enough water available on a year-round basis

Wildlife stand improvements (approx. 719 acres) treatments are needed to improve the habitat that currently exists. WSI will help produce a grass/forb understory and enhance hard mast production by residual hardwood crowns within the treated stands. WSI may be completed using hand tools or mechanical equipment depending on terrain, species composition, and cost. Herbicides will be retained as a backup treatment where prescribed burning cannot be used or scheduled to retain the grass/forb understory conditions. Areas selected for herbicide use may be treated with imazapyr, triclopyr, glyphosate or a mixture of all three depending on species composition, weather and season of treatment.

Nest structures (60) are needed in a variety of habitats for a variety of species. Many snags and cavity trees were created in this area by the December 2000 ice storm and again in January 2014. This was a positive condition for many cavity dependent species. However, time is now causing a loss of these snags and cavity trees.

Temporary Wildlife openings are needed due to the lack of early seral stage habitat and temporary wildlife openings in the project area. These openings are needed because several species need the early seral stage habitat that these openings would provide until the conditions in newly harvested areas provide the needed conditions (Revised Forest Plan. Design Criteria Pg. 78). These openings would be created from log landings, firelines and temporary roads. Existing openings will be maintained by prescribed burning, disking, seeding, planting, fertilizing, brush hogging, and/or bull dozing.

Red-cockaded Woodpecker (RCW) Treatments – would be needed if a new RCW cavity tree or a cavity tree cluster is discovered in the process of implementing a timber harvest decision in management areas other than Management Area 22 (i.e. MA 14, 17, 21), the RCW Species Recovery Plan and Ouachita National Forest Revised Forest Plan standards would apply and management of that cavity tree or cavity tree cluster area would begin immediately. In the event a new RCW cavity tree is found or started within this project area, the immediate area, including streamside management zones

(Revised Forest Plan standard 22.05 pp. 120), that surround the tree (10 acres) would be identified as an active cluster and all activities associated with enhancing and protecting the cluster would begin. Other activities would include use of cavity restrictors, snake and squirrel excluder devices, artificial cavities, single-bird augmentations, multiple-bird group-initiations, brush hogging in cavity tree clusters, removal of southern flying squirrels, population/nest monitoring, cavity maintenance and southern pine beetle (SPB) and Ips control efforts. In active, inactive, and recruitment clusters, retain no more than 10 square feet of basal area per acre in overstory hardwoods. Remove all hardwoods within 50 feet of cavity trees. (Revised Forest Plan pg. 122; 22.17).

Open Road Density - needs to be lowered, where possible, to reduce vehicle disturbance during critical periods for wildlife (i.e. the reproductive season). Currently, open road density is at 0.65 miles per square mile, meeting the Revised Forest Plan's objective for Management Area 14 and 17.

Feral Hogs Containment – If feral hogs are in this EMU they will need to be trapped and or removed to stop their spread and prevalence.

TRANSPORTATION

There is a need to improve the current road system within the project area for access and safety purposes. The roads have surface and ditch erosion as well as rusted out drains. Only temporary access is needed in some areas for project work. There is a need to take some roads off the system because the roads are no longer needed and cross streams at undesirable locations. (Revised Forest Plan. Design Criteria TR001, Pg. 90). The following is proposed to improve the road system in the project area:

- ***Road Reconstruction*** (approx. 5.23 miles) - Reconstruct existing roads because the roads have surface and ditch erosion, rusted-out drains, and fish passage concerns

- ***Road Obliteration*** (approx. 1.05 miles) - Obliterate roads, if needed because these roads are no longer needed and cross streams at undesirable locations.

- ***Temporary Road Construction*** (approx. 5.32 miles) - Construct temporary roads because they provide access to harvest units but are not needed for long-term management of the natural resources. Per Revised Forest Plan design criteria, temporary roads will be decommissioned, revegetated, and recontoured upon termination of management activity.

PRESCRIBED BURNING

Prescribed burning is proposed on approximately 3,847 acres on an *approximate* 3-5-year rotation in the general forest area). Multiple purposes would be accomplished by prescribed burning such as site preparation, wildlife habitat improvement, control of understory, and fuel reduction.

- ***Site preparation prescribed burns*** are needed in the regeneration stands after harvest to prepare a bed for seed fall and reduce competition of existing hardwood sprouts with pine seedling establishment.

- ***Wildlife prescribed burning*** is needed to increase the quality and quantity of wildlife food sources and for controlling woody sprouts in the understory. Controlling woody sprouts would create and maintain open space for wildlife while encouraging the growth of herbaceous ground cover needed by many different species.

- ***Fuel reduction prescribed burning*** is needed to reduce the wildfire hazards as a result of natural fuel buildup from the lack of fire on the landscape. Fuels can increase from 4-6 tons per acre to 8-10 tons per acre and higher

in places without prescribed burning. Prescribed burning conducted on the Ouachita National Forest typically reduces fuel loading on a unit by 1-3 tons per acre. With repeated burns, fuel loading in a burn unit can be maintained at 3-4 tons per acre. Prescribed burning reduces the risk of catastrophic wildfire helping save the lives of firefighters and citizens, while reducing the risk of damage to natural resources and private property.

- ***Fireline construction and maintenance*** are needed for "control" if a prescribed fire is applied to the stands for site preparation and/or to exclude fire during years of stand development. Firelines would be constructed around perimeters of all natural and artificial regeneration areas (i.e. shelterwood or existing regeneration areas) and some archeological sites. The mechanically constructed fireline would be bladed down to mineral soil and approximately 8 feet wide. Bladed lines would be water barred as necessary on slopes to limit soil movement. Firelines would normally be installed within 50 feet either side of stand boundaries. Firelines should be seeded after use.

OTHER

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

Rock Permits are needed to supply rocks to the local community. Currently there are no rock permits for the project area. Upon request permits would be issued to private individuals for the collection of rocks within areas of disturbance associated with road construction or reconstruction.

Boundary lines - Blaze and repaint (approx. 6 miles) of line trees on boundary lines and property corners.

Relevant Planning Documents

The following documents directly helped develop the Proposed Action by setting the "side boards" to reach desired future conditions:

- Revised Land and Resource Management Plan, Ouachita National Forest, Arkansas and Oklahoma, 2005 (USDA Forest Service, 2005a).
- Final Environmental Impact Statement (FEIS), Revised Land and Resource Management Plan, Ouachita National Forest, Arkansas and Oklahoma, 2005 (USDA Forest Service, 2005b).
- Programmatic Biological Opinion of the Revised Land and Resource Management Plan on the American Burying beetle (USDI FWS September 2005).
- *Ladd's Creek* Biological Evaluation (January 2020).
- Travel Analysis Process – *Ladd's Creek* July 2019.
- Human Health and Ecological Risk Assessment Final Reports for glyphosate, triclopyr, and Imazapyr herbicides, March 25, 2011; May 24, 2011 and December 16, 2011. Syracuse Environmental Research Associates, Inc.
- Biological Assessment for the Revised Land and Resource Management Plan.

SCOPING AND PUBLIC INVOLVEMENT

The Ladd's Creek Project was first listed in the Schedule of Proposed Actions (SOPA) on 01/01/19. The project was published to the Forest's website at this time at https://www.fs.usda.gov/project/?project=55282.

A Project Announcement Letter (PAL) or "scoping letter" was mailed to interested publics on August 29, 2019, requesting input on the proposed actions from September 1-30, 2019. One response was received on 8/29/19.

- Information Sharing During Solicitation Period: Allie Cumnock, Environmental Health Specialist, Source Water Protection, Arkansas Department of Health Engineering Section (requested shapefiles for this project). Annetta Cox, GIS Specialist, forwarded the shapefiles to her on 9/04/19.

The 30-day comment period legal for this project ran in the Arkansas Democrat-Gazette on February 23, 2020.

- Information Sharing During Solicitation Period: On February 26, 2020, Eric Mills, Archeologist/Section 106 Manager/Division of Arkansas Heritage with the Arkansas Historic Preservation Program said that the staff of the Arkansas State Historic Preservation Officer look forward to consultation on the Ladd's Creek Project in accordance with 36 CFR Part 800 and that an AHPP Tracking Number was assigned to the project.

Outside of the solicitation period (9/1-30/2019), the following comments were received:

- Dick Artley, Email requesting to be alerted to when scoping started for this project and when the scoping package is posted online, February 8, 2019. (Mr. Artley is on all the NEPA mailing lists for all NEPA projects.)
- Teresa Lee, P.E., Chief, Technical Support Engineering Section, Arkansas Department of Health – No Comments on the submittal but notes that portions of the project intersect with the source water assessment area for Danville Waterworks. ADH requests that all silvicultural BMPs be followed to minimize any potential negative effects on water quality associated with the project, October 2, 2019. (BMPs are covered on pages 9, 44-46, and 89).

Issues to be Analyzed in Depth

Issues (cause-effect relationships) serve to highlight effects or unintended consequences that may occur from the proposed action, providing opportunities during the analysis to explore alternative ways to meet the purpose and need for the proposal while reducing adverse effects. Issues also provide a tool for comparing trade-offs for the decision maker and public to understand. An issue statement should describe a specific action and the environmental effect(s) expected to result from that action. In addition to issues raised by the public, there are other sources for issues:

- Issues, concerns, and opportunities identified in Forest Plans
- Issues identified for similar projects (past actions)
- Issues identified in plan to practices stage
- Issues generated from compliance with laws or regulations
- Current management (internal) concerns
- Changes in public uses, attitudes, values, or perceptions
- Comments from other government agencies

Based on a review of internal and external comments, the Interdisciplinary Team has identified issues relevant to this project that it believes should be analyzed in depth. These issue statements and their source(s) are displayed in the table below:

Issues to be Analyzed in Depth	
Issue Statement	**Proposed timber harvest and road construction may negatively impact forest resources (soils, water quality, etc.).**
Source(s)	Raised by the public during similar project scoping
Use	This issue could be used to develop/include technical requirements/design criteria into each action alternative to minimize impacts of timber harvest and road construction on forest resources.
Issue Statement	**Proposed herbicide application, specifically glyphosate, may negatively impact the health of forest visitors and wildlife in the project area.**
Source(s)	Raised by the public during similar project scoping
Use	Forest Policy requires the analysis of an alternative to herbicide use.

Decisions to be Made

The deciding officer, District Ranger for the Poteau/Cold Springs Ranger District, Ouachita National Forest, must make two decisions: decide which alternative or the Proposed Action to implement, and decide if those actions would constitute

a major federal action and result in significant impacts on the human environment (FONSI or Finding of No Significant Impact.).

CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

TECHNICAL REQUIREMENTS

The Forest-wide Design Criteria for Management Areas 9, and 17 are incorporated by reference as mitigating measures into the Proposed Action by smart design and are located on the website (as of 12/28/2016) at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm9_039613.pdf. The technical requirements described below apply to the Proposed Action and the No Herbicide Alternative 2.

Soils

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 do 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)

Allow heavy equipment operations on soils that have a 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 do 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)

These standards apply to operations in the stands displayed in the tables below.

Harvesting Operating Seasons for Compaction			
Moderate-High (High) Rating of Soils Limited April through November Operating Season		Severe Rating of Soils Limited July through November	
COMPARTMENT	STAND	COMPARTMENT	STAND
208	3		
208	24		
208	26		
209	3		
209	4		
209	69		
209	74		
209	76		

Harvesting Operating Seasons for Hydric Soils							
Floodplains with frequent or occasional Flooding Limited July through November Operating Season							
COMPARTMENT	STAND	COMPARTMENT	STAND	COMPARTMENT	STAND	COMPARTMENT	STAND
207	1						
207	2						
207	9						

Soil loss from management actions will not exceed the estimated Forested T-factor for each soil or soil map unit based on the cumulative time period between soil disturbing management actions. (Revised Forest Plan, SW003 (3), p. 74). To

meet this standard, in addition to installing water bars and seedling, deep tillage would be required on log decks, as well as temporary roads and primary skid trails with slope grades of 15% or less, in the stands displayed in the table.

Stands Requiring Additional Erosion Control Measures	
Compartment	**Stand**
None	

Herbicide Use

- HU001 – Herbicides will be used only where necessary to achieve the desired condition in the treatment area, and then only when site specific analysis shows no unacceptable negative effects to human or wildlife health or the ecosystem as defined in HU002.
- HU002 – Herbicides will be applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. Site-specific risk assessments are required prior to herbicide application and must be calculated using the procedure developed by Syracuse Environmental Research Associates (SERA).
- HU003 – To minimize potential effects of herbicide use, whenever possible, use individual stem treatments and directed spraying.
- HU004 – Herbicides that are not soil-active will be used in preference to soil-active ones when the vegetation management objectives can be met.
- HU006 – Clearly marked buffers will protect streamside zones, private land and public water supplies.
- HU010 – The use of herbicides is prohibited in the immediate vicinity of Proposed, Endangered, or Threatened plants.
- HU011 – Within a 300-foot buffer from any source waters (public water supply), do not apply herbicide treatments unless a site-specific analysis supports use within the designated buffer to prevent more serious environmental damage than is predicted if pesticides are used.
- HU012 – No herbicide mixing, loading, or cleaning areas will occur within a 300-foot buffer of private land, open water, source waters (public water supply), wells, or other sensitive areas.
- HU018 – A certified pesticide applicator will administer all pesticide application contracts and will supervise any Forest Service personnel involved with the application of pesticides on the Forest.

Heritage

The following measures only apply to cultural resource sites that are unevaluated, eligible for listing, or listed in the National Register of Historic Places.

HP1: Site Avoidance During Project Implementation

Avoidance of historic properties (HP) will require the protection from effects resulting from the undertaking. Effects will be avoided by (1) establishing clearly defined site boundaries and buffers around archeological sites where activities that might result in an adverse effect. Buffers will be of sufficient size to ensure that integrity of the characteristics and values which contribute to, or potentially contribute to, the properties' significance will not be affected, and (2) routing proposed new roads, temporary roads, log landings and skid trails away from historic properties;

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 significantly 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. 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 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 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.

Scenery

The following technical requirements are informed by the Southern Region's Scenery Treatment Guide (April, 2008) for regeneration harvests.

- Trees should be selectively removed to improve scenery within high use areas, vista points, and along interpretive trails.
- Flowering and other visually attractive trees and understory shrubs should be favored when leaving vegetation.
- During permanent road construction, slash should be removed from view in the immediate foreground to the extent possible. Slash may be aligned parallel to roads at the base of fill slopes to collect silt, but usually only if it provides this function.
- Slash should be burned or lopped to within an average of 2 feet of ground, when visible within 100 feet on either side of Concern Level 1 travel routes. Slash should be treated to within an average of 4 feet of the ground when visible within 100 feet on either side of Concern Level 2 travel routes.
- Root wads and other unnecessary debris should be removed or placed out of sight within 100 feet of key viewing points.
- Stems should be cut to within 12 inches of the ground in the immediate foreground.
- Special road and landing design should be used. When possible, log landings, roads and bladed skid trails should be located out of view to avoid bare mineral soil observation from Concern Level 1 and 2 travel routes.

- The visual impact of roads and constructed fire lines should be blended so that they remain subordinate to the existing landscape character in size, form, line, color, and texture.
- Openings and stand boundaries should be organically shaped. Straight lines and geometric should be avoided. Edges should be shaped and/or feathered where appropriate to avoid a shadowing effect in the cut unit. Openings should be oriented to contours and existing vegetation patterns to blend with existing landscape characteristics, as appropriate.
- Cut and fill slopes should be revegetated to the extent possible. Cut banks should be sloped to accommodate natural revegetation.

MONITORING

The Revised Forest Plan lists monitoring activities for the Ouachita National Forest. The Forest's monitoring program is designed to evaluate the environmental effects of actions similar to those proposed in this project, and also serves to assess the effectiveness of treatments. In order to ensure that the appropriate design criteria protecting soil stability, water quality, and other resources are followed, trained contract administrators and inspectors would be on-site during the implementation phase of the project. For those activities that include the use of herbicides, surveillance monitoring to ensure that herbicide label instructions are being followed would be conducted as part of the contract administration. Form R8-FS-2100-1, Herbicide Treatment and Evaluation Record, would be used to monitor work involving herbicides. Stream samples would also be taken to monitor for offsite movement.

PROJECT OBJECTIVE REQUIREMENTS

- TO MANAGE FOR OUACHITA MOUNTAINS-HABITAT DIVERSITY IN MANAGEMENT AREA 14
    - To maintain the primary community types (Ouachita Pine-Oak Forest, Ouachita Pine-Oak Woodland, and Ouachita Dry-Mesic Oak Forest)
    - To create a healthy forest condition
    - To reduce competing vegetation for nutrients, water, and sun
    - To increase growth rate and quality of desired trees by reducing competition for nutrients and water among species
- TO MANAGE FOR SEMI-PRIMITIVE AREAS IN MANAGEMENT AREA 17
- TO ENSURE REGENERATION STANDS ARE RESTOCKED
    - To site prep a bed for seed fall after the regeneration harvests
    - To create a suitable seedbed in regeneration sites after initial prescribed burning
    - To ensure survival of desired trees by releasing suppressed trees from competing tree species
- TO IMPROVE WILDLIFE HABITAT
    - To create suitable habitat for the ABB
    - To create early seral stage habitat
    - To create temporary wildlife openings
    - To provide new growth for wildlife to eat
    - To create water sources for wildlife.
    - To reduce midstory and allow development of grasses and forbs on the forest floor
    - To move toward the open road density objective
    - To stop or slow the infestation of invasive and non-native species
- TO IMPROVE ACCESS TO PROJECT AREA AND PROVIDE SAFE ROAD SYSTEM.
    - To repair or maintain road surfaces, ditch erosion, and repair or replace rusted-out pipes
    - To provide short-term access to harvest units
    - To reduce the impacts to streams and get rid of roads not needed in the future
- TO REDUCE FUEL LOADING.
    - To prevent natural resources from being damaged
    - To protect personal property from wildfires
    - To reduce wildfire intensity to provide a safer environment for fire fighters
- TO BE GOOD NEIGHBORS
    - To supply firewood areas and rock permits to the local community.
    - To ensure landlines are maintained.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

No Harvest Alternative

In response to comments received during scoping, this alternative was considered by the Interdisciplinary Team, but eliminated from detailed analysis.

The ID Team concluded that a “No Harvest” alternative would not satisfy the purpose and need for improving forest health by reducing stand densities and providing the residual trees with access to greater amounts of soil nutrients and water thus increasing their growth, vigor, and improving their resistance to disease and/or insect attack. It also would not create the early seral habitat that would enhance the forage availability and native herbaceous plant rejuvenation essential for wildlife and bird species.

In addition, the ID Team felt the No Action Alternative adequately addressed the overall effects of a no harvest alternative.

No New Road Construction (including temporary roads) Alternative

In response to comments received during scoping, an alternative was considered by the ID Team that would not propose any new construction of roads, including temporary roads, but eliminated from detailed analysis.

The ID Team concluded a proposal with no temporary roads would not allow access into the project area to implement management activities that would satisfy the purpose and need, specifically:

- To have at least 6% and not more than 14% of the suitable land in the 0-10-year age class in Management Area 14 (Revised Forest Plan, pp. 78).
- To have at least 6% and not more than 10% of the suitable land in the 0-10-year age class in Management Area 17 (Revised Forest Plan, pp. 78).
- Manage the project area for native species while limiting nonnative species and off-site species (Revised Forest Plan, pp.6, 58, 59, 60, 82).
- To reduce midstory and allow development of grasses and forbs at ground level (Revised Forest Plan, OBJ06, pp. 59, WF001, pp. 78).
- To have a healthy forest stand (Revised Forest Plan, pp.58-60, 80-83).
- To have the understory and midstory more open, & dominated by herbaceous vegetation (Revised Forest Plan, WF001, pp. 78)
- To have healthy, productive stands in these areas (Revised Forest Plan, pp.58 -60, 79-83).
- To increase the vigor and mast producing potential of residual hard mast producing trees through forest management (Revised Forest Plan, OBJ003, pp. 78)

PROPOSED ACTION

PROPOSED ACTION SUMMARY OF TREATMENTS PRESCRIBED	C-207	C-208	C-209	TOTAL
HARVEST TREATMENTS				
Commercial Thinning - 70 BA Pine and 10 BA Hardwood (acres)	115	178	426	**719**
Modified Seed Tree (acres) for Regeneration	64	0	0	**64**
Clearcut Loblolly (acres) for Regeneration	0	37	0	**37**
Subtotal Regen Harvests				**101**
TOTAL HARVEST TREATMENTS				**820**
SILVICULTURE TREATMENTS				
Reforestation of New Regen Sites (acres)	64	37	0	**101**
Timber Stand Improvements of Other Regen (acres)	0	77	0	**77**
TOTAL				**178**
FUELS TREATMENT				
Fireline Construction (miles)				**11.69**
Multi-purpose Burning 3-5-year intervals (acres)	1032	990	1825	**3,847**
WILDLIFE TREATMENTS				
WSI - option to use hand tools, herbicides or mechanical (acres)	115	178	426	**719**
Nest Box (#)	22	16	22	**60**
Pond Construction (#)	6	3	10	**19**
Pond Reconstruction (#)	3	2	1	**6**
Temporary Wildlife openings (logging decks -- approximate #)				**44**
TRANSPORTATION ***				
Reconstruction (miles)				**5.23**
Temporary Roads (miles)				**5.32**
Obliteration (miles)				**1.05**
OTHER TREATMENTS				
Firewood Areas				**yes**
Landline Maintenance (miles)				**6.0**
Feral Hog Control (yes/no)				**yes**

***The August 29, 2019 Project Announcement Letter listed the road reconstruction miles as 8.13 miles and the temporary road miles as 5.18. Also, the Proposed Action included 0.11 of road decommissioning and 43 logging decks. Since that time, it was determined that less road would be needed to meet the objectives of the project. Changes include reducing road reconstruction mileage on Roads 133 and 3050A and reducing the extent to which roads will be reconstructed on roads 133, 3050, and 3050A, dropping Roads 51 and 3 (West of the intersection with 133), slightly increasing road reconstruction mileage on Road 3 (east of the intersection with 133), and slightly increasing temporary road mileage. This will also reduce the economic impacts on the project. This reconfiguration added a logging deck. Further field inspection determined that the road that was thought to be decommissioned by nature was simply blocked by debris.

Nest boxes would be installed at each pond location and at each regeneration location; two per site.

Hardwoods may be harvested in stands identified for treatment, where available, leaving a minimum hardwood component of 10 percent of the residual stand or 10 basal area per acre.

Permits would be offered to the public for collection of rocks by private individuals within road construction and reconstruction corridors. That is, rocks can be collected within areas of disturbance associated with road construction and reconstruction. Firewood and shale pit permits may be issued.

Firelines would be constructed around perimeters of all natural and artificial regeneration areas (i.e. shelterwood, seedtree, or existing regeneration areas). The mechanically constructed fireline would be bladed down to mineral soil and approximately 8 feet wide. Bladed lines would be water barred as necessary on slopes to limit soil movement. Firelines would normally be installed within 50 feet either side of stand boundaries. The purpose of a fireline is for "control" if a prescribed fire is applied to the stands for site preparation and/or to exclude fire during years of stand development.

Regeneration Stands would have reforestation and timber stand improvement activities (Site Preparation, Release, Mechanical Scarification, and TSI (multiple times if necessary). If activities are not successful, rip and plant with shortleaf pine; hand tool release, herbicide, and pre-commercial thinning may be utilized.) These activities may be repeated as necessary to obtain adequate shortleaf pine regeneration.

Red-cockaded Woodpecker (RCW) Treatments – If a new RCW cavity tree or a cavity tree cluster is discovered in the process of implementing a timber harvest decision in management areas other than Management Area 22 (i.e. MA 14, 17, 21), the RCW Species Recovery Plan and Ouachita National Forest Revised Forest Plan standards would apply and management of that cavity tree or cavity tree cluster area would begin immediately. In the event a new RCW cavity tree is found or started within this project area, the immediate area, including streamside management zones (Revised Forest Plan standard 22.05 pp. 120), that surround the tree (10 acres) would be identified as an active cluster and all activities associated with enhancing and protecting the cluster would begin. Other activities would include use of cavity restrictors, snake and squirrel excluder devices, artificial cavities, single-bird augmentations, multiple-bird group-initiations, brush hogging in cavity tree clusters, removal of southern flying squirrels, population/nest monitoring, cavity maintenance and southern pine beetle (SPB) and Ips control efforts. In active, inactive, and recruitment clusters, retain no more than 10 square feet of basal area per acre in overstory hardwoods. Remove all hardwoods within 50 feet of cavity trees. (Revised Forest Plan pg 122; 22.17).

