BEARCAT HOLLOW HABITAT ENHANCEMENT PROJECT

FINAL ENVIRONMENTAL ASSESSMENT

FEBRUARY, 2007

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134,135,745 and 746

Newton and Searcy Counties

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CHAPTER I

THE PURPOSE AND NEED FOR THE PROPOSAL

This chapter describes the proposed action, purpose and the need for action, project area, Forest Plan direction, decisions to be made, and key issues associated with the proposed action, and other issues, concerns and opportunities.

A. The Proposed Action (PA)

The Big Piney Ranger District (formerly the Buffalo Ranger District) of the Ozark National Forest proposes a series of actions within the Dry Creek area. The project is known as the Bearcat Hollow Habitat Enhancement Project Phase I (BHHEP)). The specific proposed activities include:

- Construct High Quality Forage Openings on 422 acres.
- Oak/Pine Woodland Restoration on 240 acres.
- Oak/Pine Savannah on 127 acres.
- Commercial Thinning on 216 acres.
- Noxious Weed Control on 500 acres.
- Seasonal Road Closure on 2.9 miles.
- Construction of 11 Wildlife Ponds,
- Add large woody debris to Dry Creek in 5 locations,
- Decommission 6 miles of existing roads.
- Designation of 4.3 miles of OHV trail open year around, an additional 6.4 miles of OHV trail will be designated for seasonal use (note if adverse or detrimental affects occur to either wildlife or excessive soil erosion occurs these trails will be closed without further notice).
- Prescribed Burning on 6,000 acres.
- Reconstruct 1.7 miles of road.
- Maintain 7.9 miles of existing roads.
- Provide hunting and wildlife observation opportunities by constructing observation stations.

Included in this proposed action are associated activities such as clearing logging slash and debris, use of herbicides, brush hogging, and planting of various grasses and forbs (herbaceous plants other than grasses). These activities will be implemented over the next 10 years.

This analysis discloses the direct, indirect, and cumulative effects of the proposed action and alternatives on the environment. The proposed timber harvest involves acres suitable for timber production as defined in the Final Environmental Impact Statement (FEIS) for the Ozark-St. Francis National Forest Revised Land and Resource Management Plan (RLRMP) and 36 CFR 219.17(c)(1).

B. Location of Project Area

The BHHEP Phase I area contains portions of the following townships, ranges, and sections: Township 14 North, Range 18 West, Sections 4-9, 17-19, and 30, and Township 14 North, Range 19 West, Sections 1, 2, 11-14, and 23-25. The project area lies within Newton, and Searcy Counties and is located approximately three miles southwest of Eula, Arkansas. This project is in the Dry Creek Watershed and its tributaries.

C. Purpose and Need

The primary developmental forces for this project are as follows:

Implement the RLRMP: In 2002 the Arkansas Game and Fish Commission (AGFC) approached the Ozark-St. Francis National Forest (Forest) expressing an interest in improving wildlife habitat on the Forest adjacent to the Gene Rush Wildlife Management Area (GRWMA). Currently there is very limited habitat to support a wide range of wildlife species dependent on early successional habitat. In April, 2004 the AGFC made a formal request to the Forest to include a special project area on the Buffalo Ranger District south of the GRWMA as part of the RLRMP. This proposal spawned Management Area (MA) 3.K Wildlife Emphasis Area in the RLRMP (pages 2-77 – 2-78) allocating approximately 15,712 acres to provide optimal wildlife habitat to benefit both game and non-game wildlife species (e.g. deer, turkey, elk, quail, neotropical migrant birds, and small mammals).

The desired future condition of MA 3.K is to have an area dominated by grass and herbaceous under stories with widely spaced large oaks or pines. Light reaching the forest floor is ample to support a widely diverse and abundant herbaceous component. Stand densities are reduced through repeated thinning to achieve the desired light levels, and repeated fires including growing season burns to control hardwood understories. Prescribed fire is used in the establishment phase until desired objectives are met. Regeneration will occur in this type by withholding fire for a number of years and allowing oak advanced regeneration to become established. A final removal of the overstory may or may not occur.

This oak community type is an oak overstory with herbaceous/shrub understory providing high species diversity. It is shaped primarily by the use of frequent fires and thinning with open areas occurring from natural events and constructed and maintained openings and pastures.

Address the Chiefs Four Threats: Chief Dale Bosworth delineated four threats to the health of the National Forest and Grassland system and this EA will attempt to reduce the affects of these threats on the project area. The Chiefs four threats are:

Fire and Fuels: Research shows that National Forest System (NFS) areas at high risk from wildland fire (Class 3) come to 51 million acres, or 26 percent of the NFS. Areas at moderate risk (Class 2) amount to 80.5 million acres, or 41 percent. Areas currently within their historical range (Class 1) come to 65 million acres, or 33 percent. On the NFS, 73 million acres in Classes 2 and 3 were identified as the highest priority for fuels reduction and ecosystem restoration treatments. Treatments to reduce fuels and restore ecosystems involve various techniques, including thinning, prescribed burning, and clearing forest debris.

Invasive Species: Invasive species are major threats to our Nation's aquatic and terrestrial ecosystems. Invasives destroy fish and wildlife habitats, alter nutrient cycling and natural fire regimes, and can reduce biodiversity and degrade native ecosystem health. Invasive aquatic species pose a significant risk to the 220,000 miles of streams, over 2 million acres of lake, and 15,000 miles of coastline cross the National Forest System. There are more invasive species per unit of aquatic eco-systems than in terrestrial ecosystems. All invasives combined cost Americans more than $137 billion a year in total economic damages and associated control costs. Infestations of terrestrial and aquatic invasive plants have reached epidemic proportions, spreading rapidly over hundreds of millions of acres, across all landscapes and ownerships. Invasive forest diseases, such as the Chestnut Blight, have wiped out entire forest species in the East (i.e., the American Chestnut) and Dutch elm disease virtually eliminated an urban forest tree —the American elm.

Invasive species have been found distributed throughout the project area. There is a need to conserve the native biological diversity of plant communities, species and populations. It is necessary to prevent the displacement of native species and the disruption of plant communities through the introduction of aggressive, persistent, self replicating, long lasting non-native vegetation into managed or natural plant communities

Loss of Open Space: America is losing important working forests and rangelands to development across the Nation at an alarming rate. In fact, forests and rangelands are being converted to development more than 3 acres a minute. Loss of open space (1) affects our air, water, and vegetation, (2) degrades wildlife habitat, and (3) reduces outdoor-based economic opportunities. Loss of open space is a result of the division of forested landscapes into smaller, more isolated patches. Loss of open space is of concern because it poses a threat to the health, sustainability, and viability of ecosystems and rural communities. Loss of open space impacts biodiversity in the United States. Patches of land left over from development may be too small for the

survival of certain species of birds and animals. Corridors that connect natural habitats can be cut off, potentially leading to local extinction and reduced breeding success.

Unmanaged Recreation: The number of off highway vehicles (OHV) users has climbed seven fold in the past 30 years, from approximately 5 million in 1972 to 36 million in 2000. Unmanaged OHV use has resulted in unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resource sites. Compaction and erosion are the primary effects of OHV use on soils. Riparian areas and aquatic-dependent species are particularly vulnerable to OHV use. Studies indicate that the survival and reproduction of some wildlife species may be affected by excessive noise and disturbance. Local forest designation of roads, trails, and areas for OHV use provides forest visitors with opportunities to enjoy recreation experiences while protecting natural and cultural resources. Use of OHV's in the national forests is addressed through forest plans or through separate access and travel management plans. Management of OHV impacts includes use of designated roads, trails, and areas for recreation closure of sensitive areas; user education; enforcement; and use monitoring. Within the project area, there is a need to protect resources by providing better management of OHV roads and trails as well as a need to provide for some recreational opportunities.

Other Developmental Forces:

One by-product of achieving the desired future conditions will be the harvesting of timber. Timber products provide an economic benefit to the nearby mill owners and meet the need for timber products.

This project area was once a fire-dominated ecosystem (Guyette, Spetich, Stambaugh, 2006). Frequent fires eliminated shade tolerant species from the understory and provided ample forage for many species of wildlife. Past Forest management practices have created a situation where shading and buildup of duff or needle layers has reduced or possibly eliminated grasses and forbs. The loss of these grasses and forbs is reducing the number of small mammals, seed-eating birds, as well as some species such as deer and turkey. In addition, this build-up of duff, needle and understory has created a condition that could result in a damaging wildfire situation (Federal Register, vol. 66, no. 160, Friday, August 17, 2001). To address these conditions, fire needs to be reintroduced into the ecosystem.

The project area contains many open roads that are currently used to access the area. Some of these roads are used by the public but create an unfavorable situation for wildlife through unnecessary disturbance and add to soil loss through erosion. To remedy these problems some open roads need to be closed permanently and seasonally.

The roads that are closed to motorized traffic are closed with mounds, yet OHV's are going over these mounds and accessing the area. A better way of closing roads is needed to avoid

the aforementioned disturbance to wildlife and soil loss. The District has found that the installation of gates tends to reduce the amount of violations.

D. Objectives of the Proposed Action

The overarching objectives of the Proposed Action are to implement the RLRMP's general Forest Wide Standards (FWS) and objectives, and the MA requirements for MA 3.K, in particular.

MS 3.K Standards (RLRMP page 3-38):

1) Provide native and improved pastures sufficient to provide for year round elk habitat.
2) Provide wildlife routes that connect pastures.
3) Provide ponds sufficient to allow for even dispersal of wildlife.

Specific Forest Wide Standards addressed by this project are:

1) Provide up to four permanent water sources per square mile in upland sites (FWS 35 RLRMP page 3-6).
2) Add large woody debris (LWD) to streams and rivers where natural levels are inadequate, except in wilderness areas (FWS 39 RLRMP page 3-6).

Other RLRMP objectives addressed by this project:

1) Restore and maintain at least 22,000 acres of oak woodland over the forest decade, with a long-term objective of 110,000 acres (RLRMP page 2-10).
2) Restore at least 20,000 acres of pine woodland over the first decade, with a long-term objective of 100,000 acres of pine woodland (RLRMP page 2-10).
3) Across all community types, annually burn an average of 120,000 acres under prescribed burn conditions. Burn approximately one-third of this acreage within the growing season (April 1 through October 15) (RLRMP page 2-11).
4) Reduce the risk of oak and pine mortality events by thinning and regenerating at least 150,000 acres within the first decade (RLRMP page 2-12).
5) Treat at least 200 acres per year for reduction or elimination of non-native, invasive species (RLRMP page 2-12).
6) Improve and then maintain bobwhite quail habitat on 5,000 acres per year for the first decade (RLRMP page 2-13).
7) Improve and then maintain habitat for whitetail deer on 10,000 acres per year for the first decade (RLRMP page 2-13).
8) Improve and then maintain habitat for eastern wild turkey on 10,000 acres per year for the first decade (RLRMP page 2-13).
9) Improve and then maintain habitat for black bear on 8,000 acres per year for the first decade (RLRMP page 2-13).
10) Improve winter forage grounds and maintain high grass and forb plant communities for elk on 480 acres over the first decade (RLRMP page 2-13).

11) Maintain or restore LWD (Large Woody Debris) levels in perennial streams/rivers at 75 to 200 pieces/mile for all LWD larger than 3.3 feet long and 3.9 inches in diameter in the first decade (RLRMP page 2-14).
12) Maintain or restore LWD levels in perennial streams/rivers at 8 to 20 pieces/mile for all LWD larger than 16.4 feet long and 19.7 inches in diameter in the first decade (RLRMP page 2-14).
13) In conjunction with designating low-maintenance, standard roads develop a system of motorized trails that addresses the needs of OHV enthusiasts (RLRMP page 2-19).
14) Decommission roads and trails unnecessary for conversion to either the road or trail system through the roads analysis process (RAP) (RLRMP page 2-24).
15) Identify by the first decade all system roads that should be obliterated (RLRMP page 2-24).
16) Within 15 years, restore 15 to 20 percent of all ecological communities into Fire Regime Condition Class 1 (RLRMP page 2-26).
17) Annually complete 50,000 to 100,000 acres of hazardous fuel reduction (RLRMP page 2-26).
18) Provide 731 MMBF (146MCF) per decade of sawtimber and pulpwood (RLRMP page 2-26).

E. Related Documents That Influence the Scope of This Proposed Action

Vegetation management includes the use of fire, manual, and mechanical treatments of plants in the service of ecosystem management objectives. The Final Environmental Impact Statement for the forest compares and analyzes the impacts of a variety of treatments needed to achieve the desired future conditions identified in the RLRMP (pages 1-18 through 1-49). This EA tiers to the RLRMP and it's accompanying FEIS.

The RLRMP identifies Forest Wide Standards (pages 3-1 through 3-21) and MA Standards (pages 3-22 through 3-38) that will be applied to all methods of vegetation management. This direction is incorporated into this EA's mitigations.

F. Decision To Be Made

The decision to be made on this Proposed Action will be one of the following:

1. Not to implement any action by selecting Alternative 1 (the No Action alternative).
2. Select management actions described in the Proposed Action (PA).
3. Select management actions described in Alternative 2.
4. Select management actions described in Alternative 3.
5. Approve the PA or an alternative with some modifications.
6. Require development of an environmental impact statement.

Should a decision be made to select all or part of an action alternative, the selected actions will be implemented over the next ten-year period.

G. Issues Studied in Detail

To help develop the key issues necessary to focus the analysis the District sought comments from within the agency, the general public, adjacent landowners, other Agencies, and Tribal governments (See Appendix B for further details). This process lead to the identification and development of four key issues to be addressed in the subsequent analysis. The key issues are:

Issue 1 - Water Quality: How will the actions proposed affect water quality?

Indicators of this issue: Number of miles of road reconstruction

Amount of sedimentation associated with road building, timber harvesting, creation of wildlife habitat, and prescribed fire.

Acres of herbicide use

Issue 2 - Need for High Quality Forage Openings: How will vegetation management affect species associated with early successional forest? Will species associated with late successional forest be affected?

Indicators of this issue: Acres of early successional habitat

Acres of late successional habitat

Acres of High Quality Forage Openings

Issue 3 – Unmanaged Recreation (OHV use): How well does the PA and Alternatives 1-3 address this issue?

Indicators of this issue: Miles of OHV trails designation

Miles of unmanaged OHV use being controlled

H. Issues Eliminated from Detailed Study

The ID team reviewed the RLRMP and public comments to previous timber EA's, and developed a broader list of the issues, concerns and opportunities associated with the proposed action. This broader list of concerns may be addressed, but are not key issues in the analysis.

Impacts on recreation/aesthetic values: What types of recreation are there in the area? How will timber harvesting, and road building impact recreation/aesthetic values? This issue is addressed in Chapter III of this EA.

Impacts of the increase in the Elk herd within the project area: This issue was not considered as a key issue, because the EA proposes to create and manage the habitat within the project area. In addition, the Arkansas Game and Fish Commission is currently developing a management plan to address this issue within the elk range.

I. Changes from the Predecisional to Final EA

There were some changes made between the predecisional and final version of this document. Some were of the routine nature wherein we corrected some minor errors like transposed numbers, missing numbers, and spelling. The other changes were made to improve the understanding of the analysis of the potential impacts. For example, there were questions concerning where herbicides would be used, so a table was added to attempt to clarify this issue. There were no changes to the alternatives nor were any of the findings of the analyses changed so there is no need to undergo a new public comment period.

CHAPTER II

THE ALTERNATIVES TO AND THE PROPOSED ACTION

This chapter describes the process used to develop the alternatives, the alternatives considered but not in detail, and the alternatives considered in detail for the Bearcat Hollow Habitat Enhancement project.

A. The Process Used to Develop the Alternatives

An interdisciplinary team representing various resources and uses of the Forest, such as timber, wildlife, soils, and watershed, considered the following important elements when they developed the alternatives for this analysis:

* The goals, objectives, and desired future condition for the analysis area as outlined in the Revised Land and Resource Management Plan for the Ozark St-Francis National (RLRMP),
* Comments made by the public, State and other agencies during the scoping process
* The laws, regulations, and policies that govern land management on national forests.

This document (EA) is tiered to its accompanying Ozark-St. Francis Final Environmental Impact Statement (FEIS) and is incorporated by reference. The Ozark-St. Francis FEIS and RLRMP can be viewed at local U.S. Forest Service Offices. The portions tiered to are summarized and cited in this EA as they are used. Other documents incorporated by reference in this EA can be viewed at the Big Piney Ranger District Office, Jasper, Arkansas.

B. Alternatives Considered

Three alternatives, including the alternative of taking No Action, were developed in the environmental analysis process. Each action alternative was designed to meet the purpose and need, be consistent with RLRMP direction and respond to significant issues. Alternatives developed are based on the following themes: wildlife habitat production and management area 3.K prescriptions.

C. Alternatives Considered but not in Detail

None

D. Alternatives Considered in Detail

The Forest Service uses Global Positioning System (GPS) units and the Geographic Information System (GIS) database to produce and use the most current and complete data available. GIS data and product accuracy may vary due to data being developed from differing accuracy, accurate only at certain scales, based on modeling or interpretation, or incomplete while being created or revised. The Forest Service may also correct, modify, or replace GIS data at any time.

Proposed Action (PA)

Attempts to implement the desired future condition for management area 3.K Wildlife Emphasis Area as outline by the RLRMP. The following tables and descriptions display each treatment in detail including associated treatments:

High Quality Forage Openings on approximately 422 acres in the following areas (see treatment descriptions pg II-5 for details).

Area	Compart-ment	Stand	Acres
11	134	13	19
12	134	14	44
15	134	25	29
13	134	42	17
14	134	43	06
21	135	34	34
17	135	42	16
24	135	49	12
23	135	57	09
18	135	58	11
20	135	59	09
22	135	60	06
16	135	61	04
25	139	13	26

Area	Compart-ment	Stand	Acres
19	139	29	05
26	139	30	10
27	139	31	22
28	745	07	24
29	745	29	13
30	745	37	12
32	745	38	09
31	745	41	05
35	746	02	03
36	746	05	10
37	746	06	13
33	746	16	06
34	746	18	38
38	746	28	10

Oak/Pine Woodland Restoration on approximately 240 acres in the following areas (see treatment descriptions pg II-6 for details).

Area	Compart-ment	Stand	Acres
7	134	11	42
1	134	15	12
3&4	134	39	56
2	134	41	04
9	135	10	28

Area	Compart-ment	Stand	Acres
5	135	23	14
6	135	46	36
8	746	06	07
10	746	26	41

Oak/Pine Savannah on approximately 127 acres in the following areas (see treatment descriptions pg II-6 for details).

Area	Compart-ment	Stand	Acres
51	135	14	11
55	135	35	20
53	139	11	17
52	139	14	12

Area	Compart-ment	Stand	Acres
50	139	17	23
54	139	23	13
56	745	39	31

Commercial thinning on approximately 216 acres of pine and upland hardwood areas (see treatment descriptions pg II-6 for details).

Area	Compart-ment	Stand	Acres
42	134	26	10
40&44	134	29	84
47	134	38	12
49	135	18	19
46	745	09	04

Area	Compart-ment	Stand	Acres
48	745	15	20
45	745	19	15
39	745	32	29
43	746	10	09
41	746	23	02

Other Associated Actions:

Noxious weed control on approximately 500 acres of road rights of ways (there are approximately 34 miles of existing roads in the project area), but could include areas within the Ozark Highlands Trail (OHT) corridor and other areas that develop as this project is implemented (see treatment descriptions pg II-6 for details).

Seasonal road closure of 7.5 miles of existing roads (see map B).

Construction of approximately 11 wildlife ponds (see map B) (see treatment descriptions pg II-9 for details).

Decommissioning of approximately 6 miles (see map B) as recommended by the Roads Analysis Process (RAP) for this project (the RAP is contained in the process file for this project) (see treatment descriptions pg II-9 for details).

Designation of approximately 4.3 miles of OHV trail to be open year around. An additional 6.4 miles of OHV trail will be designated for seasonal use (see map B). If adverse or detrimental

affects occur to either wildlife or excessive soil erosion occurs these trails will be closed without further notice.

Provide hunting and wildlife viewing opportunities by constructing observation stations.

Provide visitor information and education by the addition of interpretive displays.

Prescribed burning as needed on approximately 6,000 acres for wildlife habitat improvement and ecosystem restoration (i.e. fuel reduction, control understory species, promote the development of grasses and forbs) are also included in the proposed action (see treatment descriptions pg II-9 for details).

Large woody debris added to Dry Creek in five locations (see treatment descriptions pg II-10 for details).

Reconstruction of approximately 1.7 miles of road and maintenance of approximately 7.9 miles (see treatment descriptions pg II-10 – II-11 for details):

Road Segment	Traffic Surface Level*	Miles	Proposed Work Type	Road Status Before Harvest	Road Status After Harvest**
1201	C	1.7	Reconstruction	Open	Open
92134A	D	0.5	Maintenance	---------	Closed
92134B	D	0.3	Maintenance	Open	Closed
92134C	D	0.2	Maintenance	Open	Closed
92134E	D	0.1	Maintenance	Closed	Closed
92135A	D	0.5	Maintenance	Open	Closed
92135C	D	1.5	Maintenance	Open	Closed
92135E	D	0.6	Maintenance	Closed	Closed
92745B	D	0.6	Maintenance	Open	Closed
92746A	D	2.7	Maintenance	Closed	Closed
92746B	D	0.6	Maintenance	Closed	Closed
92746C	D	0.3	Maintenance	Closed	Closed

Notes: * Traffic Surface Level D are roads maintained for high clearance vehicles.

Traffic Surface Level C Roads consist of improved dirt.

** Roads will be closed with gates or earth mounds.

The following table shows where herbicides would be used as part of a treatment proposed by the PA (see herbicide descriptions and use pg II-7 – II-9 for details):

Treatment	Acres
High Quality Forage Openings	422
Oak/Pine Woodland Restoration	240
Oak/Pine Savannah	127
Noxious Weed Control	500
Total	1289

Alternative 1: **No action**

This alternative would not implement any part of the proposed action.

Alternative 2: No Herbicide Use

This alternative responds to the water quality issue by not using herbicides in managing the wildlife habitat. Treatments will be the same as outlined in the Proposed Action.

Alternative 3: No High Quality Forage Openings

This alternative creates wildlife habitat without creating any high quality forage openings within the project area. All of the areas with a proposed treatment of high quality forage openings in the PA will receive a treatment of oak/pine savannah in this alternative. This will increase the total of oak/pine savannah from 127 acres in the PA to 549 acres. All treatments are the same as the PA for all other proposed activities.

Within the project area there are other treatments that are **NOT** part of the proposed action **nor** any of the alternatives to the proposed action, but will possibly happen within the foreseeable future. These treatments consist of the construction of 65-acres of permanent wildlife opening and are considered in this EA as cumulative effects.

Treatment and Herbicide Descriptions:

High Quality Forage Openings

Trees in these areas will be pushed down, the commercially valuable timber removed, then brush and logging debris will be pushed to create brush piles for wildlife cover, herbicides will be used to control woody species and noxious weeds (See Herbicides), and the area will be prescribe burned following FLRMP standards. Mechanical equipment will be used as needed to

angle blade, disc, roll, fertilize, lime and seed as needed (FW 148). Continued management of these openings may involve any of the following as needed to maintain the high quality forage conditions: discing, burning, mowing, haying, herbicide, dozing, fertilizing and/or liming[as per soil test recommendations], drilling, and planting.

Oak/Pine Woodland Restoration

To restore oak and pine woodlands in the selected areas the tree canopy will be thinned to approximately 30-40 basal area (BA) and left on the ground. The area will be repeatedly burned over a period of years as needed to reduce fuel loads and to control woody growth. Herbicides and manual/mechanical tools will be used to control woody species and control noxious weeds in order to allow native forbs and grasses to increase.

Oak/Pine Savannah

Trees in these areas will be pushed down, except for scattered trees across the area (e.g. reduced to approximately 10-20 BA). The commercially valuable timber will be removed, then brush and logging debris will be pushed to create brush piles for wildlife cover, herbicides will be used to control woody species and noxious weeds (See Herbicides), and the area will be prescribe burned following FLRMP standards. Mechanical equipment may be used as needed prepare the soil bed and then planted with native warm season grasses and forbs as needed to supplement native recruitment (FW 148). Continued management of these areas to control woody growth and enhance native grasses and forbs may involve mowing, drilling, planting, liming, prescribed burning and/or herbicide applications.

Commercial Thinning

Commercial thinning is an intermediate harvest designed to improve the existing stand and regulate growth. This is accomplished by adjusting stand density through cutting and removal of trees, while striving to retain healthy, well-formed leave trees. Post-thinning stocking levels should be approximately 60 BA.

Non-Native Invasive Species (NNIS) and Woody Vegetation Control

These treatments will be applied to prevent existing areas (*e.g.* roadsides, trails *etc.*) of NNIS from encroaching into new areas prior to or in conjunction with other actions proposed within the project. It may also be used to control and eradicate NNIS already that are currently in other areas (*e.g*. openings, log landings *etc.*).

Woody vegetation may be controlled where it encroaches into High Quality Forage areas and as needed to manage savannah and woodlands to facilitate their restoration.

Manual treatments to control invasive species and/or competing woody vegetation may be used on a limited basis where effectiveness and costs make this a viable option. Such treatments may include hand-pulling, hoeing, tilling, mulching, burning and mowing. Manual treatments may also be used in combination with herbicide treatments to enhance effectiveness. Herbicides would primarily be used to control or eradicate invasive species of plants and noxious weeds along with controlling woody growth in openings, in oak/pine savannahs or where woodlands are being established and along roads and trails. Herbicides selected are labeled for the specified uses. All herbicides would be used at the lowest rates necessary to control targeted vegetation and would not exceed specified label rates.

The following herbicides maybe used alone or in combination according to label recommendations to control vegetation. The selected herbicide will depend on the target species and their responsiveness to treatment.

Glyphosate

The active ingredient herbicide *glyphosate* (examples of trade name **RoundUp**, **RoundUp Pro**, **Accord SP**) would be applied directly to target vegetation with a ground broadcast sprayer, UTV/ATV mounted sprayer, boom sprayer or other mechanical equipment which will provide no more than 5 lbs of the active ingredient (*glyphosate*) per acre. Mixing rates will vary depending on topography and amount of vegetation to be controlled. Repetitive treatments may occur in follow up years if overall treatment is needed. Spot applications would occur in years following the initial treatments to control future growth not suitable to the opening. Spot applications would be made at the same rate and mixture or less, but would be applied only to small areas as needed. Spot applications would be made by means of backpack, UTV/ATV mounted spray equipment or other mechanical equipment. Except for aquatic treatments, solutions may contain nonionic surfactants to increase surface contact at recommended label rates or have them added according to the manufacturer's label.