Matrix of Needed Road Work Ladd's Creek Mountain EMU

Road Name	Segment	Type of Work	Description
133	N/A	Reconstruct 0.41 mile	Apply Gravel to Road Surface and add and replace pipe as needed, for **0.41 miles** from M.P. 0.05 to M.P. 0.35 and from M.P. 0.78 to M.P. 0.89. This will remain an open road year-round after harvest.
3050	N/A	Reconstruct 2.2 miles	Add gravel to surfacing and Replace pipe as needed, for **2.2 miles** from START to END. This will remain a seasonally open road after harvest.
3050A	N/A	Reconstruct 1.2 miles	Apply Gravel to road surface and replace pipe as needed for **1.25 miles** from START to M.P. 1.25. This will remain a seasonally open road after harvest.
877	N/A	Reconstruct 0.96 mile	Apply Gravel to road surface and replace pipe as needed for **0.96 miles** from START to END. This will remain a Closed road year-round after harvest.
3	N/A	Reconstruct 0.41 mile	Replace pipe as needed for **0.28 mile** from M.P.1.39 to M.P. 1.57, from M.P. 1.63 to M.P. 1.68, and from M.P. 1.97 to M.P. 2.02. Widen Switchbacks for **0.13 mile** from M.P. 4.4 to M.P. 4.46 and M.P. 4.52 to M.P. 4.59. This will remain an open road year-round after harvest.
			Total Reconstruction – 5.23 miles
3027	NA	Obliteration	Obliterate 0.40 miles
LG38	N/A	Obliteration	Obliterate 0.65 Miles
			Total Road Obliteration – 1.05 miles
Temp Roads			5.32 miles – Many of these are old roads that would be opened. A few would be new. All temporary roads would be closed after harvest.
Various		Decks	Approximately 44 decks to be seeded as temporary wildlife openings.

C-207 STANDS	LAND CLASS	MGT AREA	ACRES	FUELS	HARVEST			SILVICULTURE		WILDLIFE			
				RX BURN	Comm Thin	Regeneration		Reforestation of New Regen	TSI of Other Regens	WSI	Nest Box	Ponds	
				3-5 Year Rotation	70 BA pine 10 BA Hwd	Seed Tree	Clearcut Loblolly	Site Prep, Natural or Artificial Reforestation, Release, PCT	Site Prep, Natural or Artificial Reforestation, Release, PCT	Hand tool, mechanical or herbicide		Rehab	New
1	500	14	63	63	63					63			
2	500	14	17	17		17		17			2		
3	821	14	374	374							2		1
4	500	14	29	29									
5	511	14	47	47		47		47			4		1
6	820	14	43	43							2		1
7	821	14	45	45							2		1
8	500	14	50	50									
9	500	14	16	16	16					16	2		1
10	821	14	43	43							2	1	
11	500	14	12	12									
12	500	14	36	36	36					36	4	2	
13	511	14	16	16									
14	650	14	68	68							2		1
15	500	14	8	8									
16	828	14	3	3									
17	828	14	14	14									
18	828	14	1	1									
19	828	14	73	73									
20	828	14	7	7									
21	500	14	27	27									
22	828	14	1	1									
23	828	14	0	0									
24	650	14	22	22									
25	828	14	1	1									
26	828	14	4	4									
27	828	14	10	10									
28	828	14	2	2									
901	Private		**99**										
TOTAL			**1131**	**1032**	**115**	**64**	**0**	**64**	**0**	**115**	**22**	**3**	**6**

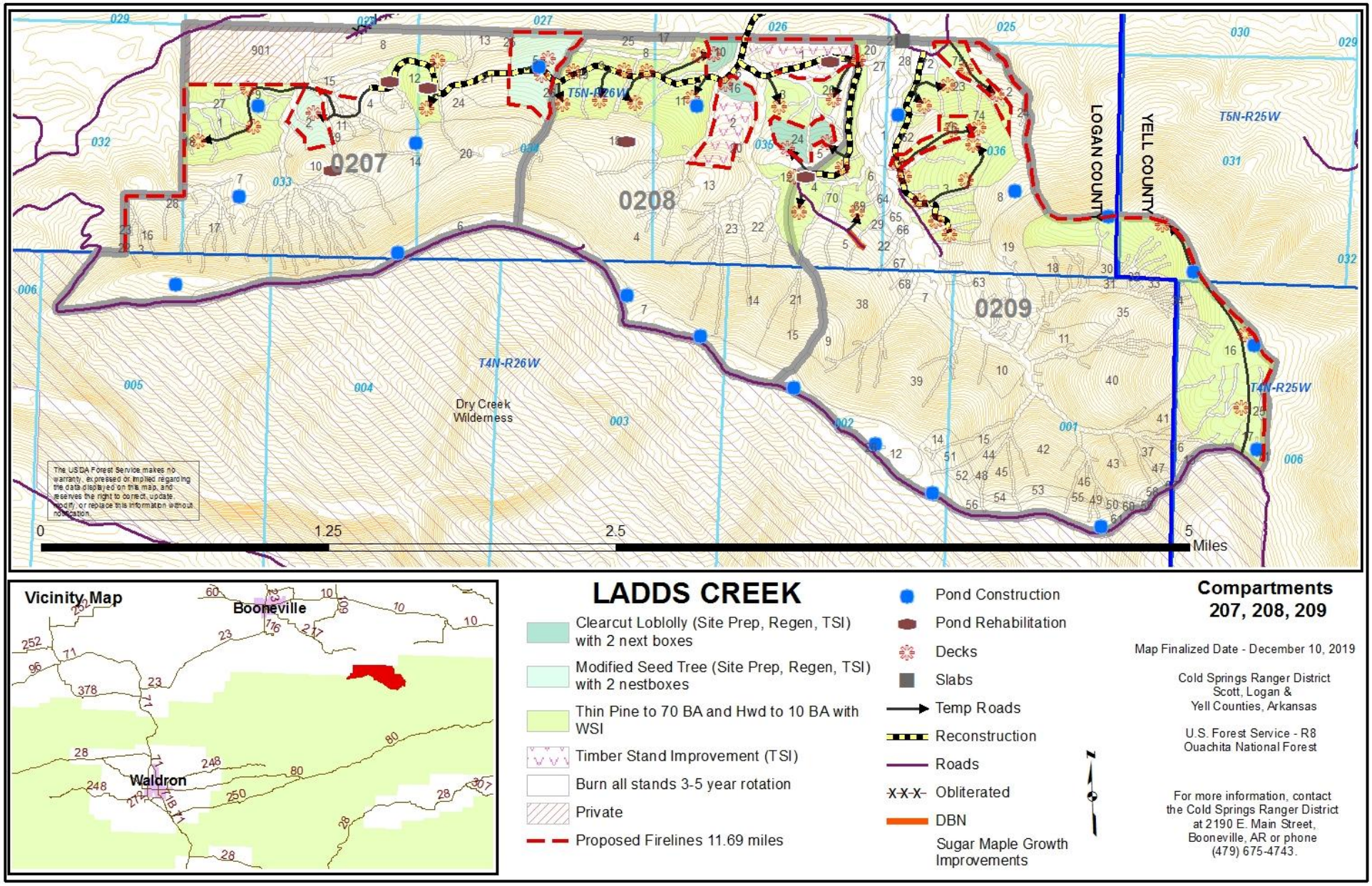
C-208 STANDS	LAND CLASS	MGT AREA	ACRES	FUELS	HARVEST			SILVICULTURE		WILDLIFE			
				RX BURN	Comm Thin	Regeneration		Reforestation of New Regen	TSI of Other Regens	WSI	Nest Box	Ponds	
				3-5 Year Rotation	70 BA pine 10 BA Hwd	Seed Tree	Clearcut Loblolly	Site Prep, Natural or Artificial Reforestation, Release, PCT	Site Prep, Natural or Artificial Reforestation, Release, PCT	Hand tool, mechanical or herbicide		Rehab	New
1	500	14	43	43					43		2	1	
2	500	14	34	34					34 (older regen)				
3	500	14	21	21	21					21			
4	821	14	178	178									
4	821	17	58	58									
5	500	14	34	34									
6	500	14	5	5									
7	820	14	19	19									
7	820	17	48	48							4		2
8	500	14	5	5	5					5			
9	500	14	62	62	62					62			
10	500	14	10	10			10	10			2		
11	500	14	64	64	64					64	2		1
12	650	14	16	16	16					16			
13	650	14	29	29									
14	821	14	12	12									
14	821	17	56	56									
15	821	14	0	0									
15	821	17	46	46									
16	500	14	7	7			7	7			2		
17	828	14	0	0									
18	500	14	54	54							2	1	
19	828	14	19	19									
20	828	14	79	79									
20	828	17	6	6									
21	828	14	0	0									
21	828	17	4	4									
22	650	14	24	24									
23	650	14	12	12									
24	500	14	20	20			20	20			2		
25	500	14	15	15									
26	500	14	10	10	10					10			

TOTAL			**990**	**990**	**178**	**0**	**37**	**37**	**77**	**178**	**16**	**2**	**3**

C-209 STANDS	LAND CLASS	MGT AREA	ACRES	FUELS	HARVEST			SILVICULTURE		WILDLIFE			
				RX BURN	Comm Thin	Regeneration		Reforestation of New Regen	TSI of Other Regens	WSI	Nest Box	Ponds	
				3-5 Year Rotation	70 BA pine 10 BA Hwd	Seed Tree	Clearcut Loblolly	Site Prep, Natural or Artificial Reforestation, Release, PCT	Site Prep, Natural or Artificial Reforestation, Release, PCT	Hand tool, mechanical or herbicide		Rehab	New
1	821	14	18	18									
1	821	17	1	1									
2	630	17	27	27									
3	630	14	2	2	2					2			
3	630	17	67	67	67					67			
4	630	14	48	48	48					48	2	1	
5	630	14	45	45									
5	630	17	1	1									
6	821	14	3	3									
7	821	14	0	0									
7	821	17	16	16									
8	821	17	29	29							2		1
9	827	17	16	16									
10	827	17	16	16									
11	827	17	21	21									
12	600	17	41	41							4		2
13	600	17	4	4									
14	821	17	7	7									
15	821	17	8	8									
16	630	17	182	182	182					182	6		3
17	600	17	15	15	15					15	2		1
18	821	17	29	29									
19	821	17	38	38									
20	821	14	3	3									
21	828	14	4	4									
22	828	14	73	73									
22	828	17	181	181									
23	828	14	1	1									
23	828	17	9	9									
24	828	17	5	5									
25	828	17	2	2									

C-209 STANDS	LAND CLASS	MGT AREA	ACRES	FUELS	HARVEST			SILVICULTURE		WILDLIFE			
				RX BURN	Comm Thin	Regeneration		Reforestation of New Regen	TSI of Other Regens	WSI	Nest Box	Ponds	
				3-5 Year Rotation	70 BA pine 10 BA Hwd	Seed Tree	Clearcut Loblolly	Site Prep, Natural or Artificial Reforestation, Release, PCT	Site Prep, Natural or Artificial Reforestation, Release, PCT	Hand tool, mechanical or herbicide		Rehab	New
26	828	17	1	1									
27	821	14	5	5									
28	821	14	3	3									
29	630	14	2	2									
30	821	17	9	9									
31	821	17	3	3									
32	821	17	1	1									
33	821	17	6	6									
34	821	17	8	8									
35	821	17	59	59									
36	821	17	7	7									
37	821	17	6	6									
38	821	14	1	1									
38	821	17	55	55									
39	821	17	195	195									
40	821	17	111	111									
41	821	17	15	15									
42	821	17	58	58									
43	821	17	37	37									
44	821	17	6	6									
45	821	17	12	12									
46	821	17	6	6									
47	821	17	1	1									
48	821	17	1	1									
49	821	17	2	2									
50	821	17	1	1									
51	821	17	7	7									
52	821	17	6	6									
53	821	17	7	7									
54	821	17	4	4									

C-209 STANDS	LAND CLASS	MGT AREA	ACRES	FUELS	HARVEST			SILVICULTURE		WILDLIFE			
				RX BURN	Comm Thin	Regeneration		Reforestation of New Regen	TSI of Other Regens	WSI	Nest Box	Ponds	
				3-5 Year Rotation	70 BA pine 10 BA Hwd	Seed Tree	Clearcut Loblolly	Site Prep, Natural or Artificial Reforestation, Release, PCT	Site Prep, Natural or Artificial Reforestation, Release, PCT	Hand tool, mechanical or herbicide		Rehab	New
55	821	17	1	1									
56	600	17	50	50							4		2
57	600	17	1	1									
58	600	17	4	4									
59	600	17	1	1									
60	600	17	1	1									
61	600	17	2	2									
62	500	14	0	0									
62	500	17	12	12									
63	821	14	1	1									
63	821	17	66	66									
64	821	14	4	4									
65	821	14	3	3									
66	821	14	1	1									
67	630	14	5	5									
67	630	17	2	2									
68	630	17	2	2									
69	630	14	15	15	15					15			
70	500	14	3	3	3					3			
71	828	17	1	1									
72	630	14	9	9									
72	630	17	0	0									
74	630	14	6	6	6					6			
74	630	17	53	53	53					53	2		1
75	630	14	1	1	1					1			
75	630	17	18	18	18					18			
76	630	14	0	0	0 .47					0.47			
76	630	17	16	16	16					16			
TOTAL			**1825**	**1825**	**426**	**0**	**0**	**0**	**0**	**426**	**22**	**1**	**10**


0207
0208
0209
T5N-R26W
T5N-R25W
T4N-R26W
T4N-R25W
LOGAN COUNTY
YELL COUNTY
Dry Creek Wilderness
The USDA Forest Service makes no warranty, expressed or implied regarding the data displayed on this map, and reserves the right to correct, update, modify, or replace this information without notification.
0
1.25
2.5
5
Miles
Vicinity Map
Booneville
Waldron
LADDS CREEK
Clearcut Loblolly (Site Prep, Regen, TSI) with 2 next boxes
Modified Seed Tree (Site Prep, Regen, TSI) with 2 nestboxes
Thin Pine to 70 BA and Hwd to 10 BA with WSI
Timber Stand Improvement (TSI)
Burn all stands 3-5 year rotation
Private
Proposed Firelines 11.69 miles
Pond Construction
Pond Rehabilitation
Decks
Slabs
Temp Roads
Reconstruction
Roads
Obliterated
DBN
Sugar Maple Growth Improvements
N
Compartments 207, 208, 209
Map Finalized Date - December 10, 2019
Cold Springs Ranger District
Scott, Logan & Yell Counties, Arkansas
U.S. Forest Service - R8
Ouachita National Forest
For more information, contact the Cold Springs Ranger District at 2190 E. Main Street, Booneville, AR or phone (479) 675-4743.

ALTERNATIVE 1 - NO ACTION

Under the No Action Alternative neither the Proposed Action nor any action alternative would be implemented. Management activities would be deferred until a later entry. However, ongoing Forest Service approved activities would continue in the project area, such as the following but not limited to fire suppression, hunting, public vehicle access, road maintenance, dispersed camping, and salvage actions. **Fire suppression:** Human and natural caused fires would be suppressed.

ALTERNATIVE 2 - NO HERBICIDE

In response to comments received during scoping and because a Forest Policy requires the analysis of an alternative to herbicide use, this alternative will be considered in detail by the Interdisciplinary Team. This alternative is the same as the Proposed Action EXCEPT the use of herbicide for treatment is not proposed.

OTHER PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

In the past, the project area was part of an area hit by the southern pine beetle epidemic of 1995. Salvage sales were conducted within these compartments to remove some dead or dying pine trees. Presently, oak decline is occurring in scattered pockets throughout the project area. There are still falling dead and dying trees in the project area because of past weather events. Private land is mostly pastureland or grazed woodlands. There is very little commercial timber. There is a reasonable expectation that salvage sales would be conducted if an infestation or natural disaster occurs. There is no other known past, present, and reasonably foreseeable future activities other than what is identified here and proposed in this environmental assessment.

SUMMARY COMPARISON OF ALL ALTERNATIVES

Comparison of Primary Objectives by Alternative (approximates only)

Primary Objectives	Proposed Activity	Units of Measure	No Action Alt. 1	Proposed Action	No Herbicide Alt. 2
TO MAINTAIN MA 14 OBJECTIVES TO MAINTAIN MA 17 OBJECTIVES	Timber Harvest	Acres	0.00	820	820
	Silviculture Treatments (Site Prep)	Acres	0.00	135	135
	Silviculture Treatments (TSI)	Acres	0.00	178	178
	Wildlife Treatments (Ponds-Rehab)	#	0.00	6	6
	Wildlife Treatments (Ponds-New)	#	0.00	19	19
	Wildlife Treatments (WSI)	Acres	0.00	719	719
TO ENSURE STAND RESTOCKING	Reforestation Site Prep	Acres	0.00	135	135
	Timber Stand Improvements	Acres	0.00	178	178
TO IMPROVE WILDLIFE HABITAT	WSI	Acres	0.00	719	719
	Pond Rehabilitation	# Ponds	0.00	6	6
	Pond Construction	# Ponds	0.00	19	19
	Nest Boxes	#boxes	0.00	60	60
	Meet Open Road Density Objectives	1 mi/sq./mi	0.65	0.59	0.59
	Temporary Openings (log decks)	Acres	0.00	44	44
	Prescribed Burning	Acres	0.00	3847	3847
	Fireline Reconstruction/Reconstruction	Miles	0.0	Yes	Yes
TO PROVIDE ACCESS	Road Reconstruction	Miles	0.00	5.23	5.23
	Temporary Roads	Miles	0.00	5.32	5.32
	Road Obliteration by Nature	Miles	0.00	1.05	1.05
TO BE GOOD NEIGHBORS	Firewood Permits	Yes/No	No	Yes	Yes
	Rock Permits	Yes/No	No	Yes	Yes
	Paint/Blaze Boundaries	Miles	0.00	6.0	6.0

Summary Comparison of Environmental Effects by Alternative

Environmental Effect (measure)	Measure	No Action Alt.1	Proposed Action	No Herbicide Alt. 2
AIR QUALITY	Below concentration limits for atmospheric pollutants -- YES/NO	Yes	Yes	Yes
	Emissions Increase / Tons	0	69 tons	69 tons
SOILS	Within Allowable Soil Loss YES/NO	NA	Yes	Yes
WATER QUALITY	Risk Level of Blue Mountain Lake	Low	Low	Low
	Cedar Creek – Petit Jean River	Low	Low	Low
	Dry Creek-Petit Jean River 111102040205	Low	Low	Low
WILDFIRE HAZARDS AND FUELS	Will fuel loading be reduced? Yes/No	No	Yes	Yes
	Prescribed Burning - Acres	0	3,847	3,847
VEGETATION	Pine and Hardwood in watershed - acres/%	Same	Pine 1,580 ac / 41% Hdw 2,2676 ac / 59%	Same
WILDLIFE	(Habitat Capability Meets Minimum Viable Populations for all MIS Species Baseline - Yes/No	No	Yes	Yes
	ABBA Habitat Improvements	No	Yes	Yes
	Early Seral Habitat Created 6-14% (MA14)	34 acres existing	101 acres added	101 acres added

	Early Seral Habitat Created 6-10% (MA17)	0	0	0
	Fish Passage - culverts replacement	0	0	0
	Resulting Road Density (1mi/sq./mi)	0.65	0.59	0.59
ECONOMY	Volume to be Harvested (ccf)	0	7,532	7,532
	Revenue Cost Ratio <1.0 below cost - >1.0 is above cost	NA	1.01	1.01

ISSUES COMPARISON

Issue	Measure	No Action Alternative 1	Proposed Action	No Herbicide Alternative 2
Proposed herbicide application, specifically glyphosate, may negatively impact the health of forest visitors and wildlife in the project area.	Are herbicides proposed? Yes/No	No	Yes	No
Proposed timber harvest and road construction may negatively impact forest resources (soils, water quality, etc.).	Miles of New Roads Miles of Temporary Roads Timber Harvest Proposed? Yes/No (acres)	0.0 System 0.0 Temporary No	0.0 System 5.32 Temporary Yes (820 acres)	0.0 System 5.32 Temporary Yes (820 acres)

CHAPTER 3 ENVIRONMENTAL DISCLOSURES

INTRODUCTION

The actions described by the Proposed Action are typical of those projected for implementation in the Revised Land and Resource Management Plan and for which the environmental effects are disclosed in the Final Environmental Impact Statement (FEIS). This environmental assessment tiers to the FEIS.

The following inventories and sources of information were used in the analysis:

- → Silvicultural field examinations for *Ladd's Creek* were conducted in 2018. Information collected in this inventory is maintained in Forest Service Vegetation database (FSVEG). A summary of this information is in the project file at the district office and is incorporated by reference.
- → District compartment records of previous management activities.
- → Soil Resource Inventory for the Ouachita National Forest updated.
- → SMS –Scenery Management System by Ouachita National Forest Recreation Staff.
- → Sensitive, threatened or endangered species database from the Arkansas Natural Heritage Commission.
- → Sensitive plant survey by Vernon Bates, Botanist under contract to the ONF and Arkansas Nature Conservancy.
- → Regional Forester's Sensitive Species List.
- → U.S. Fish and Wildlife Service list of Endangered Species.
- → American burying beetle (ABB) surveys
- → Field examination for the Biological Evaluation by the District Wildlife Biologist.
- → Geographic Information System (GIS) data files.
- → Travel Analysis Process – *Ladd's Creek* (July 2019).

AIR QUALITY

Present 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. 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.

The county where burning is proposed, prescribed fire emissions currently account for nearly 84% percent of all fine particulate emissions (1,236 tons/year from fires compared to 1,474 tons/year total emissions). In the state of Arkansas, prescribed fire emissions account for 50.6% of all fine particulate matter emissions (72,256 tons/year from fires compared to 142,824 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 2011, available online at ftp://ftp.epa.gov/EmisInventory/2011/2011neiv1_eventfire_countyscc_caphap.zip and http://www.epa.gov/ttnchie1/trends/.

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 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 (O3),	carbon monoxide (CO)	sulfur dioxide (SO2)
particulate matter (PM)	nitrogen dioxide (NO2)	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.

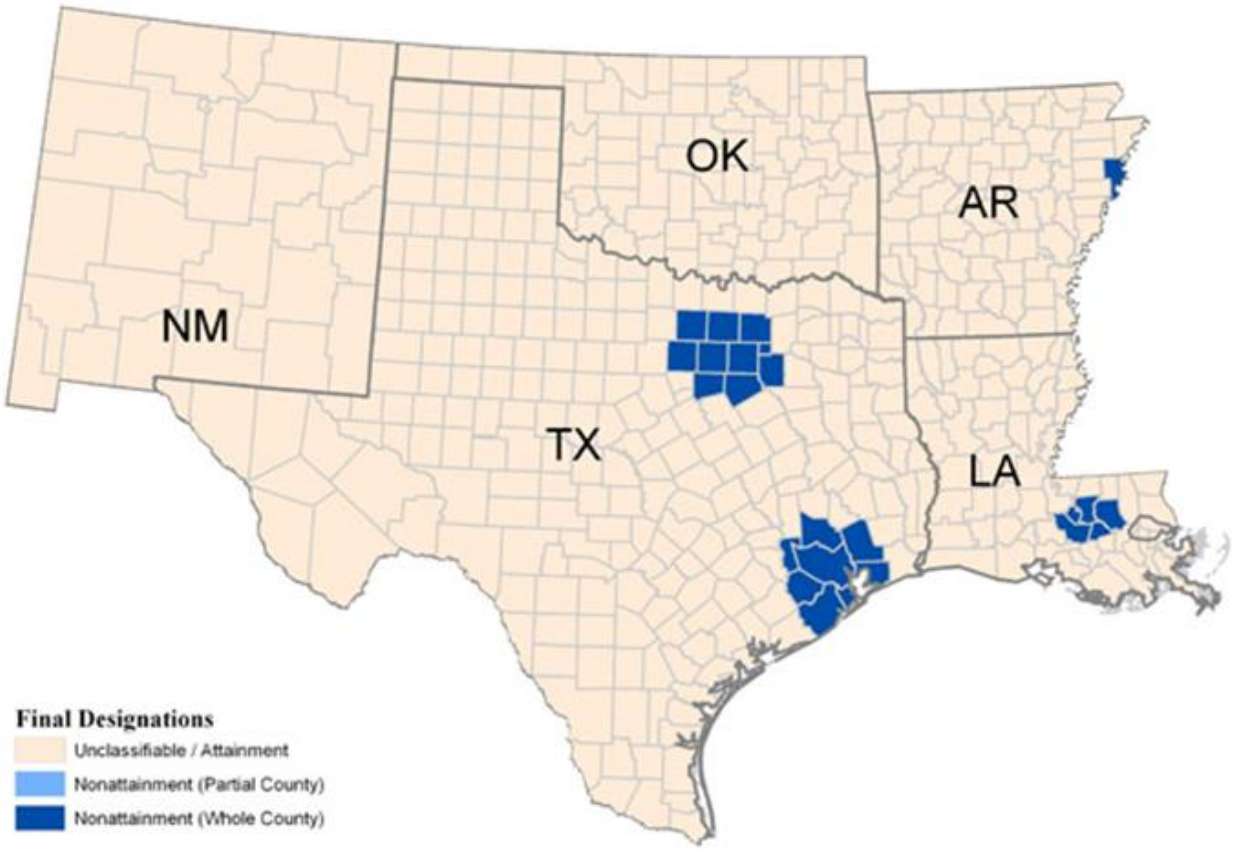
The criteria pollutants of most concern on the Ouachita National Forest are particulate matter and ozone. Fine particulate matter is the leading cause of regional haze (also known as visibility impairment), while ozone can harm sensitive vegetation within the forest. Additionally, at elevated concentrations 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**. Logan County, Arkansas, 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) See EPA Map below.. http://www.epa.gov/ozonedesignations/2008standards/final/region6f.htm (as of 12/23/2014)

EPA FINAL DESIGNATIONS MAP OF REGION 6



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 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.