The active ingredient herbicide *glyphosate,* in a formulation specified for aquatic conditions (examples of trade name **Rodeo**, **Accord)** would be applied directly to target vegetation where it has encroached on pond banks or to aquatic plants that are choking a pond. Application would use a variable mix rate, which would provide no more than 5 lbs of the active ingredient (*glyphosate*) per acre. These applications would be made by means of backpack or ATV mounted spray equipment.

Spot applications would occur in years following the initial treatment to control any regrowth and would be made at the same rate and mixture and using the same type of equipment

Triclopyr

The herbicide *triclopyr* [in a *triethylamine salt* formulation](example trade name **Garlon 3A,**) would be used on woody vegetation that is less responsive to treatment by *glyphosate*. This herbicide would be applied directly to target vegetation with either a ground broadcast sprayer, UTV/ATV mounted sprayer, boom sprayer or other mechanical equipment, which will provide no more than 5 lbs of the active ingredient (*triclopyr*) per acre. Mixing rates will vary depending on topography and amount of vegetation to be controlled. Repetitive treatments may occur in follow up years if overall treatment is needed. Spot applications would occur in years following the initial treatments to control future growth not suitable to the opening. Spot applications would be made at the same rate and mixture or less, but would be applied only to small areas as needed. Except for aquatic treatments, solutions may contain nonionic surfactants to increase surface contact at recommended label rates or have them added according to the manufacturer's label.

In some cases where woody growth is larger, a hack and squirt method or cut stump application may be made directly to each stem. The rate of application if this method is used will be in a 1:1 ratio or undiluted.

Metsulfuron methyl

Metsulfuron methyl is a selective herbicide that will be used to control brush and certain woody plants, annual and perennial broadleaf weeds, and annual grassy weeds. It is recommended for weed control and suppression in the establishment and maintenance of native grasses along with managing right-of-ways. Commercial products (example: **Escort**, **Ally**) contain 60 percent metsulfuron methyl and 40 percent inert ingredients.

Metsulfuron methyl would be applied directly to target vegetation with a ground broadcast sprayer, UTV/ATV mounted sprayer, boom sprayer or other mechanical equipment which will provide no more than 0.15 lbs of the active ingredient (*Metsulfuron methyl*) per acre. (Note: One modification to this would be in applications to control Multiflora rose. In that case, a handgun applicator will be use to direct the treatment to the soil within 2 feet of the stem union for each plant). Mixing rates will vary depending on topography and amount of vegetation to be controlled. Repetitive treatments may occur in follow up years if overall treatment is needed. Spot applications would occur in years following the initial treatments to control future growth not suitable to the opening. Spot applications would be made at the same rate and mixture or less, but would be applied only to small areas as needed. Spot applications would be made by means of backpack, UTV/ATV mounted spray equipment or other mechanical equipment. Solutions may contain nonionic surfactants to increase surface contact at recommended label rates or have them added according to the manufacturer's label.

Imazapyr

Imazapyr would be applied directly to target vegetation with a backpack sprayer, ground broadcast sprayer, UTV/ATV mounted sprayer, boom sprayer or other mechanical equipment which will provide no more than 0.45 lbs of the active ingredient (examples of trade name **Arsenal**, **Chopper**, **Stalker**) per acre. Mixing rates will vary depending on topography and amount of vegetation to be controlled. Repetitive treatments may occur in follow up years if overall treatment is needed. Spot applications would occur in years following the initial treatments to control future growth not suitable to the opening. Spot applications would be made at the same rate and mixture or less, but would be applied only to small areas as needed. Spot applications would be made by means of backpack, UTV/ATV mounted spray equipment or other mechanical equipment. Solutions may contain nonionic surfactants or vegetable-based seed oil to increase surface contact at recommended label rates or have them added according to the manufacturer's label.

In some cases, a hack and squirt method or cut stump application may be made directly to each stem. The rate of application if this method is used will be based on the target species but will not exceed 0.45 lbs per acre.

For all of the above herbicides, mixtures of herbicides may be used where they provide more effective control. But in all cases where herbicides are used, label applications and safety precautions will be observed.

Road Closure and Decommissioning

Approximately 6 miles of unauthorized road would be closed and decommissioned. Methods of decommissioning range from blocking the road entrance (gate or earthen mound) to full obliteration, and may include re-vegetation, waterbarring, fill and culvert removal, establishing drainways, removing unstable road shoulders, recontouring, and restoring natural slopes.

Pond Construction

Ponds would be constructed to approximately ¼-1/2 acre in size. Each pond will be constructed to be between 5-8 feet deep at the dam. The lining of the pond will be treated with Bentonite at the approved rate as needed. After construction exposed soil would be fertilized and revegetated with approved grasses and forbs to prevent erosion and provide an additional food supply for wildlife.

Prescribed Burning

All proposed areas would be burned according to a prescription (Prescribed Burn Plan). Areas

would be bounded by firebreaks (fireline, roads, creeks, foam or greenline etc.) and burned using various ignition devices (*i.e.* hand torches, aerial ignition). These burns could be repeated on a 2-3 year rotation.

Each burn unit would be treated with controlled broadcast fire during either the growing or dormant season. This recurring schedule will be on a continuous basis and extend indefinitely beyond the 10-year period during which other proposed management activities will occur. Prescribed burning is a key management tool to achieve improved Fire Regime and Condition Class for National Forest lands and to provide greater protection for At-Risk Communities and Forest Resources.

Prescribed burning would be used to reduce accumulated fuels, stimulate growth of native vegetation, as part of control measures for invasive species and to improve wildlife habitat. There would be approximately 80 percent coverage in areas to be burned, with expected fuel reduction of approximately 30 percent. Some duff would be retained for soil protection.

Approximately 5 miles or 4.8 (rounded to 5) acres of fireline would be constructed to contain the prescribed burns. Firelines could be constructed manually using hand tools or mechanically with a dozer depending on terrain etc. These would primarily be located on existing natural features or old roadways. Fireline would be waterbarred and seeded after use to control erosion and provide temporary linear openings for wildlife.

Large Woody Debris

Large Wood will be added to Dry Creek at five locations to bring the amount of available woody debris in the stream up to the objectives in the Forest plan, which is:

- Maintain or restore LWD (Large Woody Debris) levels in perennial streams/rivers at 75 to 200 pieces/mile for all LWD larger than 3.3 feet long and 3.9 inches in diameter.

- Maintain or restore LWD levels in perennial streams/rivers at 8 to 20 pieces/mile for all LWD larger than 16.4 feet long and 19.7 inches in diameter.

Each location will consist of a one mile section of stream and the LWD will be added to the middle ½ of the section. Primarily existing down woody material will be added to the stream. Where this is limited, trees from the surrounding area will be cut or pushed over and then pulled or cabled into the stream channel. The trees will not be cut within 20 feet of the bank and cutting the tree(s) can not lead to the basal area in the SMZ following below 50 square feet per acre of basal area so as to meet standard FW81 from the Forest plan.

System Road Reconstruction

Reconstruct approximately 1.7 miles of system road to facilitate access and hauling of timber from stands proposed for commercial harvest. Work includes, but is not limited to, widening of roads, improving alignment, providing additional turnouts, and improving sight distance that improve the standard to which the road was originally constructed.

Road Maintenance

There are approximately 7.9 miles of existing classified road that would require road maintenance prior to timber hauling. This maintenance includes slide and slump repair, surface blading, spot surfacing with gravel, maintenance of drainage structures, ditch cleaning, and clearing the roadside of vegetation.

Temporary Road Construction

Construct approximately 1.2 miles of temporary road to access and haul timber from stands proposed for commercial harvest. After use, these temporary roads would be closed, bermed, and seeded.

E. Comparison of Alternatives

Treatments and Acres	PA	Alternative 1	Alternative 2	Alternative 3
High Quality Forage Openings	422*	0	422	0
Oak/Pine Woodland Restoration	240*	0	240	240*
Oak/Pine Savannah	127*	0	127	549*
Commercial Thinning	216	0	216	216
Noxious Weed Control	500*	0	0	500*
Seasonal Road Closure (mi.)	2.9	0	2.9	2.9
Wildlife Ponds (no.)	11	0	11	11
Road Decommissioning (mi.)	6	0	6	6
OHV trail Designation (mi.)	4.3	0	4.3	4.3
Seasonal OHV trail (mi.)	6.4	0	6.4	6.4
Prescribe Burning	6,000	0	6,000	6,000
Large Woody Debris Sites	5	0	5	5
Road Reconstruction (mi.)	1.7	0	1.7	1.7
Road Maintenance (mi.)	7.9	0	7.9	7.9
Temporary Road (mi.)	1.2	0	1.2	1.2

Note: * Herbicides would be use as part of these treatments

F. Effects Comparison / Key Issue Tracking

Treatments and Acres	Proposed Action	Alternative 1	Alternative 2	Alternative 3	Addresses Key Issue Number
Miles Reconstruction	1.7	0	1.7	1.7	1
Sediment Created (tons)	33	54	33	15	1
Herbicide Use	1,289	0	0	1,289	1
Early Successional Habitat	703	0	703	619	2
Late Successional Habitat	3983	4564	3983	3983	2
High Quality Forage Openings	422	0	422	0	2
OHV trail (mi.)	4.3	0	4.3	4.3	3
Seasonal OHV trail (mi.)	4.6	0	4.6	4.6	3
Unmanaged OHV Use Controlled	8.9	0	8.9	8.9	3

G. Protective Measures/Design Criteria

In order to protect the environment and lessen possible negative impacts, the protective measures contained in the Forest Wide (FW) Standards of the RLRMP for the Ozark/St-Francis National Forest (OSFNF) would be applied to the PA and Alternatives 2 and 3 and are incorporated by reference as protective measures in this EA. Best Management Practices (BMP) Guidelines for Silviculture Activities in Arkansas would also apply as standard protective measures for all proposed actions.

Some of the FW standards that apply to this project are listed below (all page numbers are referencing the RLRMP):

FW14 Clearcutting is limited to areas where it is essential to meet forest plan objectives and involve one or more of the following circumstances:

- To establish, enhance, or maintain habitat for threatened, endangered, or sensitive species.
- To enhance wildlife habitat or water yield values, or to provide for recreation, scenic vistas, utility lines, road corridors, facility sites, reservoirs, or similar development.
- To rehabilitate lands adversely impacted by events such as fires, windstorms, or insect or disease infestations.

- To preclude or minimize the occurrence from adverse impacts of insect or disease infestations, windthrow, logging damage, or other factors affecting forest health.
- To provide for the establishment and growth of desired trees or other vegetative species that are shade intolerant.
- To rehabilitate stands poorly stocked due to past management practices or natural events.
- To meet research needs. Pg 3-3

FW19 Aquatic pesticides for use as a sampling tool or for removal of exotic species will be permitted in OSFNFs' lakes and ponds except for areas used as public or domestic water sources. Pg 3-4

FW21 Herbicides are 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. If the rate or exposure time being evaluated causes the Margin of Safety or the Hazard Quotient computed for a proposed treatment to fail to achieve the current Forest Service Region 8 standard for acceptability (acceptability requires a MOS > 100 or, using the SERA Risk Assessments found on the Forest Service website, a HQ of < 1.0), additional risk management must be undertaken to reduce unacceptable risks to acceptable levels or an alternative method of treatment must be used. Pg 3-4

FW28 No herbicide is ground broadcast within 60 feet of any known threatened, endangered, proposed, or sensitive species except for endangered bats. Selective applications may be done closer than 60 feet, but only when supported by a site-specific analysis. Selective herbicide treatments using a non-soil active herbicide may be used closer than 60 feet to protect TES plants from encroachment by invasive plants. Pg 3-5

FW32 Herbicide will not be used within the <u>appropriate Streamside Management Zones</u> (SMZs) or within 300 feet of any public or domestic water intake. Selective treatments may occur within SMZs only when a site-specific analysis of actions to prevent significant environmental damage such as noxious weed infestations supports a "Finding of No Significant Impact" (FONSI), and then using only herbicides labeled for both terrestrial and aquatic use within these areas. Pg 3-5

FW33 Maintain the following average standing dead, existing, and potential hollow den and loose bark trees per acre forest wide:

- Primary and Secondary Indiana Bat Zones – 9 snags per acre

- All other areas:
  - 2 snags per acre greater than 12” dbh; plus
  - 4 snags per acre

  Total 6 snags per acre

Unless necessary for insect/disease control or to provide for public safety, standing dead and den trees will not be cut during salvage operations.

Snags will be left from the largest size classes and maybe clumped. Pg 3-6

FW34 In the absence of glades, sufficient woodland condition, closed day-lighted roads, utility corridors, or non-fescue openings on adjacent private lands, establish at least four well-distributed 1 to 5-acre openings per square mile. When establishing openings, use non-invasive improved or native forage species. Pg 3-6

FW35 Provide up to four permanent water sources per square mile in upland sites. Pg 3-6

FW37 Wildlife water holes (ponds) less than one-half surface acre will be managed for native amphibian habitat and not stocked with fish. Pg 3-6

FW39 Add large woody debris (LWD) to streams and rivers where natural levels are inadequate, except in wilderness areas. Pg 3-6

FW89 Design, locate, and construct new system roads or other improvements to avoid floodplains and riparian areas in order to minimize impacts on water quality, flood flows, and riparian habitat. Pg 3-13

FW91 Any area that meets the riparian area definition (Page 2-71) will be managed as Riparian Corridors MA (3.I). These stands will be mapped and reallocated to Riparian Corridors MA (3.I) in subsequent LRMP amendments. 3-13

FW103 All areas of the Ozark-St. Francis National Forests except designated open roads (subject to applicable State laws) and trails are closed to OHV use in order to minimize disturbance, environmental damage, and other user conflicts. Pg 3-14

FW148 When seeding to establish or maintain range forage in pastures and openings, use native or non-invasive non-native species, which are beneficial to wildlife to the extent practicable and where soil conditions are favorable. Intentional establishment of invasive non-native plant species is prohibited. Prohibited species are defined by the Regional Forester's invasive species list.

FW153 Herbicide treatment areas will not be prescribed burned for at least 30 days after application. Pg 3-20

FW155 In any prescribed burning, the duff layer will remain present on 80 percent of the burn area. Pg 3-20

FW156 Appropriate erosion control strategies will be applied to fire lines in order to minimize soil erosion. Pg 3-20

Other Protective Measures:

1) If any proposed, threatened or endangered species is discovered, the activity will be halted and the District biologist will be contacted to determine what, if any, consultation with the US Fish and Wildlife service is needed, and what specific measures to implement to avoid any adverse effects.

2) When prescribed burning is planned during the summer months, it will take place after July 15th after the breeding season for many species.

Through applying current research, past experience, site visits, and observations all of the above protective measures have proven effective on similar sites as those that are in the project area.

H. Project Designs

A project design is a direction that is applied to similar areas on all projects and is not site specific to one project area, stand, road, or site.

1) The Forest Service will approve all log landings, skid trails, and temporary road locations. This insures proper placement of these temporary developments.

2) Minimize the number of stream crossings and maximize distance from streams in developing the transportation system. Limiting the number of stream crossings will reduce the opportunity for sediment reaching streams. Maximizing the distance from streams will reduce sediment loadings in streams by providing an opportunity for sediment to be deposited before it reaches the stream.

3) Where practical, cross streams at right angles to the main channel. Only designated stream crossings may be used by vehicles. This will reduce the surface area of approaches and disturbed area within the stream thus reducing sedimentation.

4) To reduce erosion/sedimentation all broad based dips will be installed in accordance with FSM 2482-1. This will insure that water is distributed off the road and onto vegetated areas where the water velocity will be decreased and thus reducing its sediment carrying capacity.

5) Spot gravel, as needed, to stabilize the soil (prevent rutting), and reduce erosion at stream crossings and wet areas.

6) During the sale the purchaser will maintain all drainage/erosion control structures (broad based dips) and road surfaces. This will insure proper function of drainage/erosion control structures.

7) During times of potential resource damage, the Forest Service will suspend timber-harvesting operations (e.g. too wet causing excess rutting and soil compaction).

8) Slash from the road ROW (Right of Way) will be placed on downward side of roads to serve as water energy dissipaters to help reduce velocities of water, which in turn reduces erosion/sediment loads.

9) The marking crew, while marking the stands, will establish streamside management zones as outline in the RLRMP. Width and management of these zones will follow RLRMP standards and guidelines. These protection zones reduce velocities of water and sediment loadings.

10) Close and re-vegetate selected roads (see road table for road status after harvest) following project completion. This reduces the disturbance or destruction of erosion control structures.

11) Temporary skid trails and all haul roads will be re-vegetated to facilitate restoration to previous conditions and reduce erosion. After harvest the TSA will conduct a site-specific inspection of the harvested area to determine which skid trails need to be re-vegetated.

12) Mulch slopes on roads, which have greater than 10% to retard erosion, hold seed in place, and prevent moisture loss.

13) The Forest Service will conduct follow up site visits to determine if seeding fails to establish ground cover, if so then follow up erosion work and seeding will be done.

Through applying current research, past experience, site visits, and observations all of the above project designs have proven effective on similar sites as those that are in the project area.

I. Monitoring

1) The Forest Service would inspect individual timber sale units and roads to insure protective measures are applied on the ground and maintained during active timber harvesting.

2) In order to determine how well treatments are achieving the desired future conditions, baseline monitoring will be established prior to or concurrent with treatments to evaluate selected Management Indicator Species (MIS). This would include species that are likely to benefit from habitat changes as well as those that may receive impacts. It may also include invasive species in order to evaluate their response to treatments.

3) If prescribed burning is applied during the summer, a phased approach would be taken to protect species populations. This will include the following:

- Baseline monitoring will be established prior to or concurrent with any of these burns and be continued through subsequent burning cycles.
- The prescribed burn area will be determined based on monitoring response. Initial summer burns will be moderate in size (ex: 500-700 acres). When adequate monitoring has been achieved to determine that species trends within these areas maintain an acceptable level of loss and recruitment; these summer burns may be expanded in size incrementally with monitoring to continue, and size to be adjusted based on trend analysis.
- Species that should be monitored where summer prescribed burning is to be applied include (but are not limited to): breeding birds, amphibians and/or reptiles, and sensitive species).

CHAPTER III / IV

Environmental Effects / Effected Environment

A. Physical Factors

1. Soils Affected Environment

This section describes the soil characteristics, existing conditions and analysis method used within the project area.

The area for evaluating effect on the soils includes the treatment blocks identified in the project area of the Dry Creek watershed and the few areas upon the ridge-tops (flats) immediately the Iceledo Gap Road in the adjacent watershed. These are the only areas cumulatively that could be affected by soil disturbance.

Currently the activities ongoing within the project area are limited to minor disturbances such as road maintenance and wildlife stand improvements along with maintenance of wildlife openings by the Arkansas Game and Fish Commission and some grazing of cattle on private lands.

Soil Characteristics

Soils within the project area can be subdivided into 5 different soil map units. Each map unit shows broad areas that have a distinctive pattern of soils, relief, and drainage. Typically, a map unit consists of one or more major soils and some minor soils. The unit is named for the major soils. The following map units lie within the project area;

Noark-Clarksville: Deep gently sloping to very steep, well drained and somewhat excessively drained, very cherty soils that form residuum of cherty limestone

Enders-Nella: Deep gently sloping to steep, well drained stony or gravelly loamy soils formed in residuum or colluviums of acid sandstone and shale or inter-bedded shale and sandstone

Nella-Steprock-Mountainburg: Deep, moderately deep, and shallow, gently sloping to very steep, well drained, very stony, stony, or gravelly, loamy soils that formed in colluviums and residuum of sandstone and of some inter-bedded shale and sandstone

Newnata-Eden-Summit: Deep and moderately deep, gently sloping to very steep, well drained and moderately well drained, flaggy, stony, and loamy soils that formed in residuum of inter-bedded limestone and calcareous shale.

Nella-Enders-Steprock: Deep and moderately deep, strongly sloping to very steep well drained, stony and very stony soils that formed in residuum or in colluviums of acid sandstone or shale

Twenty two soils map units were identified within the treatment areas. The following characteristics help to identify potential concerns relating to treatments areas:

Soil Types found within Treatment Areas.

Searcy County Soil Types	Symbol	Erosion Hazard	Permeability
Enders stony loam, 3-20 % slopes	22CD	Slight	Very slow
Enders stony loam, 20-40% slopes	22EF	Moderate	Very slow
Linker gravelly fine sandy loam, 3-8% slopes	34C	Slight	Moderate
Linker gravelly fine sandy loam, 8-15% slopes	34D	Slight	Moderate
Linker Mountainburg complex 3-8 % slopes	36C	Slight	Moderate
Moko Rock outcrop Eden complex 40-60% slopes	39G	Severe	Moderate
Nella gravelly loam, 3-8% slopes	46C	Slight	Moderate
Nella steprock complex 3-20% slopes	49CD	Slight	Moderate
Nella Steprock Mountainburg complex 20-40% slopes	50EF	Slight	Moderate to moderately rapid
Nella Steprock Mountainburg complex 40-60% slopes	50G	Moderate	Moderate to moderately rapid
Newnata-Eden-Moko Complex 3-20% slopes	56CD	Slight	Slow to moderate
Noark very cherty silt loam 3-8% slopes	62C	Slight	Moderate
Noark very cherty silt loam 20-40% slopes	62EF	Moderate	Moderate
Newton County Soil Types			
Enders Leesburg stony loams, 8-20% slopes	15	Moderate	Very slow to moderate
Linker gravelly loam 3-8% slopes	23	Slight	Moderate
Linker Mountainburg complex 3-8% slopes	24	Slight	Moderate to moderately rapid

Soil Types found within Treatment Areas(continued)			
Linker Mountainburg 8-20% slopes	25	Slight	Moderate to moderately rapid.
Nella gravelly loam 3-12% slopes	31	Slight	Moderate
Nella-Enders stony loams 8-20% slopes	35	Slight	Moderate to very slow
Nella-Steprock complex 8-20% slopes	37	Slight	Moderate
Nella-Steprock Mountainburg very stony loams 20-40% slopes	38	Slight	Moderate
Nella-Steprock-Mountainburg very stony loams, 40-60% slopes	39	Modera te	Moderate to moderately rapid

Permeability is measured as the number of inches per hour that water moves through the saturated soil.

The analysis method used in evaluating effects of the soils consists of identifying the soils characteristics relating to erosion hazards, permeability and soil detrimental disturbance. The Newton and Searcy County Surveys were used to gather information to identify soil types, their suitability, and limitations.

Compaction has also, been noted to impact the ability of the soil to re-vegetate, therefore treatment blocks identified as needing treatment in Chapter II have been evaluated for effects on detrimental soil disturbance. Soil compaction can occur on skid trails, landings, and temporary roads. The amount of compaction would depend on the amount of timber removed per acre, the number of acres being harvested, type of logging equipment used, and the soil moisture conditions at the time of harvest. Compaction reduces the amount of air and water held in the soil, which can reduce soil productivity. Compaction can increase runoff, which could increase erosion on disturbed areas.

Detrimental soil disturbance includes all of the physical factors that adversely affect soil, including erosion, displacement, puddling, severe burning, and compaction. A threshold has been established in the Revised Land Resource Management Plan that no more than 15% of the activity area should be detrimentally impacted to maintain soil productivity. To estimate the amount of disturbance coefficients for each harvest method are multiplied according to the acres harvested by each method then added together and divided by the total acres harvested. The result is multiplied by 100 to produce the percentage of predicted detrimental soil disturbance. The coefficients for the harvest methods are based on monitoring done on harvested units form 1993 to 2002.

Some detrimental soil disturbance including compaction, displacement, and minor erosion is expected to occur during the creation and maintenance of the high quality forage areas proposed in the Proposed Action and Alternative 2, but the disking and seeding that follows the clearing of the openings is expected to mitigate these effects. There is a potential for detrimental soil disturbance to re-occur on openings and savannahs under Alternative 2 because repeated mechanical treatments will be needed to maintain these areas because no herbicides will be used. Disking and seeding will reduce the potential for additional detrimental soil disturbance.

Comparison of Alternatives-Impacts on Soils				
Type of Treatment	**Proposed Action**	**Alternative 1 No Action**	**Alternative 2**	**Alternative 3**
	Detrimental Soil Disturbance (Acres)			
Roads (ac)	No construction			
Harvest (ac)				
Savannah	20.3	0	20.3	61.5**
Woodland	33.6	0	33.6	33.6
Forage	0*	0	0 *	0
Thinning	10.8	0	10.8	10.8
Site Prep (ac)	49.2	0	49.2	67.2**
Total acres disturbed	113.9	0	113.9	
Type of Treatment	**Detrimental Soil Disturbance %**			
Roads by %	0%	0	0%	0%
Harvest by %				
Savannah	2.0%	0	2.0%	6.1%
Woodland	3.3%	0	3.3%	3.3%
Forage	0%	0	0%	0
Thinning	1.0%	0	1.0%	1.0%
Site Prep by %	4.8%	0	4.8%	6.6%
Total in %	11.3%	0	11.3%	17.0%

*Due to disking and seeding the openings.

**Expected reduction in compaction of at least 30% due to disking and seeding between trees after harvesting

Cumulative Effects

Proposed Action and Alternative 3

Harvested areas would not be visited for a minimum of 30 years and potentially a maximum of 40 years. Areas disturbed by the Proposed Action would be expected to be recovered prior to a future entry to these areas since soil recovery may take between 30 to 40 years depending on the specific soil types and actual impacts.

Cumulative effects from past, present and future management activities are expected to be minimal, since harvesting activities are expected to utilize mostly existing roads and skid trails. Roads and skid trails that were used in previous harvesting activities would be compacted and disturbed again during the proposed harvesting activities. Recovery of these roads and skid trails would begin again after the harvesting activities are completed. Disking and seeding of skid trails and roads would help to speed up the recovery process.

Alternative 2

There is the potential for cumulative impacts to the soil in treatments areas because the repeated mechanical treatments have the potential to compact, displace, and expose the soil to erosion on a recurring basis. The soil would not likely recover between mechanical treatments. These impacts would likely be limited to fewer acres due to the high cost of mechanical treatments.

2. Waters Affected Environment

This section describes watershed characteristics, existing water quality, and analysis method used.

Watershed Characteristics

Watersheds in the United States are divided into progressively smaller units known as hydrologic units. This project area falls within the lower portion of Richland Creek a tributary of Buffalo National River. This portion of the Forest is located in the Boston Mountain eco-region with deeply dissected drainages that cut into the Boone Formation which is cherty limestone.

The majority of the project area lays within the Dry Creek sub-watershed (approximately 6,000 acres) a tributary of the lower level of Richland Creek watershed. Some of the flat ridge-tops proposed for treatments which are accessed by Iceledo Gap road are partly in the adjacent watershed to the west. The project area is essentially bound by the Ridges associated with the Iceledo Gap road and the Eula road with a portion of Richland creek road as the southern boundary and the northern boundary ends where the ridges merge

with Richland creek. The Watershed includes the land bound by these ridges above the confluence of Dry Creek with Richland Creek.

Extensive field reconnaissance was conducted during the summer of 2005 and spring of 2006 to map and inventory the roads in the analysis area. The watershed has approximately 33 miles of road within the Richland Creek watershed with two thirds being under Forest Service jurisdiction. Only 1.3 miles of road are within close proximity (within 100 feet) to streams and there are 15 stream crossings.

There are only two major perennial streams within the sixth level watershed analysis area. The Boone formation (karst topography) is associated with the major drainages well below any of the proposed treatments of any alternative. Most treatments considered are located on the upper slope and ridge tops. Therefore by following Forest Standards and State BMPs no effects associated with karst topography are expected to occur.

Average annual precipitation for the project area is about 46 inches. The elevation range is approximately 800 feet to 2042 feet. At the lower level, the drainage gradients become less steep allowing the streams to be less confined and develop small floodplains.

Surface and Ground Water Quality

Surface water quality is generally good on the Forest because the dominant land use is forest.

Water uses (beneficial uses) on the forest include warm water fisheries, livestock and wildlife watering and recreation. The most common sources of increased sediment and other non-point impacts to streams include poorly located and/or maintained roads, livestock grazing in riparian areas, and unwise off-road-vehicle use. Richland Creek has been designated as “Extraordinary Resource Water by Arkansas Department of Environmental Quality and the middle and upper portion were also, designated as a Wild and Scenic River which identified four outstanding remarkable values (Recreational, Wilderness, Geological and Botanical). However, the sixth level watershed used for cumulative effects is the Lower section of Richland Creek which is the non-designated portion. It was excluded from the designation due to the increased amount of private lands adjacent to Richland Creek.

Ground water on the Forest is typically at depths of >150 feet but in general can be highly variable. Ground water is most likely closest to ground surface (high water table) approximately >6 feet in December to April then declining through the summer as streams approaches low flow conditions.

Floodplains and Wetlands

There are small floodplains and minor wetlands within the project area; however no specific areas have been identified at this time to occur on treated acres. Therefore no impacts are expected within these areas. However, if an area is found within any treatment blocks the best management practices and mitigation measures in the Revised LRMP would be followed, therefore no impacts are expected.

Analysis Method

A valid cumulative effects analysis must be bounded in space and time. For the purposes of project planning, 6th level watersheds (10,000 to 40,000 acres) are the appropriate spatial bounds for cumulative effects analysis at the project level.

Local research has shown that the effects of increase sediment as a result of timber harvest 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 the current year. This captures the effect of other management activities that may still affect the project area. Proposed actions are constrained to a single year even through they usually occur over a period of three to five years. This would express the maximum possible effect that could occur in a worst case scenario. Past activities that have a lasting effect (such as roads and changes in land use) are captured by modeling the sediment increase from an undisturbed condition. As a result of the watershed selection, numerous characteristics of the watershed would be used in the calculation of sediment such as watershed size, acres of Forest Service surface ownership, private ownership, land use distribution including vegetation cover (forest, pasture, forest grazing and terrain), road density and eco-region.

The majority of the project area lays within the Dry Creek sub-watershed (approximately 6,000 acres) a tributary of the lower level of Richland Creek watershed. The lower level of Richland Creek a sixth level watershed, which is about 40,577 acres, will be used for the cumulative effects analysis. Some of the flat ridge-tops (approximately 150 acres or <1% of the total watershed acres) proposed for treatments which are accessed by Iceledo Gap road are partly in the adjacent watershed to the west. However, it was decided due to size and limited amount of impacts the model results would not be noticeable if the treatment effects were analyzed in a separate watershed therefore the treatments were analyzed as if they were entirely in the lower level of Richland Creek watershed.

Changes in land use and other disturbances can be modeled with respect to estimated increases in sediment. The model used in this analysis estimates current condition and the effects of various management alternatives. These predictions are then compared to risk levels established by the effects of sediment increases on fish communities. Activities that may occur in Phase II of this project were included in the cumulative effects analysis.

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

Monitoring studies on the Ouachita National Forest have demonstrated that, with proper implementation of forest standards and state BMPs, direct and indirect impacts are individually insignificant on water quality and associated beneficial uses (Clingenpeel 1989, 1990, USDA Forest Service, Ouachita National Forest 1993, Neihardt 1994, Vestal 2000, and Whitsett 2004). A cumulative assessment determines if these individually insignificant actions collectively have an adverse affect on water quality. Pollutants associated with forest management activities (timber harvest, site preparation, road construction and maintenance) can potentially include sediment, nutrient enrichment, changes in water yield, and pesticides within the water column.

A change in water yield is an effect that does not serve as a pollutant until a large change occurs. In addition, water yield models do not characterize the impacts of all management activities such as road construction and water yield changes that typically occur following vegetation management activities are less than the natural variability (Miller, Beasley and Covert 1986). The researchers measured a significant increase in summer base flow, but could not identify an increase in peak flow as a result of timber harvest and site preparation.

Changes in water nutrients or nutrient fluxes within streams as a result of management activities are minor (Miller, Beasley and Lawson 1987) and not an appropriate consideration of cumulative effects at the project level.

ALTERNATIVES CONSIDERED

Alternative 1: (No Action)

Without implementation of proposed action or other alternatives water resource conditions would continue along their current trends. This alternative would

address Forest Plan goals for maintaining water quality however, not for improving it. Roads left open in poor locations and/or not maintained would continue to impact water quality as a result of this alternative.
The Water Resource Analysis for Cumulative Effects model shows 54 tons/yr increase in sediment as existing conditions associated with roads that would continue. This increase of predicted sediment in tons would create a low risk, indicating minimal effects from sediment on aquatics and beneficial uses.

Proposed Action

An increase in potential sediment within the project area could occur from proposed road activities, clearing of the high quality forage areas, and the use of skid roads and log landings which could expose soils, cause rutting, and alter surface and subsurface water flows. Such short term effects could cause sediment to be carried in runoff to stream channels. Implementation of the above alternatives would decrease road density due to the closing of existing open roads after treatments resulting in an overall improvement from current conditions within the project area. The road closures associated with the Proposed Action are expected to reduce sediment so that there will be a smaller predicted increase in sediment compared to increase in predicted sediment for the No Action alternative.

This amount of predicted sediment would result in a low risk, indicating minimal effects from sediment to aquatic beneficial uses. Revised LRMP standards will be followed and monitoring will be done to ensure that they are being followed and are effective.

The four herbicides (Glyphosate, Triclopyr, Metsulfuron methyl and Imazapyr) proposed for use in the project area are not expected to adversely affect water resources.

Glyphosate is a broad spectrum herbicide that is strongly absorbed by the soil. The major degradation pathway is microbial breakdown in the soil although varying rates result in a longer half-life than some of the other common herbicides used in management. Glypohsate does not photodecompose to any extent and does not volatilize (Rueppel and others, 1977). Therefore, there is a risk of this chemical leaving the site and entering a stream if erosion occurs and sediment with the chemical attached to it makes it to a stream channel. However given that proper application rates, (Forest Standards and State BMPs would be followed and riparian buffer zones would be used) the risk of contaminated sediment entering a stream channel is low. This would result in low potential of decreased water quality.

Triclopyr is readily absorbed by roots and foliage and translocated easily to meristems. This compound is metabolized by bacteria and photodegrades rapidly. Its half-life is less than 90 hours in water, but Triclopyr is more persistent in soils. It is moderately soluble and not strongly absorbed in the soil. Studies indicate that it is not usually leached into the water table under normal use (Lee and others 1986). Therefore given that proper application rates, Forest Standards and State BMPs would be followed and riparian buffer zones would be used, the risk of decreased water quality is low.

Metsulfuron methyl may be transported off site by runoff or percolation. Assessing off site soil contamination by runoff can be monitored by assessing the amount of non target plants impacted. Percolation, on the other hand, represents the amount of the herbicide that would be transported below the root zone and thus may impact water quality but would not affect off site vegetation. GLEAMS modeling showed that losses from clay soils were associated almost exclusively with runoff (SERA 2000). Modeling showed that about 75% of the losses in loam soils were associated with runoff and the remaining losses were due to percolation. An Australian study found that metsulfuron methyl residues usually stayed between 0 and 20 centimeters of the surface in clay soils (Noy and Holloway 2001). The soils in the project area are underlain by loam or clay so leaching losses are expected to be minimal. The risk of decreased water quality is low because proper application rates will be used, Forest Standards and State BMPs will be followed

Imazapyr may be transported off-site by runoff and damage non target plants. Residual of soil contamination with imazapyr could be prolonged in some areas. Imazapyr does not metabolize extensively in plants but could be transported rapidly from treated leaves to root systems and may even be exuded into the soil from the roots of treated plants. The risk of decreased water quality is low because proper application rates will be used, Forest Standards and State BMPs will be followed

A study by (Neary, 1985) on the effects of herbicide use on ground water shows that regional, confined, and groundwater aquifers are not likely to be affected by silviculture herbicides. Surface unconfined aquifers in the immediate vicinity of herbicide application zones have the most potential for contamination. It is these aquifers which are directly exposed to leaching of residues from the root zone that have the greatest potential.

Where buffer strips are used or other mitigation techniques are employed, forestry herbicides generally do not pose a threat to water quality. Peak concentrations are usually low (< 100 mg/m^3) and do not persist for long periods of time (<6 mos.) (Neary and Michael, 1996).

Generally speaking, buffer strips of 15 m (45 feet) or larger are effective in minimizing pesticide residue contamination of stream flow (Neary et al., 1993). The use of buffer strips can keep herbicide residue concentrations within water quality standards. They are not absolute, one as large as 140 m did not keep residues out of perennial streams in North Carolina. However the peak concentration was 50 times lower that the water quality standard.

Alternative 2

The effects would be similar to those predicted for the Proposed Action except there would be no risk from herbicides. There is the potential for an increase in sediment above that predicted for the Proposed Action because repeated mechanical treatments would be required to reduce and remove woody competition and NNIS in openings and savannahs. The mechanical treatments would result in the repeated exposure of bare soil which would be susceptible to erosion until vegetation became re-established. The potential increase in sediment would be moderated because it is likely that fewer acres of openings and savannahs would be created due to the high cost of implementing the repeated mechanical treatments.

Alternative 3

There would be a potential increase in sediment for this alternative, but less than that predicted for the Proposed Action, Alternative 2, and the No Action Alternative because no high quality forage areas would be cleared. The risk from herbicides would be the same as that predicted for the Proposed Action.

Cumulative Effects

Past, present and reasonably foreseeable future activities on Federal and non federal lands (such as the agricultural uses, federal and private logging known to occur and road activities) that could affect water resources have been incorporated within the Water Resource Analysis for Cumulative Effects. The estimated impacts from possible future activities associated with phase II of this project were also included in the Cumulative Effects analysis. The analysis resulted in a predicted increase in sediment of 33 tons/yr. for the Proposed Action and Alternative 2. The analysis resulted in a predicted increase in sediment of 15 tons/yr. for Alternative 3. Alternative 1 No Action alternative had the highest predicted increase at 54 tons/yr due to roads being left open.

This amount of predicted sediment would result in a low risk for all alternatives, indicating minimal effects from sediment to aquatic beneficial uses. Revised LRMP standards will be followed and BMP monitoring will be done to insure compliance and effectiveness.

The effects associated with herbicide use was also considered a low risk to water quality, due to the location of treatment areas (position on ridge tops and distance from major drainages), soil characteristics and given that proper label application rates would be used, and Forest Standards and State BMPs would be followed.

3. **Air Effected Environment**

Air Quality Existing Condition

The National Ambient Air Quality Standards (NAAQS), set by authority of the Clean Air Act, cover six "criteria" pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter 10 microns in size (PM_{10}), and nitrogen dioxide (NO_2). No county in Arkansas is classified as being in "non-attainment," meaning all counties are in compliance with the NAAQS.

Existing emission sources occurring within the project area consist mainly of mobile sources. These would include, but are not limited to, combustion engines (such as those found in motor vehicles); dust from unpaved surfaces; smoke from local, county, agricultural, and forest burning; restaurants; and other activities.

The closest Class I Area of concern with respect to Regional Haze compliance is the Upper Buffalo Wilderness Area.

Air quality in northern Arkansas is considered to be of high quality. Monitoring indicates that it is better than called for in the NAAQS. Air quality is currently monitored within the National Forest boundaries by the Interagency Monitoring of Protected Visual Environments (IMPROVE) system near Deer, Arkansas.

All Alternatives
Direct / Indirect Effects

Based on the nature of the proposed management activities in all alternatives there should be no expected long-term impacts on air quality within the analysis area. The dust generated by logging activities would have a minor localized impact on air quality. The impact would be short term (lasting only as long as the logging) and sporadic (any rainfall during the harvest activities would prevent dust from being air borne). Since this type of activity has occurred over many areas within the air-shed and the air quality is still of high quality, there is no reason to suspect there would be anything other than some local short term impacts to air quality from this project.

To calculate the consumption of fuel, emission of particles, and dispersion of pollutants produced by prescribed burning of forest vegetation the Simple Approach Smoke Estimation Model (SASEM) was used (see Project File for further explanation of inputs and calculations). Table A1 list the parameters and results for the Boss Hollow project landscape burn. In addition, as the average size of any site preparation burn would only equal about 50 acres, it would fall well within the parameters below.

Table A.1

All Action Alternatives	Bearcat Hollow
Burn Type	Broadcast
Burn Duration (hours)	8
Burn Area (acres)	6000
Wind Speed and Direction (min – max)	6 – 20 West – East
Smoke Sensitive Receptor 1 and distance from project area (miles and direction)	Marshall (17 miles west)
Smoke Sensitive Receptor 2 and distance from project area (miles)	Jasper (17 miles southeast)
Smoke Sensitive Receptor 3 and distance from project area (miles and direction)	Hector (30 miles north)
Smoke Sensitive Receptor 4 and distance from project area (miles and direction)	Russellville (43 miles northeast)
PM_{10} Concentration (ug/m^{3*})	6.9 – 29.0 No Exceedence
$PM_{2.5}$ Concentration (ug/m^3)	5.8 – 24.4 No Exceedence
Total Fuel Consumed	1.9 Tons/Acre

Table A1 – Simple Approach Smoke Estimation Model Parameters and Output

*ug/m^3 – micrograms per cubic meter

The No Action Alternative does not include prescribed burning and therefore has negligible potential for affecting air quality other than that which may occur under a wild fire situation. For the Action alternatives the potential exists for smoke to cause temporary local effects on private homes and farms, and to the rural communities of St. Joe, Magic Springs or Witts Spring. Air quality effects could include temporary decreased visibility on roads, discomfort for local residents with respiratory problems, and the nuisance of the smell of smoke in and around residences. Particulate concentrations may meet the 24-hour

standard of150 ug/m3 but exceed it for short periods. Personal exposure to such effects should be limited.

The mitigation measures described in the Burn Plan and the new Arkansas Smoke Management Plan would be applied. These measures are designed to ensure that state regulations, EPA standards, and the requirements of the Clean Air Act are met, and that local effects to air quality are acceptable. Key is the development of a burning plan prior to implementation that considers wind direction and other smoke dispersal factors. The burning plan would be prepared for each burn to ensure that the combustion products (smoke) to minimize effects in smoke-sensitive areas. Burning would only occur when conditions are right for adequate smoke dispersal. Proposed burn areas under all action alternatives are large enough for efficient burning but small enough to allow burning to be completed by mid-afternoon so that most smoke is dispersed by nightfall when smoke tends to sink down slope into valleys. With these measures, effects from smoke under all alternatives are expected to be small and within local acceptable levels.

Based upon this most recent of EPA-air quality data for Newton County; potential emissions being below the lower limit acceptable by EPA; our compliance with NAAQS; and our meeting general conformity and meeting the intent of the Regional Haze regulation, the prescribed treatments should not detrimentally impact the quality of air in the proposed project area nor in the Class 1 airshed.

Cumulative Effects

Given the mobility of the pollutants considered, the scale for cumulative effects is the Forest. With similar projects, as described here, proposed on a yearly basis throughout the Forest, the sources of the pollutants would be similar (e.g., vehicle exhaust, dust from logging and travel on dirt roads, smoke and particulates from fires). Due to the distance of this area from major metropolitan areas or heavy concentrations of heavy industry, and due to favorable weather patterns keeping the atmosphere well mixed, the area should continue to exceed the NAAQS. Therefore, no significant cumulative effects are anticipated from implementing any of the alternatives described.

B. Biological Factors

Terms Used in the Biological Analysis

Vegetation - *all plants, from flowers and soft-tissued plants to pine and oak trees.*

Stand - *primarily describes the boundaries of the dominant overstory tree species in a particular condition (e.g. pine poletimber, oak sawtimber, etc.).*

Compartment - *a collection of stands within a logical boundary or a series of logical boundaries, such as roads, streams, administrative boundaries, or physical features.*

Early seral - *for the analysis of effect on vegetation = vegetation that is 0-20 years of age that has not yet reached canopy closure. For the analysis of effects on wildlife = vegetation that is 0-10 years of age (e.g. herbs, forbs and shrubs).*

Mid-seral - *refers to vegetation that is 20+ years old and stand development is approaching closure of the overstory.*

Late seral - *refers to vegetation and stand development reflecting overstory closure and mature vegetation.*

Diversity - *the numbers and variety of plant and animal communities and individuals within an area.*

Structural diversity - *the numbers and variety of young, immature, and mature plants and trees in a stand and their distribution from the forest floor to the top of the tree crown.*

Understory - *trees and other forest vegetation at ground level to 20 feet high.*

Midstory - *trees and vegetation above 20 feet high but shaded by taller vegetation.*

Overstory - *trees and other vegetation tall enough to be in the sunlight.*

Canopy - *the layer of leaves and branches formed by the tops of trees.*

Old growth - *related to a forest condition that often includes mature and overmature trees and may include a lack of human disturbance.*

Shade tolerant - *vegetation that is capable of growing under the shade of other trees*

Shade intolerant - *vegetation that doesn't grow well or is unable to grow under the shade of other trees.*

Site Index *– provides a measure of potential site productivity by using height of the tree at a given age as that measure (Given an age of 50 years, a site index of 60 for white oak means a tree would be 60 feet tall at age 50).*

Species Diversity *- a professional assessment based on field observations, of the species variety within a stand. This may be the result of such factors as the variability of species in the stand, species richness and density, age, light and soil characters.*

Between-stand-Diversity *– is the change in the variety of organisms among habitats or stands in a particular region, and is dependent on the contrast of adjacent habitats.*

Basal Area - *measured in square feet and represents the number of trees of a given size.*

Age - *the average age of the overstory based on sampling of representative trees within the stand.*

1. Vegetation

Existing Conditions

The analysis area for evaluating effects on vegetation within proposed stands and the cumulative effects of other possible actions includes approximately 6,405 acres in the vicinity of the proposed actions (Figure V1). This area is representative of the surrounding landscape for age class distribution, stand structure and forest type. This also includes lands in private ownership. Increasing the size of this area would only dilute the sensitivity to effects. Where appropriate, the total analysis area has been used to evaluate potential landscape impacts and cumulative effects. The vegetation within the analysis area is typical and representative of that found within the Boston Mountains physiographic region.

The age of forest stands within the analysis area are displayed in the following chart (Figure 1).

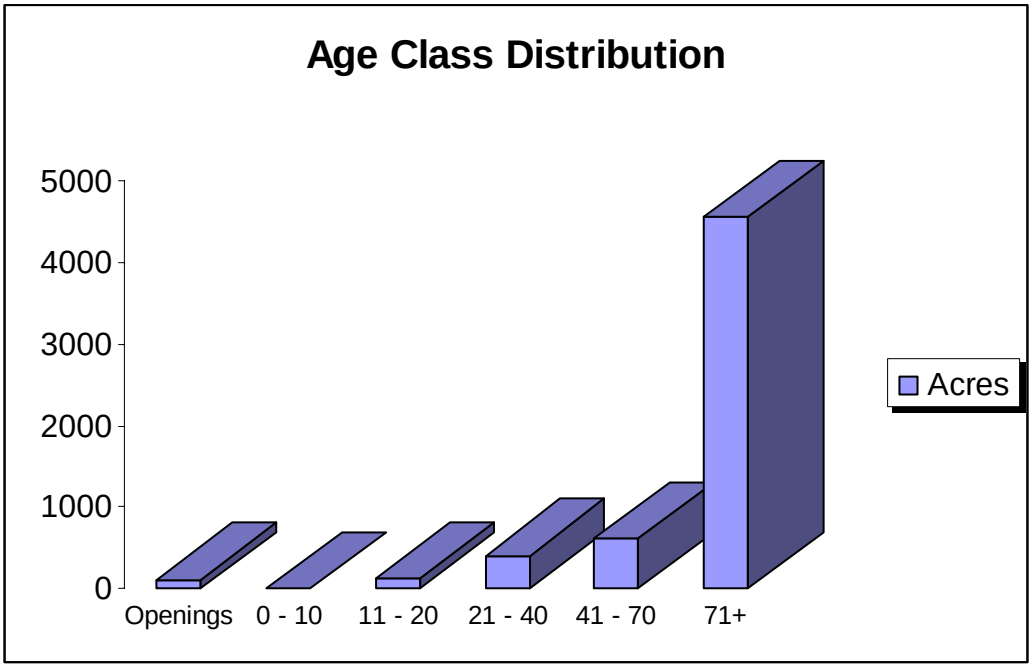

Figure V-1 Existing Age Class Distribution within Analysis Area

Presently <4% of the acres in the analysis area have stands 20 years old or less (including private land). Excluding private land for which no age class data is available, 71% of the analysis area is greater than 70 years old. As the majority of these stands are approaching maturity, few have an early seral structure, diminishing the overall structural diversity in the landscape. There are approximately 73 acres of private land in pasture or unforested.

Currently 8% of the Forest Service acres in the analysis area are composed of shortleaf pine, while 88% is upland hardwood with 2% in mixed pine-hardwood or hardwood-pine forest.

Species and structural diversity among stands within each compartment as well as at the landscape level within the analysis area are relatively low due, in part, to historic timber practices that often selectively cut quality oaks, cherry, and ash. This contributed to reducing diversity in the overstory. Competition from more shade-tolerant species in the understory, such as red maple and dogwood in most stands, often prevents these less tolerant species (oak, ash, and cherry) from developing sufficiently to replace those removed from the overstory. For species such as these to maintain dominance in the forest overstory, some type of disturbance regime is necessary (Thompson, *et. al.*, 1997).

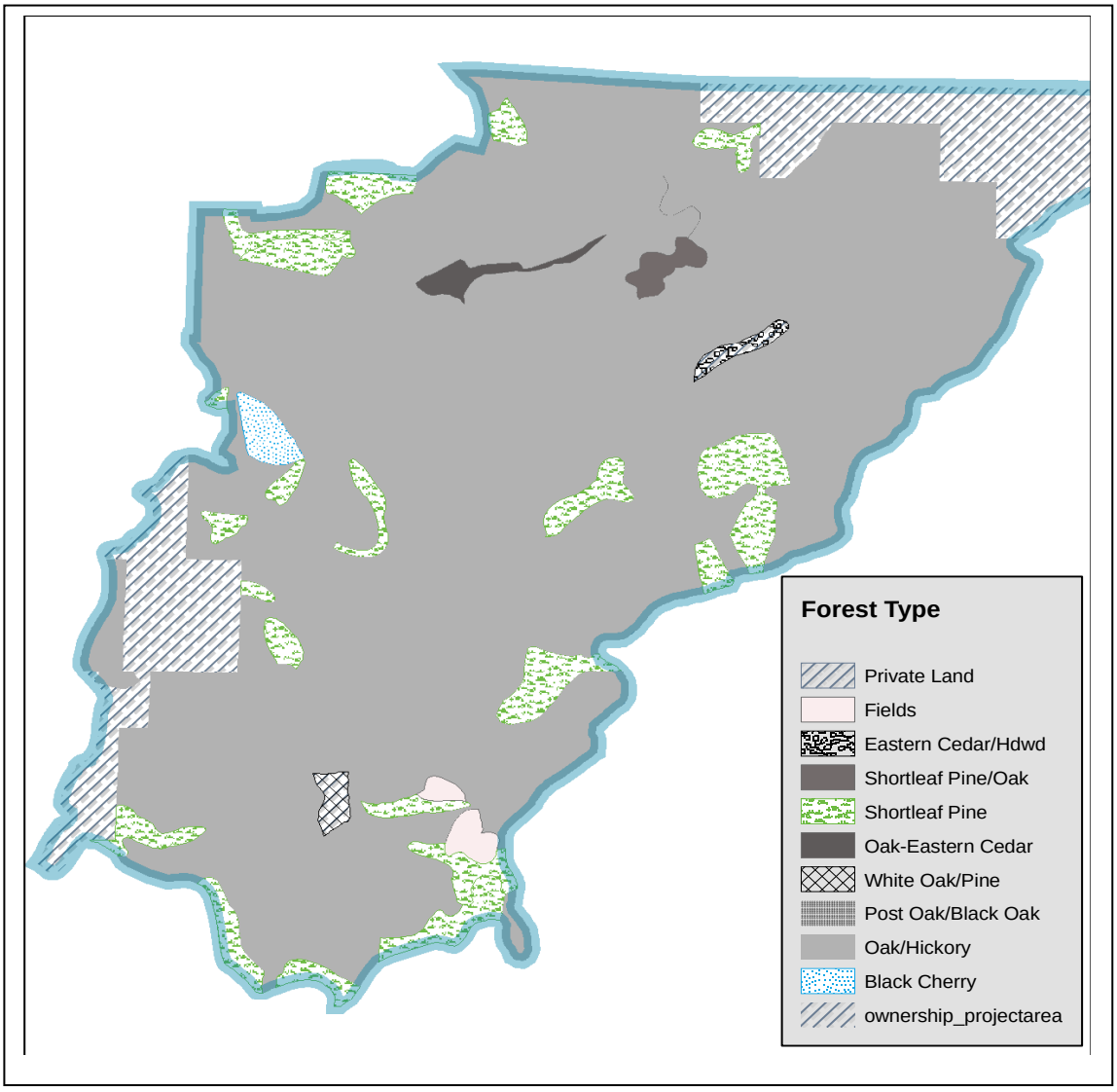

Figure V-2 Distribution of Forest Types within the Analysis Area

Oak Decline

Currently, over 75% of the analysis area displays the potential for a higher mortality risk for the development of oak decline. Oak Decline is a complex condition that may be found in certain hardwood stands. It can best be summarized as ..."the interaction of long-term predisposing stress factors (drought, tree age, or droughty site factors), short-term inciting factors (spring frost or insect defoliation), and long-term contributing factors of biotic origin (root disease, bark beetles, and canker or decay fungi) (USDA For Ser R8-PR 17, 1989 p 1).