PARTICULATE MATTER (PM 2.5)
The project area is located in Logan County, Arkansas and is listed as **Unclassifiable / Attainment** per a letter to Ron Curry, Regional Administrator, U.S. Environmental Protection Agency, Region VI, from Governor Mike Beebe dated December 5, 2013. All monitored counties in Arkansas currently meet the existing primary and secondary PM2.5 standards, and no counties are designated nonattainment.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

The proposed prescribed burning is compatible with the Forest Plan, the desired conditions, and the standards within each management prescription that falls within the project area. The following effects are based on the prescribed fires being implemented in compliance with the USDA Forest Service Southern Region's Smoke Management Guidelines, dated September 2010. The smoke management objectives set forth in the guidelines are as follows:

- Minimize amount/concentration of smoke entering populated areas
- Prevent/minimize public health/safety hazards
- Avoid exceedance of National Ambient Air Quality Standards (NAAQS)
- Protect visibility in Class I Areas

Additionally, the guidelines require that burn plans be prepared to ensure that the smoke management objectives meet USDA policy that prescribed fires may not cause or contribute to an exceedance of a National Ambient Air Quality Standards. Burn planning will include the appropriate analysis procedures to evaluate downwind smoke concentrations to ensure protection of public health and safety.

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 (Logan County mostly averages 3 tons per acres), with an average emission factor of 12 pounds of fine particulate matter per ton of fuel consumed. Calculations of emissions from the largest unit show that the resulting emissions increase as a result of this project would be 62 tons per year. The following calculation was used:

3,847 burn acres x 3.0 tons per acre x 12 (average emission factor) divided by 2,000 = 69

All prescribed burning activities on the Ouachita National Forest, including those proposed in this action are conducted in accordance with the Region 8 Smoke Management Guidelines in order to alleviate the smoke related impacts outlined above. Smoke management planning in accordance with the Region 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 Regional 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 ACTION ALTERNATIVE 1

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

In addition to using prescribed fire as is proposed, the Forest may also conduct controlled burns in one of the other units or in nearby areas. Depending on the timing of the burns, the NAAQS for fine particulate could be affected. Cumulative impacts will be discussed as they relate to these standards.

Smoke from individual prescribed fires usually disperses quickly (in hours rather than days) and once the smoke has cleared the effect is over. Therefore, prescribed burning from several days prior to the current burn event does not contribute to a cumulative effect.

Multiple prescribed fires could occur on the same day within the analysis area if burning conditions are favorable, and equipment and staffing are available. Multiple burns, occurring at the same time, could cumulatively increase particulate levels. These short-term impacts are best assessed through smoke dispersion modeling to determine how plumes intersect, the resulting particulate concentrations and the likelihood of exceeding a 24-hour NAAQS. However, at this stage of planning, combinations of burn units that might be treated on the same day are not known and therefore modeling the cumulative impact on the 24-hour NAAQS is not an option. Communication between prescribed fire managers is essential to minimize the chances of smoke from multiple burns merging, whether they are ignited on the same or consecutive days.

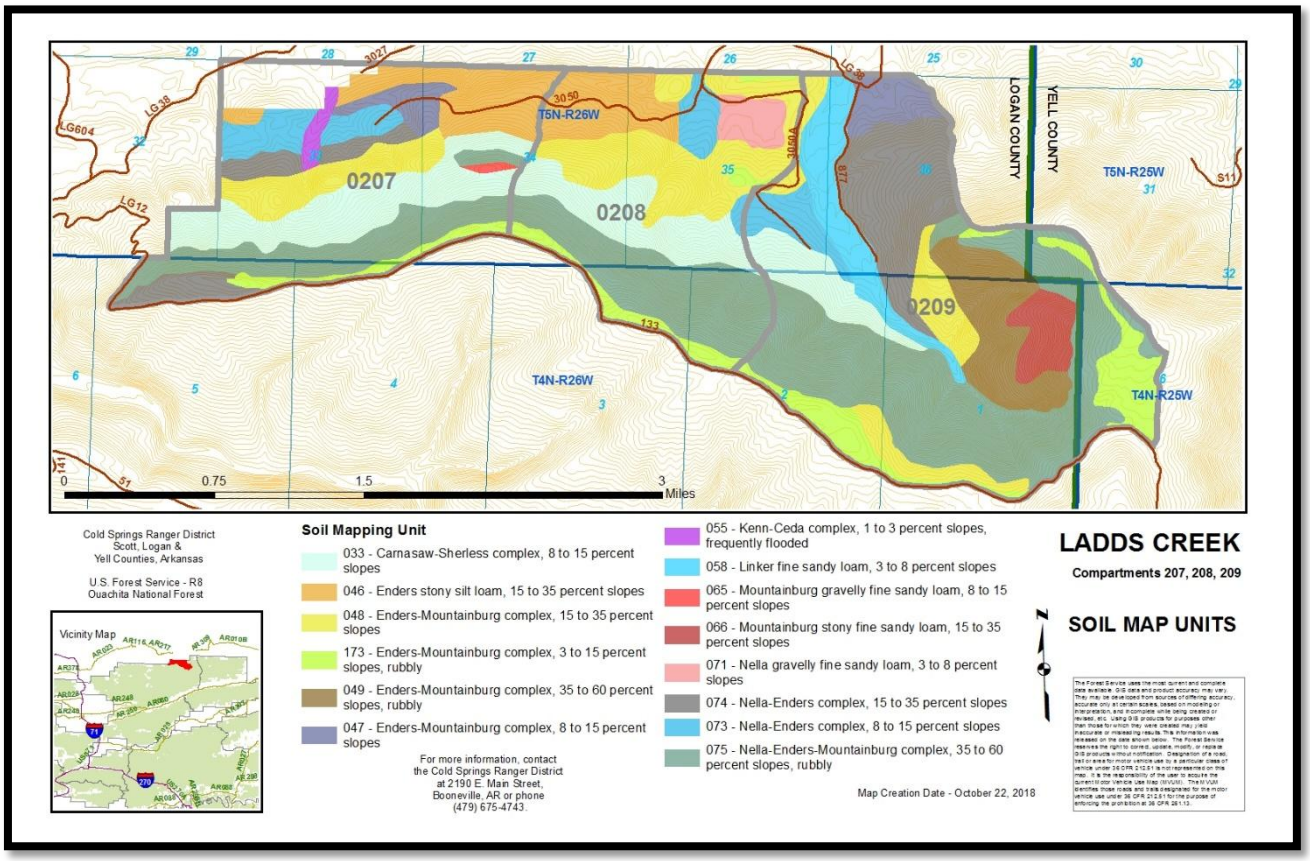
No additional impacts from reasonably foreseeable actions are anticipated.

The direct, indirect, and cumulative effects to air quality of the proposed prescribed burning would be of short duration at most (less than 24-hours). As a result of the pre-planning and effective smoke management as required throughout the burns, the overall magnitude of effects is well within the standards set to protect public health and safety. No significant cumulative effects would result from implementation of the proposed action.

SOILS

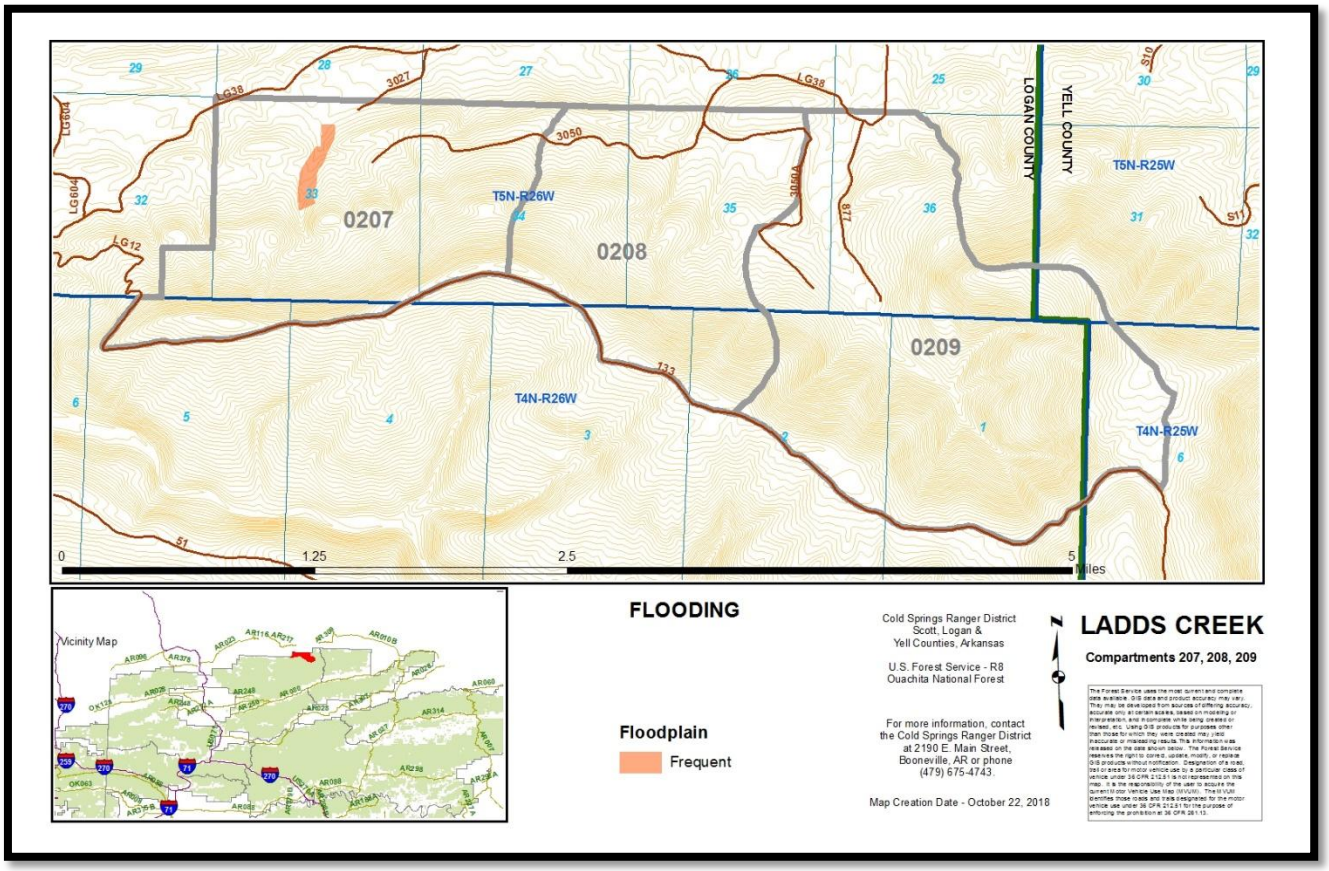
Present Conditions

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. The Soil Resource Report for the Ladd's Creek Project Area identified and described **14** soil mapping units in the project area. Soil properties and associated management implications/precautions of these soil units were analyzed with respect to the proposed practices within each alternative.



Parklands, Prime Farmlands, and Rangeland. No parklands, roadless areas, wild and scenic rivers, ecologically critical areas, or other unique areas are within or adjacent to the project area. However, there are some small acreages of Prime Farmland near and within the project area, some of which are on private ownership. The Prime Farmland within the project includes one soil type (Map units #071). Proposed management activities would occur on less than 52 acres of prime farmland soils but would not alter the soil's capacity to remain prime farmland.

Floodplains, Riparian Areas, Jurisdictional Wetlands and Municipal Watersheds. The project area has some floodplains and riparian areas, but no jurisdictional wetlands or municipal watersheds. Current Forest Plan monitoring notes these areas are protected by the Revised Forest Plan (Forest Wide Design Criteria SW001-SW009, Pg. 74-76 and Standards for MA 9, 9.01-9.27, Pg. 103-108). There are no actions proposed specifically for floodplains and riparian areas.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FLOODING
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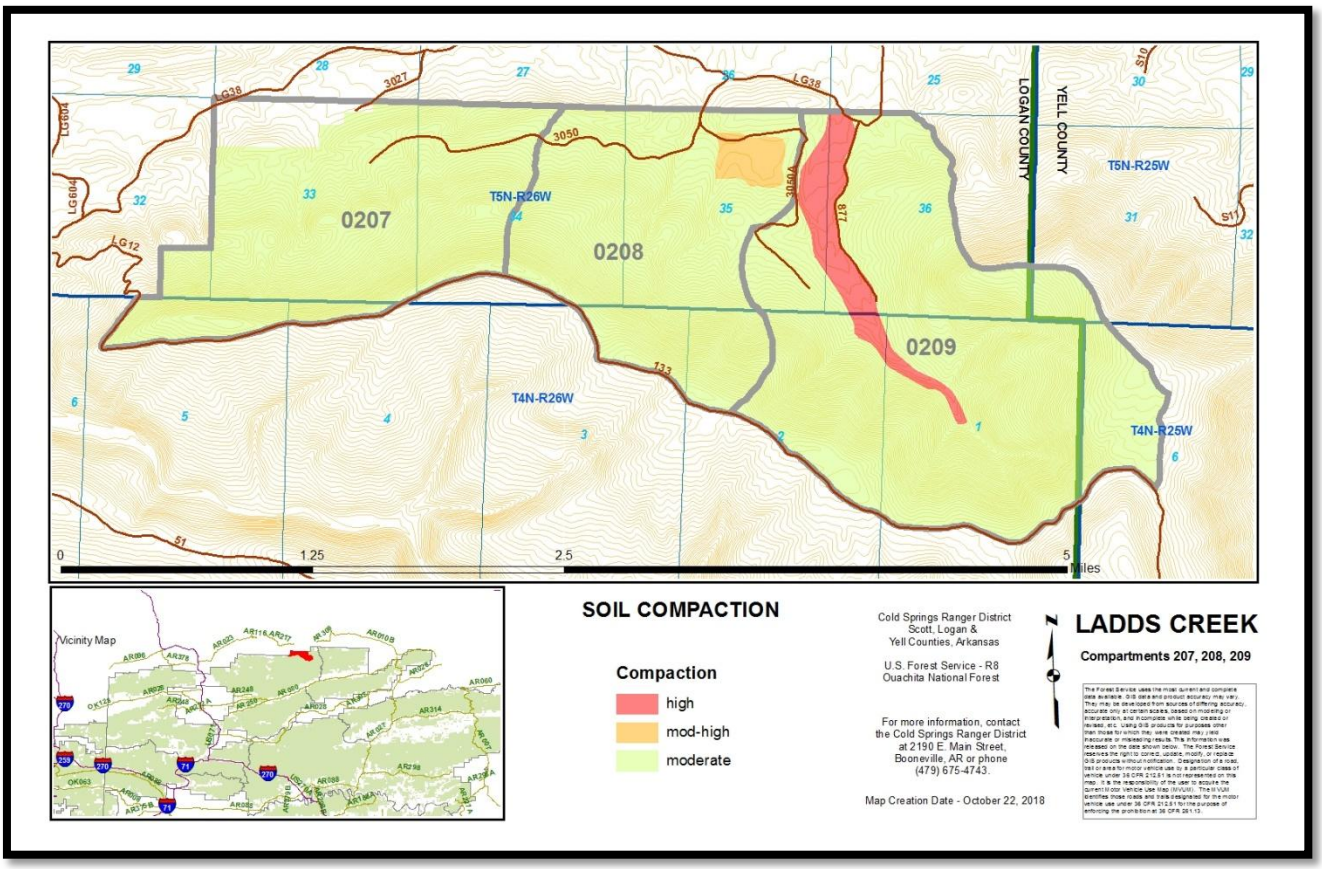
Cold Springs Ranger District
Scott, Logan &
Yell Counties, Arkansas
U.S. Forest Service - R8
Ouachita National Forest
For more information, contact
the Cold Springs Ranger District
at 2190 E. Main Street,
Booneville, AR or phone
(479) 675-4743.
Map Creation Date - October 22, 2018
LADDS CREEK
Compartments 207, 208, 209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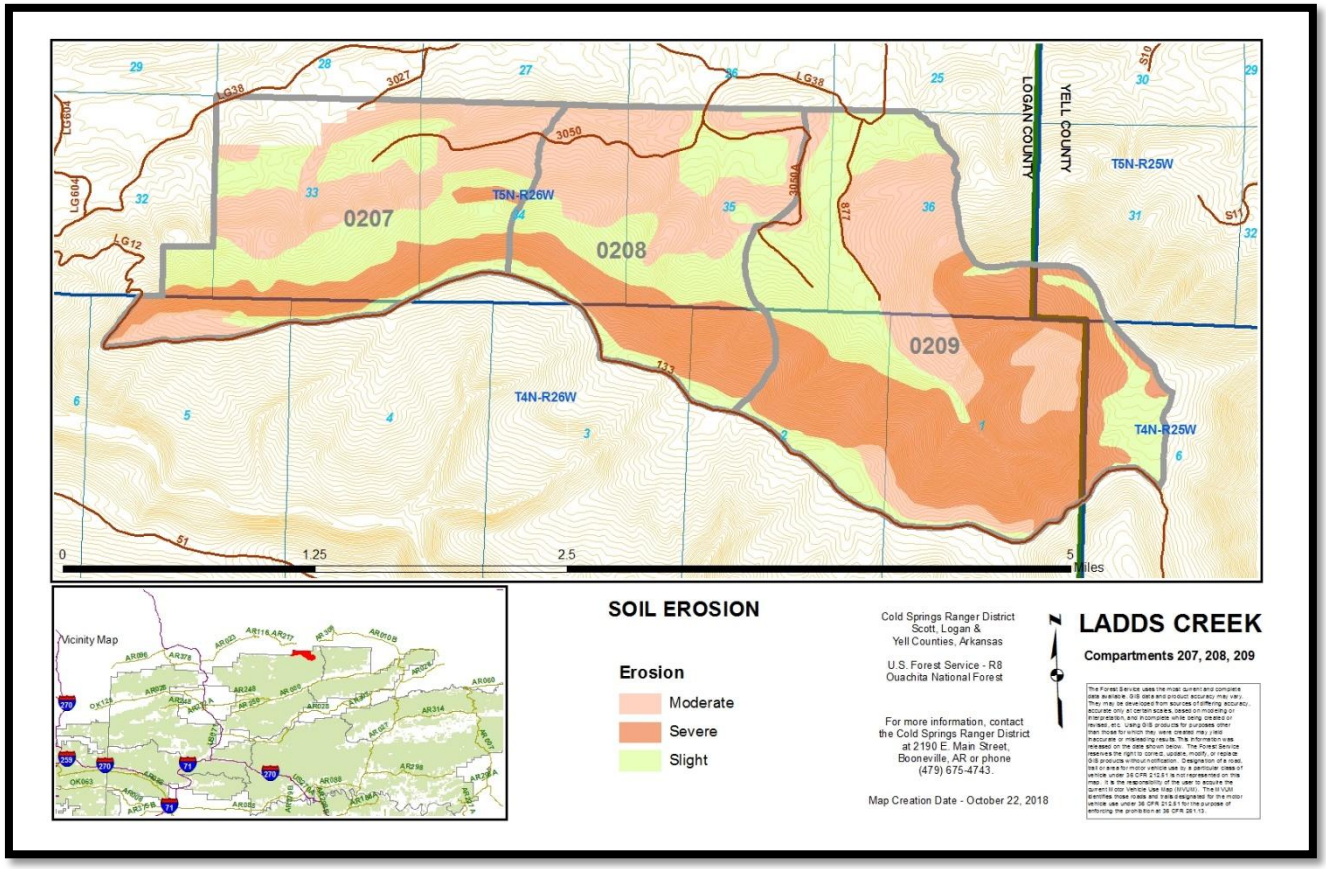
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Compartments 207, 208, 209

ENVIRONMENTAL EFFECTS

Geographic Boundary and Analysis Tools Used. The geographic boundary for the effects on soil quality would be the boundary of all compartments within ***Ladd's Creek***. Timelines for measuring the effects on soils would be 15 to 25 years between re-entry periods. The Universal Soil Loss Equation (USLE) model was used to calculate potential erosion.

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

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 (USDA Forest Service. 2005a, pg. 74-75, Criteria SW003). 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, the worst case-modeling scenarios were analyzed for soil map units with a severe and moderate 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 (scarification, waterbar and seed). 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.

Comparison of Proposed Action and Allowable Soil Loss

Soil Map Unit#	Compartment/Stand	Treatment	Soil Loss (tons/acre)	
			Proposed Action	Allowable
46	207/05	Seed Tree	12.52	15.00
74	209/03	Thin Pine to 70BA & HWD to 10BA	4.59	9.15
73	208/16	Clear Cut	2.59	15.00

The wildlife ponds to be developed in the watershed would be approximately ¼ to ½ acre in size. The resultant soil exposure would be temporary. The ponds would be constructed on gently sloping sites and, after construction, would act as a barrier to downstream movement of sediment. Planting grasses, clover, and other herbaceous vegetation would reduce the time required for pond site stabilization to less than four months. The ponds would not be constructed in any riparian areas and would be located away from any perennial stream channels. These measures would limit potential soil erosion and sedimentation to within acceptable levels.

During prescribed burning actions enough amounts of unburned material will be left intact to minimize erosion. Burns would be prescribed and implemented such that not more than 20% bare soil will be exposed on units receiving fuels reduction or wildlife enhancement burns, and not more than 30% bare soil will be exposed on units receiving site prep burns. Only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves and small twigs would be expected to be consumed. This will leave the underlying forest floor layer, which consists of more decomposed needles, leaves and twigs, to protect the mineral soil. This remaining organic layer, along with the

trees and other living vegetation on the site, should prevent or minimize most soil movement. After prescribe burning operations, all firelines will be water barred, seeded, and fertilized.

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 soils in the analysis area have compaction hazard ratings ranging from moderate to severe. Most, however, are in the moderate range (95% of the project area). Soils with a moderate-high rating (1% of the project area) will be treated as having a high rating (4% of the project area). There are several stands with very small areas of mod-high to high ratings that also have timber harvests proposed. The moderate-high rating will be treated as having a high hazard rating, since in this analysis area these soils have low proportions of rock content in the top 6-inches of soil. This situation, when 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. (Stands proposed for limited operating seasons are listed in Chapter 2, technical requirements). 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 effects on soil. Prescribed fire may affect soils positively or negatively. Positive effects include enhancement of nutrient availability and phosphorus cycling and reduction of soil acidity. Negative effects include excessive soil heating that can kill soil biota, alteration of soil structure, destruction of organic matter, and loss of site nutrients through excessive volatilization. Soil erosion and additional nutrient loss through leaching may occur later during rainstorms. Any long-term negative effects to the soil would be related to high severity burns or very short (less than three years) 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.

Effects of Herbicides on Soil. Herbicides do not physically disturb the soil; therefore, treated areas have intact litter and duff. Herbicides could affect soil productivity through biotic impacts, soil erosion, and nutrient leaching. Depending on the application rate soil environment, herbicides can stimulate or inhibit soil organisms. Adverse effects can occur when herbicides are applied at higher rates than the label rate. Use of herbicides at the lowest effective rate required by mitigation measures does not reduce activity of soil biota (Fletcher and Friedman 1986). Litter and duff serve to minimize erosion and nutrient loss from leaching. Forest standards have been developed to ensure that herbicides are applied correctly and pose no greater risk to soils and soils biota and do not accidentally contaminate surface waters. No herbicide will be mixed or used within 100 feet of perennial streams, lakes, or ponds, or within 30 feet of other streams with defined channels. Herbicides, carefully directed and foliar sprayed during late spring to summer at the minimum recommended application rate, should result in no detrimental effects to long-term soil productivity or impact water quality. With plan standards in effect, the proposed action shows acceptably low risk with respect to potential herbicide use (USDA Forest Service 2005b, pp.47).

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.

There are no actions proposed specifically for floodplains and riparian areas. Proposed management activities would occur on less than 42 acres of prime farmland soils but would not alter the soil's capacity to remain prime farmland.