Typically trees have been subjected to some form of environmental stress--drought, late frosts, insect infestations etc. which have weakened them to such an extent that they are susceptible to insects and disease which inhibit growth and result in a slow decline and death (USDA For Ser #164 p 1-2).

Some hardwood stands within the analysis area are beginning to experience damage from “Oak Mortality.” This term is used to describe a series of events including a epidemic of a group of insects called oak borers that have been influenced by several years of dry conditions, root diseases, increased tree densities, and other factors that are causing widespread severe damage to some oak stands across Arkansas and Southern Missouri. Insects that have been identified as the primary cause of this problem are Red Oak Borers (*Enaphalodes rufulus*), Twolined Chestnut Borer (*Agrilus bilineatus*), and Carpenterworms (*Prionoxystus robiniae*). Other insects identified that contribute to this mortality include: White Oak Borers (*Goes tigrinus*) and Oak Clearwing Borers (*Paranthrene simulans*). Some trees may also be infected with Armillaria Root Disease (*Armillaria mellea*). The infected dead trees usually fall within 2 years (sometimes in a year) because of the loss of root structure.

Where stands have been identified that fit the key risk factors that indicate a high mortality risk, active management may be able to reduce detrimental effects. "Thinning can reduce competition for moisture and nutrients and promote better physiological conditions of the remaining trees." (USDA For Ser #165 p 7). Although research is still required to further define the processes of oak decline and effective methods for treatment and prevention, it can be said that the..."key disposing factors may be the interaction of site quality and stand age."(USDA For Ser, 1989 R8-PR 17 p 29) The following table presents the risk factors associated with the mortality potential resulting from oak decline (taken from USDA For Ser R8-PR 17, 1989 p 18):

Low Mortality Risk	High Mortality Risk
Adequate growing-season moisture No recent spring defoliation Physiologically immature (pole-size,<50 yrs. old)	Acute summer drought (2-3 yrs.) Recent spring defoliation Physiologically mature (sawtimber, >50 yrs. old)
Composition predominantly white oak group High site index (>70)	Composition predominantly red oak group Low site index (<=70)
Mesic site conditions: Loamy soils, few rocks Deep (>18 inch) soils Coves, terraces, bottoms, lower slopes North and east aspects	Xeric site conditions: Rocky soils Shallow (<18 inch) soils Ridges or upper slopes South and west aspects

Table V-1 Characteristics of Oak Decline

Stand Characteristics

The hardwood stands containing proposed activities have primary overstory species that include white oak, northern red oak and various hickories. These stands have relatively low structural diversity presenting a fairly uniform canopy with a well developed understory, composed predominantly of dogwood, red maple and saplings of the overstory species. Herbaceous ground cover tends to be somewhat sparse except on rich sites with characteristic species including Virginia creeper, poison ivy, dittany and beggar tick.

The primary overstory species in pine stands is shortleaf pine. Hardwoods, such as white oak, northern red oak and various hickories are also included but amount to less than 30% of the total stand. Structural diversity is low due to the uniform canopy that is present in the overstory. The understory varies in composition but tends to be largely composed of dogwood, red maple and scattered shortleaf pine.

Herbaceous ground cover in pine stands tends to be somewhat sparse due to shading, the thickness of leaf litter and acidic soils. Characteristic species include Virginia creeper, poison ivy, wild sunflower, and beggar tick. The following descriptions provide specific information about forest stands that have been proposed to receive different management treatments:

High Quality Forage Openings on approximately 422 acres

Approximately 60% of the acres planned for this treatment are composed of hardwoods with the remainder being primarily shortleaf pine. The majority of these acres is either immature poletimber or low quality poletimber with an overall site index between 50-60.

Oak/Pine Woodland Restoration on approximately 240 acres

The acres being restored to an oak/pine woodland condition consist primarily of hardwoods. The stand conditions are immature or low quality poletimber with a small amount of immature or sparse sawtimber. The overall site index is <60 which is indicative of less favorable growing conditions.

Oak/Pine Savannah on approximately 127 acres

This treatment would be applied to acres that are a mixture of both hardwoods and shortleaf pine. They are mostly composed of low quality poletimber or immature poletimber. The overall site index is <60.

Commercial thinning on approximately 216 acres

The acres receiving this treatment consist of hardwood stands with a few acres of shortleaf pine. The majority are either immature sawtimber or immature poletimber with 1 area of mature sawtimber. The overall site index is 60 or greater. The age of these areas ranges from 70-91 years with 1 area that is over 100 years old.

Non-Native Invasive Species (NNIS)

On the Big Piney Ranger District, past land use practices have left behind both more benign and more invasive plant species. Early settlers brought with them plants that were familiar to them and that had uses in a homesteader's life. Some old fashioned species like blackberry lily or potato vine are just some of them. The former confines itself to old homestead sites, but the latter if encouraged would persist far beyond the bounds of its former property.

In the 1960's, wildlife managers were encouraged to plant species such as Japanese honeysuckle, multiflora rose and sericea lespedeza to benefit wildlife species. Some of these are now distributed across the district. The planting of these species was well intended, but hind sight has proved that although they some may have some virtue for some wildlife species, that is overshadowed by the aggressive competition they provide to native plants. Unchecked they can be spread by birds, small mammals and even unknowing humans who may move seed and plant parts by foot or vehicle traffic.

It is not uncommon to see sericea lespedeza along the roadsides, in openings and even on some trails in the Bearcat project area. Japanese stilt grass, Mimosa and Multiflora Rose are also found in scattered locations and others are likely to occur as well.

Wildlife Ponds and Water Sources

Currently within the analysis area, there are two small wildlife ponds. Neither of these ponds holds water year round. In addition to this Dry Creek, which is the main stream course through the area, holds pools of water in several locations during the dry summer season and has partial flow year round.

Proposed Action

As a result of the high quality forage openings, savannahs and woodland treatments proposed, structural and species diversity would increase among stands within the analysis area by approximately 12%. (See Table V-2). Species diversity would increase indirectly as a result of releasing less shade tolerant species to grow as light availability increases within savannah and woodland treatments (Hunter 1990 pp. 50-51). Within openings created, although between stand diversity would increase, species diversity would decrease as only selected high quality forage plants are planted within these areas.

Alternatives	Increase In Structural Diversity	Total Early Seral Acres Existing 0-20 Age Class + Increase
Proposed Action	703	860
Alternative 1	0	157
Alternative 2	703	860
Alternative 3	619	776

Table V-2 - Changes in between stand diversity within the analysis area.

Direct and Indirect Effects

High Quality Forage Openings

In creating these openings, impacts would occur to all the tree species as well as understory and groundcover as they are removed either through harvesting or heavy equipment. The structural diversity within the stands would be reduced although between-stand-diversity would increase as age class conditions are changed. As these areas are prepared and planted to primarily cool season grasses and forbs, native species would be reduced within the areas. Subsequent treatments including the use of herbicides and prescribed fire would prevent woody species from becoming re-established within the openings. As most of these areas have low site capabilities (SI <60) there would be little impacts to the potential growth of merchantable trees in the future. These openings would contribute to meeting Forest standards to improve winter forage conditions for wildlife including elk.

Oak/Pine Savannah

Much of the overstory would be removed as a result of treatments to restore oak/pine savannah conditions. Subsequent actions with equipment would remove much of the understory and

groundcover as seedbeds are prepared. Planting of native warm season grasses and forbs would supplement native recruitment of these species once the site has been prepared although prescribed fire used at repeated intervals and herbicides would prevent the re-growth of much of the woody understory. The structural diversity within these stands would be reduced although between stand diversity would increase as age class conditions are changed.

Overall these treatments would act to accelerate the process of savannah restoration in these areas which would help meet the desired future conditions for this management area (3.K) to "have an area dominated by grass and herbaceous under stories with widely spaced large oaks or pines..."(RFLRMP p 2-77).

Oak/Pine Woodland Restoration

Effects would be similar for the areas being restored to oak or pine woodland conditions as for savannahs except that there would be slightly greater residual basal area (BA) or stem density of trees (30-40BA). There would also not be any ground preparation using heavy equipment to prepare a seed bed so native herbaceous species would have less impact. The structural diversity within these stands would be reduced although between stand diversity would increase as age class conditions are changed. Prescribed fire used at repeated intervals and herbicides would both reduce some of the midstory and some herbaceous species present. Over time (3-10 years) burning and herbicide treatments would favor the recruitment of more native herbaceous species while reducing more of the woody mid and understory species.

Overall these treatments would help restore woodland conditions in areas where historically these conditions were likely to have prevailed prior to fire suppression. They would also help meet the RLRMP desired future condition to restore and maintain pine and oak woodland on the Forest (RLRMP 2-10).

Commercial Thinning

With this action, the desired forest condition to maintain a healthy forest would be supported (RFLRMP). This type of harvesting in these stands would maintain growth and improve overall stand vigor as low quality sawtimber is removed, allowing the remaining overstory to take advantage of additional space and light as competition is reduced (Graney 1983 p. 6). Species diversity would increase temporarily as partial canopy removal releases shade intolerant species. Structural diversity should not change measurably. Growth and vigor in thinned stands should continue to be maintained as residual trees increase in diameter. Immature poletimber stands are likely to put on measurable new growth within the next 10 years (USDA Forest Service, 1970, page 8). Thinning would help reduce competition in stands allowing better growth of residual trees as moisture and nutrients are freed (USDA For Ser #165, 1983 p. 7). Another effect of commercial thinning would be a reduced number of trees in the overstory as low quality trees and trees that are more susceptible to insect infestations are removed with the remaining being the best shaped and healthiest trees in the stands. As the forest canopy would remain intact due to the limited nature of this thinning, the age class of these areas would not be affected and later seral stage

stands would continue to provide habitat for late successional wildlife species.

Prescribed Burning

Burning would primarily consist of underburns that would be light in severity and of short duration. 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. 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 depending on fire intensity. However some hardwoods have the ability to 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 can injure or kill pine and hardwood species, depending on the type of fire and intensity.

Where prescribed burning is planned in savannah and woodland areas, primarily smaller diameter vegetation (1¼ inches in dbh and less in diameter) would likely be impacted, with occasional scorching to larger diameter trees. Growing season burns could increase the likelihood of impacts to larger diameter trees and herbaceous species that are not fire tolerant. One long term study that evaluated the effects of prescribed burning in different seasons determined that winter burning produced greater species richness for forbs, grasses and legumes than any other season of burn. It came to the conclusion that “winter burning may be just as beneficial for any management decisions as growing-season bums” (Kush, 1999). Another study evaluated effects of different seasons of burning on overstory trees in oak hardwood forest where shelterwood treatments had been applied. In it is disclosed that overall 70 to 85% of overstory oaks were essentially unaffected by prescribed burning regardless of the season, with spring fire causing the greated damage to residual overstory trees; summer slightly less damage and winter the least damage (Brose, 1999). It may be as oak savannah and woodland areas move more toward the desired condition in time, that damage to overstory trees would be reduced as fuel conditions change.

Overall this treatment would help create and maintain an open understory, stimulating growth of native grasses and forbs, and increasing foraging for browsing animals.

Non-Native Invasive Species (NNIS) and Woody Vegetation Control -

The Proposed Action would improve native vegetation by suppressing, containing or eradicating NNIS on treatment areas. It would assist the re-establishment of native plant communities by removing dominant and aggressive NNIS as well as controlling competition where woody stems encroach into openings or as support in restoring savannahs and woodlands. With this action there

would be a noticeable decline in NNIS overall, and an increase in native plant abundance and vigor. As NNIS are removed and the bare soil fills in with native plants, the plant community would become more resistant to re-establishment of NNIS.

Manual or mechanical methods when used in conjunction with selected herbicide treatments would enhance the effectiveness of treatments to some species (e.g. mowing sericea lespedeza before it goes to seed and then spraying it with herbicide when it resprouts).

Where herbicides are applied, individual, non target ground cover plants or small patches of native plants (if they are interspersed with NNIS) may be impacted. However, the loss of native plants would be temporary and small relative to the area treated. These temporary reductions in native plants would vary primarily by the NNIS treatment method used.

Applications at prescribed rates should not eliminate any native populations from the plant community. Herbicides constitute a short-term disturbance to plant communities that have evolved to withstand and recover from long-term changes and disturbances (USDA, 2003). If infestations remain untreated, they could expand and reduce native vegetation through competition.

Once the dominant NNIS are removed or killed, community diversity is expected to be re-established from the existing seeds in the soil and seeds from adjacent areas. It is expected that at least the grasses or other early-seral plants would recover within treated areas within the first growing season (typical for recovery on most sites), and abundance and diversity of native plants would increase over the following few years. Re-establishment of vegetative cover is key in prevention of NNIS reinvasion restoring native plant communities.

Treating NNIS prior to or in conjunction with other actions proposed would help contain infestations while they are relatively small and prevent spreading NNIS into uncontaminated areas by vehicles, equipment, foot traffic etc.

Specific Herbicides:

Glyphosate – is a wide spectrum herbicide and is effective in treating a variety of annual and perennial herbaceous species including grasses. It is not as effective in penetrating woody bark. Because it is non-selective, application or drift spray could effect non-target vegetation if care is not taken. Protective measures identified in Chapter 1 and following label directions would minimize effects to non-target species.

Where it is used for aquatic treatments, only specified formulations would be used that are registered for aquatic use. Glyphosate by itself is essentially nontoxic to submersed plants.

Glyphosate is metabolized by some plants, while others do not break it down. Glyphosate would remain in soil unchanged for a varying length of time depending on soil texture and organic matter content. Soil microorganisms break down glyphosate and the surfactant used (in formulations such as Roundup) to carbon dioxide.

Glyphosate is strongly adsorbed to soil particles, which prevents it from excessive leaching or from being taken up from the soil by non-target plants. It is degraded primarily by microbial metabolism, but strong adsorption to soil can inhibit microbial metabolism and slow degradation. The half-life of glyphosate ranges from several weeks to years, but averages 2 months. In water,

glyphosate is rapidly dissipated through adsorption to suspended and bottom sediments, and has a half-life of 12 days to 10 weeks (See USDA, SERA 2003a for further information and details).

Triclopyr – is a selective systemic herbicide used to control woody and herbaceous broadleaf plants. Triclopyr controls target weeds by mimicking the plant hormone auxin, causing uncontrolled plant growth that leads to withering and death. It is absorbed through the roots, foliage and green bark of plants. Grasses are not as susceptible to this chemical. Triclopyr is especially effective against root-or stem-sprouting species.

The average half-life of triclopyr acid (the parent compound) in soils is 30 days. Offsite movement through surface or subsurface runoff is a possibility with triclopyr acid, as it is relatively persistent and has only moderate rates of adsorption to soil particles. In water, the salt formulation is soluble and, with adequate sunlight, may degrade in several hours. Protective measures identified in Chapter 1 and following label directions would minimize effects to non-target species (See USDA SERA 2003b for further information and details).

Metsulfuron methyl – is a selective herbicide used to control brush and certain woody plants, annual and perennial broadleaf weeds, and annual grassy weeds. It is water-soluble and remains in the soil unchanged for varying lengths of time, depending on soil type and moisture availability. The half-life can range from 120 to 180 days. Soil microorganisms and chemical hydrolysis break it down (SERA 2000,).

Under certain conditions, adverse effects on some non-target terrestrial plant species and, to a lesser degree, some aquatic plant species can occur. If ground broadcast applications are used, damage to sensitive non-target species could occur as a result of offsite drift, if protective measures are not taken. When used in directed foliar applications (i.e. backpack), offsite drift could be reduced substantially, but this amount can't be quantified. If metsulfuron methyl is applied in areas where transport to water containing aquatic macrophytes is likely, it would be plausible that detectable but transient damage could be observed. Aquatic algae do not appear to be as sensitive as aquatic macrophytes. . Protective measures identified in Chapter 1 and following label directions would minimize effects to non-target species (See USDA SERA 2004d for further information and details).

Imazapyr - is an effective herbicide in treating annual and perennial grasses, broadleaf herbs, and certain woody species. Even tolerant plants that are directly sprayed with imazapyr at normal application rates are likely to be damaged. Imazapyr is strongly adsorbed by soils, found only in the top few inches of the soil. It is broken down by exposure to sunlight and soil microorganisms. It has a low potential for leaching to ground water, but may reach surface water during storm events over recently treated areas. The half-life of imazapyr in soil ranges from 1 to 5 months. In aquatic situations, imazapyr may undergo photodegradation with a half-life of 2 days. As imazapyr can affect a wide range of plants, care must be taken in its application. Protective measures

identified in Chapter 1 and following label directions would minimize effects to non-target species (See USDA SERA 2004e for further information and details).

(For further information on all chemicals evaluated, reference the process file for this project located at the District office).

Pond Construction

Proposed wildlife ponds would have a negligible effect on the vegetation in the analysis area because of the small number of total acres involved. On pond banks where the canopy remains open, shade intolerant species should persist. Around and in ponds, aquatic plants such as rushes, sedges, and loosestrifes requiring water throughout their life cycle and normally found only around natural springs or along creek banks, would invade and without light as a limiting factor, become established. Planned prescribed burning would increase herbaceous species within the acres prescribed while retarding the growth temporarily of the woody understory (Wigley and Dressel 1991).

Other Associated Actions

[Road Reconstruction/Maintenance & Temporary Road Construction, Large Woody Debris, Road Closure & Decommissioning, Constructing Observation Stations & Interpretive Displays]

Where road reconstruction, maintenance and temporary roads occur, and the canopy is removed shade intolerant species would be expected to increase as they would in various timber cuts. These small openings in the canopy would increase the amount of early seral habitat slightly. Once roads are closed or decommissioning occurs, these conditions would gradually change as the canopy closes again and native herbaceous species re-occupy the road beds. As there is no new road construction, impacts to new areas would be minimal. Construction observation sites or displays would disturb only a minimal amount of vegetation and should have no measurable effect. Large woody debris added to the stream course would possibly require a few trees to be felled, but again there should be no measurable impacts to vegetation.

Alternative 1: (No Action)

There would be no new actions implemented under this alternative.

Species and structural diversity among stands would remain low. The less shade-tolerant species present in the understory (*e.g.* - in hardwood stands -oaks, cherry, ash, etc.; in pine stands - shortleaf pine seedlings) would not be able to adequately develop and become well represented in

the overstory as the stands proceed toward biological maturity (Carwell 1979). Stands that are currently overstocked, that would not be thinned in this alternative, would result in less vigorous growth and increased susceptibility to insect infestation and disease. The overall effect would be to limit future timber production and put sustainability at risk through decreased growth rates. The need to maintain vigor, growth and quality in hardwood stands would not be met.

There would be a decrease in vegetative diversity among and between stands. This trend would not meet the desired future condition for this prescription area to restore the savannah and woodland conditions. Most stands would continue to exhibit low species diversity.

The current conditions would continue with a high-risk association for oak decline to occur in mature, predominantly red oak forest types which have xeric stand conditions and low to medium site quality.

There would be no responsive treatment to deal with the spread of NNIS in the analysis area. These NNIS are likely to continue spreading, some along road corridors and into any open areas; others (e.g. stilt grass) would continue to move into wooded moist areas where they would compete with and dominate native species.

There would be no opportunity to reduce fuels through prescribed burning that would help limit the potential for catastrophic wildfire.

Alternative 2: (No Herbicide)

Effects would be similar to the Proposed Action with the following exceptions.

As no herbicides would be used in establishing and maintaining the high quality forage openings, or in restoring savannahs or woodlands; repeated mechanical treatments would be required to attempt to reduce woody competition and remove any NNIS present. Repeated soil disturbance would be necessary to remove woody stems in the openings and savannahs. It is likely, due to the high costs associated with repeated manual and mechanical treatments, that fewer acres of openings would be created. The repeated use of equipment would increase the likelihood of spreading NNIS seed into uncontaminated areas.

Mechanical methods such as mowing, dozing, and disking would be less selective and effects to non-target plants would occur. The expanded use of mechanical methods would have a greater potential effect to non-target vegetation than through the selective use of herbicides. Additional grading and disking would involve repeated disturbance of the soil surface, providing a favorable substrate for seed of undesirable species, including noxious NNIS. Equipment could transport seeds and other plant parts capable of establishment on the disturbed soil surfaces. NNIS found along roadsides would continue to be available to spread to adjacent areas when soils are disturbed. Mowing could be an effective means of controlling some NNIS (mowing sericea lespedeza before it sets seed repeatedly over a number of years) where accessible through a long term mowing program, but some areas would likely be inaccessible to such equipment. Some noxious NNIS species, are adaptive to mowing regimes and would overcome the adverse pressure

of mowing by altering their growth form to flower and set seed below the level of a mower deck (Callihan, et al. 1995 and Lass, et al. 1999).

Effects of other treatments would be the same as the proposed action.

Alternative 3 (No High Quality Forage Openings)

Effects would be similar to the Proposed Action except that all high quality forage openings proposed would be managed as savannahs.

As a result the proportions of acres treated would change. There would be a small reduction in early seral habitat created. More native grasses and forbs would be retained in this alternative. There would also be less of a reduction of within stand diversity than if openings were completed, as at least some of the overstory would be maintained. The primary emphasis would be on establishing native warm season grasses and forbs. Between stand diversity would be slightly less as more acres would be retained in savannahs and there would be no new openings to add that variety to habitat.

Cumulative Effects

Proposed Action and Alternatives

The difference between the acres proposed in the proposed action and action alternatives is not great. Including all past, present and foreseeable future actions would result in approximately 860 acres for the proposed action, ; 860 for Alternative 2 and 860 for alternative 3 776 acres of early seral stage vegetation (0-20 years). In Alternative 1 age classes would not change, additional private land brings the total early seral acres to 157. These would include those acres of private land currently in regeneration or that are pastures.

In the Action Alternatives, early seral habitat would be maintained over time by the cumulative actions described. In Alternative 1 early seral community types are dependent on actions on private land and continued maintenance of the existing openings on Forest Service land. Mid seral community types would decline over time as succession takes place unless some type of disturbance takes place.

In the Action Alternatives structural diversity would increase at the landscape level as a result of the change in age class distribution where openings and savannah/woodlands are planned. Otherwise, there would be no increase in age class diversity to meet the desired future condition to meet the desired future condition for this Prescription Area (3.K.) which should be “an area dominated by grass and herbaceous under stories with widely spaced large oaks or pines”.

The potential effects of oak decline would be reduced over the next rotation for mature stands (>=50 years old) that have some form of canopy removal or reduction in the proposed action and alternatives 2-3. For alternative 1 the potential effects of oak decline would continue to increase as

hardwood stands age and become more susceptible to oak decline factors. Impacts from such insect species at the red oak borer would become more likely as aging oaks become less resilient to insect pests. As even with the actions proposed, portions of the analysis area in would likely begin to develop signs of oak decline over the next rotation especially on poorer sites where red oaks predominate unless some active management or natural disturbance takes place to reduce this effect. The predominance of older hardwood stands in the analysis area coupled with lower site index, among other factors, would likely predispose these stands toward increasing oak decline (See Existing Conditions for Oak Decline). The majority of the acres (80%) in the analysis area exceeds 70 years of age. Even with any of the action alternatives which would reduce this by approximately 10%, within 10 years the majority of acres would still be over 70 years of age (analysis indicates any stand >=50 years old is at risk). Evidence of oak decline is more likely to occur in untreated hardwood stands with a corresponding decline in the health and vigor of affected stands along with a loss of timber volume and growth.

The analysis area has approximately 4,564 acres of 71+year old stands. Many stands are mature now, while others would grow into mature stands and would decline in the mid-seral vegetation communities. Where harvesting opens the canopy, there would be a short-term effect that would slightly increase the early successional stages of vegetation. Within 10 years, there would range between 11-12% of the analysis area in the 0-20 age class (depending on action alternative). However, in alternative 1 within 10 years, there would be less than 2% of the managed Forest Service acres in the analysis area in the 0-20 age class. Structural diversity would continue to be low.

Cumulatively, the overall stand vigor and health of the analysis area would be improved with the implementation of the action alternatives. Reduced competition for water, sunlight, and nutrients would create an improved growing environment for the residual species including the red oaks and make them more resistant to various disease and insect infestations. There would be enhanced growth of the remaining shade intolerant trees including cone production in shortleaf pine and hard and soft mast production in various shade intolerant hardwood species.

Prescribed burning would resemble the natural fire events that helped develop the overstory, midstory, and understory types that probably existed historically. Overall the cumulative effects where action alternatives are applied would be an increase in diversity of fire tolerant plant species found in the analysis area as well as providing for fuel reduction that would help prevent catastrophic wildfires. In Alternative 1, prescribed burning would not occur and species diversity would continue to decline. There would be no reduction of fuels to aid in the control of wildfires.

In all Action Alternatives, effects include potential short-term reduction in nontarget vegetation from herbicides applied in ongoing NNIS treatment projects in the analysis area, on private inholdings (should they occur). There would also be continued spread of NNIS through activities that disturb the soil, such as dispersed recreational activities. In Alternative1 this is likely to be occur at a greater rate due to both the lack of NNIS control actions as well as the lack of road closures and decommissioning which would limit NNIS dispersal through recreational activities.

Long-term ecosystem restoration projects would compensate for activities that remove or damage native vegetation, including short-term removal of nontarget plants from this proposed project.

NNIS control would be beneficial over the long term as management activities would result in increased abundance and diversity of riparian, grasslands and other ground vegetation.

Other than the direct, indirect, and cumulative effects mentioned above from the proposed treatments, and from past, present committed, or reasonably foreseeable future activities there should not be any adverse effects expected to the various forms of vegetation as a result of these actions nor as an accumulation of any other impacts conducted within this analysis area.

2. Wildlife

The analysis area used for this discussion totals 6405 acres of which 5727 acres are National Forest lands. Refer to the previous Vegetation section for a more detailed description of habitat conditions currently present. To assess the impacts of this project on wildlife, the analysis would focus upon the Management Indicator Species (MIS) potentially impacted by the actions described in Chapter 2. The foundation for MIS can be found in the National Forest Management Act and Planning regulations (36 CFR 219.19). Briefly, MIS were selected because "their population changes are believed to indicate the effects of management activities" and they were used to help meet the Forest's legal requirement to "preserve and enhance the diversity of plants and animals consistent with overall multiple-use objectives." It is important to remember that MIS are a planning and monitoring tool that reflects a way to analyze a change in conditions. The list below provides information on the current conditions for the 17 MIS chosen for the Forest. The Forest completed a report assessing the population and habitat trends for the MIS (USFS 2001) and has since completed annual Monitoring & Evaluation Reports on the Forest evaluating the status of MIS.