NO ACTION ALTERNATIVE 1

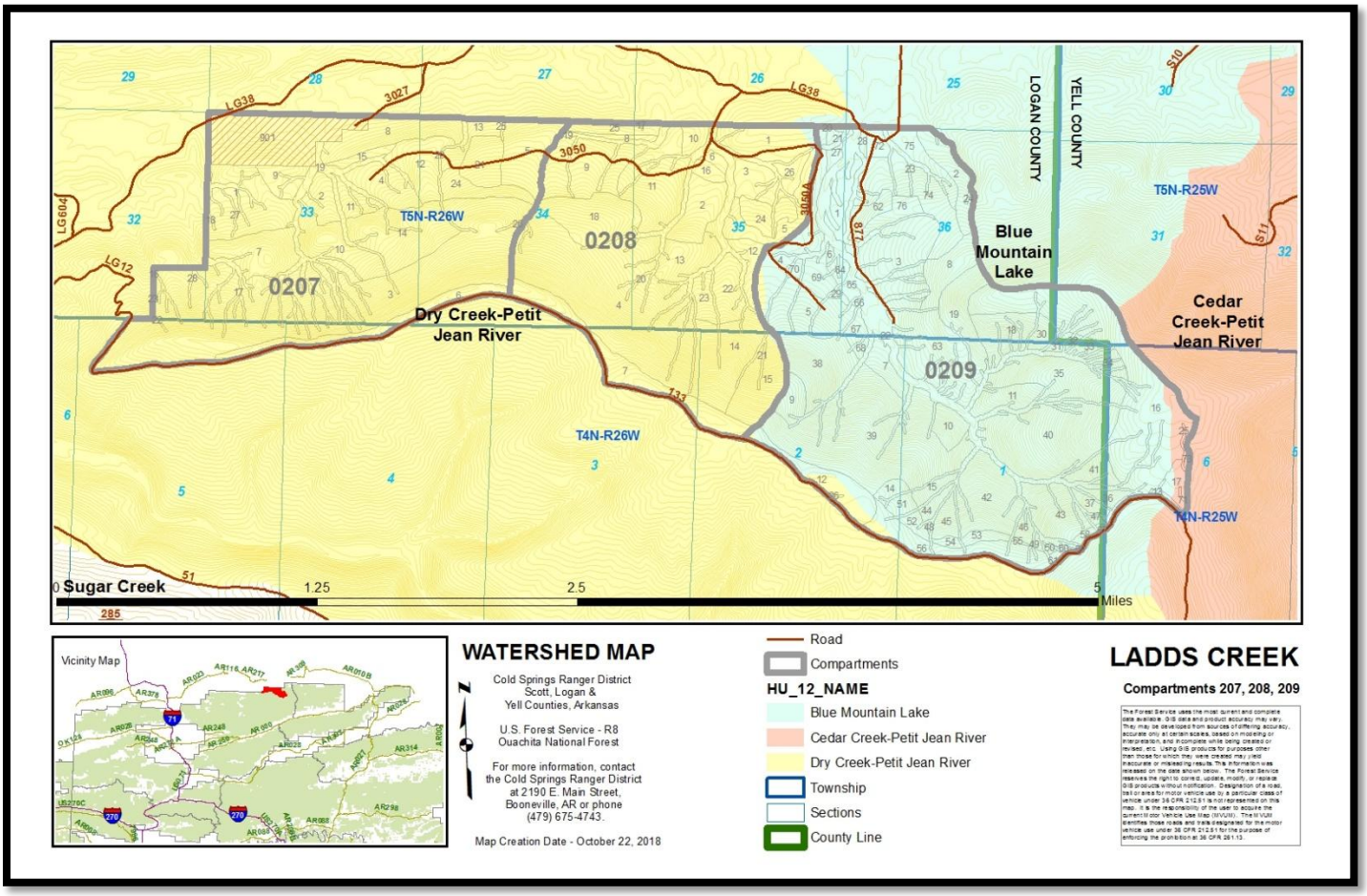
Only the undisturbed natural erosion would be expected to continue. Natural erosion from undisturbed forest soils is very low. There would be no management activities conducted on forest soils; no compaction would occur. No cumulative effects would occur because no management activities would be conducted under the No Action Alternative; there would be no additive effect.

WATER RESOURCES AND QUALITY

Present Conditions

The Ladd's Creek Project area is in three 12-digit hydrologic unit code (HUC) sixth level sub watersheds; Dry Creek-Petit Jean River 111102040205 (26,857 acres), Blue Mountain Lake111102040206 (19,658 acres), and Cedar Creek-Petit Jean River 111102040207 (17,679 acres).

Dry Creek-Petit Jean River and Blue Mountain Lake join at the C-208 east boundary and C-209 west boundary. Cedar Creek-Petit Jean River just has a sliver or the east portion of C-209. The primary beneficial use for the streams and tributaries in the Ladd's Creek Project Area is water supply for wildlife and recreation. See Watershed Map below.



Also contained within the project area are 19 existing ponds (approximately .15 acres in size). The primary beneficial use of the ponds is water supply for wildlife.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION

Non-Herbicide Treatments

A direct effect of management activities on water quality occurs when an activity places a pollutant directly into a watercourse.

Road maintenance and/or construction, fireline construction and reconstruction and timber management activities such as construction of skid trails, temporary roads and log landings could result in increases in erosion and sedimentation. Roads contribute more sediment to streams than any other land management practice (Gucinski et al., 2000).

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

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

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

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

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

Herbicide Treatments

Herbicides are proposed for the treatment of non-native invasive species, restocking areas following regeneration harvests, release/PCT, and as an option for midstory removal. The Proposed Action proposes herbicide application with glyphosate (Round-up®, Accord® or equivalent products), triclopyr (Garlon 4®, 3A or equivalent products), or Imazapry (Arsenal, Chopper or equivalent products) as backup treatments for hard to kill non-native species or undesirable stocking following regeneration. Application would be by cut surface application, tree injection, and foliar or basal spray application method. The amount treated would be the minimum necessary, however the following still applies.

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

166 acres of reforestation treatments using herbicide is proposed and is outside streamside protection areas. All streams perennial and intermittent would be protected, by 100 and 30-foot herbicide application buffers and; all source waters would be protected by 300-foot buffers. Buffers are to be clearly marked (herbicide standard HU006) before treatment so

applicators can easily see and avoid them (USDA Forest Service, 2005a). No direct, indirect or cumulative effects from proposed herbicide reforestation activities are anticipated.
Direct effects could occur from herbicide application for aquatic non-native invasive species and indirect effects when treating terrestrial invasive plant species within SMAs, but effects would be minimal due to approximately 99% of invasive species treatments occurring outside 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. Application of herbicide specimen label rates for each chemical would be followed and applied rates would be at or below the recommended application rate.

Herbicide monitoring across the Forest has found only trace amounts of herbicide have ever been detected in streams. Herbicide applications were monitored for effectiveness in protecting water quality over a five-year period on the Ouachita NF (Clingenpeel, 1993). The objective was to determine if herbicides are present in water in high enough quantities to pose a threat to human health or aquatic organisms. From 1989 through 1993, 168 sites and 348 water samples were analyzed for the presence of herbicides. The application of triclopyr for site preparation and release was included in the analysis. Of those samples, 69 had detectable levels of herbicide. No concentrations were detected that would pose a significant threat to beneficial uses. Based on this evaluation, the BMPs used in the transportation, mixing, application and disposal were determined to be effective at protecting beneficial uses. No cumulative effects are anticipated due to RFP standards, BMP and the small amount of area potentially impacted.

NO ACTION ALTERNATIVE 1

Although proposed soil disturbing activities resulting in stream sedimentation would not occur, watershed improvement activities would also not take place.

NO HERBICIDE ALTERNATIVE 2

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

Aquatic Cumulative Effects Model (ACE)

The Aquatic Cumulative Effects (ACE) model was used to identify the watershed condition of the 12-digit Hydrological Unit Code (HUC) sixth level sub watersheds, 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.

Cumulative effects analyses are bounded in space and time. The sixth level sub watershed was chosen for the model boundaries because it is the smallest sub watershed for which full coverage has been provided within the National Hydrologic Database and is the level below that used for Forest Plan revision. Local research has shown that effects of increased sediment as a result of timber harvests are identifiable for up to 3 years (Miller, Beasley and Lawson, 1985). The timeframe of this model is bound by three years prior and one year following implementation. This captures the effect of other management activities that may still affect the analysis 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 sediment increase from an undisturbed condition. Background information on the process and data used to predict sedimentation is on file at the Cold Springs Ranger District office. The predicted sediment delivery and risk level for the sub watersheds are displayed in the table below.

TREATMENTS OCCURRING IN 1-YEAR PERIOD

Sediment Delivery by Alternative

Subwatershed *6th level HUC ID#*	Alternative	Sediment Delivery		Risk Level
		Tons Per Year	% Increase*	
Blue Mountain *111102040206*	*Current Condition*		224	Low
	No Action Alternative 1		245	Low
	Proposed Action & No Herbicide Alternative 2		270	Low
Dry Creek-Petit Jean River *111102040205*	*Current Condition*		157	Low
	No Action Alternative 1	211.79	167	Low
	Proposed Action & No Herbicide Alternative 2	531.37	183	Moderate
Cedar Creek-Petit Jean River *111102040207*	*Current Condition*		372	Low
	No Action Alternative 1	138.32	386	Low
	Proposed Action & No Herbicide Alternative 2	158.78	388	Low

*Percent increase over sediment delivery from undisturbed watershed condition

Blue Mountain. For all alternatives, the risk level remained Low -- there is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses. The application of forest standards and BMPs is assumed.

Cedar Creek-Petit Jean River. For all alternatives, the risk level remained Low -- there is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses. The application of forest standards and BMPs is assumed.

*****<u>ADJUSTMENT PROTOCAL</u> - TREATMENTS SPREAD OVER A 5-YEAR PERIOD**
Dry Creek-Petit Jean River 111102040205
No Action Alternative 1, Proposed Action, and Alternative 2

Sediment Delivery by Alternative

Subwatershed *6th level HUC ID#*	Alternative	Sediment Delivery		Risk Level
		Tons Per Year	% Increase*	
Dry Creek-Petit Jean River *111102040205*	*Current Condition*		157	Low
	No Action Alternative 1	211.79	167	Low
	Proposed Action & No Herbicide Alternative 2	273.40	170	Low

*Percent increase over sediment delivery from undisturbed watershed condition

Dry Creek-Petit Jean River. For the Proposed Action and Alternative 2 the risk level increased from Low to Moderate. Environmental effects are measurable 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. Recovery is complete and beneficial uses are disrupted only for short periods in localized areas.

***To reduce predicted sediment, the ACE WCR Adjustment Protocol offers dispersing project impacts by spreading implementation over multiple years, rather than model all treatments to occur in one year (USDA Forest Service, 2015). Apportioning implementation over five years remained at a Low risk to beneficial uses. There is no risk that effects would rise to a level threatening violation of any water quality standards or administrative limits. Effects are well understood, and mitigation in past projects has demonstrated effects are either not detectable or have no effect on beneficial uses. The conscientious application of Forest standards and BMPs is assumed.

WILDFIRE HAZARDS AND/OR FUELS

Present Conditions

Fuel loads in *Ladd's Creek* continue to accumulate from normal events and processes such as storms, insects and disease, needle cast, and leaf litter, which can increase wildfire hazards in the project area. Fuels can increase from 4-6 tons per acre to 8-10 tons per acre after years without prescribed burning. Prescribed burning conducted on the Ouachita National Forest typically reduces fuel loading on a unit by one to three tons per acre. Most of this area has not been burned in recent years.

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on wildfire hazards and fuels would be the entire *Ladd's Creek* and the immediate forested areas surrounding *the project area*. Timelines for measuring the effects are current fuel and future fuel buildup for the next 10 to 15-year period. The analysis method would be by field observations and monitoring of fuels after burns.

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

There are approximately 3,847 acres of prescribed burning proposed on 3-5-year intervals for this project. With repeated burns, fuel loading in a burn unit can be maintained at approximately three to four tons per acre. Prescribed burning would significantly reduce hazardous fuels in this project area. Fireline construction and maintenance are proposed for the Proposed Action and Alternative 2.

Fuel management is implemented through normal program planning. Other resource areas such as timber and wildlife may initiate projects that also benefit fire management through fuel modification by use of prescribed fire. Burn plans would be developed to provide protection for soil and water while achieving the resource management objectives. Prescription elements would include such factors as fire weather, expected fire behavior, slope, aspect, soil moisture, fuel moisture, relative humidity, mixing heights, wind speed and direction, fuel loads, and any other indicator that may influence fire intensity.

A direct effect would be logging slash added to an already increased load from normal fuel accumulations. Even though this would add to the normal fuel loads in *Ladd's Creek*, a direct effect of a prescribed burn executed under controlled conditions would reduce this load down to near normal amounts reducing the chance of a hot wildfire that could kill live standing timber and remove the soil protecting litter layers that a prescribed burn would leave intact (indirect effect).

Slash would be produced from timber harvests, wildlife stands improvement, pre-commercial thinning, and site preparation activities. This slash would add to the fuel loading within the project area.

Measured fuel loadings on the Ouachita NF have shown that the 100-hour fuels (1-3" diameter) increased by an average of 1.7 tons per acre post-harvest (Clingenpeel, 2002). This is a result of slash or woody debris left on-site from timber harvesting.

No fuel loading data was available for the other prescribed treatments. However, a summary of the type and size of slash that would result from each activity is listed below.

FUEL LOADING PRODUCED BY PROPOSED ACTION AND ALTERNATIVE 2

Management Activity	Fuel Loading Produced - Forest Type - Diameter
Pre-commercial Thinning	Pine - < 5 inches at breast height
	Hardwood - < 8 inches at breast height
Site Preparation	Pine - None
	Hardwood - No diameter limit

In addition to slash, the site preparation activities and release activities proposed would result in increased fuel loading on the ground. These fuels would increase fire intensity during prescribed fire or wildfire event.

CUMULATIVE EFFECTS

Cumulatively, with each successive prescribed burn, less intense fires would resemble natural fire events that were common before fire suppression activities were begun. With each prescribed burn, less fuel would be available to burn and native species would increase that benefit from periodic fire. Eventually stand replacing wildfire would become less likely, easier to control or manage, and burn under moderate conditions.

NO ACTION ALTERNATIVE I

The effects would be the same.

TRANSPORTATION AND INFRASTRUCTURE

Present Conditions

There are approximately 3,847 acres of NF and 99 acres of private land resulting in approximately 6.17 square miles. There are 8.92 miles of total existing roads (both open and closed). Of these roads, 4.038 miles are currently opened. The current open road density is 0.65 miles per square mile, meeting the 2005 Revised Land and Resource Management Plan criteria of for both Management Area 14 and 17. There are some culverts that may need replaced or maintained.

ROADS THAT PROVIDE DIRECT ACCESS TO THE PROJECT AREA.

AR Highway 080 provides the main access to the Ladd's Creek EMU project area. AR Highway 080 runs East and West to the South of the Ladd's Creek EMU. Forest Service Roads and Scott County Roads provide access to this EMU.

AR Highway 10 provides the main access to the Ladd's Creek EMU project area. AR Highway 10 runs East and West to the North of the Ladd's Creek EMU. Forest Service Roads and Logan County Roads provide access to this EMU.

ROADS WITHIN THE PROJECT AREA.

Forest Service Road 133 – This is a single lane ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in fair condition due to continuous yearly use and regular maintenance. This is an open road year-round.

Forest Service Road 133A – This is a single lane, short access road, leading to a recreational overlook under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in good condition due to continuous yearly use and regular maintenance. This is an open road year-round.

Logan County Road 3027 – This road is listed in Infra as a system road, under County jurisdiction and maintenance but, is not recognized as a road by Logan County and no easement currently exists for the road and should be taken off the system.

Forest Service Road 3050 – This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in poor condition due to lack of maintenance, brush encroaching in the ditches, several pipe that have failed or are failing, and some erosion issues in the roadbed. This is a seasonally open road.

Forest Service Road 3050A – This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in poor condition due to lack of maintenance, brush encroaching in the ditches, and several failed or failing pipe. This is a seasonally open road.

Forest Service Road 877 – This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in poor condition due to lack of maintenance, brush encroaching in the ditches and roadbed, and several failed, or failing pipe. This is a closed road year-round.

Logan County Road LG38 – This is a single lane, ditched and piped road under County jurisdiction and County maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in good condition due to regular maintenance and continuous yearly use however; does suffer from several bad slabs that are outside the EMU boundary. This is an open road year-round.

Matrix for Existing Roads

Road Number	Road Name	Jurisdiction	Length Miles	Current Management Status	Maintenance
133	Dry Creek MTN	FS	6.3 (3.2)	O	FS
133A	-------	FS	0.078	O	FS
3027	Grow Up	C	0.4	O	C
3050	Cedar Creek	FS	1.98	SO	FS
3050A	Flood Mountain	FS	1.7	SO	FS
877	Laddstone	FS	0.96	C	FS
LG38	CCC Camp	C	0.36	O	C

() = boundary road, ½ length.

Current Open Road Density	Total Ac =3,947 acres / 640 ac = 6.17 sections	Open Roads = 4.038 mi	Open Road Density = 0.65 mi/ per section

Roads outside the Analysis Area

Matrix for Existing Roads outside the Ladd's Creek EMU

Road Number	Road Name	Jurisdiction	Length (Miles)	Current Management Status	Maintenance
133	Cedar Creek	FS	1.85	O	FS
3 (East)	Baker	FS	3.53	O	FS
3 (West)	Baker	FS	1.36	O	FS
3050	Cedar Creek	FS	0.22	SO	FS
51	Petit Jean	FS	6.32	O	FS
LG38	CCC Camp	C	1.60	O	C

Forest Service Road 133- This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in fair condition due to regular maintenance and continuous yearly use however; does have some pipe that have failed or are failing as well, a recent rockslide has left a small boulder in the road, making it difficult to pass. This is an open road year-round.

Forest Service Road 3- This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in fair condition due to regular maintenance and continuous yearly use however; does have some pipe that have failed or are failing. This is an open road year-round.

Forest Service Road 3050- This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in poor condition due to lack of maintenance, brush encroaching in the ditches, several pipe that have failed or are failing, and some erosion issues in the roadbed. This is a seasonally open road.

Forest Service Road 51- This is a single lane, ditched and piped road under Forest Service jurisdiction and Forest Service maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in fair condition due to regular maintenance and continuous yearly use however; does have some pipe that have failed or are failing. This is an open road year-round.

Logan County Road LG38 – This is a single lane, ditched and piped road under County jurisdiction and County maintenance. The variety of users includes hunters, recreation, and forest administration. This road is in good condition due to regular maintenance and continuous yearly use however; does suffer from several bad slabs that are outside the EMU boundary. On the western side of the road, a bridge has collapsed due to flooding and is not maintained by Logan

County, an easement does exist, but has expired, and this portion of road is no longer needed for access and should be removed from the system. This is an open road year-round.

Fish Passage Crossings

The road analysis inventory showed 1 slab. Out of these stream crossings the data showed that none of them have a fish passage problem. All fish passage culverts to be replaced will be designed to meet fish passage guidelines.

Natural Road Obliteration

The following system roads or portions of system roads are considered to be obliterated by nature and shall be removed from INFRA as system roads.

Road #	Name	Length	Action
3027	Grow Up	0.40	Obliterated
LG38	CCC Camp	0.65	Obliterated
Total Roads Obliterated		**1.05 Miles**	

ENVIRONMENTAL EFFECTS

The geographic bounds for this project include the transportation system within *Ladd's Creek project area* and portions of roads outside of the project area. Timelines for measuring the effects would be until all activities proposed are completed. The method of analysis for the transportation system in this project area is the Travel Analysis Process – Ladd's Creek that was completed in March 2017, utilizing GPS data.

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

The Proposed Action would include approximately 5.23 miles of road reconstruction, no new construction, 5.32 miles of temporary road construction, and 1.05 mile of road obliteration. Normal and emergency road maintenance would be done on existing open roads. All stream crossings with culverts being replaced would be engineered with adequate fish passage structures. This alternative would reduce the distance between culverts and replace nonfunctioning culverts, which would have an indirect effect by reducing sediment from roads in the watershed. The proposed transportation work would allow for timber harvesting, prescribed burning, silvicultural treatments, wildlife work as well as safe public access. There would be no additional road closures after treatment activities.

Open roads would change from 4.038 miles in the No Action Alternative I to 3.638 miles in the Proposed Action and Alternative 2 resulting in the open road density reducing from 0.65 miles to 0.59 miles per section. This would continue meeting the objectives of the Revised Forest Plan guidelines for both management areas. All roads except those listed as open in the MVUM will be closed.

Rock Permits - The objective of including rock permit areas in these alternatives is basically administrative in nature. The proposals don't specifically identify the "creation" of areas "specifically" for collecting rocks nor do they have road reconstruction proposed for the sole purpose of having rock permit areas. Rather, the proposals acknowledge that rock permit areas could be made available as a secondary or incidental result of road reconstruction that is needed for other purposes. Permits could be issued to the local community, if there is an inquiry or need of a rock permit. Allowing rock permits from the "disturbed" road reconstruction sites would discourage unlawful and/or unpermitted removal of "embedded" rock from the general forest area. It is expected that a very limited amount of rock permits, if any, would even be issued for this project area, but the option would be available. Pits that are on the district are for shale fill only and not for rock permits that are occasionally requested by individuals in the local community.

NO ACTION ALTERNATIVE 1

The direct effect of this alternative is that no roadwork would be done on many interior roads. Normal and emergency road maintenance would be done on existing open roads. The indirect effects would include the continued deterioration of roads, washed out stream crossings, rusted out culverts, and long distances between cross drains. Sediment from the road would eventually increase.

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.

VEGETATION

Present Conditions

Summary of existing National Forest lands and private ownership in the *Ladd's Creek* analysis area. These are ***approximate*** acres based on Geographical Information Systems (GIS).

MANAGEMENT AREA 14		***Acres***	***Percent***
Shortleaf Pine Forest Type (Forested Area)		*971*	*47%*
Hardwood Forest Type (Forested Area)		*1,052*	*51%*
Loblolly Pine Forest Type (Forested Area)		*37*	*2%*
	Total	***2,060***	***100%***
Mature Pine >= 80		*587*	*28%*
Mature Hardwood > =100		*153*	*7%*
Additional Mature Pine in the next 10 years		*21*	*1%*
Subtract Regeneration Harvests		*64*	*3%*
	Total	***-43***	***-2%***
Additional Mature Hardwood in the next 10 years		*610*	*30%*
	Total Mature Pine in the next 10 years	***544***	***26%***
	Total Mature Hardwood in the next 10 years	***763***	***37%***
MANAGEMENT AREA 17		**Acres**	**Percent**
Shortleaf Pine Forest Type (Forested Area)		572	32%
Hardwood Forest Type (Forested Area)		1,215	68%
Loblolly Pine Forest Type (Forested Area)		0	0%
	Total	**1,787**	**100%**
Mature Pine >= 80		180	10%
Mature Hardwood > =100		112	6%
Additional Mature Pine in the next 10 years		0	0%
Subtract Regeneration Harvests			
		0	0 %
	Total	**0**	**0 %**
Additional Mature Hardwood in the next 10 years		**997**	**56%**
	Total Mature Hardwood in the next 10 years	**1,109**	**62%**
	Total Mature Pine in the next 10 years	**180**	**10%**

- 1,543 acres (40%) Shortleaf Pine forest type (forested area)
- 37 acres (1%) Loblolly forest type (forested area)
- 767 acres (20%) Mature growth pine (forested area)
- 2,267 acres (59%) Hardwood forest type (forested area)
- 265 acres (7 %) Mature growth hardwood (forested area); (within 10 years, 1,607 more acres will move into mature growth age class increasing the mature growth hardwood to 1,872 (49%) meeting the forest plan objective)
- 21 acres Additional Mature Pine minus 64 acres of modified seedtree regeneration areas would be a 43 acre decrease of mature pine in the next 10 years.
- 2,596 acres (67%) Total Mature Pine and Hardwood in the next 10 years

Ladd's Creek contains a distribution of pine and pine/hardwood (1,543 acres or approximately 40%) and hardwood and hardwood/pine (2,267 acres or approximately 59%) forest types that cover rolling hills, steep, and moderately steep side slopes. There are approximately 3,847 acres of NF system land in the project area. There is a wide distribution of age classes from 0 years of age to 100+ years of age in pine and from 47 years old to 100+ years old for hardwood species. Currently there is 34 acres in the 0-10-year age class within the suitable land on National Forest System land within the

project area. Total mature pine and pine/hardwood acres (at least 80 years old and older) are 767 (approximately 20%) of the forested area. There are 265 acres (7%) of *mature growth* hardwood or hardwood/pine (100+ years old) present. However, by the end of the next 10-year period there would be approximately 1,872 acres (49%) of *mature growth* hardwood/hardwood pine. These conditions would meet Forest Wide Design Criteria WF006 of the Revised Forest Plan.

Tree species common in these stands include various white oaks and red oaks, hickories, blackgum, sweetgum, and shortleaf pine with some encroachment of invader and offsite type species such as cedar and red maple. There is some red oak decline present but not as prevalent in *Ladd's Creek* as in other parts of the district. The factors that contribute to oak mortality around the district are present here. These are hardwoods exceeding 70 years, high stem densities, and marginal site indexes (50 to 60). Drought has played a role in the amount of mortality and decline district wide. Dry years in 1998, 2000, 2001, 2002, August, September, October of 2004, October – December of 2005, January thru March of 2006, summer of 2011, and summer 2015 are still affecting the tree species on the district and forest. The Poteau-Cold Springs District has had a history of southern pine beetle and Ips beetle infestations. Because of the advanced age and stocking rates of the mature pine stands these pine stands remain susceptible to insect infestations. The older hardwood stands also become less resistant to insect and disease infestations with age.

AGE CLASS	TYPE OF FORESTED ACRES IN MANAGEMENT AREA 14						ACRES	PERCENT
	SHORTLEAF PINE	PINE/ HARDWOOD	HARDWOOD	HARDWOOD /PINE	LOBLOLLY	LOBLOLLY/ HARDWOOD		
00-10		34					34	2%
11-20							0	0%
21-30	76						76	4%
31-40	77	74					151	7%
41-50	34			5	30	7	76	4%
51-60				15			15	1%
61-70		68		0			68	3%
71-80	21			0			21	1%
81-90	256		325	63			644	31%
91-100	212		491	0			703	34%
101-110	119		153	0			272	13%
111+	0	0	0	0	0	0	0	0%
ACRES	**795**	**176**	**969**	**83**	**30**	**7**	**2060**	
PERCENT	**39%**	**9%**	**47%**	**4%**	**1%**	**0%**		**100%**
AGE CLASS	**TYPE OF FORESTED ACRES IN MANAGEMENT AREA 17**						**ACRES**	**PERCENT**
	SHORTLEAF PINE	**PINE/ HARDWOOD**	**HARDWOOD**	**HARDWOOD /PINE**	**LOBLOLLY**	**LOBLOLLY/ HARDWOOD**		
00-10	0	0	0	0	0	0	0	0
11-20	0	0	0	0	0	0	0	0
21-30	4	0	0	0	0	0	4	0
31-40	94	1	0	0	0	0	95	5%
41-50	0	0	0	0	0	0	0	0
51-60	95	198	0	0	0	0	293	16%
61-70	0	0	0	0	0	0	0	0%
71-80	0	0	0	0	0	0	0	6%
81-90	0	0	106	0	0	0	106	66%
91-100	165	15	885	112	0	0	1,177	6%
101-110	0	0	112	0	0	0	112	0%
111+	0	0	0	0	0	0	0	0%
ACRES	358	214	1,103	112	0	0	1,787	
PERCENT	**20%**	12%	62%	6%	0%	0%		100%

(Percentages in table are GIS acres.)

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on vegetation would be the boundary of all the compartments within the *Ladd's Creek* Ecosystem Management Unit boundary. Timelines for measuring the effects on vegetation would be a 10-15-year timeline from 2019 to 2029-2034, or from this entry to the next. Methods of analysis include interpreting the field data collected throughout the project area to establish existing and desired conditions. The proposed actions developed to meet the desired conditions are analyzed to determine what the direct effect of these actions would be and what the cumulative effects would be to the vegetation in the overstory, midstory, and understories.

PROPOSED ACTION

The proposed harvests are consistent with the Revised Forest Plan's direction to emphasize forest vigor and timber growing potential and sustainability in Management Area 14 and 17. It would also provide wildlife habitat diversity for various other wildlife species. The older stands in the unsuitable areas would also represent old growth conditions, a major ecological community of the Ouachita Mountains and the Arkansas Valley of Arkansas and Oklahoma.

Thinning would reduce vegetation that competes for limited soil nutrients, water, and sunlight (USDA Forest Service. 2005a, Priorities pg. 58 and Objective pg. 59). Thinning and releasing stands would improve and restore individual tree vigor, health, and resiliency of the *Ladd's Creek* analysis area. Commercial thinning stocking rates would reduce the chances of having southern pine beetle infestations spread out of the thinning stands into adjacent stands. Research has shown that Southern pine beetle (SPB) infestations in stands that have been thinned with 20-25 feet between trees will not spread to adjacent stands but will disburse (Managing Southern Forest to Reduce Southern Pine Beetle Impacts, May 1986, p19). A target BA of 70 would average approximately 24 feet between trees in mature saw timber stands. Commercial thinning on 20 ft. spacing would improve and restore individual tree vigor and growth in the younger pine plantations.

Stands selected for modified seedtree regeneration harvest are mature pine stands located at least 10 chains away from existing young stands still considered regeneration openings on National Forest system lands or on private lands. Regeneration openings are young stands that have not grown to 20% of the height of the adjacent stand.

Stands selected for clearcut method of regeneration are 41-50-year-old loblolly pine stands that would be regenerated with shortleaf pine. They are located at least 10 chains away from existing young stands still considered regeneration openings on National Forest system lands or on private lands. Regeneration openings are young stands that have not grown to 20% of the height of the adjacent stand.

Timber harvesting proposed in the Proposed Action consists of commercial thinning shortleaf pine to a target BA of 70 pine leaving 10% hardwood component on approximately 719 acres; approximately 64 acres of modified seed tree method of regeneration harvest; and 37 acres of clearcutting loblolly pine. Hardwoods may be harvested, where available, leaving a minimum hardwood component of 10 basal area per acre.

BAs of stands proposed for commercial thinning are from Table 3.6 (Revised Forest Plan, pg. 84) that lists thinning guidelines to be used for timber management. The stands to be thinned would be carried beyond the 70-year rotation period making them more susceptible to southern pine beetle infestations. These BAs would reduce the chance that southern pine beetle infestations would spread to adjacent stands. Research has shown that trees spaced at least 20 to 25 feet apart would still get southern pine beetle infestations, but the beetles would soon disperse, and the spot would not spread. Average diameter of the pine sawtimber to be thinned is 12 to 13 inches. Reducing the density down to a target 70 BA would leave approximately 24 feet between trees. These reduced BAs would eventually reduce the fuel loadings and temporarily create additional early stage habitat needed by various wildlife species.

Where various harvests are proposed there are portions that would not be thinned or harvested because of some type of topographic feature making them unsuitable such as rock outcrops or short steep slopes, or varying widths in riparian zones. The exact acres deducted from these stands would be determined in the field when the timber is marked if the Proposed Action is selected.

A **direct effect** of the Proposed Action modified seedtree and clearcut harvests would create 101 acres of early seral stage habitat (7% of the suitable and 3% of the overall forested area). A direct effect of the commercial thinning would be a reduced number of trees in the overstory taking the low-quality trees and trees that are more susceptible to insect infestations first with the remaining being the best shaped and healthiest trees in the stands.

Mature growth pine and pine hardwood 80 years old or older would be reduced by 64 acres to 703 acres but increase by 21 (from the 71 to 80 age class) to 724 acres (19% of project) in 10 years. Mature growth hardwood and hardwood/pine would eventually increase to 1,872 acres (49% of project) in 10 years. Both would meet and exceed Forest Plan Design Criteria WF006 **"Retain or develop mature growth pine habitats (80 years or greater) and mature growth hardwood habitats (100 years old or greater) at a rate of five percent of each broad cover type within each project analysis area".**

There would be reduced understory and midstory numbers (hardwood stems) throughout *Ladd's Creek* where prescribed burning, harvesting activities, timber stand improvement work, and wildlife stand improvement work would be conducted. The prescribed burning would reduce competing woody vegetation and make some nutrients tied up in the duff layers available for root uptake of remaining overstory, midstory, and understory plants. There would also be an increase of grass and forbs numbers and species composition. Scorch would be visible throughout the area burned. Some needle loss from scorch would occur but if the buds are not injured the pine can survive even severe needle loss. Hardwood species most resistant to fire in the project area and most likely to survive are white oaks, post oaks, red oaks, and black oaks. Hickories, red maple, and cedar are less resistant. Hardwood resistance increases with tree diameter due to bark thickness and fire intensity. However, some hardwood can resprout, in fact fire increases basal sprouting of hardwood species like the oaks, cherry, red maple, dogwood, blackgum, and basswood. This ability decreases with age and size. Season also can determine the amount of mortality from fire. Growing season burns injure or kill pine and hardwood species, depending on the type of fire and intensity.

The modified seed tree harvests, loblolly pine clearcuts, timber stand improvement, wildlife stand improvements, prescribed burning, and scarification if needed, would create growing conditions favorable to shade intolerant and fire tolerant plant species. The mature *growth* pine component would initially decrease from the proposed modified seed tree harvests then increase throughout the project, as the near *mature saw timber* component ages into a *mature growth* condition. The mature growth hardwood component would also increase and respond with more hard and soft mast production providing improved habitat for plant and animal species that require it. The understory throughout the project area would show an increased growth response after removing part of the overstory and midstory with the commercial thinning. The overstory would also respond with more vigor making them more resistant to insect and disease infestations.

As an **indirect effect** of removing part of the overstory and midstory, the understory would experience a rapid response due to increased sunlight that would improve growing conditions for shortleaf pine, some hardwoods, and many species of non-woody plants. A combination of the proposed action and continued prescribed burning program would eventually result in the restoration of old growth conditions in the unsuitable stands and healthy, sustainable timber stands where timber activities are suitable.

Implementing the Proposed Action in the long-term would result in crown closure occurring first in the stands where the pines would be thinned to 70 BA. The growth response of the mature pine and hardwood would not be as vigorous as in younger stands since many of the trees retained are mature sawtimber trees that have slowed in growth. However, even though the growth response would be less when compared to younger pine and hardwood stands the reduction of the number of trees per acre by harvesting creating more access to sunlight, water, and nutrients would still result in some

improved stand vigor and would reduce the chance of disease or insect infestation in the remaining trees. The 2,267 acres of hardwood and hardwood/pine stands would be managed to maintain and enhance mast-producing hardwoods.

CUMULATIVE EFFECTS

There are no effects on vegetation from other projects that would be additive to this proposal; there would be no cumulative effects.

There would not be any adverse effects expected to the various forms of vegetation in this analysis area from these actions nor as an accumulation of impacts from other harvest conducted in adjacent compartments or on private land within this watershed.

Effects of Herbicide Application

Herbicides are proposed for the treatment of non-native invasive species, restocking areas following regeneration harvests, release/PCT, and as an option for midstory removal. The Proposed Action proposes herbicide application with glyphosate (Round-up®, Accord® or equivalent products), triclopyr (Garlon 4®, 3A or equivalent products), or Imazapry (Arsenal, Chopper or equivalent products) as backup treatments for hard to kill non-native species or undesirable stocking following regeneration. Application would be by cut surface application, tree injection, and foliar or basal spray application method. **Direct effects**, as with a manual treatment, vegetative diversity will not be compromised. By reducing species in general, only actual numbers of species on an area will be affected. The native pine and hardwood species, grasses and forbs would retain their natural distribution throughout the area. The non-native species would be set back or replaced by native species.

NO ACTION ALTERNATIVE 1

If this alternative is implemented, the existing early seral stage habitat, an ecologically important part of the overall forest health would eventually disappear as a **direct effect**. There would be no open stands or developed wildlife openings or burning program to provide some type of early seral stage structure needed by various wildlife species. There would be no improvement in stand health because all the conditions that make the pine and red oaks vulnerable now would continue to exist. The understory and midstory would remain dense with fire intolerant species and invader type of species like cedar and red maple that normally do not occupy sites where fire plays a natural role in stand development. Heavy fuel loadings from natural accumulation of fuel buildup would make the *Ladd's Creek* project area susceptible to a hot crown killing wildfire.

Dense stands of timbers that have been susceptible to southern pine beetle infestations and red oak decline would become increasingly vulnerable due to the continued deteriorating conditions that make them vulnerable now. In 1995 and 1996, several Southern pine beetle (SPB) spots were detected and treated in *Ladd's Creek.* In the summer of 2011, the Ips population began to increase throughout the forest and the district as a result of the extremely dry summer. With the No Action alternative, SPB and Ips infestations would potentially be more frequent and more difficult to control.

CUMULATIVE EFFECTS

There are no effects on vegetation from other projects that would be additive to this proposal; there would be no cumulative effects.

NO HERBICIDE ALTERNATIVE 2

The effects would be the same as the Proposed Action. The only difference between the Proposed Action and Alternative 2 is herbicide use is not proposed in this alternative.

Without the use of herbicides, several manual methods would be required to control the non-native, off-site species. These species would continue to send up sprouts until the reserves stored in the root system could no longer sustain the plant.

CUMULATIVE EFFECTS

There are no effects on vegetation from other projects that would be additive to this proposal; there would be no cumulative effects.

WILDLIFE, HABITAT, AND FISHERIES

Present Conditions

Ladd's Creek Ecological Management Unit totals 3,847 acres of National Forest land, most of which is allocated to Management Area 14 (2,060 acres) and Management Area 17 (1,787 acres). For this EMU some of the existing conditions concerning wildlife, fish and T&E species and their habitats, which were considered when developing the Proposed Action for the project area are as follows:

- Ladd's Creek EMU is influenced by private land located in the EMU, mostly on the northern border with Dry Creek Wilderness adjacent on the southern border.
- There are currently 34 acres in the *suitable* 0-10-year-old age class on National Forest land in Management Area 14 and 0 acres in Management Area 17 in the project area making this EMU poor habitat for early seral stage species such as Prairie warblers and Northern bobwhites.
- Many mature forest stands have dense midstories, which limit development of an herbaceous, non-woody understories.
- Prescribed burning needs to be regularly used to maintain wildlife habitat conditions within this EMU.
- Current open road density 0.65 miles per square mile in the project area. This meets the desired Forest Plan objectives for both management areas.

The EMU contains 6 existing ponds, which are not uniformly distributed throughout the EMU. The Forest Plan guidelines suggest at least 24 water sources in this project area. Existing ponds need to be reconstructed to assure enough, reliable water sources. Nineteen (19) additional ponds are proposed for construction to optimize the forest plan objective of at least one water source per 160 acres.

There are not adequate numbers of nest structures in the project area. Nest boxes originally provisioned in the project area have deteriorated or disappeared, so need to be replaced. Forest midstories are too dense to allow development of an abundant grass/forb component. Due to overcrowding of hardwood stems, hardwood crowns cannot develop or expand to produce reliable hard mast crops.

Revised Forest Plan (RFP) Design Criteria WF001: *On a project-by-project basis, provide grass-forb or shrub-seedling habitats (include regeneration areas 0-10 years in age, areas of recent heavy storm or insect damage, and woodland conditions) at a rate of:*

A minimum of 6 percent of the suitable acres in MA 14 (*Ouachita Mountains Habitat Diversity Emphasis*) and a minimum of 6 percent of the suitable acres in MA 17 (*Semi-Primitive Areas*). To meet these criteria in *Ladd's Creek* EMU an additional 57 acres of early seral stage habit needs to be created.
This is calculated using the following equation:

- For MA 14: (1,012 suitable acres x 0.06) = 60.72 acres to create – 34 existing = 27 acres minimum to create
- For MA 17: (499 suitable acres x 0.06) = 29.94 acres to create – 0 existing = 30 acres minimum to create

RFP Design Criteria WF002: *Limit even-age regeneration cutting in each project area to no more than 14 percent of the suitable acres managed under even-aged prescriptions, per 10-year entry except for the following:*

In *Ladd's Creek* EMU no more than 158 acres of 0-10 age-class needs to be created by the proposed action.
This is calculated using the following equation:

- For MA14: 1,012 suitable acres x 0.14 = 141.68 acres to create – 34 existing acres = 108 maximum acres needed
- For MA17: 499 suitable acres x 0.10 = 49.9 acres to create – 0 existing acres = 50 maximum acres needed

RFP Design Criteria WF003: *Provide for and designate areas for mast production at the approximate rate of 20 percent of each project area. Hardwood and hardwood-pine forest types, age 50 and older, comprise this component.*

The hardwood component, which is over 50 years old, is currently about 59% (2,262 acres) total of forested land. This project area does currently meet this Revised Forest Plan Design Criteria

RFP Design Criteria WF006: *Retain or develop mature growth pine habitats (80 years old or greater) and mature growth hardwood habitats (100 years old or greater) at a rate of five percent of each broad cover type within each project analysis area.*

For *Ladd's Creek,* this would be at least 79 acres (5% of 1580 acres) of mature growth pine and 113 acres (5% of 2,267 acres) of mature growth hardwood. There are currently 265 acres (12%) of mature growth hardwood stands 100 years old or older within the project area. There are also 769 acres (49%) of pine considered mature growth pine 80 years old or older.

RFP Design Criteria WF09: *Provide nest structures where suitable natural cavities do not occur and are needed to accomplish wildlife objectives.*

Many snags and cavity trees were created in this area by past ice storms. This was a positive condition for many cavity dependent species. However, cavity trees are still considered a limiting factor in some portions of the EMU.

RFP Design Criteria WF010: *Where there is no existing water source, provide at least one wildlife pond per 160 acres where needed to accomplish wildlife objectives*.

Currently, *Ladd's Creek* contains 6 woodland ponds. These existing ponds (6) need to be reconstructed. Reconstruction is necessary to make the existing waterholes reliable as year-round water sources. Nineteen (19) additional water sources are planned to meet RFP design criteria WF010.

RFP Design Criteria WF012: *Where possible, seasonally close roads during critical periods for wildlife (March–August).*

- Currently the open road density for *Ladd's Creek* 0.65 miles per square mile. This meets the desired Forest Plan objectives for both management areas.

Fish Passage Crossings

The road analysis inventory showed 1 Ford, 2 bridges, and 2 slabs. Out of these stream crossings the data showed that none of them have a fish passage problem. All fish passage culverts to be replaced will be designed to meet fish passage guidelines.

EFFECTS OF MANAGEMENT ACTIVITIES ON WILDLIFE

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

The RFP Design Criteria was used to develop the Proposed Action and Alternative 2 for *Ladd's Creek* EMU. These criteria are in place to protect and expand populations of endangered species and maintain viable populations of all native wildlife species on the forest. Actions proposed in this environmental assessment would begin with a timber sale (and associated road work) that could not be sold until late 2018 or later. This sale(s) would probably take 3-5 years to log all stands treated with timber harvests. Other activities would occur after the timber sale is completed.

Road work would include pre-haul maintenance, reconstruction of existing roads, building temporary roads, and log decks within stands to be thinned or regenerated. Reconstruction/maintenance includes brushing back rights-of-way, replacing rusted-out culverts, and adding surface gravel where necessary along the timber sale haul routes. Road reconstruction would decrease the possibility of increased erosion and sedimentation in the local streams.

RFP Design Criteria WF012: The open road density would remain the same 1.90 miles per square miles total in all

action alternatives. Temporary roads (5.18 miles) and log decks (43) are seeded after they are no longer utilized. These temporary roads and log decks, as well as firelines, would then become temporary wildlife openings. The Proposed Action and Alternative 2 would create approximately 35 acres of temporary openings. The objective of an opening is to provide a supplemental food source to sustain wildlife populations in areas of poor habitat, or to supplement food shortages on a seasonal or temporary basis. These openings also provide nesting and brood habitat for game and non-game birds.

Wildlife stand improvement (midstory reduction) of pine stands would further open these stands to allow sunlight to the forest floor and encourage grass/forb development in the understory. Remaining hardwoods would have more space and less competition, so would be able to develop healthier crowns- thus increasing mast production. The WSI would also encourage re-sprouting of many oaks and other hardwoods. These re-sprouts could be used as browse by various wildlife species such as white-tailed deer.

Wildlife waterhole reconstruction and new waterhole construction would provide year around, permanent water sources, which could be utilized by many wildlife species. Depending upon site specific suitability, these woodland ponds may or may not be stocked with native species of fish. Those not suitable for fish stocking would provide secure and suitable habitats for increased amphibian reproduction. WF010 would not be met by all action alternatives. The Proposed Action and Alternative II would provide 19 waterholes to meet objective (**RFP Design Criteria WF010**-*water developments)*.

Nest box placement would provide supplemental cavities for species such as wood ducks and many bat species at waterhole locations, and bluebirds in regeneration areas. Many snags and cavity trees were created in this area by past ice storms. This was a positive condition for many cavity dependent species. However, some areas still need additional nesting habitat. Placing nest structures at ponds and in regeneration areas will help meet this need.

Timber harvest, particularly even-age regeneration cutting, is often referred to by the public as deforestation. This is not the case in the project area. In *Ladd's Creek* EMU the forested area stays forested but becomes a different age with differing vertical structure. The harvest cuts mimic natural occurrences such as windstorms or stand replacement wildfires. True deforestation occurs when forested land is permanently cleared and then used for other non-forest uses such as housing developments.

The use of regeneration cutting (modified Seed Tree of 64 acres and clearcut of 37 acres would produce enough early seral stage habitats to have appropriate habitat capability for viable populations of many early seral stage species and not exceed standards that protects sustainability of the forest. Both RFP Design Criteria WF001 and WF002 are met by the Proposed Action and Alternative II.

Reforestation treatments (101 acres of even-age/ modified seed tree and clearcut harvested stands) would occur on new regeneration stands. At a minimum this would consist of either a mechanical, manual, prescribed burning, herbicide or ripping site prep treatment. Depending upon the success of initial site prep treatment a follow-up site prep treatment or hand planting may be necessary to achieve reforestation. These treatments would create early seral stage habitat such as grasses, forbs, and woody re-sprouts for wildlife use.

Timber stand improvements on new regeneration sites and one older regeneration site *[some of these are repeated acres]* in the action alternatives would open these stands for more use by early seral stage wildlife species. The dense vegetative conditions now present that do not allow for ground story vegetation development in these stands would be reduced. The re-sprouting of hardwoods after the release treatments would also produce new browse utilized by various wildlife species such as white-tailed deer.

Commercial thinning to a target BA of 70 with a minimum 10% hardwood component would occur on 719 acres of pine forest. Thinning would increase sunlight to the forest floor, increase the understory species, and further develop hard and soft mast capabilities for this project area.

In the Proposed Action, herbicide application would be used if needed to ensure restocking of regeneration stands and where needed to maintain wildlife stand improvement areas. Triclopyr, 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). The herbicides would have no detrimental effect on wildlife (Syracuse Environmental Research Associates (SERA) for Glyphosate, Triclopyr, and Imazapyr 2011). No herbicides are proposed in Alternative 2.

RFP Design Criteria WF003 (*Provide for and designate areas for mast production at the approximate rate of 20 percent of each project area). Ladd's Creek* EMU does currently meet this RFP Design Criteria. Approximately 59% (2,262 acres) of the EMU can be considered suitable for mast production. This EMU exceeds the 20% mark. Neither the action alternatives nor the no action alternative negatively alters this design criterion for this EMU.

RFP Design Criteria WF006 (*Retain or develop mature growth…) Ladd's Creek* currently surpasses this criterion for pine with over 49% of the pine stands currently in a mature growth condition. The project area also meets this criterion for hardwood with 12% of the hardwood stands in a mature growth condition. All action alternatives will maintain this design criterion for this EMU.

Prescribed burning is proposed on 3,847 acres of National Forest lands in the project area on 3-5-year intervals. Multiple objectives, such as wildlife habitat improvement, control of understory plant species, and fuel reduction, would be met by prescribed burning. These burns could top-kill some hardwoods if they are less than 2" at the root collar, but re-sprouting of these hardwood stems would occur. While some ground cover would be temporarily reduced with a prescribed burn, there would be an overall increase in grasses and forbs, and this type of herbaceous cover would quickly replace what vegetative cover may have been initially lost. In the long-term prescribed burning will increase the amount and palatability of browse utilized by various wildlife species such as white-tailed deer.

NO ACTION ALTERNATIVE 1

The effects of selecting the No Action alternative for *Ladd's Creek* are many. There would be no **direct** effect. However, **indirectly**, the forest stands would continue to age and mature. Understory plant species would begin to decline in species variety and overall numbers due to shading and leaf litter accumulation. Early seral stage habitat browse and nectar sources would continue to disappear. Road conditions would continue to degrade. Some waterholes would continue to dry up during seasons of drought. Thick young stands would continue to grow denser and inaccessible to many wildlife species. Species of wildlife requiring open areas such as northern bobwhite, Bachman's sparrow, and eastern bluebird and species requiring a mosaic of forest age classes such as deer, wild turkey, and black bear would tend to avoid or vacate portions of the project area. There would be no cumulative effects.

Effects on Migratory Bird Species

The prairie warbler, scarlet tanager, bald eagle, and Bachman's sparrow are representative migratory bird species within the project area and are some of the 1,026 species listed under the Migratory Bird Treaty Act. Effects on these species and their habitat are disclosed in the following Management Indicator Species (MIS) and Proposed, Endangered, Threatened, and Sensitive (PETS) species sections.