Northern Bobwhite *(Colinus virginianus)* – For the Forest, oak savanna and woodland, restored glades, native fields, early seral forest (0-5) and thinned and burned forest areas. This species is at historic lows on the forest. Long term Breeding Bird Surveys across this species entire range show a marked declined.
White-tailed Deer (*Odocoileus virginianus*) - For the Forest, the preferred habitat for deer can be described as areas of mature hardwood, hardwood-pine and pine-hardwood stands, which provide hard and soft mast, with 0-5 year old regeneration areas, food plots, oak savannas and woodlands and permanent water sources intermixed. The regeneration areas, savanna and woodlands provide cover and along with food plots provide forage.
Black Bear (*Ursus americanus*) - On the Forest, the preferred habitat for bear can be described, as areas that are relatively isolated from disturbance, comprised of mature hardwood, hardwood-pine and pine-hardwood forest types that provide hard mast, with 0-5 year old regeneration areas and food plots intermixed. The regeneration areas provide cover and both the regeneration areas and food plots provide forage and soft mast.
Eastern wild turkey (*Meleagris gallapavo*) - The preferred habitat for wild turkeys can be described as mature hardwood or hardwood-pine stands with open areas (fields, food plots or natural openings) nearby and with a permanent water source readily available. Turkeys appear to be wide spread on the forest.
Prairie Warbler *(Dendroica discolor)* - Optimal habitat conditions include early seral habitat, regeneration areas that are in the 5-20 year old age class, pine-bluestem and oak savanna/woodland habitats. Species monitoring indicates declining trend for this physiographic region.
Yellow-breasted Chat (*Icteria virens*) - On the Forest, the preferred habitat for the chat can be described as regeneration areas and other openings with 1-3 m (3-10 ft) tall brushy vegetation. Identified in RFLRMP as MIS for the St. Francis NF.
Brown-headed Nuthatch *(Sitta pusilla)* - This species is tied to mature open pine stands or pine woodland conditions. The upland Ozarks fall outside of this species range although it is possible historically it was more widespread where mature pine stands once occurred.
Northern Parula *(Parula Americana)* – Habitat is typically where there is mature and moist forests along streams

and within riparian areas. Commonly found along Ozark wooded rivers and streams.
Rufous-crowned Sparrow *(Aimophila ruficeps)* – A very small population occurs on Mt. Magazine in Logan Cty. Primarily a species of the desert southwest. Habitat would include glades or thin shrub/seedling stands with sparse grasses and shrubs.
Cerulean Warbler *(Dendroica cerulean)* – The Arkansas Ozarks are on the southern edge of this species range. Primary habitat includes rich mature forest with mesic to wet conditions. Typically they have larger diameter trees with a defined shrub layer. More commonly found in bottomland hardwoods.
Ovenbird *(Seiurus aurocapillus)* – Typical habitat would include mid to late seral dry-oak deciduous forests with limited understory. Nesting occurs on the ground. Species well distributed in the Ozark Uplands.
Red-headed Woodpecker *(Melanerpes erythrocephalus)* – Preferred habitat would include open woodlands or pines. Requires dead trees and snags for nesting. Species is uncommon on the Forest.
Pileated woodpecker (*Dryocopus pileatus*) - The preferred habitat for the pileated woodpecker can be described as mature stands of any species or species mix with large dead snags and down woody debris on the forest floor. USFWS Breeding Bird Surveys show this specie is stable or increasing for this physiographic region.
Scarlet Tanager *(Piranga olivacea)* – Mature deciduous forest and rich upland forest is the preferred habitat for this species. In suitable habitat this species is not uncommon on the Forest. Long term Breeding Bird Surveys for this physiographic region indicate that this species is increasing.
Acadian Flycatcher *(Empidonax virescens)* – Prefers moist deciduous forest near streams and bottomland hardwoods. Not uncommon on the Ozark NF in riparian areas.
Small-mouth Bass (*Micropterus dolomieui)* - Cool, clear, mid-order streams, greater than 10.5 m (35 ft), wide with abundant shade, cover and deep pools, moderate current, and gravel or rubble substrate characterize optimum riverine habitat. The largest stream populations of smallmouth bass occur in streams with gradients of 0.75-4.70 m/km, (3-15 ft/mi), that provide alternating pools and riffles, support. Standing crop is generally largest in pools deeper than 1.2 m (4 ft.). In suitable habitat this species is indicative of high water quality.
Largemouth Bass (*Micropterus salmoides)* – prefers larger ponds, lakes resevoirs, slugh and river backwaters. Usually found close to shore in lakes and reservoirs. This species prefers warm qujiet waters with low turbidity, soft bottom and beds of aquatic plants.

Table WL1 – Management Indicator Species for the Ozark-St. Francis National Forest

A more complete description of the habitat relationships for these species can be found in the process file and reference section of the EA and are tiered in part to the Nature Serve database: http://www.natureserve.org/ , Bird Conservation Report: http://www.rmbo.org/pif/pifdb.html and a Land Manager's Guide to Birds of the South: http://www.srs.fs.usda.gov/pubs/2702

Management Indicator Species Selected for this Project

The entire list of 17 MIS was reviewed and a subset selected as MIS for this project. Species with no known occurrence within the project area or lacking suitable habitat were not selected as MIS for this analysis.

Common Name	Selected for Project (Yes/No)	Notes/Comments
Northern Bobwhite	Yes	
White-tailed Deer	Yes	
Black Bear	Yes	
Wild Turkey	Yes	
Prairie warbler	Yes	
Yellow-breasted Chat	No	Management Indicator Species Identified for the St. Francis NF in the RLRMP
Brown-headed Nuthatch	No	Outside of this species range; no suitable habitat within the analysis area
Northern Parula	Yes	
Rufous-crowned Sparrow	No	Found only on the Mt. Magazine Ranger District
Cerulean Warbler	Yes	
Ovenbird	Yes	
Red-headed Woodpecker	Yes	
Pileated Woodpecker	Yes	
Scarlet Tanager	Yes	
Acadian Flycatcher	Yes	
Smallmouth Bass	Yes	
Largemouth Bass	No	No suitable habitat occurs within the analysis area for this project

Table WL2 – Selected MIS for the Bearcat Phase 1 Project

The Bearcat Phase 1 analysis area is 89% National Forest and 11% private land. Of the National Forest lands, the majority of the forest is oak/hickory (88%) with some shortleaf pine interspersed (9%%) and the rest in mixed composition stands (2%). In addition there are 32 acres of existing fields planted for wildlife. Figure WL1 displays the breakout of the forested stands by age class for the National Forest portion. As can be seen, most of the stands fall in the 71+ year old category. The amount of acres that reflect late-successional characteristics equals 79% of the National Forest acreage. Conversely, there is very little acreage (<1%) that could be considered early successional (32 acres of openings).

The private land is broken down into three categories: non-forested (*e.g.* pasture, fields, agricultural), land currently in regeneration and wooded. Because we do not have any field data on private land, the acreage assigned to each of the categories is the best estimate we have taken from local knowledge about the area and various landowners. The breakdown is 73 acres in non-forested land and 605 acres in wooded. Without accurate age data for the wooded portion of private land, it is not possible to assign them a particular age class. However, based on our knowledge of the area we assume they fall into the 41-70 age class.

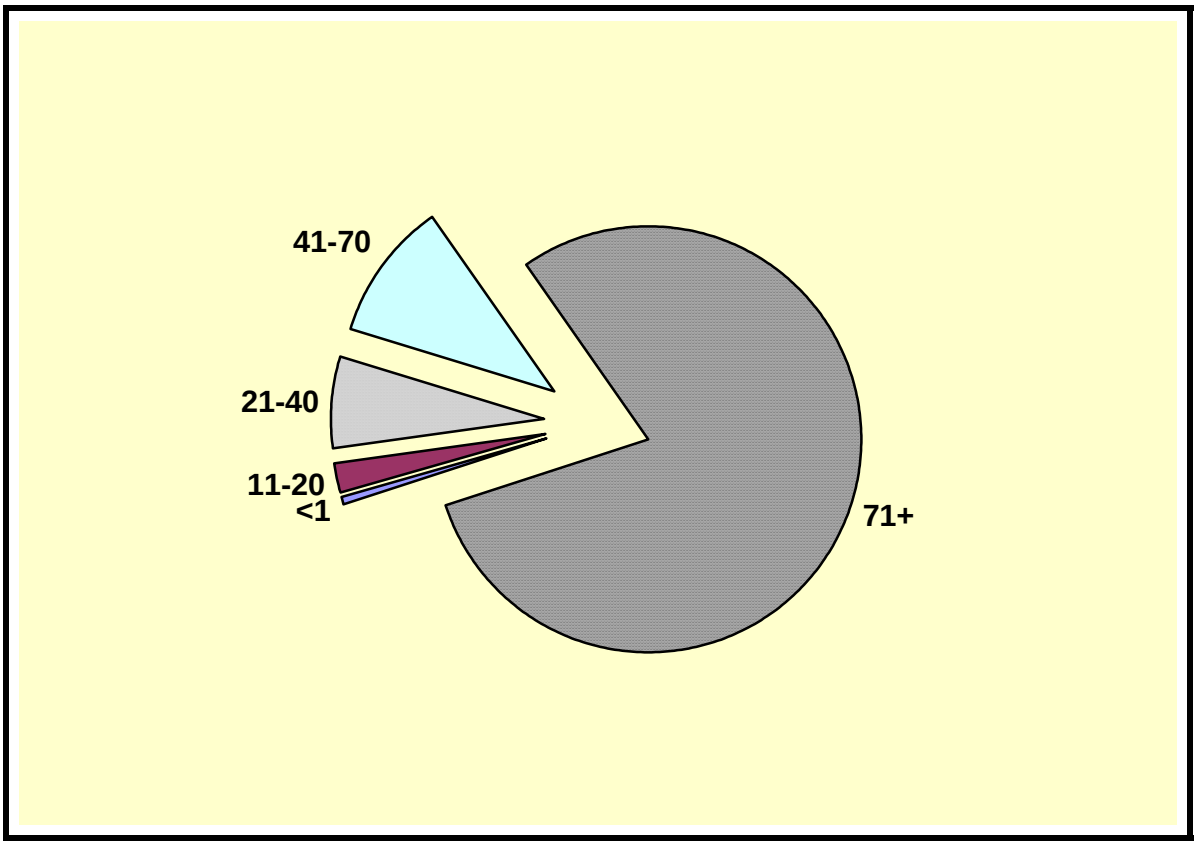

Figure WL1 – Age Class distribution on National Forest Lands in the analysis area.

When the private land is incorporated, the total percentage for the early seral provides a small increase (1%); the 41-70 age class rises from 9% to 19%; and without any additional late successional habitat that we can confirm, the amount of mature forest decreases from 80% (for just the National Forest portion) to 71% (Forest and private lands combined). Private land that has been converted into fescue pastures is included here as part of early seral habitat but does not truly provide what can be described as quality habitat since there is very little food value in them, they tend to be monotypic, and they lack any kind of structural diversity.

Besides vegetation, another important consideration is analyzing potential impacts to aquatic MIS. **The Ozark-Ouachita Highlands Assessment** (1999) notes that the watersheds that contain this analysis area provide for tertiary levels of species richness in its fishery. This means that considering the larger assessment area as a whole, there was a low level of species richness found in the watersheds.

Wildlife Ponds and Water Sources

Currently within the analysis area, there are two small wildlife ponds. Neither of these ponds holds water year round. In addition to this Dry Creek, which is the main stream course through the area, holds pools of water in several locations during the dry summer season and has partial flow year round. As its name implies, Dry Creek is a headwater stream with only intermittent flow. Fish and stream surveys made within the Dry Creek watershed and also downstream at Richland Creek indicate a fair assemblage of aquatic species in the Dry Creek drainage relative to Richland Creek. This is probably a result of the headwater nature of this stream and its limited flows. Stream surveys in 2005 indicate low concentrations of fine sediment consistent with quality stream conditions (USDA, 2006).

Proposed Action

Direct and Indirect Effects

There would be an increase of 703 acres of early seral habitat from the high quality forage openings, oak/pine savanna, oak/pine woodland treatments and small amount of acres added through road decommissioning and closure of temporary roads when they are prepared and seeded. The openings would provide primarily cool season forbs and grasses. This would be very beneficial to wildlife (i.e bobwhite, turkey, deer, elk*) especially during the winter months when nutritional forage is not as available. The savannah areas would provide abundant warm season forbs and grasses. As these areas would have few trees in the overstory, they would provide habitat along with the openings for MIS (northern bobwhite, whitetail deer, black bear, wild turkey).

** Elk (Cervus canadensis or sometimes shown as synonym Cervus elaphus with subspecies or race following) historically were part of the Arkansas Ozarks, and, in fact, once ranged across much of North America (Thomas, 1982). Since settlement much of this range has been reduced due to over-hunting. Elk were re-introduced to Arkansas in the early 1980's (FEIS 3-275) and have since ranged primarily on the Buffalo National River and the Gene Rush State Wildlife Management Area. Habitat provided in these areas is similar to what the proposed action proposes. In the past 25 years, there have been no significant impacts to riparian or other habitats that would impact other native species (pers. comm. C. Bitting). As elk co-existed in the past with such mammals as white-tailed deer, wild turkey and black bear, there is no reason to presume that their re-introduction would impact these species today.*

As elk and white-tailed deer have different foraging strategies, they are unlikely to provide consequential competition to each other. Genetically the elk re-introduced are of the same species as they were historically, although considered a sub-species or

race. Elk as a species have always shown a capability for adapting to a wide variety of ecosystems (Thomas, 1982) See also www.natureserve.org for further discussion of elk.

Restoring woodlands would provide primarily early seral habitat due to the large reduction in the overstory and the increase in forbs and grasses it would provide through repeated prescribed burning. These areas would also benefit early seral dependent MIS species and the communities they represent. Prairie warblers favor habitats such as the savanna and woodlands proposed. As this is a species poorly represented within the analysis area due to lack of suitable habitat, this increase should prove beneficial to this specie. Combining this increase with the existing 105 acres (including private land) yields a total of 808 acres (or 11%) of early seral habitat within the analysis area. The application of the other management treatments included in the proposed action (prescribed burning, mechanical, chemical *etc*.), would help prevent the amount of early seral habitat created under this alternative from returning to<2% within 10 years as those acres grow into the next seral stage (WL2). Given the transitory nature of early seral habitat and the lack of it in the analysis area any additional acreage is valuable for those species. This increase would help to offset the reduction noted above from the aging of existing habitat.

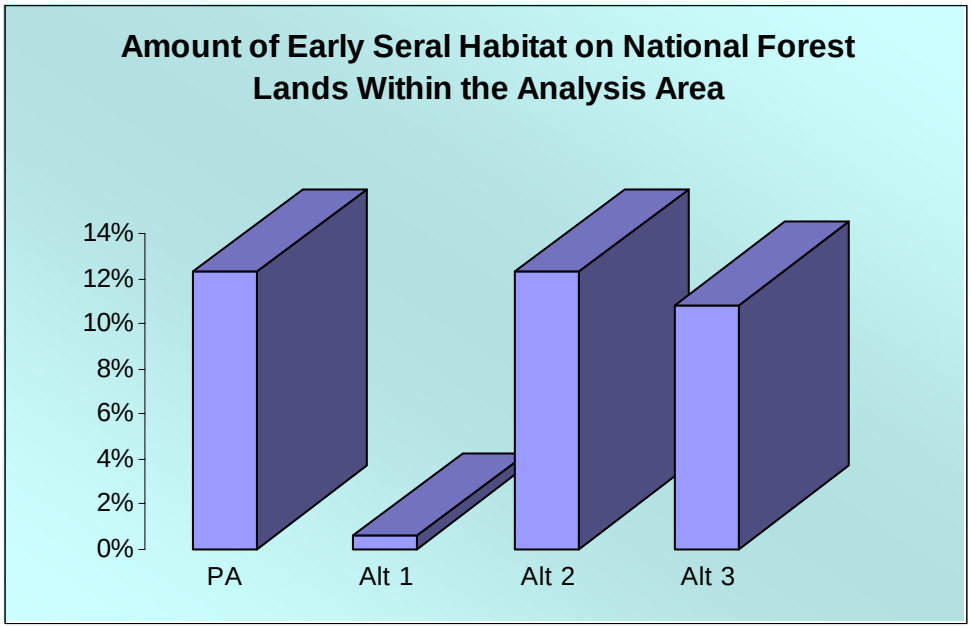

Figure WL2- Amount of early seral habitat on National Forest Lands by alternative.

Mature forest habitat would decline by 581 acres as a result of the openings, savanna and woodland treatments. The result is that there would be a reduction of 10% (70% versus 80%) of mature forest habitat on the National Forest portion of the analysis area. This reduction would be lost in the next 10 years as the forest continues to age and new stands enter mature forest conditions from those currently aged 60+ years-

old. Any thinning in the mature stands would not cause a change in the seral condition because relatively few trees are removed and the overstory remains intact.

Even though this alternative results in some reduction of acreage of late seral habitat harvested, the relative amount of the reduction is small (Fig. WL3). The habitat of the analysis area would still favor those MIS that rely on mature successional habitat components (pileated woodpecker, scarlet tanager) since there would still be thousands of acres of late seral habitat available and more developing as the stands age.

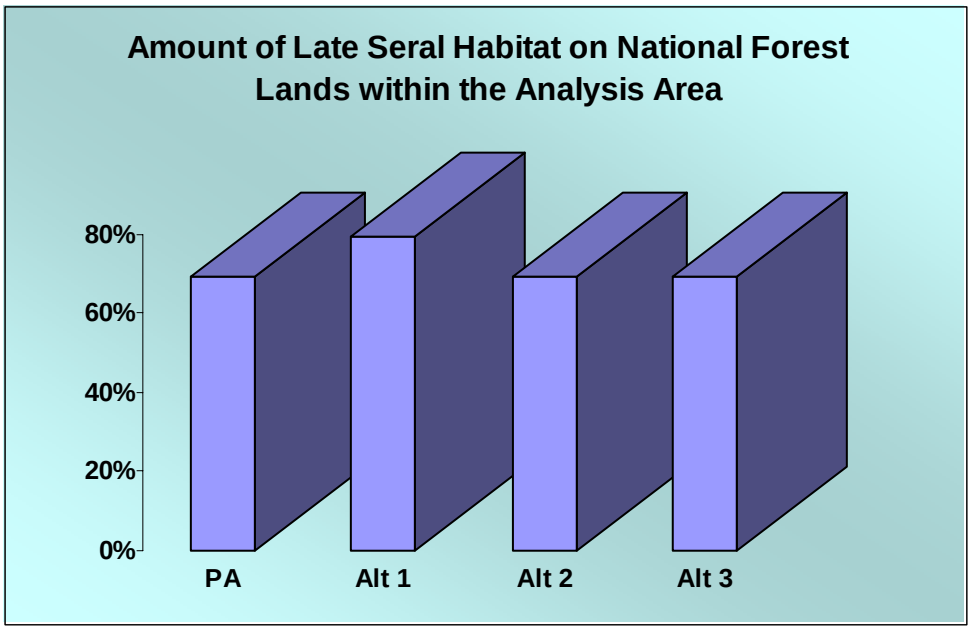

Figure WL3 – Amount of late seral habitat on National Forest lands by Alternative.

For those MIS that depend on some portion of their diet in hard mast (deer, black bear, turkey) there would be small reductions in potential production as some mast producing trees are removed (Fig. WL4). This alternative would remove some of the mast producing trees. The reduction would result in only minimal impacts since overall the analysis area would still be characterized as a landscape with thousands of acres of hardwoods that are capable of producing hard mast.

The MIS Cerulean warbler prefers mature mesic hardwood stands with larger diameter trees. Much of the analysis area does not support such conditions (GIS analysis of stand data, 2006) although transient use has been observed during the spring migration period. Approximately 536 acres could provide potential habitat although there is some

question as to how area sensitive this species is and whether sufficient core contiguous habitat is present that would support nesting pairs Nature Serve, 2006). Only six acres of the habitat identified would be impacted by the creation of early seral habitat. There would be about 67 acres of suitable habitat where thinning would occur, but this would not have negative effects on this MIS as only limited canopy is removed. The small gaps created may be beneficial to this species providing additional foraging areas (Perkins, 2006).

In the analysis area approximately 4740 acres of hardwoods provide potential habitat for the MIS Ovenbird. Of these mid to later seral hardwoods, 268 acres (6%) would be impacted through the creation of openings and restoring savannahs and woodlands. Management to maintain these areas in early seral conditions would likely make this habitat undesirable to this species. Commercial thinning on 107 acres (2%) may also negatively affect this species habitat if openings in the canopy alter understory conditions (Nature Serve, 2006). Even with these effects, the majority of potential habitat (92%) would continue to provide suitable habitat for this MIS.

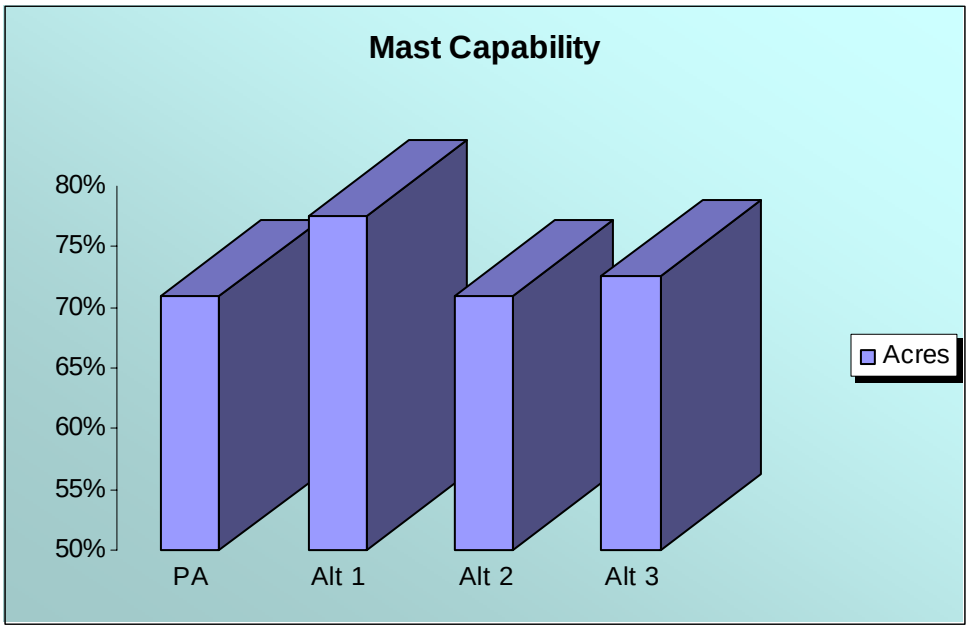

Figure WL4 – Percent of 41+ year-old mast producing stands within the analysis areas on National Forest Lands by Alternative

Red-headed woodpeckers are uncommon on the Forest, but would be expected to increase as oak savannas and woodlands are restored (FEIS pp 3-147-163). Currently there is no measurable suitable habitat within the analysis area. As most of the acres provide mature forest habitat without the open vertical structure that is beneficial to this species. The addition of savannah and woodland acres would add 367 acres of suitable habitat. The creation of openings would not be as beneficial due to the limited

vertical structure (brush piles) and commercial thinning might provide some limited benefit.

The prescribed burning would not alter the seral stage of any forested stand. The burn would not be intense enough (by design) to kill many stems greater than 2 or 3 inches in diameter. There would be a short term clearing of the understory and an increase in herbaceous vegetation. In the long term, with repeated burns, there would be a reduction in the density of understory and an increase of grasses and forbs.

There is limited information available on the effects of summer prescribed burning on wildlife species. Few studies have been done that have evaluated effects of prescribed burning to neotropical birds and little is known of impacts (Thompson, 1998). Protective measures and monitoring listed in Chapter 2 put in place prior to a summer burning program would provide information that should help balance the known benefits with possible impacts.

Both the Northern Parula warbler and Acadian Flycatcher depend on the mesic conditions more likely found within riparian areas associated with flowing streams and moist soil conditions. These areas usually have more diverse vegetation that is typical of such habitat. It is not uncommon to find these species in such areas. Currently within the analysis area, there are approximately 366 acres of this type of habitat (GIS analysis, 2006) identified. Because treatment areas have been laid out to primarily avoid these riparian areas along with the protective measures discussed in Chapter 2, there should be no impacts to these MIS.

Because most of the soil disturbing activities for this project are planned on the ridge tops, little impact to aquatic species is expected from sedimentation. Activities that interfere with aquatic habitat or alter the stream course could provide impacts to Small mouth bass. Road construction, logging, prescribed burning and excessive recreational use (OHV) could add sediments to streams reducing the quality of habitat beneficial to this MIS; however, given the existing high quality of the water along with the use of Best Management Practices and the standards in the RFLRMP, there would be no measurable impacts from proposed activities that would result in negative effects to aquatic MIS (USDA, 2006; Whalen, pers. com.). See also Water Quality section of EA.

Non-Native Invasive Species (NNIS) and Woody Vegetation Control

Efforts to control or eradicate non-native noxious weeds (NNIS) would improve wildlife habitat by allowing for the restoration of native vegetation and improvements in biological diversity. These improvements would primarily benefit those species that rely on the displaced habitat. As NNIS are removed, wildlife species would benefit from the more diverse native habitat. Control efforts of woody species would help restore both

native species components, and also help in the providing ongoing quality wildlife habitat within the openings.

As treatment areas would typically be small (roadsides, trails, etc.), there should only be a temporary and localized reduction in existing vegetation. This would not measurably impact wildlife habitat qualities, due to the limited amount of area that is likely to be treated at any given time. Ground cover vegetation would be expected to return by the first growing season after treatment.

Manual methods of weed control such as hand pulling, cutting or digging would result in minimal changes in wildlife habitat quality. Mechanical methods would primarily involve mowing along roadsides and would result in only minor alteration to any potential habitat. Changes in vegetation structure as a result of treating NNIS would be slight as these species make up only a small part of the overall structure within the analysis area.

Human Health and Ecological Risk Assessments completed by the USDA, Forest Service (See individual SERA references within text and also in the Reference section in the EA) indicate that the proposed formulations of herbicides are either nontoxic or of low toxicity to birds, mammals, and insects. The risk assessments also indicate that none of the herbicide formulations proposed for use have been shown to cause cancer, birth defects, genetic defects, or problems with fertility or reproduction.

A risk analysis of various herbicides to terrestrial wildlife species prepared for the Forest Service (USDA FS 1992) considered toxicity, potential dosage through various routes (ingestion, inhalation, dermal), and length of exposure to a number of vertebrate wildlife species and concluded that potential risks for most wildlife species are low for most herbicides and surfactants using recommended application rates.