Effects on Management Indicator Species (MIS)

The Forest Service Manual (FSM) defines MIS as, "any species, or group of species, or species habitat element selected to focus management attention for the purpose of resource production, population recovery, maintenance of population viability, or ecosystem diversity." Land managers are directed to select management indicators for a Forest Plan or project that best represent the issues, concerns, and opportunities to support recovery of Federally-listed species, provide continued viability of sensitive species, and enhance management of wildlife and fish for commercial, recreational, scientific, subsistence, or aesthetic values or uses. "Management indicators representing overall objectives for wildlife, fish, and plants may include species, groups of species with similar habitat relationships, or habitats that are of high concern." See the current Ouachita National Forest Management Indicator Species list below.

Management Indicator Species (MIS) and Associated Purposes

Life form	Scientific name	Common name	Selected for this project? (YES/NO)
DEMAND SPECIES			
Bird	*Colinus virginianus*	Northern Bobwhite	**YES**
Bird	*Meleagris gallopavo*	Eastern wild turkey	**YES**
Fish	*Micropterus dolomieui*	Smallmouth bass	**NO**
Mammal	*Odocoileus virginianus*	White-tailed deer	**YES**
VIABILITY CONCERN SPECIES – ADDRESSED IN T&E SECTION OF THIS EA			
Bird	*Picoides borealis*	Red-cockaded woodpecker	**NO**
ADEQUATE EARLY FOREST STAGE COVER			
Bird	*Colinus virginianus*	Northern Bobwhite	**YES**
Bird	*Dendroica discolor*	Prairie warbler	**YES**
ADEQUATE MATURE PINE FOREST COVER			
Bird	*Dryocopus pileatus*	Pileated woodpecker	**YES**
Bird	*Picoides borealis*	Red-cockaded woodpecker (MA 22)	**NO**
Bird	*Piranga olivacea*	Scarlet tanager	**YES**
ADEQUATE MATURE HARDWOOD FOREST COVER			
Bird	*Dryocopus pileatus*	Pileated woodpecker	**YES**
Bird	*Piranga olivacea*	Scarlet tanager	**YES**
RECREATIONAL FISHING QUALITY (LAKES AND PONDS)			
Fish	*Lepomis macrochirus*	Bluegill	**NO**
Fish	*Lepomis microlophus*	Redear sunfish	**NO**
Fish	*Micropterus salmoides*	Largemouth bass	**NO**
HABITAT QUALITY OF STREAMS: ARKANSAS RIVER VALLEY HABITAT CATEGORY			
Fish	*Ameiurus natalis*	Yellow bullhead	**YES**
Fish	*Campostoma anomalum*	Central stoneroller	**YES**
Fish	*Etheostoma whipplei*	Redfin darter	**YES**
Fish	*Lepomis cyanellus*	Green sunfish	**YES**
Fish	*Lepomis megalotis*	Longear sunfish	**YES**
HABITAT QUALITY OF STREAMS: GULF COASTAL PLAIN -- HABITAT CATEGORY NOT IN LADD'S CREEK			
Fish	*Aphredoderus sayanus*	Pirate perch	**NO**
Fish	*Campostoma anomalum*	Central stoneroller	**NO**
Fish	*Erimyzon oblongus*	Creek chubsucker	**NO**
Fish	*Lepomis cyanellus*	Green sunfish	**NO**
Fish	*Lepomis megalotis*	Longear sunfish	**NO**
HABITAT QUALITY OF STREAMS: OUACHITA MOUNTAINS -- HABITAT CATEGORY NOT IN LADD'S CREEK			
Fish	*Campostoma anomalum*	Central stoneroller	**NO**
Fish	*Etheostoma nigrum*	Johnny darter (w/in leopard darter range only)	**NO**
Fish	*Etheostoma radiosum*	Orangebelly darter	**NO**
Fish	*Etheostoma whipplei*	Redfin darter	**NO**
Fish	*Fundulus catenatus*	Northern studfish	**NO**
Fish	*Hypentilium nigricans*	Northern hog sucker	**NO**
Fish	*Lepomis cyanellus*	Green sunfish	**NO**
Fish	*Lepomis megalotis*	Longear sunfish	**NO**
Fish	*Luxilus chrysocephalus*	Striped shiner	**NO**
Fish	*Micropterus dolomieui*	Smallmouth bass	**NO**
Fish	*Percina copelandi*	Channel darter (w/in leopard darter range only)	**NO**

Note that several MIS appear under more than one habitat or purpose category.

MIS selected for this project - The Ouachita National Forest MIS list was reviewed, and a subset of categories and associated MIS was selected for this project. The right column in the table above indicates which MIS were selected for this project. The following MIS categories and their associated MIS were eliminated from further consideration because they do not occur on National Forest land in this project area. The remaining categories are represented in the project area and summarized in the table below.

	COMMON NAME	PURPOSE OF SELECTION
1.	Bobwhite quail	Demand Species and Adequate Early Forest Stage Cover
2.	Eastern wild turkey	Demand Species
3.	White-tailed deer	Demand Species
4.	Prairie warbler	Adequate Early Forest Stage Cover
5.	Pileated woodpecker	Adequate Mature Pine Forest Cover /Adequate Mature Hardwood Forest Cover
6.	Scarlet tanager	Adequate Mature Pine Forest Cover /Adequate Mature Hardwood Forest Cover
7.	**Habitat Quality of Streams: Arkansas River Valley**	
7a.	Yellow bullhead	*Habitat Quality of Streams: Arkansas River Valley*
7b.	Central stoneroller	*Habitat Quality of Streams: Arkansas River Valley*
7c.	Redfin darter	*Habitat Quality of Streams: Arkansas River Valley*
7d.	Green sunfish	*Habitat Quality of Streams: Arkansas River Valley*
7e.	Longear sunfish	*Habitat Quality of Streams: Arkansas River Valley*

Effects on project MIS - Six terrestrial animal MIS (1-6 above) were modeled to compare habitat capabilities within the project area for the Proposed Action, No Action Alternative 1 and the No Herbicide Alternative 2 (table above). It should be noted that this model assumes that all treatments occur within the same year, when in fact treatments may occur over the course of the 10-year planning period. Therefore, actual habitat capability will differ somewhat from the projections presented here. Response of Selected MIS to Alternative by Decade of Implementation (Habitat Capability Model – numbers are rounded to closest whole number).

	MANAGEMENT INDICATOR SPECIES (MIS)					
	Quail (1)	Turkey (2)	Deer (3)	Prairie Warbler (4)	Pileated Woodpecker (5)	Scarlet Tanager (6)
	INDIVIDUALS PER SQUARE MILE					
NO ACTION						
Baseline	11.74	8.14	16.71	2.39	35.31	30.20
After 10 Years	9.09	7.96	16.57	1.19	37.71	32.02
PROPOSED ACTION & Alternative 2						
After Initial treatments	57.94	10.66	27.03	86.10	28.57	28.17
After 10 Years	17.15	7.86	18.59	8.30	37.13	31.90

Model coefficients are not available for the other MIS (7a. – 7e.), which were selected for this project, but direct, indirect, and cumulative effects on their populations are discussed below.

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

These alternatives would produce early seral stage habitat through tree harvesting and site preparation activities. Habitat availability for each terrestrial vertebrate MIS would be sufficient to achieve all of the minimum population objectives, and in several cases meet or exceed the optimum levels.

Quail: Habitat availability and population trend for quail, a Demand Species that also represents Adequate Early Forest Stage Cover, would increase almost 5-fold after initial treatments of timber harvest, TSI, WSI, and prescribed burning. Directly, some nests could be disturbed by logging equipment, if treatments are performed during nesting season. Indirectly, the action alternatives would produce more preferred habitat for quail by producing enhanced nesting cover, an abundance of food, and reliable water sources. These activities should result in a positive population trend.

Deer and Turkey: Two MIS species representing Demand Species, deer and turkeys, would generally both fare better under these action alternatives. There would be no direct effect on deer, but some turkey nests could be disturbed if cultural treatments occur during nesting season. Indirectly, the habitat that both of these species prefer would be improved by an action alternative. Indirectly, both species would benefit from the overall effects of the management activities the enhancement of food, cover, and water availability.

Prairie Warbler: Prairie Warbler is an MIS for Adequate Early Forest Stage Cover. Its requirements can be met by forest stands under the age of 20 and by prescribed burning in open pine stands. Treatments in the action alternatives lead to

impressive population levels following treatments. There would be no appreciable direct effect on the prairie warbler population, though some nest disturbance could occur. Indirectly, the implementation of an action alternative would enhance nesting cover, increase food abundance and water. These habitat improvements would result in a positive population trend for the prairie warbler.

Pileated Woodpecker and Scarlet Tanager: For these MIS representing mature forest types, habitat capabilities are projected to be lowered slightly by the proposed treatments. The amount of Adequate Mature Forest Cover exceeds the optimum needs for Pileated Woodpecker and Scarlet Tanager for both pine and hardwood. There would be no appreciable direct effect on the populations of these species, though some nest disturbance could occur. Indirectly, ideal habitat will be reduced due to mature forest being regenerated.

Habitat Quality of Streams: Arkansas River Valley MIS (MIS species 7a.–7e.): The Proposed Action and the No Herbicide Alternative 2 would have no appreciable direct, indirect, or cumulative effects on stream habitats and the associated aquatic MIS. All streams would be protected from the direct effects of logging, wildlife habitat improvement activities, and prescribed burning. The management activities would have no effect on stream habitats in *Ladd's Creek EMU* or on stream-associated MIS. This project would have no effect on forest-wide trends of these MIS.

Cumulative Effects

The Proposed Action and Alternative II would perpetuate habitat capabilities for each of the selected terrestrial vertebrate MIS. The Proposed Action and Alternative II meet the wildlife associated Revised Forest Plan (2005) Design Criteria mentioned above in this wildlife section. There are no other projects currently taking place within this EMU nor for the foreseeable future. Therefore, no cumulative effects are anticipated for any of the selected MIS species.

NO ACTION ALTERNATIVE 1

Quail and Prairie Warbler: The No Action Alternative would have no direct effect on these species and produce no new early seral stage habitat (MIS category: Adequate Early Forest Stage Cover). This alternative would result in not meeting the minimum amount of early seral stage conditions in the project area. Habitat availability for prairie warblers would continue to be insufficient and not meet the projected minimum available habitat in this area. This alternative would perpetuate conditions that keep quail and Prairie Warbler numbers low in the project area.

Pileated Woodpecker, Turkey, Scarlet Tanager and White-tailed Deer: There would be no direct effect on these species. Indirectly, habitat availability for the other terrestrial vertebrate MIS would change little over the first 10 years. The No Action Alternative meets forest plan objectives for adequate mature forest cover for pine and hardwood forest types (same as the action alternatives). Forest plan objectives will also be met for two of the three MIS representing Demand Species (deer and turkeys, but not quail). Forest plan objectives for Northern bobwhite will not be met by the no action alternative, due to no early seral habitat existing or being created.

Habitat Quality of Streams: Arkansas River Valley MIS (MIS species 8a.–8e and Small mouth bass 9.): The No Action Alternative would have no appreciable direct or indirect effects on stream habitats or the associated MIS due to the lack of active management.

Cumulative Effects

There are no other projects currently taking place within this EMU. Therefore, no cumulative effects are anticipated for any of the selected MIS species.

EFFECTS ON MIS IN THE CONTEXT OF FOREST-WIDE TRENDS (USDA FOREST SERVICE, SEPTEMBER 2017)

The Northern bobwhite has experienced population declines across Arkansas due to decreases in early seral stage habitats. Northern bobwhite Breeding Bird Census data indicates a decreasing quail population since 1997, while estimated habitat capability for the species reflects a modest increase since FY 2006. However, habitat capability is still far from reaching the projected FY 2015 desired forest-wide capability of 101,748 based on the 2005 Forest Plan. Habitat

capability for the Forest should improve with the implementation of the Revised Forest Plan, which prescribes an increase in the number of acres of early seral stage habitat. Habitat capability for Northern bobwhites, as estimated by ComPATS, has increased slightly since 2005. Although the creation of early successional habitat is showing a slight upward trend, this habitat enhancement has not yet reached the Plan objective of 5,500 acres per year. This modest but increasing population trend for the Forest could be due to habitat improvements, which have resulted from aggressive prescribed burning and thinning programs elsewhere on the ranger district. The action alternatives would result in improved habitat conditions and increased habitat availability for this species. The No Action alternative would not result in any additional habitat improvements.

The Eastern wild turkey population has fluctuated over the last 5 years (2013-2017). Reproduction has varied from a low of less than 1.0 poults per hen in 2015 to a high of 2.6 poults per hen in 2014. Decreases in turkey harvest and birds detected on the Landbird Points data indicate a reduction in the number of turkeys forest wide. Still, habitat capability remains above the level projected in the 2005 Forest Plan. The sustained high levels of habitat capability may indicate that the reductions in poults per hen and birds detected on the Landbird Points are due to factors other than habitat suitability or availability. The treatments of the three action alternatives would result in improved habitat conditions and increases in habitat availability for this species; the No Action Alternative would not result in any additional habitat benefits.

The Ouachita National Forest habitat capability for White-tailed deer was calculated at 38,303 deer in 2017. This estimated habitat capability for was slightly above the Forest Plan's desired habitat capability of 38,105. Deer harvest records over the last few years indicate an upward trend. Current habitat capability for white-tailed deer still exceeds Forest Plan objectives for deer per square mile. The action alternatives would contribute positively to deer by improving habitat conditions and increasing habitat availability. The No Action alternative would not.

Landbird Monitoring Survey data for Prairie warbler indicates a slightly decreasing population trend for the time period of 20013-2017. This population trend coincides with a decreasing trend in habitat capability for the Prairie warbler on the Ouachita National Forest and is consistent with range wide trends. This decline is considered directly related to the decline in the acres of early seral habitat. The action alternatives would result in improved habitat conditions and an increase in habitat availability for this species; the No Action Alternative would not result in any additional habitat benefits.

The Pileated woodpecker has a stable to slightly decreasing population trend on the Ouachita National Forest based on landbird data. Habitat capability data suggest that this species' primary habitat, mature hardwood forest, is increasing. CompPATS estimates of habitat capability using all forest types, indicates a more stabilized trend. These data are for pine, pine-hardwood, hardwood, and hardwood-pine stands with the greatest value being for stands greater than or equal to 41 years old. As these stands age, the habitat capability to support the pileated woodpecker should continue to improve. The action alternatives would probably result in a temporary reduction of habitat for this species due to continued disturbance. However, over 1/2 of Ladd's Creek is suitable habitat for pileated woodpecker. The No Action Alternative would result in no reduction in habitat for this species.

Forest Landbird point data for Scarlet tanager supports a slightly decreasing trend for the Scarlet tanager. However, the Ouachita National Forest has 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. The action alternatives would result in a temporary reduction of habitat for this species due to disturbance. The No Action Alternative would result in no reduction in habitat for this species.

The Proposed Action, No Action Alternative 1 and the No Herbicide Alternative 2 would have no appreciable direct, indirect, or cumulative effects on stream habitats and the associated aquatic MIS. All streams would be protected from the direct effects of logging, soil disturbing wildlife habitat improvement activities, and soil disturbing prescribed fire activities. Cumulatively, the proposed action would have no effect on stream habitats in Ladd's Creek or on stream-associated MIS. This project would have no effect on Forest-wide trends of these MIS.

PROPOSED, ENDANGERED, AND THREATENED AND SENSITIVE (PETS) SPECIES

Introduction

Ladd's Creek has the potential to be habitat for 13 species listed on the Ouachita PETS List. The Ouachita PETS List is attached to the Biological Evaluation (BE) of this Project. The BE for this project is on file at the district office and is incorporated by reference (Garrett January 2020). See table below.

Number of Species for this BE	Scientific Name	Common Name
T&E SPECIES requiring FWS Concurrence (1)		
1	*Myotis septentrionalis*	Northern Long-eared Bat
SENSITIVE SPECIES		
TERRESTRIAL ANIMAL SPECIES (2-5)		
2	*Myotis leibii*	Eastern Small-footed myotis
3	*Perimyotis subflavus*	Tricolored Bat
4	*Peucaea aestivalis*	Bachman's Sparrow
5	*Danaus plexippus*	Monarch Butterfly
AQUATIC ANIMAL SPECIES (6-8)		
6	*Notropis ortenburgeri*	Kiamichi shiner
7	*Obovaria arkansasensis*	Southern hickorynut
8	*Pleurobema rubrum*	Pyramid pigtoe
RIPARIAN PLANT SPECIES (9-11)		
9	*Amorpha ouachitensis*	Ouachita false indigo
10	*Vernonia lettermannii*	Narrowleaf ironweed
11	*Vitis rupestris*	Sand grape
TERRESTRIAL PLANT SPECIES 12-13		
12	*Carex latebracteata*	Waterfall's sedge
13	*Castanea pumila var. ozarkensis*	Ozark chinquapin

*The U.S. Fish and Wildlife Service will be consulted for concurrence of determinations on any Proposed, Endangered, or Threatened (PET) species, if required.

1. NORTHERN LONG-EARED BAT

Present Conditions

The northern long-eared bat has a large range that stretches over much of the Eastern United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In the United States they are found from Maine to Florida and West to Oklahoma and Montana (USDI FWS 2013).

Northern long-eared bats use an assortment of habitats across its range including both hardwood and coniferous forest. This species is known to use a wide variety of roost sites including caves, man-made structures, as well as living trees and snags of both hardwoods and conifers. Preferred roosting habitat appears to vary from region to region within its range. Research conducted on the Ouachita National Forest documented a preference for shortleaf pine snags as roosting sites (Perry and Thill, 2007). Both male and female used managed and unmanaged timber stands. However, research result showed that females preferred to roost in managed pine stands with low pine BA while males preferred to roost in more dense stands (Perry and Thill, 2007).

The northern long-eared bat was listed as a Threatened species by the UFWS on April 2, 2015. The listing of this species is primarily due to a disease referred to as White-nosed syndrome (WNS) that has caused a decline of 99 percent in the northern long eared bat population in the Northeastern states and is expected to spread throughout the United States (USDI FWS 2013). White-nosed syndrome is named for the white fungus evident on the muzzles and wings of affected bats. The white fungus is identified as *Pseudogymnoascus destructans* and thrives in cold and humid conditions which are characteristic of the caves and mines used by bats during hibernation. Bats affected with WNS lose their fat reserves and often die from the disease.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Timber, Silvicultural/Wildlife Stand Improvement Activities*:* Cutting trees for the various proposed timber treatments may **directly** result in death and injury to bats and their young during the maternity period, when pups are non-volant (Wisconsin DNR, 2013), and may also disrupt roosting and maternity behavior. NLEBs are highly mobile and can flee to avoid danger during non-pup rearing times. The NLEB may be affected **indirectly** by noises associated with timber, silvicultural, and wildlife stand improvement activities, such as the sound of saws and/or general human interaction (USDI Fish and Wildlife Service, 2013a). Canopy and midstory openings resulting from the proposed action will increase the amount of sunlight reaching the forest floor. Increased sunlight will yield a more diverse understory allowing for a rise in the abundance of NLEB insect prey base.

Prescribed Fire: Prescribed burning can occur during the dormant season or during the growing season. Prescribed burning during the dormant season would have no **direct** effects, as there are no known hibernacula on the Poteau/Cold Springs Ranger District. However, a growing season burn during the pup season could have a **direct** effect if a snag with a non-volant juvenile burned down. It is also possible that mortality could occur during a growing season burn if toxic gases overcame a non-volant juvenile unable to fly out of the burn area. Due to the lower intensity of prescribed fire, as opposed to wildfires, prescribed fire is less likely to burn all snags, and would also cause less toxic gas and radiant heat than a high intensity wildfire. **Indirect** effects would be positive due to snag creation, improved habitat for the insect prey base and a lower risk of catastrophic wildfire.

Wildlife Treatments: Wildlife treatments include nest structures, feral hog control, wildlife openings, pond construction and reconstruction.

- ✓ Pond Construction: If pond construction occurs during the maternity season individual bats may be **directly** injured or killed if roost trees are removed during clearing of construction sites. However, the probability of directly effecting a NLEB is low due to the small acreage that will be affected and the narrow window of time when juveniles cannot fly (18-21 day). **Indirectly** foraging habitat for NLEB will be improved due to the ponds providing ideal habitat for insect pray species and open space for foraging.

- ✓ Pond Reconstruction: No **direct** effects are expected by pond reconstruction due to the small acreage associated with each site and existing ponds having only small trees, brush, and grasses growing on them. **Indirectly**, pond reconstruction will improve or maintain water sources that provide beneficial habitat for NLEB insect prey base.

- ✓ Wildlife openings: D**irect** effects from the creation of wildlife openings is possible since some tree clearing will occur. However, **direct** effects are not highly probable since existing openings such as log decks, firelines and temporary roads will be mostly utilized as temporary wildlife openings. Primarily, brush and small trees that are poor NLEB roosting habitat will be cleared to create wildlife openings. **Indirectly**, wildlife openings will improve foraging opportunities and benefit habitat for NLEB insect prey base.

- ✓ Feral Hog Control: No **direct** or **indirect** effects are expected to occur during feral hog control since vegetation will not be altered during this activity.

- ✓ Nest structures: No **direct** effects from this activity are anticipated. **Indirectly**, roosting habitat may be improved by the installation of nest structures.

Transportation System: Individual bats may be **directly** injured or killed if roost trees are cut during the maternity season. No **direct** effect is expected if transportation system activities occur during hibernation or swarming seasons because the nearest know hibernaculum is over 39 miles away from the project area. **Indirectly**, these activities also have the potential to disrupt roosting and maternity behavior. Removal of trees along reconstructed roads, temporary roads and skid trail corridors may result in a loss of roosting habitat. The decommissioning of roads will help decrease noise, while retaining the open areas used by NLEBs for foraging (Perry, Thill, & David Jr., 2008).

Special Use Permits: No **direct** or **indirect** effect from this activity is expected from issuing firewood or rock special use permits.

NO ACTION ALTERNATIVE 1

The No Action alternative would have no "**direct effects**" upon the Northern Long-eared bat. The retention of existing pine and hardwood forested conditions without human-caused disturbance would continue to offer roosting and maternity habitat for this species. However, insect diversity and abundance would likely decline due to the lack of early successional habitat combined with the reduction in sunlight reaching the forest floor. This would result in an "**indirect effect**" due to a loss of foraging opportunities for the Northern long-eared bat.

Cumulative Effects

No other projects are taking place within this EMU. However, the most significant threat to the northern long-eared bat appears to be White Nosed Syndrome (WNS) and at this time it is uncertain how WNS will affect the northern long-eared bat population in the Ouachita Mountains. This species has thrived in the habitat provided on the Ouachita National Forest and no **cumulativ**e effect is anticipated for this species associated with this project.

2. Eastern Small-footed Bat

Present Conditions

In Arkansas it is known in small numbers from only a few caves in the Ozarks and has been documented on Mt. Magazine in Logan County (Saugey pers. Comm.). Preliminary results from acoustic surveys preformed on the Ouachita National Forest in August and September of 2009 indicated that this species is present in low numbers in Scott and Montgomery Counties. Prior to this survey only a single specimen was document from Polk County and was not known from the caveless region of western Arkansas. It has been documented on the Ouachita National Forest in Oklahoma at Bear Den Caves in Leflore Co., OK (Saugey et al. 1989).

This species prefers hibernating in caves or mines they are the "hardiest" of cave bats. This bat tends to hibernate near cave entrances; hence it may be vulnerable to freezing in abnormally severe winters. This species may also overwinter in rock talus areas (D. Saugey, personal communication). Warm-season roosts include buildings, towers, hollow trees, spaces beneath the loose bark of trees, cliff crevices, and bridges. Very little is known about feeding habits or reproduction of this species (NatureServe, 2015). Major threat to this species includes human disturbance during hibernation and White Nose Syndrome.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Eastern small-footed bats are highly mobile during the active season and it is unlikely that an adult would be **directly** harmed during The Proposed Action (logging, prescribed burning, hog control, pond construction/reconstruction, road work, silvicultural treatments, RCW treatments/activities, wildlife openings, WSI and special use permits). However, little is known about where reproduction takes place for this species. If trees or snags are used as maternity sites it is possible that timber harvest or prescribed burning may have a **direct** impact on individuals during this vulnerable time. Habitat

suitable for hibernation (caves, mines and rock talus areas) has not been found within this project area. Therefore, it is highly unlikely that this species would be harmed during the inactive season. **Indirectly**, there is a possibility that Eastern small-footed bat could consume insects that have been contaminated by herbicide treatments but it is unlikely that Eastern small-footed bat would exceed the risk factors (LD_{50} and LC_{50} values) established in the risk assessments completed by the Syracuse Environmental Research Associates Inc. for small mammals by foraging in an areas that have been chemically treated. **Indirect** impacts from timber harvest, WSI, TSI, wildlife opening development/maintenance, prescribed burning and treatment of NNIS would be positive as this habitat would temporarily become more open which would improve flight paths and increasing habitat for the insect pray base.