The herbicides proposed for use, when used at the application rates and concentrations listed on the labels, following label directions and incorporating Forest standards (See Protective Measures Ch. 1) would have a very low risk of causing harm (short or long term) to wildlife species.

Specific Herbicides

Glyphosate –

Glyphosate is strongly adsorbed to soil particles, which prevents it from excessive leaching or from being taken up from the soil by nontarget plants. It is degraded primarily by microbial metabolism, but strong adsorption to soil can inhibit microbial metabolism and slow degradation. Photo and chemical degradation are not significant in the dissipation of glyphosate from soils. The half-life of glyphosate ranges from several weeks to years, but averages 2 months. In water, glyphosate is rapidly

dissipated through adsorption to suspended and bottom sediments, and has a half-life of 12 days to 10 weeks. Glyphosate by itself is of relatively low toxicity to birds, mammals, and fish; however, formulations that include surfactants have shown high impacts to aquatic systems affecting amphibians in particular. Such formulations are not proposed for use in aquatic systems (SERA 2003a). See also the herbicide discussion in the Vegetation section of Chapter 3.

Triclopyr – The formulation of Triclopyr proposed for use is an amine or salt compound. Salt formulations are relatively nontoxic to terrestrial vertebrates and invertebrates.

The quantitative risk assessment for mammalian wildlife is based on the same data as used in the
human health risk assessment. For birds, the most relevant data for this risk assessment are the standard dietary and bird reproduction studies required for registration as well as the acute oral LD50 studies. The acute oral LD50 values of triclopyr range from 849 mg/kg to 2055 mg/kg, similar to the range seen in experimental mammals.

Based on studies evaluating this, the U.S. EPA/OPP (1998a) has classified triclopyr acid as being practically non-toxic to slightly toxic to birds and triclopyr in its amine formulation as practically non-toxic to birds.

Little information is available on the toxicity of triclopyr to terrestrial microorganisms. Very high concentrations of triclopyr has been shown to cause growth inhibition in bacteria and fungi in laboratory bioassays.

In addition to the laboratory bioassays and field observations on single species or related groups of species, there are a number field studies that have assessed the effects of triclopyr on terrestrial organisms, both animal and plant. There is very little suggestion in any of the field studies that triclopyr had any direct adverse effect on terrestrial species and most reported effects may simply reflect changes in habitat secondary to vegetation management practices.

The risk characterizations for aquatic organisms for triclopyr in its amine formulation are low over the entire range of application rates that may be used in Forest Service programs. Ester formulations (not proposed for use) have higher risk levels for toxicity(SERA 2003b).

Metsulfuron methyl - Metsulfuron is water-soluble and remains in the soil unchanged for varying lengths of time, depending on soil type and moisture availability. The half-life can range from 120 to 180 days. Soil microorganisms and chemical hydrolysis break it down (SERA 2000, Infoventures 1995d). Metsulfuron methyl is practically nontoxic to birds, mammals, invertebrates, and bees (SERA 2000).

Several acute toxicity studies and two reproduction studies are available on the toxicity of metsulfuron methyl to birds. These studies indicate that birds appear to be no more sensitive than experimental mammals to the toxic effects of Metsulfuron methyl, with the major effect again being decrease body weight gain (SERA 2004d).

Metsulfuron methyl has very low toxicity to aquatic organisms. LC50 (96 hour) for rainbow trout and bluegill sunfish are both >150 mg/L. A LC50 (48 hour) for *Daphnia* was also >150 mg/L (EXTOXNET 1996c).

The available data suggest that metsulfuron methyl is more toxic to aquatic plants than to aquatic animals. Clear toxic effects in fish are not likely to be observed at concentrations less than or equal to 1000 mg/L. Aquatic plants are far more sensitive to these effects, with macrophytes appearing more sensitive than algae (SERA 2004d).

Metsulfuron methyl appears to be relatively nontoxic to aquatic invertebrates based on acute bioassays in *Daphnia* with an acute LC50 value for immobility of 720 mg/L and a NOEL for reproduction of 150 mg/L (SERA 2000/2004b).

Imazapyr – Imazapyr is strongly adsorbed by soils, found only in the top few inches of the soil. Imazapyr is broken down by exposure to sunlight and soil microorganisms (USDA, 2004). As such, it has a low potential for leaching to ground water, but may reach surface water during storm events over recently treated land.

Most toxicity studies have failed to demonstrate any significant or substantial association between imazapyr exposure and toxicity. Only a limited number wildlife species that possibly might be exposed to non-target effects have been studied. Bearing this in mind, imazapyr appears to be relatively non-toxic to terrestrial or aquatic animals. No hazards associated with the direct toxic action of this herbicide can be identified for either terrestrial or aquatic animals (SERA 2004e).

Imazapyr is relatively non-toxic to soil microorganisms, aquatic invertebrates, and fish. Imazapyr is not expected to bio-accumulate in the food chain. In terrestrial animals and birds, imazapyr is practically non-toxic. Aquatic macrophytes appear to be more sensitive to imazapyr than unicellular algae. Peak concentrations of imazapyr in surface water could be associated with adverse effects in some aquatic macrophytes. Longer term concentrations of imazapyr, however, are substantially below the level of concern (SERA 2004e).

Pond Construction

At present readily available year round water is a limiting factor for wildlife. The development of ponds would increase the availability of water for a variety of wildlife species (*e.g.*, bats, deer, turkeys, elk, amphibians). The ponds would allow better

utilization of the habitat during the dry time of year and result in expanding and perhaps increasing the size of the populations of those species.

Other Associated Actions

[Road Reconstruction/Maintenance & Temporary Road Construction, Large Woody Debris, Road Closure & Decommissioning, Constructing Observation Stations & Interpretive Displays]

Road reconstruction and maintenance would provide a temporary disturbance to some wildlife species, but after roads are closed or decommissioned and reseeded, wildlife species (i.e. bobwhite, turkey, deer) would have a slight increase of early seral habitat. These areas would quickly close in as the canopy is re-established. Road and trail closure and decommissioning of some roads would limit disturbance to many wildlife MIS species during the breeding season. It would also help with reduce potential wildlife impacts associated with illegal harvesting of game animals (deer, turkey, elk).

Large woody debris added to Dry Creek would be beneficial to small mouth bass that can spawn in the upper reaches of streams (Whalen, pers com 2006)

Construction of observation sites or displays would disturb only a minimal amount of vegetation and should have no measurable effect on any wildlife species.

Alternative 1 (No Action)

There would not be any activities implemented under this alternative.

Direct and Indirect Effects

The amount of early seral habitat in the analysis area would continue to decline as stands providing this stage of habitat succeed to saplings and trees. In less than 10 years most of the early successional habitat would be gone. This means essentially no early seral habitat would be available on the National Forest portion of the analysis area. This would force the early seral species of wildlife (deer, turkey, elk, bobwhite, prairie warbler) to seek out other areas on the District for their needs. Occurrences of these species would remain low.

Acres exhibiting late seral habitat conditions as the stands continue to age. With over 80% of the Forest Service acres already at or beyond maturity, as time passes this percentage would continue to increase. This would continue to provide ample amounts

of habitat for those species utilizing late seral habitat and mast production areas, but with a disproportionate lack of habitat for other MIS.

There would be less habitat utilization during the dry time of year without the development of the ponds. As water is already a limiting factor in this analysis area, condition would remain much as they are with only limited utilization by wildlife species

The lack of thinning any timber stands would result in a higher mortality of younger trees compared to the Proposed Action. The trees would continue to compete for a limited amount of water, nutrients, and sunlight. Their resulting weakened condition would make them susceptible to environmental stress (e.g., drought, insect and disease). This would leave the red oaks in those stands much more susceptible to the red oak borer and result in a reduction of hard mast potential into the future as they succumb to the borer. This in turn would indirectly impact species that benefit from the mast component provided by the forest (e.g. deer, turkey, black bear).

The risk of impacts to the aquatic MIS would be even less than described under the Proposed Action. The reason for this minimal risk is that with no new activities there would only be the background sediment being displaced and as discussed previously, the water quality is considered high with the amount of existing sedimentation from the current level of activities. With no addition of Large Woody Debris to Dry Creek, the opportunity to enhance the small mouth bass population would not occur.

Providing no control over NNIS would allow the continued spread of these species. As time goes on, some habitat for wildlife would be reduced or the quality impaired by expanding monocultures of such species as (sericea lespedeza, Multiflora rose, tree of heaven, Japanese stilt grass). Nesting and ground cover, grass production, seed producing food sources, and even the prey base for predators may be impacted. Although some NNIS are limited to more open areas, there are others (Japanese stilt grass) that freely move into more forested areas.

There would be no short term disturbance from road reconstruction or maintenance, but this is likely to be offset by the lack of closures on some roads and trails that would limit disturbance from excessive recreational use (OHV) and poaching.

Alternative 2 (No Herbicides)

Under this alternative, only manual or mechanical means would be applied to achieve the desired future condition. No herbicides would be used. See Chapter 2 for a more complete description of the alternative.

Direct and Indirect Effects

The short-term impacts on the terrestrial and mast MIS would essentially be the same as those described under the Proposed Action given the similarity in acres harvested (e.g., habitat would continue to favor the late successional species. Early successional habitat would increase by 12% (See Figure WL2).

As no herbicides would be used to treat NNIS or control woody encroachment, there would be more repeat manual and/or mechanical treatments needed to achieve the objective of controlling NNIS. The recovery for native vegetation from these additional treatments would probably take longer which could delay the restoration of savannah and woodlands. As costs would be higher due to the need for repeated treatments, it's likely that limited funding would decrease the probability of success. There would be additional disturbance to the soils because of the repeated treatments and also displacement of wildlife within those areas during those periods. This alternative completely eliminates any potential impacts that herbicide toxicity might pose to any wildlife.

In the places where manual/mechanical NNIS treatments are not successful, or if the spread rate of weeds continues to exceed the rate of control, the long-term effects would be similar to Alternative 1 (No Action). It is likely that increased costs necessary to implement this alternative would result in the treatment of fewer acres. As a result beneficial improvements to native vegetation and wildlife habitat would likely be offset.

Alternative 3 (No High Quality Forage Openings)

Under this alternative, no High Quality Forage Openings would be created. Instead these acres would be converted to a savannah condition where warm season grasses and scattered overstory would occur. Other actions would be the same as the Proposed Action

Direct and Indirect Effects

There would be an increase of 619 acres of early seral habitat from the combination of savannah and woodland restoration. This would provide an increase of 11% of early seral habitat on the National Forest portion of the analysis area. The primary difference in effects for wildlife would be the lack of any cool season forbs and grasses that provide food sources especially during the winter months when forage is scarce. During poor mast producing years, wildlife can help offset shortages when this is available. Large mammals (deer, black bear, elk) could be particular affected and move to more desirable locations outside the analysis areas. Elk in the watershed and on adjacent State management lands would find limited resources available to support their grazing needs. There would also be a small reduction in early seral acres where openings are made into savannahs.

All other effects would be the same as the Proposed Action.

Cumulative Effects for All Alternatives

There are different scales of consideration in discussing cumulative effects for MIS depending on the species: the analysis area for all MIS and either Forest-wide or within the Conservation Region for this physiographic area where breeding birds are concerned. Cumulative effects consider past, present, and reasonably foreseeable future actions. The analysis area is important because it reflects a geographic area that encompasses potential home ranges for individual MIS. The Forest-wide and/or Conservation Region reflect the size of area necessary to adequately speak to MIS populations and trends.

At the analysis area scale, past activities affecting the MIS are the restoration of the wildlife openings at Iceledo and Dry Creek. These acres of early successional habitat were accounted for in the existing conditions and provide what little early successional habitat there is currently. The only foreseeable future activities that may occur are the repeat burns in managing and maintaining savannah and woodland conditions as well as fuel reduction and forest health. Repeated burning would result in a more open understory and increased production of grasses and forbs that would improve the conditions for deer, turkey, and black bear by providing foraging habitat. Since there are no guarantees in funding, there is no way to predict the amount of early seral habitat that would be created. Any amount of additional habitat would help the early seral MIS species because when combining all lands within the analysis area the amount of early seral habitat increases only from <1% to <2% of the area (the percentile change compared to the National Forest figure is a result of adding 73 acres of private lands considered early seral out of the 678 acres of private lands in the area). The transitory nature of early seral habitat makes it important to have continual disturbances in order to maintain the necessary conditions. For the early seral MIS, neither of the action alternatives would contribute towards significant cumulative effects. Alternative 1's lack of habitat creation, combined with the impending reduction of that habitat and the unknown addition from burning, results in an adverse cumulative effect to these species.

The conditions for the rest of the MIS (mast, late seral, aquatic,) would not be changed to any great degree from any planned activities so none of the alternatives would contribute towards any significant cumulative effects on those MIS.

The Forest has seen a dramatic increase in the number of acres affected by the red oak borer (going from less than 25,000 acres of moderate red oak mortality to around 300,000 acres in 2001- based on interpolation of infrared aerial photography. Given

what has within this analysis area thus far, it is reasonable to expect an increase in oak mortality throughout the area. The potential changes from the red oak borer activity would express themselves regardless of implementing any of the alternatives. There is no way to predict the intensity of the outbreak. The more extensive and severe the outbreak - the greater the amount of early seral habitat provided and conversely the greater the reduction in mast production and late seral habitat.

At the Forest-wide scale, the population trends for the MIS species listed below, known or suspected of occurring in the area; were determined to be generally stable to slightly upward (USFS 2001). Table WL3 illustrate the trends for those MIS discussed in that analysis (USFS 2001). Subsequent annual Monitoring and Evaluation Reports done to evaluate Forest programs and projects continues to support that general trend (USFS 2002, 2003). The trends for the other MIS selected for this project are illustrated in Table WL4. These trends general indices of populations for the Central Hardwoods Area which the Forest forms a portion thereof (further details on interpreting this data can be found at: http://www.mbr-pwrc.usgs.gov/bbs/

MIS	Population Trend
Black bear	Up
Eastern wild turkey	Slightly up
White-tailed deer	Slightly up
Pileated woodpecker	Slightly up
Yellow-breasted chat	Slightly up
Smallmouth bass	Up

Table WL3 - From **Management Indicator Species Population and Habitat Trends**, Ozark-St. Francis National Forests (USDA,2001)

MIS	BCR Population Trend
Northern Bobwhite	Somewhat Down
Prairie Warbler	Somewhat Down
Northern Parula	Somewhat Up
Cerulean Warbler	Slightly Down
Ovenbird	Slightly Up
Red-headed Woodpecker	Somewhat Down
Scarlet Tanager	Somewhat Up
Acadian Flycatcher	Slightly Up

Table WL4 - Bird Conservation Region for the Central Hardwoods Area. Trend information provided from USGS Breeding Bird Survey Results (USGS, 2006)

As stated in the MIS report (USFS 2001) early seral is one of the most limited habitats with less than 2% of the Forest in that condition (Fig. WL5). While the current trend for the early seral MIS is slightly up, as discussed in the MIS report, it is likely that this is reflective of both a time lag of response to the relatively recent decline in the amount of habitat and the sporadic creation from natural disturbances and prescribed burning. Implementing any of the action alternatives would help to maintain some amount of early seral habitat and improve the chances of keeping the population trends for those species from declining. The lack of early seral habitat creation under the no action alternative would not help the Forest's situation to keep the populations from decreasing.

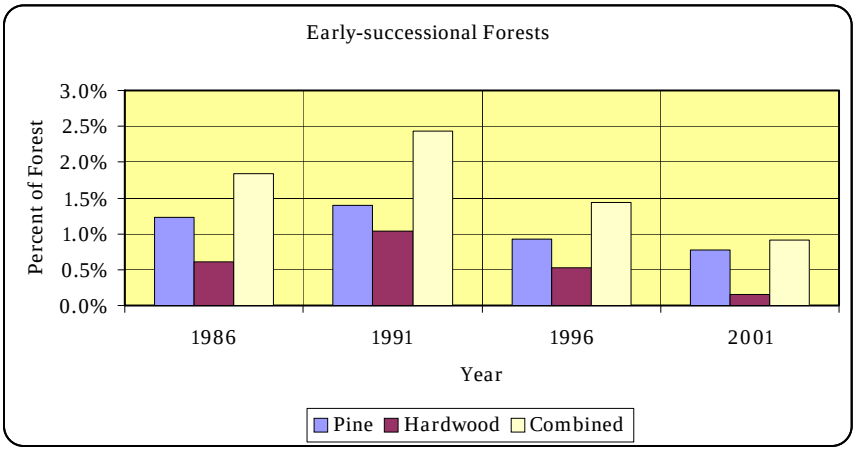

Figure WL5 – Percent of acreage in early successional stage on the Ozark-St. Francis NF, 1986-2001.

Figures WL6 and WL7 display the fact the Forest has large amounts of late seral habitat and high mast production capability and both habitats are increasing. Given the nature and intensity of the alternatives and the fact that the majority of the Forest continues to age past maturity (based on GIS analysis of age class distribution), any of them would continue to contribute to the upward trend for these particular habitats. As a result, there is no reason to believe these alternatives would alter the current population trends for the MIS associated with these habitats (SEE RFRLMP FEIS p 2-32, 2005).

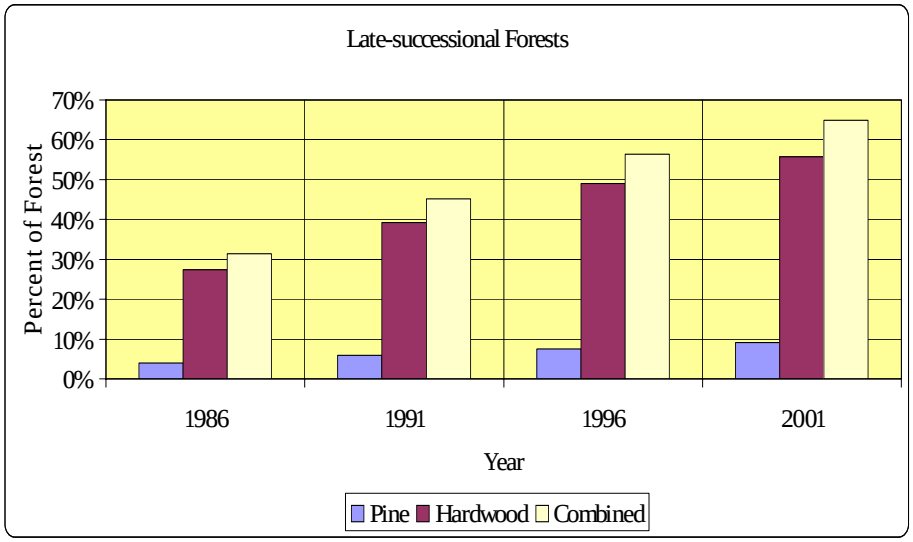

Figure WL6 – Percent of acreage in later successional stage on the Ozark-St. Francis NF, 1986-2001.

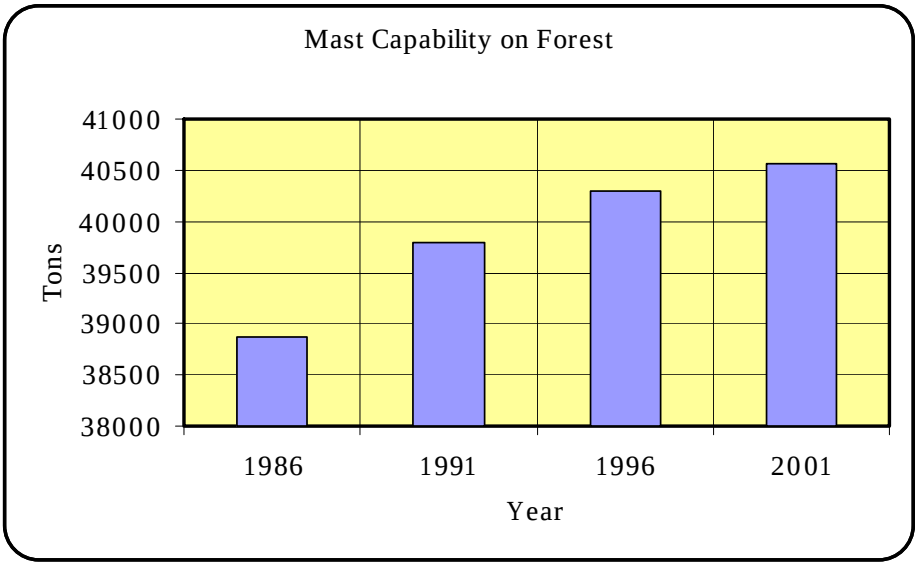

Figure WL7 – Potential mast capability on the Ozark-St. Francis NF, 1986-2001.

The lack of impacts the alternatives would have on water quality is typical of the Forest's planned activities. The aquatic resources on the Forest have remained in a high quality condition over the years. The EPA's Index of Watershed Indicators (IWI) is designed to describe broadly the condition and vulnerability (sensitivity) of aquatic systems across the U.S. For the Forest, the watersheds were ranked as either "better water quality, low vulnerability" (highest ranking) or "less serious water quality, low vulnerability" (second highest ranking) (USFS 1999). These rankings demonstrate the high quality of the watersheds and how well they compare to the rest of the nation. Two other studies confirmed this finding, one was the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) and the other was a Master thesis that looked at the headwaters of various streams across the Forest. NAWQA is a program similar to to the EPA's IWI in that it is designed to compare water quality across the country. The Forest was included in a study conducted in the early 1990's that showed how the water quality in the forested watersheds tended to be very good (Peterson *et al*. 1999). As a result, there is no reason to believe these alternatives would alter the current population trends for the MIS associated with water quality.

3. Proposed, Endangered, Threatened and Sensitive Species (PETS)

Terms Used in PETS Analysis

Biological Evaluation - a document that discloses the effects of management activities on PETS species and their associated habitat that occur or are likely to occur in the analysis area.

Endangered Species - Any species (plant or animal) which is in danger of extinction throughout all or a significant portion of its range and listed as such by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Threatened Species - Any species (plant or animal) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and one that has been designated as a threatened by the Secretary of Interior in accordance with the Endangered Species Act of 1973.

Sensitive Species - Those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

a. Existing Conditions

A biological evaluation (BE) has been completed that examines all known occurrences of Proposed, Endangered, Threatened and Sensitive (PETS) species that occur on the Regional Forester's Sensitive Species list and applicable to the Ozark-St. Francis National Forest. In addition the 19 federally proposed, endangered and threatened species identified through informal consultation with the USFWS (Forest Plan BA) were also considered. All but 5 of those species were eliminated from further evaluation due to one or more of the following factors:

- The Project Area is not within their known, documented geographic range.
- The species has never been documented from within the Project Area or its sphere of influence in field surveys, monitoring activities, reports, or the scientific literature.
- The treatment area does not provide habitat conditions known to be needed or used by the species.

PETS species known to occur or which may occur within project treatment areas or area of influence include:

COMMON NAME	SCIENTIFIC NAME	CLASSIFICATION
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Indiana bat	*Myotis sodalis*	Endangered
Ozark Chinquapin	*Castanea pumila ozarkensis*	Sensitive
Nearctic paduneillan caddisfly	*Paduniella nearctica*	Sensitive
An isopod	*Lirceus bicuspidatus*	Sensitive

This BE is being completed for the actions and alternatives proposed and is hereby incorporated by reference. The BE made use of internal expertise, earlier discussions with the US Fish and Wildlife Service (Conway, AR Office), conversations and species data from the Department of Arkansas Heritage, field reviews by District personnel and collected inventory data on the District (PETS records 1993-2005) and field surveys conducted within the project area in 2005-2006). It also includes literature and database searches for pertinent species data or information.

Below is a summary of the findings from the BE:

Proposed, Endangered or Threatened Species
Bald eagle *(Haliaeetus leucocephalus alascanus)* - Appropriate habitat for the bald eagle includes forested land in proximity to open water. Suitable habitat usually includes a number of very large trees with open branches suitable for roosting, where the potential for human disturbance is minimal. There have been no records of this species within the analysis area.
Indiana bat *(Myotis sodalis)* - The primary distribution of Indiana bats is limited to areas in the eastern United States with major cave regions. Known Arkansas populations consist of winter hibernacula with a total of less than 6000 individuals. This species has been found in one cave location on the Big Piney District. Although habitat is suitable for roosting, previous extensive surveys have not recorded this species elsewhere on the District. Potential suitable habitat is found within the project area, but no individuals were collected during surveys in the area in 2005

Sensitive Species
Ozark Chinquapin *(Castanea pumila var. ozarkensis)* – This species is typically found in mixed or deciduous mesophytic forests in the Ozarks. Due to the presence of the chestnut blight, it exists today largely as stump sprouts in forest

stands. Large, old seed-producing trees are of rare occurrence and typically also have the blight. Monitoring on the forest (Forest GIS records) indicates that this species is still distributed widely, but as stated above, the few trees may be found that do not show evidence of the blight. This species is considered sensitive on the FS Regional sensitive species list. It is considered a "vulnerable" species (S3) by the Arkansas Natural Heritage Commission. This species occurs within the analysis area in several unit areas.
Nearctic paduneillan caddisfly *(Paduniella nearctica)* - Found in 2nd/3rd order streams with permanently flowing streams with gravel or bedrock substrate. Has been reported from the main course of the Buffalo National River. Limited information is available for this species. Potential habitat exists within the project area although it has not been reported on the Big Piney District.
An isopod *(Lirceus bicuspidatus)* - An endemic to Arkansas found in streams and possibly caves with moving water. This species has been reported from the Pleasant Hill District, but not on any other District. Historical records indicate it in scattered locations in a number of counties; not much is known of this species and there is some question on the taxonomy (NatureServe, 2006). Potential habitat exists within the project area.

No critical habitat for any PET species has been identified within the analysis area. For a complete description of each species needs and habitat conditions, reference the BE and its Appendix found in the process file for this project.

EFFECTS

Effects Common to All Alternatives

Based on consultation with the US Fish and Wildlife Service (USFWS) , Endangered Species Office, none of these alternatives are likely to adversely affect the Indiana bat (USFWS 2006). The USFWS concurs with the findings of the BE regarding no effect on the bald eagle. Actions proposed are limited both in time and duration of activity and there is abundant habitat adjacent to these areas suitable for the winter roosting needs of this species.

Protection measures and monitoring to be applied are described in Section II under Protection and Monitoring in this Assessment and also referenced in the Biological Evaluation. For sensitive species, if found within an area individuals may be impacted in populations that have suitable habitat but are not likely to cause a trend to federal listing or loss of viability.

The only documented sensitive species that has been found within the project area is Ozark chinquapin which has been reported in some proposed treatment areas. This species may experience a short-term benefit where canopy removal

has occurred or may occur. This would result from reduced competition for nutrients and sunlight.

Cumulative Effects

Including all cumulative effects (past, present and foreseeable future actions) results in a “may affect -not likely to adversely affect” determination for the Indiana bat. There should be no effect on any other identified federally proposed, endangered or threatened species.

Of the sensitive species identified as occurring within the analysis area, Ozark chinquapin will likely continue to decline overall due to the effects of the chestnut blight across its known range. Because of the protection measures identified in the RFLRMP and in Chapter 2 of the EA, sensitive species are not likely to be affected. For the sensitive species identified there is a determination that actions may impact individuals but are not likely to cause a trend to federal listing or loss of viability.

C. Social Factors

1. Recreation

Existing Conditions

The analysis area for evaluating effects on recreation would be the watershed boundaries of the Dry Creek drainage a tributary of the Lower Richland Creek HUCs 6 watershed. The project area lies within Newton and Searcy Counties and is located between Eula, Witt Springs, Bass and Iceledo Gap.

The area recreational opportunities are numerous with the following designation;

One Special Interest Area (Stack Rock)
The Ozark Highland Trail that transects the middle of the project area
The Project Area borders north side of the Richland Creek Wilderness access located near Iceledo Gap.

The only special recreational designation that has a buffer zone or corridor is the Ozark Highland Trail which was designated by the Forest Plan. Special Interest Areas such as Stack Rock were established by the Forest Plan, but no buffer zones were created/identified adjacent to any of these designations. As far as the Wilderness Act that established Richland Creek Wilderness it specifically states:

> "Section 6(i) NO **BUFFER ZONE**S.—The Congress does not intend for the establishment of the Conservation Area or the Wilderness to lead to the creation of protective perimeters or **buffer zone**s around the Conservation Area or the Wilderness. The fact that there may be activities or uses on lands outside the Conservation Area or the Wilderness that would not be allowed in the Conservation Area or the Wilderness shall not preclude such activities or uses on such lands up to the boundary of the Conservation Area or the Wilderness consistent with other applicable laws."

Hunting for whitetail deer, squirrel and eastern wild turkey is a popular recreational activity in this area. Dispersed camping can be found from hikers, hunters, rock climbers or visitors seeking solitude with some sites inside and some just outside the project area. These sites receive moderate use with the peak use in spring and fall. Other activities include berry-gathering (huckleberries, raspberries, and blackberries), recreational driving, OHV use, wildlife viewing and firewood gathering within the project area.

The Revised LRMP restricts OHV use from the general forest and closed roads. However under the current plan, additional limitations have been imposed following the National directions associated with unmanaged recreation and the OHV National policy to use designated trails only. Currently there are no designated OHV trails within the project area. However, the project area is receiving OHV use on most of the existing open and closed roads.

The evaluation of effects can be described in terms of three principle components: the recreational activity, the setting in which it takes place, and the resulting experience. These three components make up the Recreation Opportunity Spectrum (ROS) that was originally completed in 1986. However, during each analysis ROS for the analysis area is reviewed and updated as needed. The setting includes both environmental and social factors. Its physical, natural features and the amount of apparent modification from human activity characterize the environmental setting of an area. The social setting of an area is characterized by the amount of contact among the visitors using it and the probability of them experiencing isolation from the sights and sounds of non-recreation human activity. The experience is the desired psychological outcome realized by participating in a preferred activity in a preferred environmental and social setting. Different combinations of these components provide a range of recreation opportunities. The ROS is a way to classify this range of opportunities and to identify the capability of the Forest to provide them. There are five classes of ROS in the Forest Plan: Semi-primitive non-motorized (SPNM), Semi-primitive motorized (SPM), Roaded Natural (RN), Rural (R) and Urban (U). The Forest Plan objective is to maintain a balance of Recreation Opportunity Spectrum on the Ozark- St. Francis National Forest. This project area contains only two ROS classifications which are RN associated with the ridge roads on the perimeter and SPM the main core of the area.

This area is classified in the Recreation Opportunity Spectrum (ROS) as semi-primitive motorized to rural. Semi-primitive areas are characterized by a predominantly natural or natural-appearing environment of moderate to large size. Motorized use is permitted. In a rural ROS, the area is characterized by modified environment that is still attractive such as a pasture. The environment may range from slight to major vegetative alterations and provides opportunities to observe and affiliate with other users. There are two special recreation designation within it, therefore it draws visitors and is used more frequent than the general forest. The upper reaches of the watersheds drainage are intermittent in nature and these areas are not noted for their fishing or boating opportunities.

The Ozark Highland trail is used year round with peak use in the spring and fall. The Richland Creek and campground has a similar peak season however most of the use is up stream outside of the project area. What sight-seeing is done occurs mainly on the county roads. Some residents gather firewood from the National Forest and private lands as a family recreational activity with the secondary purpose of heating their homes. Field observation in the analysis area during the fall and winter of 2005 and spring and summer of 2006 found little sign of high level of recreational activities occurring outside of the designated trail corridor within the project area with the exception of hunting.

Special Interest Area

Stack Rock is a Special Interest Area within the project area noted for it's geologic features. There are no activities proposed in any alternatives that would directly or indirectly impact the designated area. However visitors to the area may venture out into the surrounding area and see management activities. Visitor use is similar to the Ozarks Highland Trail.

Direct / Indirect Effects

There would be harvesting activity in the Dry Creek drainage; however, no harvesting would occur within the Ozark Highland Trail corridor. The area is popular to hunters, rock climbers and hikers alike. A large portion of the analysis area would be impacted due to wildlife stand improvement, harvesting and creating openings for forage, however management activities should not exceed the ROS classification and forest visitor could encounter resource utilization while traveling Forest Service roads or while cross country hiking.

The temporary black appearance of the stands after prescribed burning may detract from the recreation experience of users for approximately one year or until spring green up. Habitat for deer and turkey would be improved so hunting opportunities would increase with the proposed action.

OHV use would be impacted due to enforcement of existing policy limiting access to closed roads. However, all alternatives addressed the need for OHV use by designating 4.3 miles of year round trails, 6.4 miles of seasonal trails along with some additional miles of roads that would allow OHVs on seasonally open roads.

Cumulative Effects

Based on the proposed treatments in the alternatives and proposed action there are no cumulative effects to the recreational opportunities in the project area. Realizing that the recreational OHV opportunities within the area has mostly been unauthorized use and all alternatives and proposed actions designates some areas for the public enjoyment therefore meeting the needs of the OHV user while accomplishing the objective of the National OHV policy and unmanaged recreation directives. Therefore, there are no unavoidable adverse impacts identified that would effect the recreational opportunities in the foreseeable future. Also in the foreseeable future is the designation of a trail from the Ozarks Highland Trail (OHT) to the Stack Rock Special Interest Area. This trail would spur off of the OHT just east of the Stack Rock OHT parking area.

2. Visual Quality

Existing Condition

The analysis area is located in a rural and mostly forested area. Some pastures occur on private land along the northern boundary and county roads with a small community of Eula on round hill road. Sight-seeing is limited along the gravel roads because the terrain and the vegetation offer little opportunities of any vista. The creeks are intermittent in nature therefore providing limited recreational opportunities except for hiking. The project area is predominately a variety class B (Common).

The Visual Quality Objectives (VQO) Retention (R), Partial Retention (PR), Modification (M) and Maximum Modification (MM) are all found within the project and all have some areas proposed to be treated. The VQO within the watersheds consist mostly of Maximum Modification and Partial Retention with some Modification. There is also a small portion of Retention area near the Richland Creek and Eula road crossing.

Direct / Indirect Effects

The No Action alternative would have no effect on the visual since management activities would be limited to the existing maintenance of the existing infrastructure already in placed.

The proposed Action and the other two alternatives would alter the current vegetation of the density allowing the potential of increase viewing distance. The creation of High Quality Forage and Savannahs would also, provide enhance opportunities of viewing landscape vista from the treatment area. The initial impacts associated with the treatments would be negative due to the amount of vegetative debris that would be left after harvesting. However, the site preparation of windrolling, disking and seeding the High Quality Forage and at least portions of the Savannahs is expected to mitigate the impacts by promoting growth of grasses reducing the normal recovery time associated with harvesting.

Based on the proposed treatments in the alternatives and proposed action there are no known negative cumulative effects to the visual resource that would be expected within the project area. The proposed treatments are expected to increase viewing opportunities for the forest visitors enhancing their recreational experience. It is expected that as prescribed burns are repeated and herbicides used on identified non-native invasive species (NNIS) that understory vegetation would decrease providing greater sight distance. These treatments are expected to change the limited viewing opportunity of the recreational visitor such as hikers and hunters from the immediate foreground to allowing a greater variety of viewing distances and increasing the visibility of the landscape.

Special Use Permits

Currently only one special use permits is located within the Dry Creek watershed. The permit would not be impacted by any of the alternatives proposed.

3. Cultural Resources

Heritage Resource

Existing Condition

Heritage resources are the non-renewable physical remains of prehistoric and historical human activities. They are subject to damage or destruction form land disturbing activities, including

those associated with vegetation manipulation and road construction. Area disturbance can damage or destroy the historical, cultural, or scientific integrity of historical or prehistoric resources. Disturbance of historical sites, such as old cabins, can reduce the ability to reconstruct the recent history of settlement in the local area. Disturbance of ethnographic sites, such as traditional Native American campsites or burial grounds, can reduce the interpretive significance of the site or can infringe on religious rites.

The current direction of the Ozark NF is to protect significant cultural resources from adverse impacts that may occur as the result of land disturbing activities, and to inventory National Forest System lands in order to locate and evaluate all cultural resources. This policy is based on adherence to Federal and State laws and regulations. Cultural resources are closely coordinated with the State Historic Preservation Officer (SHPO).

In compliance with executive order 11593, the National Historic Preservation Act, the National Environmental Policy Act, and the USFS regulations (FSM 2360), a cultural resource inventory was performed to determine if potentially significant cultural resources would be affected by the project.

The survey of archaeological sites within the project area located 131 sites (both previously recorded and newly recorded). All sites were field recorded and submitted to the Registrar at the Coordinating Office of the Arkansas Archeological Survey. Sixty-one of the sites are historic farmsteads, stills, rock fences or lines, cemeteries, agricultural clearing piles or agricultural dams. Eight are pre-historic lithic scatters and rock shelters. Three have both prehistoric and historic components.

Based on the report submitted to the Arkansas State Historic Preservation Office on 21 November 2005, SHPO made a written response dated 16 December 2005 (AHPP Tracking number 58515). Twenty seven sites are recommended eligible for the National Register of Historic Places. Twenty-one sites are recommended undetermined. These would all require and would be protected (excluded) during project implementation.

Eighty-two sites are recommended not eligible for the National Register of Historic Places.
No further work or protection is required or recommended.

Direct, Indirect, and Cumulative Effects

Proposed Action and Alternatives 2 and 3

There would be not effects on Heritage Resources including past, present, and foreseeable cumulative effects because of the protection measures identified in the EA above and adherence to the standards in the FLRMP.

D. Irreversible and Irretrievable Effects

For the purposes of this analysis irreversible means that the effect cannot be taken back or restored such as the extinction of a species or removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way, roads wildlife openings or ponds.

Under the Proposed Action and Alternative 2, the creation of High Quality Forage/wildlife openings would be considered irretrievable effects. However, all alternatives except no action would have management activities that would impact the landscape, such as timber harvesting once removed, those particular trees would be lost to the landscape. Similarly, vegetation that is burned by a controlled fire would be lost to the landscape however, under those circumstances re-vegetation would occur almost immediately to three years with exception to openings and ponds.

There would be no irretrievable effects under the No Action alternative because there would not be any management activities conducted such as timber harvesting, burning, ponds or openings.

Consistency with the Forest Plan

The No Action alternative is not consistent with the Forest Plan prescription to provide for High Quality Forage areas listed in Wildlife Emphasis Management Area. However, the remaining two alternatives and the proposed action all improve or promote wildlife emphasis.

Unavoidable Adverse Impacts

None of the alternatives are expected to result in unavoidable adverse impacts.

Human Health Risk

Chemicals used to control plants are known as herbicides. Herbicides are being considered in the Proposed Action and in Alternative 3 with the goal of incorporating herbicide treatment along with non-chemical treatments. Herbicides kill the existing plant but often allow remaining seeds to germinate. Herbicides are known through experience with similar activities to be one of the most effective treatment methods for eradicating or controlling weed species that currently exist (For the purpose of this document weed species consists of vegetation that may be outside of management desired objective such as non native invasive species or aggressive native species). When herbicides are used in conjunction with an integrated

treatment effort it improves the effectiveness of non-chemical treatments, either concurrently or as follow-up treatments.

The primary herbicides proposed for use within the Project Area have metsulfuron methyl, triclopyr, imazapyr, and glyphosate as their active ingredients. Mixtures of herbicides could be used where they would provide more effective control, particularly for weeds that may be persistent. Because the herbicides proposed for use do not persist in the soil at effective levels for more than a few months (at the maximum), follow-up treatments may be needed to eliminate new sprouts that were in seed during the initial treatment. The most noticeable consequences from weed treatment would be the long-term, beneficial improvements to native ground vegetation such as grasses, forbs and shrubs.

Only herbicide formulas/products that have been registered with the Environmental Protection Agency (EPA) for rangeland, forest land, or aquatic use would be applied. In addition, the Forest Service has completed risk assessments that have analyzed the risk of specific herbicides on human health and safety, on wildlife/fish, and on non-target plants. Only herbicides with a completed risk assessment would be used.

No aerial application of herbicides would be used for this project. Herbicides would be applied using ground-based methods such as hand application using gloves, or spray using a backpack containing the herbicide attached to a flexible sprayer, wand or other hand application device that directs the chemical onto the target weed. Vehicles may be used with a mounted herbicide tank and boom or wand spray device to direct each respective herbicide used. Booms or wands may be articulated or fixed.

The following table explains terminology commonly used in evaluating health risk associated with herbicides.

Herbicide Risk Assessment Standard Terminology

Term	Abbrev	Explanation (see risk assessments for specific definitions)
Toxic		The short-term effects of exposure to a chemical, which appear immediately upon exposure. See specific sections of the risk assessments for definition of the various “end points” of exposure, e.g. nervous system.
Sub-chronic		The effects that do not appear immediately, but that will appear over a short period of time after exposure, or if exposure continues for a period of time.
Chronic		Effects over a number of years (or over a lifetime) of repeated exposure
No Observed Adverse Effect Level	NOAEL	The amount of a substance that shows no toxic effects given short term (mg/kg body weight) or to show lack of chronic effects over long duration may be expressed as a dose over time (mg/kg/day).
No Observed Effect Concentration	NOEC	Used for plants to determine the lowest concentration at which a concentration of herbicide had no effect.
Safety Factor		Once a no observable effect level is established, safety factors are applied for the human risk assessments in order to set a reference dose. Safety factors depend on the information used for the no effect finding. Factors include such circumstances as uncertainties in species-to species extrapolation as well as accounting for sensitive individuals in the population. Each factor reduces the exposure dose by dividing by 10, so that a NOAEL of 5 would become an RfD of 0.05 if three safety factors were applied.
Reference Dose	RfD	The amount of a substance that would not have an adverse effect if this does were given every day over a lifespan of 70 years. It is measured in milligrams of substance per kilogram body weight of the person of concern, per day (mg/kg/day). An RfD is basically defined as a level of exposure that will not result in any adverse effects in any individual. The U.S. EPA RfDs are used because they generally provide a level of analysis, review, and resources that far exceed those that are or can be conducted in support of most Forest Service risk assessments. In addition, it is desirable for different agencies and organization within the Federal government to use concordant risk assessment values.
Hazard Quotient	HQ	The result of dividing the reference dose by the expected exposure to provide a measure of the hazard and so a relationship to the expected risk.

The information in this analysis was provided from the SERA identified in the following table:

Herbicide Risk Assessment Information:

	Herbicide Name	Date prepared	Reference	Pages
1	Glyphosate	March 1, 2003	SERA 2003a	281
2	Imazapyr	December 18, 2004	SERA 2004e	149
3	Metsulfuron methyl	December 9, 2004	SERA 2004d	152
4	Triclopyr	March 15, 2003	SERA 2003b	264

These are standard risk assessment procedures, tested by several years of EPA use and scrutiny by the larger scientific community. As noted in a number of the risk assessments, the anticipated effects can be minimized or avoided by prudent industrial hygiene practices during proper handling of the herbicides. No chemical has been studied for all possible effects and the use of data from laboratory animals to estimate hazard or the lack of hazard to humans is a process that is fraught with uncertainty. Prudence dictates that normal and reasonable care should be taken in the handling of this or any other chemical. Notwithstanding these reservations, the use of herbicides does not appear to pose any risk of systemic toxic effects to workers or the general public in Forest Service Programs.

Glyphosate

The risk characterization for both workers and members of the general public are reasonably consistent and unambiguous. For both groups, there is very little indication of any potential risk at the typical application rate. Even at the upper range of plausible exposures in workers, exposure is below the level of concern, even at the upper levels when broadcast spray is used. For members of the general public, none of the longer-term exposure scenarios exceed or even approach a level of concern. There is no route of exposure or exposure scenario suggesting that the general public will be at risk from longer-term exposure to glyphosate. Only exposure scenarios that contemplate consumption of water directly out of a pond immediately after a spill exceed the levels of concern.

The current risk assessment for glyphosate generally supports the conclusions reached by U.S. EPA: Based on the current data, it has been determined that typical application rate does not approach the level of exposure in the reference dose.

At the typical application rate, the exposure to hazardous levels will not be reached or exceeded under worst-case conditions (SERA 2003a).

Imazapyr

Typical exposures to imazapyr do not lead to estimated doses that exceed a level of concern for either workers or members of the general public at either the typical or highest application rate. For workers and the general public, the upper limits of exposure when compared with reference dose are sufficiently below a level of concern that the risk characterization is relatively unambiguous. Based on the available information and under the foreseeable conditions of application, there is no route of exposure or scenario suggesting that the workers or members of the general public will be at any substantial risk from longer term exposure to imazapyr even at the upper range of the application rate considered in this risk assessment. The EPA has classified imazapyr as a Class E compound, one having evidence of non-carcinogenicity. Under typical and conservative worst-case exposure assumptions, the evidence suggests that no adverse effects would be expected from the application of imazapyr (SERA 1999b).

Metsulfuron methyl

Typical exposures to metsulfuron methyl do not lead to estimated doses that exceed a level of concern. For workers, no exposure scenarios, acute or chronic, exceeds the reference dose, even at the upper ranges of estimated dose. For members of the general public, all upper limits for hazard quotients are below a level of concern. Thus, based on the available information and under the foreseeable conditions of application, there is no route of exposure or scenario suggestion that workers or members of the general public will be at any substantial risk from acute or longer term exposures to metsulfuron methyl (SERA 2004d).

Triclopyr

There is no indication that workers will be subject to hazardous levels of triclopyr at the typical application rate and under typical exposure conditions. Nonetheless, at the upper range of exposures, all application methods exceed the level of concern based on the chronic reference dose (but not the acute RfD). Thus, for workers who may apply triclopyr repeatedly over a period of several weeks or longer, it is important to ensure that work practices involve reasonably protective procedures to avoid the upper extremes of potential exposure. At higher application rates, particularly rates that approach the maximum application rate of 10 lbs/acre, measures should be taken to limit exposure. These measures would need to be developed on a case-by-case basis depending on the specific application rates that are used and the type of the applications that are employed. For members of the general public, the risk characterization is relatively unambiguous at the typical application rate and under the foreseeable conditions of exposure. There is no route of exposure or exposure scenario suggestion that the general public will be at risk form longer term exposure to triclopyr. Even at the maximum projected application rate of 10 lbs/acre, the only long-term scenario that exceeds the level of concern is the consumption of contaminated fruit. Several acute exposures also lead to exposure to levels that are above the level of concern. For instance, accidental spray over the lower legs as well as contacting contaminated vegetation both exceed the level of concern at the central estimate of exposure when the highest application

rate is considered to be (10 lbs/acre). All dermal exposures exceed the level of concern. These dermal exposure assessments are extremely conservative and designed to identify which possible types of exposure would be most hazardous. For triclopyr, such scenarios include dermal contact and accidental spills into water (SERA 2003b).

Sub chronic and Chronic Toxicity

Considerable information exists on sub chronic and chronic effects due to exposure to herbicide in controlled animal studies. Sub chronic and chronic effects are those that might occur over a long period of time, after weeks or years of exposure. Sub chronic and chronic effects are reviewed in terms of potential impacts to their potential neurological or reproductive effects. These evaluations assume some lower threshold level below which these effects would not occur.

Other potential health effects evaluated include the herbicide potential to be carcinogenic, mutagenic, or teratogenic. These impacts are not threshold dependent, and so they are evaluated under the assumption that any level may cause the health effect. Hence, they rely on probability, based on exposure levels.

Considering anticipated exposure levels to workers and the public all four herbicides express evidence of non-carcinogenicity. Also, Glyphosate and Imazapyr both show no evidence on being mutagenic or reproductive while Metsulfuron methyl and Triclopyr evidence showed no to slight chance of mutagenic or reproductive effects.

In summary the four herbicides consider for use in the Proposed Action and Alternative 3 is not expected to create a health concern for carcinogenic, mutagenic, teratogenic sub-chronic, chronic effects to the workers or to the general public. Since herbicide forestry use of herbicide poses a low risk and usage is likely to occur only once or twice over 25 to 75 years cumulative effects are not likely to occur.

Direct/Indirect effects

Under the No Action alternative 1 or Alternative 2 “no herbicides” would be applied in the project area. No direct or indirect consequences to human health would occur related to herbicides in these alternatives.

Proposed Action and Alternative 3

The term public includes hikers, campers, hunters, fuelwood gatherers, and other forest users. It basically includes all people who use or work in the project area except those who work with the herbicide treatments.

Risk to the public is not likely to occur because none of the herbicides are persistent in the environment or in the human body. Also, none of the herbicides in this project bio-accumulates in animal tissues, so there is no threat of human exposure by eating animals that have come into contact with the herbicides.

Cumulative effects for all Alternatives

No cumulative effects are expected in any of the alternatives. This includes alternatives that proposed herbicide use. As shown above effects can be minimized or avoided by prudent hygiene, proper handling and application rates. Generally speaking, contamination of workers, the public or the environment shows very little indication of any potential risk at the typical application rates and methods.

CHAPTER V.

List of Preparers

The following is a list of persons who were primarily responsible for the environmental analysis and assessment:

Terry Hope - Recreation Assistant

BS, Forest Management, Mississippi State University. Terry has 23 years experience in natural resource management with Mississippi State Pest Management, Mississippi State Forestry Commission, National Forest Service as a technician, field forester with the Southern Experiment Station and as a resource manager.

Jim Dixon - Timber Management Assistant

BS, Forestry 1987, Oklahoma State University. Jim has 21 years experience as a forester with the U.S. Forest Service.

Jan Self - Wildlife Biologist

BA, Drama and Speech, Birmingham-Southern College, 1973, BS, Fisheries and Wildlife Management, Arkansas Tech University, 1990. Jan has spent the past 25+ years working in the field of natural resource management. She has worked with both the National Park Service and U.S. Fish and Wildlife Service previously before joining the U.S. Forest Service in 1989.

Rickey Adams – Engineering Technician

Rickey has 15+ years of experience with the U. S. Forest service. He is an Oil and Gas Resource Specialist with a foundation in Minerals and Geology.

Michael A. Crump – Hydrologist

B.S. Geology and Water Resources, Mississippi State University

University of North Carolina at Wilmington.

Career Forest Service employee with the last three years at the Ozark/St. Francis Forest. Participated in the development of the most recent Forest Land Resource Management Plan, and served as a participant on many ID teams for land management planning across the Forest.

J. Keith Whalen – Forest Fisheries Biologist

B.S. Forestry (Fisheries Option) – Virginia Tech

M.S. Biology – James Madison University.

Six years experience in Fisheries and Acquatic Research at the Southern Research Station – Center for Aquatic Technology. Transfer (CATT) team working on projects in Region 8 & 9, detailed last two years with the U.S. Forest Service National Aquatic Ecology Unit. Two and one half years experience as the Forest Fisheries Biologist on the Ozark/St Francis National Forest.

Marvin L. Weeks – Forest Soil Scientist

BA Geography at Florida State University, 1975. 25 years as soil scientist with the US Forest Service on Ranger Districts and at the Forest level on 3 National Forests in the Southeastern Region. Also 1 year as a Soil Scientist with the Soil Conservation Service [now NRCS], and 1 year as Engineering Technician with the Florida Department of Pollution Control.

CHAPTER VI.

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Appendix A

Public Involvement

To encourage public participation in the **Bearcat Hollow Habitat Enhancement Project** decision process, the District initially published a scoping letter in the Newton County Times on March 2, 2006 requesting comments, questions, and offering detailed information to those expressing an interest in the project. The legal notice announced a thirty day comment period, open house to be held on March 11, 2006 from 9:00 am until 2:00 pm, and invited the public to come by the office, call, or, express by letter their views on the project. Six people attended the March 11 meeting. In addition, to the March meeting, a notice was published in the Marshall Mountain Wave inviting the public to a meeting on May 20, 2006 at the Witts Springs gymnasium. Sixty Seven people attended this meeting and twenty people came to the office or telephoned to express their opinion. Fourteen letters were received from the public expressing an interest in, or their opinion of the project.

Another way the District seeks out public participation is by sending a letter to those landowners located within the proposed project and to those people who have shown a previous interest. On February 24, 2006 180 people were mailed a letter with maps, explaining the project. They were asked to comment on, or involve themselves in, the analysis of the proposed project and develop alternatives, and were informed about the kinds of decisions to be made. This effort yielded eleven letters, ten phone calls, one Fax, and two E-mails requesting more information.