NO ACTION ALTERNATIVE 1

The No Action alternative would have no "**direct impacts**" upon this bat but also would not **indirectly** create habitat for the species.

Cumulative Effects

The most significant threat to the Eastern small-footed myotis appears to be White Nosed Syndrome (WNS) and at this time it is uncertain how WNS will affect Eastern small-footed myotis population in the Ouachita Mountains. The purposed action would improve habitat for this sensitive species by increasing habitat for its insect prey base. No negative **cumulativ**e effect is anticipated for this species associated with this project.

3. Tri-colored Bat– Sensitive mammal (bat) species

Present Conditions

The tri-colored bat is a generalist insectivore that commonly eats small beetles, wasps, flies and moths (Sealander and Heidt, 1990). They use echolocation to find and capture prey most commonly while in flight (Fujita and Kunz 1984). This species often forages over waterways and forest edges in both partially harvested and stands that have not been recently harvested. These bats usually roost in trees during the summer and rarely use buildings and other man-made structures (Sealander and Heidt, 1990). General summer roosting habitat is characterized as timber stands greater than or equal to 50 years of age with a hardwood component present. More specifically, both live and dead hardwood trees that have clusters of dead leaves being retained are preferably selected for roosting. This species appears to avoid roosting in industrial pine plantations. However, research in the Ouachita Mountains found that maternity colonies of females occasionally roosted in clusters of dead pine needles in the canopy of both live and dead over story pines (Perry and Thill, 2007b). Major threat to this species includes human disturbance during hibernation and White Nose Syndrome.

The tricolored bat is a common species in the Ouachita Mountains and has been documented in every county of the region. The largest known hibernating population of tricolored bats on the Ouachita NF is located at Bear Dens Cave in Leflore County, Oklahoma where over 279 individuals were recorded during a survey conducted February 26, 2018. At least 7 of those tricolored bats were definitely affected with White Nose Syndrome (WNS) and there was a minimum of 4 tricolor bats found dead. This was the first confirmed report of WNS in Leflore County. Historically, the largest known hibernating population of tricolored bats in the Ouachita Mountains resided at Pip Mine. Pip Mine is located on private property approximately 50 feet from the Ouachita National Forest boundary in Polk County, Arkansas. The average hibernating population of tricolored bats at Pip Mine is 741 individuals. The largest number of tricolored bats ever recorded at Pip Mine was 1,392 in 2014. Samples collected during the 2014 visit to Pip Mine came back positive for WNS. Pip Mine was surveyed again in the winter of 2017 where only 6 tricolored bats were observed, which is a population decrease exceeding 99%.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Tricolored bats are highly mobile during the active season and it is unlikely that an adult would be **directly** harmed during the Proposed Action (logging, prescribed burning, hog control, pond construction/reconstruction, road work, silvicultural treatments, RCW treatments/activities, wildlife openings, WSI and special use permits). However, it is possible that non-volant young could be **directly** impacted if tree cutting occurred during the pup rearing season and a maternity site was destroyed. Habitat suitable for hibernation (caves, mines and cavelike areas) have not been found within this project area. Therefore, it is highly unlikely that this species would be harmed during the inactive season. **Indirectly**, impacts from noises associated with mechanical activities and/or general human interaction could temporarily disrupt roosting and maternity behavior. However, vegetation management activities would stimulate the growth of herbaceous vegetation maximizing habitat for the insect pray base and opening up flight paths resulting in improved habitat conditions.

NO ACTION ALTERNATIVE 1

The retention of existing pine and hardwood forested conditions without human-caused disturbance would continue to offer roosting and maternity habitat. Diversity of foraging conditions would decline as succession continued. Without the creation of early successional habitat, insect diversity and abundance would likely decline, resulting in a loss of foraging opportunities for the tri-color bat.

Cumulative Effects

The most significant threat to the tri-colored bat appears to be White Nosed Syndrome. This species has thrived in the habitat provided on the Ouachita National Forest and no **cumulativ**e effect is anticipated for this species associated with this project.

4. Bachman's Sparrow

Present Conditions

Bachman's Sparrow forages on the ground in dense grass or shrub habitat like that found in early forest stage cover. Key habitat requirements for breeding activity are dense grassy places where scattered trees or saplings are present usually in pine forest types. They use young pine plantations 1-3 years of age, and open pine stands with grasses and scattered shrubs, oaks or other hardwoods (see Arkansas nesting data in Haggerty 1988; also, James and Neal 1986; DeGraaf et al. 1991; Hamel 1992).

The natural history of Bachman's Sparrow and its preferred habitats has been well documented. Bachman's Sparrow populations have declined throughout its southern range in recent decades (DeGraaf et al. 1991; Hamel, 1992), however its viability as a species is not threatened at this time. Population declines may be directly related to declines in its preferred habitats that are early seral stage (losses due to changes in timber harvest methods – no regeneration harvests) and the lack of mature, open pine woodlands.

There are 34 acres of early seral stage habitat (0 – 10-year-old stands) in *Ladd's Creek* that could be considered suitable habitat for this species. Due to the lack of prescribed burning within this EMU it is unlikely that any mature pine stands are in an open condition that would add any additional habitat for this species.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

It is unlikely that an adult Bachman's sparrow would be **directly** harmed during The Proposed Action (logging, prescribed burning, hog control, pond construction/reconstruction, road work, silvicultural treatments, RCW treatments/activities, wildlife openings, WSI and special use permits). Bachman's sparrow would most likely seek cover while workers are in the area and return later. If logging, silvicultural treatments, prescribed burning, or WSI occurred during the nesting season it is possible that Bachman's sparrow nest could be lost but is unlikely since areas in need of treatment is usually not optimal habitat. **Indirectly**, this Proposed Action would increase the amount of suitable habitat for this sensitive species. Prescribed burns would help restore and maintain open forest conditions that would be created by the proposed action treatments such as commercial thinning of pine timber, wildlife and timber stand improvement. The creation and maintenance of these open forest conditions are vital component of Bachman's sparrow habitat.

NO ACTION ALTERNATIVE 1

The No Action alternative would have **"no direct impacts"** upon this bird. **Indirectly**, succession would continue maintaining the entire project area as unsuitable habitat for this species. Suitable habitat could result from unplanned natural events like wildfires and insect outbreaks.

Cumulative Effects

The purposed actions would improve habitat for this sensitive species by increasing herbaceous cover and habitat for its insect prey base. The purposed actions are the only activities currently planned for this project area and no **cumulative** effect is anticipated for this species associated with this project.

5. Monarch Butterfly

Present Conditions

The monarch butterfly is a large orange and black butterfly that lives in a variety of habitats throughout North America and various additional locations across the globe. The males are slightly larger than females and have slightly narrower black wing veins. The males also have two small black spots on the posterior part of their wings.

The migration of the North America Monarchs is the most extreme of any butterfly in the world. These butterflies cover up to 3000 miles round trip. Migration is triggered by seasonal changes such as day length and temperature changes (Monarch Watch, 2018). Monarchs will begin migrating through Arkansas in late August/early September as they make their way from northern U.S. and Canada to their overwintering grounds in Mexico. Peak fall migration is typically around the first and second week of October, but this may change slightly from year to year depending on weather patterns. In spring, they will begin migrating north, making their way into Arkansas in early April. Many will stop and breed here wherever they can find milkweed plants. Though the species may be found throughout the summer here, most monarchs will continue traveling north (Arkansas Game & Fish Commission, 2017).

Spring nectar sources typically include Coreopsis spp., Viburnum spp., Phlox spp., and, early blooming milkweeds. Important nectar sources during the fall include goldenrods (Solidago spp.), asters (Symphyotrichum spp. and Eurybia spp.), gayfeathers (Liatris spp.), and coneflowers (Echinacea spp.) and frostweed (Verbesina virginica). Cultivated crops such as alfalfa, clover, and sunflower are also important resources (USDI Fish and Wildlife Service, 2018).

The January 2019 report showed a 144% increase in area of occupancy from 2018. Good weather conditions during the breeding season supported the increase, as well as efforts across North America to protect and restore habitats (Monarch Joint Venture, 2019).

Threats to this species including habitat loss at breeding and overwintering sites, disease, pesticides and logging at overwintering sites (USDI Fish and Wildlife Service, 2018).

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

It is extremely unlikely that there would be any **direct** impacts during the Proposed Action (logging, prescribed burning, hog control, pond construction/reconstruction, road work, silvicultural treatments, RCW treatments/activities, wildlife openings, WSI and special use permits) to adult butterflies since they are highly mobile. However, there is the possibility of harming eggs and larvae if the Proposed Action occurs during the reproductive season. **Indirect** impacts would be positive. Logging, WSI, prescribed burning and silviculture treatments would improve habitat for the monarch by stimulating new herbaceous plant growth that would most likely contain desired nectar producing species and milk weed for egg deposition.

NO ACTION ALTERNATIVE 1

The No Action alternative would have "**no direct impacts**" upon this butterfly, but also would not **indirectly** create habitat for the species.

Cumulative Effects

The proposed actions would benefit monarch habitat by encouraging the growth of more nectar and egg deposition plant species. The purposed actions are the only activities currently planned for this project area and no c**umulativ**e effect is anticipated for this species associated with this project.

6. – 8. Sensitive Aquatic Animal Species

6	*Notropis ortenburgeri*	Kiamichi shiner	Fish
7	*Obovaria arkansasensis*	Southern hickorynut	Mollusk
8	*Pleurobema rubrum*	Pyramid pigtoe	Mollusk

Present Conditions

The Ladd's creek project area contains Ladd's creek along with several unnamed tributaries all of which flows into the Petit Jean River. Habitat within Ladd's creek is poor for these sensitive aquatic species due to the streams lacking constant flow but could potentially occur downstream from the project area. All three of these species have been documented to occur within the Petit Jean River but not above Blue Mountain Lake.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Vegetation management: All activities connected with timber management and WSI occur in upland pine stands, which have been designated as lands suitable for timber production. There are specific restrictions on use of heavy equipment within SMZs that protect stream quality. Vegetation management would not **directly** or **indirectly** impact these sensitive aquatic species. The use of herbicides for silviculture and wildlife treatments will have no **direct** or **indirect** impact on the three sensitive aquatic species because herbicides will only be used as per Revised Forest Plan directions and will not be used within streamside zones.

Wildlife Activities: Pond construction, reconstruction, temporary wildlife openings, RCW treatments/activities, and nest structures all occur in upland pine stands and would not **directly or indirectly** impact these sensitive aquatic species.

Special Use Permits: There would be no **direct** or **indirect** impact on these sensitive species by issuing special use permits within this project area because actions will only occur in upland habitat away from these species.

Transportation system: Properly constructed and maintained roads reduce problems of runoff detrimental to streams. Road work in this EMU would have no **direct** or **indirect** impacts on these species due to protective measures for streams within the Forest Plan.

While temporary stream crossings and fording of streams during road construction and during hauling of logs would occur, these four species would not be present at the ford sites since habitat for these species is unsuitable due to the intermittent quality of these streams. No **direct** or **indirect** impacts on these species will occur.

Prescribe burning: Low intensity burning should have little or no impact on water quality (Bidwell, et al., no date: 2877-10). Therefore, limitations of forest management activities within SMZs included in the Forest Plan would protect these aquatic sensitive species from undesirable impacts.

NO ACTION ALTERNATIVE 1

The No Action alternative would have "**no impacts**" upon these aquatic species.

Cumulative Effects

There are no other actions taking place within the project area and no cumulative effect is anticipated with the implementation of the purposed action on these sensitive aquatic species due to activities occurring away from suitable habitat and limitations of forest management activities within SMZs included in the Forest Plan.

9. - 11. Sensitive Riparian Area Plant

10	*Amorpha ouachitensis*	Ouachita false indigo
11	*Vernonia lettermannii*	Narrowleaf ironweed
12	*Vitis rupestris*	Sand grape

Present Conditions

Habitat for these three sensitive riparian plant species is an ever changing dynamic. These species are dependent on flood events to maintain and create suitable habitat. Flood event remove competing plants that are not as well adapted to tolerate such conditions. Floods may create new sites suitable for these species by moving rock and sediment downstream while at the same time destroying currently suitable habitat. Threats to these species would be similar to those for fish and mollusks. Motorized vehicles "playing" along creeks can also have a detrimental impact on these species. These species are protected through the implementation of Revised Forest Plan Standards for protection of streamside zones.

Surveys on the Poteau/Cold Springs Ranger District by Bates (1991 & 1992), field surveys by the Forest Botanists and other Forest Service employees have found these plant species distributed widely throughout the district. Each occurrence was within a protected streamside zone.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Vegetation management: Most activities connected with timber management and WSI occur in upland pine stands, which have been designated as lands suitable for timber production. There are specific restrictions on use of heavy equipment within SMZs that protect stream quality. Restrictions on herbicide use within the Forest Plan would protect SMZs and therefore limit impacts on these plant species. Vegetation management would not directly or indirectly impact these sensitive riparian area plant species.

Prescribe burning: Low intensity prescribed burns often go out in SMZs and should have discountable impacts. Fireline construction will mostly occur in upland habitat and will follow forest plan restrictions for SMZs but individuals may be

directly impacted. Little to no **indirect** impacts are anticipated for these three sensitive riparian plant species.
Wildlife Activities: Pond construction, reconstruction, temporary wildlife openings, RCW treatments/activities, and nest structures all occur in upland pine stands and would not **directly** or **indirectly** affect these three sensitive riparian plant species.

Transportation system: Properly constructed and maintained roads reduce problems of runoff detrimental to streams and streamside zones. Road work in this EMU would have no **direct** or **indirect** impacts on these species due to protective measures for streams within the Forest Plan.

Special Use Permits: There would be no **direct** or **indirect** impact on these sensitive species by issuing special use permits since these actions will only take place in upland habitat in this EMU.

NO ACTION ALTERNATIVE 1

The No Action alternative would have "no impacts" on these sensitive riparian plant species.

Cumulative Effects

There are no other actions taking place within the project area and cumulative effects are not expected.

12. Sensitive Plant: Waterfall's Sedge

Present Conditions

Waterfall's sedge is an endemic species to the Ouachita Mountains and is locally abundant. It has a Global Heritage rank of G3, and state rank of S3 for both Arkansas and Oklahoma (Natureserve, 2017). It is found in a variety of habitats such as shaley roadsides, dry shale woodlands, riparian areas, mesic oak hickory forest, pine and pine hardwood forest, and mazarn shale, and novaculite glades. It is found in Polk, Yell, Scott, Montgomery, Howard, Garland, and Pike Counties, Arkansas and LeFlore and McCurtain Counties, Oklahoma. Waterfall's sedge receives some natural protection from human disturbance by the diversity of its preferred habitats, as described above. Many of the locations on the Ouachita National Forest are on sites located within areas that have undergone timber management activities and in areas that have been burned. Often Waterfall's sedge is found in areas that have had recent silvicultural activities. It appears to do well with practices that mimic natural disturbance. No current management practices (e.g., timber harvesting and prescribed fire) significantly impact *C. latebracteata* because of the nature of the habitats it occupies.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

The proposed Action may directly impact individual plants through uprooting, or by burying plants under displaced soils. Individual plants may also be directly impacted during prescribed burning. The use of herbicides for wildlife and silvicultural treatments will have no direct effect on this sensitive plant because herbicides will only be used as per Revised Forest Plan directions. Site-specific surveys for PETS plant species will be conducted prior to the herbicide treatment to identify, delineate, and protect any PETS plant species present at treatment sites. Vegetation management and prescribe burning should have minimal indirect impacts since waterfall's sedge appears to tolerate practices that mimic natural disturbance, so species viability and distribution are not anticipated to be significantly impacted.

Cumulative Effects

There are no other known actions taking place in this EMU; thus, no **cumulative** impacts are anticipated for Waterfall's sedge.

13. Sensitive Plant: Ozark Chinquapin

Present Conditions

Ozark chinquapin was formerly a locally abundant and widespread tree within the Interior Highlands region of Arkansas. It is less common and less widespread within the uplands of southwestern Missouri and eastern Oklahoma. Historical relict populations may occur in northern Alabama in the Appalachian Highlands, but these populations may have been extirpated (NatureServe, 2017). Ozark chinquapin has been seriously impacted by the introduction of the chestnut blight (Endothia parasitica). Today, very few seed-producing mature trees of this species still exist, but immature stump sprouts are quite common (Tucker, 1975). Typically, these stump sprouts live only a few years before they die from the effects of chestnut blight. Ozark chinquapin most commonly occurs in dry upland deciduous or mixed hardwood-pine communities on acid soils of ridge-tops, upper slopes adjacent to ravines and gorges, and the tops of sandstone bluffs. Recent experiments concerning the effects of canopy removal on Ozark chinquapin suggest that the taxon responds favorably to canopy thinning through increased sprouting, flowering and fruit production (NatureServe, 2017). Ozark Chinquapin has not been recorded in *Ladd's Creek* EMU but it is possible that this species exist within the project area.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

Vegetation management: Individual sprout clumps may be **directly** impacted through uprooting, or by burying plants under displaced soil in areas mechanically disturbed. Ozark chinquapin is designated as a leave tree species during silvicultural and wildlife stand improvement treatments thus should be protected during non-ground disturbing treatments. However, it is possible that this species could be misidentified and **directly** impacted by being accidently cut down. If an Ozark chinquapin was accidently cut down, it would likely re-sprout. **Indirect** impacts are expected to be beneficial due to a reduction in competition and canopy closer.

Herbicide treatments: The use of herbicides for silviculture management and Wildlife stand improvement treatments will have no **direct** effect on this sensitive plant because herbicides will only be used as per Revised Forest Plan directions. Site-specific surveys for PETS plant species will be conducted prior to any herbicide treatment to identify, delineate, and protect any PETS plant species present at treatment sites. **Indirect** impacts would be positive due to the elimination of competing vegetation and restoration of native plant species.

Prescribe burning: Individual sprout clumps may be **directly** impacted through uprooting, or by burying plants under displaced soil during fireline construction. Individuals could also be **directly** top killed during prescribed burns but would likely re-sprout. **Indirect** impacts are expected to be beneficial due to reduced competition and canopy closer.

Wildlife activities: Individual sprout clumps may be **directly** impacted through uprooting, or by burying plants under displaced soils during pond construction, reconstruction and temporary wildlife opening activities. RCW treatments, nest structures, wildlife monitoring and feral hog control will have no **direct** impacts on this species. No **indirect** impacts to Ozark chinquapin are anticipated with any wildlife activities.

Transportation system: Individual Ozark chinquapins may be **directly** impacted through uprooting, or by burying plants under displaced soil during road work activities. **Indirectly** habitat would be improved during road obliteration and decommissioning.

Special Use Permits: There would be no **direct** or **indirect** impact on Ozark chinquapin by issuing special use firewood and rock permits. No vegetation will be impacted during rock removal and only dead and down wood would be cut for firewood.

NO ACTION ALTERNATIVE 1

The No Action alternative would have "no impacts" on this plant species.

Cumulative Effects

There are no other known actions taking place in this EMU; thus, no **cumulative** impacts are anticipated for Ozark chinquapin.

PETS Species Summary of Determinations of the Proposed Action

Species evaluated in this BE	Scientific Name	Common name	Determination
1	*Myotis Septentrionalis* **Threatened**	Northern Long-Eared Bat	**likely to adversely affect**
2	*Myotis leibii*	Eastern Small-footed myotis	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
3	*Perimyotis subflavus*	Tricolored	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
4	*Peucaea aestivalis*	Bachman's Sparrow	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
5	*Danaus plxippus*	Monarch Butterfly	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
AQUATIC ANIMAL SPECIES 6-8	*Notropis ortenburgeri, Obovaria arkansasensis, & Pleurobema rubrum*	Kiamichi shiner, Southern hickorynut & pyramid pigtoe mussel	No Impacts
RIPARIAN PLANTS 9-11	*Amorpha ouachitensis, Vernonia lettermannii, &Vitis rupestris*	Ouachita false indigo, Narrowleaf ironweed, & Sand grape	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
12	*Carex latebracteata*	Waterfall's sedge	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability
13	*Castanea pumila var. ozarkensis*	Ozark chinquapin	May impact individuals but is not likely to cause a trend to Federal listing or a loss of viability

INSECT AND DISEASE

Present Conditions

Hypoxylon canker is a disease (fungus) that has become established in the red oaks throughout the Ouachita National Forest. It is in *Ladd's Creek* as a result of stressed conditions brought on by several years of summer drought and overstocked conditions. The ice storm of 2000 added to this stress by causing physical damage to most trees of all species district wide. The fungus infects stressed trees through wounds and either produces a canker or quickly kills the tree by colonizing the sapwood. Fruiting structures develop on the cankers and spores are discharged at a rapid rate into the air and spread to new hosts through wounds. Hypoxylon cankers are generally secondary to other stressing conditions, in this case drought, ice storm damage, and age. This disease is always present in the forest but in normal conditions the individual trees, if healthy, can resist and overcome any infection. After the hypoxylon canker became established, secondary pests come in including red oak borers and two-lined chestnut borers. Under normal conditions most healthy red oaks would be able to withstand or overcome an infestation of these insects, but the same stress factors that caused the red oaks and some white oaks to become infested with hypoxylon canker also causes them to become susceptible to these insects. At this time most of the red oaks that have died or are infected with hypoxylon canker are scattered along the ridge tops in small pockets. These affected areas are also stocked with various mature white oaks, hickories, and shortleaf pines, which are surviving and still occupying the sites. Hypoxylon canker has infested other parts of the district more severe than in *Ladd's Creek* so far but it is established here. If it does become worse, there would be an absence or reduction of red oak and white oak acorn production for a 20-25-year period in the most severely affected areas. This is the average age for red oaks and white oaks to begin producing acorns.

Southern pine beetles are also present in small numbers in some individual shortleaf pine trees that are stressed or injured. In normal years most shortleaf pine would be able to withstand or overcome an infestation of this insect if healthy and growing conditions are favorable. In 1995, due to several years of warmer than normal winters, the populations grew to epidemic proportions and infested not only weaker trees (due to overstocked conditions and drought) but also healthy trees. Aerial detection flights located several infestations throughout the district in stands that had mature, heavy stocking. These were active spots that quickly grew until management and salvage operations were able to catch up and keep them in check. Several spots were approximately 2 acres when found or when controlled. Most other SPB spots were 0.25 acre or less and inactive when found and were monitored. The summer of 2011 was also a very dry time that created enough stress in the shortleaf pine to increase the Ips beetle populations throughout the district. These beetles could become established within *Ladd's Creek* if the area continues to be rain deficit in FY 13 and beyond. According to Jim Smith the Regional Entomologist from an e-mail in June 2012 SPB's have become established all over Mississippi and could move toward the Ouachita N.F. soon.

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on vegetation would be all the compartments within the *Ladd's Creek* Ecosystem Management Unit boundary. Timelines for measuring the effects on vegetation would be from 2013 to 2020-2025 or from entry period to entry period. Methods of analysis include reviewing the history of the project area, interpreting the field data collected throughout the project area to establish existing and desired conditions. The proposed actions developed to meet the desired conditions are analyzed to determine what the direct effect of these actions would be and what the cumulative effects would be to the vegetation in the overstory, midstory, and understories.

PROPOSED ACTION

Like the Proposed Action section in Vegetation of this chapter, the large number of acres of mature pine and hardwood timber types make *Ladd's Creek* susceptible to insect and disease infestations. The proposed actions would immediately create conditions allowing all forest types to remain healthy and more resistant to insect or disease infestations by reducing competition for limited water and nutrients.

The proposed commercial thinning, timber stand improvements, and to some extent wildlife stand improvements would improve the health of the affected stands by enabling the stands to withstand and overcome insect or disease infestations and respond to the silvicultural treatments with increased vigor until the next entry period 10 to 15 years down the road. The proposed treatments will directly reduce forest tree density thus increasing forest health, vigor and resistance to insects and disease.

NO ACTION ALTERNATIVE 1

There is a district-wide insect and disease project decision that would be implemented, to slow down or prevent infestations from occurring.

NO HERBICIDE ALTERNATIVE 2

These effects mimic those of the Proposed Action without the effects of herbicide use.

CUMULATIVE EFFECTS

There would be no additive effect from this project.