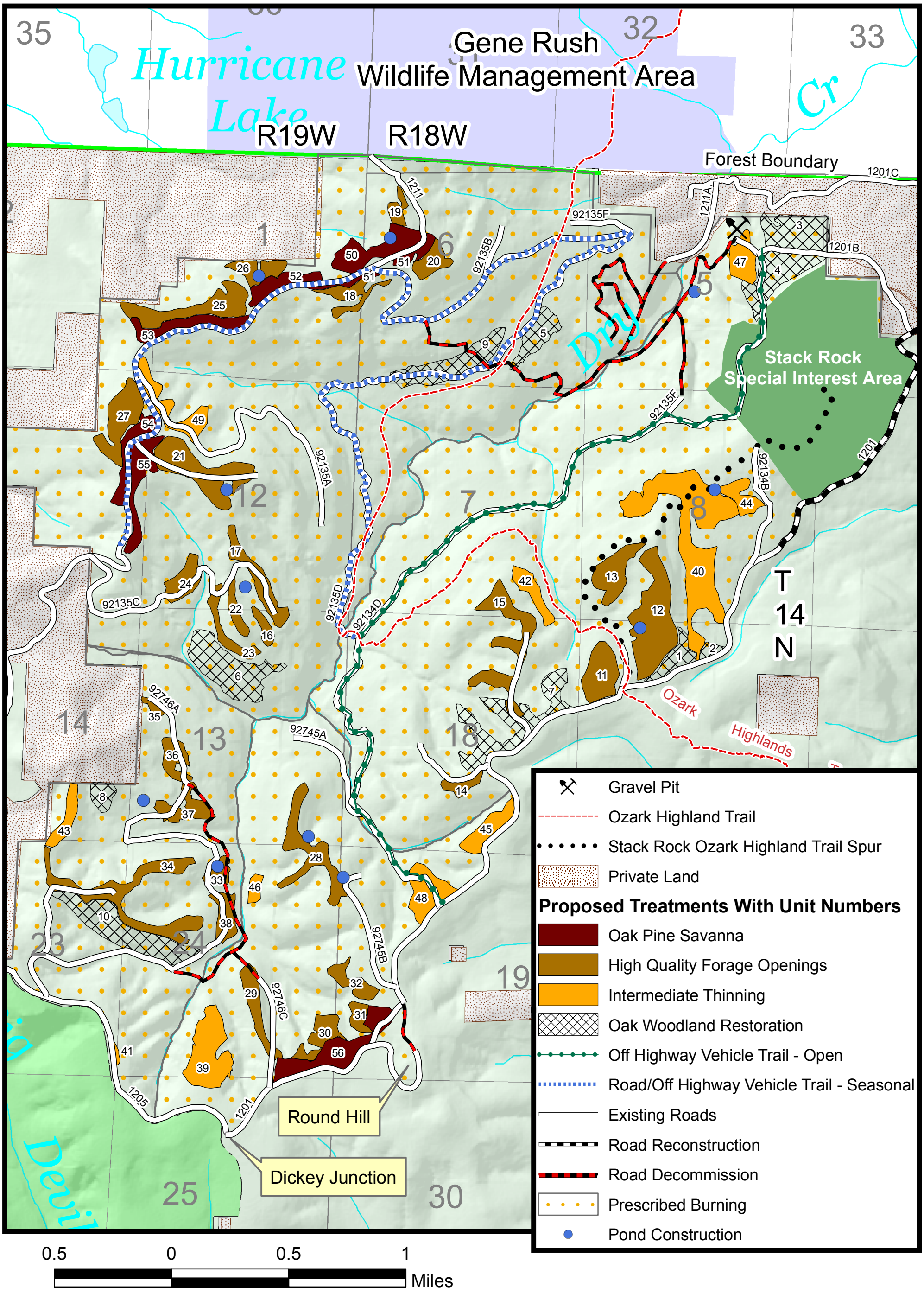
The District, also on February 24, 2006, sent a letter explaining the project to the 13 selected Tribes identified as having potential ancestral connections to the area. They were asked to comment on, or involve themselves in, the analysis of the proposed project and develop alternatives, and were informed about the kinds of decisions to be made. Five responses were received which expressed interest if archeological materials were found during the project.

Appendix B

Maps

Map B

OZARK-ST. FRANCIS NATIONAL FORESTS
Buffalo Ranger District
Bearcat Hollow Habitat Enhancement Project
PHASE 1



Appendix C

Responses to the 30-day Comment Period

On December 27, 2006 the Big Piney Ranger District of the Ozark-St. Francis National Forest made available to the public its Bearcat Hollow Phase 1 Environmental Assessment (EA). In addition, a legal notice was published in The Newton County Times on December 28, 2006 informing the public that the EA was completed and the final 30-day comment period would end 30 days from the published date. The notice was also mailed to 66 individuals or organizations that had expressed interest in the project. As a result of these efforts we received approximately 96 comment letters (some individuals sent in multiple letters) and electronic mail letters from individuals or groups concerning the Bearcat Hollow EA. Seventy-one of these responses were electronic form letters. A list of respondents follows the comments.

The Interdisciplinary Team (IDT) reviewed all comments that were received specific to the EA. Some of these comments expressed general support for the project, some represented points of unresolved conflict regarding specific environmental effects, and others suggested a variety of ways to do the analysis but they contained no specific information about the project. Some comments had no bearing on the project or expressed concerns that are already decided by law, regulation or other higher level decisions. A few were conjectural and unsupported by scientific evidence. The following summarizes these comments and the responses to each of them.

1. Herbicide could be impacting water quality and causing pollution to the Buffalo River.

The effects of herbicides on water quality were considered in the Water Effects Section which shows there is a low potential of risk for decreased water quality from herbicide use within the project area (III-5-12). Best management practices (BMPs) will be used to reduce the potential for herbicides to impact water quality. Since the potential impacts for the project are low, it is expected that impacts would be even lower further downstream in the Buffalo National River which is outside the 6th level watershed used for the analysis

2. Justifying herbicides with BMP's creates a best case negligible-erosion scenario that doesn't exist on the ground. BMP's are not put into effect until the rainy season following the harvest and terrible erosion would take place that could support movement of herbicide toxins.

The BMP's for and the timing of herbicide use are totally different than those used for soil erosion and incorporated by reference in Chapter I of the EA. The herbicides that are

proposed for use in the EA are not intended nor labeled for use when rain is expected. For a further discussion of erosion and herbicide movement see III-5-11.

3. Herbicides will impact sensitive plant species. The BE should be prepared with site-specific data.

Effects to sensitive species are found beginning in the EA at III-52 and summarize the findings of the BE. This summary on III-53 states that not only previously existing inventory data was used, but also included field surveys that were conducted within the project area during 2005-2006. The BE includes further details regarding species within the project area, and site-specific field records are a part of the process file located at the District office. The only species on the Regional Forester's list of sensitive species that has been found within the project area is Ozark chinquapin. Forest Standard FW28 referenced in the EA (II-13) and also in the BE, defines the limits of how herbicides may be used around sensitive species. Based on the application of this protective measure and others, included both in the EA and as standards in the RFLRMP (3-4,5) that restrict how herbicides may be applied, effects to sensitive species should be minimal (EA III-55 & Project BE, Forest Plan BE & BA).

4. How herbicide use is apportioned over 1289 acres is not spelled out or explained anywhere.

The 1289 acres of herbicide use is spelled out in the EA in chapter II, but a herbicide use table was added to the EA page II-5 to clarify this issue.

5. Impacts to the Richland Creek Wilderness Area, Dry Creek, Richland Creek Wild and Scenic River, and the Buffalo National River have not been addressed (soil/water). There should be a buffer in place to protect these areas.

Impacts are addressed in the Soil and Water Sections (III-1 – III-11) and the Wildlife Section (III-32 – III-51) of the EA. The analysis area for estimating the impacts for various resources is the 6th level watershed as delineated by the U.S. Geological Survey. Richland Creek Wilderness and the Buffalo National River lie outside of this watershed (III-7) and are outside the scope of this project. Stream side management zones (SMZs) are one of the BMPs that will be implemented to protect streams and water quality. Revised Land and Resources Management Plan standards will be followed to protect wilderness areas, wild and scenic rivers and streams. Additional information has been added to the EA to clarify what buffer zones are required around special designation.

6. The Proposed Action says that there will be 30 to 35 times more soil disturbance than in the No Action alternative. This could impact Richland Creek and potentially the Buffalo National River.

The Cumulative Effects are located on page III-11 and show a worst case scenario as if past, present and future activities all occur at the same time within the watershed. The analysis shows that the impacts would produce a low risk from sediment on aquatics, and other water uses even if every activity occurred within the same year within the 40,000 acre watershed. Since the risk is expected to be low, impacts to Richland Creek and the Buffalo National River would be minimal.

7. Site-specific data on soils, past soil loss, current sediment load…and estimates of future sedimentation of streams in and below the project area should be used in the analysis.

Soils were evaluated using existing information, Geographical Information System analysis, and field surveys used in the Soil and Water Section of the EA (III-1-12). The EA does shows the site specific soil characteristics see III-2 & 3, and the potential detrimental soil disturbance see III-4 and potential sediment resulting from the alternatives (III-7-12). The analysis areas are different for the project area depending on what resource you are measuring (EA III-3, III-7).

8. Aquatic species should be adequately surveyed in and below the project so that adverse impacts can be avoided.

In evaluating possible impacts to aquatic species, both past and present survey information was utilized including the Dry Creek watershed and downstream. This has been clarified in the EA on page III-36 and is referenced in the Chapter 6 also.

9. What are the impacts including cumulative impacts from road on forest fragmentation in the District on wildlife, water quality, soils and recreation? How will soil health be affected by the removal of downed woody debris? Creating large openings will impact neo-tropical birds.

Effects from roads are included in the EA beginning on III-29 and III-36 that concern wildlife. As no new road construction is proposed and many roads are closed or decommissioned, fragmentation of habitat would be minimal within the analysis area for wildlife. The EA's discussion of effects on MIS, including those that are sensitive to fragmentation (i.e. scarlet tanager, pileated woodpecker), discloses that the majority of the analysis area will continue to provide mature habitat that will support these and other species (EA III-37). Also at the larger Forest scale, the FEIS discusses species sensitive to fragmentation. It finds that on the Ozark National Forest, because of the large proportion of forest to farmland (e.g. non-forest), fragmentation "is not considered to be an issue" FEIS 3-297.

Regarding soil health some nutrients would be lost when downed woody debris is removed, but, are expected to be replaced by natural sources over a rotation (e.g. life cycle of a forest

stand) (Wheeler and Eichman 1991). For cumulative impacts associated with water quality, soils and recreation is addressed in the EA Soil and Water see III-1 – III-12, Recreation see III- 56 – III – 59.

10. The EA does not consider the visual (and other?)impacts of spraying herbicides within the OHT corridor. It does not consider the visual impact from repeated prescribed burning every 2-3 years in the project area.

Visual Impacts from proposed activities within the OHT corridor have been added to the Recreation Section of the EA, see III-59-59.

11. The EA says that there will be 5 miles of fire line will be bulldozed if terrain permits, but that there is no assessment of compaction issues.

Impacts from fire-line construction were considered in the Soils Effects Section of the EA on page III-4 in the Detrimental Soil Disturbance Table under Site Prep. Compaction is one category of soil disturbance that was discussed in the soil Section of the EA.

12. Site specific mitigation measures should be described. Also what specific types of erosion control devices will be used and what type of seeding?

See EA pages II-12-17, G. Protective Measures/Design Criteria. Water bars, broad based dips, and brush piles are specific examples of erosion control devices. Seeding mix would follow the direction under Forest Standards (FW79) found in the RLRMP.

13. Impacts to riparian zones are not assessed for the five miles of cutting and pushing over trees to drag them twenty feet to Dry Creek.

The Proposed Action description in the EA at II-10 has been clarified to include the primary use of existing down woody material. Because larger diameter woody segments will be moved selectively through streamside management zones, the placement of this wood will cause little to no impact to riparian zone functions (III-9). Access will be made to these zones where soil disturbance will be minimal, so any impacts to soils within riparian zones will be minimal (III-1). Vegetation effects are discussed in the EA at III-29. In the Wildlife section (III-44) effects to the MIS species small mouth bass are discussed regarding the addition of LWD to streams.

14. Prescribed burning as a whole is decreasing air quality and contributing to global warming.

The Environmental Protection Agency (EPA) monitors air quality and has delegated air quality monitoring to the State, specifically the Air Division of the Arkansas Department of Environmental Quality. (ADEQ). This agency recognizes that fire has played an important role in the ecology of the State, and has developed a Smoke Management Program that is designed to assure adherence to air quality regulations and to manage smoke from prescribed fire so that the smoke's impact on people and the environment will be acceptable. The Forest Service is implementing this policy.

Impacts from prescribed burning were considered in the Air Section of the EA (III-12-14). Air quality within close proximity to the fire would exceed air quality standards for 2.5 microns. However, as the smoke disperses from the immediate area of combustion. The air quality would return to acceptable limits within a short distance due to the parameters established for smoke management in the burning plan. Also, mitigation measures described in the burning plan identifies smoke sensitive areas to avoid and minimize the effects.

Global warming is out of the scope of this project level EA, due to the fact that the Environmental Protection Agency (EPA) does not consider wildfires or prescribed burning as a major contributor to green house gas production.

15. There is no good justification for prescribed burning to reduce fuel loads. The actions proposed would artificially create brush piles to justify fuel loads.

The primary purpose of prescribe burning in this area as stated on page I-4 of the EA is to increase the forbs and grasses thus increasing small mammals, seed-eating birds, as well as improving the habitat for species such as deer and turkey. The EA goes on to say that a build-up of fuel could result in damaging wildfire, but it is not the sole reason for prescribed burning.

16. What documentation shows that repeated prescribed burns do not harm the viability of wildlife?

Effects to MIS including prescribed burning are discussed in the EA beginning at III-32

The discussion of Cumulative Effects to Wildlife (III-47) “Repeated burning will result in a more open understory and increased production of grasses and forbs that will improve the conditions for deer, turkey, and black bear by providing foraging habitat.” It goes on to discuss that population trends for MIS on the Forest are either stable, slightly increasing or slightly decreasing, but not likely to produce a trend toward a loss of viability.

The BE found in the process file at the District office also discusses prescribed burning with a finding of not likely to adversely effect for the endangered Indiana bat. It states in part: “Foraging opportunities may be enhanced as a result of wildlife openings created, prescribed burning and the thinning that will occur that opens the canopy in limited areas”. It goes on to say, “There may be some indirect benefits from prescribed burning that is likely to enhance

habitat for species of Lepidoptera that this species feeds on as a result of opening up habitat. (BE p 11)." The US Fish & Wildlife Service has concurred with the findings of the BE. A summary of this is located in the EA at III-53.

The FEIS APPENDIX D Terrestrial Viability Assessment evaluates all conservation priority species for the Forest and includes potential effects from prescribed burning.

17. Smoke generated during prescribed burns can cause roosting Indiana bats discomfort or death.

The Revised Forest Plan states as a priority that we will: "Ensure that smoke is not adversely affecting Indiana bats by not permitting active combustion and smoldering phase smoke from prescribed burns to enter hibernacula. Develop monitoring plans to evaluate residual smoldering phase and drift smoke entry into primary and secondary zones. Consider all weather parameters, intra-cave airflow dynamics, burn duration, elevation, and topography in developing burn prescriptions" (RFLRMP 2-14). There is further direction given in Forest Standards at RFLRMP 3-10.

The FEIS states that impacts from prescribed burning will be reduced because of efforts to avoid smoke sensitive targets and "to avoid active combustion and smoldering phase smoke from entering these sites when bats are present" (FEIS 3-224). It should also be noted that no Indiana bats were recorded during mist net surveys conducted in the project area and there are no other records of their presence within this area. Effects to Indiana bats are summarized in the EA (III-7) and more fully in the BE located in the process file.

18. The health effects of smoke are not discussed.

Smoke impacts associated to health were discussed in the Air Section of the EA see III-12. The section identified smoke sensitive areas and potential health problems associated with the burning. Also see the comment on Prescribed Burning impacts on air quality (# 14).

19. Creating openings and savannahs in the forest will increase opportunities for invasive species to have impacts on the natural ecology and native species.

The EA states in the Proposed Action that "…treatments will be applied to prevent existing areas (*e.g.* roadsides, trails *etc.*) of NNIS from encroaching into new areas prior to or in conjunction with other actions proposed within the project…" (II-6-7).

Also in Chapter 3 is stated that "Treating NNIS prior to or in conjunction with other actions proposed will help contain infestations while they are relatively small and prevent spreading NNIS into uncontaminated areas by vehicles, equipment, foot traffic etc" (III-27).

20. Elk are an introduced, invasive, non-native species and the impacts to the native ecology are not known. Introducing elk into the area will have effects that have not been assessed on non-game and many other species. Impacts from elk expanding into the Richland Wilderness have not been addressed. In American Wildlife and Plants, it says that ½ the diet of Rocky Mountain Elk is riparian browse.

The prescription area named: 3.K Wildlife Emphasis Area in the RLRMP describes as a priority that elk habitat be provided (2-78). The proposed actions are to implement this prescription which includes increasing habitat suitable for elk. This is part of the purpose and need for the proposal (EA I-2).

As it is stated in the FEIS, the remains of elk and bison have been found in caves and bluff shelters on the Forest indicating their presence historically. "This evidence indicates that there was sufficient herbaceous habitat to sustain these species" (FEIS 3-11). There is no reason to believe that as elk were present along with other wildlife species in the past that they would be incompatible or have further impacts to native species today. The same is true for any access that elk may make into Wilderness areas. As elk tend to forage more as grazers, wilderness habitat will have limited appeal due to the greater likelihood of closed canopy conditions with less suitable habitat being present. Also the increase in optimal habitat provided by the proposed action within the project will be more attractive to elk than the wilderness area. The Gene Rush State Wildlife Management Area adjacent to the project area has successfully attracted and held elk for a number of years because of the high quality forage provided (per com Cartwright, AGFC).

The FEIS provides a description of elk habitat requirements as well as a brief history of the re-introduction of elk to Arkansas Ozarks (FEIS 3-275). It has a further discussion of effects at FEIS 3-395.

In the Wildlife Effects section of the EA, the benefits of actions to a variety of wildlife species is discussed (III-36).

Although MIS are the primary tool used in evaluating effects, a further description of elk can be found in the EA at III-36. Elk are a native species and were once widespread across North America. Elk re-introduced into Arkansas are not a separate species from any indigenous elk previously found here (Thomas, 1982). It should be noted that the purpose of this project is not to re-introduce elk, but to expand the range of a population that presently exists.

In response to the reference concerning the diet of Rocky Mountain elk, it must be noted that there was not a complete citation given only the title of the paper or book and the authors. The closest reference found referred to an out-of-print book published in 1951. No context was given as to how or where the study was made. Perhaps a better reference concerning elk diet may be found in the volume Elk of North America – Ecology and Management, edited by Jack Ward Thomas *et. al.* and published in 1982. In It discusses the highly adaptive diet of elk

which by no means limits it to riparian zones. It should also be noted that the Buffalo National River, where elk have thrived since about 1981, has not reported any significant impacts to riparian or other habitats (pers. com. Bitting, BNR).

21. Wildlife will benefit tremendously from establishing openings that provide a year round food source. Years of hard mast failures, many wildlife species can depend on this. Research has shown that the addition of a sufficient number of high quality forage openings can more than double carrying capacity (Rogers, M.J. et al. Deer Habitat in the Ozark Forests of Arkansas. SO-259, USDA, Forest Service, Sou. Forest Exp. Station). This type of work has been done on the Gene Rush WMA with a significant increase especially in deer, elk and turkey.

The proposed action responds to your concern to provide year round forage opportunities not only for potential game species, but also many non-game species such as breeding birds and small mammals.

22. Eliminate OHV use in the project area in order to increase opportunities for elk to expand and use it year round. Seasonal roads should not be designated for OHV use as damage will always result.

Currently there are OHV encroachments throughout the area including a small portion of the OHT (EA III-56-57). In order to gain compliance, the project designates actual routes and discourages other uses. This should reduce the amounts of impacts associated with OHV. For example, a portion of the OHT that follows an existing road already has OHV use. In the future, we will be proposing to reroute this segment of the OHT to a different location to eliminate this OHV use and also provide a more scenic route. Routes proposed for OHV use have been designed to either avoid areas where elk are likely to be concentrated or through seasonal use only. If impacts to wildlife or other resources occur because of this use, then additional closures may be added.

23. There are insufficient impacts to warrant closing OHV use on existing closed roads, currently used trails that are not-authorized and open roads that will be closed by this project.

Currently, there is unauthorized OHV use on roads and trails within the project areaThis illegal use is preventing these areas from being re-vegetated. One of the priorities of this project is to expand the elk range and provide high quality wildlife habitat (EA I-2). Continued unauthorized use of these routes would provide considerable disturbance to wildlife (EA III-44) along with promoting ongoing soil disturbance that contributes to erosion.

24. The public was not given the opportunity to comment on the proposed 10.7 miles of OHV trails as to their location and the impact on the existing Ozark Highlands Trail (OHT). Establishing OHV trails near the OHT will increase the problem of illegal OHV use on this foot trail. Impacts to recreation in this area are

hugely underestimated. Rd #92135D looks like it would be especially suited to increasing OHV traffic on the Ozark Highlands Trail.

As stated in appendix A of the EA this project, a letter was sent to 193 individuals and native American tribes on February 24, 2006, was scoped in the Newton County Times on March 2, 2006, again in the Marshal Mountain Wave, and two public meeting were held on March 11 and May 20, 2006. To this date no one has come forward with any site specific comments on OHV trail locations or notified us of any illegal OHV use on foot trails.

Field visits associated with this project and staff observations for the past 14 years on the District show that recreational use appears to be restricted mostly to the OHT, Stack Rock SIA, and the illegal use of OHV's. Few recreational visitors venture away from these main points of interest and those that do are primarily hunters.

25. The EA does not mention how heritage sites will be protected from the proposed actions.

Since we have completed a survey and know where the sites are that need protection, these sites will simply be avoided as stated on page III-59-60 of the EA.

26. The designation of the prescription area (3.K. Wildlife Emphasis Area) is arbitrary and capricious and an abuse of agency discretion.

The EA is a project level document designed to implement the prescription described in the Forest Plan. A challenge to this designation is outside the scope of this project.

27. The cumulative effects of Bearcat Phase 1 cannot be done because the effects of Phase 2 are not considered.

The analysis of a project area should analyze the past, present, and reasonably foreseeable future actions for cumulative effects. Analysis areas are different for evaluating effects depending on what resources you are measuring. Each resource defines its area for cumulative effects and provides the reasons for that.

28. Private land should not be included in the project area. The Forest Service shouldn't add new hunting rules and regulations.

The Forest Service (FS) does not make hunting rules and regulations and only includes activities happening on private land as cumulative affects. No actions are proposed on private lands.

29. The EA fails to lay out a detailed skidder and road system for logged areas. There are no logging routes shown on Map B for 42, 39, and 46. It fails to specify how the USFS plans to monitor timber sale units and proper maintenance of logging roads.

The EA is required to show the effects of the PA within the project area. The EA pages III-3 and III-7-8 outlines how the log landings, skid trails, and temporary roads are estimated based on past harvesting units and used to estimate effects. The EA page II-15 and II-16 states that the Forest Service will approve all temporary developments and require the purchaser to maintain these developments during the life of the sale. The Forest Service Handbook and Manual outline the monitoring process for all timber sales on federal lands.

30. There is no description of what the reconstructed road by Stack Rock will look like. The public deserves to know what is planned here.

The EA page II-11 gives a description of the types of work that would be undertaken for road reconstruction.

31. No evidence exists from the Government Land Office Surveys (GLO) that the project area was ever in the desired future conditions of oak-pine woodland, oak-pine savannah, or wildlife openings. Converting land to such habitat is illegal, arbitrary and capricious and an abuse of agency discretion.

No claim is made in the EA for this project level decision that GLO notes are the basis for the proposed actions. Determinations for which areas would be appropriate for treatments were established by field examination by District staff. Actual site characteristics were the determining factor for specific treatments.

It should be noted that the FEIS states that "Vegetation derived from analysis of GLO surveys of witness trees from the 1820s-1840s provides a baseline for historical reference conditions"(FEIS 3-364). These "historical reference conditions" are to provide some context for the basis of Forest Planning, and do not indicate that they were the actual conditions present on any given piece of land.

Additionally, An excerpt from the FEIS states, "...Much of the landscape was dominated by fire-adapted vegetation where periodic, low-intensity fire (both lightning–caused and aboriginal) maintained ecological conditions that guaranteed a dynamically changing, yet stable perpetuation of regional flora and fauna.

Undoubtedly, there were also some closed canopy forests, particularly on more mesic sites. The slope, aspect, elevation, soils, and an aboriginals-induced fire regime largely dictated these diverse conditions" (FEIS 3-397).

32. An Environmental Impact Statement (EIS) should be completed for this project.

The purpose of an environmental assessment is to consider and disclose environmental impacts that will help the responsible official in determining whether to prepare an EIS or to issue a finding of no significant impact. The format used to document an environmental analysis is largely at the discretion of the responsible official. The intensity of the analysis is unaffected by whether or not an EA or an EIS is used. An EIS is triggered when scoping or the subsequent analysis indicates the proposed action may have a significant effect on the human environment. No EIS is necessary as the project was determined to have no significant effects.

Comments were received from the following before the comment period ended:

Gianella Edelen	Sarah Mincey	Alice J. Andrews	SE Corrigan
David Wilson et al	Andy/Linda Mahler	Dale R. Brister	David C Anderson
Martin Steitz	Jimmy Witherington	Tom McKinney 1	Martha Burton
Mike Faupel	Terri Green	Gabe Timby	Becky Reimbold
Jeanmarie Mako	Justin Peterson	Jonna Hussey	Josh Jackson
Alice B. Andrews 2	Craig Rhodes	Sam Sneed 3	Tonya McCray
A. J. Riggs 4	John Weber	Linden Blaisus	Ryan Camp
William Beaver	Niko Hartmann	Angela Timby	Dana Kuhnline
Laura Timby 2	Joseph McGibbon	Ainslie Gilligan 2	Danny Seltzer
Barry Weaver 5	Lucille Bertuccio	David Wilson 6	Paul Schneller
Shown Porter 5	Tony Jones	Joseph Cross	Ruben Ryan
Peter Yencsik	Aaron Brooks	Stephen Grimes	Mary Hood
Stefanie Spear	Carol Westerman-Jones	Berry Seth	Kim Kost
Ruben Ryan	Charles Phillips	Lester Peyton	Larry Gillen
Jnet Keating	Robert Rutlowski	Dinda Evans	Melody Scherubel
Shawn Waggener	Steve Witwer	Eileen Rice	Gail Gillis
Lauryn Slotnick	Peter Slavin	Siri Larson	Greg Moore
Richard Scherubel	Garret Adams	Mike Englert	Charlotte Noss
Billy Stern	Louise Mann	Amy Drake	Eric Hoyer
Carolyn Moon	Joel Kimmons	Meghan Reef	Richard Spotts
Gregory Buck	Leigh Haynie	Carol Showalter	Ellen Veazey
Lief Hagglund	Becky Ceartas	Robert Fener	Eric W. Morris
Susan Heitker	Lee Garver	Mke Cartwright 4	

1- Seirrra Club
2- Ozark Society
3- Rocky Mountain Elk Foundation
4- Arkansas Game and Fish
5- Newton County Wildlife Association
6- National Wild Turkey Federation

Comments were received from the following after the comment period, but were still addressed:

Nathaniel Nehus – Arkansas Department of Environmental Quality
Martin Maner, P. E. - Arkansas Department of Environmental Quality
David Timby
Angela Timby (second letter)