ECONOMY

Present Conditions

Most of this project is in Logan County, Arkansas with a small portion on the east side in Yell County, Arkansas. Approximately 18,585 acres (20%) of Logan County is National Forest System lands. The average earnings per job in 2015 for Logan County, Arkansas, was $38,243. The 2015 population estimate was 21,714. The unemployment rate in 2015 was 5.9%. In comparison, since 1976, the annual unemployment rate ranged from a low of 4.1% in 2000 to a high of 12.2% in 1983. Total Federal Land Payments to State and Local governments from the Forest Service in FY 2016 was $155,128 (36.8%). Payments in Lieu of Taxes (PILT) was $265,870 (63.2%). From FY 1986 to FY 2015, Forest Service revenue sharing payments shrank from $319,453 to $155,128; a decrease of 51 percent. In FY 2015, PILT made up the largest percent of federal land payments in Logan County (63.2%). National Forest Socioeconomic Indicators; Report Date 5/9/2017; headwaterseconomics.org/eps)

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on the local or county economy is Logan County. The timeframe used for measuring these effects is the duration of implementation of the activities included in the project financial efficiency analysis. Quick-Silver 7 was used to determine the financial efficiency of each Alternative. This program is a project analysis tool that utilizes a MS Access database for use by forest managers to determine the economic performance of long-term investments.

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

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.

PROJECT FINANCIAL EFFICIENCY ANALYSIS

The Proposed Action and No Herbicide Alternative would both have costs and revenues associated with the sale of timber. Costs include activities that are directly associated with timber management (site preparation, timber sale administration, road maintenance, etc.). Revenues are generated from the sale of timber. The Quick-Silver7 evaluation

of the financial efficiency of each alternative is displayed in the table below. The detailed costs, revenues, and the complete Quick-Silver analysis report are in the Project file.

Comparison by Financial Efficiency

Cost/Income Activities	No Action	Proposed Action	Alt. 2
Present Value of Revenues- sum of all revenues discounted at some interest rate.	0	348,724.41	348,724.41
Present Value of Costs- sum of all costs discounted at some interest rate.	0	-345,686.74	-345,686.74
Present Net Value-sum of present value of revenues minus sum of present value of costs.	0	6,933.43	6,933.43vol
Revenue/Cost Ratio-present value of revenues divided by present value of costs.	N/A	1.01	1.01

The Present Net Value and Revenue/Cost Ratio are the same for both action alternatives. The priority even with the Proposed Action is to use prescribed fire and hand tool treatments. History shows this to be successful and explains why there is no difference in cost calculations when compared to the No Herbicide Action alternative.

NO ACTION ALTERNATIVE 1

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

Cumulative Effects

For the Proposed Action and Alternative 2, the economic effects would be additive to the jobs and revenue provided by these ongoing and future activities. Ecosystem management activities, including timber harvests, will be implemented in Logan County by the Ouachita National Forest. For the No Action Alternative 1, future Forest Service contracts located within Logan County would occur, but there would be no additive effects on the local economy from not implementing the proposed actions.

PUBLIC HEALTH AND SAFETY

Present Conditions

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

METHODS OF ANALYSIS

Site-specific risk assessments developed by Syracuse Environmental Research Associates (SERA) have been conducted for this analysis area as required by the Revised Forest Plan and are in the project file (Revised Forest Plan, Part 3, pg 87, HU002). The SERA Human Health and Ecological Risk Assessments worksheets for Glyphosate March 25, 2011, Triclopyr May 24, 2011, and Imazapyr date December 16, 2011 are a series of excel spreadsheets designed to analyze the risks associated with use of specific herbicides. These worksheets allow for the generation of project specific analysis of potential herbicide use. Refer to the Air Quality methods of analysis in this Chapter.

ENVIRONMENTAL EFFECTS

PROPOSED ACTION

Only one or the other of the three herbicides will be used, if any herbicide is used. The herbicides under consideration, glyphosate, triclopyr, and imazapyr are available commercially in products called Round-up, Accord, Garlon, and Arsenal or other brand names. Herbicides proposed for use would be mixed and applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. Application rate and work time must not exceed levels that pose an unacceptable level of risk to human or wildlife health. Herbicides are proposed as a last resort for release and wildlife stand improvements, as well as NNIS treatment, in the Proposed Action.

The Revised Forest Plan allows for herbicide use at the lowest effective rate. The project calls for the potential use of 1.3 pounds/acre of Glyphosate to be used for cut-surface treatments and 1 pound/acre for foliar spray treatments. In the SERA Human Health and Ecological Risk Assessment Final Report for Glyphosate, for both workers and members of the general public, all exposure assessments are based on the unit application rate of 1 lb. a.e./acre. Based on the HQ method, concern for workers is minimal. At the highest labeled application rate for terrestrial applications, about 8 lbs. a.e./acre, the highest HQ is 0.6, the upper bound of the HQ for workers involved in ground broadcast applications. For members of the general public, the only non-accidental exposure scenario of concern is for acute exposure involving the consumption of contaminated vegetation shortly after glyphosate is applied. For this exposure scenario, the HQ reaches a level of concern (HQ=1) at an application rate of about 1.4 lbs. a.e./acre. (SERA 2011a)

Triclopyr-acid (TEA) would be applied at a rate of up to 4 lbs. /acre for cut-surface treatments and triclopyr-bee at a rate of up to 2 lbs. /acre for foliar spray. Because these application rates exceed the rates analyzed in the SERA Human Health and Ecological Risk Assessment Final Report for Triclopyr, site-specific SERA spreadsheets were used to determine HQs.

At the central and upper bounds of the estimated exposures for workers using a backpack sprayer application method, the hazard quotients for both triclopyr amine and triclopyr ester formulations exceed the level of concern, ranging from 1 to 12. The level of concern is also exceeded for accidental exposure to contaminated gloves for one hour at the central and upper bounds of exposure to triclopyr ester. This risk can be mitigated however, by requiring the worker to wear the proper attire and safety equipment; have properly functioning equipment; apply the herbicide at the proper rate; work in an organized fashion so as to not re-enter treated areas; by not exceeding the “typical” length of workday (7 hours) and other measures.

For the general public, several exposure scenarios exceed the level of concern. Hazard quotients for direct spray of a child’s whole body and direct spray to the feet and lower legs of an adult female range from 1.4 to 3. For an adult female consuming contaminated vegetation, the upper bound HQ is 108 for acute exposures and 26 for longer-term exposures. In addition, some of the central estimates of exposure to triclopyr involving a young woman consuming contaminated vegetation or fruit also exceed the level of concern. Because triclopyr has been shown to cause adverse developmental effects in mammals, high HQs associated with terrestrial applications are of concern in terms of the potential for adverse reproductive outcomes in humans. Adverse developmental effects in experimental mammals have been observed, however, only at doses that cause frank signs of maternal toxicity. The available toxicity studies suggest that overt and severe toxicity would not be associated with any of the HQs and this diminishes concern for reproductive effects in humans (SERA 2011c).

Imazapyr may be used at an application rate of 1.5 lb./acre. At this rate, the risk assessments indicate the use of imazapyr does not pose any identifiable hazard to workers or the general public in Forest Service applications. Hazard quotients are at acceptable levels (less than 1) for all exposure scenarios (SERA 2011b).

Public safety in and around areas of herbicide use is a high priority concern. Measures are taken to help ensure that the general public does not come in contact with herbicides. These include posting warning signs on areas that have been treated; selectively targeting for application only that vegetation that needs to be controlled rather than using a broadcast application; establishing buffer zones of non-treatment around private property, streams, roads and hiking trails; carefully transporting only enough herbicide for one days use; mixing it on site away from private land, open water or other sensitive areas; properly maintaining and operating equipment (e.g. no leaks); and having good accident preplanning and emergency spill plans in place. These measures along with others are incorporated into contracts and through good enforcement and administration will be effective in reducing the risk of accidental contamination of humans or the environment. Herbicides and application methods were chosen to minimize risk to human and wildlife health and the environment (Revised Forest Plan, Part 3, pg. 87, HU004). The Revised Forest Plan includes standards for applying herbicides to reduce the possibility of adverse effects. These standards are required at all phases of the project including being incorporated as clauses in contracts (Revised Forest Plan, Part 3, pp 77, 80, 87-89, and 106). Indirect risks to the

public from the use of hand tools would include the risk of falling on a remaining stump-stub. This risk would be minimized by maintaining attention to one's path of foot traffic. Although hand tools pose a risk to forest workers for injury and accidents, the required proper personal protective equipment would lessen the likelihood of injuries.

Refer to the Air Quality section of this Chapter for disclosure of effects on public health and safety from prescribed burning. Refer to the Water Quality section of this Chapter for additional disclosure of effects on public health and safety from herbicide application.

CUMULATIVE EFFECTS

Refer to the Air Quality section and Water Quality section of this Chapter for cumulative effects on public health and safety from prescribed burning. There are no other known or expected activities within the geographic bounds and timelines that would contribute to a cumulative effect on public health and safety.

ALTERNATIVE II (same as Proposed Action without the use of herbicides)

The direct, indirect, and cumulative effects of Alternative II would be the same as those disclosed above for the Proposed Action except for herbicide use. 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 ALTERNATIVE I

No direct effects on public health and safety would occur. No Action could have a negative indirect effect to public health and safety if wildfires occur and create excessive smoke, or smoke that fails to disperse.

CUMULATIVE EFFECTS

There are no other known or expected activities within the geographic bounds and timelines that would contribute to a cumulative effect on public health and safety.

RECREATION RESOURCES

Present Conditions

Ladd's Creek has a rich history of recreational hunting of various game species. This includes whitetail deer, eastern wild turkey, bobwhite quail, raccoon and limited black bear hunting. There are a few scattered primitive hunter camps within this area, but no developed sites. Some forest visitors do recreate in this area by driving for pleasure, hiking, photography and wildlife viewing. Forest Service Road 33 is a scenic gravel road that is the north boundary of Dry Creek Wilderness. The road has a "fall foliage" spectacular area that is comprised of sugar maple, red maple and oak that supply brilliant fall color.

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on recreation resources encompass both analysis area and the entire view shed as viewed from the transportation system. Timelines for measuring the effects on the recreation values are the immediate user experience and the values and memories created for a lifetime. The user experiences created or affected by the proposed management activities would be from short term to possibly indefinitely.

PROPOSED ACTION

A **direct effect** of the Proposed Action would be during harvest operations. The evidence of human activity in the area would increase due to the activity associated with logging. This activity may temporarily displace hunters and other dispersed users. Following harvest, logging activity and equipment would leave the area and disruption would cease. In

the future, prescribed burning could temporarily limit the activities that would occur on these areas. Initially, prescribed burning may produce ash, which sometimes disturbs hunting dogs. However, this ash would settle after 2 or 3 rains. The slash produced in logging areas could impede foot travel in the areas for 2 or 3 years until the slash decomposed. The habitat work proposed in this alternative would promote diversity for both game and non-game species, increasing recreational opportunities for hunting and bird watching. **Direct effects** from this alternative would include an increase in hunting and other dispersed recreational use over time as a result of management activities. The Proposed Action proposes both wildlife stand improvements and pond rehabilitation. The direct effect of these actions would be minimal on recreation activities. Herbicide work would temporarily display evidence of increased human activity within *Ladd's Creek* due to traffic associated with the herbicide workers. Recreational users would notice negligible impacts on wildlife and vegetation due to the timing of the herbicide application. **Indirectly**, wild game for hunting would be more abundant due to new growth and increased browse as a result of timber management and prescribed burning activities. Hunting and dispersed camping would continue to occur and most likely increase.

NO ACTION ALTERNATIVE 1

Under this alternative, there would be no additional management activity occurring within the project area. Only routine maintenance would continue. **Indirect effects** include a reduction in the number of dispersed recreation users due to vegetative growth having a negative impact on access and wildlife encounters. **Indirectly**, wild game would not be as abundant due to no timber harvesting or prescribed burning. The result would be a reduction in hunting activity within the project area.

NO HERBICIDE ALTERNATIVE 2

Direct, indirect, and **cumulative effects** are estimated to be similar to the effects of the Proposed Action, without the increased human activity associated with an herbicide application.

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.

VISUAL RESOURCES

Present Conditions

Ladd's Creek is a very accessible area of the forest, located approximately 10 air miles southeast of Booneville, Arkansas. The rolling topography and gentle slopes are visible from various Forest Service graveled roads, including forest roads 133, 3050, county road 3025 and state highway 10.

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

Scenic integrity generally refers to the degree of intactness or wholeness of the landscape character. Human alteration can increase, lower, or maintain the scenic integrity of a landscape. The existing landscape character being viewed is the frame of reference for measuring scenic integrity and the potential effects of management activities. Scenic integrity levels for the Ouachita National Forest include Very High, High, Moderate, and Low. Scenic Integrity Levels establish the objective for management of the scenery resource and is called the Scenic Integrity Objective (SIO).

The SIOs assigned to this project area are high (approximately 75%) and moderate (approximately 25%).

ENVIRONMENTAL EFFECTS

The geographic boundary for the effects on the visual resources encompasses both the foreground viewshed and areas outside the analysis area that would be viewed from forest development roads.

Timelines for measuring the effects on the visual resources are immediate, during planned management activities. Any vegetation manipulation techniques would be evident, to varying degrees, for decades. Analysis strategies include, but are not limited to, special techniques, modeling and evaluating all planned vegetation management and soil disturbing proposals.

PROPOSED ACTION

The scenic resource is affected by management activities that alter the appearance of what is visible in the landscape. Short-term scenic effects are usually considered in terms of degree of visual contrast with existing or adjacent conditions that result from management activity. The scenic landscape can be changed over the long-term or cumulatively by the alteration of the visual character. Management activities that result in visual alterations inconsistent with the assigned SIO, even with mitigation, affect scenery. Management activities that have the greatest potential of affecting scenery are road construction, large-scale and long-term vegetation management, insect and disease control, utility rights-of way, and mineral extraction. Other management activities that also can impact the scenic resource at a lesser degree are threatened and endangered (T&E) species habitat management, prescribed burning, fire suppression, land exchange, old growth forest management, recreation, administrative site facility construction, and wildlife management (USDA Forest Service 2005b, pp. 264, 265). The Scenery Treatment Guide- Southern Region National Forests will be followed.

Direct effects to the scenic character of the forest would occur largely in the form of changes in forest vegetation resulting from proposed timber harvest, prescribe burning, site preparation, reforestation treatments (including possible herbicide release), pond rehabilitation, temporary wildlife openings, and wildlife stand improvement activities (also with possible herbicide application). A **direct effect** would be a loss in vegetative screening. An **indirect effect** of timber harvest activity will be enhanced viewing depth and contrasting tree density. Harvest treatment will also result in a **direct effect** of logging or thinning residue (slash) such as treetops and branches accumulating on the ground. Slash will eventually decay resulting in reduced long-term effect to scenery. Travel-ways within the project area are dominated by a mostly closed view of the forest. Closely spaced trees and dense midstory and/or understory vegetation greatly limit depth of view. Providing some diversity of visibility, with the development of more open forest conditions, was considered by the ID Team to be consistent with Scenic Integrity Objectives.

Prescribed burning will temporarily reduce the amount of understory vegetation, allowing for greater viewing depth into the forest. Burning would create the **direct effect** of a charred appearance on tree trunks and the forest floor. These effects would diminish in three to six months due to re-growth of vegetation on the forest floor, as well as natural leaf and needle shedding. This “green up” would restore a more natural appearance in the landscape.

Proposed stand improvements through release methods (including herbicide release) would result in a short-term direct effect on visual quality as the vegetation becomes brown and dies off. Over time the visual quality would increase as the leaves drop to the forest floor and decompose or are removed during prescribed burning as mentioned above. By implementing the proposed management activities, it is expected that there will be an increase in the vigor or health of the forest that will reduce the **direct and indirect** negative effects to visual quality that could result in an alteration of the landscape due to tree damage or mortality caused by insects and disease. Because some of the management treatments target hardwoods, an **indirect effect** could be a loss of spring and fall colors. Changes in color and texture could possibly result from exposed soil in roads and skid trails; however, this indirect effect should be expected to be short-term considering expected revegetation from natural conditions and/or restoration measures. With the implementation of controlled (prescribed) burning the potential **direct and indirect** detrimental effects to visual quality resulting from catastrophic fire are diminished. Prescribed burning substantially diminishes the potential for crown fires that could result in dead overstory trees and large burn scars on remaining live trees. Low intensity prescribed fires tend to create short-term color change.

NO ACTION ALTERNATIVE 1

By not implementing the proposed activities, this Alternative would not alter scenic quality. Mature and over-mature trees would decay and die creating contrasts in form, line and texture. All changes in this landscape would appear natural to the observer. Scenic integrity may be compromised by not implementing harvest activities in this area. Densely stocked stands result in reduced vigor or health, which cause susceptibility to insects and disease. Infestations could result in tree death, negatively impacting visual quality. In the event of a catastrophic wildfire, crown fires, or those that sweep through the canopy, would create a visible change to the landscape. Snags would appear as black, brown, and gray "skeletons". Other trees would show burn scars. Burn scars on tree trunks or "torched trees" remain visible for a long time. Understory vegetation would quickly green up, however the standing burned vegetation would remain.

NO HERBICIDE ALTERNATIVE 2

Direct, indirect, and cumulative impacts are expected to be similar to those of the Proposed Action without the effects of an herbicide application.

CUMULATIVE EFFECTS

No cumulative effects are expected from implementation of these alternatives because there are no other known or expected activities within the geographic bounds and timelines that would affect visual quality. The changes in the landscape would continue to appear natural to the observer.

HERITAGE RESOURCES

Present Conditions

Known Cultural Resources. Twelve (12) archeological sites have been identified in or near the Project Area because of cultural resources inventory surveys. Based on scientific evaluation and consultation with the SHPO and Tribes, 11 of the sites were determined to be ineligible for listing in the National Register of Historic Places. One (1) of the sites will require more investigation to formally determine their eligibility and will need to be protected.

Site Locations Not Yet Known. Cultural resource surveys may not be complete for certain activities because additional planning may be required prior to implementation. These activities include, but are not limited to:

- Burn boundary and fireline construction locations
- Temporary roads, skid trails, and log landings outside areas already surveyed
- Road reconstruction, maintenance, conversion, or decommissioning activities involving ground disturbance occurring outside areas already surveyed
- New pond construction for wildlife water source

These areas will be surveyed, and regulatory and tribal consultation completed prior to implementation.

ENVIRONMENTAL EFFECTS

The scope of the analysis for potential effects to cultural resources includes the entire *Ladd's Creek* Project Area (see Chapter 1and Appendix "B" maps) and considers the proposed activities within treatment areas (see Chapters 1 and 2), as well as access to these areas.

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 outlined in the *Ladd's Creek* Project that have potential to directly affect cultural resources include timber harvesting and associated log landings, skid trails, and temporary roads, prescribed burning and associated fire line construction, road

maintenance or reconstruction where ground disturbance takes place outside existing right-of-way area, and pond construction for wildlife water source.

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.

In general, proposed project 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 ACTION AND NO HERBICIDE ALTERNATIVE 2

Proposed access changes and opening of forested areas from timber harvest (see Harvest and Road Work maps, Appendix “B”) 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 the archeological sites include primarily timber, prescribed fire, road management, and some wildlife management activities. Adverse effects to cultural resources resulting from *Ladd’s Creek* project activities could be avoided provided site avoidance and site protection measures are properly applied to any eligible of unevaluated historic properties (see Chapter 2, technical requirements/design criteria). In that instance, project activities would not be expected to adversely affect archeological sites.

Project scoping and analysis have not disclosed any definitive plans for use on non-national forest lands in the project area.

CUMULATIVE EFFECTS

Cumulative effects to cultural resources are not expected to occur. Known or discovered historic properties will be monitored to ensure continued protection.

NO ACTION ALTERNATIVE 1

Currently, archeological surface and subsurface site integrity in the *Ladd’s Creek* Project Area is subject to adverse effects from the buildup of hazardous fuels and the potential decline of unmanaged forest. These conditions pose the potential for increased tree mortality and wildfire intensity. Fires occurring in areas with dense concentrations of combustible material have the potential to burn with greater than normal intensity and duration, thereby altering the physical integrity and/or research value of archeological sites or site components. Resulting soil exposure can lead to an increase in erosion, thus disturbing or leading to a loss of archeological soil matrices and/or site components. With no change in current management activities and direction, adverse effects (and the potential for them) on several the archeological sites may continue. With the No Action Alternative, historic properties likely would continue to degrade. Where sites exist in currently accessible areas, such as along roads, there is potential for being impacted, disturbed, or vandalized due to accessibility. 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

Cumulative effects are not expected to occur; there are no past or present actions affecting cultural resources, nor is there future actions planned that would affect cultural resources.

CLIMATE CHANGE

Present Conditions

Forests play a major role in the global carbon cycle by storing carbon in live plant biomass (approximately 50% of dry plant biomass is carbon), in dead plant material, and in soils. Forests contain three-fourths of all plant biomass on earth, and nearly half of all soil carbon. The amount stored represents the balance between absorbing CO2 from the atmosphere in the process of photosynthesis and releasing carbon into the atmosphere through live plant respiration, decomposition of dead organic matter, and burning of biomass (Krankina and Harmon, 2006).

Through the process of photosynthesis, carbon is removed from the atmospheric pool. About half the carbon absorbed through photosynthesis is later released by plants through respiration as they use their own energy to grow. The rest is either stored in the plant, transferred to the soil where it may persist for a very long time in the form of organic matter, or transported through the food chain to support other forms of terrestrial life. When plants die and decompose, or when biomass or its ancient remains in the form of fossil fuels are burned, the original captured and stored carbon is released back to the atmosphere as CO2 and other carbon-based gases. In addition, when forests or other terrestrial ecosystems are disturbed through harvesting, conversion, or natural events such as fires, some of the carbon stored in the soils and organic matter, such as stumps, snags, and slash, is oxidized and released back to the atmospheric pool as CO2. The amount released varies, depending on subsequent land use and probably rarely is more than 50% of the original soil store (Salwasser, 2006). As forests become older, the amount of carbon released through respiration and decay can exceed that taken up in photosynthesis, and the total accumulated carbon levels off. This situation becomes more likely as stands grow overly dense and lose vigor. Wildfires are the greatest cause of carbon release from forests. At the global scale, if more carbon is released than is captured and stored through photosynthesis or oceanic processes, the concentration of carbon dioxide (CO2) builds in the atmospheric pool. However, the greatest changes in forest sequestration and storage over time have been due to changes in land use and land use cover, particularly from forest to agriculture and more recently changes are due to conversions from forest to urban development, dams, highways, and other infrastructure (Malmsheimer et al., 2008).

ENVIRONMENTAL EFFECTS

PROPOSED ACTION AND NO HERBICIDE ALTERNATIVE 2

The proposed harvest operations would result in a release of carbon and reduce carbon storage in the forest both by removing organic matter (trees) and by increasing heterotrophic soil respiration. However, much of the carbon that is removed is offset by storage in forest products. Forest management that includes harvesting provides increased climate change mitigation benefits over time because wood-decay CO2 emissions from wood products are delayed (Malmsheimer et al., 2008). Prescribed burning activities, although a carbon neutral process, would release CO2, other greenhouse gasses, and particulates into the atmosphere. However, implementing the proposed prescribed burns on a 3 to 5-year cycle would reduce fuel loading and could be expected to reduce fire intensity and severity as well.

Indirectly, implementation of the proposed actions would increase the overall health, vitality, and growth within the project area, reduce the susceptibility to insects and disease, as well as reduce fuel accumulations and lower the risk for a

catastrophic wildfire from occurring in the project area. This would serve to increase carbon storage within the project area and mitigate carbon accumulation in the atmosphere.

NO ACTION ALTERNATIVE I (Deferred Management Activities)

No management activities would occur under this alternative, therefore no direct effects on GHG emissions and carbon cycling would occur.

Because no management activities would take place under this alternative, carbon would continue to be sequestered and stored in forest plants, trees, (biomass) and soil. Unmanaged, older forests can become net carbon sources, especially if probable loss due to wildfires is included (Malmsheimer et al., 2008). In the absence of prescribed fire, fuel loadings would continue to increase and accumulate on the forest floor. In the event of a wildfire, fuel loading would be higher, increasing the risks of catastrophic damage to natural resources. This would result in a large release of GHG and carbon into the atmosphere. By deferring timber harvest activities, the forests would continue to increase in density. Over time this could pose a risk to density dependent mortality, insects, and disease. This could result both in a release of carbon from tree mortality and decomposition as well as hinder the forests ability to sequester carbon from the environment because live, vigorous stands of trees retain a higher capacity to retain carbon.

CUMULATIVE EFFECTS

As GHG emissions and carbon cycling are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with this project or any number of projects. It is not expected that the effects of this project or multiple projects can be specifically attributed the cumulative effects on global climate change.

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CHAPTER 5 PERSONS AND AGENCIES CONTACTED AND/OR CONSULTED

List of Agencies Consulted – Mailed Hardcopy

The Choctaw Nation of Oklahoma
The Chickasaw Nation
The Osage Nation
Quapaw Tribe of Oklahoma
Caddo Nation of Oklahoma

Mailed Hardcopy

Howard Robinson
Bob Waid

Emailed Using GovDelivery Mail Blast System

Correspondence mailed electronically using GovDelivery; mailing lists created from Ouachita National Forest planning website from individuals who requested to received information on this project. List of email addresses are electronically filed at the district office.

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